

**United States Department of the Interior
Bureau of Land Management**

**Environmental Assessment
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**San Rafael Desert Master Leasing Plan
and
Draft Resource Management Plan Amendments/
Draft Environmental Assessment**

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The Bureau of Land Management

- Our Vision** To enhance the quality of life for all citizens through the balanced stewardship of America's public lands and resources.
- Our Mission** To sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.
- Our Values** To serve with honesty, integrity, accountability, respect, courage, and commitment to make a difference.
- Our Priorities** To improve the health and productivity of the lands to support the BLM multiple use mission.
- To cultivate community-based conservation, citizen-centered stewardship, and partnership through consultation, cooperation, and communication.
- To respect, value, and support our employees, giving them resources and opportunities to succeed.
- To pursue excellence in business practices, improve accountability to our stakeholders, and deliver better service to our customer.

On the Cover:

CONTENTS

CHAPTER 1— Introduction, Purpose and Need	1-1
1.1 Introduction.....	1-1
1.2 Purpose	1-3
1.3 Need	1-3
1.4 Issues	1-3
1.5 Issues Considered but not Analyzed in Detail	1-6
1.6 Planning Criteria	1-7
1.7 Relationship to Other Policies, Plans, and Programs	1-8
CHAPTER 2— Alternatives	2-1
2.1 Introduction.....	2-1
2.2 Description of the Alternatives	2-1
2.3 Alternatives Considered but not Analyzed in Detail	2-3
2.4 Alternatives Tables.....	2-4
CHAPTER 3— Affected Environment	3-1
3.1 Introduction.....	3-1
3.2 Air Quality	3-1
3.3 Climate Change.....	3-10
3.4 Soil Resources.....	3-14
3.5 Water Resources	3-16
3.6 Vegetation.....	3-22
3.7 Cultural Resources	3-32
3.8 Paleontological Resources	3-44
3.9 Visual Resources and Night Skies	3-47
3.10 Auditory Management (Soundscapes).....	3-50
3.11 Special Status Species	3-54
3.12 Wildlife and Fisheries	3-74
3.13 Lands with Wilderness Characteristics.....	3-84
3.14 Recreation	3-90
3.15 Oil and Gas Resources.....	3-99
3.16 Special Designations	3-103
3.17 Socioeconomics	3-108
3.18 Health and Safety	3-1
CHAPTER 4— Environmental Consequences	4-1
4.1 Introduction.....	4-1
4.2 Air Quality	4-4
4.3 Climate Change.....	4-14
4.4 Soil Resources.....	4-21
4.5 Water Resources	4-31
4.6 Vegetation.....	4-45

4.7	Cultural Resources	4-56
4.8	Paleontological Resources	4-60
4.9	Visual Resources and Night Skies	4-64
4.10	Auditory Management (Soundscapes).....	4-73
4.11	Special Status Species	4-81
4.12	Wildlife and Fisheries	4-97
4.13	Lands with Wilderness Characteristics.....	4-112
4.14	Recreation	4-126
4.15	Oil and Gas Resources.....	4-149
4.16	Special Designations	4-158
4.17	Socioeconomics	4-163
4.18	Health and Safety	4-163
4.19	Cumulative Impacts.....	4-166
CHAPTER 5— Consultation and Coordination.....		5-1
5.1	Introduction.....	5-1
5.2	Consultation and Coordination	5-1
5.1	Public Outreach and Participation.....	5-3
5.3	List of Preparers	5-4
CHAPTER 6— References		6-1

APPENDICES

Appendix A.	Reasonably Foreseeable Development Scenario for Oil and Gas in the San Rafael Desert Master Leasing Plan Area.
Appendix B.	Oil and Gas Lease Stipulations and Notices
Appendix C.	Best Management Practices for Alternatives B, C, and D
Appendix D.	Stipulations on Suspended Leases
Appendix E.	Best Management Practices for Alternative A

FIGURES

Figure 3-1.	Global GHG emissions by gas, 1990–2010.	3-11
Figure 3-2.	Greenhouse gas emissions in the United States from 1990 through 2010. Source: EPA (2016k).	3-12
Figure 3-3.	Seasonally Adjusted Unemployment Rates, Emery County, 2009–2016.....	3-117
Figure 3-4.	Seasonally Adjusted Unemployment Rates, Wayne County, 2009–2016	3-117

MAPS

Map 1-1.	San Rafael Desert Master Leasing Plan Planning Area
Map 2-1.	Lands with Wilderness Characteristics
Map 2-2-A.	Oil and Gas Leasing Categories (Alt A)
Map 2-2-B.	Oil and Gas Leasing Categories (Alt B)
Map 2-2-C.	Oil and Gas Leasing Categories (Alt C)
Map 2-2-D.	Oil and Gas Leasing Categories (Alt D)
Map 2-3.	Three Rivers Locatable Mineral Withdrawal
Map 2-4.	Paleontological Resources
Map 2-5.	Special Designations and Special Recreation Management Areas
Map 2-6.	Recreation Focus Areas and Canyon Rims
Map 2-7.	Key Observation Points
Map 2-8-B.	Travel Corridors (Alt B)
Map 2-8-D.	Travel Corridors (Alt D)
Map 2-9.	Soil Resources
Map 2-10.	Steep Slopes
Map 2-11.	Water Resources
Map 2-12.	Special Status Animal Species
Map 2-13.	Special Status Plant Species
Map 2-14.	Visual Resources
Map 2-15.	Pronghorn Habitat
Map 3-1.	Subwatersheds crossed by the Planning Area
Map 3-2.	Land Cover Types
Map 3-3.	Visual Resource Inventory
Map 3-4.	Mule Deer and Bighorn Sheep Habitat
Map 3-5.	Lands with Wilderness Characteristics Groups for Analysis
Map 3-6.	Recreation Opportunity Spectrum

TABLES

Table 2-1.	Air Quality	2-6
Table 2-2.	Cultural Resources	2-10
Table 2-3.	Lands with Wilderness Characteristics	2-12
Table 2-4.	Oil and Gas	2-13
Table 2-5.	Paleontology	2-15
Table 2-6.	Recreation	2-16
Table 2-7.	Special Designations.....	2-22
Table 2-8.	Soil and Water Resources	2-25
Table 2-9.	Special Status Species	2-30
Table 2-10.	Vegetation.....	2-35
Table 2-11.	Visual Resources Management/Auditory Management (Soundscapes)	2-36
Table 2-12.	Wildlife and Fisheries.....	2-38
Table 3-1.	Landownership and Land Management in the Planning Area	3-1
Table 3-2.	National Ambient Air Quality Standards.....	3-2
Table 3-3.	2014 Criteria Pollutant Emissions in Emery and Wayne Counties by Source	3-4
Table 3-4.	O ₃ Concentrations in Canyonlands National Park, 2009–2015.....	3-5

Table 3-5.	2014 HAP Emissions in Emery County (greater than 0.5 tpy)	3-6
Table 3-6.	IMPROVE Visibility Data on the Hazyest and Clearest Days in Canyonlands and Capitol Reef National Parks, 2009–2015.....	3-8
Table 3-7.	NDAP Wet Deposition Data for Canyonlands National Park, 2009–2015.....	3-9
Table 3-8.	CASTNet Dry Deposition Data for Canyonlands National Park, 2009–2014	3-10
Table 3-9.	Utah GHG Emissions by Sector.....	3-13
Table 3-10.	Named Streams within the Analysis Area	3-18
Table 3-11.	Land Cover Types in the Vegetation Analysis Area	3-23
Table 3-12.	Designated Noxious Weeds in Utah.....	3-29
Table 3-13.	Prehistoric Site or Component Types in the Analysis Area*.....	3-37
Table 3-14.	Prehistoric Sites or Components in the Analysis Area by Time Period	3-38
Table 3-15.	Historic Site Types in the Analysis Area.....	3-38
Table 3-16.	Historic Themes in the Analysis Area	3-39
Table 3-17.	General Land Office Maps Covering the Analysis Area	3-41
Table 3-18.	Abandoned Wells in the Analysis Area.....	3-42
Table 3-19.	Potential Fossil Yield Classification Designations within the Planning Area	3-46
Table 3-20.	Visual Resource Management Class Acreage Distribution in the Planning Area.....	3-48
Table 3-21.	Visual Resource Inventory Class Acreage Distribution in the Planning Area.....	3-49
Table 3-22.	Perceived Change in Decibel Levels	3-51
Table 3-23.	Sound Levels for Common Noise Sources	3-51
Table 3-24.	Noise Levels Associated with Oil and Gas Sources.....	3-52
Table 3-25.	BLM Sensitive Plant Species that May Occur in the Planning Area.....	3-58
Table 3-26.	BLM Sensitive Wildlife Species that May Occur in the Planning Area.....	3-70
Table 3-27.	Mule Deer Habitat	3-76
Table 3-28.	Pronghorn Habitat	3-77
Table 3-29.	Bighorn Sheep Habitat.....	3-77
Table 3-30.	BCC Region 16 and Utah PIF High-Priority Species That May Occur in Planning Area	3-79
Table 3-31.	Lands with Wilderness Characteristics Units in the Planning Area	3-86
Table 3-32.	Off-Highway Vehicle Registrations in Emery and Wayne Counties from 2012 to 2016.....	3-97
Table 3-33.	Visitor Data for the Maze District of Canyonlands National Park.....	3-98
Table 3-34.	Visitor Use Data for Labyrinth Canyon.....	3-98
Table 3-35.	Current Oil and Gas Leasing Categories for BLM-Administered Public Lands in the Planning Area.....	3-101
Table 3-36.	Areas of Critical Environmental Concern in the Planning Area	3-104
Table 3-37.	Land Management in the Study Area	3-110
Table 3-38.	2010 Population, Area, and Population Density of the Study Area	3-110
Table 3-39.	Income Levels in the Socioeconomic Study Area, 2009–2014 (2014 \$).....	3-111
Table 3-40.	Environmental Justice Indicators, Minority Population, 2010 Census and 2009–2015 ACS	3-115
Table 3-41.	Emery County Employment by Industry, 2001–2015	3-118
Table 3-42.	Wayne County Employment by Industry, 2001–2015	3-119
Table 3-43.	Emery County Earnings by Industry, 2001–2015 (1,000s of 2015 \$).....	3-121
Table 3-44.	Wayne County Earnings by Industry, 2001–2015 (1,000s of 2015 \$)	3-122
Table 3-45.	Emery County Employment and Wages by Industry, 2015 (2015 \$).....	3-123
Table 3-46.	Wayne County Employment and Wages by Industry, 2015 (2015 \$).....	3-124
Table 3-47.	Components of Personal Income, Emery County, 1970–2015 (1,000s of 2015 \$).....	3-125

Table 3-48.	Components of Personal Income, Wayne County, 1970–2015 (1,000s of 2015 \$)	3-126
Table 3-49.	Components of Non-Labor Income, 2015, Percent of Total Personal Income	3-126
Table 3-50.	Tourism Spending, Employment, and Tax Revenue for Emery and Wayne Counties and State of Utah, 2015	3-131
Table 3-51.	Economic Impacts of MLP BLM Public Land Recreation, Day Use Market Segment, 2011	3-132
Table 3-52.	Economic Impacts of MLP BLM Public Land Recreation, Non-Local Camping Market Segment, 2011	3-132
Table 3-53.	Economic Impacts of MLP BLM Public Land Recreation, Non-Local Lodging Market Segment, 2011	3-133
Table 3-54.	Recreation Consumer Surplus Values per Person per Day by Activity and Region (2010 \$).....	3-134
Table 4-1.	Types of Impacts	4-1
Table 4-2.	Projected Oil and Gas Development and Surface Disturbance on Bureau of Land Management–Administered Public Lands by Alternative (over the next 15 years).....	4-3
Table 4-3.	Emissions from Projected Oil and Gas Development in the Planning Area	4-5
Table 4-4.	Direct GHG Emissions from Projected Oil and Gas Development in the Planning Area	4-15
Table 4-5.	Indirect GHG Emissions from Projected Oil and Gas Development in the Planning Area	4-16
Table 4-6.	Sensitive Soils by Oil and Gas Leasing Category in Alternative A	4-22
Table 4-7.	Sensitive Soils by Oil and Gas Leasing Category in Alternative B.....	4-25
Table 4-8.	Sensitive Soils by Oil and Gas Leasing Category in Alternative C.....	4-27
Table 4-9.	Sensitive Soils by Oil and Gas Leasing Category in Alternative D	4-30
Table 4-10.	Land Cover Types by Oil and Gas Leasing Category under Alternative A.....	4-47
Table 4-11.	Land Cover Types by Oil and Gas Leasing Category under Alternative B	4-50
Table 4-12.	Land Cover Types by Oil and Gas Leasing Category under Alternative C	4-52
Table 4-13.	Land Cover Types by Oil and Gas Leasing Category in Alternative D	4-55
Table 4-14.	Probability for the Occurrence of Cultural Sites	4-57
Table 4-15.	Probability for the Occurrence of Cultural Sites by Alternative and Oil and Gas Leasing Category.....	4-58
Table 4-16.	Oil and Gas Leasing Categories by PFYC under Alternative A	4-60
Table 4-17.	Oil and Gas Leasing Categories by PFYC under Alternative B	4-62
Table 4-18.	Oil and Gas Leasing Categories by PFYC under Alternative C	4-62
Table 4-19.	Oil and Gas Leasing Categories by PFYC under Alternative D	4-63
Table 4-20.	Oil and Gas Leasing Categories by VRI Class under Alternative A	4-65
Table 4-21.	Oil and Gas Leasing Categories by VRM Class under Alternative A.....	4-65
Table 4-22.	Oil and Gas Leasing Categories by VRI Class under Alternative B	4-67
Table 4-23.	Oil and Gas Leasing Categories by VRM Class under Alternative B	4-67
Table 4-24.	Oil and Gas Leasing Categories by VRI Class under Alternative C	4-69
Table 4-25.	Oil and Gas Leasing Categories by VRM Class under Alternative C	4-69
Table 4-26.	Oil and Gas Leasing Categories by VRI Class under Alternative D.....	4-71
Table 4-27.	Oil and Gas Leasing Categories by VRM Class under Alternative D.....	4-71
Table 4-28.	Special Status Species Habitat by Oil and Gas Leasing Category in All Alternatives	4-83
Table 4-29.	Wildlife Habitats by Oil and Gas Leasing Category under Alternatives A through D.....	4-99
Table 4-30.	LWC Groups by Oil and Gas Leasing Category under Alternative A	4-113
Table 4-31.	LWC Groups by Oil and Gas Leasing Category under Alternative B.....	4-116
Table 4-32.	LWC Groups by Oil and Gas Leasing Category under Alternative C.....	4-118

Table 4-33.	LWC Groups by Oil and Gas Leasing Category under Alternative D	4-123
Table 4-34.	Oil and Gas Leasing Categories in the Dirty Devil/Robbers Roost SRMA in the Planning Area (all alternatives).....	4-127
Table 4-35.	Oil and Gas Leasing Categories in the Labyrinth Canyon SRMA in the Planning Area (all alternatives)	4-128
Table 4-36.	Oil and Gas Leasing Categories for ROS Classes in the Labyrinth Canyon SRMA in the Planning Area (all alternatives)	4-129
Table 4-37.	Oil and Gas Leasing Categories in the Recreation Focus Areas (all alternatives)	4-132
Table 4-38.	Projected Oil and Gas Development and Surface Disturbance on Bureau of Land Management Lands (over the next 15 years)	4-151
Table 4-39.	Oil and Gas Leasing Categories under Each Alternative.....	4-153
Table 4-40.	ACECs by Mineral Leasing Category	4-158
Table 5-1.	Native American Tribes Contacted for Consultation	5-2
Table 5-2.	Bureau of Land Management Preparers	5-5
Table 5-3.	Non-Bureau of Land Management Preparers (SWCA Environmental Consultants)	5-6

CHAPTER 1—INTRODUCTION, PURPOSE AND NEED

1.1 INTRODUCTION

The San Rafael Desert Master Leasing Plan and Draft Resource Management Plan Amendments/Draft Environmental Assessment (referred to hereafter as the MLP/EA) has been prepared by the United States Department of the Interior, Bureau of Land Management (BLM) Price and Richfield Field Offices.

The amendments to the Price and Richfield Field Offices' records of decision and resource management plans (referred hereafter as the ROD/RMPs) (BLM 2008a, 2008b) are focused exclusively on management decisions pertaining to oil and gas resources in the planning area. Due to the limited focus of this planning effort, decisions for other resources that would normally be considered in a full RMP revision are not addressed.

The planning area is located in Emery and Wayne Counties in Utah and encompasses approximately 525,000 acres of public land primarily located south of Interstate 70 and east of State Route 24. The eastern boundary of the planning area is generally the Green River. A small portion of the planning area is located north of Interstate 70, west of the city of Green River, Utah, and east of the San Rafael Swell. U.S. Highway 6 crosses this part of the planning area (Map 1-1).

This MLP/EA is being prepared to implement new oil and gas leasing policy, to resolve long-standing lease protests, and to complete supplemental analyses required under the National Environmental Policy Act (NEPA) for leases that were placed in suspension because of litigation. Since the completion of the Price and Richfield Field Offices' ROD/RMPs in 2008 (BLM 2008a, 2008b), the BLM has also collected new information relevant to this analysis. Additional information regarding oil and gas leasing policy and lease issues in the planning area and new information that has been collected since completion of the Price and Richfield Field Offices' ROD/RMPs are included in the sections below.

1.1.1 Updated Policy

On May 17, 2010, the BLM Washington Office (WO) issued Instruction Memorandum (IM) No. 2010-117: Oil and Gas Leasing Reform – Land Use Planning and Lease Parcel Reviews (BLM 2010a). Subsequently, in January 28, 2013, guidance included in IM 2010-117 was incorporated into BLM Handbook (H) 1624-1 – *Planning for Fluid Mineral Resources* (BLM 2013). As part of its oil and gas leasing reform policy, the BLM introduced the MLP concept. MLPs provide a mechanism for completing additional planning, analysis, and decision-making in areas that meet certain criteria. The preparation of an MLP is required when the following criteria are met:

1. A substantial portion of the area to be analyzed in the MLP is not currently leased.
2. There is a majority of federal mineral interest.
3. The oil and gas industry has expressed a specific interest in leasing, and there is a moderate or high potential for oil and gas confirmed by the discovery of oil and gas in the general area.
4. Additional analysis or information is needed to address likely resource or cumulative impacts if oil and gas development were to occur where there are multiple-use or natural and cultural resource conflicts; impacts to air quality; impacts to the resources or values of any unit of the National Park Service system, a national wildlife refuge, or a National Forest System wilderness area, as determined after consultation or coordination with the National Park Service, the U.S. Fish and Wildlife Service, or the U.S. Forest Service; or impacts to other specially designated areas.

In addition to the abovementioned criteria, the BLM's leasing reform policy states that MLPs may be completed under other circumstances at the State Director's discretion.

1 Following issuance of IM No. 2010-117 (BLM 2010a), the BLM Utah State Office was asked to develop
2 a leasing reform implementation plan. In February 2011, the BLM Director approved the BLM Utah State
3 Office’s leasing reform implementation plan, which included a commitment to complete five MLPs,
4 including one for an area referred to at the time as the “San Rafael River.” Subsequently, in August 2015,
5 the BLM changed the name of the project area to the “San Rafael Desert” to more accurately describe
6 public lands in the planning area.

7 The planning area meets most of the criteria for preparation of an MLP, but it does not fully meet
8 criterion 3 listed above. Although there are existing leases and although the oil and gas industry has
9 expressed a specific interest in additional leasing, there has been no discovery of oil and gas resources.
10 Nevertheless, the State Director has determined that completion of an MLP in the area is appropriate,
11 primarily because of long-standing lease issues that must be resolved in the planning area.

12 **1.1.2 Protested and Suspended Leases**

13 Of particular importance in this planning process is the resolution of 16 protested and suspended oil and
14 gas leases in the SRD MLP planning area.

15 On August 1, 2006, the United States District Court of Utah issued a ruling in *Southern Utah Wilderness*
16 *Alliance* [SUWA] *v. Norton* [BLM] (2:04CV574). In that ruling, the court reversed and remanded the
17 BLM’s decision to lease 16 parcels included in the November 2003 competitive oil and gas lease sale.
18 The court ruled that the BLM violated NEPA by failing to consider significant new information on
19 wilderness characteristics before leasing.

20 Pending before the courts were two additional lawsuits, *SUWA et al. v. Lynn Scarlett* [BLM] (2:06-cv-
21 0342) and *SUWA et al. v. Dirk Kempthorne* [BLM] (2:08-cv-0064) that presented similar legal and factual
22 issues to those addressed by the court in *SUWA v. Norton*. Because these cases were similar, the BLM
23 decided to suspend the contested leases involved in the pending cases and motioned that the court remand
24 the decisions back to the agency for further consideration. The court agreed to the BLM’s motion. All
25 suspended leases located in the SRD MLP planning area were part of these two lawsuits. Before allowing
26 any action on these leases, the BLM must conduct supplemental NEPA analysis. Following the NEPA
27 analysis, the BLM will issue a new decision on each lease and may cancel or modify the leases or lift the
28 lease suspensions.

29 In addition to the aforementioned suspended leases, the SRD MLP planning area includes several lease
30 parcels that were sold at the February and May 2006 lease sales but never issued. These leases, which
31 were sold just prior to the *SUWA v. Norton* decision, were protested because the BLM did not consider
32 information on wilderness characteristics before leasing. The BLM has not resolved all of the lease
33 protests.

34 The BLM’s *Land Use Planning Handbook* (H-1601-1) (BLM 2005) gives the agency discretion to use a
35 single land use planning and NEPA process to make both land use planning and implementation
36 decisions, provided that both types of decisions are adequately addressed with the appropriate level of
37 NEPA analysis. In addition to a land use planning–level analysis, this EA includes a site-specific analysis
38 of the impacts of oil and gas leasing in areas where there are suspended and protested leases. Completion
39 of this EA will fulfill the BLM’s obligations to conduct supplemental NEPA analysis for all leases in
40 question. Implementation decisions regarding the protested and suspended leases will be made at the
41 same time the BLM decides whether to amend the Price and Richfield Field Offices’ ROD/RMPs. The
42 BLM will clearly distinguish which decisions are implementation decisions.

43 Implementation-level decisions in this EA will be appealable for 30 days after a decision record (DR) is
44 signed. Planning decisions will be made in accordance with the BLM’s planning regulations in 43 Code
45 of Federal Regulations (CFR) 1600. Before land use planning decisions are finalized and selected, they
46 must be presented to the public as proposed decisions that can be protested with the BLM Director.

1 **1.1.3 New Information**

2 Since the Price and Richfield Field Offices' ROD/RMPs were completed in 2008 (BLM 2008a, 2008b),
3 the following new information has been identified for consideration in the MLP/EA process:

- 4 • A planning area-wide wilderness characteristics inventory
- 5 • A cultural resources inventory, viewshed analysis, and historic setting analysis for the Old
6 Spanish National Historic Trail
- 7 • Pronghorn habitat data from the Utah Division of Wildlife Resources
- 8 • Visual resource inventories for the Price and Richfield Field Offices
- 9 • Reasonably foreseeable development scenario for oil and gas resources (Appendix A)
- 10 • Recreation and cultural resources inventory data

11 **1.2 PURPOSE**

12 The MLP/EA process will provide additional planning and analysis prior to new leasing of oil and gas
13 within the planning area. The MLP/EA will enable the Price and Richfield Field Offices to 1) resolve
14 long-standing lease protests relating to parcels of land for which the BLM received lease offers subject to
15 protest but for which the BLM has not issued leases in the planning area; 2) determine whether the BLM
16 should cancel, modify, or lift the suspensions on suspended leases in the planning area; 3) evaluate
17 potential development scenarios; 4) identify and address potential resource conflicts and environmental
18 impacts from development; 5) create oil and gas development mitigation strategies; and 6) consider a
19 range of new conditions, including prohibiting surface occupancy or closing certain areas to leasing.

20 **1.3 NEED**

21 The BLM introduced MLPs as part of its 2010 Oil and Gas Leasing Reform effort (IM No. 2010-117)
22 (BLM 2010a). These reforms have been incorporated into and supplemented in various BLM handbooks,
23 including H-1624-1 BLM 2013. In response to this policy, the State Director has determined that
24 additional planning and analysis are warranted prior to allowing new mineral leasing and development.
25 Furthermore, the MLP is needed to resolve long-standing lease protests from the February and May 2006
26 lease sale, and to complete supplemental NEPA for leases that were placed in suspension in 2005 and
27 2006 because of litigation.

28 **1.4 ISSUES**

29 Public scoping began with the publication of the notice of intent in the *Federal Register* on May 19, 2016.
30 The scoping period included two public scoping meetings held in Green River and Castle Dale, Utah. The
31 formal scoping period ended on July 1, 2016. During the scoping process, the BLM received
32 approximately 350 comments that were extracted from approximately 20 unique comment submissions.
33 In addition, the BLM received multiple form letters.

34 Listed below are issues that were identified during scoping. Issues are organized by resource topic, and
35 similar issues are grouped together where possible.

36 **1.4.1 Air Quality**

- 37 • How would the MLP address emissions and pollutants affecting air quality resulting from oil and
38 gas development?

- 1 • What mitigation measures and design features would be implemented to address potential impacts
2 to air quality or air quality–related values?
- 3 • What would be the effect of oil and gas activities on ozone formation in the region?
- 4 • How would the MLP address fugitive dust and dust suppression associated with mineral
5 operations?
- 6 • How would the MLP address contributions from fugitive dust on early snowmelt?

7 **1.4.2 Climate Change**

- 8 • What direct and indirect greenhouse gas emissions would be associated with oil and gas
9 development in the MLP area?
- 10 • What design features and technologies would be necessary to minimize contributions to
11 greenhouse gas emissions and climate change?
- 12 • How would climate change, in conjunction with any planned leasing and development,
13 cumulatively effect vegetation, wildlife, and other resources in the MLP area?

14 **1.4.3 Soil Resources**

- 15 • What stipulations should be applied to mineral leasing to protect steep slopes?
- 16 • How would the BLM prevent erosion in areas where sand dunes are held intact by native grasses?
- 17 • How should the MLP/EA address soils, sensitive soils, and biological soil crusts?

18 **1.4.4 Water Resources**

- 19 • What stipulations would be applied to oil and gas leasing in order to protect aquifers, wetlands,
20 springs, seeps, rivers, streams, and riparian areas?
- 21 • How would the MLP identify and address surface water quality and impaired or threatened water
22 body segments?
- 23 • Would the MLP require a water management plan and water monitoring plan for mineral projects
24 to protect nearby water uses?
- 25 • How would the MLP address the effect of sedimentation from mineral development on surface
26 water quality?
- 27 • How would the MLP mitigate potential significant impacts to water resources including those
28 impacts associated with drilling and production; potential spills; and leaks from pits, evaporation
29 ponds, and pipelines?
- 30 • What BMPs would be developed to protect stream crossings and ephemeral washes?

31 **1.4.5 Vegetation**

- 32 • How would the MLP address the control of noxious weeds and invasive species?
- 33 • How would native grasslands be protected from oil and gas development?

34 **1.4.6 Cultural Resources**

- 35 • How would the MLP protect important historic and cultural sites, including Paleoindian sites in
36 the planning area?

1 **1.4.7 Paleontological Resources**

- 2 • What type of paleontological survey would be required to determine if resources exist where oil
3 and gas development is permitted?

4 **1.4.8 Wilderness Characteristics**

- 5 • How would mineral leasing and development impact lands with wilderness characteristics?
6 • What management actions and/or stipulations would be needed to reduce or eliminate impacts to
7 lands with wilderness characteristics from mineral development?

8 **1.4.9 Visual Resources, Night Skies, Auditory Management**

- 9 • How would important viewsheds from the Horseshoe Canyon unit of Canyonlands National Park
10 be protected?
11 • How would important viewsheds from the Green River be protected?
12 • How would important viewsheds along the Green River Labyrinth Canyon rim be protected?
13 • How would the BLM utilize up-to-date visual resource inventories?
14 • What mitigation measures would be developed in order to minimize impacts to the visual quality
15 of the area from mineral leasing and development?
16 • What provisions would be developed to minimize noise levels associated with mineral
17 development near the Horseshoe Canyon unit of Canyonlands National Park and Labyrinth
18 Canyon?
19 • How would ambient noise impact visitors on public lands and wildlife?
20 • What mitigation measures would be developed to minimize impacts to night skies?

21 **1.4.10 Special Status Species**

- 22 • How would the MLP address impacts to migratory birds and their habitats?
23 • How would the MLP protect special status species?
24 • How would the MLP provide protections to areas such as springs, riparian areas, and wetlands
25 that provide habitat to special status species?
26 • What surveys would be considered for protection of special status species prior to mineral
27 activities?

28 **1.4.11 Wildlife and Fisheries**

- 29 • How would the MLP protect native and endemic bees and bee habitat from oil and gas
30 development?
31 • How would the MLP protect crucial pronghorn habitat?
32 • What lease stipulations and BMPs for oil and gas would be developed to provide the necessary
33 protections for fish and wildlife habitat?
34 • What surveys would be considered for the protection of wildlife species prior to mineral
35 activities?

1 **1.4.12 Recreation**

- 2 • How would mineral leasing and development impact recreation resources and experiences?
- 3 • What protections would be applied to overlooks and viewsheds associated with recreation
- 4 experiences?
- 5 • How would the MLP protect roads, trails, and sites that support hiking, biking, boating, off-
- 6 highway vehicle use, camping, equestrian use, and rock climbing from mineral development?
- 7 • How should recreation areas adjacent to the Horseshoe Canyon unit of Canyonlands National
- 8 Park be protected?
- 9 • How should recreation opportunities and experiences in Labyrinth Canyon be protected?
- 10 • How should special recreation management areas (SRMAs) designated in the Price and Richfield
- 11 Field Offices' ROD/RMPs (BLM 2008a, 2008b) be protected?
- 12 • How should recreation areas that are outside of the SRMAs be protected?

13 **1.4.13 Oil and Gas**

- 14 • What areas would be available for oil and gas leasing and development, and what restrictions and
- 15 BMPs would be imposed to protect resource values?

16 **1.4.14 Special Designations**

- 17 • How would mineral leasing decisions impact areas with special designations?
- 18 • What restrictions or stipulations would be placed on mineral development to provide the
- 19 necessary protections for designated areas of critical environmental concern (ACECs), the Green
- 20 River suitable wild and scenic river segment, and the Old Spanish National Historic Trail?
- 21 • How would the BLM address the protection of the Old Spanish National Historic Trail segment
- 22 located within the planning area?

23 **1.4.15 Socioeconomics**

- 24 • What are the potential impacts associated with mineral development to the local communities,
- 25 including impact to jobs, tax revenues, and personal incomes?
- 26 • What are the economic impacts of natural resources extraction relative to the economic impacts
- 27 of outdoor recreation and tourism?

28 **1.5 ISSUES CONSIDERED BUT NOT ANALYZED IN DETAIL**

29 During the public scoping period, interested members of the public recommended that the BLM consider
30 the establishment of new ACECs, wild and scenic rivers, and SRMAs, and consider whether certain areas
31 warrant the protection of their wilderness characteristics. As previously mentioned, this plan amendment
32 is focused exclusively on oil and gas resources and will not include decisions regarding new designations
33 or whether lands inventoried by the BLM as having wilderness characteristics should be managed to
34 protect, preserve, and maintain these characteristics.

35 During scoping, the BLM determined that there are a number of public land resources and BLM program
36 areas that would not be impacted to the extent that detailed analysis is required. For example, given the
37 types of vegetation present in the planning area, oil and gas leasing decisions would have no impact on
38 fire and fuels management or forestry and woodland products.

1 Oil and gas leasing and development has the potential to impact other resource uses; however, because
2 the projected amount of development is low (see Appendix A), the BLM does not anticipate that potential
3 changes in oil and gas management would have a measureable impact on travel management, existing or
4 future lands and realty authorizations, or livestock grazing operations. In addition, conflicts with the
5 extraction of locatable, salable, and other leasable mineral resources are not expected because there is
6 generally low occurrence and development potential for other mineral resources in the planning area.

7 The planning area includes portions of the Robbers Roost wild horse herd area. The Price Field Office
8 RMP, completed in 2008, set the appropriate management level for this herd area at zero. Currently, there
9 are approximately 30 horses in the herd area. Given the large size of the herd area, the small size of the
10 population, and the low level of expected development, the BLM has determined that potential oil and gas
11 leasing would not impact wild horses to an extent that detailed analysis is required.

12 Finally, although the potential for impacts to lands with wilderness characteristics is one of the primary
13 issues addressed in this analysis, impacts to wilderness study areas (WSAs) are not addressed in the direct
14 and indirect impacts analysis because there are no WSAs in the SRD MLP planning area. Impacts to
15 WSAs that are outside of the planning area but contiguous with lands with wilderness characteristics that
16 are in the planning area, are discussed in the cumulative impacts section.

17 **1.6 PLANNING CRITERIA**

18 Planning criteria are based on appropriate laws, regulations, BLM Manual sections, and policy directives,
19 as well as on public participation and coordination with cooperating agencies, other federal agencies, state
20 and local governments, and Native American tribes. Planning criteria are the standards, rules, and factors
21 used to resolve issues and develop alternatives. Planning criteria are prepared to ensure that decision-
22 making is tailored to the issues and to ensure that the BLM avoids unnecessary data collection and
23 analysis. Planning criteria are also developed to guide the development of alternatives. The planning
24 criteria to be considered in the development of the MLP/EA are as follows:

- 25 1. Limit the scope to RMP decisions pertaining to oil and gas leasing and post-leasing development
26 of the area
- 27 2. Resolve long-standing lease protests and decide whether to cancel, modify, or lift the suspension
28 on suspended leases in the planning area
- 29 3. Recognize valid existing rights
- 30 4. Address only management of public lands (including federal mineral estate under non-federal
31 surface in a “split estate” situation)
- 32 5. Use a collaborative, multi-jurisdictional approach to determine how mineral leasing will be
33 managed
- 34 6. Ensure that its management decisions are as consistent as possible with local, state, and other
35 federal agency plans
- 36 7. Prepare development scenarios for oil and gas resources based on historical, existing, and
37 projected levels of development
- 38 8. Consider a range of alternatives that focus on mitigating the impacts of development on resources
39 that are of concern
- 40 9. Address the socioeconomic impacts of the alternatives
- 41 10. Use the best available scientific information and inventory and monitoring information to
42 determine appropriate decisions for oil and gas leasing

1 **1.7 Relationship to Other Policies, Plans, and Programs**

2 The SRD MLP is being prepared to comply with IM No. 2010-117 (BLM 2010a) and with H-1624-1
3 (BLM 2013) Chapter V, Master Leasing Plans, as well as other BLM policy directives.

4 The Federal Land Policy and Management Act (FLPMA) Title II, Section 202, requires that the BLM
5 coordinate planning efforts with Native American tribes, other federal agencies, and state and local
6 governments. To accomplish this directive, the BLM has invited other federal, state, and local agencies to
7 participate as cooperating agencies in this planning process. The BLM has also consulted with Native
8 American tribes. FLPMA and the planning regulations require that BLM plans be consistent with
9 approved or adopted plans of other federal, state, and local governments to the extent that those plans are
10 consistent with federal law and regulations applicable to the public lands. In keeping with the above
11 mandates, the Price and Richfield Field Offices have asked cooperating agencies and Native American
12 tribes to review the MLP/EA and inform the agency of any inconsistencies. Potentially relevant plans
13 include the following:

- 14 • Emery County General Plan (revised 2012)
- 15 • Draft Wayne County Resource Management Plan (2017)
- 16 • Canyonlands National Park Resource Management Plan (1996)
- 17 • Canyonlands National Park General Management Plan (1979)
- 18 • Canyonlands National Park Backcountry Management Plan (1984, 1995)
- 19 • Canyonlands Wilderness Recommendation (1974)
- 20 • Colorado Pikeminnow Recovery Plan (2002)
- 21 • Humpback Chub Recovery Plan (2002)
- 22 • Bonytail Chub Recovery Plan (2002)
- 23 • Recovery Implementation Program Environmental Assessment (EA) for the Endangered Fish
24 Species in the Upper Colorado River Basin (1987)
- 25 • Mexican Spotted Owl Recovery Plan (2012)
- 26 • Razorback Sucker Recovery Plan (2002)
- 27 • Final Recovery Plan for Southwestern Willow Flycatcher (2002)
- 28 • Wright Fishhook Cactus Recovery Plan (1985)
- 29 • Recovery Plan for the California Condor (1996)
- 30 • Final Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States
31 Programmatic EIS and associated ROD (2007)

CHAPTER 2—ALTERNATIVES

2.1 INTRODUCTION

This chapter presents four alternatives for managing oil and gas leasing and development for Bureau of Land Management (BLM)-administered lands and minerals in the San Rafael Desert (SRD) Master Leasing Plan (MLP) planning area.

Under each alternative, the BLM has identified leasing stipulations, lease notices, oil and gas leasing decisions, and best management practices (BMP). The BLM developed these alternatives to respond to issues raised during the public scoping process (presented in Chapter 1).

Oil and gas leasing stipulations include timing limitation (TL), controlled surface use (CSU), and no surface occupancy (NSO). Lands may also be closed to leasing or open to leasing subject to standard lease terms and applicable laws, regulations, and orders (also referred to as “standard terms and conditions”). A TL stipulation prohibits surface use during specified time periods. A CSU stipulation requires special operational constraints. An NSO stipulation prohibits the use or occupancy of the surface for exploration and development of oil and gas. Oil and gas resources under NSO lands may be developed by directionally or horizontally drilling from nearby lands that do not have an NSO limitation or through inclusion in a “unitized” area, which allocates production and royalties to the lease due to drainage from adjacent wells. Lease stipulations developed through this planning process would only apply to oil and gas leasing and development, not to other surface-disturbing activities.

Under some alternatives, stipulations may be excepted, modified, or waived by the Authorized Officer. An exception is a one-time exemption for a particular site in a leasehold. Exceptions are determined on a case-by-case basis, and the stipulation continues to apply to all other sites in the leasehold. A modification is a change to the provisions of a lease stipulation, either temporarily or for the term of the lease. A waiver is a permanent exemption from a lease stipulation; the stipulation no longer applies in the leasehold. Exceptions, modifications, or waivers of surface stipulations would be considered based on the subsequent site-specific analysis. Exceptions, modifications, and waivers to lease stipulations are described in Appendix B.

Lease notices provide lease holders with additional information on limitations that already exist in law, lease terms, regulations, or operational orders. A lease notice also addresses special items the lessee should consider when planning operations. Lease notices that would be applied in the planning area are also included in Tables 2-1 through 2-12 and Appendix B.

BMPs are state-of-the-art mitigation measures applied on a site-specific basis to minimize or eliminate environmental or social impacts. BMPs are applied to management actions to aid in achieving desired outcomes for safe, environmentally sound resource development by preventing, minimizing, or mitigating adverse impacts and reducing conflicts. For each proposed action, as many BMPs may be applied as determined necessary to mitigate the expected impacts. In some cases, operators may incorporate BMPs into individual project proposals as design features. Alternatively, the BLM may incorporate BMPs into its authorizations as conditions of approval. BMPs applied to the alternatives are provided in Appendix C.

2.2 DESCRIPTION OF THE ALTERNATIVES

The four alternatives presented in detail by resource in Tables 2-1 through 2-12 of this chapter are as follows.

2.2.1 Alternative A No Action

Alternative A is the No Action Alternative, and it is a continuation of current management direction contained in the Price and Richfield Field Offices' ROD/RMPs, which were completed in 2008 (BLM 2008a, 2008b). Under the current RMPs, the majority of lands in the planning area are open to leasing with no specific constraints. New oil and gas leasing would generally be subject to standard lease terms and applicable laws, regulations, and orders. Mitigation measures could be considered on a site-specific basis during the development phase to minimize environmental or social impacts.

This alternative has been sub-divided into two alternatives in order to address the issue of lease suspensions in the planning area. All decisions except the implementation decisions pertaining to suspended leases would be the same.

Alternative A-1: Under this alternative, the BLM would lift the lease suspensions on leases that were suspended in 2005 and 2006. Each of the leases would be returned to active status with the same terms and conditions that were included on the lease at the time the lease was issued. All suspended leases in the planning area were issued under the management direction of the *Henry Mountain Management Framework Plan* (BLM 1982), which was superseded by the Richfield Field Office RMP in 2008 (BLM 2008b). Stipulations from the *Henry Mountain Management Framework Plan* that are attached to the suspended leases can be found in Appendix D.

Alternative A-2: Under this alternative, the BLM would modify the terms and conditions of the leases that were suspended in 2005 and 2006 to be consistent with the lease terms and conditions contained in the Richfield Field Office ROD/RMP (BLM 2008b). Lease holders interested in retaining their leases would be required to accept the modified terms and conditions outlined in Appendices B and E, which include additional stipulations intended to protect air resources. If a lease holder is unwilling to accept the modified terms and conditions, the leases would be canceled and the BLM would be required to issue the lease holder(s) a refund.

Additional information regarding the history of suspended leases in the planning area can be found in Section 1.1.2.

Although different stipulations would be attached to the currently suspended leases under Alternatives A-1 and A-2, the actual differences between these alternatives would be small. If Alternative A-1 is selected, the BLM, during the site-specific analysis associated with processing of any application for ground-disturbing activities, would attach as conditions of approval that are similar, if not identical, to management actions included in the 2008 Richfield Field Office ROD/RMP (BLM 2008b).

2.2.2 Alternative B

Alternative B was developed in response to comments that suggested major constraints should be placed on oil and gas leasing and development in most of the planning area due to impacts to recreation, wilderness characteristics, cultural and historic resources, and natural ecosystems. Under this alternative, oil and gas leasing would be allowed in most of the planning area, but stipulations would prohibit the use or occupancy of the surface for exploration and mineral development. Where possible, minerals under public lands that have surface use restrictions could be accessed by directionally or horizontally drilling from nearby lands that do not have surface use limitations. Under Alternative B, public lands within 1.0 mile of the Green River and the Horseshoe Canyon unit of Canyonlands National Park would be closed to oil and gas leasing. Lands inventoried and found to have wilderness characteristics during the 2016 inventory would be managed subject to NSO stipulations.

1 **2.2.3 Alternative C**

2 Alternative C takes into consideration feedback received by the State of Utah and Emery and Wayne
3 Counties during the alternatives development planning process. Providing the opportunity for oil and gas
4 leasing and development is prioritized in the majority of the planning area. This alternative recognizes the
5 importance of sensitive resource areas such as Horseshoe Canyon and Labyrinth Canyon. Under this
6 alternative, the BLM would place major constraints on oil and gas leasing and development in areas
7 within 1.0 mile of the Green River through Labyrinth Canyon and the Horseshoe Canyon unit of
8 Canyonlands National Park. The BLM would place minor and moderate constraints on oil and gas leasing
9 and development in areas that have recreational value or other sensitive resources. Lands with wilderness
10 characteristics would generally remain open to leasing subject to standard terms and conditions.

11 **2.2.4 Alternative D**

12 Similar to Alternative C, this alternative recognizes the importance of resources such as Horseshoe
13 Canyon and Labyrinth Canyon. However, Alternative D places additional surface use restrictions on
14 public lands surrounding these areas. This alternative recognizes the increased public interest in the San
15 Rafael Desert and the importance of minimizing resource conflicts by protecting recreational
16 opportunities and experiences from the impacts of oil and gas leasing and development. Under
17 Alternative D, the BLM would make public lands within 1.0 mile of the Green River through Labyrinth
18 Canyon and the Horseshoe Canyon unit of Canyonlands National Park closed to oil and gas leasing.
19 Lands with wilderness characteristics in the remainder of the Labyrinth Canyon inventory unit would be
20 managed subject to NSO stipulations. Additionally, the BLM would place a combination of major and
21 moderate constraints on leasing and development in other areas that have visual sensitivity, recreational
22 value, wilderness characteristics, or other sensitive resources.

23 **2.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL**

24 **2.3.1 Expansion of the San Rafael Desert Master Leasing Plan Area**

25 During the scoping process, a consortium of stakeholder groups requested that the BLM expand the SRD
26 MLP/EA planning area boundaries to include additional public lands located primarily to the south and
27 west of the current planning area. In response to these comments, the Price Field Office conducted an
28 independent analysis of these areas to determine whether they met the MLP criteria identified in
29 Washington Office (WO) Instruction Memorandum (IM) 2010-117 Oil and Gas Leasing Reform – Land
30 Use Planning and Lease Parcel Review, which was subsequently incorporated into various BLM
31 handbooks, including H-1624-1, Planning for Fluid Mineral Resources.

32 The BLM’s leasing reform policies direct the agency to use the following criteria in determining whether
33 preparation of an MLP may be required.

- 34 1. A substantial portion of the area is not leased.
- 35 2. There is a majority federal mineral interest.
- 36 3. The oil and gas industry has expressed specific interest in leasing, and there is a moderate or high
37 potential for oil and gas confirmed by the discovery of oil and gas in the general area.
- 38 4. Additional analysis or information is needed to address likely resource or cumulative impacts if
39 oil and gas development were to occur whether there are multiple use or natural resource
40 conflicts, impacts to air quality, impacts on the resource values of the National Park Service
41 system, a national wildlife refuge, or a National Forest System wilderness area, or impacts on
42 other specially designated areas.

43 An MLP may also be completed under other circumstances at the State Director’s discretion.

1 Public lands in the proposed expansion area have experienced some oil and gas exploration resulting in
2 numerous plugged and abandoned wells; however, there has been no oil and gas production. Therefore,
3 these areas do not fully meet MLP criterion 3 because there has been no discovery of oil or gas resources.

4 After a review of the MLP evaluation, the State Director decided not to expand the MLP area because
5 expansion of the boundaries does not meet the purpose and need for the project, which is, in part, to
6 resolve long-standing lease protests and complete the court-mandated NEPA analysis for leases placed in
7 suspension because of litigation.

8 Additionally, the decision to initiate a land use plan amendment is a discretionary agency action. If the
9 BLM decides to initiate a plan amendment, planning regulations and policies give the agency broad
10 discretion in determining the appropriate geographic extent of the planning area.

11 **2.3.2 Phased Leasing**

12 During the public scoping and the preliminary alternatives review periods, stakeholders suggested that the
13 BLM should consider an alternative that requires phased leasing and phased development. Phased leasing
14 and phased development, which are identified in IM 2010-117 as examples of planning decisions that
15 may be made through the MLP process, are tools that can be used by the BLM to control the pace,
16 density, and location of development. For example, in some areas with known development potential,
17 phased development has been used to limit the percentage of surface disturbance on the landscape.

18 To date, there has been no oil and gas discovery in the planning area. In addition, the Reasonably
19 Foreseeable Development Scenario (RFD) prepared specifically for this EA (see Appendix A), indicates
20 that limited oil and gas development is expected in the planning area during the next 15 years. Given the
21 low RFD, the BLM has determined that it is unnecessary to consider an alternative that places specific
22 limitations on the pace of development in the planning area. The BLM is also considering other planning
23 decisions that address issues related to the density and location of development. According to the BLM's
24 RFD, if no stipulations are placed on oil and gas leases, new surface disturbance is not expected to exceed
25 585 acres. Notably, this acreage represents 0.1% of the planning area.

26 Organizations also recommended that the BLM consider a phased leasing approach that prioritizes leasing
27 and subsequent development in areas with high development potential and low resource conflict. Under
28 this phased leasing approach, oil and gas development would be kept away from low to medium
29 development potential areas that may have high resource sensitivity. This approach to leasing does not
30 work in the SRD MLP planning area because the known higher oil and gas potential generally overlaps
31 the areas that have sensitive resources (i.e., the eastern side of the project planning area).

32 **2.4 ALTERNATIVES TABLES**

33 Tables 2-1 through 2-12 include management actions that would apply to oil and gas leasing and
34 development in the SRD MLP planning area. All decisions are considered to be land use planning
35 decisions except MLE-1 and MLE-2. These decisions, which deal with suspended and protested leases in
36 the SRD MLP planning area are considered implementation decisions.

37 The SRD MLP planning area includes multiple resources. The BLM has considered oil and gas decisions
38 that are intended to reduce conflict or minimize impacts on each resource from development. Because
39 multiple resources may be present in the same area, multiple decisions may apply to—or be layered
40 over—the same area. In these cases, the most restrictive management decision would apply.

1 For example, the BLM may place a timing limitation on development in an area that has been identified
2 as crucial habitat for wildlife. The purpose of this management decision would be to avoid disrupting
3 wildlife during a particular period when wildlife is known to be present in the area. It is possible that this
4 same area may also have important scenic values. The BLM may decide that it should not allow surface
5 occupancy of the land in order to retain scenic the character of the landscape. In this example, the BLM
6 considered separate but appropriate management prescriptions for different resources. When the BLM
7 determines the leasing category, this area would be identified as open to leasing subject to major
8 constraints, because an NSO stipulation is more restrictive than a timing limitation.

1 **Table 2-1. Air Quality**

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Objective				
Maintain or improve existing air quality and air quality-related values (e.g. visibility) by ensuring that all authorized uses on public lands comply with and support Federal, State, and local laws and regulations for protecting air quality.				
Management Actions Common To All Alternatives				
AQ-1	Manage all BLM and BLM-authorized activities to maintain air quality within the thresholds established by the State of Utah Ambient Air Quality Standards and to ensure that those activities continue to keep the area as attainment, meet prevention of significant deterioration of Class I and Class II increments, and protect the air quality related values (AQRV) in the Class I air shed of the National Parks (e.g., Arches, Canyonlands, and Capitol Reef) as well as Class II areas.			
AQ-2	BLM would continue to work cooperatively with State, Federal, and tribal entities in developing air quality assessment protocols to address cumulative impacts and regional air quality issues.			
AQ-3	Project specific analyses would consider use of quantitative air quality analysis methods (i.e. modeling), when appropriate as determined by BLM, in consultation with State, Federal and tribal entities.			
Management Actions By Alternative				
AQ-4	No similar action.	Comply with Utah Air Conservation (UAC) Regulation R446-1. The best air quality control technology, as per guidance from the Utah Division of Air Quality (UDAQ), would be applied to actions on public lands as needed to meet air quality standards.	Same as Alternative B.	Same as Alternative B.
AQ-5	No similar action.	Comply with UAC Regulations R446-1-4.5.3 and R307-205, which prohibit the use, maintenance, or construction of roadways without taking appropriate dust abatement measures. Compliance would be obtained through special stipulations as a requirement on new projects and through the use of dust abatement control techniques in problem areas.	Same as Alternative B.	Same as Alternative B.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
AQ-6	<p>National Ambient Air Quality Standards are enforced by the Utah Department of Environmental Quality, Division of Air Quality (UDEQ-DAQ), with Environmental Protection Agency (EPA) oversight. When processing land use authorizations additional emission control requirements to reduce potential air quality impacts would be considered on a case-by-case basis in processing land use authorizations.</p>	<p>National Ambient Air Quality Standards are enforced by the Utah Department of Environmental Quality, Division of Air Quality (UDEQ-DAQ), with Environmental Protection Agency (EPA) oversight. When processing land use authorizations additional emission control requirements to reduce potential air quality impacts would be considered on a case-by-case basis in consultation with UDAQ, EPA, and other Federal agencies whose lands may be impacted by the proposal.</p>	Same as Alternative B.	Same as Alternative B.
AQ-7	<p>BLM would require as a Condition of Approval for Applications for Permits to Drill:</p> <ol style="list-style-type: none"> 1. All new and replacement internal combustion oil and gas field engines of less than or equal to 300 design-rated horsepower must not emit more than 2 grams of NO_x per horsepower-hour. This requirement does not apply to oil and gas field engines of less than or equal to 40 design-rated horsepower. 2. All new and replacement internal combustion oil and gas field engines of greater than 300 design rated horsepower must not emit more than 1.0 gram of NO_x per horsepower-hour. 	<p>Apply a CSU stipulation throughout the planning area that requires the following to mitigate the impacts to air quality and greenhouse gas emissions:</p> <ol style="list-style-type: none"> 1. All new and replacement internal combustion gas-fired field engines of less than or equal to 300 design-rated horsepower shall not emit more than 2 grams of NO_x (mononitrogen oxides) per horsepower-hour. 2. All new and replacement internal combustion gas-fired field engines of greater than 300 design-rated horsepower shall not emit more than 1 gram of NO_x per horsepower-hour. <p>The Authorized Officer may modify the stated requirements in accordance with updated specifications to comply with the Clean Air Act, or as deemed necessary to ensure that the stipulation is sufficient to maintain air quality and protect AQRV in nearby national parks.</p>	Same as Alternative A.	Same as Alternative B.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
AQ-8	No similar action.	<p>To mitigate any potential impact that oil and gas development emissions may have on regional ozone formation, or to the extent such emissions may cause or contribute to adverse AQRV impacts (including visibility) in nearby national parks, apply a CSU stipulation across the planning area that requires the following minimum standards:</p> <ul style="list-style-type: none"> • Drill rig engines that meet Tier II or better standards, as necessary, based on air quality conditions or projections, and consistent with the most stringent EPA emissions standards that are in force at the time of installation or approval. • Stationary internal combustion engine standard of 2g NOx/brake horsepower-hour (bhp-hr) for engines <300HP and 1g NOx/bhp-hr for engines >300 HP. • Low-bleed or no-bleed pneumatic controller. • Dehydrator Volatile Organic Compound (VOC) emission controls to +95 percent efficiency. • Tank VOC emission controls to +95 percent efficiency equivalent to NSPS subpart 0000. 	Same as Alternative B.	Same as Alternative B.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
AQ-9	Apply a lease notice across the planning area to inform the lessee/operator that prior to project-specific approval, additional air quality analyses may be required to comply with the NEPA, FLPMA, and/or other applicable laws and regulations. Analyses may include dispersion modeling for deposition and visibility impacts analysis, control equipment determinations, and/or emission inventory development. These analyses may result in the imposition of additional project-specific air quality control measures.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
AQ-10	No similar action.	Apply a CSU stipulation requiring a fugitive dust control plan for oil and gas activities that would disturb a surface area larger than 0.25 acre, or that would result in substantial increases in truck traffic on unpaved or untreated surfaces.	Same as Alternative A.	Same as Alternative B.
AQ-11	No similar action.	To minimize impacts on air quality and AQRVs, as well as minimize emissions of greenhouse gases, apply a planning area-wide CSU that prohibits venting or open flaring of associated gas.	In the absence of a pipeline, to capture gas associated with production from an oil well, use of a combustor or other best available technologies would be required. Venting or open flaring would be prohibited except in circumstances identified in existing rules.	In the absence of a pipeline, to capture gas associated with production from an oil well, use of a combustor or other best available technologies would be required. To minimize impacts on air quality and AQRVs, as well as minimize emissions of greenhouse gases, venting or open flaring would be prohibited except in circumstances identified in existing rules. Where open flaring is allowed, a visual screen must be used to minimize sky glow, glare, and adverse visual effects on night sky resources.

1
2

1 **Table 2-2. Cultural Resources**

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Objectives				
Identify, preserve, and protect significant cultural resources and ensure that they are available for appropriate uses for present and future generations.				
Seek to reduce imminent threats and resolve potential conflicts from natural or human-caused deterioration or potential conflict with other resource uses by ensuring that all authorizations will comply with the National Historic Preservation Act, Section 106.				
Management Actions Common to All Alternatives				
CUL-1	All leases may be found to contain historic properties and/or resource protected under the NHPA, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statues and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized, or mitigated.			
Management Actions By Alternative				
CUL-2	No similar action.	Apply a lease notice throughout the planning area to mitigate the potential impacts to TCPs or cultural plants identified through consultation. Mitigation would be developed through further consultation with affected groups which may include measures to maintain the viewshed and intrinsic values, as well as the auditory, visual, and esthetic settings of the resources.	Same as Alternative B.	Same as Alternative B.
CUL-3	Cultural viewsheds were not addressed. This means that a lease notice requiring viewshed assessment for cultural sites may not be applied.	Apply a lease notice throughout the planning area requiring viewshed analysis for cultural sites that are eligible for inclusion on the National Register, or properties of traditional religious and cultural importance to an Indian Tribe. If the analysis shows that the oil and gas development would have adverse effects to the historic properties, the project may require relocation or redesign.	Same as Alternative A.	Apply a lease notice throughout the planning area requiring viewshed analysis for cultural sites that are determined eligible for inclusion on the National Register when location, setting, or feeling contribute to the overall integrity of a site, or properties of traditional religious and cultural importance to an Indian Tribe. If the analysis shows that the oil and gas development would have adverse effects to the historic properties, the project may require relocation or redesign.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
CUL-4	No similar action. The potential for encountering cultural sites was not addressed. This means that a lease notice informing the operator that it may be more difficult or costly to exercise lease rights may not be applied.	Apply a lease notice to areas of high potential for cultural site occurrence, informing the lessee/operator that a higher likelihood of encountering cultural resource concerns (i.e., potential adverse effects) that may require archaeological monitoring, ethnographic data collection, data recovery, and mitigation of historic properties may be required.	Same as Alternative B.	Same as Alternative B.

1

1 **Table 2-3. Lands with Wilderness Characteristics**

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Objective				
Minimize impacts to lands determined by BLM to have wilderness characteristics.				
Management Actions by Alternative				
WC-1	<i>Richfield:</i> Manage the Dirty Devil/French Springs and Horseshoe Canyon South non-WSA lands with wilderness characteristics (identified as Natural Areas in the Richfield ROD) (Map 2-1) as NSO, no exceptions, waivers, or modifications.	Close the Dirty Devil/French Springs and Horseshoe Canyon South non-WSA lands with wilderness characteristics (identified as Natural Areas in the ROD) to leasing.	Same as Alternative A.	Same as Alternative A.
WC-2	No similar action. The Price and Richfield RMPs do not include any oil and gas stipulations specific to other non-WSA lands with wilderness characteristics in the MLP area.	Manage all lands identified by the BLM as having wilderness characteristics during the 2016 wilderness characteristics inventory (Map 2-1) as NSO.	Manage lands identified as having wilderness characteristics in the Labyrinth Canyon unit as CSU. In this area: <ul style="list-style-type: none"> • No disturbance would be allowed within the viewshed of the Green River. • Well pads would be placed no closer than 320 acres apart. • Production facilities would be co-located and designed to minimize surface impacts. • Pipelines and utilities would be buried, to the extent practical, and placed along existing roads. • Require interim reclamation of roadway disturbance and reclamation of well pads to well head/production facilities to minimize long-term surface disturbance. • During final reclamation, fully restore the original landform. Travel routes would be restored to their original character. Manage all other lands identified as having wilderness characteristics in the planning area as open to leasing subject to standard terms and conditions.	Manage lands identified as having wilderness characteristics in the Labyrinth Canyon unit as NSO. Apply a CSU stipulation to all other lands identified by BLM as having wilderness characteristics during the 2016 wilderness characteristics inventory. In these areas: <ul style="list-style-type: none"> • Well pads would be placed no closer than 640 acres (1 mile) apart. • Production facilities would be co-located and designed to minimize surface impacts. • Pipelines and utilities would be buried, to the extent practical, and placed along existing roads. • Require interim reclamation of roadway disturbance and reclamation of well pads to well head/production facilities to minimize long-term surface disturbance. • During final reclamation, fully restore the original landform. Travel routes would be restored to their original character.

1 **Table 2-4. Oil and Gas**

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Objective				
Provide opportunities for environmentally responsible exploration and development subject to appropriate BLM policies, laws, and regulations.				
Management Actions by Alternative				
Oil and Gas Suspended Lease Decisions (Implementation Decision)				
MLE-1	Alternative A-1: Rescind the suspension on leases. Alternative A-2: Modify the terms and conditions on leases that are in suspension to be consistent with Richfield RMP/ROD (BLM 2008b).	Cancel all suspended leases.	Modify the lease terms and conditions on the leases that are in suspension to be consistent with Alternative C.	Modify the lease terms and conditions on the leases that are in suspension to be consistent with Alternative D.
Lease Protest Resolution (Implementation Decision)				
MLE-2	Resolve lease protests and issue protested leases with terms and conditions that are consistent with the Price RMP/ROD (BLM 2008a).	Resolve the lease protests by denying the leases.	Issue the protested leases with terms and conditions that are consistent with Alternative C.	Issue the protested leases with terms and conditions that are consistent with Alternative D.
Oil and Gas Leasing Stipulations				
MLE-3	Approximately 399,462 acres would be open to oil and gas leasing, subject to standard terms and conditions. Approximately 19,083 acres would be open to oil and gas leasing subject to CSU and TL stipulations. Approximately 33,627 acres would be open to oil and gas leasing subject to a NSO stipulation. Approximately 220 acres would be closed to oil and gas leasing. See Map 2-2-A.	Approximately 0 acres would be open to oil and gas leasing, subject to standard terms and conditions. Approximately 98,164 acres would be open to oil and gas leasing subject to CSU and TL stipulations. Approximately 324,161 acres would be open to oil and gas leasing subject to a NSO stipulation. Approximately 30,068 acres would be closed to oil and gas leasing. See Map 2-2-B.	Approximately 37,865 acres would be open to oil and gas leasing, subject to standard terms and conditions. Approximately 362,127 acres would be open to oil and gas leasing subject to CSU and TL stipulations. Approximately 52,208 acres would be open to oil and gas leasing subject to a NSO stipulation. Approximately 193 acres would be closed to oil and gas leasing. See Map 2-2-C.	Approximately 0 acres would be open to oil and gas leasing, subject to standard terms and conditions. Approximately 339,884 acres would be open to oil and gas leasing subject to CSU and TL stipulations. Approximately 92,170 acres would be open to oil and gas leasing subject to a NSO stipulation. Approximately 20,339 acres would be closed to oil and gas leasing. See Map 2-2-D.
MLE-4	No similar action.	Close to leasing the area covered by the Three Rivers locatable mineral withdrawal.	Manage areas covered by the Three Rivers locatable mineral withdrawal as NSO.	Same as Alternative B.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
MLE-5	<p><i>Richfield</i>: Subject geophysical operations under 43 CFR 3150 to the oil and gas leasing restrictions with the following exceptions:</p> <ul style="list-style-type: none"> • Consider geophysical operations proposed for lands that are designated as NSO or closed to leasing for approval when (1) the circumstances or relative resource values in the areas have changed, (2) less restrictive requirements could be developed to protect the resource of concern, or (3) operations could be conducted without causing unacceptable impact to the resources of concern (MIN-12). <p><i>Price</i>: Geophysical operations will be allowed consistent with existing regulations for geophysical exploration (MLE-12).</p>	<p>Do not allow geophysical operations in areas closed to leasing.</p> <p>Only allow heliport geophysical operations in areas that are managed as NSO.</p>	<p>Do not allow geophysical operations in areas closed to leasing.</p> <p>Geophysical operations would be allowed in areas managed as NSO under the following conditions:</p> <ul style="list-style-type: none"> • No new road construction or road improvements • No staging areas • Full reclamation of all surface disturbance • No geophysical operations in crucial pronghorn antelope habitat from May 15 through June 15 	<p>Same as Alternative C.</p>
Best Management Practices				
MLE-6	<p>The Price RMP (Appendix R-14) and the Richfield RMP (Appendix 15) include a list best management practices that typically apply to oil and gas development. These measures summarized in Appendix E.</p>	<p>Require implementation of BMPs that minimize the potential resource impacts associated with oil and gas development (see Appendix C for a list of BMPs, by resource).</p>	<p>Same as Alternative B.</p>	<p>Same as Alternative B.</p>

1 **Table 2-5. Paleontology**

Decision	Alternative A(No Action)	Alternative B	Alternative C	Alternative D
Objective				
Protect paleontological resources from surface-disturbing activities.				
Management Actions By Alternative				
PAL-1	<p><i>Price and Richfield:</i> Mitigate adverse impacts on vertebrate and significant non-vertebrate paleontological resources resulting from authorized surface disturbing actions.</p> <p><i>Price:</i> An assessment of fossil resources will be required on a case-by-case basis, mitigating, as necessary, before and during surface disturbance.</p> <p><i>Richfield:</i> Require on-the-ground paleontological inventories prior to permitting surface disturbing activities in areas where there is a high potential to affect scientifically significant paleontological resources.</p> <p><i>Richfield:</i> Require paleontological assessments prior to permitting surface disturbing activities in areas where there is a moderate potential to affect scientifically significant paleontological resources.</p> <p><i>Richfield:</i> For all permitted actions occurring in paleontologically sensitive areas, include stipulation(s) to cover unanticipated paleontological discoveries during disturbance. This stipulation would mandate work stoppage (or avoidance), notification to the authorized officer, and protection of the material and geological context if any paleontological resources were discovered during disturbance activities. Other stipulations might be appropriate on a case-by-case basis.</p>	<p>Apply a CSU stipulation requiring survey and monitoring for all surface disturbing oil and gas activities in potential fossil yield classification (PFYC) 4 and 5 areas (Map 2-3).</p> <p>Where monitoring encounters vertebrate and vertebrate trace fossils during oil and gas operations, all operations must cease until the BLM Authorized Officer determines whether the site can be avoided, protected, or must be fully excavated.</p>	Same as Alternative B.	Same as Alternative B.

2

1 **Table 2-6. Recreation**

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
<p>Objective To provide for multiple recreational uses of the public lands and sustain a wide range of recreation opportunities and potential experiences for visitors and residents, while supporting local economic stability and sustaining the recreation resource base and sensitive resource values.</p>				
<p>Management Actions By Alternative</p>				
<p>REC-1</p>	<p>No similar action. There are no oil and gas leasing decisions specific to the Labyrinth Canyon SRMA (Map 2-4).</p>	<p>Manage the Labyrinth Canyon SRMA as NSO.</p>	<p>Manage lands in the Labyrinth Canyon SRMA as CSU. In this area:</p> <ul style="list-style-type: none"> • No disturbance would be allowed within the viewshed of the Green River. • Well pads would be placed no closer than 320 acres apart. • Production facilities would be co-located and designed to minimize surface impacts. • Pipelines and utilities would be buried, to the extent practical, and placed along existing roads. • Require interim reclamation of roadway disturbance and reclamation of well pads to well head/production facilities to minimize long-term surface disturbance. • During final reclamation, fully restore the original landform. Travel routes would be restored to their original character. 	<p>Same as Alternative B.</p>

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
REC-2	<p><i>Richfield</i>: Manage oil and gas leasing in the Dirty Devil/Robbers Roost SRMA (Map 2-4) (outside of the WSA) as follows:</p> <p>Lease VRM Class II areas and canyon rims within the viewshed of all canyons (approximately one-quarter mile) as NSO (10,382 acres). Lease the remainder of the SRMA is subject to CSU and/or timing limitations (4,647 acres).</p>	Manage all lands in the Dirty Devil/Robbers Roost SRMA (outside of the WSA) as NSO.	Same as Alternative A.	Same as Alternative A.
REC-3	No similar action.	Close to leasing all lands within 1 mile of the Green River/Labyrinth Canyon Rim (Map 2-5).	Manage all lands within 1 mile of the Green River/Labyrinth Canyon Rim as NSO.	<p>Manage all lands within 1 mile of the Green River/Labyrinth Canyon Rim that are north of the San Rafael River as NSO.</p> <p>Manage all lands within 1 mile of the Green River/Labyrinth Canyon Rim south of the San Rafael River as closed to oil and gas leasing and development.</p>
REC-4	No similar action.	Close to leasing all lands within 1 mile of the Horseshoe Canyon Rim (Map 2-5).	Manage all lands within 1 mile of Horseshoe Canyon Rim as NSO.	Same as Alternative B.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
REC-5	No similar action.	<p>Manage the following recreational focus areas in the Price and Richfield ERMA's as NSO (Map 2-5):</p> <ul style="list-style-type: none"> • Fossil Point • Dry Lake • Three Canyon • Saucer Basin/Moonshine Wash • The Cone • Keg Knoll • Sweetwater Reef • Cottonwood Wash • Horseshoe Canyon Trailhead 	<p>Manage the following recreational focus areas in the Price and Richfield ERMA's as CSU:</p> <ul style="list-style-type: none"> • Fossil Point • Dry Lake • Three Canyon • Saucer Basin/Moonshine Wash • The Cone • Keg Knoll • Sweetwater Reef • Cottonwood Wash • Horseshoe Canyon Trailhead <p>In these areas:</p> <ul style="list-style-type: none"> • Well pads would be placed no closer than 160 acres apart. • Production facilities would be co-located and designed to minimize surface impacts. • Pipelines and utilities would be buried, to the extent practical, and placed along existing roads. • Require interim reclamation of roadway disturbance and reclamation of well pads to well head/production facilities to minimize long-term surface disturbance. • During final reclamation, fully restore the original landform. Travel routes would be restored to their original character. 	<p>Manage the following recreational focus areas in the Price and Richfield ERMA's as NSO:</p> <ul style="list-style-type: none"> • Fossil Point • Dry Lake • Three Canyon • Saucer Basin/Moonshine Wash • Keg Knoll • Sweetwater Reef • Horseshoe Canyon Trailhead <p>Manage the following recreational focus areas in the Price and Richfield Extensive Recreation Management Areas as CSU:</p> <ul style="list-style-type: none"> • The Cone • Cottonwood Wash <p>In these areas:</p> <ul style="list-style-type: none"> • Well pads would be placed no closer than 640 acres (1 mile) apart. • Production facilities would be co-located and designed to minimize surface impacts. • Pipelines and utilities would be buried, to the extent practical, and placed along existing roads. • Require interim reclamation of roadway disturbance and reclamation of well pads to well head/production facilities to minimize long-term surface disturbance. • During final reclamation, fully restore the original landform. Travel routes would be restored to their original character.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
REC-6	No similar action.	<p>Manage all lands within 3 miles of the following key observation (Map 2-6) points as NSO:</p> <ul style="list-style-type: none"> • Keg Knoll • Wolverton Overlook • Horseshoe Canyon Trailhead • Trin Alcove/Three Canyon • Bull Bottom 	<p>Manage all lands within 1 mile of the following key observation points as NSO:</p> <ul style="list-style-type: none"> • Keg Knoll • Wolverton Overlook • Horseshoe Canyon Trailhead • Trin Alcove/Three Canyon • Bull Bottom 	<p>Manage all lands within 1 mile of the following key observation points as NSO:</p> <ul style="list-style-type: none"> • Keg Knoll • Wolverton Overlook • Horseshoe Canyon Trailhead • Trin Alcove/Three Canyon • Bull Bottom <p>Manage all lands between 1-3 miles from the following key observation points as CSU:</p> <ul style="list-style-type: none"> • Keg Knoll • Wolverton Overlook • Horseshoe Canyon Trailhead • Trin Alcove/Three Canyon • Bull Bottom <p>Prior to authorizing any surface disturbing activities, a viewshed analysis will be completed from all applicable key observation points. If an area is determined to be within the viewshed, a visual resource contrast rating, including visual simulations, would be completed in accordance with BLM Manual 8431. Site-specific mitigation measures would be identified for all disturbances that are visible within 3 miles that minimize visual impacts, regardless of the area's visual resource management class.</p>

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
REC-7	No similar action.	<p>Manage all lands within 3 miles of the following travel corridors as NSO:</p> <ul style="list-style-type: none"> • Lower San Rafael Road from Hwy 24 to Horseshoe Canyon • Lower San Rafael Road from Green River to Horseshoe Canyon (Map 2-7-B) 	Same as Alternative A.	<p>Manage all lands within 1 mile of the following travel corridors as NSO.</p> <ul style="list-style-type: none"> • Lower San Rafael Road from Saucer Basin Road to Horseshoe Canyon. • Lower San Rafael Road from the San Rafael River to Horseshoe Canyon (Map 2-7-D). <p>Manage all lands between 1-3 miles from the following travel corridors as CSU.</p> <ul style="list-style-type: none"> • Lower San Rafael Road from Saucer Basin Road to Horseshoe Canyon. • Lower San Rafael Road from the San Rafael River to Horseshoe Canyon <p>Prior to authorizing any surface disturbing activities a viewshed analysis will be completed from all applicable travel corridors. If an area is determined to be within the viewshed, a visual resource contrast rating, including visual simulations, would be completed in accordance with BLM Manual 8431. Site-specific mitigation measures would be identified for all disturbances that are visible within 3 miles that minimize visual impacts, regardless of the area's visual resource management class.</p>

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
REC-8	No similar action.	<p>In order to minimize impacts to night skies, apply a planning area-wide CSU stipulation requiring operators to:</p> <ul style="list-style-type: none"> • Limit the use of artificial lighting during nighttime operations to only those that are determined necessary for safety. • Utilize shielding and aiming techniques as well as limiting the height of light poles to reduce glare and avoid light shining above horizons. • Direct lights downward onto the task area. The bottom surface of the light fixture should be level, or if unable to be fully level, point it as close to straight down as possible or shield it to avoid light being projected horizontally. • Use motion sensors, timers, or manual switching for areas that require illumination, but are seldom occupied. • Reduce lamp brightness and select lights that are not broad spectrum or bluish in color. 	Same as Alternative A.	Same as Alternative B.
REC-9	No similar action.	<p>Prior to APD approval, operators would be required to submit a Lighting Plan to the BLM to address the requirements of decision REC-8. These Lighting Plans would include information such as:</p> <ul style="list-style-type: none"> • Number of lights and lumen output • Fixture design • Lamp color temperature 	Same as Alternative A.	Same as Alternative A.

1

1 **Table 2-7. Special Designations**

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Areas of Critical Environmental Concern				
Objective				
Manage ACECs to protect and prevent damage to the relevant and important values such as historic, cultural, scenic, fish and wildlife, and natural systems or processes.				
Management Actions Common to all Alternatives				
ACEC-1	The Big Flat Tops ACEC (190 acres) is managed as closed to oil and gas leasing and development (Map 2-4).			
Management Actions by Alternative				
ACEC-2	The Dry Lake Archeological District ACEC (Map 2-4) is open to leasing subject to major constraints (NSO).	Same as Alternative A, except no exceptions, waivers, or modifications.	Same as Alternative B.	Same as Alternative B.
ACEC-3	The Uranium Mining District ACEC (Tidwell Draw) (Map 2-4) is open to leasing subject to major constraints (NSO).	Same as Alternative A.	<p>Manage the Tidwell Draw site in the Uranium Mining District ACEC as open to leasing subject to minor constraints (CSU).</p> <p>Do not allow surface disturbing activities that adversely impact the physical evidence of past mining activities.</p> <p>Apply a lease notice to inform the lessee/operator that compensatory mitigation may be required for all disturbances in the ACEC.</p> <p>Mitigation may include restoration of historic sites, conducting oral histories, or development of interpretive/educational materials.</p>	Same as Alternative A.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
National Historic Trails				
Objective				
Preserve the integrity of landscapes along the Old Spanish National Historic Trail (OSNHT) on public lands within the planning area.				
Management Actions by Alternative				
TRA-1	Oil and gas leasing will be open to leasing subject to minor constraints (timing limitations, CSU, lease notices) (Map 2-4).	<p>Conserve, protect, and restore the National Trail resources, qualities, values, and associated settings.</p> <p>In order to protect the integrity of the Old Spanish Trail, manage all lands within 3 miles as NSO.</p> <p>This stipulation would apply to the congressionally designated route and to any draft refinements of this route.</p>	<p>Apply a lease notice along the length of the Old Spanish Trail. The lease notice, which would apply to a 2-mile width on both sides, would give notice to lessees/operators that modifications to the Surface Use Plan of Operations may be required in order to conserve, protect, and restore the National Trail resources, qualities, values, and associated settings. Additionally, coordination with the National Park Service and BLM will be necessary.</p> <p>Apply a CSU stipulation to high potential sites and route segments. The CSU stipulation would require the lessee to maintain the current setting within 2 miles of the trail.</p> <p>This lease notice and stipulation would apply to the congressionally designated route or the latest verified trail location.</p>	<p>Conserve, protect, and restore the National Trail resources, qualities, values, and associated settings.</p> <p>In order to protect the integrity of the Old Spanish Trail:</p> <p>Manage all lands within 1 mile of high potential sites and route segments as NSO.</p> <p>Manage all lands between 1-3 miles from high potential sites and route segments as CSU.</p> <p>Prior to authorizing any surface disturbance, a viewshed analysis will be completed from the Old Spanish Trail. If an area is determined to be within the viewshed, a visual resource contrast rating, including visual simulations, would be completed in accordance with BLM Manual 6280. In order to protect the historic integrity of the trail, mitigation measures would be identified that minimize visual impacts, regardless of the area's visual resource management class. In addition, coordination with trail administration (i.e., BLM and NPS) will be required.</p> <p>These stipulations would apply to the congressionally designated route or the latest verified trail location.</p>

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Wild and Scenic Rivers				
Objective				
Maintain and enhance the free flowing character, preserve and enhance the outstandingly remarkable values, and allow no activities within the river corridor that will alter their classification as suitable for Congressional designation in the National Wild and Scenic River (WSR) System.				
Management Actions by Alternative				
WSR-1	The Green River suitable segment from the confluence of the San Rafael River to Canyonlands National Park (scenic) (Map 2-4) is managed as NSO.	Close to leasing the Green River suitable segment from the confluence of the San Rafael River to Canyonlands National Park (scenic).	Same as Alternative A.	Same as Alternative B.

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1 **Table 2-8. Soil and Water Resources**

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Objectives				
Manage soil, water, and riparian resources to enhance ecosystem health and provide for public uses.				
Avoid or minimize the disturbance, loss, or degradation of soil, surface and groundwater resources, riparian areas, wetlands, and associated floodplains.				
Management Actions By Alternative				
Soil Resources				
SOL-1	No similar action.	Apply a CSU stipulation that requires use of BMPs (Appendix C) to minimize or mitigate wind erosion and emissions of fugitive dust. Areas characterized by fine sandy soils with high wind erosion potential (Map 2-8), including dune complexes, should be avoided to the extent possible. If avoidance is not possible, then operators must provide a written Plan of Development that identifies specific measures that will be implemented to effectively mitigate and prevent accelerated wind erosion and downwind (off-site) emissions of fugitive dust. Use of wind fences or other forms of wind breaks, dust suppressants, or other methods of erosion control may be required.	Same as Alternative B.	Same as Alternative B.
SOL-2	No similar Action.	Apply a timing limitation stipulation to saline soils in the Mancos Shale (Map 2-8). Do not allow surface disturbing activities during the period from December 1 to April 15. This restriction includes heavy equipment traffic on existing roads associated with drilling and completion operations.	Apply a timing limitation stipulation to saline soils in the Mancos Shale. Do not allow surface disturbing activities during the period from December 1 to April 15. This restriction does not include heavy equipment traffic on existing roads associated with drilling and completion operations.	Same as Alternative C.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
SOL-3	<p><i>Price:</i> Any surface disturbing proposal regarding construction on slopes of 20 percent to 40 percent must include an approved erosion control strategy and topsoil segregation/restoration plan. Such construction must be properly surveyed and designed by a certified engineer and approved by the BLM prior to project implementation, construction, or maintenance (SOL-1) (Map 2-9).</p> <p>Allow no surface disturbance on slopes greater than 40 percent (except as allowed through exceptions, waivers, or modification as described in Appendix R-3) (SOL-2).</p> <p><i>Richfield:</i> Surface disturbing proposed projects involving construction on slopes greater than 30% will be avoided. If the action cannot be avoided, rerouted, or relocated then a proposed project will include an erosion control strategy, reclamation and site plan, with a detailed survey and design completed by a certified engineer. This proposed project must be approved by the BLM prior to construction and maintenance (Map 2-9).</p>	Same as Alternative A, except no exceptions, waivers, or modifications to the NSO stipulation in the Price RMP that prohibits surface disturbance on slopes greater than 40 percent.	Same as Alternative B.	Same as Alternative B.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Water Resources				
WAT-1	<p><i>Richfield:</i> The BLM will continue its cooperative work with the State Division of Water Quality to monitor water quality. Water quality monitoring will be conducted at designated water quality sampling stations or chosen reaches, on a priority basis, using indicators that are chosen in coordination with the State Division of Water Quality. The State Division of Water Quality publishes a biennial report on water quality conditions in the state including a list of impaired water.</p> <p><i>Price:</i> Implement appropriate best management practices such as those found in the Utah Nonpoint Source Management Plan and other reference documents for protection, soil, water, and riparian resources.</p>	<p>BLM would take appropriate actions to maintain water quality by working with the Utah Division of Water Quality and other agencies in accordance with the MOU regarding implementing the nonpoint source water quality program in the State of Utah. This MOU addresses the development of monitoring data and BMPs to protect water resources. The BLM would meet State and Federal water quality standards, including designated beneficial uses and anti-degradation requirements.</p>	<p>Same as Alternative B.</p>	<p>Same as Alternative B.</p>

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
WAT-2	<p><i>Richfield:</i> Maintain buffer zones of no surface disturbance and or occupancy around natural springs unless it can be shown that (1) there are no practical alternatives, or (2) all long-term impacts can be fully mitigated, or (3) the activity will benefit and enhance the riparian area. Base the size of the buffer zone on hydrological, riparian, and other factors necessary to protect the water quality of the springs. If these factors cannot be determined, maintain a 330-foot buffer zone from outer edge (Map 2-10).</p> <p><i>Price:</i> No surface disturbance or occupancy will be maintained around natural springs to protect the water quality or the spring. The distance will be based on geophysical, riparian, and other factors necessary to protect the water quality of the springs. If these factors cannot be determined, a 660-foot buffer zone will be maintained.</p> <p>No new surface disturbance (excluding fence lines) will be allowed in areas within the 100-year floodplain or 100 meters (330 feet) on either side from the centerline, whichever is greater, along all perennial and intermittent streams, streams with perennial reaches, and riparian areas (Map 2-10).</p>	<p>Apply an NSO stipulation to preclude oil and gas activities within public water reserves, 100-year floodplains and within 660 feet of intermittent and perennial streams, rivers, riparian areas, wetlands, water wells, and springs.</p>	<p>Apply an NSO stipulation within public water reserves, 100-year floodplains, and within 330 feet of intermittent and perennial streams, rivers, riparian areas, wetlands, water wells, and springs.</p>	<p>Same as Alternative B.</p>

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
WAT-3	No similar action. Water resources along ephemeral streams were not specifically addressed. This means that a lease stipulation along ephemeral streams would not be applied.	Apply an NSO stipulation to preclude oil and gas activities within 100 feet of ephemeral streams (Map 2-10).	Apply an NSO stipulation to preclude oil and gas activities within 100 feet of ephemeral streams. An exception could be granted for road and pipeline crossings. Roads and pipelines crossing ephemeral streams would be constructed in accordance with best management practices outlined in Appendix C .	Same as Alternative C.
WAT-4	<i>Richfield</i> : Implement appropriate BMPs designed to protect water quality for all ground disturbing activities (Appendix 14). <i>Price</i> : No similar action.	Apply BMPs to drilling operations for the protection of surface and groundwater resources (Appendix C).	Same as Alternative B.	Same as Alternative B.
WAT-5	No similar action. Shallow aquifers and potential unconsolidated aquifers were not addressed. This means that BMPs may not be applied to protect shallow aquifers and potential unconsolidated aquifers.	Apply BMPs for the protection of shallow aquifers and potential unconsolidated aquifers (Appendix C).	Same as Alternative B.	Same as Alternative B.

1

1 **Table 2-9. Special Status Species**

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Objective				
Maintain, protect, and enhance habitats of Federally listed threatened, endangered, or candidate plant or animal species to promote recovery to the point that they no longer need protection under the Endangered Species Act.				
Maintain, protect, and enhance habitats of BLM Sensitive plant and animal species to prevent the listing of these species under the Endangered Species Act.				
Management Actions Common To All Alternatives				
SSS-1	Threatened and endangered species conservation measures and lease notices developed in consultation with USFWS would be used for all surface-disturbing activities to comply with the Endangered Species Act and BLM Manual 6840, Special Status Species Management. These species include: Mexican spotted owl, Southwestern willow flycatcher, yellow-billed cuckoo, bonytail, Colorado pikeminnow, humpback chub, razorback sucker, Jones cycladenia, and Wright fishhook cactus.			
SSS-2	Utah and BLM sensitive species mitigation measures and lease notices developed in consultation with the State of Utah would be used for all surface disturbing activities to comply with BLM Manual 6840, Special Status Species Management. These species include: bluehead sucker, flannelmouth sucker, roundtail chub, Jones Indigo bush, Paria spurge, flattops buckwheat, trotter orexis, and hole-in-the-rock prairie clover.			
SSS-3	Colorado River Endangered Fish (Endangered) (Map 2-11): No surface-disturbing activities within the 100-year floodplain of the Green River and associated back waters would be allowed. Any exceptions to this requirement would require consultation with USFWS. Restrictions on surface disturbance within this critical habitat would be developed through this consultation process. Water depletions from any portions of the Upper Colorado River drainage basin are considered to adversely affect and adversely modify the critical habitat of the endangered fish species (bonytail, Colorado pikeminnow, humpback chub, and razorback sucker). Section 7 consultation would be completed with the USFWS prior to any such water depletions.			
SSS-4	Mexican Spotted Owl (Threatened) (Map 2-11): Prior to authorizing any surface disturbing activities, surveys would be required in potential habitat and must follow survey protocol outlined by the USFWS. Protect occupied habitat by precluding temporary activities from March 1 through August 31. Permanent actions are prohibited year-round within 0.5 mile of a PAC. If BLM determines that a proposed action may affect Mexican spotted owl (MSO) or its habitat, consultation with USFWS would be initiated.			
SSS-5	Southwestern Willow Flycatcher (Threatened): If BLM determines that a proposed action may affect Southwestern willow flycatcher (SWFL) or its habitat, consultation with USFWS would be initiated. Protect SWFL and their habitat by precluding surface-disturbing activities within a 100-meter buffer of suitable habitat year long. Activities within 0.25 mile of occupied breeding habitat would not occur during the breeding season, April 15 through August 15.			
SSS-6	Yellow-billed Cuckoo (Threatened): If BLM determines that a proposed action may affect the yellow-billed cuckoo or its habitat, consultation with the USFWS would be initiated. Protect the yellow-billed cuckoo and its habitat by precluding surface-disturbing activities within 0.25 mile of occupied habitat within riparian areas from June 15 through August 31.			

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Management Actions by Alternative				
SSS-7	White-tailed Prairie Dog Habitat (Map 2-11) (Sensitive): White-tailed prairie dog surveys would be required within mapped habitat. Do not allow surface disturbing activities within 660 feet of prairie dog colonies identified within prairie dog habitat. No above-ground facilities are allowed within the 660 feet buffer.	White-tailed Prairie Dog Habitat (Sensitive): Same as Alternative A; however, changes have been made to the exceptions, modifications, and waivers criteria.	Same as Alternative B.	Same as Alternative B.
SSS-8	Kit Fox (Sensitive): There are no stipulations or lease notices specific to kit fox. The lessee/operator is also given general notice that lands may include potential habitat for species on the Utah Sensitive Species List.	Kit Fox (Sensitive): Prior to conducting surface disturbing activities in potential habitat, kit fox surveys would be required. Preclude surface-disturbing activities within 660 feet (200 meters) of an occupied kit fox den.	Same as Alternative B.	Same as Alternative B.
SSS-9	Jones Cycladenia (Threatened) (Map 2-12): <i>Price</i> : There is no specific decision related to the Jones Cycladenia. General special status species decisions and USFWS conservation measures apply. <i>Richfield</i> : The Jones Cycladenia does not occur in the Richfield Field Office.	Jones Cycladenia (Threatened): Surveys would be required in all modeled habitat. Preclude surface-disturbing activities within 300 feet of occupied habitat.	Jones Cycladenia (Threatened): Surveys would be required in all modeled habitat where there is moderate potential for occupation. The need for surveys would be determined on a case-by-case basis by the BLM. Preclude surface-disturbing activities within 300 feet of occupied habitat.	Same as Alternative C.
SSS-10	Wright fishhook cactus (Endangered) (Map 2-12): <i>Richfield</i> : There is no specific decision related to the Wright fishhook cactus. General special status species decisions and USFWS conservation measures apply. <i>Price</i> : There is no specific decision related to the Wright fishhook cactus. General special status species decisions and USFWS conservation measures apply.	Wright fishhook cactus (Endangered): Surveys would be required in all modeled habitat. Preclude surface-disturbing activities within 300 feet of occupied habitat.	Wright fishhook cactus (Endangered): Surveys would be required in all modeled habitat where there is moderate potential for occupation. The need for surveys would be determined on a case-by-case basis by the BLM. Preclude surface-disturbing activities within 300 feet of occupied habitat.	Same as Alternative C.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
SSS-11	<p><i>Price:</i> Migratory bird nesting areas will be closed seasonally from April 15 to August 1. Areas with migratory birds designated as BLM Special Status Species will have the highest priority.</p> <p><i>Richfield:</i> No similar action.</p> <p>Lessees/operators are given notice that surveys for nesting migratory birds may be required during migratory bird breeding season whenever surface disturbances and/or occupancy is proposed in association with fluid mineral exploration and development within priority habitats.</p>	<p>During nesting season for migratory birds (April 15-August 1), avoid surface-disturbing activities in occupied migratory bird habitat. Breeding season surveys would be required.</p>	Same as Alternative B.	Same as Alternative B.
Raptors				
SSS-12	<p>There are no lease stipulations for raptors. The Lessee/operator is given notice that raptor management would be guided by the use of Best Management Practices for Raptors and Their Associated Habitats in Utah (Utah BLM 2006, Appendix E “Best Management Practices for Raptors and Their Associated Habitats in Utah”), utilizing seasonal and spatial buffers, as recommend by the Utah Field Office of the USFWS (2002), as well as mitigation, to maintain and enhance raptor nesting and foraging habitat, while allowing other resource uses.</p>	<p>Apply seasonal restrictions (TL) and spatial buffers (CSU) on all known raptor nests in accordance with Utah Field Office Guidelines for Raptor Protection from Human and Land use Disturbances (USFWS 2002).</p> <p>In addition, operators would be required to mitigate unavoidable impacts to raptors and their habitats. The amount and type of mitigation should be based on losses in habitat value.</p>	Same as Alternative B.	Same as Alternative B.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
SSS-13	Bald Eagle (Sensitive): There are no lease stipulations for Bald Eagles. The lessee/operator is given notice that portions of their lease may contain Bald Eagle habitat. In Bald Eagle habitat, the lessee/operator may be required to follow avoidance and minimization measures and/or modify their Surface Use Plan of Operations to protect the Bald Eagles and/or habitat from surface disturbing activities.	See raptor stipulation above.	Same as Alternative B.	Same as Alternative B.
SSS-14	Golden Eagle (Sensitive): There are no lease stipulations for Golden Eagles. The lessee/operator is given notice that portions of their lease may contain Golden Eagle habitat. In Golden Eagle Habitat, the lessee/operator may be required to modify their Surface Use Plan of Operations to protect the Golden Eagles and/or habitat from surface disturbing activities.	See raptor stipulation above.	Same as Alternative B.	Same as Alternative B.
SSS-15	Ferruginous Hawk (Sensitive): There are no lease stipulations or notices specific to Ferruginous Hawk. The lessee/operator is also given general notice that lands may include raptor habitat and that spatial buffers will be placed on raptor nests in accordance with Utah Field Office Guidelines for Raptor Protection from Human and Land use Disturbances (USFWS 2002) and Best Management Practices for Raptors and their Associated Habitats in Utah (BLM 2006).	See raptor stipulation above.	Same as Alternative B.	Same as Alternative B.

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
SSS-16	<p>Burrowing Owl (Sensitive): There are no stipulations for burrowing owls. In burrowing owl habitat, a lease notice is applied notifying operators that modification to the Surface Use Plan of Operations may be required in order to protect the Burrowing Owl and/or habitat from surface disturbing activities in accordance with Section 6 of the lease terms, Endangered Species Act, and 43 CFR 3101.1-2.</p>	See raptor stipulation above.	Same as Alternative B.	Same as Alternative B.

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1 **Table 2-10. Vegetation**

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Objectives				
Minimize impacts to vegetative communities.				
Control invasive and non-native weed species and prevent the introduction of new invasive species.				
Management Actions By Alternative				
VEG-1	<p><i>Richfield:</i> The use and perpetuation of native species would be emphasized. However, when restoring or rehabilitating disturbed or degraded rangelands, non-intrusive, non-native plant species may be used where native species:</p> <ul style="list-style-type: none"> • Are not available • Are not economically feasible • Cannot achieve desired future conditions, desired plan communities, or other ecological objectives as well as non-native species, and/or • Cannot complete with already established non-native species • Non-native forbs and perennial grasses could be used in preference to monocultures of non-native annuals. <p><i>Price:</i> Promote the use of native plant species that are desirable for wildlife, livestock, watershed management, and other resource values while maintaining vegetation species diversity.</p>	<p>Native species would be use when restoring or rehabilitating disturbed areas.</p> <p>In addition, Apply BMPs from Appendix C for reclamation, soils, and noxious weeds.</p>	<p>Same as Alternative A.</p> <p>In addition, Apply BMPs from Appendix C for reclamation, soils, and noxious weeds.</p>	<p>Same as Alternative C.</p>
VEG-2	<p>Control noxious weed species and prevent the infestation and spread of invasive species. Develop cooperating agreements with other Federal, State, local, and private organizations to control invasive and noxious weed species.</p>	<p>Same as Alternative A.</p> <p>In addition, apply BMPs from Appendix C to control noxious weeds and invasive species.</p>	<p>Same as Alternative B.</p>	<p>Same as Alternative B.</p>

1 **Table 2-11. Visual Resources Management/Auditory Management (Soundscapes)**

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Visual Resources				
Objectives				
Manage public lands in a manner that protects the quality of scenic values.				
Management Actions By Alternative				
VRM-1	<p><i>Price:</i> Apply a CSU stipulation for mineral leasing to all areas designated as VRM Class II. This requires all surface disturbing activities to comply with BLM Manual Handbook 8431-1 to retain the existing character of the landscape.</p> <p><i>Richfield:</i> Apply a CSU stipulation for mineral leasing to all areas designated as VRM Class II. Surface disturbing activities must meet the objectives VRM class II. The level of change to the landscape should be low; management activities may be seen, but should not attract the attention of the casual observer. Any change to the landscape must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. Surface disturbing activities that are determined to be compatible and consistent resource values are exempted.</p>	<p>Apply an NSO stipulation to all areas inventoried as VRI Class II or designated (VRM) as Class II (Map 2-13).</p>	<p>Apply a CSU stipulation for oil and gas leasing to all areas designated as VRM Class II.</p> <p>Prior to authorizing any surface disturbing activity, a visual resource contrast rating would be completed in accordance with BLM Manual 8431. Mitigation measures would be identified to retain the existing character of the landscape.</p>	<p>Apply a CSU stipulation for oil and gas leasing to all areas inventoried as VRI Class II or designated as VRM Class II.</p> <p>Prior to authorizing any surface disturbing activity, a visual resource contrast rating would be completed in accordance with BLM Manual 8431. Mitigation measures would be identified to retain the existing character of the landscape.</p>

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
Auditory Management (Soundscapes)				
Objective				
Manage sensitive public lands to preserve soundscapes that enhance recreational experiences.				
Management Actions By Alternative				
AUD-1	No similar action. Auditory management was not specifically addressed. This means that BMPs or lease stipulations would not be applied to protect natural soundscapes.	Apply a planning area-wide CSU stipulation requiring that noise levels from production equipment do not exceed 45 decibels as measured at 350 feet from the source. Mitigate noise levels so there is no change in the natural ambient sound as recorded in Canyonlands National Park or Glen Canyon National Recreation Area. This stipulation applies to all phases of oil and gas operations and at all sites and facilities.	Mitigate noise levels so there is no change in the natural ambient sound as recorded in Canyonlands National Park or Glen Canyon National Recreation Area. This stipulation applies to all phases of oil and gas operations and at all sites and facilities.	Same as Alternative B.

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1 **Table 2-12. Wildlife and Fisheries**

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
<p>Objectives Maintain, protect, and enhance habitats to support natural wildlife diversity, reproductive capability, and a healthy, self-sustaining population of wildlife and fish species. Manage crucial, high-value, and unfragmented habitats as management priorities.</p>				
<p>Management Actions by Alternative</p>				
<p>WL-1</p>	<p><i>Price:</i> The Price RMP does not include any oil and gas stipulations related to pronghorn habitat. <i>Richfield RMP:</i> The Richfield RMP includes a stipulation that restricts surface disturbing activities in crucial pronghorn antelope habitat from May 15 through June 15 to protect the species during sensitive fawning seasons. However, according to the Richfield RMP, there are no mapped protected wildlife habitats (Richfield RMP Map 8) in the SRD MLP area.</p>	<p>Apply a TL stipulation restricting surface disturbing activities in crucial pronghorn antelope habitat from May 15 through June 15 to protect the species during sensitive fawning seasons (Map 2-14). In addition, apply BMPs for the protection of pronghorn during oil and gas development (Appendix C).</p>	<p>Same as Alternative B.</p>	<p>Same as Alternative B.</p>

Decision	Alternative A (No Action)	Alternative B	Alternative C	Alternative D
WL-2	No similar action.	<p>Apply a lease notice to inform the lessee/operator that compensatory mitigation may be required for all disturbances in crucial pronghorn habitat. Mitigation should be planned to offset the loss of habitat directly and indirectly affected by oil and gas operations.</p> <p>Offset the loss of important habitat by completing rehabilitation and enhancement projects in appropriate locations in the region or landscape.</p> <p>Habitat rehabilitation and enhancement projects may include, but are not limited to:</p> <ul style="list-style-type: none"> • Water developments Springs/seeps; • Wetland development Ponds/reservoirs; • Big game guzzlers; • Vegetation Enhancement • Wells/windmills for wildlife waters; • Seeding and planting of grasses and shrubs; • Fencing or fencing upgrades to protect or enhance wildlife habitats; or • Reclamation of previous disturbances, such as undesignated routes. 	Same as Alternative B.	Same as Alternative B.

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CHAPTER 3—AFFECTED ENVIRONMENT

3.1 INTRODUCTION

Chapter 3 describes the current conditions and trends for resources, resource uses, and social and economic values within the planning area. Information from this chapter will inform the analysis of impacts from implementation of the proposed alternatives presented in Chapter 2. The impacts analysis is presented in Chapter 4.

This chapter was developed using the best available data for each resource and resource use. The data have been gathered from a variety of sources, including the Bureau of Land Management (BLM) Price and Richfield Field Offices, other agencies, published and unpublished reports, databases, and websites. For some resources (e.g., lands with wilderness characteristics), the BLM has conducted new inventories in the planning area to inform the master leasing plan (MLP) process.

3.1.1 Planning Area Overview

The planning area for the San Rafael Desert MLP is approximately 526,174 acres and includes a portion of BLM-administered public lands and federal mineral estate managed by the BLM's Price and Richfield Field Offices in Emery and Wayne Counties (see Map 1-1). The planning area is located in the Colorado Plateau physiographic province. The nearest municipalities are the towns of Green River and Hanksville, Utah. The western boundary of the planning area is partially formed by State Route 24, and the eastern boundary is partially formed by the Green River. The southern boundary of the planning area abuts the Horseshoe Canyon unit of Canyonlands National Park, and the northern boundary borders the town of Green River. The planning area encompasses a mix of land uses, and includes an airport, a state wildlife management area, and generally undeveloped BLM-administered public lands used for livestock grazing, dispersed recreation, and other multiple uses. Table 3-1 lists the approximate acreages of private land, state-managed land, and federally managed land in the planning area.

Table 3-1. Landownership and Land Management in the Planning Area

Owner or Agency	Area (acres)*	Percentage*
Bureau of Land Management	451,134	85.7%
Private	12,204	2.3%
State sovereign lands	1,447	0.3%
Utah School and Institutional Trust Lands Administration	57,584	10.9%
State wildlife management area	3,521	0.7%

*Acreages and percentages are approximate and may not sum to the entire planning area.

3.2 AIR QUALITY

3.2.1 Introduction

The analysis area for impacts to air quality is the planning area, which encompasses approximately 525,000 acres of land, along with the states of Utah, Colorado, Arizona, and New Mexico. These states, which share regional air quality issues with the planning area, are included in the analysis area for the consideration of cumulative impacts.

1 **3.2.2 Resource Conditions and Trends**

2 **3.2.2.1 Ambient Air Quality**

3 **Criteria Air Pollutants**

4 The U.S. Environmental Protection Agency (EPA) established the National Ambient Air Quality
5 Standards (NAAQS) to limit the amount of air pollutants considered harmful to public health and the
6 environment. Primary and secondary standards have been set for six criteria pollutants: carbon monoxide
7 (CO), lead, nitrogen dioxide (NO₂),¹ ozone (O₃), sulfur dioxide (SO₂), and particulate matter (PM).
8 Ground-level O₃ is not directly emitted into the air but is created by chemical reactions between NO_x and
9 volatile organic compounds (VOCs) in the presence of sunlight. The primary standards provide public
10 health protection and also protect sensitive populations such as children and the elderly. Secondary
11 standards provide public welfare protection, which includes protection against decreased visibility and
12 damage to animals, crops, vegetation, and buildings (EPA 2016a). Table 3-2 shows the NAAQS.

13 Ground-level O₃ and PM are of particular concern in the southwestern United States. Although it can
14 occur naturally, O₃ is also formed under certain conditions through the reaction of its precursor gases
15 (nitrogen oxides [NO_x] and VOCs), which are emitted from power generation, oil and gas production,
16 wildfires, and other sources. Humans can experience health problems when exposed to O₃, and vegetation
17 that is sensitive to O₃ may have slowed growth, reduced photosynthesis, and an increased risk of disease
18 and damage (EPA 2016b). PM, also known as particle pollution, is a complex mixture of extremely small
19 dust, dirt, and soot particles. It is composed of coarse, inhalable particles (generally 10 micrometers in
20 diameter and smaller [PM₁₀]) and fine inhalable particles (generally 2.5 micrometers and smaller [PM_{2.5}]).
21 PM can be directly emitted from a source such as an unpaved road or formed in the atmosphere from
22 reactions of chemicals such as SO₂ and NO_x. PM can cause health effects in humans, with PM_{2.5} posing
23 the greater risk because of its ability to penetrate the lungs and possibly enter the bloodstream. PM_{2.5} is
24 also the main cause of reduced visibility (haze). PM can settle on vegetation, snow, or water and has
25 potential environmental effects such as depleting the nutrients in soil and making lakes and streams acidic
26 (EPA 2016c). Both O₃ and PM can be transported great distances, although elevated short-term, local
27 concentrations can also occur.

28 **Table 3-2. National Ambient Air Quality Standards**

Pollutant	Primary/ Secondary	Averaging Time*	Level	Form
CO	Primary	8 hours	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead	Primary and secondary	Rolling 3-month average	0.15 µg/m ³	Not to be exceeded

¹ EPA uses NO₂ as the indicator for the larger group of nitrogen oxides (oxides of nitrogen) or NO_x. However, emissions are usually reported as NO_x.

Pollutant		Primary/ Secondary	Averaging Time*	Level	Form
NO ₂		Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and secondary	1 year	53 ppb	Annual mean
O ₃		Primary and secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
PM	PM _{2.5}	Primary	1 year	12 µg/m ³	Annual mean, averaged over 3 years
		Secondary	1 year	15 µg/m ³	Annual mean, averaged over 3 years
		Primary and secondary	24 hours	35 µg/m ³	98 th percentile, averaged over 3 years
	PM ₁₀	Primary and secondary	24 hours	150 µg/m ³	Not to be exceeded more than once per year on average over 3 years
SO ₂		Primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

1 Source: EPA (2016a).

2 Notes: µg/m³ = microgram(s) per cubic meter; ppb = part(s) per billion; ppm = part(s) per million.

3 * Averaging time is the time period during which pollutant concentrations are measured and averaged.

4 Areas that do not comply with NAAQS requirements for criteria pollutants are considered nonattainment
5 areas. A particular geographic region may be designated an attainment area for some pollutants and a
6 nonattainment area for others. Comprehensive state plans to reduce pollutant concentrations are required
7 in nonattainment areas. Emery and Wayne Counties are currently in attainment with the NAAQS (EPA
8 2016d; Utah Division of Air Quality [DAQ] 2013). Compliance with the NAAQS is typically
9 demonstrated by monitoring for ground-level atmospheric air pollutant concentrations. The DAQ operates
10 and maintains a network of ambient air monitoring stations across the state to collect air quality data and
11 to evaluate compliance with the NAAQS. No air monitoring stations exist in Emery or Wayne Counties;
12 therefore, there are no air monitoring stations in the planning area.

13 An emissions inventory is a summary of emissions for a particular source during a given time period. The
14 DAQ compiles statewide emission inventories to assess the level of pollutants released into the air from
15 various sources. Table 3-3 summarizes criteria pollutant emissions in Emery and Wayne Counties from
16 the 2014 statewide emission inventory.

1 **Table 3-3. 2014 Criteria Pollutant Emissions in Emery and Wayne Counties by Source**

County	Source	Emissions (tons per year)					
		CO	NO _x	PM ₁₀	PM _{2.5}	SO _x	VOCs
Emery	Area Sources	157.7	254.7	3,332.0	374.3	0.7	148.1
	Area Sources: Oil and Gas	160.5	158.1	8.9	8.4	1.2	482.5
	Mobile Sources: Non-road	475.8	227.4	16.3	15.7	1.3	103.7
	Mobile Sources: On-road	2,270.0	1390.0	272.8	98.8	3.8	238.7
	Point Sources	7,146.0	18,372.6	1,516.4	752.7	6,420.1	208.3
	Biogenics	7,627.0	0.0	0.0	0.0	0.0	34,859.9
	Wildfires	0.0	0.0	0.0	0.0	0.0	0.0
	Total	17,837.0	20,402.8	5,146.4	1,249.9	6,427.1	36,041.2
Wayne	Area Sources	48.6	164.4	1,138.3	143.9	1.2	46.5
	Area Sources: Oil and Gas	0.0	0.0	0.0	0.0	0.0	0.0
	Mobile Sources: Non-road	785.8	35.2	12.1	11.2	0.1	288.4
	Mobile Sources: On-road	449.2	124.8	31.0	10.4	0.5	45.4
	Point Sources	0.0	0.0	0.0	0.0	0.0	0.0
	Biogenics	4,692.6	0.0	0.0	0.0	0.0	21,802.1
	Wildfires	0.0	0.0	0.0	0.0	0.0	0.0
	Total	5,976.2	324.4	1,181.3	165.5	1.9	22,182.4

2 *Source:* DAQ (2014a).

3 *Note:* Biogenics are emissions from natural, living sources such as vegetation and organisms.

4 As shown in Table 3-3, Emery County had higher criteria pollutant emissions than Wayne County in
 5 2014. Point sources are a large contributor to Emery County emissions. They consist of the Energy West
 6 Mining Company (Cottonwood Coal Prep Plant and Deer Creek Mine), Nielson Construction Company's
 7 Mill Flat Asphalt and Aggregate Pit, and PacifiCorp's Hunter Power Plant and Huntington Power Plant.
 8 The Hunter Power Plant and Huntington Power Plant are major sources of pollution in Emery County and
 9 the analysis area. No significant point sources exist in Wayne County (DAQ 2014b). Wayne County also
 10 has no emissions from the oil and gas industry, unlike Emery County. There are no active oil and gas
 11 wells in the planning area; all previously existing wells have been abandoned and plugged.

12 Naturally occurring and prescribed fires may occur in the planning area. Prescribed fire or controlled
 13 burning is an important management tool used to reduce the risk of large, uncharacteristically severe
 14 wildfires; increase public and firefighter safety; and meet multiple resource management objectives. Such
 15 objectives may include habitat restoration, maintenance of vegetation treatments, and restoration or
 16 maintenance of ecosystem health. However, because fire produces short-term air pollution (including PM,
 17 carbon dioxide [CO₂], O₃-forming chemicals, and VOCs), smoke management is a priority during

1 prescribed fires. Because of the type and quantity of vegetation in the planning area, wildfire is generally
 2 uncommon. No wildfire emissions are shown for either county in the 2014 emission inventory data.
 3 Historical emission inventories report wildfire emissions in Emery County in 2002 and 2005.

4 ***Ozone Conditions and Trends***

5 Although the planning area does not have any air quality monitoring stations, nearby stations provide
 6 information about O₃ current conditions and trends. The National Park Service (NPS) evaluated long-term
 7 trends in O₃ concentrations for 27 national parks using the annual fourth-highest 8-hour maximum O₃
 8 concentration, which reflects the form of the O₃ NAAQS. Of the three national parks near the planning
 9 area, only Canyonlands National Park was included in the evaluation. No significant upward or
 10 downward trends in O₃ concentrations were identified for this park from 1993 through 2008 (NPS 2010a).
 11 Table 3-4 summarizes O₃ monitoring data from Canyonlands National Park post-2008.

12 **Table 3-4. O₃ Concentrations in Canyonlands National Park, 2009–2015**

Year	O ₃ NAAQS (parts per million)		O ₃ Concentrations in Canyonlands National Park (parts per million)
	2008 NAAQS (in effect at the time of monitoring)	Current NAAQS (effective December 28, 2015)	
2009	0.075	0.070	0.068
2010	0.075	0.070	0.068
2011	0.075	0.070	0.069
2012	0.075	0.070	0.072
2013	0.075	0.070	0.066
2014	0.075	0.070	0.064
2015	0.075	0.070	0.065

13 *Source:* NPS (2015a).

14 *Note:* No data were available for Arches or Capitol Reef National Parks.

15 These data reflect a statistically significant improving trend in O₃ concentrations in Canyonlands National
 16 Park. The NPS indicates that human health risks from O₃ concentrations at Canyonlands National Park
 17 warrant moderate concern, based on several factors, including the 2011–2015 estimated O₃ concentration
 18 of 0.0691 parts per million. The NPS also indicates that the vegetation health risk warrants moderate
 19 concern (NPS 2014a).

20 **Hazardous Air Pollutants**

21 Hazardous air pollutants (HAPs), also known as toxic air pollutants, are known or suspected to cause
 22 cancer or other serious health effects, or adverse environmental effects. HAPs emitted by the oil and gas
 23 industry include benzene, toluene, ethyl benzene, mixed xylenes, formaldehyde, normal-hexane,
 24 acetaldehyde, and methanol. The EPA regulates 187 listed HAPs through emission standards, a risk and
 25 technology review program, mobile source rules, and other regulations.

26 The Clean Air Act (CAA) requires the EPA to publish a list of source categories that emit certain levels
 27 of HAPs. The list of source categories includes major sources emitting 10 tons per year (tpy) of any one
 28 HAP, or 25 tpy of any combination of HAPs, and area sources (i.e., smaller sources, such as dry
 29 cleaners). Section 112(d) of the CAA requires the EPA to promulgate regulations establishing emission
 30 standards (National Emission Standards for Hazardous Air Pollutants [NESHAPs]) for each listed source

1 category. The standards must require the maximum degree of emission reduction determined to be
 2 achievable by each particular source category, through the application of maximum achievable control
 3 technology (MACT). Different criteria for MACT apply to different sources. Source categories for which
 4 NESHAP (MACT) standards have been promulgated include oil and natural gas production facilities, and
 5 natural gas transmission and storage.

6 HAP pollutant emissions in Emery and Wayne Counties are included in the 2014 statewide emission
 7 inventory. No HAP emissions were reported for Wayne County. In Emery County, 45 HAPs were
 8 reported as being emitted from Nielson Construction Company’s Mill Flat Asphalt and Aggregate Pit and
 9 PacifiCorp’s Hunter Power Plant and Huntington Power Plant (DAQ 2014c). Table 3-5 shows HAP
 10 emissions in Emery County greater than 1,000 pounds per year or 0.5 tpy.

11 **Table 3-5. 2014 HAP Emissions in Emery County (greater than 0.5 tpy)**

HAP	Emery County Emissions (tpy)
Allyl chloride	0.7
Cyanide	8.6
Hydrochloric acid (hydrogen chloride)	34.2
Hydrofluoric acid (hydrogen fluoride)	45.9
Manganese (total suspended particulates)	0.5
Methyl bromide (bromomethane)	0.6
Methyl chloride (chloromethane)	1.8
Methyl hydrazine	0.6
Methylene chloride (dichloromethane)	1.0
Selenium (total suspended particulates)	0.8
Sulfuric acid	29.0

12 *Source: UDAQ (2014c).*

13 Hydrochloric acid, hydrofluoric acid, sulfuric acid, and cyanide constitute the largest HAP emissions in
 14 Emery County and are emitted from the Hunter and Huntington Power Plants.

15 **3.2.2.2 Air Quality–Related Values**

16 The Prevention of Significant Deterioration (PSD) is a CAA permitting program for new and modified
 17 major sources of air pollution that are located in attainment areas. It is designed to prevent NAAQS
 18 violations, preserve and protect air quality in sensitive areas, and protect public health and welfare. Under
 19 PSD regulations, the EPA classifies airsheds as Class I, Class II, or Class III. Congress designated certain
 20 existing areas as mandatory Class I areas, which preclude redesignation to a less restrictive class. Class I
 21 areas are those areas allowing for very little deterioration of air quality. They are areas of special national
 22 or regional natural, scenic, recreational, or historic value for which PSD regulations provide extra
 23 protection. Class II areas allow moderate deterioration, and Class III areas allow more deterioration. In all
 24 cases, pollutant concentrations cannot violate any of the NAAQS (NPS 1981).

25 A PSD increment prevents the air quality in clean areas from deteriorating and is the maximum allowable
 26 increase in ambient pollutant concentrations. Significant deterioration is said to occur when the amount of
 27 new pollution would exceed the applicable PSD increment (EPA 2016e). The allowable PSD increments
 28 of new pollution are very small in Class I areas.

1 Utah has five Class I areas (all national parks) (EPA 2016f). The closest Class I areas to the planning area
2 are as follows: Canyonlands National Park, approximately 3 miles to the southeast of the planning area
3 (the Horseshoe Canyon unit of Canyonlands National Park, which is separate from the main park
4 boundaries, is adjacent to the east border of the planning area); Arches National Park, approximately 22
5 miles east of the project area; and Capitol Reef National Park, approximately 24 miles west of the project
6 area. All portions of Utah outside Class I areas are designated Class II areas. The project area is located in
7 a Class II area. Industrial growth is allowed in these areas; however, the air quality will not be allowed to
8 degrade to the level of the NAAQS in many parts of the state where the air is exceptionally clean (Utah
9 Air Quality Board 2006).

10 PSD requirements are applicable to a source if it has the potential to exceed the major source thresholds
11 of either 100 or 250 tpy of a regulated pollutant, depending on the type of pollutant. For stationary source
12 categories listed in the regulation, the threshold is 100 tpy. For unlisted source categories, such as oil and
13 gas operations, the threshold is 250 tpy. At the projected amount of oil and gas development in the
14 reasonably foreseeable development scenario in the planning area (30 wells) (see Appendix A), PSD
15 regulations would not likely be triggered because such development would not have the potential to emit
16 250 tpy of any air pollutant.

17 An air quality-related value (AQRV) is defined as a resource “for one or more Federal areas that may be
18 adversely affected by a change in air quality. The resource may include visibility or a specific scenic,
19 cultural, physical, biological, ecological, or recreational resource” identified by a federal land manager for
20 a particular area” (Federal Land Manager’s Air Quality Related Values Work Group [FLAG] 2010). The
21 requirement to assess impacts to AQRVs is established in the PSD rules. The federal land manager for
22 each Class I area has the responsibility to define and protect the AQRVs at such areas, and to consider
23 whether new emissions from proposed major facilities (or modifications to major facilities) would have
24 an adverse impact on those values. Visibility is a common AQRV for national parks. Although the
25 planning area does not have any air quality monitoring stations, nearby stations in national parks provide
26 information about AQRV current conditions and trends.

27 **Visibility Conditions and Trends**

28 Section 169A of the CAA established a national visibility goal to prevent future visibility impairment and
29 remedy any existing impairment in national parks and wilderness areas (Class I areas). *Visibility* refers to
30 the clarity with which scenic vistas and landscape features are perceived at great distances. *Impairment*
31 refers to human-caused air pollution. In 1999, the EPA promulgated the Regional Haze Rule to address
32 regional haze, which refers to haze that impairs visibility in all directions over a large area. Haze forms
33 when sunlight encounters particle pollution in the air. The Regional Haze Rule calls for state and federal
34 agencies to work together to establish goals and emission reduction strategies to improve visibility in
35 Class I areas (EPA 2017a). States are required to address visibility in their state implementation plans.

36 Visibility is affected by pollutant concentrations in the air. PM pollution is the major cause of reduced
37 visibility in many federal mandatory Class I areas, with PM_{2.5} being most responsible for impacts (EPA
38 2001). The five key contributors to visibility impairment in the form of PM_{2.5} are sulfate, nitrate, organic
39 carbon, elemental carbon, and crustal material. Three metrics are typically used to describe visibility:
40 visual range (the greatest distance at which a large dark object can be seen against the background sky),
41 light extinction coefficient (the attenuation of light per unit distance due to the scattering and absorption
42 by gases and aerosols between the source and receptor), and the deciview (dv) haze index (derived from
43 calculated light extinction measurements) (EPA 2001). One dv represents the minimal perceptible change
44 in visibility to the average person, approximately a 10% change in light extinction. A dv scale is near zero
45 for a pristine atmosphere and increases as visibility degrades.

1 Interagency Monitoring of Protected Visual Environments (IMPROVE) is a visibility monitoring program
 2 that has been collecting data since 1987 to support the visibility protection regulations for mandatory
 3 Class I areas. The closest IMPROVE site to the planning area is in Canyonlands National Park.

4 The NPS evaluated long-term trends in visibility for 29 national parks using annual dv on the haziest and
 5 clearest days for the period of record for each park. Of the three national parks near the planning area,
 6 only Canyonlands National Park was evaluated. From 1990 through 2008, a statistically significant trend
 7 of improving air quality was noted at Canyonlands National Park on the haziest and clearest days.
 8 However, visibility at all of the analyzed parks suffered from at least some impairment, particularly on the
 9 haziest days. In addition, visibility conditions on the clearest days were also impaired, although to a lesser
 10 degree (NPS 2010a). Table 3-6 summarizes IMPROVE data at Canyonlands National Park post-2008.
 11 Data for Capitol Reef National Park are also included (similar data were not available for Arches National
 12 Park).

13 **Table 3-6. IMPROVE Visibility Data on the Haziest and Clearest Days in Canyonlands and**
 14 **Capitol Reef National Parks, 2009–2015**

Year	Canyonlands National Park		Capitol Reef National Park	
	Haziest Days* (dv)	Clearest Days* (dv)	Haziest Days (dv)	Clearest Days (dv)
2009	11.5	3.3	10.3	2.7
2010	10.7	2.7	9.6	2.1
2011	9.9	2.7	9.3	2.9
2012	11.6	3.2	11.8	2.4
2013	10.4	3.4	9.9	2.9
2014	9.1	2.6	9.1	2.1
2015	9.8	2.5	9.5	2.6

15 *Source:* NPS (2015b).

16 *Note:* For Canyonlands National Park, the natural condition (i.e., before human activities) haze index on the haziest days is 6.4 dv. The natural
 17 condition haze index for the clearest days is 1 dv. For Capitol Reef National Park, the natural condition haze index on the haziest days is 5.7 dv.
 18 The natural condition haze index for the clearest days is 1.2 dv.

19 * Haziest days are the 20% of days where visibility is most limited. Clearest days are the 20% of days where visibility is most clear.

20 IMPROVE data from 2006 through 2015 for Canyonlands National Park indicate that there is no
 21 statistically significant trend in visibility on the 20% of clearest days. However, visibility improved on the
 22 20% of haziest days during this time period. Overall, visibility shows impairment based on comparisons
 23 with the natural condition haze index (see Table 3-6 and table note) (NPS 2015b). For Capitol Reef
 24 National Park from 2006 through 2015, there is no statistically significant trend in visibility on the 20%
 25 of clearest days, but there is a statistically significant improving trend on the 20% of haziest days (NPS
 26 2014b). Visibility at Capitol Reef National Park is also impaired, as shown by comparisons with the
 27 natural condition haze index.

28 The NPS indicates that visibility at Canyonlands National Park warrants moderate concern, based on
 29 several factors, including the 2011–2015 estimated visibility on mid-range days of 2.7 dv above natural
 30 conditions (NPS 2016). Visibility effects at the park include a reduction of the average natural visual
 31 range from about 170 miles without pollution to approximately 130 miles with pollution, and a reduction
 32 of the visual range to below 80 miles on high-pollution days (NPS 2017a).

1 **Deposition Conditions and Trends**

2 Atmospheric deposition is the process by which airborne pollutants are deposited on the ground. These
3 pollutants include SO₂, NO_x, ammonia, and mercury. Wet deposition, commonly known as acid rain,
4 occurs when pollutants are deposited in combination with precipitation, such as rain, snow, fog, or hail.
5 Dry deposition of particles and gases can occur when chemicals are incorporated into dust or smoke in the
6 absence of moisture, and are then deposited on the earth’s surface by settling, impaction, or adsorption.
7 Atmospheric deposition of air pollutants can increase the acidity of soils and water resources (e.g., lakes
8 and streams). Dry and wet deposition are combined to estimate the total deposition of pollutants to the
9 earth’s surface.

10 **Wet Deposition**

11 The National Atmospheric Deposition Program (NADP) monitors wet deposition. The NPS used NADP
12 monitoring data to evaluate long-term trends in concentrations of ammonium, nitrate, and sulfate in wet
13 deposition for 29 national parks. Of the national parks near the planning area, only Canyonlands National
14 Park has an NADP monitor. From 1998 through 2008, a statistically significant degrading trend in
15 ammonium concentrations was noted at Canyonlands National Park. During this same time period, no
16 statistically significant trends at the park were noted for nitrate or sulfate concentrations in precipitation
17 (NPS 2010a). Table 3-7 summarizes NADP deposition data for Canyonlands National Park post-2008.

18 **Table 3-7. NDAP Wet Deposition Data for Canyonlands National Park, 2009–2015**

Year	Wet Atmospheric Deposition in Canyonlands National Park		
	Ammonium	Nitrate	Sulfate
	Precipitation Weighted Mean (milliequivalents per liter [µeq/L])		
2009	15.4	16.9	27.5
2010	10.8	13.7	8.0
2011	16.2	15.1	12.8
2012	12.9	13.2	8.4
2013	14.2	13.4	9.7
2014	16.6	12.5	8.7
2015	13.0	10.8	7.2

19 *Source:* NPS (2015c).

20 *Note:* No data were available for Arches or Capitol Reef National Parks.

21

22 The NDAP data from 2009 through 2015 indicate that there is no statistically significant trend for
23 ammonium in precipitation or sulfate in precipitation, but that the trend for nitrate in precipitation is
24 improving. The NPS indicates that wet nitrogen deposition warrants significant concern at Canyonlands
25 National Park, based on several factors, including the 2011–2015 estimated wet nitrogen deposition of 1.4
26 kilograms per hectare per year and the very highly sensitive ecosystems at the park. Wet sulfur deposition
27 is in good condition at Canyonlands National Park, based on factors including the 2011–2015 estimated
28 wet sulfur deposition of 0.6 kilograms per hectare per year (NPS 2015c).

1 **Dry Deposition**

2 The Clean Air Status and Trends network (CASTNet) monitors dry deposition of sulfur and nitrogen
3 species, as well as rural O₃ concentrations. The only CASTNet station near the planning area is in
4 Canyonlands National Park. Table 3-8 summarizes recent CASTNet dry deposition data for Canyonlands
5 National Park.

6 **Table 3-8. CASTNet Dry Deposition Data for Canyonlands National Park, 2009–2014**

Year	Dry Atmospheric Deposition in Canyonlands National Park	
	Total Dry Nitrogen Deposition* (kilograms of nitrogen per hectare)	Total Dry Sulfur Deposition† (kilograms of sulfur per hectare)
2009	0.71	0.17
2010	0.67	0.17
2011	0.67	0.17
2012	0.71	0.17
2013	0.72	0.17
2014	0.58	0.15

7 *Source:* EPA (2016g).

8 *Note:* No data were available for Arches or Capitol Reef National Parks.

9 * Includes dry nitric acid (HNO₃), dry ammonium (NH₄), and dry nitrate (NO₃).

10 † Includes dry SO₂ and dry sulfate (SO₄).

11 Table 3-8 shows that dry deposition of nitrogen and sulfur has been relatively unchanged or slightly
12 decreasing in Canyonlands National Park from 2009–2014; however, it is not known whether these trends
13 are statistically significant.

14 **3.3 CLIMATE CHANGE**

15 **3.3.1 Introduction**

16 *Global warming* refers to the ongoing rise in global average temperature near the Earth’s surface. It is
17 caused mostly by increasing concentrations of greenhouse gases (GHGs) (primarily CO₂, methane,
18 nitrous oxide [N₂O], and fluorinated gases) in the atmosphere, and it is changing climate patterns. *Climate*
19 *change* refers to any significant change in the measures of climate (e.g., temperature, precipitation, and
20 wind patterns) lasting for an extended period of time (EPA 2016h).

21 In 2010, the National Research Council concluded that “climate change is occurring, is caused largely by
22 human activities, and poses significant risks for a broad range of human and natural systems” (National
23 Research Council 2010). The Intergovernmental Panel on Climate Change (IPCC) states that “human
24 influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the
25 highest in history. Recent climate changes have had widespread impacts on human and natural systems”
26 (IPCC 2014). The IPCC also indicates that the effects of anthropogenic GHG emissions are “extremely
27 likely” to have been the dominant cause of observed warming since the mid-twentieth century (IPCC 2014).

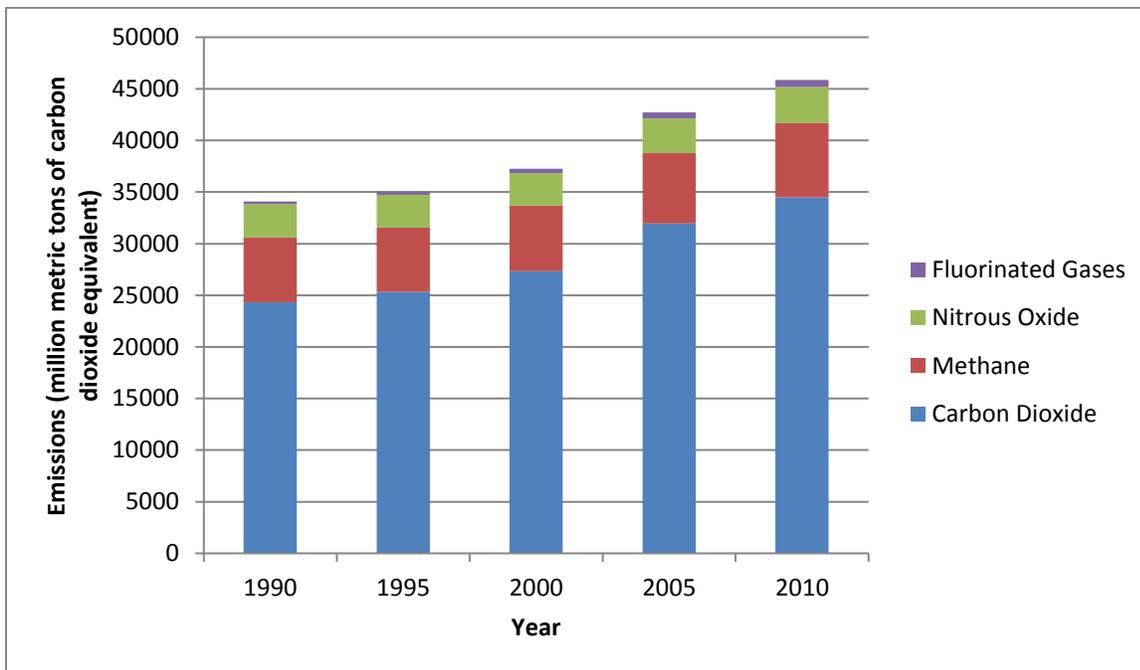
28 The buildup of GHGs in the atmosphere and the warming of the planet are causing increases in ocean
29 temperatures, sea level, and acidity; changes in temperature and precipitation patterns; melting of glaciers
30 and sea ice; changes in the frequency, intensity, and duration of extreme weather events; and shifts in

1 ecosystem characteristics (e.g., the length of growing seasons, timing of flower blooms, and migration of
2 birds). In addition, the changing climate has impacts on human health and well-being, such as heat-related
3 illnesses and deaths, the prolonging of allergy seasons, availability of water supplies, and the increased
4 spread of diseases such as Lyme disease and West Nile virus (EPA 2016i).

5 Secretarial Order No. 3289 directs the BLM and other Department of the Interior agencies to apply
6 scientific tools to address the impacts of climate change on water, land, and other natural and cultural
7 resources. In addition, the CEQ published final guidance in 2016 for federal departments and agencies on
8 considering GHG emissions and the effects of climate change in NEPA reviews. The guidance provides a
9 framework to consider both the effects of a proposed action on climate change, as indicated by its GHG
10 emissions, and the effects of climate change on a proposed action (CEQ 2016).

11 3.3.2 Global Conditions and Trends

12 CO₂ is the primary GHG emitted through human activities that contributes to climate change; it is
13 followed by methane, N₂O, and fluorinated gases (EPA 2016j). Figure 3-1 shows global GHG emissions
14 by gas from 1990 through 2010.



15
16 *Source:* EPA (2014).

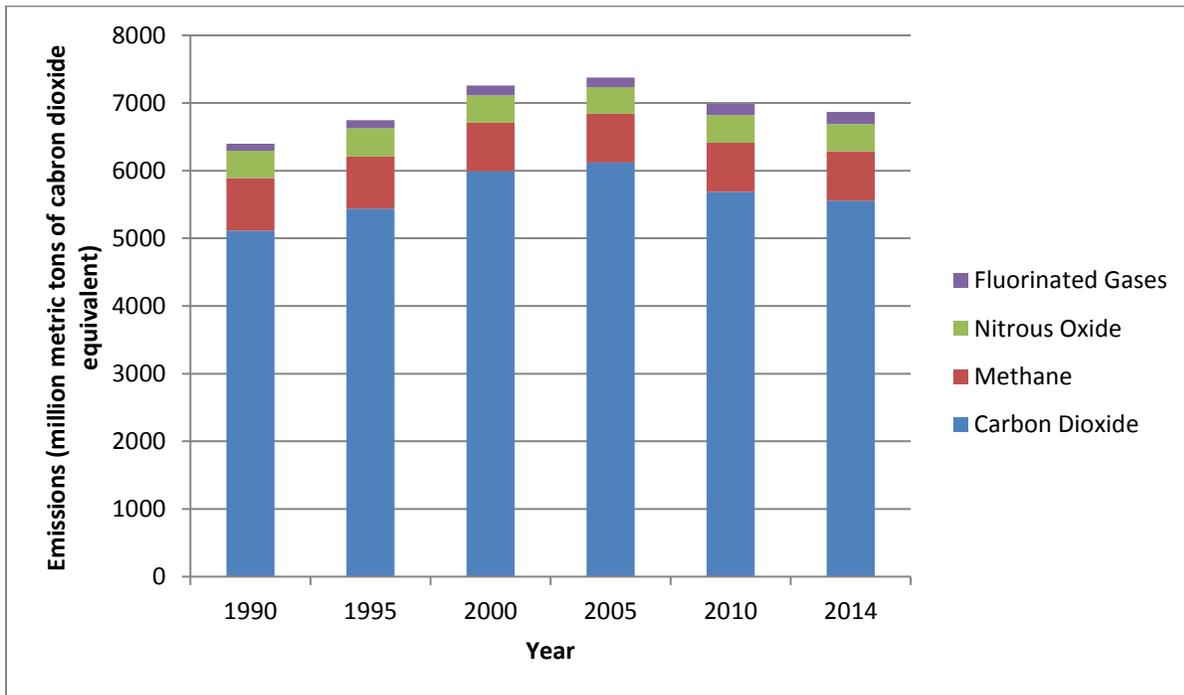
17 *Note:* The term carbon dioxide equivalent (CO₂e) is a metric measure used to compare emissions from various GHGs based on their global
18 warming potential. For any quantity and type of GHG, CO₂e represents the amount of CO₂ that would have the equivalent global warming
19 impact. The CO₂e for a gas is derived by multiplying the tons of the gas by the associated global warming potential.

20 **Figure 3-1. Global GHG emissions by gas, 1990–2010.**

21 As shown in Figure 3-1, global emissions of all major GHGs increased between 1990 and 2010. The
22 energy sector (energy production and use) was the largest contributor to global GHG emissions in 2010
23 (32,678 million metric tons of carbon dioxide equivalent [CO₂e], or about 71% of the total), followed by
24 agriculture (5,999 million metric tons of CO₂e, or about 13% of the total) (EPA 2014a). The majority of
25 emissions come from three regions: Asia, Europe, and the United States. These regions accounted for
26 88% of total global emissions in 2012 (EPA 2015).

1 **3.3.3 National and Regional Conditions and Trends**

2 Figure 3-2 shows U.S. GHG emissions by gas from 1990 through 2010.



3
4 **Figure 3-2. Greenhouse gas emissions in the United States from 1990 through 2010. Source: EPA**
5 **(2016k).**

6 As shown in Figure 3-2, CO₂ is the primary GHG emitted through human activities in the United States
7 that contributes to climate change. GHG emissions in the United States totaled 6,870 million metric tons
8 of CO₂e in 2014, which is a 7% increase since 1990 but a 7% decrease since 2005. During the period
9 from 1990 through 2014, CO₂ emissions increased by approximately 9%, methane emissions decreased
10 by 6%, N₂O emissions decreased by 1%, and fluorinated gas emissions increased by 77% (EPA 2016k).
11 Electricity generation was the largest contributor to U.S. GHG emissions in 2014 (2,081 million metric
12 tons of CO₂e), followed by transportation (1,810 million metric tons of CO₂e), and industry (1,462
13 million metric tons of CO₂e) (EPA 2014b).

14 In May 2014, the U.S. Global Change Research Program released *Climate Change Impacts in the United*
15 *States: The Third National Climate Assessment* (Assessment), a comprehensive report on climate change
16 and its impacts in the United States (Melillo et al. 2014). In the Assessment, the Southwest region
17 includes Arizona, California, Colorado, Nevada, New Mexico, and Utah. According to the Assessment,
18 the decade 2001–2010 was the warmest in the 110-year record for the Southwest region, with
19 temperatures almost 2 degrees Fahrenheit (°F) higher than historic averages and with fewer cold air
20 outbreaks and more heat waves. Regional annual average temperatures are projected to rise by 2.5°F to
21 5.5°F by 2041–2070, assuming continued growth in global emissions. Key climate change highlights for
22 this region include the following, excerpted directly from Chapter 20 of the Assessment:

- 23
- Snowpack and streamflow amounts are projected to decline in parts of the Southwest,
24 decreasing surface water supply reliability for cities, agriculture, and ecosystems.

- 1 • The Southwest produces more than half of the nation’s high-value specialty crops,
2 which are irrigation-dependent and particularly vulnerable to extremes of moisture,
3 cold, and heat. Reduced yields from increasing temperatures and increasing
4 competition for scarce water supplies will displace jobs in some rural communities.
- 5 • Increased warming, drought, and insect outbreaks, all caused by or linked to climate
6 change, have increased wildfires and impacts to people and ecosystems in the
7 Southwest. Fire models project more wildfire and increased risks to communities
8 across extensive areas.
- 9 • Flooding and erosion in coastal areas are already occurring even at existing sea levels
10 and damaging some California coastal areas during storms and extreme high tides. Sea
11 level rise is projected to increase as Earth continues to warm, resulting in major damage
12 as wind-driven waves ride upon higher seas and reach farther inland.
- 13 • Projected regional temperature increases, combined with the way cities amplify heat,
14 will pose increased threats and costs to public health in southwestern cities, which are
15 home to more than 90% of the region’s population. Disruptions to urban electricity and
16 water supplies will exacerbate these health problems. (Garfin et al. 2014)

17 **3.3.4 Utah Conditions and Trends**

18 Utah’s gross GHG emissions increased by 40% from 1990 to 2005, while national emissions rose by only
19 16% during this period. Based on these data, Utah’s GHG emissions appear to be rising at a faster rate
20 than those of the United States as a whole. Table 3-9 shows historical 2005 Utah GHG emissions and
21 projected 2020 Utah GHG emissions by sector.

22 **Table 3-9. Utah GHG Emissions by Sector**

Sector	Utah GHG Emissions (million metric tons of CO ₂ e)	
	2005 (Historical)	2020 (Projected)
Electricity Production	25.6	36.6
Residential/Commercial/Non-fossil Industry	12.2	16.3
Transportation	16.9	22.4
Fossil Fuel Industry	4.1	4.6
Industrial Processes	3.7	5.8
Waste Management	2.0	4.7
Agriculture	4.2	5.8
Total Gross Emissions	68.8	96.1

23 *Source:* Center for Climate Strategies (2007).

24 As shown in Table 3-9, Utah’s gross GHG emissions are projected to increase by 39.7% by 2020 from
25 2005 levels. The main source of Utah’s GHG emissions is electricity production, followed by
26 transportation.

27 Temperatures in the state of Utah have warmed by about 2°F in the past century. Heat waves are
28 becoming more common. Snow is melting earlier in spring, and the snowpack has been decreasing since
29 the 1950s. In the coming decades, the flow of water in Utah’s rivers is likely to decrease. Overall, the

1 changing climate is likely to increase the need for water but reduce the supply. The frequency and
2 intensity of wildfires are expected to increase, and the productivity of ranches and farms is expected to
3 decrease. Warmer and drier conditions may also increase the ability of pests and diseases to become
4 established (EPA 2016).

5 **3.4 SOIL RESOURCES**

6 The analysis area for soil resources is the subwatersheds (HUC 12) crossed by the planning area (Map 3-
7 1). This area covers approximately 901,313 acres. The analysis area was selected because it represents a
8 natural boundary within which changes to soils in the planning area could affect soils, water, vegetation,
9 or other resources on BLM-administered public lands.

10 Stable and productive soils provide the foundation for other resources and for resource uses. Soils are the
11 medium for plant growth and provide nourishment for nearly all terrestrial organisms, supporting a wide
12 variety of plant and animal communities within the planning area. Soils are derived primarily from the
13 geologic formations that occur throughout the planning area; from materials washed down by rivers and
14 streams; and from windblown sands and silts known as loess, residuum, colluvium, alluvium, aeolian
15 sands.

16 Soils are linked to nutrient and hydrologic cycles, energy flows, and other ecological processes. Soils in
17 the planning area can have well developed biological soil crusts. Biological crust communities can
18 provide significant protection from wind and water erosion. Disturbance of biological crusts affects most
19 soils, some more than others, depending on soil type and biotic community.

20 **3.4.1 Resource Conditions**

21 The planning area occurs entirely within the Colorado Plateau ecological province. Soils of the Colorado
22 Plateau are relatively young and undeveloped and are dominated by Aridisols and Entisols. The
23 distribution and occurrence of soils depends on a number of factors, including the interaction of relief
24 (slope), aspect, parent material (geology), living organisms, and climate.

25 The analysis area contains a variety of soil types, including soils that are sensitive in nature such as
26 moderately saline and highly erodible soils. Special management is necessary to protect sensitive soils
27 from accelerated erosion and associated degradation. These soils may be especially vulnerable to impacts
28 and harder to reclaim or restore after disturbance.

29 **3.4.1.1 Sensitive Soils**

30 **Wind Erodible Soils**

31 Some soils in the planning area are more susceptible than others to wind and water erosion. Although
32 these soils have naturally high rates of erosion, their erosion rates are easily accelerated by surface-
33 disturbing activities. Best management practices to protect soil stability include interim reclamation;
34 mulching bare ground with natural materials; and limiting or seasonally restricting surface-disturbing
35 activities such as grazing, off-road travel, and oil and gas and mineral exploration and development,
36 especially during drought conditions.

37 Soils are especially susceptible to wind erosion when plant cover and/or biological soil crust cover are
38 removed. A well-developed biological soil crust can prevent soil movement during high-wind events,
39 especially when interspersed between shrubs. Increases in wind-erosion rates increase regional dust
40 production, which can affect regional snowmelt conditions.

1 Within the analysis area, sandy soils have formed stabilized sand dunes. These dunes are sensitive to
2 disturbance and wind erosion, which could cause destabilization. Relying on a composite of NRCS
3 provisional soils data and Utah 1:500k geological maps, Map 2-9 shows areas of sandy soils susceptible
4 to erosion and dune destabilization. There are 355,985 acres of sandy soils highly susceptible to wind
5 erosion in in the analysis area and 303,070 acres within the planning area.

6 ***Wind Erosion and Fugitive Dust***

7 Increased dust levels are a national and regional concern, as windblown dust deposited on snow-covered
8 mountain peaks can cause earlier and faster snowmelt events. Earlier snowmelts can cause earlier peak
9 flows and result in lower water yields.

10 An implication of wind-borne sediment is its effect on snowpack in downwind mountain ranges and,
11 ultimately, on water yield to the Colorado River and its tributaries. Airborne dust that collects on
12 mountain snow decreases snow reflectance and accelerates spring snowmelt. For example, in 2009, the
13 San Juan Mountains experienced heavy fallout from spring dust storms; even though the snow pack was
14 average, spring snow melt was the earliest on record at 50 days earlier than normal (Painter et al. 2010).
15 Painter et al. (2010) modeled the impacts of dust on snow to estimate dust’s contribution to changes in
16 runoff in the Upper Colorado River Basin during the timeframe 1916 to 2003. The group found that while
17 modeled natural flow peaked in June and produced runoff into July, post-disturbance (present-day) runoff
18 increased in April, peaked in May, and dropped off in June.

19 The models by Painter et al. (2010) indicate that dust is reducing the flow of the Colorado River by 5%
20 (two times the annual allotment for Las Vegas). Early snowmelt from accumulated dust (26–50 days) is
21 greater than that predicted for temperature and precipitation changes from climate change (5–15 days).
22 The authors believe that regional efforts at dust abatement and soil stabilization could have a mitigating
23 effect on the runoff response of the Upper Colorado River as well as on future regional impacts of climate
24 change (Bryce 2012).

25 Potential sources of dust that may contribute to accelerated snowmelt were compiled as part of the
26 Colorado Plateau Rapid Ecoregional Assessment Report (Bryce 2012). The dataset shows a number of
27 factors that may contribute to dust production at a location, including areas around mines and oil/gas
28 wells, areas with low vegetation cover or with invasive annual vegetation, areas of recent disturbance,
29 unpaved roads, and areas with soils with high potential for wind erosion. A large portion of the planning
30 area was rated as having one to two factors that may contribute to dust production (Bryce 2012).

31 **Steep Slopes**

32 Surface disturbances such as road or well pad construction and large-truck traffic on steep slopes can
33 increase erosion and surface runoff rates. The analysis area contains 77,368 acres of steep slopes (slopes
34 greater than 30%), as shown on Map 2-10. The 2008 Price RMP does not allow new surface-disturbing
35 activities on slopes greater than 40%; surface-disturbing activities on slopes ranging from 21% to 40%
36 require an erosion-control strategy and topsoil segregation/restoration plan to be approved by the BLM
37 before construction. The 2008 Richfield RMP requires that projects involving construction on slopes
38 greater than 30% will be avoided. If an action cannot be avoided, rerouted, or relocated, then the proposed
39 project will include an erosion-control strategy, reclamation, and site plan, with a detailed survey and
40 design completed by a certified engineer. This proposed project must be approved by the BLM before
41 construction and maintenance.

42 **Saline Soils**

43 The analysis area contains approximately 56,186 acres of Mancos Shale–derived soils, which are known
44 to be moderately saline. Mancos Shale–derived soils occur along the northern portion of the planning
45 area, as shown on Map 2-9. Soils with moderate salinity content have naturally high erosion rates and

1 low reclamation potential. They are highly susceptible to surface disturbance, and their erosion rates are
2 easily accelerated. Erosion of saline soils affects the water quality of downstream watersheds, raising
3 salinity, selenium, and sediment loads and associated water chemistry parameters (TDS, Total
4 Suspended Solids, etc.).

5 **Biotic Soil Crusts**

6 Biotic soil crusts consist of mats or filaments of cyanobacteria, fungi, and lichen. Development of biotic
7 soil crust is strongly influenced by soil texture, soil chemistry, and soil depth. Crusts are more developed
8 in shallow, sandy, non-saline soils but can also be found throughout saline soil areas. They tend to be
9 commonly found associated with soils high in gypsum. Soil crust species richness varies by soil type and
10 parent material, with species richness higher on gypsiferous soils, non-calcareous sandy soils, and
11 limestone-derived soils. Many of the vegetative communities in the planning area have evolved with the
12 presence of biological soil crusts.

13 Biotic soil crusts play a major role in reducing water and wind erosion and in preventing the
14 establishment of invasive annual grasses. Biotic soil crusts fix atmospheric nitrogen and carbon, retain
15 soil moisture, and provide surface cover. Crust composition and level of abundance can be used to
16 determine the ecological history and condition of a site (BLM 2001).

17 Loss of biotic soil crust leads to reduced soil productivity, decreased plant cover and vigor, and increased
18 wind and water erosion. Severity, size, frequency, and timing of a surface-disturbing activity affect the
19 degree of impacts to biotic soil crusts. Fine-textured soils have faster crust recovery rates than coarse-
20 textured soils (BLM 2001). “Soil crust populations are degraded when mechanical disturbances such as
21 vehicular traffic, land clearing, or trampling disturb the soil surface. While any of these disturbances may
22 not directly eliminate soil crusts, repeated disturbance degrades and fragments crust cover and may keep
23 it in an early successional state” (BLM 2001; Bryce 2012).

24 Although soil crusts exist throughout the planning area, there are areas with high-density or well-
25 developed crusts or unusual crust components. Areas with higher potential for high-density or well-
26 developed crusts include shallow, sandy areas associated with rock outcrops.

27 **3.4.2 Resource Trends**

28 Soils within the planning area currently experience low levels of disturbance, and many previous BLM-
29 authorized surface disturbances there have been reclaimed. Surface disturbance from previous oil and gas
30 exploration and geophysical exploration has been largely reclaimed, as the last oil or gas well in the
31 planning area was drilled, plugged, and abandoned in 1989 and the last geophysical activities were
32 completed in 2007/2008. Relatively little development of new routes has occurred in the planning area
33 over the past 30 years. Ongoing livestock grazing may contribute to soil disturbance, especially in areas
34 where livestock congregate. Additionally, OHV use and other dispersed recreation may contribute to
35 localized impacts on soil resources.

36 **3.5 WATER RESOURCES**

37 **3.5.1 Resource Conditions**

38 The analysis area for water and riparian resources consists of the subwatersheds (HUC 12) crossed by the
39 planning area (Map 3-1). This area covers approximately 901,313 acres. The analysis area was selected
40 because it represents a natural boundary within which changes in water resources in the planning area
41 could affect water, riparian, wildlife, or other resources on BLM-administered public lands.

1 **3.5.1.1 Water**

2 **Surface Water**

3 Surface waters within the analysis area include the Green River, the San Rafael River, the Dirty Devil
4 River, intermittent streams and washes, and springs and seeps (Map 2-11). Numerous stock ponds and
5 small reservoirs within the analysis area seasonally provide water to livestock and wildlife. Many surface
6 waters have water rights associated with their uses; the water rights are managed by the State of Utah.

7 The 100-year floodplains of all perennial, intermittent, and ephemeral drainages are important
8 components of the surface water system, as they provide needed drainage for stormwater and large flash
9 floods within the analysis area. It is important to allow stormwater to flow through the drainage system
10 without accelerated erosion and/ or sedimentation. Unstable conditions can add sediments or other
11 pollutants to the naturally sediment-rich hydrologic systems, causing water-quality impairments within
12 the Colorado River Basin.

13 The UDEQ conducts monitoring of some of the surface water resources within the analysis area,
14 including the San Rafael, Green, Fremont, and Dirty Devil Rivers. UDEQ collects water chemistry data
15 such as temperature, dissolved oxygen, pH, TDS, and other parameters and also collects macro-
16 invertebrate samples. Using that monitoring data, UDEQ completes detailed assessments to determine the
17 conditions of those water resources and submits the information to the U.S. EPA every 2 years in the
18 Integrated Report or Utah's List of Impaired Waters. Currently the San Rafael River is the only water
19 body in the planning area that has been determined by the Utah Division of Water Quality (UDWQ) to be
20 impaired and not meeting state standards, while within the larger analysis area the Fremont and Dirty
21 Devil Rivers are on the impaired list.

22 **Rivers**

23 The Green River forms the eastern boundary of the planning area for almost 40 miles. The headwaters of
24 the Green River are located in Wyoming and northern Utah. The Green River's flows in the planning area
25 are dam controlled, with the Flaming Gorge Dam more than 100 miles upstream of the analysis area
26 providing the primary control. Streamflows have been measured by the USGS near the town of Green
27 River, Utah, just upstream of the planning area, since 1894. The average base flow in the analysis area is
28 about 3,000 cubic feet per second (cfs), with average daily stream flows ranging from 2,100 cfs in
29 December and January to 20,000 cfs in early June. In June 1917, stream flow at this site peaked at 68,000
30 cfs (USGS 2017a).

31 The San Rafael River begins at the confluence of Huntington, Cottonwood, and Ferron Creeks and flows
32 southeastward toward its confluence with the Green River. The San Rafael River is the last major
33 tributary of the Green River before the latter joins the Colorado River in Canyonlands National Park.
34 Except for brief, high-intensity monsoonal storms, stream flow within the San Rafael River depends upon
35 runoff from the nearby mountains. The average base flow in the analysis area is about 127 cfs, with
36 average daily stream flows ranging from 34 cfs in January to 600 cfs in early June (USGS 2017b).

37 The Dirty Devil River is in the southern portion of the analysis area, just outside the planning area. The
38 river forms at the confluence of the Fremont River and Muddy Creek and runs for approximately 80
39 miles, flowing southeast in the analysis area and then south to meet the Colorado River. Average daily
40 stream flows range from 36 to 160 cfs, with an average base flow of about 100 cfs (USGS 2017c).

41 **Streams**

42 Within the analysis area are 2,500 miles of intermittent streams and stream segments, with an additional
43 70 miles of perennial streams and stream segments that flow year round (Map 2-11). These streams are
44 mainly fed by springs and seeps, are enhanced seasonally by snowmelt and monsoonal flood flows, drain
45 the analysis area, and flow into the Green, Dirty Devil, and San Rafael Rivers. The named stream
46 segments within the analysis area and their watersheds are listed in Table 3-10.

1 **Table 3-10. Named Streams within the Analysis Area**

Watershed	Stream	Perennial/Intermittent	Miles within Analysis Area
Dugout Creek	Dugout Creek	Intermittent	18.90
Horseshoe Canyon	Barrier Creek	Perennial	20.10
Moonshine Wash	Antelope Valley Wash	Intermittent	21.20
Outlet Muddy Creek	Muddy Creek	Perennial	15.70
Outlet Muddy Creek	Wild Horse Creek	Intermittent	0.03
Upper Dirty Devil River	Fremont River	Perennial	0.10

2 ***Springs/Seeps***

3 Springs and seeps are important sources of water in isolated areas, providing water for wildlife and
 4 grazing as well as supporting riparian vegetation and wildlife habitats. These water sources are directly
 5 related to groundwater and are affected by changes to groundwater water quality conditions or flow
 6 conditions. Spring flows often have seasonal and annual variations with a delayed response to recharge
 7 conditions. This delay may be short term, with quick responses to drought conditions, or may be long
 8 term, with changes taking years to appear. Seep and spring locations are shown on Map 2-11.

9 ***100-Year Floodplains***

10 Washes and their associated floodplains convey stormwater runoff through the watersheds to the Green,
 11 Dirty Devil, and San Rafael Rivers. Each wash or drainage has an adjacent floodplain that is essential for
 12 conveying stormwater runoff, especially during substantial precipitation events. The 100-year floodplain
 13 is the floodplain that conveys stormwater runoff for a 100-year flood event, a flood event that has a 1%
 14 probability of occurring in any given year. Based on the expected 100-year flood flow rate in a given
 15 drainage, the 100-year floodplain is the area of inundation. The locations of these 100-year floodplains
 16 vary depending on topography, floodplain, and channel profile (widths, depths). Specific mapping of the
 17 100-year floodplains has not been completed in the planning area. However, modeling and analysis to
 18 identify the floodplain can be completed to inform the analysis and authorization of surface disturbances
 19 on BLM-administered public lands at the time surface use authorizations are requested. In order to protect
 20 floodplains and reduce erosion and associated sedimentation, the Price and Richfield Field Offices’
 21 ROD/RMPs restrict surface-disturbing activities within these 100-year floodplains.

22 **Surface Water Quality**

23 Natural processes and human actions influence the chemical, physical, and biological characteristics of
 24 surface water, which can vary seasonally. Indicators of water quality include but are not limited to:

- 25 • Chemical characteristics (e.g., pH, conductivity, dissolved oxygen, dissolved solids, salinity),
- 26 • Physical characteristics (e.g., suspended sediments, temperature, and turbidity), and
- 27 • Biological characteristics (e.g., macro-invertebrate communities, bacteria levels, algae and fish
 28 species).

1 Potential concerns with water quality within the analysis area can include high stream temperatures, low
2 dissolved-oxygen levels, high sediment loads, high nutrient levels, high levels of TDS, and salinity. High
3 stream temperatures and low dissolved-oxygen levels are associated with low stream flow conditions but
4 can result from lack of riparian vigor and shading. High sediment loads are often associated with natural
5 flood events but can be increased by surface disturbances upstream in the watershed.

6 ***Impaired Waters/ Total Maximum Daily Load Reports***

7 With sufficient data, UDEQ can determine whether a stream meets state standards. If a problem is
8 documented in a stream segment, that segment will be included by the State of Utah on the List of
9 Impaired Waters of Utah (303[d] list) submitted to the EPA every 2 years. Then a study will be required
10 to determine how to reduce pollutants and restore all beneficial uses. Such a study is called a Total
11 Maximum Daily Load (TMDL), and it establishes the maximum amount of a pollutant allowed in the
12 water while maintaining all of its designated beneficial uses. Three water bodies within the analysis area
13 were determined by UDEQ to be impaired: the San Rafael River, the Dirty Devil River, and the Freemont
14 River.

15 The San Rafael River, the only impaired water within the planning area, was listed in 2010 for
16 impairment to the OE bioassessment standard (comparing the observed macroinvertebrate composition to
17 what the expected macroinvertebrate composition would be without human influence on the river) and in
18 2016 for impairment to the TDS standard. A TMDL for the West Colorado Watershed Management Unit,
19 including the Price River, San Rafael River, and Muddy Creek, was approved by the State of Utah,
20 Division of Water Quality, in 2004 for TDS. The lower San Rafael River is considered to be non-
21 supporting of the Beneficial Use Class 4 - Agriculture. The criterion for TDS in streams is 1,200 mg/L for
22 waters for agricultural use. Mean TDS for the Lower San Rafael River is 2,549 mg/L (UDWQ 2004).
23 These high TDS concentrations are attributed to continual loading from natural sources, inflows, and
24 irrigation return flows. The San Rafael River was also included on the 303(d) list for the bioassessment
25 standard for not supporting Beneficial Use Classification 3C – Nongame fish and other aquatic life. A
26 TMDL for this classification has not been developed.

27 The Freemont River has an approved TMDL for the Freemont River Watershed, approved in 2002. The
28 Fremont River is considered to be non-supporting of the agricultural beneficial use classification because
29 the river has high levels of TDS. Mean TDS levels are 1,095, but 23% of the samples exceeded the
30 criterion of 1,200 mg/L. TDS levels generally exceed target levels only during the summer months, when
31 flow levels are low (UDWQ 2002).

32 The Dirty Devil River is also considered non-supporting of the agricultural beneficial use classification
33 because the river has high levels of TDS. The river does not have an approved TMDL.

34 ***Salinity***

35 High salinity levels in surface waters are a water quality concern of national significance recognized in
36 the Colorado River Basin Salinity Control Act of 1974. Salinity contributions are from both point sources
37 and nonpoint sources. During low-flow periods, salt contribution comes solely from point sources,
38 including seeps, springs, and groundwater flow. During high-flow periods, non-point sources, including
39 erosion of saline soils, become major contributors to salinity problems.

40 The primary nonpoint sources of salinity in the analysis area are the diffuse overland runoff from saline
41 soils and erosion and transport of saline soils during flow events. The Mancos Shale is recognized as the
42 largest contributor of nonpoint salinity in the Upper Colorado River Basin (Laronne 1977).
43 Approximately 56,186 acres of Mancos Shale-derived soils are in the northern portion of the analysis
44 area. Any surface disturbance on these soils increases erosion and associated salinity and sediment
45 loading to the Colorado River Basin, especially when the soils are wet and easily compacted.

1 **Groundwater**

2 Groundwater resources vary in quality, quantity, and depths throughout the analysis area. Groundwater is
3 the source of water for most springs and seeps as well as some streams in the analysis area, supporting
4 riparian resources and wildlife habitat. Groundwater wells within the analysis area provide water to
5 livestock and wildlife, while water wells in communities adjacent to the planning area are important
6 sources of public drinking water.

7 Changes to groundwater conditions such as water quality, quantity, or depth can affect surface water
8 resources over time. Likewise, groundwater resources, recharged by infiltration of snowmelt, rainwater,
9 and sometimes stream flows, can be affected by surface-water conditions and climatic variations.

10 ***Aquifers***

11 Of the geologic units present in the analysis area, five are considered to be major aquifers because of
12 their large areal extent or thickness or their potential for locally large yields to individual wells. These
13 units are the Entrada Sandstone, Navajo Sandstone, Wingate Sandstone, Coconino Sandstone, and rocks
14 of the Mississippian age. The Navajo Sandstone is regionally the most shallow and permeable and
15 contains the best quality water (Hood and Patterson 1984). Several other geologic units in the analysis
16 area also are aquifers, but they are restricted in potential development owing to their thinness,
17 distribution of permeable zones, or chemical quality of water. They include older alluvium, the Salt
18 Wash Sandstone Member of the Morrison Formation, the Curtis Sandstone, the Carmel Formation, and
19 the Moss Back Member of the Chinle Formation (Hood and Patterson 1984).

20 The Carmel Formation is also important to the groundwater hydrology of the area, as the unit is widely
21 exposed and can receive recharge directly. The formation overlies the Navajo Sandstone and can supply
22 water to or receive water from the Navajo Sandstone. The Carmel Formation also contains large amounts
23 of evaporates that contribute to the deterioration of the chemical quality of both groundwater and surface
24 waters in the area (Hood and Patterson 1984).

25 Groundwater recharge occurs from precipitation. Water use from groundwater is primarily for livestock
26 watering and mining use (Hood and Patterson 1984). No public water system facilities or groundwater
27 protection zones exist in the analysis area. Groundwater in the area is too saline for municipal use.

28 ***Monitoring***

29 Groundwater monitoring is under way within the analysis area and is conducted by the USGS Division of
30 Water Resources. The monitoring involves measuring artesian or pumped flows and water chemistry
31 parameters on select water wells in the analysis area. These wells are revisited on a regular basis over a
32 period of several years. The USGS has sampled a water well near State Route 24 and Lower San Rafael
33 Road several times in the past decade, measuring depth to water surface, which averages 326 feet below
34 land surface.

35 **Water Rights**

36 The administration of water rights is the responsibility of the Utah State Division of Water Rights. The
37 planning area is located in Water Right Area 93. There are a total of 306 active water-rights applications
38 filed on water sources, both groundwater and surface water sources, within the analysis area. The BLM
39 has 32 approved water right applications on water sources located on BLM lands (DEQ 2017). These
40 water rights are primarily used for livestock and wildlife purposes.

1 **3.5.1.2 Riparian**

2 Riparian and wetland areas are sensitive vegetative or physical ecosystems that develop in association
3 with surface or subsurface water (Leonard et al. 1992). Riparian/wetland habitats are fragile resources and
4 are often among the first landscape features to reflect impacts from management activities. These habitats
5 are used as indicators of overall land health and watershed condition. Healthy riparian systems filter and
6 purify water, reduce sediment loads and enhance soil stability, reduce destructive energies associated with
7 flood events, provide physical and thermal micro-climates in contrast to surrounding uplands, and
8 contribute to groundwater recharge and base flow (BLM 1991).

9 Riparian and wetland areas in the analysis area include but are not limited to areas adjacent to waterways
10 with either perennial or intermittent flows, areas with surface and/or subsurface water, springs, seeps, and
11 ponds. Riparian areas are recognized as “a form of wetland transition” between permanently saturated
12 wetlands and upland areas (Leonard et al. 1992). Riparian and wetland ecosystems are classified by type
13 based on hydrologic, geomorphologic, and biological factors (Cowardin et al. 1979).

14 Riparian resources account for 10,709 acres within the analysis area and 4,215 acres within the planning
15 area for a total of less than 1% of lands in the planning area (Map 2-11). The majority of these resources
16 are located along the Green River and the San Rafael River. Vegetation in the riparian areas consists of
17 the SWReGAP Invasive Southwest Riparian Woodland and Shrubland community, which is dominated
18 by introduced riparian woody species such as tamarisk and Russian olive (*Eleagnus angustifolius*), and
19 the Rocky Mountain Lower Montane Riparian Woodland and Shrubland community, which is typically
20 dominated by trees such as Fremont cottonwood (*Populus fremontii*), willow species (*Salix* spp.), and
21 box elder (*Acer negundo*), as well as sedges, rushes, and grasses.

22 Tamarisk are invasive trees that have become established on many rivers, tributaries, and drainages
23 throughout the West. Tamarisk out-compete native species, forming dense monocultures that crowd and
24 shade out native riparian forage, resulting in reduced plant and wildlife diversity. Tamarisk establishes
25 dense communities in corridors bordering the riparian waterways that close off access to recreational
26 opportunities such as fishing and bird watching. Dense thickets produce an aggressive fuels accumulation
27 and create wildfire hazards along drainages and rivers. Tamarisk have had a negative impact on the San
28 Rafael River, including loss of habitat biodiversity, aggressive fuels accumulation, and river channel
29 narrowing. Tamarisk are concentrated along the San Rafael River and floodplain. The density of the
30 tamarisk result in is minimal native vegetation in the associated understory. The tamarisk beetle
31 (*Diorahbda elongata*) has existed in the project area for several years and has defoliated and continues to
32 defoliate the majority of the tamarisk. In some areas where the tamarisk beetle has defoliated the
33 tamarisk, willows are starting to reestablish on the banks of the river.

34 Both the Price and Richfield Field Offices’ ROD/RMPs include decisions to avoid surface-disturbing
35 activities near springs and riparian areas. The Richfield Field Office ROD/RMP specifies no disturbance
36 within 100 m (330 feet) of natural springs, and the Price Field Office ROD/RMP states that a 200-m (660-
37 foot) buffer will be maintained around springs. The Price Field Office ROD/RMP also specifies no
38 surface disturbance within 100 m of riparian areas, floodplains, springs, or other water features. These
39 decisions apply to all oil and gas exploration, drilling, and development activities, including access roads
40 and pipelines.

41 **3.5.2 Resource Trends**

42 **3.5.2.1 Water**

43 Surface water in the analysis area continues to be used for agriculture and recreation. Water quality
44 conditions have remained steady. A TMDL was developed for the San Rafael River in 2004 for TDS, but
45 the river has remained on the 303(d) list for non-attainment of that standard. Agricultural use upstream of
46 the analysis area is one of the main contributors of TDS.

1 Groundwater use remains low in the analysis area, as the water is too saline for domestic purposes. With
2 few uses in the analysis area, water quality is not heavily monitored and likely remains steady.

3 **3.5.2.2 Riparian**

4 In 2015, BLM began implementing the San Rafael River Restoration Project. The project was designed to
5 improve the ecological condition of the lower San Rafael River, which has degraded severely over time
6 through a combination of impacts, including altered flow regimes and non-native vegetation
7 encroachment. Implementation of the project will improve the riparian habitat in the planning area.

8 **3.6 VEGETATION**

9 The analysis area for vegetation resources is the subwatersheds (HUC 12) crossed by the planning area
10 (Map 3-1). The analysis area covers approximately 901,313 acres and was selected because it represents a
11 natural boundary within which changes in vegetation within the planning area could affect soil, water,
12 other vegetation, or other resources on BLM-administered public lands.

13 Vegetation in the planning area provides benefits for wildlife and livestock such as forage and browse,
14 cover, and nesting habitat for a variety of wildlife species. Vegetation also functions in the hydrologic
15 cycle as a dynamic interface between the soil and atmosphere. It intercepts precipitation, retards overland
16 flow, retains soil moisture and nutrients (root absorption), and transports water and nutrients back to the
17 atmosphere via stems and leaves (evapotranspiration). Vegetation is also contributes to the aesthetic
18 setting for visitors to the planning area.

19 The State of Utah is divided into five major eco-regions determined by geographic and climatic similarity.
20 The planning area occurs entirely within the Colorado Plateau eco-region. The climate and geology of the
21 Colorado Plateau allow for the growth of many endemic and rare plant species and, thus, a substantial
22 amount of biodiversity.

23 **3.6.1 Resource Conditions**

24 **3.6.1.1 Vegetation Communities**

25 Vegetation communities across the analysis area were identified using land cover data developed by the
26 Southwest Regional Gap Analysis Project (SWReGAP) (Prior-Magee et al. 2007). SWReGAP land cover
27 data were intended to be used for depicting the distribution of various land cover types at scales of
28 1:100,000 or smaller. While adequate for characterizing land cover and vegetation over large areas, these
29 data are less accurate when viewed for smaller, localized areas.

30 The land cover types within the planning area are listed in Table 3-11 and are displayed on Map 3-2.
31 Cover types are described in the sections following Table 3-11 (USGS 2005). The cover types that do not
32 have significant native vegetation (Open Water, Disturbed, and Developed areas) are presented in the
33 table but are not discussed in this document.

1 **Table 3-11. Land Cover Types in the Vegetation Analysis Area**

Land Cover Type	Planning Area (acres)	Analysis Area (acres)	Analysis Area (percentage)
Agriculture	20	559	0.1%
Colorado Plateau Blackbrush-Mormon-Tea Shrubland	229,652	314,179	34.9%
Colorado Plateau Mixed Bedrock Canyon and Tableland	37,080	134,509	14.9%
Colorado Plateau Pinyon-Juniper Shrubland	1,802	19,592	2.2%
Colorado Plateau Pinyon-Juniper Woodland	415	2,432	0.3%
Developed, Medium - High Intensity	466	870	0.1%
Developed, Open Space - Low Intensity	104	505	0.1%
Disturbed, Oil Well	7	61	0.0%
Inter-Mountain Basins Active and Stabilized Dune	113,419	147,950	16.4%
Inter-Mountain Basins Big Sagebrush Shrubland	115	5,566	0.6%
Inter-Mountain Basins Greasewood Flat	12,570	19,928	2.2%
Inter-Mountain Basins Mat Saltbush Shrubland	56,032	105,269	11.7%
Inter-Mountain Basins Mixed Salt Desert Scrub	9,407	20,734	2.3%
Inter-Mountain Basins Semi-Desert Grassland	15,779	26,230	2.9%
Inter-Mountain Basins Semi-Desert Shrub Steppe	10,100	20,601	2.3%
Inter-Mountain Basins Shale Badland	9,796	30,014	3.3%
Invasive Annual and Biennial Forbland	1,495	2,770	0.3%
Invasive Annual Grassland	3	22	0.0%
Invasive Southwest Riparian Woodland and Shrubland	4,043	9,523	1.1%
Open Water	956	3,815	0.4%
Rocky Mountain Cliff and Canyon	0	7	0.0%
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	0	12	0.0%
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	173	1,186	0.1%
Southern Colorado Plateau Sand Shrubland	22,743	34,978	3.9%

2 **Agriculture**

3 The agriculture landcover type includes both pasture/hay (areas of grasses, legumes, or grass-legume
4 mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial
5 cycle, where pasture/hay vegetation accounts for greater than 20% of total vegetation) and Cultivated
6 crops (areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and
7 cotton, and also perennial woody crops such as orchards and vineyards, where crop vegetation accounts
8 for greater than 20% of total vegetation). This cover type also includes all land being actively tilled.

1 **Colorado Plateau Blackbrush-Mormon-Tea Shrubland**

2 This ecological system occurs on the Colorado Plateau on benchlands, colluvial slopes, pediments, or
3 bajadas. Elevation ranges from 560 to 1,650 m above sea level. Substrates are shallow, typically
4 calcareous, non-saline, and gravelly or sandy soils over sandstone or limestone bedrock, caliche, or
5 limestone alluvium. This ecological system also occurs in deeper soils on sandy plains where it may have
6 invaded desert grasslands. The vegetation is characterized by extensive open shrublands dominated by
7 *Coleogyne ramosissima* often with *Ephedra viridis*, *Ephedra torreyana*, or *Grayia spinosa*. Sandy
8 portions may include *Artemisia filifolia* as codominant. The herbaceous layer is sparse and composed of
9 graminoids such as *Achnatherum hymenoides*, *Pleuraphis jamesii*, or *Sporobolus cryptandrus*.

10 **Colorado Plateau Mixed Bedrock Canyon and Tableland**

11 The distribution of this ecological system is centered on the Colorado Plateau where it is composed of
12 barren and sparsely vegetated landscapes (generally <10% plant cover) of steep cliff faces, narrow
13 canyons, and open tablelands of predominantly sedimentary rocks, such as sandstone, shale, and
14 limestone. Some eroding shale layers similar to Inter-Mountain Basins Shale Badland may be interbedded
15 between the harder rocks. The vegetation is characterized by very open tree canopy or scattered trees and
16 shrubs with a sparse herbaceous layer. Common species includes *Pinus edulis*, *Pinus ponderosa*,
17 *Juniperus* spp., *Cercocarpus intricatus*, and other short-shrub and herbaceous species that utilize moisture
18 from cracks and pockets where soil accumulates.

19 **Colorado Plateau Pinyon-Juniper Shrubland**

20 This ecological system is characteristic of the rocky mesa tops and slopes on the Colorado Plateau and
21 western slope of Colorado, but these stunted tree shrublands may extend farther upslope along the low-
22 elevation margins of taller pinyon-juniper woodlands. Sites are drier than those in the Colorado Plateau
23 Pinyon-Juniper Woodland. Substrates are shallow and rocky with shaley soils at lower elevations (1,200–
24 2,000 m). Localized patches of this system grade into Colorado Plateau Mixed Bedrock Canyon and
25 Tableland. The vegetation is dominated by dwarfed (usually <3 m tall) *Pinus edulis* and/or *Juniperus*
26 *osteosperma* trees forming extensive, tall shrublands in the region along low-elevation margins of pinyon-
27 juniper woodlands. Other shrubs may include *Artemisia nova*, *Artemisia tridentata* ssp. *wyomingensis*,
28 *Chrysothamnus viscidiflorus*, and *Coleogyne ramosissima*. Herbaceous layers are sparse to moderately
29 dense and typically composed of xeric graminoids.

30 **Colorado Plateau Pinyon-Juniper Woodland**

31 This ecological system occurs in the dry mountains and foothills of the Colorado Plateau including the
32 Western Slope of Colorado to the Wasatch Range, south to the Mogollon Rim and east into the
33 northwestern corner of New Mexico. It is typically found at lower elevations ranging from 1,500 to 2,440
34 m above sea level. These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and
35 ridges. Severe climatic events, such as freezing temperatures and drought, that occur during the growing
36 season are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal
37 belts on mountainsides. Soils supporting this system vary in texture ranging from stony, cobbly, gravelly
38 sandy loams to clay loam or clay. *Pinus edulis* and/or *Juniperus osteosperma* dominate the tree canopy. In
39 the southern portion of the Colorado Plateau in northern Arizona and northwestern New Mexico,
40 *Juniperus monosperma* and hybrids of *Juniperus* spp. may dominate or codominate the tree canopy.
41 *Juniperus scopulorum* may codominate or replace *Juniperus osteosperma* at higher elevations.
42 Understory layers are variable and may be dominated by shrubs or graminoids, or may be absent.
43 Associated species include *Arctostaphylos patula*, *Artemisia tridentata*, *Cercocarpus intricatus*,
44 *Cercocarpus montanus*, *Coleogyne ramosissima*, *Purshia stansburiana*, *Purshia tridentata*, *Quercus*
45 *gambelii*, *Bouteloua gracilis*, *Pleuraphis jamesii*, or *Poa fendleriana*. This system occurs at higher

1 elevations than Great Basin Pinyon-Juniper Woodland and Colorado Plateau shrubland systems where
2 sympatric.

3 **Inter-Mountain Basins Active and Stabilized Dune**

4 This ecological system occurs in Intermountain West basins and is composed of unvegetated to
5 moderately vegetated (<10%–30% plant cover) active and stabilized dunes and sandsheets. Species
6 occupying these environments are often adapted to shifting, coarse-textured substrates (usually quartz
7 sand) and form patchy or open grasslands, shrublands, or steppe composed of *Achnatherum hymenoides*,
8 *Artemisia filifolia*, *Artemisia tridentata* ssp. *tridentata*, *Atriplex canescens*, *Ephedra* spp., *Coleogyne*
9 *ramosissima*, *Ericameria nauseosa*, *Leymus flavescens*, *Prunus virginiana*, *Psoralidium lanceolatum*,
10 *Purshia tridentata*, *Sporobolus airoides*, *Tetradymia tetrameres*, or *Tiquilia* spp.

11 **Inter-Mountain Basins Big Sagebrush Shrubland**

12 This ecological system occurs throughout much of the western United States, typically in broad basins
13 between mountain ranges, plains, and foothills at elevations between 1,500 and 2,300 m above sea level.
14 Soils are typically deep, well drained, and non-saline. These shrublands are dominated by *Artemisia*
15 *tridentata* ssp. *tridentata* and/or *Artemisia tridentata* ssp. *wyomingensis*. Scattered *Juniperus* spp.,
16 *Sarcobatus vermiculatus*, and *Atriplex* spp. may be present in some stands. *Ericameria nauseosa*,
17 *Chrysothamnus viscidiflorus*, *Purshia tridentata*, or *Symphoricarpos oreophilus* may codominate
18 disturbed stands. Perennial herbaceous components typically contribute less than 25% vegetative cover.
19 Common graminoid species include *Achnatherum hymenoides*, *Bouteloua gracilis*, *Elymus lanceolatus*,
20 *Festuca idahoensis*, *Hesperostipa comata*, *Leymus cinereus*, *Pleuraphis jamesii*, *Pascopyrum smithii*, *Poa*
21 *secunda*, or *Pseudoroegneria spicata*.

22 **Inter-Mountain Basins Greasewood Flat**

23 This ecological system occurs throughout much of the western United States in Intermountain basins and
24 extends onto the western Great Plains. It typically occurs near drainages on stream terraces and flats or
25 may form rings around more sparsely vegetated playas. Sites typically have saline soils and a shallow
26 water table; they may flood intermittently but remain dry for most growing seasons. The water table
27 remains high enough to maintain vegetation, despite salt accumulations. This system usually occurs as a
28 mosaic of multiple communities, with open to moderately dense shrublands dominated or codominated by
29 *Sarcobatus vermiculatus*. *Atriplex canescens*, *Atriplex confertifolia*, or *Krascheninnikovia lanata* may be
30 present to codominant. Occurrences are often surrounded by mixed salt desert scrub. The herbaceous
31 layer, if present, is usually dominated by graminoids. There may be inclusions of *Sporobolus airoides*,
32 *Distichlis spicata* (where water remains ponded the longest), or *Eleocharis palustris*.

33 **Inter-Mountain Basins Mat Saltbush Shrubland**

34 This ecological system occurs on gentle slopes and rolling plains on the northern Colorado Plateau and in
35 the Uinta Basin on Mancos Shale and in arid, wind-swept basins and plains across parts of Wyoming.
36 Substrates are shallow, typically saline, alkaline, fine-textured soils developed from shale or alluvium and
37 may be associated with shale badlands. Infiltration rate is typically low. These landscapes typically
38 support dwarf-shrublands composed of relatively pure stands of *Atriplex* spp. such as *Atriplex corrugata*
39 or *Atriplex gardneri*. Other dominant or codominant dwarf-shrubs may include *Artemisia longifolia*,
40 *Artemisia pedatifida*, or *Picrothamnus desertorum*, sometimes with a mix of other low shrubs such as
41 *Krascheninnikovia lanata* or *Tetradymia spinosa*. *Atriplex confertifolia* or *Atriplex canescens* may be
42 present, but they do not codominate. The herbaceous layer is typically sparse. Scattered perennial forbs
43 occur, such as *Xylorhiza glabriuscula* and *Sphaeralcea grossulariifolia*, and the perennial grasses
44 *Achnatherum hymenoides*, *Bouteloua gracilis*, *Elymus elymoides*, *Elymus lanceolatus* ssp. *lanceolatus*,
45 *Pascopyrum smithii*, or *Sporobolus airoides* may dominate the herbaceous layer. In less-saline areas,

1 there may be inclusions grasslands dominated by *Hesperostipa comata*, *Leymus salinus*, *Pascopyrum*
2 *smithii*, or *Pseudoroegneria spicata*. In Wyoming and possibly elsewhere, inclusions of non-saline,
3 gravelly barrens or rock outcrops dominated by cushion plants such as *Arenaria hookeri* and *Phlox hoodii*
4 without dwarf-shrubs may be present. Annuals are seasonally present and may include *Eriogonum*
5 *inflatum*, *Plantago tweedyi*, and the introduced annual grass *Bromus tectorum*.

6 **Inter-Mountain Basins Mixed Salt Desert Scrub**

7 This extensive ecological system includes open-canopied shrublands of typically saline basins, alluvial
8 slopes, and plains across the Intermountain western United States. This type also extends in limited
9 distribution into the southern Great Plains. Substrates are often saline and calcareous, medium- to fine-
10 textured, alkaline soils, but they include some coarser-textured soils. The vegetation is characterized by a
11 typically open to moderately dense shrubland composed of one or more *Atriplex* species such as *Atriplex*
12 *confertifolia*, *Atriplex canescens*, *Atriplex polycarpa*, or *Atriplex spinifera*. Other shrubs that codominate
13 may include *Artemisia tridentata* ssp. *wyomingensis*, *Chrysothamnus viscidiflorus*, *Ericameria nauseosa*,
14 *Ephedra nevadensis*, *Grayia spinosa*, *Krascheninnikovia lanata*, *Lycium* spp., *Picrothamnus desertorum*,
15 or *Tetradymia* spp. *Sarcobatus vermiculatus* is generally absent but, if present, does not codominate. The
16 herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids such
17 as *Achnatherum hymenoides*, *Bouteloua gracilis*, *Elymus lanceolatus* ssp. *lanceolatus*, *Pascopyrum*
18 *smithii*, *Pleuraphis jamesii*, *Pleuraphis rigida*, *Poa secunda*, or *Sporobolus airoides*. Various forbs are
19 also present.

20 **Inter-Mountain Basins Semi-Desert Grassland**

21 This widespread ecological system occurs throughout the Intermountain western United States on dry
22 plains and mesas at elevations ranging from 1,450 m to 2,320 m. These grasslands occur in lowland and
23 upland areas and may occupy swales, playas, mesa tops, plateau parks, alluvial flats, and plains, but sites
24 are typically xeric. Substrates are often well-drained sandy or loamy soils derived from sedimentary
25 parent materials but are quite variable and may include fine-textured soils derived from igneous and
26 metamorphic rocks. The dominant perennial bunch grasses and shrubs within this system are all very
27 drought resistant. These grasslands are typically dominated or codominated by *Achnatherum hymenoides*,
28 *Aristida* spp., *Bouteloua gracilis*, *Hesperostipa comata*, *Muhlenbergia* sp., or *Pleuraphis jamesii*, and
29 may include scattered shrubs and dwarf-shrubs of species of *Artemisia*, *Atriplex*, *Coleogyne*, *Ephedra*,
30 *Gutierrezia*, or *Krascheninnikovia lanata*.

31 **Inter-Mountain Basins Semi-Desert Shrub Steppe**

32 This ecological system occurs throughout the Intermountain western United States, typically at lower
33 elevations on alluvial fans and flats with moderate to deep soils. This semi-arid shrub-steppe is typically
34 dominated by graminoids (>25% cover) with an open shrub layer. Characteristic grasses include
35 *Achnatherum hymenoides*, *Bouteloua gracilis*, *Distichlis spicata*, *Hesperostipa comata*, *Pleuraphis*
36 *jamesii*, *Poa secunda*, and *Sporobolus airoides*. The woody layer is often a mixture of shrubs and dwarf-
37 shrubs. Characteristic species include *Atriplex canescens*, *Artemisia tridentata*, *Chrysothamnus Greenei*,
38 *Chrysothamnus viscidiflorus*, *Ephedra* spp., *Ericameria nauseosa*, *Gutierrezia sarothrae*, and
39 *Krascheninnikovia lanata*. *Artemisia tridentata* may be present but does not dominate. The general aspect
40 of occurrences may be either open shrubland with patchy grasses or a patchy open herbaceous layer.
41 Disturbance may be important in maintaining the woody component. Microphytic crust is very important
42 in some stands.

1 **Inter-Mountain Basins Shale Badland**

2 This widespread ecological system of the Intermountain western United States is composed of barren and
3 sparsely vegetated substrates (<10% plant cover) typically derived from marine shales, but it also includes
4 substrates derived from siltstones and mudstones (clay). Landforms are typically rounded hills and plains
5 that form a rolling topography. The harsh soil properties and high rate of erosion and deposition are
6 driving environmental variables supporting sparse dwarf-shrubs (e.g., *Atriplex corrugata*, *Atriplex*
7 *gardneri*, and *Artemisia pedatifida*) and herbaceous vegetation.

8 **Invasive Annual and Biennial Forbland**

9 These areas are dominated by introduced annual and/or biennial forb species such as *Halogeton*
10 *glomeratum*, *Kochia scoparia*, and *Salsola* spp.

11 **Invasive Annual Grassland**

12 These areas are dominated by introduced annual grass species such as *Avena* spp., *Bromus* spp., and
13 *Schismus* spp.

14 **Invasive Southwest Riparian Woodland and Shrubland**

15 These areas are dominated by introduced riparian woody species such as *Tamarix* spp. and *Elaeagnus*
16 *angustifolius*.

17 **Rocky Mountain Cliff and Canyon**

18 This ecological system of barren and sparsely vegetated landscapes (generally <10% plant cover) is found
19 from foothill to subalpine elevations on steep cliff faces, narrow canyons, and smaller rock outcrops of
20 various igneous, sedimentary, and metamorphic bedrock types. It is located throughout the Rocky
21 Mountains and northeastern Cascade Ranges in North America. Also included are unstable scree and talus
22 slopes that typically occur below cliff faces. This system may include small patches of dense vegetation,
23 but it typically includes scattered trees and/or shrubs. Characteristic trees include *Pseudotsuga menziesii*,
24 *Pinus ponderosa*, *Pinus flexilis*, *Populus tremuloides*, *Abies concolor*, *Abies lasiocarpa*, or *Pinus edulis*
25 and *Juniperus* spp. at lower elevations. Scattered shrubs such as species of *Holodiscus*, *Ribes*,
26 *Physocarpus*, *Rosa*, and *Juniperus*; *Jamesia americana*; *Mahonia repens*; *Rhus trilobata*; and
27 *Amelanchier alnifolia* may be present. Soil development is limited, as is herbaceous cover.

28 **Rocky Mountain Gambel Oak-Mixed Montane Shrubland**

29 This ecological system occurs in the mountains, plateaus, and foothills in the southern Rocky Mountains
30 and Colorado Plateau including the Uinta and Wasatch Ranges and the Mogollon Rim. These shrublands
31 are most commonly found along dry foothills, lower mountain slopes, and at the edge of the western
32 Great Plains at elevations ranging from 2,000 to 2,900 m above sea level, and they are often situated
33 above pinyon-juniper woodlands. Substrates are variable and include soil types ranging from calcareous,
34 heavy, fine-grained loams to sandy loams, gravelly loams, clay loams, deep alluvial sand, and coarse
35 gravel. The vegetation is typically dominated by *Quercus gambelii* alone or codominant with
36 *Amelanchier alnifolia*, *Amelanchier utahensis*, *Artemisia tridentata*, *Cercocarpus montanus*, *Prunus*
37 *virginiana*, *Purshia stansburiana*, *Purshia tridentata*, *Robinia neomexicana*, *Symphoricarpos oreophilus*,
38 or *Symphoricarpos rotundifolius*. There may be inclusions of other mesic montane shrublands with
39 *Quercus gambelii* absent or as a relatively minor component. This ecological system intergrades with the
40 lower montane-foothills shrubland system and shares many of the same site characteristics. Density and
41 cover of *Quercus gambelii* and *Amelanchier* spp. often increase after fire.

1 **Rocky Mountain Lower Montane Riparian Woodland and Shrubland**

2 This system is found throughout the Rocky Mountain and Colorado Plateau regions within a broad
3 elevation range from 900 to 2,800 m above sea level. This system often occurs as a mosaic of multiple
4 communities that are tree-dominated with a diverse shrub component. This system is dependent on a
5 natural hydrologic regime, especially annual to episodic flooding. Occurrences are found within the flood
6 zones of rivers, on islands, on sand or cobble bars, and on immediate streambanks. They can form large,
7 wide occurrences on mid-channel islands in larger rivers or narrow bands on small, rocky canyon
8 tributaries and well-drained benches. This system is also typically found in backwater channels and other
9 perennially wet but less-scoured sites such as floodplains swales and irrigation ditches. Dominant trees
10 may include *Acer negundo*, *Populus angustifolia*, *Populus balsamifera*, *Populus deltoides*, *Populus*
11 *fremontii*, *Pseudotsuga menziesii*, *Picea pungens*, *Salix amygdaloides*, and *Juniperus scopulorum*.
12 Dominant shrubs include *Acer glabrum*, *Alnus incana*, *Betula occidentalis*, *Cornus sericea*, *Crataegus*
13 *rivularis*, *Forestiera pubescens*, *Prunus virginiana*, *Rhus trilobata*, *Salix monticola*, *Salix drummondiana*,
14 *Salix exigua*, *Salix irrorata*, *Salix lucida*, *Shepherdia argentea*, and *Symphoricarpos* spp. Exotic trees of
15 *Elaeagnus angustifolia* and *Tamarix* spp. are common in some stands. Generally, the upland vegetation
16 surrounding this riparian system is different and ranges from grasslands to forests.

17 **Southern Colorado Plateau Sand Shrubland**

18 This large-patch ecological system is found on the south-central Colorado Plateau in northeastern Arizona
19 and extends into southern and central Utah. It occurs on windswept mesas, in broad basins, and on plains
20 at low to moderate elevations (1,300–1,800 m above sea level). Substrates are stabilized sandsheets or
21 shallow to moderately deep sandy soils that may form small hummocks or small coppice dunes. This
22 semi-arid, open shrubland is typically dominated by short shrubs (10–30% cover) with a sparse graminoid
23 layer. The woody layer is often a mixture of shrubs and dwarf-shrubs. Characteristic species include
24 *Ephedra cutleri*, *Ephedra torreyana*, *Ephedra viridis*, and *Artemisia filifolia*. *Coleogyne ramosissima* is
25 typically not present. *Poliomintha incana*, *Parryella filifolia*, *Quercus havardii* var. *tuckeri*, or
26 *Ericameria nauseosa* may be present or dominant locally. *Ephedra cutleri* and *Ephedra viridis* often
27 assume a distinctive matty growth form. Characteristic grasses include *Achnatherum hymenoides*,
28 *Bouteloua gracilis*, *Hesperostipa comata*, and *Pleuraphis jamesii*. The general aspect of occurrences is an
29 open low shrubland but may include small blowouts and dunes. Occasionally, grasses may be moderately
30 abundant locally and form a distinct layer. Disturbance may be important in maintaining the woody
31 component. Aeolian processes are evident in the form of pediceled plants, occasional blowouts, or small
32 dunes, but the generally higher vegetative cover and less-prominent geomorphic features distinguish this
33 system from Inter-Mountain Basins Active and Stabilized Dune.

34 **3.6.1.2 Invasive Species and Noxious Weeds**

35 One of the BLM's highest priorities is to promote ecosystem health, and one of the greatest obstacles to
36 achieving this goal is the rapid expansion of invasive, non-native species or weeds across public lands. A
37 noxious weed is any plant designated by a federal, state, or county government as injurious to public
38 health, agriculture, recreation, wildlife, or property. Noxious weeds are capable of invading plant
39 communities and replacing native species, and they are particularly successful following a disturbance. If
40 not eradicated or controlled, noxious and invasive weeds could jeopardize the health of the public lands
41 and the myriad activities that occur there.

42 Noxious weeds are designated and regulated by various state and federal laws. The State of Utah
43 Commissioner of Agriculture and Food has designated a list of noxious weeds (State of Utah 2016)
44 (Table 3-12). The Emery County Weed Board has also identified one species (Russian olive [*Elaeagnus*
45 *angustifolia*]) as noxious in Emery County. Wayne County has not identified any county noxious weeds.

1 **Table 3-12. Designated Noxious Weeds in Utah**

Common Name	Scientific Name	Classification*
Common crupina	<i>Crupina vulgaris</i>	1A
African rue	<i>Peganum harmala</i>	1A
Small bugloss	<i>Anchusa arvensis</i>	1A
Mediterranean sage	<i>Salvia aethiopis</i>	1A
Spring millet	<i>Milium vernale</i>	1A
Syrian beancaper	<i>Zygophyllum fabago</i>	1A
Ventenata (North Africa grass)	<i>Ventenata dubia</i>	1A
Plumeless thistle	<i>Carduus acanthoides</i>	1A
Malta starthistle	<i>Centaurea melitensis</i>	1A
Camelthorn	<i>Alhagi maurorum</i>	1B
Garlic mustard	<i>Alliaria petiolata</i>	1B
Purple starthistle	<i>Centaurea calcitrapa</i>	1B
Goatsrue	<i>Galega officinalis</i>	1B
African mustard	<i>Brassica tournefortii</i>	1B
Giant reed	<i>Arundo donax</i>	1B
Japanese knotweed	<i>Polygonum cuspidatum</i>	1B
Blueweed (Vipers bugloss)	<i>Echium vulgare</i>	1B
Elongated mustard	<i>Brassica elongata</i>	1B
Common St. Johnswort	<i>Hypericum perforatum</i>	1B
Oxeye daisy	<i>Leucanthemum vulgare</i>	1B
Cutleaf vipergrass	<i>Scorzonera laciniata</i>	1B
Leafy spurge	<i>Euphorbia esula</i>	2
Medusahead	<i>Taeniatherum caput-medusae</i>	2
Rush skeletonweed	<i>Chondrilla juncea</i>	2
Spotted knapweed	<i>Centaurea stoebe</i>	2
Purple loosestrife	<i>Lythrum salicaria</i>	2
Squarrose knapweed	<i>Centaurea virgata</i>	2
Dyers woad	<i>Isatis tinctoria</i>	2
Yellow starthistle	<i>Centaurea solstitialis</i>	2
Yellow toadflax	<i>Linaria vulgaris</i>	2
Diffuse knapweed	<i>Centaurea diffusa</i>	2
Black henbane	<i>Hyoscyamus niger</i>	2
Dalmation toadflax	<i>Linaria dalmatica</i>	2
Russian knapweed	<i>Acroptilon repens</i>	3

Common Name	Scientific Name	Classification*
Houndstounge	<i>Cynoglossum officianale</i>	3
Perennial pepperweed (Tall whitetop)	<i>Lepidium latifolium</i>	3
Phragmites (Common reed)	<i>Phragmites australis ssp.</i>	3
Tamarisk (Saltcedar)	<i>Tamarix ramosissima</i>	3
Hoary cress	<i>Cardaria spp.</i>	3
Canada thistle	<i>Cirsium arvense</i>	3
Poison hemlock	<i>Conium maculatum</i>	3
Musk thistle	<i>Carduus nutans</i>	3
Quackgrass	<i>Elymus repens</i>	3
Jointed goatgrass	<i>Aegilops cylindrica</i>	3
Bermudagrass	<i>Cynodon dactylon</i>	3
Perennial Sorghum spp.	including but not limited to Johnson Grass (<i>Sorghum halepense</i>) and sorghum	3
Cogongrass (Japanese blood grass)	<i>Imperata cylindrica</i>	4
Myrtle spurge	<i>Euphorbia myrsinites</i>	4
Dames Rocket	<i>Hesperis matronalis</i>	4
Scotch broom	<i>Cytisus scoparius</i>	4
Russian olive	<i>Elaeagnus angustifolia</i>	Declared by Emery County

* Classifications are as follows:

Class 1A: Early Detection Rapid Response Watch List. Declared noxious and invasive weeds not native to the state of Utah and not known to exist in the state that pose a serious threat to the state and should be considered a very high priority.

Class 1B: Early Detection Rapid Response. Declared noxious and invasive weeds not native to the state of Utah that are known to exist in the state in very limited populations and that pose a serious threat to the state and should be considered a very high priority.

Class 2: Control. Declared noxious and invasive weeds not native to the state of Utah that pose a threat to the state and should be considered a high priority for control. Weeds listed in the control list are known to exist in varying populations throughout the state. The concentration of these weeds is at a level where control or eradication may be possible.

Class 3: Containment. Declared noxious and invasive weeds not native to the state of Utah that are widely spread. Weeds listed in the containment noxious weeds list are known to exist in various populations throughout the state. Weed control efforts may be directed at reducing or eliminating new or expanding weed populations. Known and established weed populations, as determined by the weed control authority, may be managed by any approved weed control methodology, as determined by the weed control authority. These weeds pose a threat to the agricultural industry and agricultural products.

Class 4: Prohibited. Declared noxious and invasive weeds not native to the state of Utah that pose a threat to the state through the retail sale or propagation in the nursery and greenhouse industry. Prohibited noxious weeds are annual, biennial, or perennial plants that the commissioner designates as having the potential or are known to be detrimental to human or animal health, the environment, public roads, crops, or other property.

A systematic weed inventory has not been completed for the planning area, although the BLM typically requires inventories as a component of any surface-disturbing activity the agency authorizes. Extensive tamarisk and Russian olive infestations are known to occur along the perennial waterways in the planning area and have resulted in vegetation compositions far removed from native riparian plant communities. Prior to the initiation of the Lower San Rafael River Restoration Project, nearly all tamarisk on the San Rafael River was defoliated by the tamarisk leaf beetle (*Diorhabda* spp.). The tamarisk beetle was initially released at Fuller Bottom by the Emery County Weed Department in 2005 and was subsequently released at Hatt's Ranch. Thus, the beetle has been present in the lower San Rafael River for several years and may start to induce tamarisk mortality in the next few years, depending on the root mass of plants and the

1 intensity of defoliation (BLM 2014a). The BLM’s physical removal of extensive stands of tamarisk
2 associated with the Lower San Rafael River Restoration Project in recent years has decreased the
3 distribution and density of tamarisk along the San Rafael River in the planning area.

4 To control weeds on BLM-administered public lands in the planning area, the BLM partners with Wayne
5 and Emery Counties and utilizes integrated pest management strategies (i.e., the combined use of
6 mechanical, cultural, chemical, manual, biological, and prevention measures).

7 Weed-eradication methods, such as herbicide spraying, on BLM-administered public lands must be
8 consistent with the record of decision for the *Final Vegetation Treatments Using Herbicides on BLM*
9 *Lands in 17 Western States Programmatic Environmental Impact Statement* (BLM 2007a). The BLM
10 typically attaches stipulations to land-use authorizations for BLM-administered public lands that prevent
11 the introduction and spread of noxious weeds. For revegetation purposes, the use and perpetuation of
12 native species is a priority, except for certain situations where non-native species may be desirable.

13 **3.6.2 Resource Trends**

14 **3.6.2.1 Vegetation Communities**

15 The distribution of vegetation types in the planning area over time is primarily influenced by soil type,
16 temperature, elevation, precipitation, and topography, and also by land management activities such as
17 livestock and wildlife grazing, road and minerals development, and recreation and OHV use. Vegetation
18 communities were impacted by severe drought conditions existing in the area from 1998 through 2004.

19 Livestock grazing occurs throughout the planning area, and, in some areas, the existing vegetation shows
20 signs of past BLM-authorized surface disturbances. Recreation is becoming more popular in some
21 portions of the planning area. The BLM’s Assessment, Inventory, and Monitoring program and ongoing
22 evaluation and renewal of grazing permits in the planning area are implemented to help ensure that
23 rangelands and vegetation communities are not unduly impacted by livestock grazing. Likewise, the BLM
24 will place restrictions on recreation activities in areas where adverse impacts on vegetation are occurring.

25 In 2012, the BLM completed a Rapid Ecoregional Assessment (REA) Report for the Colorado Plateau
26 (Bryce et al. 2012). This report constitutes the best available information regarding climate change and its
27 impacts on vegetation in the planning area.

28 The REA used a regional climate model to predict changes in precipitation and temperature in the
29 Colorado Plateau between 2010 and 2060. The climate model projects increasing temperatures in all
30 seasons. For 2015 to 2030, the model shows less precipitation annually, in winter, and especially in
31 summer (reduction in the monsoon). For 2045 to 2060, the model shows a slight increase in annual
32 precipitation, particularly during winter months. The ecoregion is expected to undergo general warming
33 over the entire region with as much as 2° Celsius increase by 2060 in some locations, particularly in the
34 southern portion of the ecoregion. Average summer temperatures are expected to increase, but even
35 greater increases are simulated for the winter months (Bryce et al. 2012).

36 Precipitation is expected to decline throughout much of the year during the 2015 to 2030 time period
37 (with the exception of a couple months in the fall), with severe drought likely to occur in some areas. The
38 2045 to 2060 time period remains drier (or comparable to historic conditions) during most of the year, but
39 sporadic wetter months result in some areas expressing overall projected increases in annual precipitation.
40 For the seasonal results, summer (July through September) showed more spatial variability in
41 precipitation than did the winter season (January through March) (Bryce et al. 2012).

42 The REA also used a model to predict changes in vegetation resulting from changes in temperature and
43 precipitation. The model predicts that climate conditions will change to favor more grasses and shrubland
44 over other vegetation types. The results do not mean the potential vegetation type will necessarily be
45 established during a particular time period, only that climate conditions would be optimal for their

1 development there at that time period if seed sources were available and human intervention did not occur
2 to destabilize soils or modify its hydrological properties. Many other factors will affect future vegetation
3 type such as human-caused fire, invasive species introduction, or dispersal factors. The projections may
4 also indicate trends where vegetation mortality may occur (Bryce et al. 2012).

5 Winter precipitation is critical to perennial native plants and biological soil crusts, and it enhances annual
6 productivity especially for plants that are less adapted to drought. If both winter and summer precipitation
7 is reduced, trees, especially pinyon pine and biological soil crusts, may be reduced, and shrubs (e.g.
8 blackbrush) are likely to continue to expand (Bryce et al. 2012).

9 **3.6.2.2 Invasive Species and Noxious Weeds**

10 The spread of noxious weeds and invasive species across the planning area is an ongoing concern for all
11 BLM actions. To help address this issue, the BLM has developed and incorporated BMPs into the Price
12 and Richfield Field Offices' ROD/RMPs and requires implementation of these BMPs on BLM-authorized
13 actions. Ongoing land uses including recreation, OHV use, livestock grazing, and other surface-disturbing
14 activities will likely continue to introduce and spread invasive species and noxious weeds in the planning
15 area. This spread may be exacerbated by droughts that stress native vegetation.

16 Recent actions associated with the Lower San Rafael River Restoration Project have removed extensive
17 stands of tamarisk, and these areas are trending toward more natural riparian conditions. However, with
18 removal of the tamarisk, secondary weeds and tamarisk re-sprouts are becoming an issue. On-going
19 management will be necessary to continue this trend toward more natural vegetation conditions, and
20 complete removal of tamarisk from the planning area is unlikely.

21 In areas adjacent to the planning area, populations of Russian knapweed have also reached high levels in
22 many river corridors with camelthorn and Ravenna grass (*Saccharum ravennae*) following suit. New
23 species invasions such as these threaten existing vegetation communities, species diversity, and habitats
24 of special status species.

25 **3.7 CULTURAL RESOURCES**

26 Cultural resources are any prehistoric or historic district, site, building, structure, or object considered
27 important to a culture, subculture, or community for scientific, traditional, religious, or other purposes.
28 These are the resources that provide insight into the human experience, past and present. Archaeological
29 resources are areas where prehistoric or historic activity measurably altered the earth or where deposits of
30 physical remains (e.g., arrowheads, pottery, and bottles) are discovered. Prehistoric cultural resources are
31 those materials deposited or left behind prior to the entry of non-Native American (i.e., European)
32 explorers and settlers into an area. Historic cultural resources are those materials deposited or left behind
33 after the European presence was permanently established. Architectural and engineering resources include
34 standing buildings, districts, bridges, dams, and other structures of historic or aesthetic value. Traditional
35 resources can include archaeological resources, structures, topographic features, habitats, plants, wildlife,
36 and minerals that Native Americans or other groups consider essential for the preservation of traditional
37 culture. Cultural resources also include places identified by traditional groups (e.g., Native American
38 tribes) as sacred or otherwise important to the maintenance of group identity, even if no physical
39 manifestations of past activities are present at that location. Traditional values can be manifested at
40 locations called traditional cultural properties (TCPs). The sections below outline human use of the
41 planning area and surrounding region because this is the context in which locations achieve cultural
42 significance. The known cultural resources in the planning area are summarized below.

3.7.1 Resource Conditions

The planning area region features a variety of environmental settings with diverse resources that have been used by humans for millennia. These geographies include portions of the northern Colorado Plateau and eastern Great Basin and portions of the Greater Southwest, Great Basin, and Rocky Mountain cultural traditions. The region contains a diverse collection of prehistoric archaeological sites, historic archaeological sites and localities, and locations of religious and cultural significance to Native American tribes. For BLM management purposes, cultural resources take the form of sites, artifacts, buildings, structures, ruins, features, and landscapes with particular cultural importance. With a few exceptions, cultural resources must be at least 50 years old to be considered significant, or eligible for or listed on, the National Register of Historic Places (NRHP).

Archaeologists divide human use of the region into five broad time periods and base the definitions of each period on temporal, behavioral, and technological considerations. These five temporal classes are the Paleoindian, Archaic, Formative, Protohistoric, and Historic periods. The first four (Paleoindian, Archaic, Formative, and Protohistoric) are collectively referred to as Prehistoric periods, and they predate the region's written history. The Historic period includes Euro-American expansion into the region and contact with local Native American groups.

3.7.1.1 Prehistoric Culture History

Paleoindian

As is the case throughout North America, the earliest compelling evidence for a human presence in the Great Basin and northern Colorado Plateau dates to approximately 13,000 calendar years ago (Beck and Jones 1997; see Gilbert et al. 2008 for recently discovered earlier evidence from the western Great Basin; Graf and Schmitt 2007). The Paleoindian period represents adaptations to terminal Pleistocene environments and is characterized by small groups of relatively mobile foragers who used most sites only briefly or infrequently. Paleoindian archaeology is sparse on the Colorado Plateau, especially in comparison with the Great Plains region, so considerations of Paleoindian lifeways in the planning area must therefore be extrapolated from regional data.

Archaic

The relative continuity of behavior and material culture throughout the Paleoindian and Archaic eras in this region has prompted some scholars to dismiss the distinctions between these time periods as “negligible” and to regard the entire temporal stretch as a continuum called the “Paleoarchaic.” However, regardless of the striking similarity of these two time periods throughout the region, there is sufficient behavioral and material variability within them to warrant examining each individually (Aton 2009; Meltzer 2009:239–281; Simms 2008:141–180).

In the Great Basin, Simms (2008) divides the Archaic period into three sub-periods: the Early Archaic (8,000–7,000 years B.P.), Middle Archaic (7,000–3,000 years B.P.), and Late Archaic (3,000–1,000 years B.P.). On the Colorado Plateau, however, other authors (e.g., Matson 1991) divide the Archaic period into four sub-periods with slightly different date ranges: Early Archaic (approximately 8,000–6,000 years B.P.), Middle Archaic (6,000–4,000 years B.P.), Late Archaic (4,000–3,000 years B.P.), and Terminal Archaic (3,000–2,500 years B.P.). Most Southwest archaeologists lump the Terminal Archaic into the early Basketmaker II period (e.g., Charles and Cole 2006). Given the closer proximity and greater relevance of the Great Basin literature to the planning area, this document follows Simms's chronology.

Early Archaic sites are vanishingly rare in and around the region. However, the overwhelming majority of known archaeological sites within and around the planning area are lithic scatters that are unfortunately devoid of diagnostic artifacts, so Early Archaic occupation may indeed have occurred. As with the Early Archaic, there is a scarcity of Middle Archaic sites in and around the planning area. The most-diagnostic

1 and illustrative Middle Archaic archaeology comes instead from places like Hogup Cave and Lakeside
2 Cave far to the west.

3 As elsewhere on the Colorado Plateau, Late Archaic occupation is far better represented in the region
4 immediately surrounding the planning area than are the earlier Archaic phases. A dramatic rock art panel
5 that has been dated to the Late Archaic period looms over Range Creek Canyon (Aton 2009:77), and a
6 site called Cedar Siding Shelter located about 30 miles southeast of Price represents probably the only
7 significant investigation into the Archaic period near the planning area (Spangler 1995:111).

8 Investigations at that site by Martin (1983) revealed sporadic occupation starting around 4,000 years B.P.
9 and continuing until approximately 1,980 years B.P. (i.e., well into the Formative period, which included
10 practice of horticulture). The cultural continuity observed by Martin (1983:118–120) during his
11 excavations at Cedar Siding Shelter suggest that, unlike with the Paleoindian and Archaic temporal
12 boundary, there may indeed have been in situ development and transition between the Archaic and the
13 Formative periods.

14 **Formative**

15 The Formative era is marked by an emphasis on domesticated plants, most notably corn (*Zea mays*), or
16 maize; sedentary or semi-sedentary settlement near areas optimal for horticulture; and the introduction of
17 pottery (Matson 1991). The Formative era in the planning area is represented by Fremont occupation.

18 The Fremont archaeological complex represents an extension of horticultural adaptations into the far
19 northern Colorado Plateau, the Wasatch Plateau, and the eastern Great Basin. The distribution of Fremont
20 ceramics covers an even larger area, ranging from what is now central Nevada into southern Idaho and
21 southwestern Wyoming (e.g., Hockett and Morgenstein 2003). The date range that Madsen and Schmitt
22 (2005) use for this period is 2,100 years B.P. to 500 years B.P., which calibrates to ca. 150 B.C. to A.D.
23 1450 (see also Massimino and Metcalfe 1999). Calibrated B.C. and A.D. dates will be used from this
24 point forward.

25 Although there is evidence for considerable adaptive diversity in the eastern Great Basin and surrounding
26 areas throughout prehistory, this is especially the case for the Formative period. As Madsen and Simms
27 (1998) note, groups attributed to the Fremont complex adopted a variety of subsistence and mobility
28 strategies, and individuals within those groups may have pursued a range of strategies within their
29 lifetimes (see also Barlow 2002; Coltrain and Leavitt 2002). Fremont sites range from fairly large, settled
30 villages, particularly on either side of the Wasatch Plateau, to more ephemeral camps that suggest a high
31 degree of mobility. Caves also continued to be used during the Formative period (e.g., Aikens 1970;
32 Bryan 1977). The full range of subsistence strategies from pure hunting and gathering to relatively
33 intensive farming is evident at Fremont sites. Barlow (2002) suggests that such variability in the
34 importance of horticulture was due to variability over time and space in the productivity of wild
35 resources, noting that intensive horticulture would have been economical only when and where high-
36 return wild resources were encountered infrequently.

37 Fremont populations before A.D. 900 flourished to the north of the planning area in the Uinta Basin and
38 to the west in the San Rafael Swell. Both of those groups differed considerably from the Fremont that
39 subsequently lived around Desolation Canyon and the Tavaputs Plateau from A.D. 900 to A.D. 1300
40 (Aton 2009:79). Numerous Fremont sites or sites with Fremont components have been reported in the
41 part of the planning area managed by the Price Field Office. Nine Mile Canyon is noted for its extensive
42 assemblage of Fremont rock art panels and for storage and living structures of stone masonry laid with
43 mud mortar. Found in 1950 in Range Creek Canyon, the iconic Pilling figurines, a set of 11 clay
44 figurines, were made by Fremont artisans and closely resemble the anthropomorphs in much of Fremont
45 rock art. Excavations at Windy Ridge Village, Crescent Ridge, and Power Pole Knoll (Madsen 1975)
46 helped to establish local architectural and ceramic chronologies. Additionally, ongoing research by the

1 University of Utah in Range Creek Canyon (e.g., Boomgarden et al. 2014) continues to explicate and
2 refine Fremont horticultural practices in the area.

3 **Protohistoric**

4 In Formative chronology, the time period between the Fremont occupation and the Historic (Euro-
5 American) period marks the abandonment of horticulture and sedentary settlement systems. The
6 disappearance of a sedentary, horticultural lifeway among the Fremont and the return to a hunter-gatherer
7 subsistence pattern by about A.D. 1300 is a perplexing problem, although coincident timing with the
8 abandonment of most of the Colorado Plateau and aggregation of Pueblo peoples into supra-communities
9 like those at the Hopi Mesas is suggestive of regional climatic factors (Benson and Berry 2009; Glowacki
10 2015; Spangler 1995; Varien 2006).

11 It is commonly believed that during the Protohistoric period the Numic-speaking Utes were the primary
12 occupants of eastern and central Utah. Evidence from linguistic and archaeological investigations suggest
13 that Numic-speaking peoples immigrated into the region by about A.D. 1100, or shortly before the
14 disappearance of the Formative-era peoples, and researchers have historically attributed this to an
15 expansion of Numic-speaking populations from homelands in the southwestern Great Basin (Spangler
16 1995:599). Currently, however, there is little consensus about the timing of the Numic expansion, how it
17 occurred, why it occurred, the relationship of Numic-speaking populations to existing resident
18 populations, how settlement patterns and subsistence strategies differed from pre-Numic populations, and
19 whether or not a “Numic expansion” indeed even occurred (Spangler 1995:599). Indeed, as early as the
20 1930s, archaeologists like Julian Steward wrote about a distinctive break between archaeological deposits
21 associated with the Fremont and ones associated with the people who came after (Simms 2008:231). The
22 abandonment of the region by Fremont horticulturalists and its subsequent occupation by Numic-speaking
23 Native American tribes may both be reactions to independent variables rather than having anything
24 directly to do with one another (Spangler 1995:172).

25 In and around the planning area, evidence of occupation by Numic-speaking peoples during this time
26 includes Ute rock art panels, occasional Numic sherds, and the recovery of at least one Numic-style
27 basket in Nine Mile Canyon (Spangler 1995:173). At sites near Thompson and in the San Rafael Swell,
28 additional finds substantiate a Numic-speaking Late Prehistoric presence in the planning area (Spangler
29 1995:173). Most notably, in 1969 a bundle of Numic artifacts called the Sitterud Bundle was collected in
30 Emery County and found to contain leather sinew and cordage, a snare, leather leggings, some squawbush
31 berries, and a number of bone and lithic tools (Benson 1982).

32 **3.7.1.2 Historic Culture History**

33 The Historic period in Utah refers to the time recorded by Euro-American history. The Historic period in
34 Utah started with the first Euro-American explorers trekking through the state and continues to the
35 present. The first known Europeans to enter the area of Emery County were probably Mauricio Arze and
36 Lagos Garcia of New Mexico (Geary 1996:24–25). Destined for the Sevier Valley in central Utah to trade
37 furs in 1813, Arze and Garcia may have traveled through the San Rafael Desert to the southern end of
38 Castle Valley in western Emery County. Jedediah Smith is reported to have traveled through the area 13
39 years later, during his 1826 to 1827 expedition (Geary 1996:25–26).

40 During the early- to mid-1800s, the primary travel corridor through Emery County and the future Utah
41 territory as a whole was the Old Spanish Trail. The Old Spanish Trail entered “Emery County by way of a
42 ford about three miles north of Green River City” (Geary 1996:26). “The Green River crossing and
43 Wasatch (Salina) Pass were key points on the [Old] Spanish Trail, a nineteenth-century trade route
44 between the Hispanic settlements in New Mexico and those in California” (Geary 1996:2). John Wesley
45 Powell began the first of his two expeditions down the Green and Colorado Rivers in the spring of 1869.

1 Powell summarily recorded his impressions of these areas during his journey along the rivers and during
2 his overland hiking expeditions through the San Rafael Desert (Geary 1996).

3 As with most regions of Utah, the first deliberate Euro-American settlement of Emery County occurred at
4 the behest of the Church of Jesus Christ of Latter-Day Saints (Mormon Church) leader Brigham Young.
5 In 1877, Young ordered several families to establish a community in the area. The settlement marked a
6 transition in the methodology of Mormon pioneering; it was the last settlement directed to be established
7 by Young and the first in a region surveyed for entry under the revised laws of the Homestead Act, the
8 original version of which became applicable in Utah in 1869.

9 From the beginning, agriculture and raising livestock were the economic mainstays of the region. Within
10 30 years of the first Euro-American permanent settlement, 25,918 acres were under cultivation in the
11 county (Geary 1996:130). As was the case throughout the desert West, agricultural expansion was made
12 possible only through the construction of extensive systems of irrigation canals. By the end of the
13 nineteenth century, more than 154 miles of canals had been constructed in Emery County alone. The most
14 extensive of these waterways was the Cleveland Canal, completed in 1888.

15 The completion of the Denver & Rio Grande Western (D&RGW) in 1883, linking Salt Lake City to
16 Denver, proved to be an economic boon for the residents of Emery County, particularly those living in
17 Green River. This prosperity lasted only a decade, however, because most railroad operations shifted to
18 the town of Helper in Carbon County. Rail service in Emery County did continue to operate but on a
19 much smaller scale (Geary 1996:108–112).

20 Although the completion of the D&RGW Railroad stimulated mining in Emery County, the first mining
21 operation in the area predated both the development of the rail line and the first Mormon settlement. As
22 early as 1875, coal mines were being worked on the Wasatch Plateau. None of these early mines,
23 however, proved prosperous. The first mines were originally operated on a small scale during the fall and
24 winter months in order to obtain coal for heating area homes. Soon, several major, local mining
25 syndicates acquired property in the eastern canyons of the Wasatch Plateau and, in conjunction with the
26 railroad, began what has become a long history of coal extraction (Geary 1996:136).

27 As was common throughout the state, Emery County residents felt a surge of patriotism during World
28 War I, with many enlisting and serving both domestically and abroad. However, the decrease in the
29 number of young men in the area took a toll on the local workforce, creating a labor shortage for the
30 mines and farms and temporarily pushing wages higher. When the war overseas came to an end, the
31 residents of Emery County felt the sting of the downside of a wartime economy as markets for industrial
32 and agricultural goods and services returned to their normal levels. Combined with a slump in coal mine
33 production and decreases in land values, this signaled the future economic outlook for the county.

34 Residents of Emery County did not immediately feel the impacts of the stock market crash in 1929. It
35 took a couple of years before the true impact of the Great Depression was felt in the area, and the local
36 economy reached its lowest point. It is estimated that as many as 40% of the families in Emery County
37 were receiving federal aid at some point during the Depression years (Geary 1996:275). As was occurring
38 throughout the nation, the federal relief programs designed to lessen the effects of the Great Depression
39 initiated a second wave of public works and improvement projects. Most of the projects of this nature
40 undertaken in the county during this time were under the auspices of the Civilian Conservation Corps and
41 the Works Progress Administration.

42 Recovery from the economic hardship of the 1930s was slow for Emery County. Unlike many counties
43 farther north, Emery County did not enjoy as much of the economic fortunes associated with the nation's
44 entry into World War II. Only one significant development occurred in the area in direct association with
45 the war efforts—the opening of a mine intended to supply coke coal to Geneva Steel in Utah County
46 (Geary 1996:304). The lack of employment opportunities in the area forced many families to relocate to
47 other counties, beginning a 30-year population decline (Geary 1996:315).

1 **3.7.2 Resource Trends**

2 For the discussion that follows, the cultural resources analysis area is defined to include the entirety of the
3 planning area. This analysis area is assumed to encompass all areas where potential direct, indirect, or
4 cumulative effects to cultural resources might occur. SWCA conducted a files search of cultural resources
5 information maintained by the Utah Division of State History (UDSH) for the entire analysis area to
6 assess the extent of previously conducted cultural resources inventories and the quantities and types of
7 cultural resources known to exist within the analysis area. Most of the analysis area has not been
8 inventoried for cultural resources. Current records indicate that a total of 17,402 acres in the analysis area
9 has been subjected to intensive-level archaeological surveys. Existing data for 110 previously conducted
10 surveys in the analysis area indicates the earliest survey was conducted in 1973 and the most recent in
11 2015. Only 30 of the 110 surveys were conducted within the past 10 years and only 11 within the past 5
12 years. Most of the surveys were linear, with very few large block surveys. The largest survey was a
13 seismic survey conducted by Southwest Archaeological Consultants in 2007 (U07SZ1167b) in the south-
14 central portion of the analysis area. In all, 321 sites have been documented in the analysis area. Of the 321
15 sites, 270 are prehistoric, 17 are historic, 24 are multicomponent, and 10 are an unknown site class; 292 of
16 the sites are located on BLM-managed land, and the remaining 29 sites are lands managed or owned by
17 other entities. Most of the previously documented sites are located in the 2007 Southwest Archaeological
18 Consultants survey area in the south-central portion of the analysis area.

19 **3.7.2.1 Archaeological Sites**

20 According to UDSH data, most of the prehistoric sites or prehistoric components that could be assigned to
21 a site type are open lithic scatters (204) and open artifact scatters (77). The remaining 13 prehistoric sites
22 are open architectural, open artifact scatters with thermal feature(s), open lithic scatters with thermal
23 feature(s), other/unknown, rock art, and sheltered non-architectural (Table 3-13). In addition to the sites
24 known from UDSH data, 17 rock art locations recorded by the Utah Rock Art Research Association
25 (URARA) in Cottonwood Wash are in the analysis area. Most of the prehistoric sites date to the Archaic,
26 Fremont, Formative (general), and Paleoarchaic periods (Table 3-14).

27 **Table 3-13. Prehistoric Site or Component Types in the Analysis Area***

Site Type	Site Count
Isolated artifact	0
Isolated other feature(s)	0
Isolated thermal feature(s)	0
Lithic source	0
Open architectural	1
Open artifact scatter	77
Open artifact scatter with thermal feature(s)	5
Open lithic scatter	204
Open lithic scatter with thermal feature(s)	3
Other/unknown	1
Quarry	0
Rock art	18

Site Type	Site Count
Sheltered architectural	0
Sheltered non-architectural	2
Total	311

* Includes rock art sites recorded by the Utah Rock Art Research Association.

Table 3-14. Prehistoric Sites or Components in the Analysis Area by Time Period

Category	Corresponding Codes	Site/Component Count
Paleoarchaic	PA	7
Archaic (general)	AR, EA, LA, MA	15
Early Archaic	EA	1
Middle Archaic	MA	2
Late Archaic	LA	1
Formative (general)	FR	9
Fremont	FR	9
Late Prehistoric	LP	5
Unknown	NI, ZZ	265
Total		314

According to UDSH data, most historic sites or historic components known to exist within the analysis area are artifact scatters (24), artifact scatters with thermal feature(s) (5), and architectural-farming/ranching (4). The remaining eight historic sites are architectural-other, architectural-residential, railroad, trail/road with artifacts, and trail/road without artifacts (Table 3-15). Five historic themes were noted for the historic sites documented in the analysis area: farming/ranching (agriculture), unknown, transportation (including roads/trails), railroad, and mining/mineral extraction (Table 3-16). Finally, the historic sites are primarily associated with Euro-Americans, with one site each associated with Basques and Mexicans. The remainder have unknown affiliation.

Table 3-15. Historic Site Types in the Analysis Area

Site Type	Count
Architectural-farming/ranching	4
Architectural-general industrial	0
Architectural-mining	0
Architectural-other	3
Architectural-residential	1
Artifact scatter	24
Artifact scatter with thermal feature(s)	5
Cemetery/burial	0

Site Type	Count
Isolated artifact	0
Isolated other features	0
Mining	0
Other/unknown	0
Railroad	2
Rock or tree art	0
Trail/road with artifacts	1
Trail/road without artifacts	1
Transmission	0
Water control	0
Total	41

1 **Table 3-16. Historic Themes in the Analysis Area**

Theme	Code	Theme 1 Count	Theme 2 Count
Farming/ranching (agriculture)	FR	23	0
Mining/mineral extraction	MN	1	1
Railroad	RR	2	1
Transportation (including roads/trails)	RT	3	0
Unknown	ZZ	11	0
Total		40	2

2 **3.7.2.2 Formal Systems of Recognition**

3 In the analysis area, the importance of cultural resources can be acknowledged in several ways. On a
4 national level, a site or building of importance can be listed on the NRHP or as a National Historic
5 Landmark (NHL). On a state level, the Utah Century Register of Historic Houses and the Utah State
6 Register of Historic Sites recognize cultural resources, but neither of these lists has been updated since
7 1988. NRHP eligibility is temporally fluid, and the status of any given site can change over time.
8 Accordingly, NRHP eligibility statements in available site records typically document a time-specific
9 NRHP eligibility recommendation made by the researchers who recorded the site, or those records
10 document an agency’s determination of a site’s NRHP eligibility. For those sites documented in the
11 analysis area, 67 have been recommended eligible and another 23 have been determined eligible for the
12 NRHP.

13 A check of the NHL list, the Utah Century Register of Historic Houses, and the Utah Register of Historic
14 Sites revealed no properties, sites, or historic districts listed within the analysis area. The following GIS
15 layers were examined for the analysis area: NRHP, State Historic Districts, Historic Trails, NHL, and
16 UDSH Historic Properties.

17 One historic property, the Lower San Rafael Bridge, is included in UDSH’s online Preservation Pro
18 database and was documented using Historic American Buildings Survey/Historic American Engineering

1 Record (HABS/HAER) methods. The bridge was replaced in 1996. The expanded Horseshoe Canyon
2 Archaeological District is not in the analysis area but is immediately adjacent to its southeast boundary.
3 No NRHP-listed properties, NHLs, or historic districts were noted in the analysis area.

4 TCPs are areas identified as culturally important to Native American or other groups who consider a
5 location important for the preservation of traditional culture. These resources can include archaeological
6 resources, structures, topographic features, habitats, plants, wildlife, and minerals identified by traditional
7 groups as sacred or otherwise important to the maintenance of group identity, even if no physical
8 manifestations of past activities are present at that location. Groups who identify a culturally sensitive
9 area may ask that its location not be revealed. For this reason, documented TCPs are not common. The
10 Green River, which abuts the eastern side of the analysis area, is the only known TCP, and it is considered
11 culturally important by the Navajo Nation.

12 **3.7.2.3 Special Designations**

13 Special designations—ACECs, WSAs, special recreation areas, and special management areas—were
14 reviewed for their potential to contain cultural resources. Three ACECs are located in the analysis area:
15 Big Flat Tops, Dry Lake Archaeological District, and Tidwell Draw of the Uranium Mining Districts.
16 Only the Dry Lake Archaeological District and Tidwell Draw of the Uranium Mining Districts are
17 cultural or historic in nature. Tidwell Draw is also located within the UDOGM San Rafael River District.
18 The Dry Lake Archaeological District likely dates to the Paleoarchaic period, and additional prehistoric
19 sites would be expected within this ACEC. The Tidwell Draw portion of the Uranium Mining Districts
20 ACEC would likely have a higher percentage of uranium and vanadium mine sites dating to 1900 and
21 later. No WSAs, special recreation areas, or special management areas were noted in the analysis area.

22 **3.7.2.4 Undocumented Cultural Resources**

23 Given that the majority of the analysis area has not been previously surveyed, there is considerable
24 potential for undocumented archaeological sites to exist in the unsurveyed areas. Areas with high
25 potential for undocumented prehistoric sites include known water sources. Areas with high potential for
26 undocumented historic sites include historic mining and oil and gas well locations, historic locations
27 indicated on GLO maps, historic trail and road corridors, and known historic springs and water sources.
28 Named streams and rivers in the analysis area include the San Rafael River, Green River, Dugout Creek,
29 and Antelope Valley Wash. Thirteen named springs exist in the analysis area: North Spring, Hooch
30 Spring, Village Home Spring, Twin Springs, Sweetwater Spring, Old Man Spring, Upper Dugout Spring,
31 Keg Spring, Dugout Spring, Saddle Horse Spring, Cottonwood Spring, Moonshine Spring, and Crows
32 Nest Spring.

33 Two historic trails, the Fremont Trail and the Old Spanish Trail, were identified in GIS trails data within
34 the analysis area. Both trails cross the northern portion of the analysis area. The cemeteries GIS layer for
35 Utah was examined, but no cemeteries were noted in the analysis area.

36 An inventory was made of BLM GLO maps covering the analysis area. In all, 41 GLO maps dating
37 between 1879 and 1957 were identified for the analysis area (Table 3-17). More than three-quarters of
38 these GLO maps were made before 1950. These maps can provide additional information about historic
39 resources in the analysis area. GLO maps examined for the analysis area show historic roads, cabins,
40 ranches, oil wells, springs, railroad alignments, trails, named settlements, and a mail trail. These historic
41 resources, many of which have not yet been formally documented, should be sought out and verified as to
42 their continued existence and condition. All of these GLO features fall under the historic themes observed
43 in the existing historic site data.

1 **Table 3-17. General Land Office Maps Covering the Analysis Area**

Township	Range	GLO Plat Year	Surveyor
21 South	14 East	1885	Pancake
		1947	Yundt
21 South	15 East	1907	Heist
21 South	16 East	1882	Ferron
		1883	Ferron
22 South	14 East	1885	Pancake
		1915	Miller
22 South	15 East	None	–
22 South	16 East	1899	Blossom
23 South	14 East	1885	Pancake
23 South	15 East	1907	Heist
23 South	16 East	1879	Dickert
		1899	Blossom
24 South	13 East	1915	Miller
24 South	14 East	1885	Pancake
24 South	15 East	1885	Pancake
24 South	16 East	1879	Dickert
		1914	Miller
25 South	12 East	1935	Moore
25 South	13 East	1935	Clark
25 South	14 East	1935	Moore
25 South	15 East	1935	Moore
25 South	16 East	1879	Dickert
		1935	Moore
25 South	17 East	1875	Dickert
		1956	Russell
26 South	12 East	1936	Moore
26 South	13 East	1935	Clark
26 South	14 East	1955	Russell
26 South	15 East	1879	Dickert
		1947	Bird
26 South	16 East	1955	Edmonds

Township	Range	GLO Plat Year	Surveyor
26 South	17 East	1955	Lewis
		1956	Russell
27 South	11 East	1879	Dickert
		1941	Bird
27 South	12 East	1936	Moore
27 South	13 East	1957	Sylvester
27 South	14 East	1947	Bird
27 South	15 East	1879	Dickert
		1947	Bird
27 South	16 East	1947	Nelson

1
2 The USGS topoView online historical topographic map collection is an easily accessed source for historic
3 topographic maps of the analysis area; maps range in scale from 1:24,000 to 1:250,000. This online
4 collection allows a user to download topographic maps in several formats. At present, the National
5 Geospatial Program is still scanning and georeferencing maps, but when it is complete, the collection will
6 include scans of paper maps from 1884 through 2006 (USGS topoView 2015).

7 Historic aerial imagery can complement topographic maps during background research and potentially
8 confirm property and/or structure locations depending on the quality of the imagery. Imagery available
9 from the Utah Geological Survey’s Aerial Imagery Collection ranges in date from 1935 through the
10 present. Not all areas have early imagery available.

11 Based on UDOGM’s abandoned well data provided to SWCA by the agency, there are at least 36
12 abandoned oil and gas well locations in the analysis area that could be historic in age. All 36 of these are
13 located on BLM-managed lands (Table 3-18). The wells are concentrated in the northern and southern
14 ends of the analysis area.

15 **Table 3-18. Abandoned Wells in the Analysis Area**

Well Name	Township	Range	Section	County	Company Name	Lease Number
AMAX-SINCLAIR GOVT 29-4B	T22.0S	R15.0E	29	Emery	Amax Petroleum Corp	UTU-036250
GREEN RIVER DESERT U 9-7	T22.0S	R15.0E	09	Emery	Amax Petroleum Corp	UTU-08861
45-56	T24.0S	R15.0E	05	Emery	General Petroleum Corp	UTU-02410
LOOKOUT POINT UNIT 1	T25.0S	R16.0E	29	Emery	Standard Oil Co Of Calif	UTU-08867
MOONSHINE WASH U 2	T25.0S	R15.0E	22	Emery	Continental Oil Company	UTU-08741
FOREST GOVT 1	T23.0S	R14.0E	11	Emery	Forest Oil Corp	UTU-010356A

Well Name	Township	Range	Section	County	Company Name	Lease Number
DUGOUT CREEK U 1	T24.0S	R14.0E	21	Emery	Humble Oil & Refining Co	UTU-08196A
NEQUOIA ARCH U 3	T26.0S	R14.0E	26	Emery	Humble Oil & Refining Co	UTU-08699
NEQUOIA ARCH U 7	T26.0S	R14.0E	30	Emery	Humble Oil & Refining Co	UTU-05546
1 MID TOP	T26.0S	R13.0E	17	Emery	Larue, E B Jr	UTSL-08712A
HATT 1	T23.0S	R14.0E	19	Emery	Lion Oil Company	UTU-09466A
JAKY'S RIDGE 12-3	T23.0S	R16.0E	03	Emery	Mobil Oil Corporation	UTU-08970
JAKY'S RIDGE 34-15	T23.0S	R16.0E	15	Emery	Mobil Oil Corporation	UTU-015637
FEDERAL 1	T26.0S	R14.0E	07	Emery	Odessa Natural Corp	UTU-011206
NEQUOIA ARCH UNIT 9	T26.0S	R13.0E	25	Emery	Pan American Petroleum Corp	UTU-05417
NEQUOIA ARCH UNIT 10	T26.0S	R13.0E	35	Emery	Pan American Petroleum Corp	UTU-03245
USA-C M BROWN 1	T25.0S	R12.0E	24	Emery	Pan American Petroleum Corp	UTSL-169347
CHAFFIN UNIT 1	T23.0S	R15.0E	21	Emery	Shell Oil Company	UTU-14680A
GRUVERS MESA 1	T24.0S	R16.0E	19	Emery	Shell Oil Company	UTU-014152
GRUVERS MESA 2	T25.0S	R16.0E	10	Emery	Shell Oil Company	UTU-032777
BOW KNOT UNIT 14-5	T26.0S	R17.0E	05	Emery	Superior Oil Company	UTU-014242
GRAND FAULT UNIT 14-24	T21.0S	R15.0E	24	Emery	Superior Oil Company	UTU-011978
N SPRING WASH 31-15	T25.0S	R15.0E	15	Emery	Superior Oil Company	UTU-08782A
FEDERAL 1	T22.0S	R15.0E	26	Emery	Texas Eastern Trans Co	UTU-014710
TEMPLE SPRINGS UNIT 1	T25.0S	R13.0E	14	Emery	Texaco Inc	UTU-013076
TEMPLE SPRINGS UNIT 2	T25.0S	R14.0E	22	Emery	Texaco Inc	UTU-031216
1	T22.0S	R16.0E	21	Emery	Whisnant, W P	FEE
FEDERAL 1	T22.0S	R15.0E	28	Emery	Equity Oil Company	UTU-02181
RUSSELL 1	T25.0S	R12.0E	34	Emery	Delhi-Taylor Oil Corp	UTSL-068506
NEQUOIA ARCH U 5	T27.0S	R14.0E	17	Wayne	Amerada	U-07044-A
MURPHY-GOVT 1	T27.0S	R14.0E	13	Wayne	Arco Oil & Gas Company	U-08665
BLACKBURN DRAW U 1	T27.0S	R12.0E	09	Wayne	Humble Oil & Refining Co	U-08648
NEQUOIA ARCH U 1	T27.0S	R14.0E	05	Wayne	Humble Oil & Refining Co	U-05448-A

Well Name	Township	Range	Section	County	Company Name	Lease Number
HANKSVILLE UNIT 31-30	T27.0S	R13.0E	30	Wayne	Superior Oil Company	U-09308
FEDERAL 1	T27.0S	R14.0E	05	Wayne	Texas Production Co	U-032263
FEDERAL 1	T27.0S	R12.0E	04	Wayne	Mt Vernon Oil Co	SL-043820

1 Source: Data provided by UDOGM.

2 In all likelihood, numerous prehistoric and historic cultural resources exist in unsurveyed portions of the
3 analysis area. The number, nature, and location of these unidentified resources likely vary depending on a
4 host of factors. Through extensive study of archaeological sites throughout the West, archaeologists have
5 identified a number of key factors that influence site locations and types. Many of these factors are
6 environmental and include elevation, slope, aspect, distance to permanent and/or intermittent water, and
7 the presence or absence of key resources (e.g., food resources and raw materials for tools, etc.).
8 Significant variation also depends on the time period (prehistoric or historic) considered. An
9 archaeological site location model using available cultural resources records has been developed for the
10 analysis area and will be used to assess possible project effects to cultural resources in the next chapter.

11 **3.8 PALEONTOLOGICAL RESOURCES**

12 The analysis area for paleontological resources is the planning area (Map 2-4), which covers
13 approximately 526,174 acres. This analysis area was selected because it represents the area within which
14 paleontological resources on BLM-administered public land may be affected.

15 **3.8.1 Resource Conditions**

16 Paleontological resources are the fossilized remains, traces, or imprints of organisms preserved in or on
17 the Earth's crust that are of paleontological interest and that provide information about the history of life
18 on Earth (Paleontological Resources Preservation Act [PRPA], Section 6301; 16 USC 470aaa). Among
19 paleontologists, fossils are generally considered to be scientifically significant if they are unique, unusual,
20 rare, diagnostically or stratigraphically important, or add to the existing body of knowledge in a specific
21 area of the science. The BLM considers all vertebrate fossils to be scientifically significant. Invertebrate
22 and plant fossils may be determined to be significant on a case-by-case basis.

23 The BLM has identified uniform procedural guidance and four objectives for managing paleontological
24 resources on the land it administers: 1) locating, evaluating, managing, and protecting paleontological
25 resources; 2) facilitating appropriate scientific, educational, and recreational uses of fossils; 3) ensuring
26 that proposed land uses do not inadvertently damage or destroy important paleontological resources; and
27 4) fostering public awareness of the nation's rich paleontological heritage (BLM 1998).

28 **3.8.1.1 Potential Fossil Yield Classification**

29 Under the Potential Fossil Yield Classification (PFYC) system, geologic units are classified based on the
30 relative abundance of vertebrate fossils or uncommon invertebrate or plant fossils and their sensitivity to
31 adverse impacts; a higher class number indicates a higher potential for fossils to occur. This classification
32 is best applied at the geologic formation or member level. It is not intended to be an assessment of
33 whether important fossils are known to occur occasionally in these units (i.e., a few important fossils or
34 localities widely scattered throughout a formation does not necessarily indicate a higher class), nor is it
35 intended to be applied to specific sites or areas. The classification system is intended to provide baseline
36 guidance for assessing and mitigating impacts to paleontological resources. In many situations, the

1 classification should be an intermediate step in the analysis, and should be used to assess additional
2 mitigation needs. PFYC classes are defined as follows:

- 3 • Class 1: Geologic units that are unlikely to contain recognizable fossil remains. Management
4 concern for paleontological resources in Class 1 units is negligible or not applicable. No
5 assessment or mitigation is needed except in very rare circumstances. The presence of significant
6 fossils in Class 1 units is non-existent or extremely rare.
- 7 • Class 2: Sedimentary geologic units that are not likely to contain vertebrate fossils or
8 scientifically significant invertebrate or plant fossils. The potential for affecting vertebrate fossils
9 or uncommon invertebrate or plant fossils is low. Management concern for paleontological
10 resources is low, and management actions are not likely to be needed. Localities containing
11 important resources may exist, but they would be rare and would not influence the classification.
- 12 • Class 3: Fossiliferous sedimentary geologic units where fossil content varies in significance,
13 abundance, and predictable occurrence or sedimentary units of unknown fossil potential. These
14 units are often marine in origin with sporadic known occurrences of vertebrate fossils. Vertebrate
15 fossils and uncommon invertebrate fossils are known to be present inconsistently, and
16 predictability is known to be low. Class 3 includes units that are poorly studied and/or poorly
17 documented so that the potential yield cannot be assigned without ground reconnaissance.
18 Management concern for paleontological resources in these units is moderate or cannot be
19 determined from existing data. Surface-disturbing activities may require field assessment to
20 determine a further course of action. The Class 3 category includes a broad range of potential
21 impacts. Geologic units of unknown potential, as well as units of moderate or infrequent fossil
22 occurrence are included. Assessment and mitigation efforts also include a broad range of options.
23 Surface-disturbing activities would require sufficient assessment to determine whether significant
24 fossil resources are present in the area of a proposed action and whether the action could affect
25 the paleontological resources.
- 26 • Class 4: Geologic units that contain a high occurrence of significant fossils but that have less risk
27 of human-caused adverse impacts and/or less risk of natural degradation. The potential for
28 affecting significant fossils is moderate to high and depends on the proposed action. The bedrock
29 unit has high potential, but a protective layer of soil, thin alluvial material, or other mitigating
30 circumstances may lessen or prevent potential impacts to the bedrock resulting from the activity.
31 Mitigation efforts must include assessment of the disturbance (e.g., the removal or penetration of
32 protective surface alluvium or soils), the potential for future accelerated erosion, and the potential
33 for increased ease of access resulting in greater looting potential. If impacts to significant fossils
34 are anticipated, on-the-ground surveys prior to authorizing the surface-disturbing action would
35 usually be necessary. On-site monitoring may also be necessary during construction activities.
36 Management prescriptions for resource preservation and conservation through controlled access
37 or special management designation should be considered. Class 4 and Class 5 units are often
38 combined as Class 5 for general applications such as planning efforts or preliminary assessments
39 because a designation of Class 4 is determined based on local mitigating conditions and the
40 impacts of the planned action.
- 41 • Class 5: Highly fossiliferous geologic units that regularly and predictably produce vertebrate
42 fossils or uncommon invertebrate or plant fossils and that are at risk of human-caused adverse
43 impacts or natural degradation. These include units in which vertebrate fossils or uncommon
44 invertebrate or plant fossils are known and documented to be present consistently, predictably, or
45 abundantly. Class 5 pertains to highly sensitive units that are well exposed with little or no soil or
46 vegetative cover, units in which outcrop areas are extensive, and exposed bedrock areas that are
47 larger than 2 contiguous acres.

1 Management concern for paleontological resources in Class 5 units/areas is high because the potential for
 2 affecting significant fossils is high. Vertebrate fossils and uncommon invertebrate fossils are known or
 3 can be reasonably expected in the planning area. Assessment by a qualified paleontologist would be
 4 required in advance of surface-disturbing activities or land tenure adjustments, and mitigation will often
 5 be necessary before and/or during surface-disturbing actions. Field surveys prior to authorizing any
 6 surface-disturbing activities will usually be necessary. On-site monitoring may also be necessary during
 7 construction activities. Designation of areas of special interest and concern may be appropriate. Class 2,
 8 3, and 5 areas within the planning area are shown on Map 2-4 and listed in Table 3-19.

9 **Table 3-19. Potential Fossil Yield Classification Designations within the Planning Area**

PFYC Designation	Geologic Units	Acres in the Planning Area
Class 2	Glen Canyon Group (Navajo, Kayenta, Wingate, Moenave) Surficial alluvium and colluvium, Surficial aeolian deposits, Surficial older alluvium and colluvium	315,636
Class 3	Indianola, Mancos, Frontier, Straight Cuffs, Iron Springs, Summerville, Entrada, Caramel, Arapien, Twin Creek	164,521
Class 5	Dakota, Cedar Mountain, Kelvin, Morrison	46,017

10 **3.8.2 Resource Trends**

11 The BLM paleontology program is mandated under the PRPA to manage paleontological resources using
 12 scientific principles and expertise. Natural or accelerated erosion, decay, improper collection, and
 13 vandalism can remove, alter, or damage those characteristics that make the paleontological resource
 14 scientifically important or enjoyable to the public. The Price and Richfield Field Offices' ROD/RMPs
 15 (BLM 2008a, 2008b) require mitigation of adverse impacts on vertebrate and significant invertebrate
 16 paleontological resources resulting from surface-disturbing activities. An assessment of fossil resources is
 17 required in the Richfield RMP before permitting surface-disturbing activities can be permitted in areas
 18 with moderate to high potential to affect scientifically significant paleontological resources. In the Price
 19 Field Office, assessments are required on a case-by-case basis before and during surface disturbance.

20 A search of the Utah Geological Survey (UGS) fossil database in 2017 revealed a total of 50
 21 paleontological localities in the planning area (UGS Fossil Locality Database 2017). Of those, 21 are
 22 vertebrate fossils, three are tracks from vertebrates, 15 are invertebrate fossils, and five are petrified
 23 wood. Six records do not specify the type.

24 Collection of paleontological resources from BLM-administered land in the planning area is allowed with
 25 some restrictions, depending on the significance of the paleontological resources. Under the existing
 26 regulations for both field offices, the collection of common invertebrate or plant paleontological resources
 27 for personal, noncommercial use is allowed in reasonable quantities except on developed recreation sites
 28 and areas or where otherwise posted or prohibited. Vertebrate and significant invertebrate fossils can be
 29 collected only under a permit that is issued to qualified researchers. Permission to collect significant plant
 30 and invertebrate fossils is determined on a case-by-case basis and must be identified in decision
 31 documents. Professional paleontologists conducting research or assessment and mitigation are regulated
 32 through the permit process. The BLM issued three excavation permits the planning area in the last 11
 33 years.

1 Fossil Point in the planning area is a popular recreational area and has exposed vertebrate fossils. Located
2 south of Green River, Utah, the site has experienced damage and theft of fossils by the public.

3 Fossil theft and vandalism occur with some regularity throughout the planning area. Only a small number
4 of these occurrences are ever prosecuted. The escalating commercial value of fossils also means that
5 fossils on federal lands are increasingly subject to theft and vandalism. These crimes reduce scientific and
6 public access to scientifically significant and instructive paleontological resources, and destroy the
7 contextual information critical for interpretation.

8 **3.9 VISUAL RESOURCES AND NIGHT SKIES**

9 The BLM’s visual resource management (VRM) system is a way to identify and evaluate scenic values to
10 determine the appropriate levels of management to apply to a defined area. VRM is a tool to identify and
11 map essential landscape settings and, in turn, develop management guidelines. It also provides a way to
12 analyze potential visual impacts and apply visual design techniques to ensure that surface-disturbing
13 activities are in harmony with their surroundings. The BLM’s VRM system helps to ensure that actions
14 taken on BLM-administered land will maintain the visual and scenic qualities associated with landscapes.

15 The analysis area for visual resources is the planning area plus the viewshed from the Horseshoe Canyon
16 unit of Canyonlands National Park and the Green River Labyrinth Canyon rim (see Maps 2-6). The
17 planning area is largely undeveloped, with few human-made structures or other developments, and is a
18 mostly natural landscape. The topography is characterized as a flat plateau with incised valleys and
19 canyons; buttes and red rock outcrops dot the landscape. The San Rafael River crosses the planning area
20 from the northwest to the planning area’s eastern side before joining the Green River. From the surface of
21 the plateau and elevated areas, many distant peaks—including the La Sal Mountains, which are as much
22 as 45 miles from the planning area—are visible on clear days. From elevated locations in the planning
23 area, 360-degree views of southeastern Utah can be seen.

24 Areas adjacent to the planning area such as the Green River Labyrinth Canyon and Canyonlands National
25 Park are renowned for opportunities to view naturally dark night skies. These night skies are among the
26 most unspoiled that remain in the continental United States, and the Canyonlands National Park is
27 certified as an International Dark Sky Park for the quality of its pristine night sky viewing. Naturally dark
28 skies are identified as an important resource in Canyonlands National Park for the stunning starscapes that
29 are often visible (NPS 2017b). Opportunities to view night skies have become an important component of
30 the overall recreational experiences of BLM and NPS visitors.

31 **3.9.1 Resource Conditions**

32 The BLM uses a visual resource inventory (VRI) and the resulting VRI classes, to inform management
33 decisions including assignment of visual resource management (VRM) classes to a given area. The VRI
34 class does not always match the VRM class because the VRM class considers factors other than those
35 used to establish the VRI classes (see VRI and VRM discussion below).

36 **3.9.1.1 Visual Resource Management Classes**

37 Current management objectives for visual resources in the planning area are prescribed in the Price and
38 Richfield Field Offices’ RMP-RODs, completed in 2008 (BLM 2008a, 2008b). The VRM classes range
39 from Class 1 to Class IV, as prescribed by the BLM’s *Manual 8400 - Visual Resource Management*
40 (BLM 1984). The VRM class assigned to a given area determines the amount of change or contrast from
41 development activities to the elements of the landscape that are allowable under the current RMPs. The
42 VRM class is determined by considering the VRI, discussed below, and other resource concerns or uses.
43 When disclosing the impacts that development activities may have on the visual characteristics of the

1 landscape, the analysis is based on a contrast rating, which is the degree of visual contrasts created in line,
2 form, color, and texture and land, water, vegetation and structures from a proposed action. The VRM
3 class management objectives are as follows (BLM 2012a):

- 4 • Class I objective: To preserve the existing character of the landscape. The level of change to the
5 characteristic landscape should be very low and must not attract attention. Class I can only be
6 applied to lands with a special designation such as a WSA or ACEC.
- 7 • Class II objective: To retain the existing character of the landscape. The level of change to the
8 characteristic landscape should be low.
- 9 • Class III objective: To partially retain the existing character of the landscape. The level of change
10 to the characteristic landscape should be moderate.
- 11 • Class IV objective: To provide for management activities which require major modification of the
12 existing character of the landscape. The level of change to the characteristic landscape can be
13 high.

14 VRM class acreages in the planning area are listed in Table 3-20 and depicted in Map 2-14. The acreages
15 include BLM-administered lands only.

16 **Table 3-20. Visual Resource Management Class Acreage**
17 **Distribution in the Planning Area**

VRM Class	Acres
Class I	225
Class II	14,233
Class III	390,234
Class IV	46,442
Total	451,134

18 **3.9.1.2 Visual Resource Inventory Classes**

19 The BLM conducted an inventory of visual values, known as a visual resource inventory (VRI), across
20 the planning area in 2011 in accordance with the BLM's *Manual H-8410-1 - Visual Resources Inventory*
21 (BLM 1986). The BLM categorizes visual resources into inventory classes, which are based on scenic
22 quality evaluations, analysis of sensitivity level, and the delineation of distance zones. The VRI process
23 consists of the following:

- 24 • A scenic quality evaluation to rate the visual appeal of an area
- 25 • An analysis of sensitivity level to assess public concern about an area's scenic quality and
26 sensitivity to potential changes in the visual setting
- 27 • A delineation of distance zones to indicate the relative visibility of the landscape from primary
28 travel routes or observation points

29 The inventory classes represent the relative values of the visual resources. Inventory Classes I and II
30 represent areas with the most value. Inventory Class III represents a moderate value. Inventory Class IV
31 represents areas with the least value. Inventory Class I can be applied only to lands with a special
32 designation where a management decision has been made to maintain a natural landscape. Table 3-21 lists
33 the acreage in the planning area by VRI class resulting from the 2011 inventory. While the current VRM

1 prescriptions from the Price and Richfield Field Offices' ROD/RMPs were designated prior to the 2011 VRI
 2 and have not been amended, the 2011 VRI results may be used during the MLP planning process to assist
 3 the BLM in identifying appropriate mineral leasing stipulations to mitigate impacts on visual resources.
 4 These acreages include both BLM-administered lands and non-BLM lands within the planning area.

5 **Table 3-21. Visual Resource Inventory Class Acreage**
 6 **Distribution in the Planning Area**

VRI Classes	Acres
Class I	0
Class II	25,681
Class III	34,925
Class IV	465,568
Total	526,174

7 Class II areas include portions of Saucer Basin/Moonshine Wash, Keg Knoll, and Trin Alcove/Three
 8 Canyon recreation focus areas, a portion of the Labyrinth SRMA and other viewpoints on the Green River
 9 Labyrinth Canyon rim (see Map 3-3). The rest of the planning area is inventoried as Class III and Class
 10 IV.

11 **3.9.2 Resource Trends**

12 Visual values in the planning area have not experienced great change in the last several years because the
 13 area is remote and development has been minimal. Some linear features such as user-created OHV trails
 14 and two-track roads used for previous seismic studies or for access to the canyon rim have appeared in
 15 some areas and can be seen at a distance. Grazing activities are occasionally evidenced by the visibility of
 16 corrals or fencing, cattle trails, and livestock. Mechanical removal of salt cedar (tamarisk), along the San
 17 Rafael River has resulted in some visual modification to riparian areas over the last decade.

18 As part of the MLP process, the BLM identified key observation points (KOPs) within the planning area
 19 to focus the alternatives on areas where viewers are more likely to seek visually appealing experiences.
 20 These areas are shown in Map 2-7 and include overlooks to view the Green River Labyrinth Canyon
 21 corridor and access points to canyon hiking such as the Horseshoe Canyon Trailhead. The KOPs include
 22 Bull Bottom, Trin Alcove/Three Canyon Overlook, Wolverton Overlook, Keg Knoll, and the Horseshoe
 23 Canyon Trailhead (see Map 2-6). The primary travel route in the planning area, known as Lower San
 24 Rafael Road, is also identified as a linear key observation corridor, and is shown on Map 2-8-B. These
 25 KOPs and the viewsheds from these KOPs have the highest potential value for those recreationists and
 26 other users for whom scenic quality is an important component of their experience (see Section 4.14 for
 27 full analysis of impacts to recreation). Other areas likely to be visited are the miles of OHV, bike,
 28 equestrian, and foot trails occasionally visited in the planning area by recreationists, hunters, permitted
 29 livestock grazing allotment holders, and scenic drivers within the planning area or along highways
 30 bordering the planning area such as Interstate 70 or State Route 24.

1 **3.10 AUDITORY MANAGEMENT (SOUNDSCAPES)**

2 **3.10.1 Introduction**

3 The analysis area for auditory management (soundscapes) consists of the planning area and adjacent lands
4 that have sensitive receptors and that could be affected by decisions in the planning area. The adjacent
5 lands include the following:

- 6 • Portions of the Labyrinth Canyon and Dirty Devil/Robbers Roost SMRAs that are south and east
7 of the planning area and above the rim of the Green River
- 8 • The Horseshoe Canyon unit of Canyonlands National Park

9 **3.10.2 Resource Conditions**

10 ***3.10.2.1 Soundscape***

11 A soundscape consists of both natural and human-created sounds and is the total acoustic environment of
12 an area. Like scenery or water, a soundscape is a valuable resource that can be degraded easily or
13 destroyed by inappropriate sounds or sound levels. Soundscapes, like airsheds and viewsheds, transcend
14 management boundaries and may require management.

15 Sound can be defined as any pressure variation that the human ear can detect. It occurs from vibrations or
16 sound waves radiating through air, water, or solid objects. For the purposes of this analysis, noise is
17 defined as unwanted sound that interferes with normal activities or that in some way reduces the quality
18 of the environment.

19 The natural and human-created sounds within a soundscape are characterized as being heard at noise-
20 sensitive human receptors. Noise-sensitive human receptors are places where sounds can be heard; they
21 may consist of residences, hospitals, libraries, recreation areas, churches, and similar locations. Studies
22 have shown direct links between noise and health. Noise-induced hearing loss is the most common health
23 effect (EPA 2017b). In addition, noise can reduce the quality of the visitor recreation experience on public
24 lands. Although noise is known to have an effect on wildlife health and behavior, this section considers
25 sound and noise levels as they relate to the human environment.

26 ***3.10.2.2 Sound Level Characteristics and Sound Data***

27 Humans experience sound based on frequency, amplitude, and time pattern. Frequency or pitch is defined
28 as the number of pressure variations per second in the air, and it is expressed in hertz (Hz). Humans can
29 generally hear sound in the 20- to 20,000-Hz range. Amplitude is the magnitude or intensity of a sound
30 and is usually expressed in decibels (dB), which is a dimensionless ratio of sound pressure to a reference
31 pressure (usually 20 micropascals). The threshold of human hearing is 0 dB. Decibels are measured on a
32 logarithmic scale. A change in sound level of 10 dB is perceived by the average person as doubling (or
33 halving) the level of loudness (Table 3-22).

1

Table 3-22. Perceived Change in Decibel Levels

Change in Sound Level	Perceived Change to the Human Ear
±1 dB	Not perceptible
±3 dB	Threshold of perception
±5 dB	Clearly noticeable
±10 dB	Twice (or half) as loud
±20 dB	Fourfold (4×) change

2

Note: For comparison purposes, the threshold of human hearing is 0 dB.

3

Source: Minnesota Pollution Control Agency (1999)

4

Because the human ear perceives sounds at low frequencies differently than it does sounds at high frequencies, measured sound levels may be adjusted to correspond to human hearing. The A-weighted decibel (dBA) is the adjusted unit of sound used to describe the human response to noise. Sound levels and perception by the human ear are presented in Table 3-23. Sound and noise are also considered in terms of time patterns; noise can be continuous (e.g., the sound of a waterfall or machinery operating without interruption in the same mode), intermittent (e.g., aircraft take-offs and landings), or impulsive (e.g., noise from impacts or explosions such as from a gunshot). Sound and noise can fluctuate and vary over time (e.g., the loudness of traffic at a busy intersection).

11

12 **Table 3-23. Sound Levels for Common Noise Sources**

Noise Source or Noise Environment	Sound Level (dBA)	Characteristic Impression
Jackhammer	130	Threshold of pain
Jet aircraft takeoff at 100 feet	120	Uncomfortably loud
Riveting machine at operator’s position	110	Extremely loud
Industrial boiler room	90	
Quiet air compressor at 50 feet	70	Very loud
Normal conversational speech at 5-10 feet	60	
Open office area background level	50	Quiet
Residential with soft radio music	40	
Soft whisper at two feet	30	Very quiet
Concert hall	20	

13

Note: For comparison purposes, the threshold of human hearing is 0 dB.

14

Source: Cavanaugh and Tocci (1998)

15

Although dBA indicates the level of noise at a specific point in time, noise levels within a soundscape can vary continuously and can include sounds from a variety of sources. This variation can be accounted for using the energy-equivalent sound level (L_{eq}). The A-weighted L_{eq} is the dBA average over some time interval.

18

19

Noise levels can be affected by the distance of the noise receptor from the noise source. Attenuation (the reduction of sound intensity by various means) as a result of distance typically has a drop-off rate of 6 dBA with every doubling of distance from the point source, assuming no interference from obstacles,

21

1 atmospheric conditions (e.g., rain, snow, and wind), or site-specific terrain (e.g., hills and forests)
 2 (Minnesota Pollution Control Agency 1999).

3 **Oil and Gas Noise Contributions**

4 Although data regarding noise levels from oil and gas activities are generally limited, both the BLM and
 5 U.S. Bureau of Reclamation have published noise levels for some oil and gas activities. Table 3-24 shows
 6 noise levels associated with specific oil and gas activities.

7 **Table 3-24. Noise Levels Associated with Oil and Gas Sources**

Sound Source	Time Pattern	BLM Data	Bureau of Reclamation Data
		(dBA)*	
Well drilling	Intermittent, fluctuating	83	–
Pump jack operation	Long term, continuous	82	–
Produced-water injection facilities	Long term, continuous	71	–
Natural gas compressors	Long term, continuous	89	62–87
Site construction and rehabilitation: earth moving and agricultural equipment	Intermittent, fluctuating	–	93–108
Oil and gas drilling/workover	Intermittent, fluctuating	–	100–130
Oil and gas fracturing operation	Intermittent, fluctuating	–	100–145
Oil and gas operations	Long term, continuous	–	62–87

8 *Sound levels are normalized to a distance of 50 feet (15 meters) from the source.

9 Sources: BLM 2000; Bureau of Reclamation 2008.

10 **3.10.2.3 Analysis Area Noise Levels**

11 The natural soundscape is an important component of the recreational experience enjoyed by visitors to
 12 the analysis area. The existing soundscape in the analysis area includes noise from vehicles on State
 13 Route 24 and Interstate 70, localized vehicular traffic, aircraft overflights, OHV users, boaters, mountain
 14 bikers, climbers, other recreation users, and livestock grazing operations. Noise from localized vehicular
 15 traffic is loudest immediately adjacent to roads and parking areas, but it can be audible a long distance
 16 from roads if there are low levels of natural sound in the background. Sounds tend to travel a great
 17 distance in the desert. Natural sounds such as birdsong and the sound of running water are also present in
 18 the analysis area.

19 The level of highway noise in the analysis area from State Route 24 and Interstate 70 depends on the
 20 volume of traffic on each route, the speed of the traffic, and the number of trucks in the traffic flow. The
 21 loudness of traffic noise generally increases with heavier traffic volumes, higher speeds, and a greater
 22 number of trucks. Traffic noise can also be increased by factors such as defective mufflers, other faulty
 23 vehicle equipment, or steep inclines (FHWA 1980). A medium-sized truck traveling at 50 miles per hour
 24 has a perceived relative loudness of 80 dBA from 50 feet away, and a modified motorcycle traveling at
 25 the same speed has a perceived relative loudness of 90 dBA from 50 feet away (FHWA 1980). Traffic
 26 noise is usually not a serious problem for people more than 500 feet from heavily traveled freeways or
 27 more than 100–200 feet from lightly traveled roads (FHWA 1980).

1 The majority of the analysis area is not near State Route 24 or Interstate 70, and portions of its
2 soundscape may compare to an agricultural area such as a tomato field or to a small town or quiet
3 suburban area. A typical day-night average sound level (the 24-hour A-weighted equivalent sound level
4 with a 10-decibel penalty applied to nighttime levels, or L_{dn}) for a tomato field on a farm is 44 dBA,
5 whereas a small town cul-de-sac and wooded residential area both have a typical day-night average sound
6 level of 50 dBA (EPA 1974). However, much of the analysis area (and especially more remote parts such
7 as the recreation focus areas and KOPs) likely has average sound levels well below 44 to 50 dBA. Natural
8 sound predominates, and human-caused noise, such as aircraft overflights or vehicle traffic, consists of
9 distinct noise events. Existing ambient sound levels in these areas may be similar to a representative
10 sound level of 20 dBA from leaves rustling in Canyonlands National Park (Ambrose and Burson 2004). It
11 should be noted that although there is often less sensitivity to noise in developed areas, the soundscape of
12 the analysis area is expected to be natural, with little, if any, human-caused noise in backcountry and
13 wilderness-like areas (Ambrose and Burson 2004).

14 Noise-sensitive human receptors in the analysis area primarily consist of recreation users in Labyrinth
15 Canyon and the Dirty Devil/Robbers Roost SRMAs, in Horseshoe Canyon, and in the five KOPs
16 identified in the Visual Resources and Night Skies section (Bull Bottom, TrinAlcove/Three Canyon,
17 Wolverton Overlook, Keg Knoll, and the Horseshoe Canyon trailhead).

18 **3.10.2.4 Regulatory Summary**

19 Laws and guidelines at the federal level that are most relevant to the assessment of noise impacts in the
20 analysis area include the following:

- 21 • Noise Control Act of 1972, as amended (PL 92-574, 42 USC 4901 et seq.)
- 22 • Clean Air Act Title IV – Noise Pollution (42 USC 7641)
- 23 • The Quiet Communities Act of 1978 (PL 95-609, 92 USC 3079)
- 24 • Occupational Safety and Health Administration Occupational Noise Exposure; Hearing
25 Conservation Amendment (29 CFR 1910)
- 26 • NPS Director’s Order #47: Soundscape Preservation and Noise Management and other park
27 soundscape management policies

28 There is no state or local noise control program for the analysis area.

29 The Noise Control Act of 1972 established a national policy to promote an environment free from noise
30 that jeopardizes the health or welfare of the American population (EPA 1974). In 1974, the EPA
31 identified a 24-hour exposure level of 70 dB as the level of environmental noise to prevent measurable
32 hearing loss over a lifetime. In addition, noise levels of 55 dB outdoors and 45 dB indoors were identified
33 as requisite to protect public health and safety from activity interference and annoyance (EPA 1974). A
34 small town and quiet suburban community typically has an outdoor day-night sound level of 50 dB; a
35 suburban community has an outdoor day-night sound level of 55 dB (EPA 1974).

36 Clean Air Act Title IV gives the EPA the authority to investigate and study noise and its effect,
37 disseminate information to the public regarding noise pollution, respond to inquiries on matters related to
38 noise, and evaluate the effectiveness of existing regulations for protecting public health and welfare. It
39 also directed the EPA to establish the Office of Noise Abatement and Control, which was phased out in
40 1982 with the decision that noise issues were best handled at the state and local level.

41 The Quiet Communities Act of 1978 amended portions of the 1972 Noise Control Act, expanding the
42 EPA’s mission to control noise pollution and undertake research and public information initiatives. It also
43 required coordination between federal agencies on noise control.

1 The Occupational Health and Safety Act of 1970 established hearing conservation noise exposure
2 regulations for workers. The purpose of the act is to ensure safe and healthful working conditions.
3 Worksite noise levels are regulated by 29 CFR 1910.95, which deals with occupational noise exposure.
4 This section limits the noise pressure level to 90 dBA continuous exposure for an 8-hour day. If workers
5 are exposed to an 8-hour time-weighted average of 85 dBA or greater, a worker hearing protection
6 program must be implemented.

7 NPS Director’s Order #47 outlines agency operational policies that require the protection, maintenance,
8 or restoration of natural soundscape resources in a condition unimpaired by inappropriate or excessive
9 noise sources. The NPS has established additional management policies for soundscape protection,
10 including policies for cultural soundscape management, overflight management, and motorized
11 equipment in national parks.

12 **3.10.2.5 Current Management**

13 There is no management direction for auditory management (soundscapes) in either the Price or Richfield
14 Field Office’s ROD/RMPs (BLM 2008a, 2008b). The travel management decisions in the Richfield Field
15 Office ROD/RMP indicate that the designation of routes should take into account “noise and other
16 factors” (BLM 2008b).

17 **3.10.3 Resource Trends**

18 Nearly 64 million people live within 25 miles of BLM-administered public land. The population in the
19 West continues to increase at a rapid rate and, as a result, so does the use of public lands (BLM 2014b).
20 Human-created noise levels are expected to rise with the increased use of public lands, and management
21 of soundscapes will require more attention.

22 Changing patterns of human use and land use continually affect the acoustic environment. In general,
23 soundscape management is becoming more complex and challenging with an increase in threats to
24 acoustic resources (NPS n.d. [2017]). Resource planning for soundscapes is an important step to address
25 threats to BLM resources from noise and other soundscape changes.

26 **3.11 SPECIAL STATUS SPECIES**

27 Special status species include species listed as threatened, endangered, or candidates for listing under the
28 Endangered Species Act (ESA) and species designated as sensitive by the BLM. The BLM is responsible
29 for managing habitat for special status plant and animal species as well as managing special status plants.
30 The BLM RMPs for the Price and Richfield Field Offices allocate resources on public lands for special
31 status species. The RMPs also require the implementation of stipulations, such as restrictions on surface
32 disturbance and seasonal and spatial buffers to protect individuals and habitats for special status species.

33 BLM State Directors designate species within their respective states as BLM sensitive. Species designated
34 as BLM sensitive must be native species found on BLM-administered lands for which the BLM has the
35 capability to significantly affect the conservation status of the species through management, and either

- 36 1. there is information that a species has recently undergone, is undergoing, or is predicted to
37 undergo a downward trend such that the viability of the species or a distinct population segment
38 of the species is at risk across all or a significant portion of the species’ range; or
- 39 2. the species depends on ecological refugia or specialized or unique habitats on BLM-administered
40 lands, and there is evidence that such areas are threatened with alteration such that the continued
41 viability of the species in that area would be at risk.

- 1 The BLM’s objectives for managing special status species are to
- 2 1. conserve and/or recover ESA-listed species and the ecosystems on which they depend so that
 - 3 ESA protections are no longer needed for these species, and
 - 4 2. initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species
 - 5 to minimize the likelihood of and need for listing of these species under the ESA.

6 The analysis area for special status species varies by species. For special status fish and wildlife species
7 for which habitats have been delineated or modeled by BLM or another regulatory agency, the analysis
8 area is the extent of the habitats crossed by the planning area. For special status fish and wildlife species
9 for which habitats have not been delineated, the analysis area is the subwatersheds (Hydrologic Unit Code
10 [HUC] 12) crossed by the planning area. For special status plants, the analysis area is the extent of
11 identified habitats within the subwatersheds (HUC 12) crossed by the planning area. The analysis areas
12 were selected because they represent the areas within which changes to special status species populations
13 could be observed as a result of impacts on the soil, water, vegetation, or individuals of each species in
14 the planning area.

15 **3.11.1 Resource Conditions**

16 This section describes the existing condition of special status species that are known to or may occur on
17 BLM-administered public lands in the planning area. BLM developed this information by reviewing lists
18 of species listed under the ESA that may occur in the planning area (USFWS 2017) and the Utah BLM
19 sensitive species lists (BLM 2010b, 2011) and identifying species that may occur in the planning area
20 using the best available information, including known sightings and historic locations and habitat
21 conditions in the planning area.

22 ***3.11.1.1 Special Status Plants***

23 **Species Listed Under the Endangered Species Act**

24 ***Jones Cycladenia (Cycladenia humilis var. jonesii) – Threatened***

25 Regulatory Status

26 Jones cycladenia (*Cycladenia humilis* var. *jonesii*) was proposed for listing on January 10, 1985 (*Federal*
27 *Register* 50:1247–1251). On May 5, 1986, the USFWS listed Jones cycladenia as a threatened species
28 (*Federal Register* 51:16526–16530).

29 Critical habitat has not been designated for Jones cycladenia. USFWS has not finalized or approved a
30 comprehensive recovery plan for the species, but a recovery outline was published in December 2008
31 (USFWS 2008a). The recovery outline is intended to guide recovery efforts and inform consultation and
32 permitting activities until a comprehensive recovery plan for the species has been finalized and approved.

33 Distribution and Habitat Requirements

34 Jones cycladenia occurs between 4,390 and 6,000 feet (1,338 and 1,829 meters [m]) above mean sea level
35 (amsl) in plant communities of mixed desert scrub, juniper, or wild buckwheat-Mormon tea. It is found on
36 gypsiferous, saline soils of Cutler, Summerville, and Chinle Formations (USFWS 2008a). Populations are
37 found on all aspects and on slopes that range from moderate to steep (USFWS 2008b).

38 Jones cycladenia is known from 26 sites. A “site” is a uniquely named occurrence, distinct from other
39 named occurrences by distance or landscape structure, such as elevation, slope position, or characteristics
40 of intervening habitat. These 26 sites are located in five areas, termed “complexes.” The five Jones

1 cycladenia complexes include Joe Hutch Creek, San Rafael, Moab, and Greater Circle Cliffs in Utah, and
2 Pipe Springs in Arizona (USFWS 2008a).

3 Primary Threats to Survival

4 At the time of listing, Jones cycladenia was known from three sites with low numbers. It was thought to
5 be a Tertiary relict, poorly adapted to the present-day arid climatic regime. The Jones cycladenia
6 ecosystem was thought to be fragile, easily degraded, and slow to recover (*Federal Register* 51:16526–
7 16530). Ongoing and potential anthropogenic impacts on habitat include off-highway vehicle (OHV) use;
8 oil, gas, and mineral exploration, including uranium mining and tar sands; and livestock grazing (although
9 the rule notes the probability of grazing causing serious damage was low) (*Federal Register* 51:16526–
10 16530). Habitat disturbance was thought to be reducing seedling establishment. Jones cycladenia was also
11 at risk as a result of inadequate state and federal regulatory mechanisms (USFWS 2008a).

12 The variety's threatened status has prompted federal land managers to implement protective measures to
13 limit impacts from OHV and mountain bike use, cattle grazing, and extractive activities. While these
14 threats have been managed to reduce anthropogenic impacts, these issues remain an ongoing and long-
15 term concern. Specifically, mountain biking and OHV use occurs near the Moab and San Rafael
16 complexes; cattle grazing occurs at sites in the San Rafael complex; and uranium mining and tar sands
17 extraction are foreseeable threats in both the San Rafael and Greater Circle Cliffs complexes (both
18 complexes are in Designated Special Tar Sands Areas) (USFWS 2008a).

19 Since listing, a number of other biological limiting factors have been revealed. Preliminary research (1988
20 to 1993) has shown that the plant has low fruit production and seed set, likely due to a complicated
21 pollination system and inadequate pollinator abundance (i.e., pollinators may have been lost or may be
22 migratory and appear episodically). No seedling germination events have been documented (USFWS
23 2008a). Genetic research at the San Rafael (the Spotted Wolf Canyon site), Moab (two separate sites at
24 Onion Creek and Castle Valley), and Greater Circle Cliffs complexes (one site at Deer Point, one site at
25 Silver Falls Canyon, and one site at Purple Hills) indicates that these sites of Jones cycladenia are
26 genetically distinct and not inbred, but may face other genetic limitations, such as genetic bottlenecking
27 or genetic drift. Several researchers have concluded that an ongoing lack of population recruitment may
28 result in a permanent loss of genetically important individuals or occupied sites. The species' fractured
29 distribution could further complicate issues associated with limited natural reproduction, dispersal
30 constraints, and genetic risks (USFWS 2008a).

31 Other factors reported since the time of listing include natural predation and relations to fragile
32 cryptobiotic crusts in some locations (USFWS 2008a).

33 Occurrence in the Planning Area

34 The BLM Price Field Office conducted studies in 2012 and 2014 to document distribution, identify
35 habitat requirements, and model the extent of suitable habitat of the species. The study indicates that the
36 species is not known to occur in the planning area. However, there are several known occupied sites along
37 the San Rafael River, approximately 1.75 miles west of the planning area. Additionally, the study
38 modeled potentially suitable habitat for the species. There are approximately 32,500 acres of habitat
39 classified as low-probability habitat, 148,367 acres of habitat classified as medium-low, 15,196 acres of
40 habitat classified as medium-high probability habitat, and 118,164 acres of habitat classified as highest
41 probability habitat in the planning area (Map 2-13) (Sansom and Elliott 2014).

1 ***Wright Fishhook Cactus (Sclerocactus wrightiae) – Endangered***

2 **Regulatory Status**

3 Wright fishhook cactus (*Sclerocactus wrightiae*) was listed as endangered under the ESA in October 1979
4 (*Federal Register* 44:58868). No critical habitat has been designated for the species. USFWS completed a
5 90-day finding on a petition to delist the species in 2005 in which the USFWS found that there is no
6 substantial information that would indicate that delisting of Wright fishhook cactus may be warranted
7 (*Federal Register* 70:44544). USFWS initiated a 5-year status review of the species in 2016 (*Federal*
8 *Register* 81:33698).

9 **Distribution and Habitat Requirements**

10 The Wright fishhook cactus is known from Emery, Sevier, Wayne, and Garfield Counties in south-central
11 Utah. Populations of Wright fishhook cactus occur primarily on lands managed by the BLM out of the
12 Price and Richfield Field Offices and by the National Park Service (USFWS 2008c).

13 The Wright fishhook cactus is found on semi-barren sites in salt desert shrub, pinyon/juniper woodland-
14 low shrub, pinyon/juniper woodland-grassland, pinyon/juniper woodland-big sage phase, mixed
15 grassland, and mixed desert shrub communities. The cactus is most commonly found between the
16 elevations of 4,200 and 7,600 feet (1,280 and 2,315 m) (USFWS 2008c).

17 The Wright fishhook cactus is found on a variety of geological formations. It appears that the Wright
18 fishhook cactus does not solely occur on any particular formation but is most commonly found on the
19 Curtis, Mancos Shale, and Summerville Formations (USFWS 2008c).

20 **Primary Threats to Survival**

21 Potential human threats to the Wright fishhook cactus populations and suitable habitat include recreation,
22 including OHV use; energy and mineral exploration and development, including associated ancillary
23 facilities and disturbances; infrastructure development; and illegal collection (USFWS 1985). BLM has
24 also documented impacts to the species from trampling as a result of livestock grazing, which is a major
25 threat to this species. Illegal collection and removal of individuals and populations also constitutes a
26 significant threat to the species (BLM 1979, Christiansen 1991, and USFWS 1979, as cited in USFWS
27 2008c).

28 **Occurrence in the Planning Area**

29 The Wright fishhook cactus is known to occur in several locations of the southwestern portion of the
30 planning area in the vicinity of Hanksville. BLM has mapped a total of 2,293 acres of suitable habitat in
31 the planning area (Map 2-13).

32 **BLM-Sensitive Species**

33 Table 3-25 identifies BLM sensitive plant species that may occur or are known to occur in the planning
34 area.

1 **Table 3-25. BLM Sensitive Plant Species that May Occur in the Planning Area**

Common Name (Scientific Name)	County	Habitat Information	Potential Occurrence Rating*
Rabbit Valley gilia (<i>Aliciella caespitosa</i>)	Wayne	Pinyon-juniper-mountain mahogany communities at 1,735–2,595 m amsl on Navajo Sandstone and Carmel Limestone Formations, in crevices and on talus.	2
Mussentuchit Creek gilia (<i>Aliciella tenuis</i>)	Emery	Shadscale, ephedra, wyethia, Indian ricegrass, pinyon-juniper, and mountain mahogany communities at 1,585–2,170 m.	3
Peabody’s milkvetch (<i>Astragalus pubentissimus</i> var. <i>peabodianus</i>)	Emery	Entrenched channels cut into the escarpments draining the south and wet flanks of the Tavaputs Plateaus, in and below the Cretaceous Straight Cliffs’ coal-bearing sequences. Sandy drainage bottoms in pinyon-juniper and mixed desert shrub communities at 1,300–1,770 m amsl.	1
Loa milkvetch (<i>Astragalus welshii</i>)	Wayne	Sagebrush, pinyon-juniper, and sagebrush-aspen communities, exclusively on igneous gravels at 2,135–2,810 m amsl.	1
Bolander’s camissonia (<i>Camissonia bolanderi</i>)	Emery	Gypsiferous Triassic Moenkopi Formation in Emery County, Utah. It is a narrowly restricted edaphic endemic. It is known only from the type locality at the upper Tidwell Draw in the San Rafael Desert. It occurs in association with <i>Atriplex</i> spp. and <i>Ephedra</i> spp. at 4,780 feet (1,457 m) amsl and was found next to a telephone pole (Atwood and Welsh 2007). The type locality is about 1 mile from the planning area, but Moenkopi Formation is not present in planning area.	2
Creutzfeldt’s cryptantha (<i>Cryptantha creutzfeldtii</i>)	Emery	Barren clay knolls and shale slopes of the Mancos Shale Formation in shadscale and mat-saltbush communities at 1,600–2,073 m amsl; in silty-clay soils of the Blue Gate Member of the Mancos Shale, which is often overlain by a veneer of fragments from the overlying Emery Sandstone.	3
Featherleaf springparsley (<i>Cymopterus beckii</i>)	Wayne	Sandy or stony places, pinyon-juniper-mountain brush, ponderosa pine-manzanita, conifer-oak, and Douglas-fir communities at 1,700–2,635 m.	1
Maguire’s fleabane (<i>Erigeron maguirei</i>)	Emery	Exposed mesas and steep, narrow canyons cut into Navajo Sandstone; cool, shaded, mesic sites in crevices that collect soil and organic matter and, less frequently, along canyon bottom washes at 1,600–2,170 m amsl. Cool, mesic wash bottoms and dry, partially shaded slopes of eroded sandstone cliffs of Wingate, Chinle, and Navajo Sandstone Formations in mountain shrub, Douglas-fir, ponderosa pine, and lower limits of juniper woodland communities between 5,400 and 7,100 feet amsl (Utah Rare Plant Guide 2017a).	1
Flat-top buckwheat (<i>Eriogonum smithii</i>)	Emery, Wayne	Purple sage, matchweed, ephedra-Indian ricegrass, and rabbitbrush communities, on the Entrada Formation, and on stabilized sand dunes at 1,585–1,710 m amsl.	3
Paria spurge (<i>Euphorbia nephradenia</i>)	Emery, Wayne	Mat saltbush, blackbrush, ephedra, and mixed sandy desert shrub communities, mainly on Tropic Shale and Entrada Formations at 1,155–1,465 m amsl.	3

Common Name (Scientific Name)	County	Habitat Information	Potential Occurrence Rating*
Rushpink skeletonplant (<i>Lygodesmia entrada</i>)	Emery	Juniper and mixed desert shrub communities at 1,340–1,465 m amsl.	3
Manystem blazingstar (<i>Mentzelia multicaulis</i> var. <i>librina</i>)	Emery	Sagebrush, rabbitbrush, and pinyon-juniper communities at approximately 1,890 m amsl on Mancos Shale and Price River Formations.	3
Trotter’s alpine parsley (<i>Oreoxis trotteri</i>)	Emery	In crevices or in sandy pockets on the Moab Tongue and occasionally the Slick Rock members of the Entrada Sandstone. Found in the open, although usually on sites with a northern aspect, and, less frequently, in alcoves and along shaded cliff bases. Mixed juniper and warm desert shrub community at 1,359–1,573 m amsl.	2
Jones dalea (<i>Psorothamnus polydenius</i> var. <i>jonesii</i>)	Emery	Shadscale, mat saltbush, ephedra, and galleta grass communities on Mancos Shale Formation (Blue Gate and Tununk members) and less commonly on sandy terrace gravels at 1,270–1,500 m amsl.	4
Jane’s globemallow (<i>Sphaeralcea janeae</i>)	Wayne (Millard benches)	Warm and salt desert shrub on the Shinarump and Moenkopi Formations, and White Rim and Organ Rock members of the Cutler Formation at 1,220–1,405 m amsl. Frequently on sandy and gravelly soils of the weathered underlying formations, often on river benches and roadsides.	1
Psoralea globemallow (<i>Sphaeralcea psoraloides</i>)	Emery, Wayne	Zuckia-ephedra, shadscale, buckwheat, ephedra, pepperweed, and pinyon-juniper communities on saline and gypsiferous Mancos Shale (Tununk member), Buckhorn Conglomerate, Curtis Sandstone, Entrada siltstone, Carmel, Kaibab limestone at 1,220–1,925 m amsl. Occupies hogbacks and intervening strike valleys along the eastern and southeastern footslope of the San Rafael Swell.	4
Cedar Mountain fame flower (<i>Talinum thompsonii</i>)	Emery	Siliceous conglomerate gravels of Cedar Mountain Formation in pinyon-juniper and ponderosa pine communities at approximately 2,290 m. Shallow, gravelly soils comprised mainly of rounded, siliceous pebbles of the Buckhorn Conglomerate of the Cedar Mountain Formation in pinyon-juniper, sagebrush, and ponderosa pine communities at 2,000–2,500 m amsl (Welsh et al. 2003).	2
Alpine greenthread (<i>Thelesperma windhamii</i>)	Wayne	Pinyon-juniper, mountain brush, and bristlecone pine communities at 2,100–2,745 m amsl on Carmel Limestone and on sand associated with the Navajo and Entrada Formations.	2

* Potential Occurrence Rating:

1. Very Low or No Potential. Suitable habitat is not present.
2. Low Potential. Less than 100 acres of suitable habitat present/or low quality suitable habitat is present.
3. Medium Potential. Suitable habitat is present.
4. High Potential. High quality suitable habitat is present and/or historic records of species presence
5. Very High Potential. Occupied habitat is present. [Not used in this table, but here for reference.]

1 ***Species Descriptions***

2 Rabbit Valley gilia (*Aliciella caespitosa*)

3 A perennial herb with sparsely leafy flowering stems, 3 to 8.5 cm tall, this plant arises from a densely
4 leafy base. Flowers (June–July) are scarlet red, occasionally fading to maroon or purple. This plant was
5 first collected in 1875 and was not seen again for almost 90 years.

6 Mussentuchit Creek gilia (*Aliciella tenuis*)

7 A tufted, short to long-lived perennial herb, 0.5 to 1.5 decimeters (dm) tall, this plant has lobed basal
8 leaves. Forms mounds with age. The plant is densely covered with glandular hairs that are often covered
9 with adhering sand grains. Flowers (May–July) are pale blue.

10 Peabody’s milkvetch (*Astragalus pubentissimus* var. *peabodianus*)

11 Plants grow as low, rounded clumps with spreading lower branches in the sandy drainage bottoms, and
12 the flowers vary in color from plant to plant and even within a single plant, with the older flowers
13 different in color from younger ones.

14 Loa milkvetch (*Astragalus welshii*)

15 A perennial herb, 4 to 20 centimeters (cm) tall, this plant has whitish (drying yellowish-white), often
16 purple-tinged flowers in bloom May to early June.

17 Bolander’s camissonia (*Camissonia bolanderi*)

18 Bolander’s camissonia was first located and described as a species in 2005. It is known only from a single
19 location in the upper Tidwell Draw, approximately 15 miles northwest of the town of Green River. This
20 location is on the Triassic Moenkopi Formation in association with saltbush and ephedra at 4,780 feet
21 amsl (Atwood and Welsh 2007).

22 Creutzfeldt’s cryptantha (*Cryptantha creutzfeldtii*)

23 A perennial herb, this plant is 7 to 23 cm tall, with many stems. Clusters of white flowers bloom from
24 April to early June.

25 Featherleaf springparsley (*Cymopterus beckii*)

26 A perennial herb, up to 4 dm tall, this plant produces bright yellow flowers in compact clusters in the spring.

27 Maguire’s fleabane (*Erigeron maguirei*)

28 A hairy perennial herb, 7 to 25 cm tall, this plant has one to four flower heads with pinkish-white rays,
29 and yellow disk flowers are borne on the ends of the stems. The plant blooms from May to June.

30 Flat-top buckwheat (*Eriogonum smithii*)

31 An erect to spreading, bright green shrub, this plant is 4 to 8 dm tall and produces open clusters of bright
32 yellow flowers.

33 Paria spurge (*Euphorbia nephradenia*)

34 A slightly succulent annual herb 1 to 2.5 dm tall, this plant produces small flowers inside yellow-green
35 cup-shaped structures. Each flower cluster produces a rounded seed capsule, which droops out of the
36 center the flowering structure. The plant blooms from June through August.

1 Rushpink skeletonplant (*Lygodesmia entrada*)

2 A perennial herb with thin, woody stems, the plant is typically 2.5 to 4.5 dm tall. White flower heads
3 bloom from May to June. The plants produce a milky juice.

4 Manystem blazingstar (*Mentzelia multicaulis* var. *librina*)

5 The plants are characterized by diffusely branched stems up to 3 dm tall, simple pinnatifid leaves with
6 narrow lobes, and scarcely winged seeds. Plants produce flowers and fruit June through August (Colorado
7 Rare Plant Guide 2017).

8 Trotter's alpineparsley (*Oreoxis trotteri*)

9 This is a clump-forming perennial herb. Clumps are up to 5 dm wide and 4 to 8 cm tall. Clusters of
10 yellow flowers bloom in late April and May.

11 Jones dalea (*Psorothamnus polydenius* var. *jonesii*)

12 This is an armed shrub 1.5 to 8 dm tall with ascending branches. Leaflets are curved, at least some over 4
13 millimeters (mm) long. Branches velvety with short hairs, conspicuously glandular with yellow or orange
14 resinous glands (Utah Rare Plant Guide 2017b).

15 Jane's globemallow (*Sphaeralcea janeae*)

16 This is a perennial herb, 3 to 9 dm tall, that produces a cluster of orange flowers from May to July. It is
17 similar to *Sphaeralcea leptophylla* in general habit during early anthesis. However, at maturity, it
18 becomes much taller than *S. leptophylla* and differs in color, simulating the large, rounded growth form
19 and yellowish-green color of the unrelated *Psoralidium junceum* and *Amsonia tomentosa* (Welsh et al.
20 2008). Also differs from *S. leptophylla* in having green leaves with rays of hairs steeply ascending, as
21 opposed to gray leaves with spreading rays (Utah Rare Plant Guide 2017c).

22 Psoralea globemallow (*Sphaeralcea psoraloides*)

23 This is a perennial herb, 1.4 to 3.5 dm tall, with deeply lobed, yellow green leaves. Orange flowers bloom
24 mid –May through July. The trifoliolate to three-lobed typically yellow green leaves are diagnostic for
25 this species, although there are gray green phases sometimes growing intermixed with the more typical
26 yellow green phases (Welsh et al. 2008). Its leaves are wedge shaped to rounded at the base and longer
27 than broad, which may also help to distinguish it from *S. coccinea*, which has cordate leaves broader than
28 long (Neese 1987 cited in Jones 2004). Furthermore, its flowers, borne singly at each node, may assist in
29 distinguishing from *S. grossulariifolia* and *S. parvifolia*, which have two or several-flowered clusters
30 (Neese 1987 cited in Jones 2004). This plant is a self-incompatible, obligate out-crossing species that is
31 likely dispersed by wind and rain (Jones 2004).

32 Cedar Mountain fameflower (*Talinum thompsonii*)

33 This is a succulent perennial herb that forms low clumps, up to 1 dm across, and produces loose clusters
34 of pink flowers from July to September.

35 Alpine greenthread (*Thelesperma windhamii*)

36 This is a perennial herb, 2 to 7 cm tall, with a thick, branching caudex. Leaves are mainly basal, pinnately
37 to subpalmately lobed or some entire; flower stems are pubescent at least on the lower portion (Utah Rare
38 Plant Guide 2017d).

1 **3.11.1.2 Special Status Fish**

2 **Species Listed Under the Endangered Species Act**

3 ***Humpback chub (Gila cypha) – Endangered***

4 Regulatory Status

5 The humpback chub (*Gila cypha*) was listed as endangered under the Endangered Species Preservation
6 Act (ESPA) on March 11, 1967 (*Federal Register* 32:4001). With the 1973 passage of the ESA, which
7 superseded the ESPA, the species retained its endangered status. On April 18, 2007, the USFWS initiated
8 a 5-year species status review (*Federal Register* 72:19549), which was completed in 2011 (USFWS
9 2011a).

10 In March 1994, the USFWS designated seven reaches critical habitat for the species in the Colorado River
11 system, including portions of the Colorado, Green, and Yampa Rivers in the Upper Basin and portions of
12 the Colorado and Little Colorado Rivers in the Lower Basin, totaling 379 river-miles of critical habitat for
13 the species (*Federal Register* 59:13374).

14 Distribution and Habitat Requirements

15 Humpback chubs are found in large rivers in a variety of habitats. Adults have been found in deep
16 turbulent currents, shaded canyon pools, and areas under shaded ledges in moderate current, riffles, and
17 eddies (*Federal Register* 59:13374–13400). Young and spawning adults generally are found in sandy runs
18 and backwaters (USFWS 1990) in the Colorado, Green, Lower Yampa, and White Rivers.

19 Historically, the humpback chub was found throughout the Colorado River Basin from western Colorado
20 and Wyoming to northern Arizona in the Colorado, Green, Lower Yampa, and White Rivers. Currently,
21 there are six known self-sustaining populations consisting of 7,300 to 13,800 wild adults. Five
22 populations exist in the Upper Colorado River basin and one in the Lower Colorado River basin. The
23 Upper Colorado River basin populations are present in the Colorado River (Black Rocks, Westwater, and
24 Cataract Canyons in Utah), the Yampa River (Yampa Canyon in Colorado), and the Green River
25 (Desolation/Gray Canyons in Utah).

26 Primary Threats to Survival

27 The current primary threats to the humpback chub are loss, fragmentation, and modification of habitat due
28 to construction and operation of the Hoover Dam. The dam has led to impoundment of streams causing
29 stream inundation, reduced water temperatures, reduced spring flow, sediment capture, and increased
30 daily fluctuation in flow. Decreased temperatures and flow reduction may impede successful spawning
31 and increase competition with other species. As with the other Colorado River Basin endangered fishes,
32 predation by introduced species also likely contributed to the decline of the species. Species such as bass,
33 sunfish, catfish, red shiner, and redbreast shiner prey on the eggs and young of a number of native fish
34 species (*Federal Register* 45:27710).

35 Other threats include hybridization with *G. elegans* (bonytail) and *G. robusta* (roundtail chub), introduced
36 parasites, and effects of a small population size. In addition to possible genetic effects and higher
37 vulnerability to catastrophic events, small population size in fish can contribute to low reproductive
38 success during spawning. Increased hybridization among the native *Gila* species is thought to be
39 symptomatic of changes in habitat and movement patterns, leading to the genetic introgression (Utah
40 Natural Heritage Program [UNHP] 2003). The introduced Asian tapeworm also may be a serious threat to
41 the survival of the humpback chub.

1 Occurrence in the Planning Area

2 There is no designated critical habitat for the humpback chub in the planning area.

3 The nearest known populations to the planning area are in the Colorado River (Cataract Canyon) and the
4 Green River (Desolation/Gray Canyons).

5 ***Bonytail (Gila elegans) – Endangered***

6 Regulatory Status

7 The bonytail (*Gila elegans*) was first proposed for listing as endangered under the ESA on April 24, 1978,
8 (*Federal Register* 43:17375), and the final listing rule was released in 1980 (*Federal Register* 45:27710).

9 Critical habitat for the bonytail and other listed Colorado River fish was designated in 1994 (*Federal*
10 *Register* 59:13374). The designation included seven reaches of the Colorado River system, including
11 portions of the Colorado, Green, and Yampa Rivers in the Upper Basin and the Colorado River in the
12 Lower Basin, totaling 312 river-miles.

13 Distribution and Habitat Requirements

14 Formerly abundant throughout the Colorado River and its larger tributaries, the bonytail has been found
15 from the Green River in Wyoming and Utah; the Yampa and Gunnison Rivers in Colorado; the Colorado
16 River in Arizona, Colorado, Nevada, and California; San Juan River in New Mexico; and the Gila and
17 Salt Rivers in Arizona (USFWS 2002a). Extirpated or declining across most of its range, the bonytail is
18 now one of the most critically imperiled North American freshwater fishes.

19 Primary Threats to Survival

20 Threats to the species include streamflow regulation, habitat modification or destruction, and competition
21 with and predation by non-native fish species. Historically, the species inhabited the large, turbid
22 mainstream rivers of the Colorado River Basin that alternated between swift water canyons characterized
23 by torrential rapids and slow, meandering, sandy-bottomed stretches. The Colorado River and its major
24 tributaries have been greatly altered by dams and diversions, eliminating much of the bonytail's original
25 habitat. The lower Colorado River basin is now an alternating series of reservoirs and cold tailwaters that
26 do not provide the warm-water temperature needed for bonytails to spawn. Predation by introduced
27 species such as bass, sunfish, catfish, red shiner, and redbreast shiner reduce survival of juvenile bonytails
28 and further contribute to the species' low recruitment (*Federal Register* 45:27710). Stocking efforts have
29 been adjusted to release larger size classes of bonytails in an attempt to reduce the risk of predation on
30 juveniles, but even the largest individuals regularly stocked (approximately 10 inches) appear to be
31 susceptible to predation by striped bass (*Morone saxatilis*) in reservoirs (Karam and Marsh 2010).

32 Occurrence in the Planning Area

33 There is no designated critical habitat for the bonytail in the planning area.

34 Known locations include the Yampa River in Dinosaur National Monument, the Green River in Gray and
35 Desolation Canyons, the Colorado River near Black Rocks (Kaeding et al. 1986) and Cataract Canyon
36 (*Federal Register* 59:13374), Lake Mohave near the Arizona–Nevada border, and Lake Havasu in
37 Arizona and California (USFWS 2002a). Bonytails have also dispersed into the San Rafael River from
38 release sites in the Colorado or Green rivers and likely made greater use of the river historically (BLM
39 2014a).

1 ***Colorado Pikeminnow (Ptychocheilus lucius) - Endangered***

2 Regulatory Status

3 Colorado pikeminnow was listed as endangered (as the Colorado River squawfish) under the ESA on
4 March 11, 1957 (*Federal Register* 32:4001) and as endangered under the ESA on its passage in 1973.
5 Two reintroduced Colorado pikeminnow populations have been designated as Nonessential Experimental
6 Populations (NEP) under Section 10(j) of the ESA (*Federal Register* 50:30188). An additional
7 reintroduced population has been proposed for designation as an NEP (*Federal Register* 52:32143), but
8 the ruling has never been finalized. A 5-year review was initiated on April 18, 2007 (*Federal Register*
9 72:19549), and completed in 2011 (USFWS 2011b).

10 On March 21, 1994, the USFWS designated 1,148 river-miles as critical habitat in six reaches of the
11 Colorado River system, including portions of the Colorado, Green, Yampa, White, and San Juan Rivers
12 (*Federal Register* 59:13374).

13 Distribution and Habitat Requirements

14 The Colorado pikeminnow is found in warm-water reaches of the main stem Colorado River and larger
15 tributaries. Adults have been found in various habitats, including deep, turbid, strongly flowing water;
16 eddies; runs; flooded bottoms; and backwaters. Lowlands inundated during high spring flows appear to be
17 important habitats for health and reproductive conditioning, as the fish use these habitats to offset winter
18 stress and replenish energy stores needed for long migrations and spawning. In winter, adults are most
19 commonly found in shallow, ice-covered shoreline areas (USFWS 2002b).

20 Adults migrate long distances (Tyus and McAda 1984) and seek whitewater canyons for spawning. They
21 appear to select river canyons receiving groundwater discharge from sandstone and limestone seeps, and
22 return to the same spawning site every year. Only two principal spawning sites have been identified, both
23 in the Green River subbasin. One site is near Three Fords Canyon in Gray Canyon of the Lower Green
24 River, and the other is in the lower 20 miles of the Yampa River (USFWS 2002b). After hatching, the
25 larvae drift downstream and then move to shoreline areas and backwaters. Juvenile pikeminnow
26 temporarily occupy shallow, ephemeral backwaters formed in late summer by receding water levels (Utah
27 Division of Wildlife Resources [UDWR] 1997).

28 The Colorado pikeminnow was once widespread in the large rivers of the Colorado River and major
29 tributaries, but its historical distribution was much greater than at present. The last capture of a wild
30 Colorado pikeminnow in the lower Colorado River was in 1975 (Minckley et al. 2003). The three
31 remaining wild populations are found in the Green, upper Colorado, and San Juan River subbasins.

32 Primary Threats to Survival

33 Threats to the Colorado River Basin endangered fishes include streamflow regulation, habitat
34 modification or destruction, and competition/predation from non-native fish species. Historically, the
35 species inhabited the large, turbid main stem rivers of the Colorado River Basin that alternated between
36 swift water canyons characterized by torrential rapids and slow, meandering, sandy-bottomed stretches.
37 The Colorado River has been greatly altered by dams and diversions eliminating much of the Colorado
38 pikeminnow original habitat. Currently, the lower Colorado River Basin is an alternating series of
39 reservoirs and cold tailwaters that do not provide the warm-water temperature needed for the Colorado
40 pikeminnow to spawn. Predation by introduced species also likely contributed to the decline of the
41 species. Species such as bass, sunfish, catfish, red shiner, and redbreast shiner prey on the eggs and young
42 of a number of native fish species (*Federal Register* 45:27710).

1 Occurrence in the Planning Area

2 The Green River in the planning area is designated critical habitat for the Colorado pikeminnow (Map 2-12).
3 The species is known to occur in the planning area in the Green River (from Lodore Canyon to the
4 Colorado River confluence) and is also known to occur in the San Rafael River (2.8 miles downstream of
5 the Hatt Ranch diversion to the Green River confluence) (BLM 2014a).

6 ***Razorback Sucker (Xyrauchen texanus) – Endangered***

7 Regulatory Status

8 The razorback sucker (*Xyrauchen texanus*) was first proposed for listing as a threatened species under the
9 ESA of 1973 on April 24, 1978 (*Federal Register* 43:17375). On May 27, 1980, the USFWS withdrew
10 the proposal because it was not finalized within the 2-year time limit from the initial publication in the
11 *Federal Register* (*Federal Register* 45:35410). In 1989, the USFWS received a petition requesting that
12 the razorback sucker be listed as an endangered species. A positive finding was made and subsequently
13 published by the USFWS on October 23, 1991 (*Federal Register* 56:54957). A 5-year review was
14 initiated on April 18, 2007 (*Federal Register* 72:19549) and completed in 2012 (USFWS 2012a). Another
15 5-year review was initiated in 2016 (*Federal Register* 81:33698).

16 In March 1994, the USFWS designated 15 reaches of the Colorado River system, including portions of
17 the Green, Yampa, Duchesne, Colorado, White, Gunnison, and San Juan Rivers in the Upper Basin and
18 portions of the Colorado, Gila, Salt, and Verde Rivers in the Lower Basin, totaling 1,724 river-miles of
19 critical habitat for the species (*Federal Register* 59:13374).

20 Distribution and Habitat Requirements

21 Razorback sucker habitat includes slow areas, backwaters, and medium to large eddies of medium-sized
22 to large rivers and their impoundments. Three of the four remaining populations of more than 100
23 individuals are found in reservoirs. Flooded lowlands and lower portions of tributary streams serve as
24 resting and feeding areas during breeding season in the Green River Basin. The razorback sucker is
25 commonly associated with sandy, muddy, and rocky substrates in areas with little aquatic vegetation. In
26 Lake Mohave, individuals were associated with inshore habitats, except during the hotter months, when
27 they moved offshore, possibly to avoid warmer water temperatures (USFWS 2002c).

28 In streams, spawning occurs most commonly near shores in streams over silty sand, gravel, or rock
29 substrate. In reservoirs, spawning occurs on gravel bars swept clean by wave action or along shorelines
30 over mixed substrates. Larvae appear to remain in gravel initially, swim up in the shallow littoral zone for
31 a few weeks after hatching, and then disperse to deeper waters. Seasonally inundated flood plains provide
32 favorable feeding areas for young (USFWS 2002c).

33 Historically, the razorback sucker was widely distributed and abundant in the Colorado River and major
34 tributaries from Northern Mexico through Arizona and Utah into Wyoming, Colorado, and New Mexico.
35 Now, it is much reduced in range and abundance.

36 Primary Threats to Survival

37 Primary threats to the razorback sucker are non-native fishes and invertebrates and human alteration of
38 riparian habitat. Predation on larvae and juveniles by introduced fishes results in low and sometimes
39 absent recruitment despite confirmed spawning and hatched larvae. Competition with and predation by
40 exotic crayfish also may have been documented in some areas. Hybridization with other suckers is a
41 potential problem in some locations. The loss, fragmentation, and modification of habitat due to
42 construction and operation of dams greatly restrict the amount of suitable habitat. Dams lead to
43 impoundment of streams, causing changes in winter and spring flows, altered river temperatures, and
44 reduced flooding (USFWS 2002c).

1 Occurrence in the Planning Area

2 The Green River in the planning area is designated critical habitat for the razorback sucker (Map 2-12).

3 In the Upper Colorado River Basin, razorback suckers are considered extant in four locations: Westwater
4 and Cataract Canyons, the Utah–Colorado border on the Colorado River, Desolation and Gray Canyons of
5 the Green River, and a population in northwestern Colorado on the Yampa River. These known
6 populations are outside the planning area; however, the species has been recorded in the Lower San
7 Rafael and Green Rivers in the planning area (BLM 2014a).

8 **BLM Sensitive Species**

9 No BLM sensitive fish species are known to occur in the planning area. Flannelmouth sucker
10 (*Catostomus latipinnis*), bluehead sucker (*Catostomus discobolus*), and roundtail chub (*Gila robusta*) are
11 species that are known to exist in the planning area and are species for which BLM is a signatory to a
12 conservation agreement, though these species are not specifically designated as sensitive. These species
13 are addressed in Section 3.11.

14 **3.11.1.3 Special Status Wildlife**

15 **Species Listed Under the Endangered Species Act**

16 ***California Condor (Gymnogyps californianus) – Endangered, Experimental***

17 Regulatory Status

18 The California condor (*Gymnogyps californianus*) was listed as an endangered species on March 11, 1967
19 (*Federal Register* 32:4001). A special provision of the ESA, the 10(j) rule, allows for the designation of
20 NEP for listed species. Reintroduction efforts for the condor in northern Arizona were developed under
21 this rule (*Federal Register* 61:54045). In Utah, California condors are considered endangered west of
22 Interstate (I-) 15 and north of I-70. Any condors that leave the experimental population area will be
23 considered endangered (*Federal Register* 61:54043).

24 Critical habitat for the condor was established in 1977 (*Federal Register* 42:47840).

25 Distribution and Habitat Requirements

26 Condors occupy remote rugged areas at low to moderate elevations that support large mammals (e.g.,
27 deer), which they consume as carrion. These birds require cliff sites or caves for nesting and cliffs, tall
28 conifers, or snags for roosting. Condors prefer nest sites inaccessible to terrestrial predators. Because they
29 are such large birds, they typically select roosting sites near cliffs where updrafts provide adequate lift for
30 them to take flight (AGFD 2017; USFWS 1996).

31 Historically, the California condor ranged in the 1800s from British Columbia to Baja California . The
32 fossil record indicates that in prehistoric times these non-migratory birds also were present across the
33 southern United States to Florida, and north along the east coast to New York. By the 1970s, condors
34 were resident only in southern California, with breeding sites limited to the Los Padres National Forest
35 (AGFD 2017; USFWS 1996).

36 In 1992, releases to the wild began in central and southern California, to be followed by releases in the
37 Vermilion Cliffs area of Arizona in 1996 and in Baja California in 2002. As of 2011 there are currently 97
38 wild condors in California, 74 in Arizona, and 20 in Baja California (AGFD 2017). The Vermilion Cliffs
39 population is managed by the BLM (AGFD 2017). The current range of this population is centered on the
40 Colorado River Basin in northern Arizona and southern Utah.

1 Primary Threats to Survival

2 Because condors have a low reproductive rate, condor populations can be influenced even by sporadic
3 mortality (USFWS 1996). Shooting and egg collecting contributed to the decline of condors in the 1800s
4 and 1900s. Other causes of decline in the condor population include pesticides such as DDT, which cause
5 eggshell thinning; lead poisoning as the result of ingesting lead fragments from unrecovered or field
6 dressed deer; secondary poisoning from ingesting carcasses of poisoned coyotes; collision and
7 electrocution hazards associated with electric transmission lines; and conversion of ranch lands (where
8 condors feed on dead livestock) to housing (AGFD 2017; USFWS 1996).

9 Occurrence in the Planning Area

10 There is no California condor designated critical habitat in the planning area.

11 There are no known occurrences or nesting sites for California condor in the planning area, though the
12 area does provide suitable foraging habitat.

13 ***Mexican Spotted Owl (Strix occidentalis lucida) – Threatened***

14 Regulatory Status

15 The Mexican spotted owl (*Strix occidentalis lucida*) was listed as threatened under the ESA on March 16,
16 1993 (*Federal Register* 58:14248). Critical habitat originally was designated on March 16, 1993 (*Federal*
17 *Register* 58:14248), and subsequently revoked on March 25, 1998 (*Federal Register* 63:14378). Critical
18 habitat was designated again on February 1, 2001 (*Federal Register* 66:8530) and further revised to its
19 current extent on August 31, 2004 (*Federal Register* 69:53181). Designated critical habitat is located in
20 Utah, Colorado, Arizona, and New Mexico.

21 Distribution and Habitat Requirements

22 The Mexican spotted owl is a permanent resident in the interior mountain ranges of western North
23 America, from southern Utah and central Colorado south through the mountains of Arizona, New
24 Mexico, and extreme west Texas.

25 Across the species' range, the Mexican spotted owl normally occupies old-growth forest in mixed conifer,
26 pine-oak woodland, deciduous riparian, or a combination of these habitats that will support a home range
27 of 1,400 to 4,500 acres. Habitat also typically has a structured canopy, a perennial water source, and a
28 rodent dominated prey base of adequate size. In Utah, however, breeding owls primarily inhabit deep,
29 steep-walled canyons and hanging canyons. These canyons typically are surrounded by terrain that does
30 not appear to provide nest/roost habitat but may provide foraging habitat for owls (USFWS 2012b).
31 Mexican spotted owl home ranges include activity centers that represent concentrated use areas for
32 nesting, roosting, and foraging. Protected Activity Centers designated by the USFWS (2012b) require a
33 minimum of 600 acres centered on known or potential nest sites where disturbance should be avoided to
34 conserve core use areas.

35 Primary Threats to Survival

36 The primary threat to Mexican spotted owls in the United States is the risk of stand-replacing wildfire
37 (USFWS 2012b). However, fire is not a landscape-scale threat to Mexican spotted owl habitat on the
38 Colorado Plateau, as the cliff and canyon habitat experiences a very low incidence and extent of stand-
39 replacing fire (USFWS 2012b).

1 Occurrence in the Planning Area

2 There is no designated critical habitat for Mexican spotted owl in the planning area. The nearest
3 designated critical habitat is approximately 5.5 miles southeast of the planning area in Canyonlands
4 National Park.

5 There are also no confirmed reports of Mexican spotted owls in the planning area, though surveys for the
6 species have never been conducted in the planning area. Cliffs and canyons in the planning area do
7 provide suitable nesting habitat for the species, and there have been anecdotal reports of a Mexican
8 spotted owl being found dead on a road in the planning area in the past. A statewide habitat modeling
9 exercise identified 51 acres of potential nesting habitat and 35,294 acres of potential foraging habitat for
10 the species in the planning area (Map 2-12).

11 ***Southwestern Willow Flycatcher (Empidonax traillii extimus) – Endangered***

12 Regulatory Status

13 The southwestern willow flycatcher was listed as endangered under the ESA on February 27, 1995
14 (*Federal Register* 60:10695). Critical habitat originally was designated on July 22, 1997 (*Federal*
15 *Register* 62:39129), and revised in response to legal actions in 2005 (*Federal Register* 70:60886) and
16 2013 (*Federal Register* 78:343). Designated critical habitat is located in California, Nevada, Utah,
17 Colorado, Arizona, and New Mexico.

18 Distribution and Habitat Requirements

19 The southwestern willow flycatcher breeds in relatively dense riparian tree and shrub communities
20 associated with rivers, swamps, and other wetlands, including lakes (e.g., reservoirs). Most of these
21 habitats are classified as forested wetlands or scrub-shrub wetlands. Habitat requirements for wintering
22 are not well known, but include brushy savanna edges, second growth, shrubby clearings and pastures,
23 and woodlands near water (USFWS 2002d).

24 The historical breeding range of the southwestern willow flycatcher included southern California,
25 southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and
26 extreme northwestern Mexico (USFWS 2002d). The flycatcher's current range is similar to the historical
27 range, but the quantity of suitable habitat within that range is much reduced from historical levels. The
28 flycatcher occurs from near sea level to over 2,600 m amsl, but is primarily found in lower elevation
29 riparian habitats. Throughout its range, the flycatcher's distribution follows that of its riparian habitat;
30 relatively small, isolated, widely dispersed locales in a vast arid region (USFWS 2002d).

31 Primary Threats to Survival

32 The southwestern willow flycatcher has experienced extensive loss and modification of breeding habitat,
33 with consequent reductions in population levels. Destruction and modification of riparian habitats have
34 been caused mainly by a reduction or elimination of surface and subsurface water as a result of diversion
35 and groundwater pumping; changes in flood and fire regimes from dams and stream channelization;
36 clearing and controlling vegetation; livestock grazing; changes in water and soil chemistry due to
37 disruption of natural hydrologic cycles; and establishment of invasive non-native plants. Concurrent with
38 habitat loss have been increases in brood parasitism by the brown-headed cowbird (*Molothrus ater*),
39 which inhibit reproductive success and further reduce population levels (USFWS 2002d).

40 Occurrence in the Planning Area

41 There is no designated critical habitat for southwestern willow flycatcher in or near the planning area.

1 The riparian habitats along the San Rafael and Green Rivers in the planning area could provide suitable
2 nesting habitat for the species. However, no nesting activity has been documented in or near the planning
3 area.

4 ***Western Yellow-billed Cuckoo (Coccyzus americanus) – Threatened***

5 Regulatory Status

6 The western Distinct Population Segment (DPS) of the yellow-billed cuckoo was listed as threatened by
7 USFWS in 2014 (*Federal Register* 79:59992). Following the proposed listing of the DPS, the USFWS
8 proposed critical habitat for the yellow-billed cuckoo in 2014 (*Federal Register* 79:48547). Critical
9 habitat was proposed in nine states, including Utah, though a final rule has not been published.

10 Distribution and Habitat Requirements

11 The western yellow-billed cuckoo was formerly widespread and locally common in California and
12 Arizona; locally common in New Mexico, Oregon, and Washington; and local and uncommon along
13 drainages in western Colorado, western Wyoming, Idaho, Nevada, and Utah (*Federal Register* 66:38611).
14 Populations of yellow-billed cuckoos in the western United States have declined over the past century,
15 and their breeding range has contracted.

16 The western yellow-billed cuckoo prefers large stands of dense riparian woodlands for nesting that are
17 primarily composed of cottonwood (*Populus fremontii*), willow (*Salix* spp.), and mesquite (*Prosopis* spp.)
18 along riparian corridors in otherwise arid areas. While yellow-billed cuckoos typically avoid
19 monocultures of tamarisk for nesting, tamarisk may be a component of nesting habitat (*Federal Register*
20 79:48548). Several studies have reported western yellow-billed cuckoos preferring to nest in tracts greater
21 than 25 acres in size. Water is required near the nesting site; this, along with dense vegetation, maintains
22 the humidity required in the nesting area for hatching eggs and rearing chicks. Migration, stopover, and
23 dispersal habitat is apparently similar to nesting habitat, but patch size may be smaller than required for
24 nesting, and vegetation structure may differ in structure (e.g., percentage canopy cover, presence and
25 composition of understory) (*Federal Register* 79:48547).

26 Primary Threats to Survival

27 The primary threat to western yellow-billed cuckoos is the loss of high-quality riparian habitat suitable for
28 nesting. Riparian habitat throughout the western United States has been modified or destroyed by dams,
29 water diversions, river flow management, stream channelization and stabilization, conversion to
30 agricultural uses (e.g., livestock grazing), construction of urban and transportation infrastructure, and
31 increased wildfire. Habitat fragmentation and invasion of native habitats by non-native plant species
32 (especially tamarisk) result from the aforementioned habitat-modifying factors (*Federal Register*
33 78:61622).

34 Other natural and anthropogenic factors threatening the continued existence of yellow-billed cuckoo
35 include a small overall population size, isolation of populations, lack of immigration, chance weather
36 events, fluctuating availability of prey populations, pesticides, collisions with tall vertical structures
37 during migration, spread of the introduced tamarisk leaf beetle as a biocontrol agent in the Southwest that
38 results in defoliation of non-native habitats occasionally used for nesting, and climate change (*Federal*
39 *Register* 78:61622).

40 Occurrence in the Planning Area

41 There is no proposed critical habitat for yellow-billed cuckoo in the planning area. The nearest proposed
42 critical habitat is approximately 8 miles southeast of the planning area in Canyonlands National Park
43 along the Green River.

1 The riparian habitats along the San Rafael and Green Rivers in the planning area could provide suitable
 2 nesting habitat for the species. However, no nesting activity has been documented in or near the planning
 3 area.

4 **BLM Sensitive Species**

5 Table 3-26 identifies BLM sensitive wildlife species that may or are known to occur in the planning area.

6 **Table 3-26. BLM Sensitive Wildlife Species that May Occur in the Planning Area**

Common Name (Scientific Name)	Habitat Description	Amount of Habitat in Planning Area (acres)
Allen's big-eared bat (<i>Idionycteris phyllotis</i>)	Mine tunnels and boulder piles in forested mountain areas; also pinyon-juniper habitat or saltcedar.	Unknown
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Roosts and nests in tall trees near bodies of water.	
Big free-tailed bat (<i>Nyctinomops macrotis</i>)	Rocky and woodland habitats, roosts in caves, mines, old buildings, and rock crevices.	Unknown
Bobolink (<i>Dolichonyx oryzivorus</i>)	Riparian or wetland areas.	Unknown
Burrowing owl (<i>Athene cucicularia</i>)	Open grassland and prairies.	Unknown
Cornsnake (<i>Elaphe guttata</i>)	Riparian areas, including rocky hillsides, forests, canyons, and stream and river margins.	Unknown
Ferruginous hawk (<i>Buteo regalis</i>)	Flat and rolling terrain in grassland or shrub steppe; nests on elevated cliffs, buttes, or creek banks.	
Great Plains toad (<i>Bufo cognatus</i>)	Cropland/hedgerow, desert, grassland/herbaceous, shrubland/chaparral, suburban/orchard.	Unknown
Fringed myotis (<i>Myotis thysanodes</i>)	Desert and woodland areas, roosts in caves, mines, and buildings.	Unknown
Kit fox (<i>Vulpes macrotis</i>)	Semidesert grasslands and open shrublands.	
Long-billed curlew (<i>Numenius americanus</i>)	Grassland/herbaceous.	Unknown
Peregrine falcon (<i>Falco peregrinus</i>)	Steep, rocky canyons near riparian or wetland areas.	Unknown
Short-eared owl (<i>Asio flammeus</i>)	Grasslands, shrublands, and other open habitats.	Unknown
Spotted bat (<i>Euderma maculatum</i>)	Found in a variety of habitats, ranging from deserts to forested mountains; roost and hibernate in caves and rock crevices.	Unknown
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Occurs in many types of habitat, but is often found near forested areas; roosts and hibernates in caves, mines, and buildings.	Unknown
Western red bat (<i>Lasiurus blossevillii</i>)	Hardwood and mixed forest, suburban/orchard, hardwood and mixed woodland, and riparian.	Unknown
White-tailed prairie dog (<i>Cynomys leucurus</i>)	Grasslands, semidesert, and montane shrublands.	

1 *Species' Descriptions*

2 Allen's big-eared bat (*Idionycteris phyllotis*)

3 Allen's big-eared bat (*Idionycteris phyllotis*) inhabits mountainous regions of the southwestern United
4 States and Mexico. The northernmost limit of its range is in Utah, where it occurs in the southern third of
5 the state, including in Grand, San Juan, Washington, Garfield, and Kane Counties. Allen's big-eared bats
6 occur primarily in forested mountain areas, from pine and oak to riparian woodlands of cottonwood and
7 willow. In Utah, this species has been collected in arid environments of pinyon-juniper habitat or
8 saltcedar. Females segregate from males during the summer breeding season to form maternity colonies.
9 These colonies typically are located in mine tunnels or in boulder piles (UDWR 2011). The planning area
10 may contain suitable habitat for the species.

11 Bald eagle (*Haliaeetus leucocephalus*)

12 Utah's wintering bald eagle (*Haliaeetus leucocephalus*) population is typically found near rivers, lakes,
13 and marshes where unfrozen, open waters offer the opportunity to prey on fish and waterfowl. The San
14 Rafael and Green River corridors are used by Utah's wintering bald eagles. The eagles begin to arrive in
15 November and migrate north by March. Utah also hosts a small population of desert bald eagles that can
16 be found in desert valleys, far from any water. These eagles feed primarily on carrion. There are no
17 known bald eagle nests in the planning area. Egg laying and incubation occur from February through
18 May, with eaglets hatching during May and early June and fledging by early July. The bald eagle
19 continues to be protected by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle
20 Protection Act.

21 Big free-tailed bat (*Nyctinomops macrotis*)

22 The big free-tailed bat (*Nyctinomops macrotis*) is listed as a BLM Sensitive Species because of declining
23 population sizes and limited distribution within the State. It is a migratory species and is known from the
24 southern half of Utah, although it may range farther north. The big free-tailed bat has been captured in
25 riparian, desert shrub and montane forest habitat types (UDWR 2011). The planning area contains
26 potential habitat for the species.

27 Bobolink (*Dolichonyx oryzivorus*)

28 The bobolink (*Dolichonyx oryzivorus*) is listed as a BLM sensitive species and a state sensitive species
29 because of rangewide declining populations and limited habitat. Wet meadow habitats—the preferred
30 bobolink habitat—have been decreased and fragmented in Utah as a result of many of the same factors
31 that impact riparian areas, e.g., agricultural encroachment, urban encroachment, road development, water
32 development (reservoirs and in-stream flow depletions), and channelization (Parrish et al. 2002). The
33 planning area contains potential winter habitat for the species.

34 Burrowing owl (*Athene cunicularia*)

35 The burrowing owl (*Athene cunicularia*) is listed as a BLM sensitive species to recent decreases in
36 population size. Burrowing owls are neotropical migrants, nest underground in burrows, and are typically
37 found in open desert grassland and shrubland areas that are level and well drained. They depend on
38 burrowing mammals for nest sites and are often associated with prairie dog colonies. The decline of the
39 owl's population across its range appears to be due primarily to agricultural practices, use of pesticides,
40 and the decline of prairie dog colonies. The planning area contains prairie dog colonies and other suitable
41 burrowing owl potential nesting habitat.

1 Cornsnake (*Elaphe guttata*)

2 The cornsnake is listed as a BLM sensitive species because of its limited distribution and its potential for
3 genetic uniqueness from the cornsnakes east of the Continental Divide. The cornsnake is associated with
4 the Colorado and Green River corridors, and population declines are attributed to habitat degradation,
5 vegetative changes, and illegal collection (UDWR 2011). The planning area contains suitable habitat for
6 the species along the San Rafael and Green Rivers.

7 Ferruginous hawk (*Buteo regalis*)

8 The ferruginous hawk (*Buteo regalis*) is the largest of the North American buteos. It is a neotropical
9 migrant breeding from southwestern Canada to central Arizona, New Mexico, and northern Texas and
10 wintering in California to northern Mexico. It is a year-round resident from Nevada through western and
11 southern Utah, northern Arizona, and New Mexico to eastern Colorado and South Dakota. In Utah, the
12 ferruginous hawk nests at the edge of juniper habitats and open, desert and grassland habitats in the
13 western, northeastern, and southeastern portions of the state. Ferruginous hawks are highly sensitive to
14 human disturbance and are also threatened by habitat loss from surface disturbance, agricultural practices,
15 and urban encroachment. They have experienced decline across much of their range and have been
16 extirpated from some of their former breeding grounds in Utah (UDWR 2011). The planning area
17 contains suitable nesting and foraging habitat for the species.

18 Fringed myotis (*Myotis thysanodes*)

19 The fringed myotis bat (*Myotis thysanodes*) is listed as BLM sensitive species because of limited
20 distribution within the state. This species occurs predominantly in southern Utah, although records of this
21 species occur throughout the state. Fringed myotis occur in a variety of habitat, including riparian, desert
22 shrub, pinyon-juniper woodland, mountain meadow, ponderosa pine, and montane forest (UDWR 2011).
23 The planning area contains potential habitat for the species.

24 Great Plains toad (*Bufo cognatus*)

25 The Great Plains toad (*Bufo cognatus*) is a common and widespread toad that occurs across the central
26 United States, much of Mexico, and limited areas of Canada. In Utah, the Great Plains toad occurs in
27 scattered areas throughout the state, where it prefers desert, grassland, and agricultural habitats. In cold
28 winter months, the Great Plains toad burrows underground and becomes inactive (UDWR 2011). UDWR
29 has located Great Plains toad along the San Rafael River at Hatts Ranch and Frenchman in recent years
30 (Keller 2016). However, this species is highly mobile and is likely to be present in other locations along
31 the San Rafael River. The planning area also contains additional habitat for the species along the Green
32 River.

33 Kit fox (*Vulpes macrotis*)

34 The kit fox (*Vulpes macrotis*) most often occurs in open prairie, plains, and desert habitats. It
35 opportunistically eats small mammals (primarily rabbits and hares), small birds, invertebrates, and plant
36 matter. The species is primarily nocturnal, but individuals may be found outside their dens during the day.
37 The kit fox mates in late winter, with a litter of four to seven pups being born about 2 months later.
38 Young first leave the den about 1 month after birth, in late spring or early summer. The planning area
39 contains large areas of suitable kit fox habitats, and the species is known to occur in the planning area.

40 Long-billed curlew (*Numenius americanus*)

41 The long-billed curlew (*Numenius americanus*) breeds from south-central British Columbia, southern
42 Alberta, southern Saskatchewan, and southern Manitoba south to east-central California, central Nevada,
43 central Utah, central New Mexico, and northern Texas, and east to southwestern North Dakota,

1 northwestern South Dakota, north-central Nebraska, and southwestern Kansas. The long-billed curlew is a
2 fairly common summer resident and migrant in Utah, especially through the central and more northern
3 valleys. It is less common in the Colorado River drainage. This species lives and breeds in higher and
4 drier meadowlands than many other shorebird species (Parrish et al. 2002). The planning area contains
5 suitable habitat for the species.

6 Peregrine falcon (*Falco peregrinus*)

7 The peregrine falcon (*Falco peregrinus*) was listed as an endangered species in 1970 under the
8 Endangered Species Conservation Act of 1969 but after a successful recovery due to restrictions on the
9 use of organochlorine pesticides, the species was delisted in 1999 (*Federal Register* 64:46543). The
10 peregrine falcon is a widely distributed bird, occurring from the tundra to the tropics in a variety of
11 different terrestrial habitats. The species most commonly occupies cliff habitats with open landscapes for
12 foraging in proximity to water (coasts, lakes, rivers, etc.), but also occurs in artificial habitats such as
13 towers, buildings, and urban settings. Although the peregrine falcon is still rare in Utah, it has become
14 much more abundant throughout its range in recent years. The planning area does contain potential
15 nesting and foraging habitat for the species, especially in canyons on and adjacent to the Green River. No
16 formal nesting surveys have been completed in the planning area.

17 Short-eared owl (*Asio flammeus*)

18 The short-eared owl (*Asio flammeus*) is usually found in grasslands, shrublands, and other open habitats.
19 There is some concern that short-eared owl populations are declining. The planning area contains suitable
20 habitat for the species, though no formal nesting surveys have been completed.

21 Spotted bat (*Euderma maculatum*)

22 The spotted bat (*Euderma maculatum*) occupies a wide variety of habitats, but has been collected most
23 often in dry, rough, desert terrain. Roosts are typically in rock crevices or under loose rocks or boulders.
24 The spotted bat is considered rare in Utah (although the spotted bat's distribution ranges throughout the
25 western states from British Columbia to Mexico). The spotted bat has a very low reproductive potential,
26 and therefore once populations are reduced they rebuild slowly (UDWR 2011). The planning area
27 contains suitable habitat for the species.

28 Townsend's big-eared bat (*Corynorhinus townsendii*)

29 The Townsend's big-eared bat (*Corynorhinus townsendii*) is a BLM sensitive species due to limited
30 distribution and a declining population (Oliver 2000). The Townsend's big-eared bat is a cave-roosting
31 species that moves into human-made caves such as mines and buildings. Unlike many other bats, they are
32 unable to crawl into crevices and usually roost in enclosed areas where they are vulnerable to disturbance.
33 The Townsend's big-eared bat is quite sensitive to human disturbance, and this appears to be the primary
34 cause of population decline for this species. This bat is colonial during the maternity season, when
35 compact clusters of up to 200 individuals might be found. Maternity roosts form in the spring and remain
36 intact during the summer. Site fidelity is high, and if undisturbed, the bats will use the same roost for
37 many generations. The planning area contains suitable habitat for the species.

38 Western red bat (*Lasiurus blossevillii*)

39 The western red bat (*Lasiurus blossevillii*) occurs in the western United States and parts of Mexico. The
40 species is extremely rare in Utah, being known from only a few locations in Utah. Western red bats are
41 normally found near water, often in wooded areas. Some individuals may hibernate during cold times of
42 year, but most members of the species migrate south to warmer climates for the winter. The species is
43 nocturnal; daytime roosting usually occurs in trees. Females may give birth to one litter of two to four

1 young during late spring. Western red bats eat insects, often foraging near riparian areas (UDWR 2011).
2 The planning area contains suitable habitat for the species.

3 White-tailed prairie dog (*Cynomys leucurus*)

4 White-tailed prairie dogs (*Cynomys leucurus*) inhabit mountain valleys, semidesert grasslands,
5 agricultural areas, and open shrublands in Western North America. In Utah, white-tailed prairie dogs
6 occur in the eastern portion of the state, primarily in the Uintah Basin and the northern portion of the
7 Colorado Plateau. White-tailed prairie dog colonies are located in Grand, Emery, and Carbon Counties. In
8 1985, colonies of white-tailed prairie dog were mapped and population densities estimated in an attempt
9 to identify potential reintroduction sites for black-footed ferrets (*Mustela nigripes*). Though these surveys
10 were not exhaustive, 63,397 acres of colonies were mapped in the three counties. Surveys completed in
11 2002 on public lands within southeastern Utah identified only 10,257 acres of active colonies, or an 84%
12 decline in occupied acreage of white-tailed prairie dog colonies since 1985. This decrease was attributed,
13 at least in large part, to outbreaks of sylvatic plague (UDWR 2011). There are 8,094 acres of mapped
14 white-tailed prairie dog colonies in the planning area (Map 2-12), and additional habitats also exist that
15 are capable of supporting the species.

16 **3.11.2 Resource Trends**

17 Very little information is available with which to assess trends for special status species in the planning
18 area. In general, wildlife populations in relatively undeveloped landscapes similar to the planning area are
19 a function of habitat availability and quality. Habitat availability has stayed relatively constant in the
20 planning area, as few surface disturbing activities have been implemented. Livestock grazing, OHV use,
21 and dispersed recreation activities do occur and recreational use is increasing. However, these activities
22 occur at relatively low intensities and therefore are not anticipated to be substantially affecting special
23 status species trends.

24 The largest factor affecting the majority of wildlife population and habitat trends in the planning area is
25 drought. The planning area has experienced extended periods of moderate to severe drought in 2000–
26 2003 and again in 2012–2016 that contributed to habitat deterioration. As of January 2017, the drought in
27 the planning area is easing somewhat, and the area is classified as experiencing somewhat abnormally dry
28 conditions (U.S. Drought Monitor 2017). Special status species habitat and populations are anticipated to
29 be responding positively to the easing of drought.

30 BLM began implementing the San Rafael River Restoration Project in 2015; that process is ongoing. The
31 San Rafael River Restoration Project was designed to improve the ecological condition of the lower San
32 Rafael River, which has degraded severely over time through a combination of impacts, including altered
33 flow regimes and non-native vegetation encroachment. Implementation of the project will improve the
34 riparian and aquatic habitat in the planning area, including developing riffles, pools, and backwaters,
35 which were lacking before the project began. This project will greatly improve the riparian and aquatic
36 habitat in the San Rafael River in the planning area, and it is anticipated that species that depend on
37 riparian and aquatic habitats will respond with increases in their distribution and numbers as a result.

38 **3.12 WILDLIFE AND FISHERIES**

39 The analysis area for wildlife and fisheries varies by species. For species for which habitats have been
40 delineated by the UDWR, the analysis area is the extent of the habitats crossed by the planning area. For
41 species for which habitats have not been delineated by UDWR, the analysis area is the subwatersheds
42 (HUC 12) crossed by the planning area. The analysis areas were selected because they represent the areas
43 within which changes to wildlife and fisheries populations could be observed as a result of impacts on the
44 soil, water, vegetation, or wildlife and fisheries in the planning area.

1 The planning area is located in the Colorado Plateau and contains a diversity of habitats and landforms
2 that support a variety of wildlife and fish species. With the exception of species listed under the ESA, the
3 UDWR manages wildlife populations in the planning area, including establishing management goals and
4 objectives. The BLM Price and Richfield Field Offices manage wildlife habitats that occur on BLM-
5 administered public lands in the planning area and coordinate closely with the UDWR on issues related to
6 wildlife habitat management and to ensure that wildlife habitats identified by the UDWR are recognized
7 in planning efforts.

8 The BLM RMPs for the Price and Richfield Field Offices allocate resources on public lands, including
9 forage, for wildlife and fish species. The RMPs also require the implementation of stipulations, such as
10 restrictions on surface disturbance and seasonal and spatial buffers to protect individuals and habitats for
11 big-game species, migratory birds, raptors, reptiles, amphibians, and other non-game species.

12 The BLM's management of wildlife habitat has had, and will continue to have, an impact on both local
13 communities and those that exist outside the Colorado Plateau. There is regional interest in the overall
14 condition and management of wildlife habitats in the planning area. In the past, a majority of the local
15 interest has been focused on big-game management and associated recreational activities. Because many
16 of the wildlife species found in the planning area regularly cross federal, state, and private lands, a
17 collaborative effort between all land managers and owners is for effective wildlife management in the
18 planning area.

19 Special status species, including BLM-sensitive and species listed as threatened or endangered under the
20 ESA are addressed in Section 3.11.

21 **3.12.1 Resource Conditions**

22 ***3.12.1.1 Big Game***

23 Habitats for many big-game species within the planning area are delineated by UDWR. UDWR also
24 develops management plans and establishes population objectives for big-game species. In developing
25 and mapping big-game habitats, UDWR designates season of use (e.g., summer, winter, fawning) and
26 habitat importance (i.e., substantial or crucial). Crucial habitat is defined as habitat essential to the life
27 history requirements of the species for which it was designated. The UDWR periodically reviews these
28 habitat areas through coordination with the various land management agencies and revises habitat
29 boundaries as needed.

30 **Mule Deer (*Odocoileus hemionus*)**

31 Mule deer (*Odocoileus hemionus*) occupy most ecosystems in Utah but likely attain their greatest
32 densities in shrublands on areas characterized by rough, broken terrain and abundant browse and cover.
33 Mule deer summer range habitat types include spruce/fir, aspen, alpine meadows, and large, grassy parks
34 located at higher elevations. Winter range habitat primarily consists of shrub-covered, south-facing slopes
35 and often coincides with areas of concentrated human use and occupation. Because of learned behavioral
36 use patterns passed on from one generation to the next, deer migrate for the winter into the same areas
37 every year, regardless of forage availability or condition. These generally are areas with shallow snow
38 depth, which allow easier movement, with pinyon-juniper and sagebrush vegetation types. These
39 vegetation types provide deer with both escape and thermal cover.

40 Limiting factors that often control mule deer populations include the availability of crucial/critical winter
41 habitat and fawning areas, extreme weather (heavy snowfall and persistent cold temperatures, and
42 extended drought) disease (most notably chronic wasting disease in the Rocky Mountains region),
43 predation, competition for forage with livestock, legal harvest, and the effects of human-induced habitat
44 alteration (Sanchez-Rojas and Gallina-Tessaro 2008).

1 The majority of the planning area does not provide high-quality mule deer habitat, though UDWR has
2 mapped substantial value year-long mule deer habitat in the planning area along the San Rafael and Green
3 Rivers, and along the southeastern boundary of the planning area (Map 3-4). Table 3-27 presents the mule
4 deer habitats identified by UDWR in the planning area and analysis area. The mule deer that occupy this
5 area are a part of the UDWR’s San Rafael Deer Herd Unit. The UDWR’s Herd Unit Management Plan
6 identifies the management goals for this unit as

7 Manage for a population of healthy animals capable of providing a broad range of recreational
8 opportunities, including hunting and viewing. Balance deer herd impacts on human needs, such as
9 private property rights, agricultural crops and local economies. Maintain the population at a level
10 that is within the carrying capacity of the available habitat. Range Trend data is not collected on
11 the San Rafael unit. The majority of deer on this unit utilize agricultural areas to some extent
12 throughout the winter. (UDWR 2012)

13 **Table 3-27. Mule Deer Habitat**

Habitat Type	Area in Planning Area (acres)
Year-long, substantial	34,608

14 The San Rafael Deer Herd Unit has a population objective of 1,000 wintering deer, though UDWR does
15 not monitor or model this population; a population estimate is not available (UDWR 2012). Statewide,
16 deer populations showed a sharp decline during winter 1992–1993, though since then the statewide deer
17 herd has shown an increasing trend. The statewide population had good growth during the mid to late
18 1990s, but then declined during the severe drought years from 2000 to 2003, when fawn production was
19 reduced. The harsh winters in northern Utah in 2007–2008 and in southern Utah in 2009–2010 lowered
20 adult and fawn survival and also caused population declines. Despite of those weather events, the deer
21 population in Utah has grown at an average rate of 1.6% over the past 20 years and is now at a level not
22 seen since 1992 (UDWR 2014).

23 **Pronghorn (*Antilocapra americana*)**

24 Pronghorn (*Antilocapra americana*) can be found throughout the western United States, Canada, and
25 northern Mexico. They are generally associated with open plains, where they feed mainly on forbs and
26 grasses. Pronghorn prefer to occupy areas with large tracts of flat to rolling open terrain where they rely
27 on keen eyesight and swift movement to avoid predators. They also rely on vegetation within the shrub
28 and grassland plant communities for food. Pronghorn are often found in small groups and are usually
29 most active during the day.

30 A critical limiting factor in much of Utah’s pronghorn habitat is the lack of succulent forbs and grasses on
31 spring/summer ranges. This is the result of xeric, low annual precipitation conditions on many of Utah’s
32 pronghorn units, combined with persistent early spring grazing practices (UDWR 2009).

33 Pronghorn populations in Utah during the early 1900s were located in the west desert from Beaver
34 County north to the Idaho state line and in Daggett County in northeastern Utah adjacent to the Wyoming
35 state line. Beginning in 1945 and continuing to the present, transplants of pronghorn to other areas in the
36 state have resulted in a wider distribution in most of Utah’s suitable desert habitats and have increased the
37 statewide population to an estimated 12,000–14,000 animals (UDWR 2009).

38 UDWR has identified large portions of the planning area as pronghorn crucial and substantial-value year-
39 long habitat (Map 2-15). Table 3-28 presents the pronghorn habitats identified by UDWR in the planning
40 area and analysis area. The pronghorn that occupy this area are a part of the UDWR’s San Rafael Desert
41 Unit. UDWR has not developed Unit specific management plans for pronghorn.

1

Table 3-28. Pronghorn Habitat

Habitat Type	Area in Planning Area (acres)
Year-long, crucial	264,278
Year-long, substantial	154,880

2 Pronghorn were released into the San Rafael Desert Unit in 1949 (35 animals), 1984 (151 animals), 1985
3 (157 animals), 2005 (24 animals), and 2006 (26 animals) (UDWR 2009). These animals and their
4 descendants occupy the UDWR-identified pronghorn habitat in the planning area. In 2008, the pronghorn
5 population in the San Rafael Desert is estimated to be 275 with an increasing 5- and 10-year trend
6 (UDWR 2009).

7 **Desert Bighorn Sheep (*Ovis canadensis nelson*)**

8 Desert bighorn sheep (*Ovis canadensis nelson*) are native to Utah are uniquely adapted to inhabit some of
9 the most remote and rugged parts of the Colorado Plateau. Habitat is characterized by rugged terrain,
10 including canyons, gulches, talus cliffs, steep slopes, mountaintops, and river benches (Shakleton et al.
11 1999). Desert bighorn generally occur in Southern Utah and do not migrate.

12 Utah’s desert bighorn sheep populations declined significantly from historic levels during European
13 settlement as a result of competition with domestic livestock for forage and space, vulnerability to
14 domestic livestock-borne diseases, habitat conversions away from native grasslands toward shrub lands as
15 a result of excessive grazing and fire suppression, and unregulated hunting. Whereas some herds suffered
16 early extirpation, others remained relatively unexploited until the 1940s and 1950s, when uranium was
17 discovered on the Colorado Plateau. By the 1960s, only a small population of desert bighorns remained in
18 Utah along the remote portions of the Colorado River (UDWR 2013).

19 The current population estimate for desert bighorns in Utah managed by UDWR is 2,000 and has been
20 relatively stable for the past 10 years. Utah currently has 12 distinct populations of desert bighorn sheep.
21 Of those 12, three are showing increasing trends, four are stable, and five are showing declining trends or
22 have low numbers of sheep. The population of bighorn sheep that uses habitats in and adjacent to the
23 planning area is a part of the San Rafael, Dirty Devil; and San Rafael, Maze (Canyonlands National Park),
24 subunits. The San Rafael, Dirty Devil, subunit has shown a general declining trend, with population
25 counts of 115 animals in 2008, 67 in 2010, and 66 in 2012 (UDWR 2013). UDWR has not developed
26 unit-specific management plans for bighorn sheep. Population trend information is not available for the
27 San Rafael Maze subunit.

28 UDWR has identified small portions of the planning area as bighorn sheep year-long crucial and
29 substantial habitat. These areas are generally related to the steep canyons associated with Labyrinth
30 Canyon along the Green River and various side canyons, including Horseshoe, Keg Spring, and Three
31 Canyons (Map 3-4). Table 3-29 presents the bighorn sheep habitat identified by UDWR in the planning
32 area and analysis area.

33

Table 3-29. Bighorn Sheep Habitat

Habitat Type	Area in Planning Area (acres)
Year-long substantial	413
Year-long crucial	3,684

1 **3.12.1.2 Upland Game**

2 UDWR has identified habitat for upland game in the planning area, including California quail (*Callipepla*
3 *californica*), ring-necked pheasant (*Phasianus colchicus*), and Rio Grande turkey (*Meleagris gallopavo*).
4 In general, California quail habitat is identified along the San Rafael and Green River corridors, ring-
5 necked pheasant habitat is identified in the vicinity of the town of Green River, and Rio Grande turkey
6 habitat is identified along the Green River corridor.

7 Annual fluctuations for most upland game bird and small-mammal populations correlate closely to annual
8 climatic patterns. Mild winters and early spring precipitation during the months of March, April, and May
9 are associated with increases in upland game populations. Warm, dry weather, especially during June, is
10 generally considered vital for the survival of newly born young of many upland game species. The
11 planning area has experienced periods of moderate to severe drought in recent years, which has
12 contributed to habitat deterioration for upland game. As of January 2017, the drought in the planning area
13 has eased somewhat, and the area is classified as experiencing somewhat abnormally dry conditions (U.S.
14 Drought Monitor 2017). Population levels and trends for upland species typically mimic habitat quality.

15 **3.12.1.3 Migratory Birds**

16 A wide variety of songbirds, neotropical migrants, waterfowl, and raptors spend at least part of the year
17 within the planning area (Parrish et al. 2002). These species use a wide variety of habitats found within
18 the planning area for important functions, including migration stopover, breeding, nesting, and foraging.
19 The term “migratory bird” is used in this document as a regulatory term reflecting any species protected
20 under the MBTA and addressed under other federal policies derived from the MBTA and does not
21 directly refer to the biological definition of a migratory bird. Many species protected under the MBTA are
22 year-round residents and do not migrate.

23 The MBTA (16 U.S.C. 703–712) broadly protects more than 1,000 avian species as listed in 50 CFR
24 10.13 and is administered by the USFWS. The MBTA makes it unlawful to pursue, hunt, kill, capture,
25 possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs,
26 or migratory bird products. The most recent list of birds protected under the MBTA includes 1,026
27 species (*Federal Register* 78(212):65844-65874). In addition to the MBTA, some migratory bird species
28 are also protected under the Endangered Species Act (16 U.S.C. 1531 *et seq.*) and the Bald and Golden
29 Eagle Protection Act (16 U.S.C. 668–668d).

30 Executive Order (EO) 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds,” was
31 issued in 2000 and directs federal agencies to take certain actions to further implement the MBTA. The
32 federal agencies are directed to develop and implement a Memorandum of Understanding (MOU) with
33 the USFWS to promote conservation of migratory bird populations. Pursuant to this EO, BLM entered
34 into BLM “Memorandum of Understanding WO-230-2010-04 Between the Bureau of Land Management
35 and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds.” This MOU
36 outlines a collaborative approach to promote the conservation of migratory bird populations and is
37 intended to strengthen migratory bird conservation efforts by identifying and implementing strategies to
38 promote conservation and reduce or eliminate adverse impacts on migratory birds through enhanced
39 collaboration between the BLM and the USFWS in coordination with state, tribal, and local governments.

40 BLM implements EO 13186 and MOU WO-230-2010-04 by identifying migratory bird species of
41 concern that are likely to occur on public lands and may be affected by BLM planning and
42 implementation decisions, evaluating the effects of BLM’s decisions on these species in NEPA
43 documents, and implementing recommended conservation measures where appropriate. In Utah, BLM
44 identifies migratory bird species of concern using resources, including the USFWS’s Birds of
45 Conservation Concern (BCC) and Utah PIF American Landbird Conservation Plan.

1 The overall goal of the BCC is to accurately identify the migratory and non-migratory bird species
 2 (beyond those already listed under the ESA as threatened or endangered) that represent the highest
 3 conservation priorities for the USFWS. The most recent BCC list was published in 2008 and is organized
 4 into 37 Bird Conservation Regions. The planning area is entirely within Region 16 (Colorado Plateau)
 5 (USFWS 2008d). The Utah PIF American Landbird Conservation Plan was completed in 2002 as a
 6 statewide avian conservation strategy identifying “priority species” for conservation because of declining
 7 abundance, declining distribution, or vulnerability to various local and/or rangewide risk factors (Parrish
 8 et al. 2002).

9 The Utah PIF Priority Species List and the BCC list for Region 16 (Colorado Plateau) were used to
 10 identify priority species and their potential habitats within the planning area. Table 3-30 lists the BCC and
 11 PIF species that may occur within the planning area. Map 3-2 displays the distribution of land cover types
 12 that function as potential migratory bird habitats in the planning area.

13 **Table 3-30. BCC Region 16 and Utah PIF High-Priority Species That May Occur in Planning Area**

Species	BCC*	PIF†	Utah Sensitive Species‡	Primary Breeding Habitat†	Secondary Breeding Habitat†	Winter Habitat†	Utah Population Trend (% population change 1966–2012)§
Black-throated Gray Warbler		X		pinyon-juniper woodland	mountain scrub	migrant	+2.5
Bobolink		X	X	wet meadow	agriculture	high desert scrub	N/A
Brewer’s Sparrow	X	X		shrub steppe	high desert scrub	migrant	-1.2
Broad-tailed Hummingbird		X		lowland riparian	mountain riparian	migrant	-2.5
Burrowing Owl	X		X	high desert scrub	grassland	migrant	-0.7
Ferruginous Hawk		X	X	pinyon-juniper	shrubsteppe	grassland	-1.7
Gambel’s Quail		X		low desert scrub	lowland riparian	low desert scrub	--2.0
Golden Eagle	X			cliff	high desert scrub	high desert scrub	--1.0
Grace’s Warbler	X			ponderosa pine	mixed conifer	migrant	+1.8
Gray Vireo	X	X		pinyon-juniper woodland	oak	migrant	-1.2
Juniper Titmouse	X			pinyon-juniper woodland	pinyon-juniper woodland	pinyon-juniper woodland	+1.3
Long-billed Curlew	X	X	X	grassland	agriculture	migrant	+0.9

Species	BCC*	PIF†	Utah Sensitive Species‡	Primary Breeding Habitat†	Secondary Breeding Habitat†	Winter Habitat†	Utah Population Trend (% population change 1966–2012)§
Lucy's Warbler		X		lowland riparian	low desert scrub	migrant	N/A
Peregrine Falcon	X			cliff	lowland riparian	wetlands	+0.8
Pinyon Jay	X			pinyon-juniper woodland	ponderosa pine	pinyon-juniper woodland	N/A
Prairie Falcon	X			cliff	high desert scrub	agriculture	+0.9
Sage Sparrow		X		shrub steppe	high desert scrub	low desert scrub	-1.1
Virginia's Warbler		X		oak	pinyon-juniper woodland	migrant	+2.6
Yellow-billed Cuckoo		X	X	lowland riparian	agriculture	migrant	N/A

1 * Utah Partners in Flight Avian Conservation Strategy Version 2.0 (Parrish et al. 2002)

2 † Birds of Conservation Concern 2008 (USFWS 2008d)

3 ‡ Utah Sensitive Species List (UDWR 2015)

4 § North American Breeding Bird Survey (Sauer et al. 2012)

5 Long-distance migration across state and international boundaries requires that suitable types and extents
6 of habitat be present to support all stages of a bird's life and exposes birds to a variety of potential
7 stressors that may be addressed or exacerbated by diverse regulatory regimes. Migratory bird population
8 levels are often closely correlated to habitat availability and condition, and some species are used as
9 indicators of habitat availability and quality.

10 Within Utah, PIF identifies lowland riparian is the habitat used most by Utah's avifauna. This habitat type
11 is present in the planning area, especially along the San Rafael and Green Rivers. At least 42% of Utah's
12 avian species use lowland riparian as either breeding habitat or in winter. In addition, lowland riparian is
13 the habitat used most by the priority species (Parrish et al. 2002). Other important migratory bird habitats
14 identified by the Utah PIF that are present in the planning area include low and high desert scrub, and
15 cliffs. At least 23 avian species select low desert scrub as breeding habitat, and an additional two species
16 select this habitat in winter (Parrish et al. 2002). Five priority species select high desert scrub as breeding
17 habitat, and two priority species select cliff habitat as breeding habitat (Parrish et al. 2002).

18 **Raptors**

19 Raptors (hawks, eagles, falcons; some definitions also include vultures and owls) are addressed equally
20 with all other bird species protected under the MBTA and do not receive additional protections by the
21 MBTA, EO 13186, or the MOU between the USFWS and BLM. However, raptors are especially sensitive
22 to land management activities; therefore, BLM typically provides management prescriptions to prevent
23 impacts from BLM-authorized activities. These special prescriptions often include buffer zones around
24 sensitive nest or roost sites developed in coordination with the USFWS *Utah Field Office Guidelines for*
25 *Raptor Protection from Human and Land Use Disturbances* (Romin and Muck 2002).

1 Raptors that are known to or may occur in the planning area include but are not limited to bald eagle,
2 peregrine falcon, golden eagle, ferruginous hawk, Swainson’s hawk, northern harrier, osprey, sharp-
3 shinned hawk, Cooper’s hawk, red-tailed hawk, prairie falcon, American kestrel, turkey vulture, great
4 horned owl, short-eared owl, long-eared owl, Mexican spotted owl. Within the planning area, cliffs are
5 the most important raptor nesting habitats.

6 **Waterfowl**

7 Waterfowl (ducks, geese, and swans) in the planning area are generally associated with the San Rafael
8 and Green Rivers. Some waterfowl can also be found in isolated riparian areas, stock ponds, and
9 reservoirs. Some individuals or species breed, winter, or remain yearlong in the Utah, while larger
10 numbers pass through the area during the spring and fall migration. Many species feed on insects and
11 small fish or amphibians in addition to aquatic plant foods. In addition, some species feed frequently on
12 upland grasses and forbs in grassy fields and meadows where such vegetation is succulent and habitat is
13 sufficiently open to preclude hiding predators and enable rapid flight.

14 Waterfowl population trends generally throughout the planning area and region are stable to increasing
15 (Sauer et al. 2012). Blue-winged teal was the only species that was considered to have a decreasing trend
16 in population (Sauer et al. 2012).

17 **3.12.1.4 Reptile, Amphibian, and Other Non-Game Species**

18 The planning area contains a high diversity of reptile, amphibian, and other non-game species, including
19 small mammals, birds, and invertebrates, because of the variety of habitats found within the area. The
20 planning area contains various riparian, shrub, grassland, cliff, pinyon-juniper woodland, and ridgetop
21 habitats that support these species.

22 Reptiles likely to occur in a wide range of habitats in the planning area include fence lizard (*Sceloporus*
23 *undulatus*), garter snake (*Thamnophis elegans*), and Great Basin gopher snake (*Pituophis catenifer*
24 *deserticola*).

25 Aquatic habitats located in the planning area support amphibians, including toads and frogs. Amphibian
26 species require aquatic and semi-aquatic habitats for breeding and often use adjacent terrestrial habitats
27 during nonbreeding periods. Most frog species overwinter in the bottom substrates of their aquatic
28 habitats. Amphibians likely to occur in the project area include the northern leopard frog (*Rana pipiens*),
29 spotted toad (*B. punctatus*), western toad (*B. boreas*), Woodhouse’s toad (*B. woodhousii*), Great Basin
30 spadefoot toad (*Spea intermontana*), and Couch’s spadefoot toad (*Scaphiopus couchii*). Great Plains toad
31 is also known to occur in the planning area, though this species is addressed in Section 3.11.

32 Mammals likely to be present in planning area include small aerial species such as bat (*Vespertilionidae*,
33 *Molossidae*, and *Phyllostomidae*) and terrestrial species, which include mouse and vole (*Muridae*), shrew
34 (*Soricidae*), rat (*Dipodomys* and *Neotoma* spp.), gopher (*Geomyidae*), and chipmunk (*Tamias striatus*).
35 Mid-sized mammals likely to be present include skunk (*Mephitidae*), rabbit (*Sylvilagus* spp.), hare (*Lepus*
36 spp.), beaver (*Castor canadensis*), and raccoon (*Procyon lotor*). Meso- and large-bodied carnivores likely
37 to be present include badger (*Taxidea taxus*), fox (*Vulpes* spp.), and coyote (*Canis latrans*).

38 Very little is known about the status of most of these species, though the availability of suitable habitat
39 provides a proxy for potential occurrence.

40 **3.12.1.5 Native Pollinators**

41 Research has shown that that San Rafael Desert, including the planning area, has a very high diversity of
42 insect pollinators. One study found 68 endemic species of bees in the San Rafael Desert, as well as
43 disjuncts from both the Great Plains and the Mojave and Sonoran Deserts (Griswold et al. 1997). This
44 same research also identified 48 new species of bees and found that numbers of bee genera in the San

1 Rafael Desert is more than in all of New England (Griswold et al. 1997). Another study found that one-
2 third of Utah's bee species live in an area (centered on the San Rafael Desert) that covers only 2% of the
3 State (Jones 1999). In addition, describing 48 new species in the San Rafael Desert, the researchers also
4 documented the deepest bee nest ever recorded in North America and nests in honeycomb-like holes in
5 sandstone (Jones 1999).

6 The diversity of bees in the San Rafael Desert is partly the result of floral specialization; at least one-third
7 of the bee species in the San Rafael Desert specialize on plants at the family or generic level (Griswold et
8 al. 1997). Because of floral specialization among pollinators, preservation of rare endemic plants requires
9 considerations to conserve habitat of their pollinators, as well as habitat for the plants themselves, and
10 vice-versa. In general, insect pollinators, including bees, are highly specialized and have co-evolved with
11 specific plant hosts, which may make them less adaptable to anthropogenic disturbances and changing
12 conditions. For example, in a study of reproduction of the Jones cycladenia (*Cycladenia humilis* var.
13 *jonesii*), a species listed as threatened under the ESA that may occur in the planning area, researchers
14 speculated that low reproductive success may have been because the plant's original pollinator was no
15 longer consistently found within the plant's range (Sipes and Tepedino 1995).

16 **3.12.1.6 Fisheries**

17 The San Rafael and Green Rivers both support fisheries within the planning area. There are no other
18 perennial waters in the planning area that support fish.

19 **San Rafael River**

20 The fish habitat in the lower San Rafael River in the planning area was historically degraded by a suite of
21 anthropogenic impacts. The main cause of physical degradation on the San Rafael River has been the
22 altered hydrology. The magnitude and duration of snowmelt floods have been reduced, compared with the
23 early 1900s, as a result of decreased precipitation and water storage. Monsoon floods have also been
24 reduced in magnitude but still transport large quantities of sediment to the river, which is deposited on the
25 floodplain and as levees or berms along the channel. The reduced frequency of large snowmelt floods that
26 transported large quantities of sediment through the river system has led to narrowing and confinement of
27 the channel and to a loss of complex habitat used by native fish. Tamarisk colonization in the 1950s
28 accelerated channel narrowing by stabilizing channel bars and floodplain sediments and has subsequently
29 reduced opportunities for native vegetation recruitment, especially cottonwood trees. The loss of the
30 processes that created and maintained stream and floodplain habitat has contributed to reduced
31 populations of native fish and vegetation. Native fish are also impacted by a diversion dam that prevents
32 upstream movement, by predation and competition from non-native fish, and by dewatering of the river
33 during dry periods. Because of these threats, populations of native fish in the lower portion of the San
34 Rafael River are persisting primarily as a result of immigration from the Green River and from upstream
35 source populations (BLM 2014a). Recent implementation of the San Rafael River Restoration Project has
36 begun to address some of these issues (refer to Section 3.11.2); however, many of these challenges (e.g.,
37 altered hydrology) still exist.

38 Four native fish species have been observed regularly within the San Rafael River during sampling:
39 speckled dace (*Rhinichthys osculus*), flannelmouth sucker (*Catostomus latipinnis*), bluehead sucker
40 (*Catostomus discobolus*), and roundtail chub (*Gila robusta*) (Bottcher 2009; McAda et al. 1980;
41 Walsworth 2011). A rangewide conservation agreement was signed to manage the flannelmouth sucker,
42 bluehead sucker, and roundtail chub in 2004 (UDWR 2006). Densities of the three species have been
43 consistently higher in sampling locations in the upper San Rafael River than in the lower San Rafael
44 River, and lower-river populations are thought to be maintained only by immigration from the upper river
45 and the Green River (Bottcher 2009; McAda et al. 1980; Walsworth 2011). Sampling in the planning area
46 has often found no native fish, indicating very low densities of native fish. One reason for low densities of
47 native fish in the planning area is a lack of available habitat, particularly a lack of pools, riffles, and

1 backwaters, which are preferred habitats for native fish. Surveys of the lower river conducted in 2010
2 found that each of the project reaches contained <20% pool, riffle, and backwater habitats by area (BLM
3 2014a).

4 Non-native fish are also found in the lower San Rafael River and include red shiner (*Cyprinella lutrensis*),
5 sand shiner (*Notropis stramineus*), mosquitofish (*Gambusia* spp.), fathead minnow (*Pimephales*
6 *promelas*), common carp (*Cyprinus carpio*), black bullhead (*Ameiurus melas*), and channel catfish
7 (*Ictalurus punctatus*) (Bottcher 2009; McAda et al. 1980; Walsworth 2011). Non-native fish are preying
8 on and competing with the three species in the lower San Rafael River and are a severe threat to
9 persistence of native fish in the lower river (Walsworth 2011; Walsworth et al. 2013). Competition may
10 be especially intense in the lower river because of the limited availability of habitat for production of food
11 resources such as macroinvertebrates (Walsworth 2011).

12 Native fish populations within the San Rafael River are likely limited by occasional drying of the lower
13 river during periods of low water and complete freezing of the water column during cold periods in winter
14 (BLM 2014a). Temperature may also limit distribution of native fish in the lower river. Temperature
15 monitoring by the USGS at the SH-24 gage between 1950 and 1977 indicated that summer temperatures
16 at this location consistently approached and sometimes exceeded 30 degrees Celsius (°C), which is at the
17 upper end of temperature preferences for the three species (Bezzerrides and Bestgen 2002). Temperatures
18 exceeding 35°C have also been observed in isolated pools when the river has become dewatered (Bottcher
19 2009). Even if temperatures do not exceed 30°C in the summer, as the temperature increases, metabolic
20 demands increase. The low productivity, combined with competition from non-native species in the lower
21 San Rafael River, may prevent native fish from obtaining sufficient resources to meet metabolic demands
22 when temperatures are elevated. Thus, temperature may be a limiting factor for native fish in some years.

23 Overall the reduced density of the three species in project reaches on the lower San Rafael River has been
24 attributed to a suite of factors, including competition and predation from non-native fish, dewatering
25 during dry periods, low productivity, increased water temperatures, and a lack of complex habitat,
26 including riffles, pools, and backwaters (Bottcher 2009; Walsworth 2011). However, where isolated
27 sections of the lower river contain more complex habitat, such as at tributary confluences, higher densities
28 of the three species have been found or are predicted to occur (BLM 2014a; Walsworth 2011). Thus, the
29 lack of available habitat in project areas is a key limiting resource for native fish populations.

30 **Green River**

31 The portions of the Green River in the planning area is known to support native and non-native fish,
32 including flannelmouth sucker, blueheaded sucker, channel catfish, roundtail chub, speckled dace, fathead
33 minnow, red shiner, sand shiner, smallmouth bass, largemouth bass, carp, black bullhead, yellow
34 bullhead, walleye, northern pike. The Green River also has been affected by flow modifications and
35 tamarisk colonization, which affects fish habitat in the San Rafael River. However, compared with the
36 San Rafael River, the Green River has much higher flow; therefore, the river's fishery is not limited by
37 summer temperature or winter freezing in the same manner as the San Rafael fishery.

38 **3.12.2 Resource Trends**

39 Very little information is available with which to assess trends for wildlife and fisheries in the planning
40 area. In general, wildlife populations in relatively undeveloped landscapes similar to the planning area are
41 a function of habitat availability and quality. Habitat availability has stayed relatively constant in the
42 planning area, as few surface disturbing activities have been implemented. Livestock grazing, OHV use,
43 and dispersed recreation activities do occur, and recreational use is increasing. However, these activities
44 occur at relatively low intensities and therefore are not anticipated to substantially affect wildlife trends.

45 The largest factor affecting wildlife population and habitat trends in the planning area is drought. The
46 planning area experienced extended periods of moderate to severe drought from 2000 to 2003 and again

1 from 2012 to 2016, which that contributed to habitat deterioration. As of January 2017, the drought in the
2 planning area has eased somewhat, and the area is classified as experiencing somewhat abnormally dry
3 conditions (U.S. Drought Monitor 2017). Wildlife habitat and populations are anticipated to respond
4 positively to the easing of drought.

5 BLM began implementing the San Rafael River Restoration Project in 2015, and that process is ongoing.
6 The San Rafael River Restoration Project was designed to improve the ecological condition of the lower
7 San Rafael River, which has been degraded severely over time through a combination of impacts,
8 including altered flow regimes and non-native vegetation encroachment. Implementation of the project
9 will improve the riparian and aquatic habitat in the planning area, including developing riffles, pools, and
10 backwaters, which were lacking before the project began. This project will greatly improve the riparian
11 and fish habitat in the San Rafael River in the planning area, and it is anticipated that native fish
12 populations will increase in their distribution and numbers as a result.

13 **3.13 LANDS WITH WILDERNESS CHARACTERISTICS**

14 **3.13.1 Introduction**

15 This section describes the affected environment for lands with wilderness characteristics (LWCs). The
16 analysis area for LWCs includes the planning area as well as LWC inventory units that extend outside the
17 planning area and other adjacent lands that the BLM manages for the preservation of wilderness character
18 (i.e., wilderness study areas [WSAs]). The analysis area includes the Sweetwater Reef Unit A, San Rafael
19 River Units A through E, Units 5 and 7, Labyrinth Units A and B, the Dirty Devil/French Springs LWC
20 units, the Dirty Devil WSA, the Horseshoe Canyon North WSA, and the Horseshoe Canyon South WSA
21 (see Map 2-1).

22 The BLM’s authority to recommend lands for Congressional wilderness designation expired in 1991
23 under FLPMA Section 603 (43 USC 1782). However, Congress gave the BLM broad authority and
24 discretion under FLPMA, aside from Section 603, to identify LWCs and, if appropriate, to manage lands
25 to protect such characteristics. The LWC inventory authority comes from FLPMA, Title II, Section 201
26 (43 USC 1711(a)) that states the BLM is to “prepare and maintain on a continuing basis an inventory of
27 all public lands and their resource and other values.” The BLM makes decisions regarding the
28 management of resources present on BLM-administered public lands, including LWCs, through the RMP
29 planning process.

30 One of the key characteristic of lands meeting the qualities of wilderness is the requirement under the
31 Wilderness Act that the parcels of land contain at least 5,000 contiguous roadless acres or be of sufficient
32 size to allow for their preservation and use in an unimpaired condition. BLM Manual 6310—Conducting
33 Wilderness Characteristics Inventory on BLM Lands (BLM 2012b) requires the areas being evaluated to
34 be at least 5,000 acres in size, contiguous to other protected lands with wilderness characteristics, of
35 sufficient size to be able to preserve and use in an unimpaired condition, or a roadless island.

36 The other two major criteria in evaluating wilderness characteristics is the naturalness of an area and
37 opportunities for solitude or a primitive and unconfined type of recreation. While the Wilderness Act
38 discusses and mandates these key characteristics of wilderness, the act does not clarify these terms. The
39 BLM has subsequently defined these terms in BLM Manual 6310 and has described how to assess these
40 conditions on parcels. The following are the terms clarified by BLM policy that are used to describe these
41 key wilderness characteristics.

42 **Naturalness:** Lands and resources exhibit a high degree of naturalness when affected primarily by the
43 forces of nature and where the imprint of human activity is substantially unnoticeable. The BLM has the
44 authority to inventory, assess, and/or monitor the attributes of the lands and resources on public lands,
45 which, taken together, are an indication of an area’s naturalness. These attributes may include the

1 presence or absence of roads and trails, fences, and other improvements; and the nature and extent of
2 landscape modifications; the presence of native vegetation communities; and the connectivity of habitats.

3 **Opportunities for solitude and primitive and unconfined recreation:** Visitors may have outstanding
4 opportunities for solitude or primitive and unconfined types of recreation when the sights, sounds, and
5 evidence of other people are rare or infrequent; where visitors can be isolated, alone, or secluded from
6 others; where the use of the area is through non-motorized, non-mechanical means; and where no or
7 minimal developed recreation facilities are encountered.

8 **Supplemental values:** Another component of LWCs is that those lands may also contain ecological,
9 geological, or other features of scientific, educational, scenic, or historical value; these are known as
10 supplemental values. Although supplemental values are not required in the BLM's policy on wilderness
11 characteristics, these values are of particular importance and reflect the character of the area. For
12 example, some areas in the planning area may show wilderness characteristics by meeting the definitions
13 for size, naturalness, and opportunities for solitude and primitive and unconfined recreation and also by
14 providing historical value to others by preserving Native American ruins or rock art.

15 **3.13.2 Resource Conditions**

16 ***3.13.2.1 Lands with Wilderness Characteristics***

17 All lands within the Price and Richfield Field Offices underwent an initial inventory for wilderness
18 characteristics in 1979. The initial inventory led to some lands undergoing a more intensive inventory,
19 which led to a subset of these lands being identified as WSAs. These lands have been managed since this
20 identification to prevent impairment of their wilderness characteristics until Congress decides on their
21 final disposition. The Secretary of the Interior directed the BLM in 1996 to reexamine some of the lands
22 originally inventoried in 1979. In response, the BLM inventoried these lands and found approximately 2.6
23 million acres of public land in Utah (outside of existing WSAs) to have wilderness characteristics (BLM
24 1999). This effort is referred to as the 1999 inventory. As part of the 2008 Richfield and Price Field
25 Offices' RMP processes, the BLM reexamined some portions of the 1999 inventory. However, prior to
26 2016, the BLM had never completed a full LWC inventory for many areas within the planning area.

27 In 2016, the Price and Richfield Field Offices conducted a wilderness inventory for the planning area. The
28 2016 LWC inventory included 449,394 acres and 20 inventory units (BLM 2016). The effort was
29 intended to document the presence or absence of wilderness characteristics consistent with BLM Manual
30 6310 (BLM 2016). Of the 20 units that were inventoried, 263,705 acres, or 13 units, were determined to
31 have wilderness characteristics (see Map 2.1, Table 3-31). Approximately 250,994 acres within these
32 units falls within the planning area. For the purposes of this analysis, the LWC units are grouped by
33 proximity, and their acreages are shown in Table 3-31. Map 3-5 displays the boundaries of the LWC
34 groups used in the analysis.

1 **Table 3-31. Lands with Wilderness Characteristics Units in the Planning Area**

Group Name	Units Composing Group	Acres in the Planning Area	Total LWC Acreage
Sweetwater Reef	Sweetwater Reef Unit A (69,348 acres)	69,348	69,348
San Rafael River	San Rafael River Unit A (6,354 acres) San Rafael River Unit B (24,248 acres) San Rafael River Unit C (7,162 acres) San Rafael River Unit D (66,794 acres in planning area; 66,849 acres LWC total) San Rafael River Unit E (9,132 acres in planning area; 9,201 acres LWC total) Unit 6 (9,112 acres)	122,804	122,929
Units 5 and 7	Unit 5 (5,616 acres) Unit 7 (8,528 acres)	14,144	14,144
Dirty Devil/French Springs	Dirty Devil/French Springs Units 1 and 3 (5,454 acres in planning area; 17,343 acres LWC total) Horseshoe Canyon South (8,147 acres in planning area; 8,929 acres LWC total)	13,601	26,272
Labyrinth	Labyrinth Unit A (20,023 acres in planning area; 20,025 acres LWC total) Labyrinth Unit B (11,075 acres in planning area; 11,077 acres LWC total)	31,098	31,102
Total of All Units		250,994	263,705

2 **Description of Lands with Wilderness Characteristics Groups**

3 The following sections summarize the naturalness, opportunities for solitude and primitive and
 4 unconfined recreation, supplemental values, and evidence of human activity for the five groups of LWCs.
 5 This information was extracted from the 1999 *Utah Wilderness Inventory* and the *San Rafael Desert*
 6 *Lands with Wilderness Characteristics Inventory* (BLM 2016). For more detailed information on each of
 7 the units, please refer to the inventories.

8 ***Sweetwater Reef Group***

9 The Sweetwater Reef group is composed of the Sweetwater Reef Unit A (69,348 acres). The Sweetwater
 10 Reef Unit A is primarily in Emery County with a portion of the southern boundary located in Wayne
 11 County. The Lower San Rafael Road and Saucer Basin Road border the unit. This unit covers an area of
 12 the San Rafael Desert made up of a variety of geographic features ranging from stabilized sand dunes,
 13 incised slick rock canyons, and expanses of brush-grasslands to the uplifted Sweetwater Reef. The unit is
 14 bordered by bladed natural surface roads and is located east of State Route 24 and west of the Horseshoe
 15 Canyon unit of Canyonlands National Park.

16 The unique natural desert ecosystem of dry washes, oak brush–stabilized sand dunes, and endemic
 17 blackbrush flats offers exemplary opportunities for primitive and unconfined recreation. Additionally, this
 18 area offers opportunities for viewing wildlife in a landscape of huge skies, varied geologic forms, and
 19 unique isolated riparian systems.

1 The unit contains extensive undocumented cultural resources in the form of lithic scatters, which appear
2 and disappear as shifting sands expose and then recover them. The unit also contains isolated rock art and
3 historic cabins and corrals located near springs. Some of the earliest petroleum exploration occurred in
4 this part of the San Rafael Desert in the 1920s. The most substantial human activity observed and noted
5 was the existence of roads and berms from historic seismic activity. Mineral exploration, probably during
6 the 1950s and 1960s, left the unit crisscrossed with long stretches of lines and routes, which are in various
7 stages of natural rehabilitation. In some cases, the lines have naturally reclaimed to the point that they are
8 barely visible and the average visitor would not notice them (BLM 2016).

9 ***San Rafael River Group***

10 The San Rafael River group consists of San Rafael River Units A through E and Unit 6 (see Map 3-5).
11 The San Rafael River group is located in Emery County. The group is bounded by State Route 24 and the
12 Cottonwood Spring Loop Road on the west side, by the Gillies Ranch Road on the north side, the Lower
13 San Rafael Road on the east side, and by the Saucer Basin, Dugout Creek, Sand, Spring Canyon, and
14 Landing Field Roads on the south side.

15 These units cover an area of the San Rafael Desert made up of a variety of geographic features ranging
16 from mesa tops, river bottoms, and incised slick rock canyons to expanses of brush-grasslands. The
17 unique natural desert ecosystem of dry washes, slot canyons, alcoves, slickrock, oak brush-stabilized
18 sand dunes, and endemic blackbrush flats offers exemplary opportunities for primitive and unconfined
19 recreation and wildlife viewing in a landscape of huge skies, varied geologic forms, and unique isolated
20 riparian systems. Although Unit 6 provides outstanding opportunities for solitude, its sand, topography,
21 and location make it difficult and undesirable for most of the public, and it therefore it does not provide
22 outstanding opportunities for primitive and unconfined recreation. Due to the vast ruggedness of the
23 overall area, outstanding opportunities for solitude exists.

24 The most substantial human activity observed were haul locations accessed only by the grazing permittee.
25 Many units contain several range improvements including water haul locations, tanks and troughs,
26 corrals, salt and mineral haul locations, and spring locations. In San Rafael River Unit C, some historic
27 routes from mineral exploration, probably during the 1950s and 1960s, can be seen. Today, these historic
28 routes are in various stages of natural rehabilitation. In some cases, the lines have naturally reclaimed to
29 the point that they are barely visible and the average visitor would not notice them. Dispersed campsites,
30 a mountain biking area, a slot canyon hike, and a reclaimed airstrip are also among the human activities
31 observed in one of the units. San Rafael River Units C through E have seismic exploration lines and
32 ATV, motorcycle, and jeep trails throughout, but these are not maintained except by the passage of
33 vehicles.

34 Many of the units contains extensive undocumented cultural resources in the form of lithic scatters, which
35 appear and disappear as shifting sands expose and then recover them. One unit also contains isolated rock
36 art and a historic corral. Some of the earliest petroleum exploration occurred in this part of the San Rafael
37 Desert in the 1920s. Portions of the Dry Lake ACEC, which is managed for its relevant and important
38 values of cultural resources, are located within San Rafael River Unit A (BLM 2016).

39 ***Units 5 and 7 Group***

40 The Units 5 and 7 group cover 14,144 acres in total. Units 5 and 7 are bounded on the west by the Lower
41 San Rafael Road, to the north and south by BLM Designated Route 501 and BLM Designated Route 701,
42 respectively, and to the east by Fossil Point Road, which is also the shared boundary between the units.

43 These units have been affected by range improvements, and have evidence of mining and mineral
44 exploration. These impacts have naturally reclaimed to the point that they are difficult to see, and these
45 features would not be generally recognizable to the public. These units have some vegetation such as

1 grasses and small brush, whereas other areas are covered only in sand and rock. The topography of the
2 units is typical of the general area and includes some large hills, washes, and small canyons.

3 These units provide outstanding opportunities for solitude. Visitors who explore the central portions of
4 the units, away from boundary roads and primitive routes, encounter topography that allows them to be
5 shielded from the sights and sounds of vehicle traffic. There are no authorized routes or ways that access
6 the middle of the units.

7 These units provide outstanding opportunities for primitive and unconfined recreation. There are many
8 opportunities to hike and explore small canyons, washes, sand dunes, and hills. The southern boundary of
9 Unit 5 and the northern boundary of Unit 7 provide access to Fossil Point, where visitors can discover and
10 examine paleontological resources including fascinating bones. The eastern boundary for each of the units
11 is the Green River, which also provides many unconfined recreation opportunities such as hiking and
12 boating access. Portions of the Dry Lake ACEC can be found within both units (BLM 2016).

13 ***Dirty Devil/French Springs Group***

14 The Dirty Devil/French Springs Group is composed of the northern portions of Dirty Devil/French
15 Springs Units 1 and 3 (5,454 acres) and the Horseshoe Canyon South unit (8,147 acres). The southern
16 portions of Units 1 and 3 and the remainder of the Dirty Devil/French Springs units fall outside of the
17 planning area. The units that fall within the planning area straddle the Emery and Wayne County line in
18 the southern portion of the planning area. Approximately 31% of the Dirty Devil/French Springs Units 1
19 and 3 and 91% of the Horseshoe Canyon South unit lie within the planning area.

20 The Dirty Devil area is remote and has a rich prehistory and history. The archaeological resources in the
21 area are impressive, and the outlaw history of this area is extensive. Part of the Outlaw Trail that stretched
22 from Montana to Mexico is located here. Butch Cassidy and his Wild Bunch were some of the most
23 famous of the outlaws to frequent this region (BLM 1999).

24 The Dirty Devil area is crisscrossed by deeply incised canyons creating a landscape of topographic
25 extremes. It has remained largely unchanged since the post–World War II uranium exploration boom. The
26 units are used for grazing and recreation. The portion of Dirty Devil Unit 1 that falls within the planning
27 area is mainly the access road to the Dirty Devil River. Seismic lines and range improvements are present
28 but the units are not substantially impacted by intrusions.

29 Horseshoe Canyon South has a diverse combination of incised sandstone canyons and rugged benchlands,
30 and it includes the headwaters and entire upper drainage of Horseshoe Canyon. The unit is contiguous to
31 the Horseshoe Canyon South WSA. Vegetation above the canyon bottoms is predominantly sagebrush
32 and blackbrush grasslands, with scattered stands of piñon and juniper at the higher elevations and along
33 the canyon breaks. Riparian species in the canyons include Fremont cottonwood, willow, common reed
34 grass, and tamarisk. Grazing use continues to be permitted throughout most of the unit, although many
35 areas remain largely ungrazed because of a lack of access and limited reliable water sources. Human
36 activities include mineral and petroleum exploration activities, some widely scattered old seismograph
37 lines, and range developments; however, the seismograph lines are generally screened by the vegetation
38 and topography.

39 The Dirty Devil/French Springs units and the Horseshoe Canyon South unit provide abundant
40 opportunities for solitude due to the large scale of the country, the expansive and rugged terrain, and
41 ample topographic screening. The inventory units are contiguous to and are an extension of the Horseshoe
42 Canyon South WSA and the Dirty Devil WSA, respectively, which have outstanding opportunities for
43 primitive and unconfined recreation. The remoteness, expansive views, significant cultural history,
44 limited visitation, and diversity and quality of recreational activities in these units combine to create
45 outstanding opportunities for the visitor seeking remote recreation experiences.

1 ***Labyrinth Group***

2 The Labyrinth Group is composed of Labyrinth Unit A (20,025 acres) and Labyrinth Unit B (11,077
3 acres). The Labyrinth Group is bounded on the west by the Lower San Rafael Road, on the north by Road
4 LC-A-001, on the east by the Green River and the Horseshoe Canyon North WSA, and on the south by
5 Road LC-B-018.

6 Labyrinth Unit A is composed of sagebrush and blackbrush flats along the upper benches and knolls and
7 the incised canyons of the main chasm of Labyrinth Canyon, as well as riverine-influenced zones along
8 the Green and San Rafael Rivers. Labyrinth Unit B also is composed of sagebrush and blackbrush flats
9 along the upper benches and knolls, but it is farther from the Green River. The Labyrinth Unit B ranges
10 from a gently sloping to a rugged, broken landscape of ridges and escarpments cut by side canyons.
11 Spring Canyon and Horseshoe Canyon provide access to the Green River and are two extensive canyon
12 systems in the area.

13 The predominantly desert landscapes within both units provide views of diverse geological formations,
14 some of which include high desert plateaus that transition to steep canyons that eventually give way to
15 various washes throughout the units (and the surrounding WSA in the case of Labyrinth Unit B), where
16 drastic elevation transitions are prevalent. Naturalness is enhanced by topographic screening from deep
17 canyons, rugged terrain, and the natural re-vegetation of disturbed areas, which obscures most intrusions
18 in the predominantly blackbrush communities. Vegetation includes, but is not limited to, native grasses
19 and shrubs, which are sparse in some areas.

20 Human impacts are present in both units in the form of reclaiming seismic lines and range improvements.
21 Major current human uses also include recreation-based activities due to the remoteness of this area.
22 Activities such as hunting, hiking, exploring, sightseeing, photography, camping, and river rafting access
23 would be most likely to occur within this area.

24 Steep and rugged topography, as well as the extensive side canyons, cliffs and other topographical
25 features maintain the area's natural character and also provide outstanding opportunities for solitude.
26 Labyrinth Unit B is contiguous to the Horseshoe Canyon North WSA and the Canyonlands National Park
27 Horseshoe Canyon unit; both provide and are managed for outstanding opportunities for solitude. Due to
28 the remoteness and topography found within these units, outstanding opportunities for primitive and
29 unconfined recreation are prevalent. Some of these activities may include hiking, canyoneering, mountain
30 biking, floating, and primitive camping.

31 Scenic quality is excellent within these units. There are extensive views of red, buff, and purple sandstone
32 canyons, domes, alcoves, multiple arches, and sheer cliff faces of spectacular dimensions.

33 There are several historic features, including sheep access trails to the river. These units contain the same
34 type of nationally significant, prehistoric cultural sites and rock art found within the Horseshoe Canyon
35 unit of Canyonlands National Park.

36 These units provides exceptionally diverse habitats. Most important are the extensive riparian areas found
37 along the river and major side canyons. An expanding herd of desert bighorn sheep inhabits the rims and
38 canyons. The endangered Colorado pikeminnow, humpbacked chub, bonytail chub, and razorbacked
39 sucker are all found in the Green River. Labyrinth Unit B has an abundant pronghorn population, and one
40 of only a few herds in Utah that was not eliminated by the human settlement.

41 The 2008 Price Field Office ROD/RMP established several "special" categories along the Green River
42 through Labyrinth Canyon for the purpose of protecting values and prescribing management direction as
43 follows:

- 44 • The Labyrinth Canyon SRMA within the inventory area and WSA recognize the intensive and
45 special recreation values of the canyon.

- The Bowknot Bend ACEC within the WSA protects the ungrazed vegetation communities on the isolated mesa tops that have remained completely undisturbed.
- The Green River through Labyrinth Canyon is suitable as scenic for inclusion in the National Wild and Scenic Rivers System (BLM 2008).

3.13.2.2 *Natural Areas*

In general, non-WSA LWCs that are managed according to an approved BLM RMP to protect wilderness values while allowing other uses as appropriate are referred to as BLM “natural areas” (BLM 2008b). BLM natural areas are managed to preserve, protect, and maintain the values of primitive recreation, the appearance of naturalness, and opportunities for solitude (BLM 2008b).

There are two natural areas identified in the Richfield Field Office ROD/RMP located within the planning area. One is the Horseshoe Canyon South natural area; for this natural area 3,733 acres of the 12,147 acres identified in the 2008 Richfield Field Office ROD/RMP falls within the planning area (see Map 2-1). The other is the Dirty Devil/French Springs natural area; for this natural area 138 acres of the 6,081 acres identified in the 2008 Richfield Field Office ROD/RMP fall within the planning area (see Map 2-1).

3.13.3 **Resource Trends**

The presence or absence of wilderness characteristics on BLM-administered public lands can be modified by human activities such as approved land uses or by the natural reclamation process through which evidence of past disturbances can be reduced or eliminated over time. As a result, BLM-administered lands that have been inventoried previously and not found to have wilderness characteristics could be found to have wilderness characteristics in future inventories, and visa-versa.

Evidence of human activities such as seismic studies and cross-country travel in the planning area have been reduced or eliminated over time by the natural reclamation process. Recreation development has been limited in the area due to its remoteness, and recreationists have been drawn to surrounding areas such as Canyonlands and Arches National Parks. For these reasons, several areas that were inventoried by the BLM in 1999 and determined not to have naturalness were found to have wilderness characteristics in the 2016 inventory (BLM 2016).

Recreation and human activities in the planning area are expected to increase in the next 20 years. Recreational destinations surrounding Moab are saturated with visitors, and the public is looking for other areas to recreate. Additionally, there is the potential for BLM-authorized land uses such as oil and gas development in the planning area. Oil and gas development is now more likely than ever as a result of available modern horizontal drilling and hydraulic fracturing technologies. Recreational development and other BLM-authorized land uses could reduce the presence of LWCs in the planning area in the future.

3.14 RECREATION

3.14.1 **Introduction**

The analysis area for recreation consists of the planning area and adjacent lands that could be affected by decisions regarding the planning area. The adjacent lands include the following:

- The Green River corridor through Labyrinth Canyon and related Green River tributaries.
- Lands managed by the Moab Field Office east of the Green River and east of the planning area. (Management decisions in the Moab Field Office may affect users’ river experiences and users accessing the river from the planning area.)
- Portions of the Labyrinth Canyon and Dirty Devil/Robbers Roost SRMAs, which are south and east of the planning area and above the rim of the Green River

- The Horseshoe Canyon unit of Canyonlands National Park

3.14.2 Resource Use Conditions

3.14.2.1 *Dispersed Recreation and Visitation*

The planning area is in a region of Utah that is well known for its recreational opportunities. Three national parks, the San Rafael Swell, and Goblin Valley State Park are located within 25 miles of the planning area and offer multiple recreation activities. The Green River, which forms the eastern boundary of the planning area, is a popular destination for river rafting, and the nearby Henry Mountains offer hunting, hiking, camping, and other recreational activities.

Recreation is a highly valued use of BLM-administered public land in the planning area. Because there are no developed recreation sites in the planning area, all recreation is considered to be dispersed. Visitors to the planning area currently engage in a wide variety of motorized and non-motorized recreational activities. The busiest seasons tend to be spring and fall, although visitation occurs throughout the year. Recreation activities include climbing, hiking, canyoneering, biking, OHV (ATV and motorcycle) use, driving for pleasure, cultural and paleontological resource viewing, boating on the Green and San Rafael Rivers, camping, hunting, and horseback and mule riding.

An important element of recreation is the visitor experience. Different types of visitors seek different experiences for their chosen recreation activity. The visitor experience depends on factors such as interaction with other people (a low degree of interaction to a high degree of interaction), the presence of infrastructure (no infrastructure to heavy infrastructure such as developed campgrounds), the level of risk (low-risk activities to high-risk activities), opportunities for solitude and closeness to nature, and the level of physical effort (easy to strenuous). The BLM seeks to provide multiple visitor experiences meeting different recreation needs and desires while observing resource protection and other management requirements.

3.14.2.2 *Current Management*

Management goals and decisions for recreation in the planning area are described in the current BLM ROD/RMPs for the Price and Richfield Field Offices (BLM 2008a, 2008b). Recreation goals in the Price ROD/RMP (BLM 2008a) are as follows:

- To establish management that provides necessary public services, authentic recreation experiences, and opportunities within allowable use levels; minimizes user conflicts; and maintains the healthy ecosystems and settings that provide the basis for recreation and experience.
- To provide an environment for and encourage entrepreneurial activities that are supportive of the recreation program goals and objectives.

Recreation goals in the Richfield ROD/RMP (BLM 2008b) are as follows:

- To provide recreational opportunities in a variety of physical, social, and administrative settings, from primitive to near-urban, that allow visitors to have desired recreational experiences and enjoy the resulting benefits.
- To provide opportunities for recreational experiences unique to the lands managed by the Richfield Field Office consistent with resource capabilities and mandated resource requirements and to provide for visitor education and interpretation of the recreational opportunities.
- To work with local communities to foster recreation and tourism.
- To provide for public health, education, and safety through interpretation, facility development, and visitor management.

- To maintain important recreational values and sites in federal ownership to ensure a continued diversity of recreation settings, activities, and opportunities.

Each ROD/RMP provides extensive lists of management actions or decisions for recreation, including general management decisions for recreation and specific management decisions for developed recreation sites, use of the Recreation Opportunity Spectrum (in the Price Field Office ROD/RMP), each SRMA, extensive recreation management areas (ERMAs), special recreation permitting, and OHV recreation.

3.14.2.3 Special Recreation Management Areas

Recreation management areas compose the system used by the BLM to manage recreational use of public lands. All public lands managed by the BLM fall within either a SRMA or an ERMA. SRMAs are evaluated and designated through the BLM's preparation of RMPs. The current SRMAs in the planning area were designated in the 2008 BLM ROD/RMPs for the Price and Richfield Field Offices (BLM 2008a, 2008b). A SRMA is an area where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation. A SRMA is managed to protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics. There are two SRMAs in the planning area: the Dirty Devil/Robbers Roost SRMA and the Labyrinth Canyon SRMA (Map 2-5). ERMAs are managed to support and sustain the existing recreation use and demand. However, recreation may not be the primary management objective in these areas so recreational activities may be subject to fewer restrictions.

The Dirty Devil/Robbers Roost SRMA and the Labyrinth Canyon SRMA are described here.

Dirty Devil/Robbers Roost SRMA

The Dirty Devil/Robbers Roost SRMA covers 290,500 acres and is managed by the Richfield Field Office. The planning area contains 15,032 acres, or 5.2%, of this SRMA and intersects the northernmost portion of the SRMA (see Map 2-5). The Dirty Devil/Robbers Roost SRMA surrounds the Horseshoe Canyon unit of Canyonlands National Park and includes tributaries of Horseshoe Canyon. The Richfield Field Office ROD/RMP states that Horseshoe Canyon should be managed as part of the Dirty Devil/Robbers Roost SRMA (BLM 2008b). A portion of the Horseshoe Canyon Trailhead recreation focus area (see Section 3.14.2.5) is within the SRMA in the planning area. The Horseshoe Canyon Trailhead provides access from the west rim of Horseshoe Canyon into the canyon bottom.

The Dirty Devil/Robbers Roost SRMA is in remote desert country where plateau rangeland is incised by Navajo sandstone slots that release into large, deep canyons. The Dirty Devil River flows from north to south through the western portion of the SRMA, which is outside of the planning area. The Dirty Devil River has low water flows but is floatable by kayakers and canoers at certain times of the year, typically spring and early summer (American Whitewater 2012). This SRMA, including the portion of the SRMA in the planning area, provides opportunities for primitive and semi-primitive recreation, including canyoneering, backcountry camping, and hiking. In particular, the Dirty Devil River corridor, its tributaries, and the Horseshoe Canyon drainage offer primitive and semi-primitive, non-motorized recreation experiences, and the bench lands of the SRMA offer semi-primitive motorized recreation experiences on designated routes.

Labyrinth Canyon SRMA

The Labyrinth Canyon SRMA covers 45,862 acres and is administered by the Price Field Office. The planning area contains 9,732 acres, or 21.2%, of the western and northern portions of the SRMA. The SRMA in the planning area is managed under the ROS as P (1,571 acres), SPNM (3,796 acres), SPM (4,334 acres), and RN (31 acres). In the planning area, the SRMA follows the western planning area

1 boundary in a wide block from the border between Emery and Wayne Counties to a location containing
2 private lands south of the confluence of the San Rafael and Green Rivers. This portion of the SRMA
3 includes some tributary canyons of the Green River. The SRMA in the planning area continues north of
4 the confluence almost to the city of Green River and becomes more segmented and narrow (see Map 2-5).
5 Portions of the Three Canyon and Keg Knoll recreation focus areas (see Section 3.14.2.4) are within the
6 SRMA in the planning area. Three Canyon is a side canyon of Labyrinth Canyon and is often visited by
7 river rafters on a hike. It is also a less technical canyon for canyoneering (although side forks of the
8 canyon have more technical canyoneering routes). It contains a small intermittent stream and occasional
9 pools. The Keg Knoll recreation focus area is a popular dispersed camping site.

10 The Green River, a large-volume desert river meandering through the scenic high-walled cliffs of
11 Labyrinth Canyon, is easily accessible to floaters and runs through the Labyrinth Canyon SRMA. It is
12 federally adjudicated as navigable water, and lands below the 1897 high water line are state owned. The
13 flat water of the canyon attracts numerous recreationists seeking a scenic river float. Impacts occur from
14 concentrated use along the river, primarily in camping areas. Resource damage may also occur because
15 the canyon attracts a large number of novice and first-time river runners (BLM 2008a).

16 ***Recreation Opportunity Spectrum***

17 The Recreation Opportunity Spectrum (ROS) is a tool used by BLM recreation planners to identify
18 existing outdoor recreational opportunities and management potential based on a combination of three
19 criteria: recreational activity, setting, and experience. The range of recreational opportunities in the Price
20 Field Office portion of the planning area (Emery County) has been inventoried into five ROS classes by
21 the Price Field Office. (The Richfield Field Office has not conducted a ROS inventory.) Although the
22 entire Price Field Office portion of the planning area has been inventoried for ROS, BLM management
23 objectives in the Price Field Office ROD/RMP only specify use of the ROS in SRMAs (to guide decision-
24 making on projects with the potential to change the physical, managerial, or social settings that create the
25 available recreation opportunities and experiences) (BLM 2008a). Within the Labyrinth Canyon SRMA,
26 the BLM Price Field Office manages for the ROS classes identified in the inventory (BLM 2008a).

27 The ROS classes for the Emery County portion of the planning area are shown in Map 3-6 and described
28 here:

- 29 1. Primitive (P): Areas characterized by a roadless, essentially unmodified natural environment.
30 There is a very high probability of solitude in P-class areas. Motorized use is prohibited.
31 Approximately 1,891.6 acres of the planning area in Emery County are inventoried as P.
- 32 2. Semi-Primitive Nonmotorized (SPNM): Areas characterized by a roadless, predominantly
33 unmodified environment. There may be rustic improvements to protect resources, and there is a
34 high probability of solitude in SPNM-class areas. Motorized use is prohibited. Approximately
35 36,258.0 acres of the planning area in Emery County are inventoried as SPNM.
- 36 3. Semi-Primitive Motorized (SPM): Areas that are the same as SPNM except that motorized use is
37 permitted. There is a moderate probability of solitude in SPM areas. Approximately 291,093.9
38 acres of the planning area in Emery County are inventoried as SPM.
- 39 4. Roaded Natural (RN): Areas characterized by a generally natural environment and that have
40 evidence of natural resource modification that is in use and harmony with the natural
41 environment. Developments such as campgrounds, trailheads, and boat launches may be present.
42 Users of RN-class areas will encounter moderate evidence of human sights and sounds and
43 moderate user concentrations at campsites. Approximately 38,253.9 acres of the planning area in
44 Emery County are inventoried as RN.

- 1 5. Rural (R): Areas characterized by a substantially modified natural environment. Heavy site
2 modifications and facilities may be present. There is a high degree of interaction with people in
3 R-class areas. Approximately 0.1 acre of the planning area in Emery County is inventoried as R.

4 A sixth ROS class, Urban (U), is characterized by a user-intensive, developed, and modified resource
5 setting. There is no land inventoried as U in the planning area.

6 RN and R classes typically require very little BLM management. The P, SPNM, and SPM classes are
7 designed to provide certain types of recreation experiences and settings, and may require BLM
8 management to meet the recreation objectives. As shown in Map 3-6, most of the planning area is
9 inventoried as SPM followed by RN and SPMN.

10 **3.14.2.4 Recreation Focus Areas**

11 In response to comments received during public scoping, the BLM conducted an inventory of recreational
12 uses in the planning area to assist in the development of the MLP. The inventory resulted in the
13 identification of recreation focus areas that attract higher recreation interest and have more concentrated
14 recreational use than other portions of the planning area. The term “recreation focus area” is not intended
15 to be a designation in a BLM RMP, nor does it carry management implications. The BLM is not
16 considering changing any decisions related to recreation in the existing RMPs through the MLP process.
17 The eight recreation focus areas identified during the inventory are shown in Map 2-6 and described
18 below:

- 19 • Fossil Point (4,947 acres): The Fossil Point recreation focus area provides outstanding opportunities
20 for self-guided hikes and exploration of paleontological remains, as well as viewing scenic vistas
21 of the La Sal and Henry Mountains.
- 22 • Dry Lake Archaeological District (14,023 acres): This recreation focus area is also part of an ACEC
23 (18,000 acres) with archaeological and geologic values. It has multiple, apparently undisturbed
24 lithic scatters and types of sites such as lithic procurement areas, shelters, and campsites. The Dry
25 Lake Archaeological District is one of the most likely locations for finding Paleoindian sites (the
26 rarest site type in Utah). There are also opportunities for hiking, accessing the Green River, driving
27 for pleasure, and viewing the CO₂-driven cold water Tumbleweed Geysers.
- 28 • Three Canyon (16,440 acres): The Three Canyon recreation focus area provides spectacular views
29 and recreation opportunities, including hiking, climbing, canyoneering, single-track trail riding,
30 camping, and driving for pleasure.
- 31 • Saucer Basin/Moonshine Wash (14,791 acres): This recreation focus area provides outstanding
32 opportunities for hiking and exploring in Moonshine Wash Canyon. Saucer Basin is a circular
33 depression surrounded by a ring of low hills; the area as a whole has great opportunities for hiking,
34 backpacking, climbing, camping, and driving for pleasure to scenic viewpoints. The Saucer
35 Basin/Moonshine Wash recreation focus area has the potential for expanding mountain biking and
36 single-track trail use along its many slickrock sections.
- 37 • The Cone (12,409 acres): The Cone recreation focus area provides exceptional views of the Cone,
38 which is a single rising mountain that can be viewed from miles away. The area has opportunities
39 for hiking, canyoneering, hunting, climbing, and driving for pleasure, as well as scenic views and
40 outstanding dispersed camping.
- 41 • Keg Knoll (7,469 acres): The Keg Knoll recreation focus area is a launching point for multiple
42 hiking, camping, and exploring opportunities. It has an outstanding 360-degree view and is a
43 destination for dispersed campers.

- 1 • Sweetwater Reef (8,164 acres): The Sweetwater Reef focus area is a ridge that provides an
2 impressive view of the San Rafael desert. It contains OHV roads and trails that lead to breathtaking
3 views, as well as launching points for hiking, biking, climbing, and canyoneering.
- 4 • Cottonwood Wash (4,598 acres): The Cottonwood Wash focus area provides an opportunity to hike
5 and explore the Cottonwood Wash drainage, which contains culturally significant writings and
6 historic cowboy camps.
- 7 • Horseshoe Canyon Trailhead (2,033 acres): The Horseshoe Canyon Trailhead recreation focus area
8 provides trail access from the west rim of Horseshoe Canyon into the canyon bottom to view
9 significant rock art. Primitive camping is allowed at the trailhead with a permit from Canyonlands
10 National Park. This area may also be used as a base for other recreational activities in nearby
11 canyons.

12 **3.14.2.5 Horseshoe Canyon Unit of Canyonlands National Park**

13 Horseshoe Canyon is part of the Maze District of Canyonlands National Park, but it is a detached unit
14 located west of the main Maze District. It is a canyon with sheer sandstone walls and mature cottonwood
15 groves along an intermittent stream in the canyon bottom. Horseshoe Canyon contains some of the most
16 significant rock art (Barrier Canyon style) in North America. Most visitors access the canyon from the
17 west on a 30-mile graded dirt road from Utah State Route 24. It can also be accessed on a dirt road
18 traveling south from Green River. Both of these access routes cross the planning area and expose visitors
19 to the recreation offerings in the planning area. The west rim trailhead into Horseshoe Canyon provides
20 primitive camping with a vault toilet but no water. Visitors can hike into the canyon or access the canyon
21 on horseback. NPS rangers provide guided walks in spring and fall.

22 **3.14.2.6 Special Recreation Permits**

23 Special recreation permits (SRPs) are authorizations that allow specified recreational uses of the public
24 lands and related waters. They are issued as a means to manage visitor use, ensure public health and
25 safety, protect recreation, protect natural and cultural resources, and provide a fair monetary return to the
26 public for certain recreation uses on public lands. SRPs are authorized by the Federal Lands Recreation
27 Enhancement Act. There are five types of uses for which SRPs are required: commercial, competitive,
28 vending (the sale of goods and services on public lands in conjunction with a recreation activity),
29 individual or group use in special areas, and organized group activity and event use.

30 The Price Field Office issues SRPs as discretionary actions subject to environmental analysis and
31 according to established evaluation factors. The Richfield Field Office issues SRPs on a case-by-case
32 basis and also subject to environmental analysis. According to the Richfield Field Office ROD/RMP,
33 SRPs are currently in place for commercial uses in its planning area; examples include canyoneering, rock
34 climbing, backpacking, hiking, guided hunting, and vehicle tours (BLM 2008b).

35 **3.14.2.7 Visual Landscape**

36 The visual landscape is an important resource for recreation users in the planning area. Scenic views and
37 visual characteristics may be the primary reason recreation users come to a particular location. The visual
38 landscape is often an essential part of a hiking or backpacking experience, and it adds to the quality of
39 other recreation experiences such as camping and climbing.

40 A visual resource inventory was conducted for the planning area in 2011. Visual resource inventory
41 classes were identified, and these are discussed in Section 3.9. As part of the MLP process, the BLM
42 identified key observation points (KOPs) within the planning area where viewers are more likely to be
43 present and seeking visually appealing experiences. The KOPs are as follows:

- 1 • Bull Bottom: Located at the end of Bull Bottom Road, this KOP provides access to the Bull Bottom
2 overlook and is at the entrance to the Labyrinth Canyon narrows. It is a remarkable 360-degree
3 vantage point, with foreground, middle ground, and background views. Slickrock buttes, rolling
4 hills, cliff walls, and patches of open grassy areas with sparse rabbitbrush and other vegetation are
5 visible.
- 6 • Trin Alcove/Three Canyon: Located at the end of Trin Alcove Road in a parking area, this KOP
7 provides 360-degree views of the foreground, middle ground, and background. The flat, brilliant,
8 white slickrock of Three Canyons is easily seen from the KOP. Slickrock buttes, rolling slickrock
9 hills, various rock formations, patchy vegetation, and great color variation are also visible. Trin
10 Alcove/Three Canyon KOP is also used as a camping area.
- 11 • Wolverton Overlook: This KOP is located in an area of flat topographical relief with views for
12 many miles in almost all directions. The visible landscape includes blackbrush, rabbitbrush, sparse
13 grasses, and a wide variety of slickrock colors.
- 14 • Keg Knoll: Keg Knoll KOP is one of the highest points overlooking the planning area. It has 360-
15 degree views of the foreground, middle ground, and background. The visible landscape includes
16 blackbrush, rabbitbrush, sparse grasses, and a wide variety of slickrock colors. This KOP is a
17 recreation destination with a trailhead and multiple hiking, camping, and exploration options.
- 18 • Horseshoe Canyon Trailhead: This KOP is located at the trailhead providing the main access into
19 Horseshoe Canyon for hikers and those wishing to see the rock art in the canyon. The view into the
20 planning area consists of a rolling ridge created by sand with blackbrush, rabbitbrush, and sparse
21 grasses to the west. In other directions, the viewshed is larger and the foreground, middle ground,
22 and background can be seen from the trailhead.

23 Bull Bottom, Trin Alcove/Three Canyon, and Wolverton Overlook KOPs are in or adjacent to the Three
24 Canyon recreation focus area. Keg Knoll is in the Keg Knoll recreation focus area. Horseshoe Canyon
25 Trailhead is in the Horseshoe Canyon Trailhead recreation focus area.

26 **3.14.2.8 Motorized and Mechanized Recreation**

27 Both motorized recreation (OHV) and mechanized recreation (mountain biking) occur in the planning
28 area. OHV use consists of ATVs and off-road motorcycles. Most OHV riders choose to ride large loops
29 of approximately 60 to 70 miles on roads and BLM-designated routes although there are no designated
30 OHV trails in the planning area. Likewise, there are no designated trails for mountain biking, but
31 mountain biking use does occur on some slickrock expanses and roads in the planning area.

32 Both the Price and Richfield Field Offices ROD/RMPs indicate that the overall number of registered
33 OHVs in Utah has grown significantly (BLM 2008a, 2008b). The Price Field Office ROD/RMP indicates
34 that OHV use is the fastest growing activity in the planning area. OHV registrations in Emery and Wayne
35 Counties for the past 5 years are shown in Table 3-32.

1 **Table 3-32. Off-Highway Vehicle Registrations in Emery and Wayne Counties from 2012 to 2016**

Year	Type of Off-Highway Vehicle	Off-Highway Vehicle Registrations		
		Emery County	Wayne County	Total for Both Counties
2012	ATV	1,314	286	2,835
	Off-highway motorcycle	924	311	
2013	ATV	1,294	309	2,735
	Off-highway motorcycle	847	285	
2014	ATV	1,288	320	2,637
	Off-highway motorcycle	770	259	
2015	ATV	1,320	331	2,675
	Off-highway motorcycle	779	245	
2016	ATV	1,296	324	2,554
	Off-highway motorcycle	690	244	

2 Source: Utah State Tax Commission (2012, 2013, 2014, 2015, 2016)

3 As shown in Table 3-32, more ATV registrations than motorcycle registrations are occurring in both
 4 counties, and Emery County has more OHV registrations than does Wayne County. Total OHV
 5 registrations in both counties have decreased by 9.9% over the last 5 years. However, a number of OHV
 6 users in the planning area come from areas of Utah outside Emery and Wayne Counties. OHV users may
 7 also come from other western states such as Colorado. The data in Table 3-32 reflect potential local users
 8 only.

9 **3.14.3 Resource Use Trends**

10 ***3.14.3.1 Recreation Visitation***

11 Recreation visitation to the planning area is not currently tracked by the BLM. However, the NPS collects
 12 visitor data for Canyonlands National Park. (The Horseshoe Canyon unit of Canyonlands National Park is
 13 located adjacent to the western border of the planning area and the Maze District of Canyonlands National
 14 Park is located approximately 3.0 miles southeast of the planning area.) Access to Horseshoe Canyon and
 15 the Maze District of Canyonlands National Park is through dirt roads that cross the planning area. There
 16 are no designated campgrounds in the Horseshoe Canyon unit, and many visitors camp in the planning
 17 area to facilitate a visit to Horseshoe Canyon. Table 3-33 shows visitor data for the Maze District of
 18 Canyonlands National Park (including Horseshoe Canyon) from 1991 to 2016. Although there is some
 19 fluctuation from year to year, overall visitor use appears to be increasing in Horseshoe Canyon and in the
 20 Maze District.

1 **Table 3-33. Visitor Data for the Maze District of Canyonlands National Park**

Maze District Areas	Total Annual Visitors					
	Maze District of Canyonlands National Park					
	1991	1996	2001	2006	2011	2016
Maze Overlook	956	1,733	2,128	1,769	1,101	1,701
Land of Standing Rocks	1,344	1,593	1,370	1,356	1,118	1,485
Horseshoe Canyon	3,529	7,693	5,871	4,426	6,635	8,166
Total visitors	5,829	11,018	9,369	7,551	8,854	11,352

2 Source: NPS (1991, 1996, 2001, 2006, 2011, 2016).

3 Visitor use data is also available for Labyrinth Canyon through boater permitting and is shown in Table 3-
4 34.

5 **Table 3-34. Visitor Use Data for Labyrinth Canyon**

Visitor Use Data	Year					
	2011	2012	2013	2014	2015	2016
Permits	252	405	446	550	564	562
Users	1,217	1,918	2,314	3,083	3,171	2,872
User days *	6,256	10,558	12,360	17,041	14,778	N/A

6 Source: Blocker (2017)

7 * User days are defined as the number of days the user was on the river in Labyrinth Canyon.

8 N/A = not available.

9 Based on the data in Table 3-34, visitor use of Labyrinth Canyon increased approximately 161% from
10 2011 to 2015 but declined slightly in 2016.

11 In Utah as a whole, tourism is increasing. Visits to Arches National Park increased 26.7% from 2010 to
12 2014; visits to Canyonlands National Park increased 24.4% from 2010 to 2014, and visits to Capitol Reef
13 National Park increased 18.7% during the same time period (University of Utah 2014). Visits to Utah's
14 national parks increased 15.6% from 2014 (Utah Tourism Industry Association 2016). From 2014 to
15 2015, 25 out of 29 counties experienced year-over increases in taxable leisure and hospitality sales, with
16 one of the largest annual increases being in Wayne County (18%). In addition, 26 of 29 counties
17 experienced year-over increases in leisure and hospitality jobs and county transient room sales tax
18 revenue (Utah Tourism Industry Association 2016). If tourism in Utah continues to grow, visitation and
19 recreational use in Canyonlands National Park, Labyrinth Canyon, and the planning area is likely to
20 increase.

21 **3.14.3.2 User Conflict and Displacement**

22 Recreation activities can conflict with one another and affect the available recreation opportunities and
23 experiences. For example, heavy use of an area by OHV riders may displace non-motorized users such as
24 hikers or those seeking solitude. Recreation activities may also affect other resources and uses of the
25 planning areas (e.g., damage to cultural resources, disturbance of wildlife habitat, and disruption of
26 grazing). Some recreation visitors may see their use of the public lands as the highest and best use,

1 exhibiting a low tolerance for competing users. When various recreational activities reach certain
2 thresholds in heavily used areas, the public may resent multiple use management on BLM public lands.

3 **3.15 OIL AND GAS RESOURCES**

4 **3.15.1 Introduction**

5 This section discusses the affected environment for oil and gas resources. Other mineral resources,
6 including other leasable, salable, and locatable minerals, will not be addressed in detail in this EA because
7 the MLP would have no effect on these resources or BLM's current management of these resources as
8 outlined in the existing BLM Price and Richfield Offices' ROD/RMPs (BLM 2008a, 2008b). The
9 rationale for exclusion of other minerals outside oil and gas from detailed analysis can be found in
10 Chapter 1. The analysis area for oil and gas is the planning area because this is the area that would be
11 affected by oil and gas leasing decisions in the MLP.

12 The BLM Price and Richfield Field Offices released mineral potential reports (MPRs) and reasonably
13 foreseeable development (RFD) scenarios in association with development of the 2008 RMPs. The MPRs
14 evaluated the occurrence and potential of locatable, leasable (including oil and gas), and salable mineral
15 resources within the jurisdiction of the field offices. The RFD is a technical report intended to project a
16 baseline scenario of oil and gas exploration, development, production, and reclamation activity to aid the
17 BLM with land-use planning by providing a mechanism to analyze the effects that discretionary
18 management decisions may have on oil and gas development; local and regional economies; and
19 important resource values such as, air quality, cultural resources, and wildlife habitat. The RFDs
20 completed for the 2008 RMPs projected oil and gas activity for both field offices (see Appendix A).

21 In accordance with BLM Washington Office Instruction Memorandum (IM) No. 2010-117: Oil and Gas
22 Leasing Reform – Land Use Planning and Lease Parcel Reviews (BLM 2010a), the BLM prepared an
23 RFD for the San Rafael Desert MLP planning area in preparation for the planning process. The RFD was
24 finalized in 2016. Excerpts from the RFD are included below in the Existing Resource Use and Trends
25 section. The entire RFD can be found on the BLM's eplanning website for the project.

26 **3.15.2 BLM Management of Oil and Gas Resources**

27 The BLM administers the mineral resources on the nation's public lands, including oil and gas.
28 Development of these resources depends on decisions in the land-use planning process. Various laws,
29 including FLPMA (43 USC 1701, et seq.), mandate that the BLM administer the exploration for and
30 development of these mineral resources on public lands for the benefit of the citizens of the United States.
31 Through the BLM's regulations, U.S. citizens or corporations may acquire the rights to explore or
32 develop mineral resource deposits on the public lands.

33 The leasing and development of oil and natural gas is accomplished in several stages. The first stage is
34 categorization of the land for land-use planning purposes, during which a determination is made regarding
35 which lands should be leased and with what restrictions. The second stage is leasing. The third stage is
36 exploration, development, production, and reclamation.

37 For fluid leasable mineral resources, the land-use plan must identify lands in four land-use categories:
38 open to leasing with standard stipulations; open to leasing with minor and moderate constraints; open to
39 leasing with highly restrictive, major constraints; and closed to leasing. In detail they are as follows:

- 40 • Open with Standard Stipulations: This category identifies lands that are open to exploration and
41 development subject to standard lease stipulations on a standard lease form. Standard terms and
42 conditions for oil and gas leasing allow the BLM to impose reasonable measures, such as
43 modifying well siting or timing of operations to minimize resource impacts.

- 1 • Open with Minor or Moderate Constraints: This category identifies lands that are open to leasing
2 with relatively minor and moderate constraints such as seasonal restrictions, including those with
3 timing limitations (TL) such as seasonal closures for wildlife or controlled surface use (CSU)
4 such as requiring 40-acre well spacing. These areas possess other land uses or resource values
5 such as critical special status plant and wildlife species habitat that might conflict with fluid
6 leasable exploration and development; therefore, moderately restrictive lease stipulations may be
7 required to mitigate these impacts. The stipulations are used where resource values require some
8 sort of special protection but the conflicts with fluid leasable exploration and development are not
9 of sufficient magnitude to preclude surface occupancy.
- 10 • Open with Major Constraints: This mineral lease category identifies areas that are open to
11 exploration and development but subject to highly restrictive lease stipulations, including No
12 Surface Occupancy (NSO). These areas possess special resource values or land uses such as
13 camping or picnic areas, scenic areas, Recreation and Public Purpose patents and leases,
14 important historical or archaeological areas, and buffer zones along the boundaries of special-use
15 areas such as wild and scenic river corridors. This category is used for those areas where a
16 number of seasonal or other minor constraints would severely restrict exploration and
17 development.
- 18 • Closed to Leasing: This lease category identifies areas that are closed to leasing either by
19 discretionary or non-discretionary decisions. These areas have other land uses or resource values
20 that cannot be adequately protected even with the most restrictive lease stipulations. Closing these
21 areas to leasing is the only way to ensure their appropriate protection. Discretionary closures
22 involve lands where BLM has determined that energy or mineral leasing, entry, or disposal, even
23 with the most restrictive stipulations or conditions, would not be in the public interest. Non-
24 discretionary closures involve lands that are specifically closed to energy or mineral leasing;
25 entry; or disposal by law, regulations, secretarial decision, or executive order.

26 Before a holder of a BLM oil and gas lease conducts any surface-disturbing activities, BLM approval
27 must be obtained. Drilling proposals are subject to environmental review, lease terms, and stipulations
28 that are attached to the lease, as well as necessary mitigation measures that are consistent with lease
29 rights. A lease notice provides lease holders with additional information on limitations that already exist
30 in law, lease terms, regulations, or operational orders. A lease notice also addresses special items the
31 lessee should consider when planning operations.

32 **3.15.3 Existing Resource Use and Trends**

33 ***3.15.3.1 Existing Leasing Categories***

34 The planning area contains approximately 452,392 acres of BLM-administered public lands and mineral
35 estate. Current oil and gas leasing categories and acreages for BLM-administered public lands and
36 mineral estate in the planning area are shown in Table 3-35 and on Map 2-2-A. No split-estate lands are in
37 the planning area.

1 **Table 3-35. Current Oil and Gas Leasing Categories for BLM-Administered**
 2 **Public Lands in the Planning Area**

Category	Acreage
Open with standard terms and conditions	399,462
Open with minor or moderate constraints (TL/CSU)	19,083
Open with major constraints (NSO)	33,627
Closed	220
Total	452,392

3 **3.15.3.2 Oil and Gas Leasing and Exploration Activity**

4 The planning area currently supports no production of oil and gas. Seventy-nine wells have been drilled in
 5 the planning area, all of which have been plugged and abandoned. Five wells have been drilled in the
 6 planning area during the past 31 years. The last well drilled in the planning area was in 1989. The
 7 potential for future drilling success in the planning area would be enhanced by the advances in horizontal
 8 drilling, completion, and geophysical technology that have been made in the past 20 years. The trend in
 9 drilling and drilling success rates within the BLM Moab Field Office in the Fractured Interbed Play (Play
 10 2103), which extends into the planning area, combined with forecasted improving market conditions,
 11 favor the potential for discovery of economic quantities of oil and gas within the planning area (see
 12 Appendix A).

13 Four sold but not issued lease parcels are within the planning area. The parcels were protested but sold at
 14 the February and May 2006 lease sales. In addition, 16 oil and gas leases for parcels within the planning
 15 area have been suspended as a result of litigation so that the BLM can re-evaluate leasing decisions based
 16 on new information regarding non-WSA LWC.

17 Authorized and pending federal oil and gas leases within the planning area cover a total of 82,454 acres or
 18 16% of the planning area. In addition, 97,452 acres of land have been nominated but deferred in the
 19 planning area since 2011. Existing federal oil and gas leases are shown on Map 1-1.

20 **Geophysical Exploration**

21 Geophysical exploration has historically occurred in all portions of the planning area. Both 2-D and 3-D
 22 seismic projects have taken place there. During the past 30 years, geophysical exploration in the planning
 23 area has included one project, completed in 2007/2008 (see Appendix A).

24 **3.15.3.3 Historical Drilling and Production**

25 **Oil and Gas**

26 Neither oil nor natural gas has been discovered within the planning area. The nearest producing oil and gas
 27 fields are located east of the planning area in the jurisdiction of the Moab Field Office. These fields are
 28 located from 1 to 25 miles from the eastern border of the planning area. The Moab Master Leasing Plan
 29 Planning Area, which abuts the planning area on the east, includes seven active fields, four inactive fields,
 30 and one abandoned field (BLM 2012c). Total production from these fields within the Moab Master Leasing
 31 Plan Planning Area has been roughly 9,530,761 barrels of oil and 17.4 billion cubic feet of natural gas.

32 In Utah, standard well spacing for a vertical or directional oil and gas well is 40 acres. For horizontal wells,
 33 temporary spacing of 640 acres provides for anticipated pool development. The Utah Board of Oil, Gas
 34 and Mining has the authority to issue special spacing orders establishing drilling units or authorizing

1 different well density or location patterns for particular pools to promote efficient development and protect
2 correlative rights. For example, as fields mature, exceptions can be made to increase well density to
3 maximize oil and gas recovery. The BLM generally defers to State of Utah well spacing (see Appendix A).

4 No interstate gas pipeline systems, gas plants, water injection/disposal wells, or commercial water
5 disposal facilities are within the planning area. The nearest interstate pipelines to the planning area are the
6 Williams Pipeline, which transports gas, and Enterprise Products Partners, L.P. Pipeline, which transports
7 natural gas liquids. A small gas plant is approximately 10 miles east of the planning area and roughly 14
8 miles southeast of the town of Green River, Utah. A second, larger gas plant is located near Canyonlands
9 Field (Moab airport) approximately 15 miles east of the planning area (see Appendix A).

10 ***3.15.3.4 Development Potential***

11 The baseline assumptions for oil and gas and geophysical exploration presented in this section represent
12 average activity levels over the next 15 years and are not intended to serve as thresholds for limiting
13 future activity. Oil and gas exploration and development activity tends to be sporadic over time because
14 of market influences and other factors affecting the oil and gas industry. As a result, it is recognized that
15 during the next 15 years there may be years when oil and gas activity in the planning area is much less
16 than the projected average levels and other years when activity is greater.

17 **Oil and Gas Resources**

18 As described in the Price and Richfield Field Office MPRs, two oil and gas plays, the Fractured Interbed
19 Play (2103) and the Salt Anticline Play (2105), underlie the planning area. The Fractured Interbed Play is
20 associated with the commercial production of oil and gas in the adjacent jurisdiction of the Moab Field
21 Office and has development potential within the planning area. A third play, the Buried Fault Block Play
22 (Play 2101), is an oil-and-gas-producing play within the jurisdiction of the Moab Field Office that could
23 extend and have development potential within the planning area (see Appendix A).

24 Increased drilling success rates resulting from continued technological advances in horizontal drilling, the
25 development of fracture identification tools, hydraulic fracture stimulation, underbalanced drilling, and
26 completions in fractured shales—all of which will help in the discovery of new fields in moderately sized
27 reservoirs with more than minimal oil columns—should increase the potential for development within the
28 planning area. In addition to the Cane Creek Shale, other organic shales, notably the Chimney Rock,
29 Gothic, and Hovenweep Shales, that may provide new drilling targets for hydrocarbon accumulations.
30 Some development may occur in the Salt Anticline Flank play (Play 2105) as seismic technology
31 continues to improve, allowing better definition of the location and nature of the structural traps in the
32 play and promoting increased drilling and recompletion opportunities along the flanks of the salt
33 anticlines (BLM 2012c).

34 Domestic crude oil production has increased in recent years; however, a slowdown in the world economy
35 has resulted in a drop in demand and subsequently a substantial decrease in price for crude oil and natural
36 gas. Production of crude oil and natural gas is expected to decline in 2016, and the decreased production
37 is expected to continue until the world economy turns around. Domestic crude oil production is expected
38 to level out by 2020 and then slightly decrease through 2040. For the purpose of projecting potential oil
39 and gas exploration activity in the planning area, it is assumed that the demand and price for crude oil and
40 natural gas will increase in the future and during the 15-year planning term (see Appendix A).

41 Future oil and gas drilling for the next 15 years in the planning area is projected to average two wells per
42 year for a total of 30 wells. This would result in a total surface disturbance of 585 acres from construction
43 of new well pads and associated infrastructure, including roads and pipelines. The estimated total existing
44 surface disturbance from previous oil and gas activity in the planning area is 0 acres because the last well
45 drilled there was plugged and abandoned more than 25 years ago. Over the next 15 years a total of 585

1 acres is expected to be disturbed by oil and gas drilling activity; of that total 492 acres would be
2 reclaimed or under reclamation, resulting a net surface disturbance of 93 acres (see Appendix A).

3 **Geophysical Exploration**

4 For geophysical exploration, 270 linear miles of source lines with an associated surface disturbance of
5 330 acres are projected over the next 15 years. Total geophysical-related surface disturbance that will be
6 reclaimed during the next 15 years will be 264 acres, resulting a net surface disturbance of 66 acres (see
7 Appendix A).

8 **3.16 SPECIAL DESIGNATIONS**

9 According to the BLM's land use planning policy, "special designations" fall into two categories: 1)
10 congressional designations and 2) administrative designations (e.g., those applied by the BLM through
11 the land use planning process). Congressional designations include national monuments and
12 congressionally designated national conservation areas, national recreation areas, cooperative
13 management and protection areas, outstanding natural areas, forest reserves, and national and scenic
14 historic trails. Administrative designations include identified WSAs; river segments to be assessed under
15 the Wild and Scenic Rivers Act of 1968; areas of critical environmental concern (ACECs), which include
16 the more specific sub-types of research natural areas and outstanding natural areas; and BLM Scenic or
17 Back Country Byways, national recreation trails, watchable wildlife viewing sites, and wild horse and
18 burro ranges (BLM 2005).

19 **3.16.1 Areas of Critical Environmental Concern**

20 ***3.16.1.1 Resource Conditions***

21 Section 202(c)(3) of FLPMA requires that priority be given to the designation and protection of ACECs.
22 FLPMA Section 103(a) defines ACECs as public lands where special management attention is required to
23 protect and prevent irreparable damage to important historic, cultural, or scenic values; fish and wildlife
24 resources; or other natural systems or processes; or to protect life and safety from natural hazards (BLM
25 2008).

26 The BLM designates ACECs and their appropriate management during the development of RMPs. There
27 is no one method of management for all ACECs. Special management is designed specifically for the
28 relevant and important values of each ACEC and therefore varies from area to area.

29 ***3.16.1.2 Relevance and Importance Criteria***

30 To be considered for designation as an ACEC, an area must meet the requirements of relevance and
31 importance as described in 43 CFR 1610.7.2. The definitions for relevance and importance are as follows:

32 **Relevance**

33 An area is considered relevant if it contains one or more of the following:

- 34 • A significant historic, cultural, or scenic value (e.g., rare or sensitive archaeological resources and
35 religious or cultural resources important to Native Americans).
- 36 • A fish and wildlife resource (e.g., habitat for endangered, sensitive, or threatened species, or
37 habitat essential for maintaining species diversity).
- 38 • A natural process or system (e.g., endangered, sensitive, or threatened plant species; rare,
39 endemic, or relict plants or plant communities; and rare geologic features).

- A natural hazard (e.g., areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the resource management planning process that it has become part of the natural process.

Importance

The value, resource, system, process, or hazard described above must have substantial significance to satisfy the importance criterion. This generally means it is characterized by one or more of the following:

- Has more than locally significant qualities that give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource
- Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change
- Has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of FLPMA
- Has qualities that warrant highlighting in order to satisfy public or management concerns about safety and public welfare
- Poses a significant threat to human life and safety or to property

Three ACECs fall within the planning area. The analysis area for ACECs consists of the ACECs in their entirety within and outside the planning area. Table 3-36 identifies the three existing ACECs and their relevant and important values.

Table 3-36. Areas of Critical Environmental Concern in the Planning Area

ACEC	Area (acres)	Relevant and Important Values
Dry Lake Archaeological District	18,009	Archaeology, geology
Tidwell Draw (one of the four sites in the Uranium Mining Districts ACEC)	Approximately 899 acres of the total 1,966 ACEC acreage is within the planning area.	Historic mining
Big Flat Tops	192	Relict vegetation

3.16.1.3 Dry Lake Archaeological District Area of Critical Environmental Concern

Description of Area

The Dry Lake Archaeological District ACEC is located south of the town of Green River, Utah. It is bounded by the Green River on the east side, and the San Rafael River runs through its southeast corner.

Relevance and Importance Criteria

The Dry Lake Archaeological District ACEC contains rare or sensitive archaeological resources and religious or cultural resources important to Native Americans. The ACEC has a multitude of apparently undisturbed, single-episode lithic scatters and other site types such as lithic procurement sites, shelters, and campsites. It is a known location for Paleoindian sites, which is the rarest and oldest site type in Utah.

The area also contains the Dry Lake Meander, two large, well-expressed abandoned meanders of the Green River. The site of the meander scar indicates that abandonment must have occurred during either the Early Pleistocene or the Late Pliocene periods when the volume of water in the river was greater than

1 it is now. Related geologic values are visible where the Summerville and Curtis Formations erode to form
2 an escarpment, colorful promontories, and stepped terraces, especially in Curtis beds. It is the Paleoindian
3 lithic scatters that qualify this area for ACEC designation. Individually, these sites have little or no
4 scientific value, but collectively they are a valuable resource.

5 ***3.16.1.4 Tidwell Draw (Uranium Mining Districts Area of Critical Environmental*** 6 ***Concern)***

7 **Description of the Area**

8 Tidwell Draw is located west of Green River, north of I-70 near the San Rafael River. Along with the
9 Hidden Splendor, Susan B, and Lucky Strike mining districts, it is one of the four mining districts that are
10 part of the Uranium Mining Districts ACEC. Only a portion (899 acres, or 46%) of Tidwell Draw falls
11 within the planning area.

12 **Relevance and Importance Criteria**

13 Tidwell Draw has significant historical value. This ACEC includes several significant mining sites
14 associated with the development of uranium as part of the United States' efforts during the escalation of
15 the Cold War in the 1950s. These sites have the remains of the habitations of the miners, which provide
16 evidence of the non-mining parts of their lives, and the remains of mining efforts, which demonstrate the
17 technology of the era.

18 The sites are part of a national effort: the development of uranium as a deterrent in the Cold War. The
19 history of these sites can be retrieved only through studies of the resources on the ground along with oral
20 histories. Tidwell Draw mining district, although lacking the dramatic scenery and romance of the other
21 districts, produced the greatest economic gain and was the last to remain in production.

22 ***3.16.1.5 Big Flat Tops Area of Critical Environmental Concern***

23 **Description of the Area**

24 The Big Flat Tops ACEC is just north of the Emery County line southwest of the town of Green River,
25 Utah.

26 **Relevance and Importance Criteria**

27 The Big Flat Tops ACEC contains isolated relict plant communities that remain unaltered by human
28 intervention or domestic livestock grazing. The area has potential for scientific study and can serve as a
29 comparison area for similar vegetation communities that have been grazed. The mesa top supports a little-
30 disturbed vegetation community that would fill identified needs of Utah's growing system of natural
31 areas.

32 One of the BLM sensitive species—Smith wild buckwheat (*Eriogonum smithii*)—occurs within this
33 ACEC. The Nature Conservancy (Tuhy 1986) has recommended designation as a research natural area
34 (RNA) for the North Big Flat Tops area to provide a location where natural ecosystem structure and
35 function can be studied.

36 **3.16.2 Wild and Scenic Rivers**

37 ***3.16.2.1 Resource Conditions***

38 Congress enacted the Wild and Scenic Rivers Act (WSRA) (16 USC 1271–1287) on October 2, 1968, to
39 address the need for a national system of river protection. The WSRA stipulates that selected rivers

1 should be preserved in a free-flowing condition with outstandingly remarkable values in their natural
2 condition and should be protected for the benefit and enjoyment of present and future generations.

3 Section 5(d)(1) of the WSRA directs federal land management agencies to consider potential wild and
4 scenic rivers in their land and water planning processes. To fulfill this requirement, the BLM evaluated
5 river and stream segments to determine whether they might be eligible for inclusion in the National Wild
6 and Scenic Rivers System (NWSRS) during the 2008 Price Field Office RMP effort.

7 Consideration of whether a river should be designated for inclusion in the NWSRS can be broken into
8 three phases:

- 9 • Determination of eligibility: Federal agencies conduct an evaluation of river features to determine
10 which rivers qualify to be added to the NWSRS.
- 11 • Determination of suitability: Most commonly, federal agencies conduct a review and then
12 recommend to Congress which rivers should be protected.
- 13 • Designation: Congress designates a river as wild, scenic, or recreational.

14 The Green River defines the northeastern boundary of the planning area from the I-70 crossing near the
15 town of Green River to the northern tip of the Horseshoe Canyon WSA. The 20-mile segment within the
16 planning area from the San Rafael River to just north of Key Canyon was determined to be suitable for
17 consideration as part of the NWSRS and will be the analysis area for this EA (see Map 2-5). The other
18 segment of the Green River in the planning area from the town of Green River to the San Rafael River
19 was determined eligible but not suitable (BLM 2008).

20 The Green River eligibility report identified cultural, recreation, scenic, fish, and paleontology as the
21 outstandingly remarkable values for the Green River segment that falls in the planning area. This area has
22 evidence of significant occupation and use by prehistoric peoples and includes rock art and other features
23 that remain significant to some Native American populations today. Many sites are eligible for the
24 National Register of Historic Places. The Morrison Formation, a geologic outcrop known for its
25 vertebrate fossils including dinosaur bones, is exposed along the Green River. Indeed, the geology of the
26 area, with varnished cliffs of Wingate Formation and deeply incised canyons, creates some of the high
27 scenic value in the area. This portion of the river provides habitat for four endangered fish, including
28 spawning habitat for the Colorado pikeminnow. There are great opportunities for dispersed camping and
29 hiking to cultural sites, unique geologic features, and other attractions.

30 Under the NWSRS, rivers are classified as wild, scenic, or recreational, as follows:

- 31 • Wild river areas: Those rivers or sections of rivers that are free of impoundments and generally
32 inaccessible except by trail, with watersheds or shorelines essentially primitive and waters
33 unpolluted. These represent vestiges of primitive America.
- 34 • Scenic river areas: Those rivers or sections of rivers that are free of impoundments, with
35 shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible
36 in places by roads.
- 37 • Recreational river areas: Those rivers or sections of rivers that are readily accessible by road or
38 railroad, that may have some development along their shorelines, and that may have undergone
39 some impoundment or diversion in the past.

40 The Green River segment in the planning has a tentative classification of scenic.

41 Guidance for selecting and managing wild and scenic river segments is contained in *Wild and Scenic
42 Rivers – Policy and Program Direction for Identification, Evaluation, and Management, Bureau of Land
43 Management Manual – 8351* (BLM 1993).

1 The management prescriptions put forth in the Price 2008 RMP to protect the outstandingly remarkable
2 values that include paleontologic resources, fish, cultural and historic resources, recreation, and scenery
3 values. Current prescriptions for this segment include managing the river corridor as VRM II, as NSO for
4 oil and gas, limiting travel to designated routes, and allowing grazing to continue as currently allocated
5 (BLM 2008).

6 In addition, the BLM works cooperatively with the State of Utah, local and tribal governments, and
7 federal agencies to reach consensus regarding recommendations to Congress for the inclusion of rivers
8 into the NWSRS. The BLM will also continue to work with affected local, state, federal, and tribal
9 partners to identify in-stream flows necessary to meet critical resource needs, including values related to
10 the subject segments, so that they may be identified for inclusion into future recommendations to
11 Congress.

12 **3.16.3 National Historic Trails**

13 The National Trails System Act of 1968 provides for the establishment of a system that includes
14 recreational, scenic, and historic trails. A national historic extended trail must possess several qualities for
15 designation. The trail must be at least 100 miles in length and follow the original route as closely as
16 possible. The trail must be established by historic use and be historically significant as a result of that use.
17 The trail must be of national significance with respect to any of several broad categories of American
18 history, such as trade and commerce, exploration, migration and settlement, or military campaigns.
19 Finally, the trail must have significant potential for public recreational use or historical interest based on
20 historic interpretation and appreciation.

21 The BLM manages historic trails under the auspices of *Manual 6280 – Management of National Scenic
22 and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation
23 (Public)* (BLM 2012d), *Manual 8353 – Trail Management Areas – Secretarially Designated National
24 Recreation, Water, and Connecting and Side Trails (Public)* (BLM 2012e), and *Manual 6250 – National
25 Scenic and Historic Trail Administration* (BLM 2012f).

26 **3.16.3.1 Old Spanish Trail**

27 The Old Spanish National Historic Trail (OST) is a 2,700-mile historical trade route that connects Santa
28 Fe, New Mexico, to Los Angeles, California. The trail passes through the states of New Mexico,
29 Colorado, Utah, Arizona, Nevada, and California, and runs through areas of deep canyons, arid deserts,
30 and high mountains. It is considered one of the most difficult trade routes in the United States. The OST
31 was designated by Congress as a National Historic Trail in December 2002. By memorandum from the
32 Secretary of the Interior, the Old Spanish National Historic Trail is jointly administered by the BLM and
33 the National Park Service working in partnership with other federal, state, and local government agencies,
34 as well as private landowners who manage or own lands along the trail route.

35 The *Old Spanish National Historic Trail Final Comprehensive Strategy* was released in late 2016 (U.S.
36 Department of the Interior, National Park Service-National Trails Intermountain Region, and Bureau of
37 Land Management Utah 2016). The document does not propose specific land management actions, but it
38 will serve the functions of a comprehensive management plan by identifying high-potential sites and
39 segments, refining route alignments, presenting the official trail logo, and establishing the foundations for
40 future trail planning efforts.

41 Nine miles of the OST falls within the northernmost portion of the planning area. The analysis area for
42 the OST is from the Green River Crossing (see Map 2-5) to 3 miles west of the western planning area
43 boundary. The western limit of the analysis area was developed through a viewshed analysis that depicted
44 the topography that could be seen from the western project boundary.

1 The segments of the OST that fall within the planning area are considered to be high-potential routes with
2 high-potential historic sites. The term "high-potential historic sites" refers to those historic sites related to
3 the route, or sites in close proximity thereto, that provide opportunity to interpret the historic significance
4 of the trail during the period of its major use. Criteria for consideration as high-potential sites include
5 historic significance, presence of visible historic remnants, scenic quality, and relative freedom from
6 intrusion. The term "high-potential route segments" refers to those segments of a trail that would afford a
7 high-quality recreation experience in a portion of the route having greater-than-average scenic values or
8 that would afford an opportunity to vicariously share the experience of the original users of a historic
9 route (16 USC 1251).

10 The segments in the planning area were selected for the outstanding recreational opportunities to follow
11 the known trail location in an area with a retained setting and better-than-average scenery (Sweeten
12 2017). The opportunity for people to have a vicarious experience is great. There are also multiple
13 identified trail segments and sites found in the area (Sweeten 2017).

14 **3.17 SOCIOECONOMICS**

15 **3.17.1 Introduction**

16 Given the limited scope of the MLP/EA, the topics covered in this section are more limited than for a
17 comprehensive RMP/EIS planning effort. In this BLM planning action, there may be socioeconomic
18 impacts related to:

- 19 • restrictions on mineral development, specifically oil and gas leasing;
- 20 • impacts on social and economic values associated with recreation, based on visual and other
21 impacts of mineral development on the recreation experience and potential restrictions on
22 recreation activities in and around mineral development sites; and
- 23 • nonmarket values, including ecosystem services.

24 Conceivably there could be some impacts to additional resource uses. However, as discussed in Chapter
25 1, the BLM has determined that there is no potential for significant impact to some resources and they are
26 not discussed further in this section. Therefore, the focus of this section is on information relevant to oil
27 and gas development and production, and recreation.

28 ***3.17.1.1 Definitions of Labor and Non-Labor Income Used in this Section***

29 Personal Income: Income received from all sources, including income received from participation in
30 production as well as from government and business transfer payments. It is the sum of compensation of
31 employees (received), supplements to wages and salaries, proprietors' income with inventory valuation
32 adjustment and capital consumption adjustment (CCAdj), rental income of persons with CCAdj, personal
33 income receipts on assets, and personal current transfer receipts, less contributions for government social
34 insurance.

35 **Labor Income**

36 Labor Earnings / Net Earnings: Earnings by place of work is the sum of wage and salary disbursements,
37 supplements to wages and salaries, and proprietors' income. Net earnings by place of residence is
38 earnings by place of work, less contributions for government social insurance, plus an adjustment to
39 convert earnings by place of work to a place of residence basis.

1 **Non-Labor Income**

2 Dividends, Interest, and Rent: Personal dividend income, personal interest income, and rental income of
3 persons with capital consumption adjustment, sometimes referred to as “investment income” or “property
4 income.”

5 Dividends: This component of personal income consists of the payments in cash or other assets,
6 excluding the corporation’s own stock, made by corporations located in the United States or abroad to
7 persons who are U.S. residents. It excludes that portion of dividends paid by regulated investment
8 companies (mutual funds) related to capital gains distributions.

9 Interest: This component of personal income is the interest income (monetary and imputed) of persons
10 from all sources.

11 Rent: Rental income is the net income of persons from the rental of real property except for the income of
12 persons primarily engaged in the real estate business; the imputed net rental income of the owner-
13 occupants of nonfarm dwellings; and the royalties received from patents, copyrights, and the right to
14 natural resources.

15 Transfer Payments (Personal Current Transfer Receipts): This component of personal income is payments
16 to persons for which no current services are performed. It consists of payments to individuals and to
17 nonprofit institutions by federal, state, and local governments and by businesses. Government payments
18 to individuals includes retirement and disability insurance benefits, medical benefits (mainly Medicare
19 and Medicaid), income maintenance benefits, unemployment insurance compensation, veterans’ benefits,
20 and federal education and training assistance. Government payments to nonprofit institutions exclude
21 payments by the federal government for work under research and development contracts. Business
22 payments to persons consists primarily of liability payments for personal injury and of corporate gifts to
23 nonprofit institutions.

24 Income Maintenance: Income maintenance payments consists largely of supplemental security income
25 payments, family assistance, food stamp payments, and other assistance payments, including general
26 assistance.

27 Unemployment Insurance Compensation: Unemployment insurance compensation includes state
28 unemployment compensation, unemployment compensation of federal civilian employees, unemployment
29 compensation of railroad employees, unemployment compensation of veterans, and trade adjustment
30 allowances to workers who are unemployed because of adverse economic effects of international trade
31 arrangements.

32 Retirement and Other: Retirement and other consists of retirement and disability insurance benefit
33 payments, medical benefits, veterans benefit payments, federal education and training benefits, other
34 government payments to individuals, government payments to nonprofit institutions, and business
35 payments. However, disbursements received from private retirement programs (e.g., from 401k accounts)
36 are not included. The BEA REIS data do not currently capture this source of income, which is an
37 important source of income in counties with substantial populations of retired persons. (Definitions from
38 BEA 2010.)

39 **3.17.2 Overview of the Socioeconomic Study Area**

40 The socioeconomic study area (study area) has been defined to include all of Emery and Wayne Counties.
41 It is likely that any social or economic impacts from the management alternatives would occur mostly
42 within these two counties. Although the geographic extent of the two counties is larger than that of the
43 planning area, including all of the counties is reasonable because of the key role of the county
44 governments in providing public services (e.g., roads, emergency services) related to use of the planning
45 area.

1 The current land management within the study area is presented in Table 3-37. The BLM is the largest
 2 land manager in both counties. Altogether, the federal government manages approximately 79.5% of the
 3 land area of Emery County, 85.6% of Wayne County, and 81.7% of the study area.

4 **Table 3-37. Land Management in the Study Area**

Ownership	Emery County		Wayne County		Study Area	
	Acres	%	Acres	%	Acres	%
BLM	2,060,540	72.0	892,437	56.5	2,952,957	66.5
National Park Service	2,108	0.1	298,050	18.9	300,158	6.8
USFS	212,238	7.4	160,566	10.2	372,804	8.4
State of Utah	348,392	12.2	169,800	10.8	518,192	11.7
Private	238,623	8.3	57,889	3.7	296,512	6.7
Total	2,861,996	100	1,578,834	100	4,440,830	100

5 Source: Headwaters Economics (2016).

6 According to U.S. Census Bureau data as shown in Table 3-38, the total resident population of the study
 7 area in 2010 was 13,754. The study area has a number of towns and small cities with concentrated
 8 populations, but the majority of the area is very sparsely populated. The overall population density of the
 9 study area is 1.18 persons per square mile, which is very low compared to the population density of Utah
 10 and the nation.

11 **Table 3-38. 2010 Population, Area, and Population Density of the Study Area**

Geographic Area	2010 Population	Land Area (Million Acres)	Land Area (Square Miles)	Persons Per Square Mile
Emery County	10,976	2.86	4,462	2.5
Wayne County	2,778	1.58	2,461	1.1
Study Area	13,754	4.44	11,491	1.18
Utah	2,763,885	52.59	82,169	33.6
United States	308,745,538	2,260.42	3,531,905	87.4

Sources: Population—U.S. Census Bureau (2010a); Land Area—U.S. Census Bureau Quickfacts (2010).

12 The history of the study area is primarily a story of the Native American cultures, settlement by Mormon
 13 pioneers, agricultural use, development of mineral resources, and recent influxes of residents and tourists
 14 attracted by the beauty and recreational resources of the region. The Price and Richfield FEIS/Proposed
 15 RMPs (BLM 2008a, 2008b) provide summaries of the history of Emery and Wayne Counties, and that
 16 information is not repeated here. An additional source of information is the set of county profiles
 17 published by the Utah Historical Society (Utah Division of State History).

1 **3.17.3 Social and Cultural Conditions**

2 **3.17.3.1 Communities**

3 Emery County spans approximately 2.86 million acres. Most population centers are concentrated along
4 Utah State Highway 10 in the northwest corner of the county, with the exception of the city of Green
5 River in the extreme east side of the county. The city of Castle Dale is the county seat of Emery County
6 and had 1,657 persons in the 2010 census. Huntington is the largest town in the county with just over
7 2,000 residents. The seven other incorporated towns in the county generally have 1,000 residents or less.

8 Wayne County is roughly 23 miles wide north–south, and 105 miles long east–west. The county includes
9 two of Utah’s national parks: Capitol Reef in the west-center and Canyonlands on the eastern border. Ten
10 communities are located in the county, most of which are quite small. The county seat is Loa, which
11 numbered 572 residents in 2010. The town closest to the MLP area is Hanksville, with a population in
12 2010 of 219.

13 **Demographics**

14 Average income levels in the study area are lower than those of the state or nation, as shown in Table 3-
15 39. According to ACS data, the median family income in Emery County is over \$10,000 lower than that
16 of Utah, and the median family income in Wayne County is nearly \$20,000 lower than that of Utah. The
17 per capita income levels are also presented in Table 3-39. However, the median family income figures
18 listed in the table are from the ACS, and the per capita income figures are from the BEA. Because of the
19 different datasets, which use different sampling methods and include different components of income, the
20 per capita income figures have somewhat different relationships. As with the median family income
21 figures, the Wayne County per capita income figure is substantially lower than the statewide figure.
22 However, the Emery County per capita income is higher than the state per capita income. These
23 differences also reflect in part the difficulties in measuring per capita income, especially in small
24 populations. The BEA data have some flaws. The data are designed to measure payments to factors of
25 production, not the money income of households (Hoffman and Rex 2010). However, the data are used by
26 the State of Utah, including in the county tables in the annual economic report to the governor.

27 Table 3-39 also shows county-wide poverty levels. The percentage of individuals in poverty in Emery
28 County is similar to that for Utah and the nation. The percentage of individuals in poverty in Wayne
29 County is much higher.

30 **Table 3-39. Income Levels in the Socioeconomic Study Area, 2009–2014 (2014 \$)**

Geographic Area	Median Household Income (2009–2014)	Per Capita Income (2014)	Individuals Below Poverty Level (%) (2009–2014)
Emery County	\$50,653	\$20,274	12.9%
Wayne County	\$43,393	\$19,950	14.1%
Utah	\$59,846	\$24,312	11.3%
United States	\$53,482	\$28,555	13.5%

Source: U.S. Department of Commerce (2015).

Note: Per capita and household income can vary greatly depending on the data source, particularly for the small sample sizes typical of rural areas. For example the BEA’s data for both counties reports per capita income at 50% higher than does ACS. Both data sources rely on surveys, but are taken in different time periods and with different groups. For a discussion of these differences, see Katz (2012). Explaining Long-term Differences Between Census and BEA Measures of Household Income, BEA, Washington, D.C.

1 **3.17.3.2 Public Services**

2 Local governments in the study area maintain critical public infrastructure such as roads and provide a
3 wide range of public services that benefit residents, visitors, and businesses. Other local governments in
4 the study area provide infrastructure and services in addition to those provided by the counties. These
5 governments include the cities and towns listed earlier, and a number of districts and special service
6 districts for schools, fire protection, recreation, transportation, health care, mental health, cemetery
7 maintenance, water, sewer, housing, mosquito abatement, solid waste, and general services. Public
8 infrastructure and services that could potentially be impacted by BLM decisions include roads, water and
9 wastewater infrastructure, landfills, law enforcement, fire and emergency response, schools, and
10 healthcare facilities and services. Impacts on public services may occur in a variety of ways. They may be
11 direct, such as wear and tear on roads due to increased heavy truck traffic with resource development, or
12 indirect, such increased demand on schools or healthcare facilities if resource development leads to
13 significant population increases.

14 **3.17.3.3 Stakeholders**

15 Many organizations are stakeholders in the use and management of BLM public lands. These stakeholder
16 organizations and individuals have widely varying interests in the use and management of these
17 resources. Different types of stakeholders have distinct sets of attitudes, beliefs, values, opinions, and
18 perceptions about public resources and the effects of various management policies and actions. These
19 views reflect different cultural as well as economic linkages people have to public lands.

20 Broad categories of stakeholders affected by the decisions to be made in this planning action are
21 identified and characterized below. The categorization of stakeholders is not meant to imply that all
22 individuals and social groups fit into a single category; many individuals or organizations may have
23 multiple interests. The point of categorization is to facilitate the impacts analysis phase of the planning
24 process by allowing differentiation of social impacts based on broad differences in socio-cultural linkages
25 to public lands and peoples' associated points of view.

26 **Habitat and Resource Conservation Stakeholders**

27 These stakeholders have a number of conservation objectives, but most believe broadly that protecting at-
28 risk species and maintaining habitats and ecosystems for all species is a fundamental value and should be
29 a high priority in public policy. Most believe in the intrinsic value of wildlife, well-functioning
30 ecosystems, and pristine areas. Some advocate resource conservation for human as well as wildlife needs,
31 pointing to the beauty and solitude values of unspoiled areas in the planning area.

32 These stakeholders see a number of threats to species and habitat protection and to resource conservation
33 generally. A major concern for them is oil and gas development due to impacts from associated roads,
34 drilling pads, pipelines, etc. Additional resource conservation topics that are of interest to members of this
35 stakeholder category include water, air, and soil resources; and vegetation and riparian zone management.
36 Persons and organizations concerned with protection of paleontological, cultural, and historic sites also
37 generally fit into this category of resource conservation stakeholders. Although mineral development is
38 the primary concern of this stakeholder category, other sources of impacts on habitat and other
39 conservation values are concerns to some in this category.

40 Based on their values and various concerns, these stakeholders favor designation of new protected areas
41 and strong restrictions and stipulations on resource development. They advocate development of specific
42 management actions (prescriptions, restrictions, and/or mitigations) to meet desired conditions for priority
43 species and habitats, to support other species, and to protect the ecosystem and other resources (e.g.,
44 water, cultural, and scenic resources).

1 **Recreation Stakeholders**

2 Many types of recreational activities are available in the planning area. The primary concern of most
3 recreation stakeholders is potential degradation and loss of recreational use values from mineral resource
4 development. These stakeholders typically view resource development as having permanent impacts on
5 recreation. They seek protection of areas with high recreation values so that future generations can enjoy
6 these values. For many recreationists, maintaining recreation values and habitat or ecosystem values go
7 hand-in-hand; they say that healthy ecosystems support positive recreation experiences. For many
8 recreation stakeholders, the preservation of natural soundscapes is also important, in order to provide
9 users with adequate opportunities for quiet recreation. They see resource development and new roads as
10 antithetical to this objective.

11 **Mineral Development and Production Stakeholders**

12 These stakeholders believe mineral development, including oil and gas, is a vital component of the
13 national, state, and local economies—creating jobs, generating income, and contributing tax and royalty
14 payments to all levels of government. Throughout the West, many of these stakeholders also believe
15 mineral development and production is socially important because it has been part of the social fabric of
16 some communities for years, and because it supports the social systems of local communities by
17 providing private-sector livelihoods and revenues to government. Mineral development stakeholders are
18 concerned that MLP decisions involving restrictions and stipulations on mineral development could have
19 adverse impacts on the industry in the planning area and on the local economies. Many are concerned
20 about limitations that would reduce future development or increase the costs of development; some are
21 concerned that restrictions could abrogate operators’ valid existing rights.

22 **Visual Resource Stakeholders**

23 These stakeholders focus on the scenic qualities of the area. Although they share many of the perspectives
24 of habitat and resource conservation stakeholders and recreation stakeholders, visual resource
25 stakeholders emphasize the role of visual resources as the fundamental asset underlying both direct
26 recreational use of public lands and general tourism in the region. They believe the scenic quality of the
27 landscape in and around the planning area is world renowned and that national parks and other federally
28 and state managed lands are a huge economic draw to southern Utah and the area in and around the MLP
29 planning area because of their scenic qualities. Based on this view of visual resources as a unique and
30 valuable asset, these stakeholders emphasize that the visual integrity of the area needs to be maintained.
31 Many of these stakeholders are also concerned with preservation of soundscapes with minimal unnatural
32 noises, and preservation of dark night skies free of light pollution. Some note the aesthetic role that
33 vegetation has on the landscape, and the potential for disruption of natural vegetative cover from resource
34 development. In addition, some of these stakeholders note the potential for deterioration of air quality
35 caused by airborne pollutants and fugitive dust from resource development, and highlight the importance
36 of protecting the surrounding Class 1 airsheds of the neighboring national parks.

37 **3.17.4 Environmental Justice**

38 Evaluation of environmental justice (EJ) impacts requires identification of minority and low-income
39 populations (including Native American tribes) within the affected area and evaluation of the potential for
40 the alternatives to have disproportionately high and adverse impacts on such populations. This section
41 includes a screening analysis of the study area to identify the presence and location of any “EJ
42 populations.”

43 The most recent data that are broken-down to the sub-county level in the study area are from the 2010
44 Census for minority populations and from the Census Bureau’s 2009–2015 ACS for poverty. Both
45 sources provide data for cities, towns, and Census Demographic Profiles (CDPs), which are notable

1 population concentrations in unincorporated areas. This “place” level of geography is appropriate for a
2 BLM planning-level decision, as it provides a reasonably disaggregated view of population variations
3 across a large study area.

4 Data for race, Hispanic identification, poverty rates, and margins of error associated with poverty rates for
5 study area cities, towns, and CDPs are summarized in Table 3-40. The table also presents the
6 corresponding data for two reference populations: the state of Utah and the United States. In the table, the
7 data for each minority or poverty group are expressed as a percentage of the total population. For this
8 screening analysis, the convention noted above has been adopted: if the minority population or population
9 in poverty is 10 percentage points or more greater than for one of the reference populations (i.e., the lower
10 percentage figure for either the state or the United States), the area is “flagged” as being a potential EJ
11 population and therefore an area of potential concern from an EJ perspective.

12 No determination is made here as to the likelihood of disproportionately high and adverse effects on these
13 populations. That can only be determined once the management alternatives are defined and the impact
14 analyses are performed. Based on the available data and the definitions and threshold values noted above,
15 the following places are flagged for further EJ consideration in the impacts analysis process.

- 16 • Emery County: the city of Green River flagged for some other race and population in poverty.
- 17 • Wayne County: the town of Bicknell flagged for population in poverty.

18 As the table footnotes indicate, estimates for populations in poverty from the ACS tend to have very high
19 margins of error for smaller communities. The actual poverty rate for Bicknell (at the 90% confidence
20 interval) could be anywhere between 6.3% and 52.0%, given the margin of error of 22.7%, plus or minus.

1 **Table 3-40. Environmental Justice Indicators, Minority Population, 2010 Census and 2009–2015 ACS**

Geographic Area	Total Population (2010)	Race							Hispanic (%)	Percent Below Poverty	Margin of Error for Poverty Rate
		White (%)	Black/ African American (%)	American Indian/ Alaska Native (%)	Asian (%)	Native Hawaiian/ Pacific Islander (%)	Some Other Race (%)	Two or More Races (%)			
United States	308,745,538	72.4	12.6	0.9	4.8	0.2	6.2	2.9	16.3	15.5	+/-0.1
Utah	2,763,885	86.1	1.1	1.2	2.0	0.9	6.0	2.7	13.0	12.3	+/-0.2
Emery County	10,976	93.9	0.2	0.7	0.3	0.1	3.8	0.9	6.0	11.2	+/-2.6
Wayne County	2778	97.8	0.1	0.5	0.7	0.1	2.2	1.7	4.2	15.4	+/-5.7
Bicknell	327	96.0	0.6	0.6	0.3	0.3	1.8	1.2	0.9	29.3	+/-22.7
Castle Dale	1,630	97.1	0.1	1.3	0.2	0.1	0.6	0.5	2.9	10.8	+/-7.8
Clawson	163	98.2	0.0	0.0	0.0	0.0	0.6	1.2	1.8	15.2	+/-20.6
Cleveland	464	99.6	0.0	0.2	0.2	0.0	0.0	0.0	0.2	15.3	+/-10.0
Elmo	418	95.7	0.7	0.5	0.2	0.0	1.4	1.4	1.5	16.0	+/-9.3
Emery	288	95.5	0.0	0.7	0.1	0.0	1.7	0.1	3.1	11.7	+/-7.3
Ferron	1,626	96.0	0.5	1.0	0.2	0.0	1.2	1.1	2.6	9.9	+/-6.0
Green River	952	79.3	0.3	0.7	0.5	0.0	18.5	0.7	21.4	30.7	+/-9.4
Hanksville	219	98.2	0.0	0.0	0.5	0.0	0.0	1.4	0.9	18.6	+/-24.0
Huntington	2,129	91.3	0.2	0.9	0.3	0.3	0.6	1.0	8.9	9.6	+/-3.7
Loa	572	96.5	0.2	0.2	0.9	0.2	0.3	1.7	4.0	15.5	+/-9.9

Geographic Area	Total Population (2010)	Race							Hispanic (%)	Percent Below Poverty	Margin of Error for Poverty Rate
		White (%)	Black/African American (%)	American Indian/Alaska Native (%)	Asian (%)	Native Hawaiian/Pacific Islander (%)	Some Other Race (%)	Two or More Races (%)			
Orangeville	1,470	98.6	0.1	0.1	0.2	0.0	0.3	0.5	1.4	5.5	+/-4.6
Teasdale CDP	191	95.3	0.0	2.6	1.0	0.5	0.0	0.5	1.6	6.1	+/-10.3
Torrey	182	90.7	0.0	0.0	0.0	0.0	7.1	2.2	9.9	31.5	+/-20.1

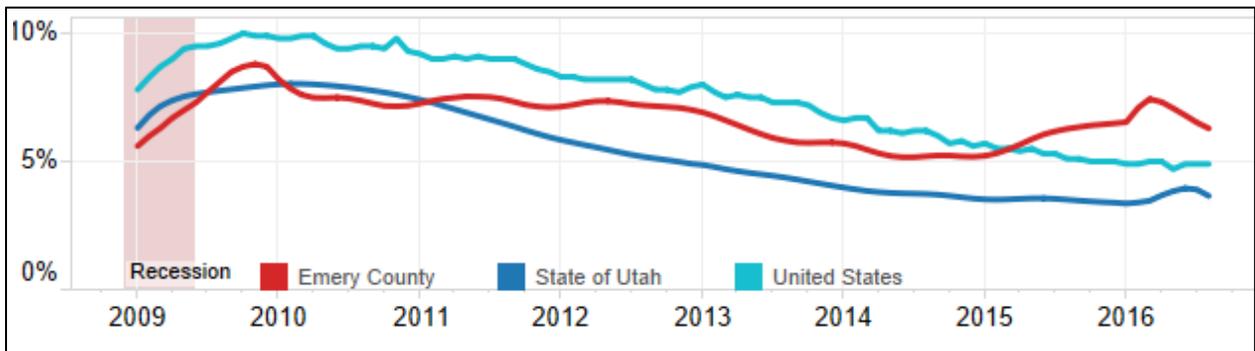
- 1 Source for race and ethnicity: U. S. Census (2010b)
- 2 Source for poverty rates: U.S. Department of Commerce (2015). Note: For smaller communities such as those in the planning area, ACS margins of error can be substantial.
- 3 Table values may not always add up to 100%.

1 **3.17.5 Economic Conditions**

2 **3.17.5.1 Employment**

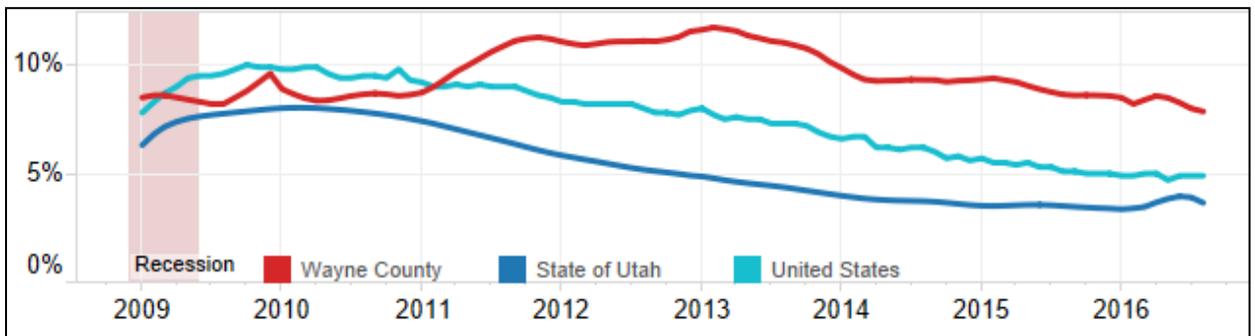
3 Figure 3-1 and Figure 3-2 illustrate the unemployment rate in Emery and Wayne Counties, respectively,
4 in recent years. In both counties, unemployment increased significantly from the beginning of the period
5 shown and remained high until the last quarter of 2011, when it began to decline. This pattern mirrors
6 state and national trends, but the unemployment rates in the two counties have been higher, at least since
7 2015.

8 The unemployment rate in Emery County was lower than the national rate throughout most of this period,
9 but exceeded the national rate starting in 2015. The unemployment rate in Emery County has exceeded
10 the state rate since 2011, and currently (August 2016) stands at 6.3%. This is considerably higher than
11 both the state and national rates of 3.7% and 4.9%, respectively. In Wayne County, the unemployment
12 rate has exceeded the national and state rates throughout most of the time period, and to a greater degree
13 than in Emery County. As of August 2016, Wayne County's unemployment rate stood at 7.9%,
14 considerably higher than both the state and national rates of 3.7% and 4.9%, respectively.



15 Source: Utah Department of Workforce Services (2016).

16 **Figure 3-3. Seasonally Adjusted Unemployment Rates, Emery County, 2009–2016**



18 Source: Utah Department of Workforce Services (2016).

19 **Figure 3-4. Seasonally Adjusted Unemployment Rates, Wayne County, 2009–2016**

21 Historical economic data by industry demonstrate the relative importance of different industries to the
22 study area over time. This section and the next focus on jobs and labor earnings by specific industry for
23 recent years. The tables below provide trends in employment for 2001 to 2015, for each county, by North
24 American Industry Classification System (NAICS) code. These data show details and differences in
25 employment trends by sector at the local county level.

1 Note that although BEA estimates annual employment for counties nationwide, BEA does not disclose
 2 some information (e.g., total employment for an industry sector that has few companies within a
 3 particular geography) to ensure that it does not violate confidentiality for those companies. However, the
 4 provider of the BEA data used in this report, Headwater Economics, has a methodology to provide
 5 estimates for non-disclosed data. These estimates are incorporated in various tables and figures
 6 throughout this report. Also note that the three sector categories—Services related, Non-services related,
 7 and Government—are categories created by Headwater Economics. While not official BEA categories,
 8 they provide useful high-level groupings of roughly similar industries.

9 As shown in Table 3-41, the largest industries in Emery County in 2005 were government (915 jobs),
 10 retail trade (630 jobs), and farming (589 jobs). From 2001 to 2015, almost all industries experienced
 11 employment losses, with total jobs in Emery County down; the construction and professional and
 12 technical services industries showed the largest declines. The employment picture in Wayne County has
 13 both similarities and differences to that of Emery County, as shown in Table 3-42 The largest industries
 14 in Wayne County in 2015 were accommodation and food services (294 jobs), followed closely by
 15 government (270 jobs) and construction (208 jobs). Wayne County showed a slight increase in total
 16 employment from 2001 to 2015.

17 **Table 3-41. Emery County Employment by Industry, 2001–2015**

	2001	2005	2010	2015	Change 2010-2015
Total Employment (number of jobs)	5,335	5,560	5,598	5,036	-562
Non-services related	~996	~1,012	~1,240	~1,432	~192
Farm	560	516	575	589	14
Forestry, fishing, & ag. services	na	na	na	na	na
Mining (including fossil fuels)	na	na	na	339	na
Construction	382	433	605	434	-171
Manufacturing	54	63	60	70	10
Services related	~2,173	~2,198	~2,267	~2,089	-~178
Utilities	na	na	na	na	na
Wholesale trade	na	na	na	40	na
Retail trade	613	622	611	630	19
Transportation and warehousing	159	189	105	~105	~0
Information	171	152	137	~128	-~9
Finance and insurance	~86	~100	~151	115	-~36
Real estate and rental and leasing	~19	~83	~114	~73	-~41
Professional and technical services	114	126	258	139	-119
Management of companies and enterprises	43	32	~35	~25	-~10
Administrative and waste services	142	~152	~136	~105	-~31
Educational services	18	na	na	na	na

	2001	2005	2010	2015	Change 2010-2015
Health care and social assistance	127	na	na	na	na
Arts, entertainment, and recreation	41	36	34	22	-12
Accommodation and food services	251	314	290	308	18
Other services, except public administration	389	392	396	399	3
Government	914	882	938	915	-23

1 All employment data are reported by place of work.

2 na = not available. Estimates for data that were not disclosed are shown in italics. Actual and estimated data may not add to totals.

3 Source: EPS-HDT (2016).

4 **Table 3-42. Wayne County Employment by Industry, 2001–2015**

Industry	2001	2005	2010	2015	Change 2010–2015
Total Employment (number of jobs)	1,710	1,633	1,737	1,763	26
Non-services related	<i>417</i>	<i>404</i>	<i>393</i>	<i>462</i>	<i>69</i>
Farm	214	200	207	202	-5
Forestry, fishing, & ag. services	na	na	na	na	na
Mining (including fossil fuels)	14	13	<i>17</i>	<i>17</i>	<i>0</i>
Construction	134	160	135	208	73
Manufacturing	55	31	34	35	1
Services related	842	739	900	927	27
Utilities	na	na	na	na	na
Wholesale trade	23	<i>21</i>	27	25	-2
Retail trade	148	127	123	145	22
Transportation and warehousing	28	25	25	28	3
Information	5	3	<i>0</i>	2	2
Finance and insurance	na	na	na	30	na
Real estate and rental and leasing	22	24	29	31	2
Professional and technical services	<i>30</i>	<i>31</i>	<i>45</i>	53	8
Management of companies and enterprises	0	0	0	0	0
Administrative and waste services	16	<i>14</i>	<i>16</i>	23	7
Educational services	3	5	<i>15</i>	15	<i>0</i>
Health care and social assistance	<i>197</i>	<i>199</i>	<i>218</i>	127	-91

Industry	2001	2005	2010	2015	Change 2010–2015
Arts, entertainment, and recreation	34	21	42	51	9
Accommodation and food services	262	191	277	294	17
Other services, except public administration	74	78	83	103	20
Government	309	279	305	270	-35

1 All employment data are reported by place of work.

2 na: Not available. Estimates for data that were not disclosed are shown in italics. Actual and estimated data may not add to totals.

3 Source: EPS-HDT (2016).

4 **3.17.5.2 Earnings and Pay**

5 Earnings for Emery County by industry for 2001 to 2015 are shown in Table 3-43 in total dollars and as a
6 percentage of total earnings. In 2015, the three largest industries by earnings are the same as the three
7 largest industries by number of jobs, but the relative rankings and sizes are different. Government is the
8 largest industry by earnings, with \$50.4 million in earnings, or 26.2% of all earnings in the county.
9 Accommodation and food services is the second-largest industry (17.8 %), followed by retail trade
10 (11.5%). Accommodation and food services had the largest numerical gain in earnings from 2001 to 2009
11 (\$9.8 million), followed by government (\$8.4 million) and health care and social assistance (\$4.7
12 million). The greatest percentage gains in this period were made in educational services (118.1%),
13 professional and technical services (81.6%), and finance and insurance (72.6%). Professional and
14 technical services did not show up as a top industry by employment in the discussion above, but based on
15 the earnings data it appears to be an important emerging industry—besides having the second highest rate
16 of earnings growth, it also had the fifth highest numerical increase in earnings (\$4.0 million). For
17 comparison purposes, in earnings the mining industry was the eighth largest industry in the county in
18 2009 and had the tenth largest increase in earnings from 2001 (\$0.8 million, representing 14.6% growth).
19 In summary, the earnings data show the dominant importance of service sector industries, along with
20 government, to the Emery County economy.

21 For Wayne County, Table 3-44 presents earnings data for the same period. In 2009, by far the largest
22 industry by earnings in this county was government, with \$80.5 million in earnings, or 42.8% of all
23 earnings. The second largest, at \$25.3 million (13.5% of earnings), was mining. The third largest was
24 health care and social assistance (9.6%), with accommodation and food services close behind (8.8%). The
25 largest numerical increases in earnings from 2001 to 2010 were in government (\$6.5 million), mining
26 (\$5.7 million), and health care and social assistance (\$3.8 million). The largest percentage increases (over
27 1,000%) were in two industries that barely had a presence in Wayne County in 2001 but grew to
28 important size by 2009: finance and insurance, and information. The third largest percentage gain was in
29 administrative and waste services (276%), which also had the fourth largest numerical increase in
30 earnings (\$2.6 million). Notably, although farming was a top industry in 2009 by employment, it does not
31 show up as a top industry in the earnings data; in fact, farming had negative earnings in 2009. This
32 dichotomy frequently occurs in farming in many parts of the nation and is due to the extreme volatility of
33 income from year to year in this sector, relative to expenses. In summary, based on earnings data, the
34 Wayne County economy has a very strong reliance on wages in the government sector, with a strong role
35 also played by mining and certain service industries.

1 **Table 3-43. Emery County Earnings by Industry, 2001–2015 (1,000s of 2015 \$)**

Industry	2001	2005	2010	2015	Change 2010–2015
Labor Earnings	\$233,969	\$245,053	\$265,480	\$205,782	-\$59,698
Non-services related	<i>\$16,309</i>	<i>\$21,538</i>	<i>\$37,817</i>	<i>\$56,106</i>	<i>\$18,289</i>
Farm	-\$333	\$2,174	\$575	\$5,294	\$4,719
Forestry, fishing, & ag. services	na	na	na	na	na
Mining (including fossil fuels)	na	na	na	\$26,572	na
Construction	\$15,444	\$17,971	\$36,182	\$22,775	-\$13,407
Manufacturing	\$1,198	\$1,392	\$1,060	\$1,465	\$405
Services related	<i>\$40,472</i>	<i>\$44,246</i>	<i>\$65,093</i>	<i>\$49,199</i>	<i>-\$15,894</i>
Utilities	na	na	na	na	na
Wholesale trade	na	na	na	\$1,559	na
Retail trade	\$10,286	\$10,688	\$10,513	\$10,946	\$433
Transportation and warehousing	\$9,570	\$9,696	\$4,045	\$3,992	-\$53
Information	\$6,858	\$7,138	\$7,435	\$4,926	-\$2,509
Finance and insurance	<i>\$1,567</i>	<i>\$1,598</i>	<i>\$3,411</i>	\$2,001	-\$1,410
Real estate and rental and leasing	<i>\$165</i>	<i>\$534</i>	<i>\$425</i>	<i>\$455</i>	<i>\$30</i>
Professional and technical services	\$2,966	\$2,826	\$19,123	\$3,862	-\$15,261
Management of companies and enterprises	\$901	\$631	<i>\$1,995</i>	\$888	-\$1,107
Administrative and waste services	\$1,293	<i>\$2,216</i>	\$3,935	<i>\$1,978</i>	-\$1,957
Educational services	\$33	na	na	na	na
Health care and social assistance	\$2,825	na	na	na	na
Arts, entertainment, and recreation	\$406	-\$348	\$27	\$25	-\$2
Accommodation and food services	\$4,204	\$5,782	\$4,661	\$5,235	\$574
Other services, except public administration	\$13,117	\$12,953	\$15,186	\$13,332	-\$1,854
Government	\$41,904	\$41,578	\$48,873	\$43,626	-\$5,247

2 All employment data are reported by place of work.

3 na = not available.

4 Estimates for data that were not disclosed are shown in italics. Actual and estimated data may not add to totals.

5 Source: EPS-HDT (2016).

6

1 **Table 3-44. Wayne County Earnings by Industry, 2001–2015 (1,000s of 2015 \$)**

Industry	2001	2005	2010	2015	Change 2010–2015
Labor Earnings	\$58,943	\$52,255	\$48,236	\$47,665	-\$571
Non-services related	<i>\$11,201</i>	<i>\$10,567</i>	<i>\$5,858</i>	<i>\$10,444</i>	<i>\$4,586</i>
Farm	\$6,092	\$4,834	\$1,467	\$3,716	\$2,249
Forestry, fishing, & ag. services	na	na	na	na	na
Mining (including fossil fuels)	\$122	\$30	-\$139	-\$178	-\$39
Construction	\$3,266	\$5,126	\$3,906	\$6,257	\$2,351
Manufacturing	\$1,721	\$577	\$624	\$649	\$25
Services related	\$18,598	\$17,535	\$19,420	\$19,015	-\$405
Utilities	na	na	na	na	na
Wholesale trade	<i>\$746</i>	<i>\$624</i>	<i>\$783</i>	<i>\$557</i>	<i>-\$226</i>
Retail trade	\$2,934	\$4,291	\$1,862	\$2,210	\$348
Transportation and warehousing	<i>\$3,574</i>	<i>\$3,060</i>	<i>\$2,594</i>	<i>\$2,483</i>	<i>-\$111</i>
Information	\$166	<i>\$183</i>	<i>\$175</i>	<i>\$224</i>	<i>\$49</i>
Finance and insurance	na	na	na	\$77	na
Real estate and rental and leasing	\$198	\$106	\$27	\$93	\$66
Professional and technical services	<i>\$1,078</i>	<i>\$659</i>	<i>\$985</i>	<i>\$1,144</i>	<i>\$159</i>
Management of companies and enterprises	\$0	\$0	\$0	\$0	\$0
Administrative and waste services	\$479	<i>\$248</i>	<i>\$320</i>	<i>\$405</i>	<i>\$85</i>
Educational services	\$70	\$79	\$258	\$154	-\$104
Health care and social assistance	\$7,362	\$6,701	\$6,626	\$3,646	-\$2,980
Arts, entertainment, and recreation	\$510	\$78	\$553	\$526	-\$27
Accommodation and food services	\$5,558	\$2,909	\$4,637	\$5,026	\$389
Other services, except public administration	\$2,228	\$2,349	\$2,290	\$2,470	\$180
Government	\$14,236	\$14,857	\$16,375	\$15,046	-\$1,329

2 All employment data are reported by place of work.

3 na = not available.

4 Estimates for data that were not disclosed are shown in italics. Actual and estimated data may not add to totals.

5 Source: EPS-HDT (2016).

6 The average annual wages by industry for the two counties in 2015 are presented in Tables 3-45 and 3-46.
 7 The tables also present employment by industry to indicate the relative importance of each industry. The
 8 industry categories are different for these tables than the categories used in earlier tables. Wage levels are
 9 important because the best-paying jobs are not always in the largest industries.

1 The average annual wage in Emery County in 2015 was \$43,769. The highest average wages in Emery
2 County were in the natural resources and mining sector (this sector is a combination of mining and other
3 natural resource industries) at \$70,600, followed by utilities (\$55,196) and construction (\$50,777).
4 Notably, average wages in the leisure and hospitality industry were well below the county-wide average,
5 at \$13,884. Jobs in this industry tend to be lower paying and are often seasonal or less than full-time.
6 In Wayne County, the average annual wage in 2015 was \$28,797. The highest average wages were in
7 state government (\$57,111), federal government (\$52,325), and natural resources and mining (\$43,336).
8 As in Emery County, average wages in the leisure and hospitality industry were well below the county-
9 wide average, at \$16,219.

10 **Table 3-45. Emery County Employment and Wages by Industry, 2015 (2015 \$)**

Industry	Employment	% of Total Employment	Avg. Annual Wages	% Above or Below Avg.
Total	3,151		\$43,769	
Private	2,287	72.6%	\$48,572	11.0%
Non-Services Related	675	21.4%	\$59,895	36.8%
Natural Resources and Mining	315	10.0%	\$70,600	61.3%
Agriculture, forestry, fishing & hunting	21	0.7%	\$30,506	-30.3%
Mining (incl. fossil fuels)	294	9.3%	\$73,463	67.8%
Construction	344	10.9%	\$50,577	15.6%
Manufacturing (Incl. forest products)	16	0.5%	\$49,508	13.1%
Services Related	1,612	51.2%	\$43,830	0.1%
Trade, Transportation, and Utilities	891	28.3%	\$55,196	26.1%
Information	na	na	na	na
Financial Activities	na	na	na	na
Professional and Business Services	91	2.9%	\$44,993	2.8%
Education and Health Services	74	2.3%	\$20,376	-53.4%
Leisure and Hospitality	272	8.6%	\$13,884	-68.3%
Other Services	126	4.0%	\$40,888	-6.6%
Unclassified	0	0.0%	na	na
Government	864	27.4%	\$31,054	-29.1%
Federal Government	55	1.7%	\$48,042	9.8%
State Government	59	1.9%	\$49,863	13.9%
Local Government	750	23.8%	\$28,329	-35.3%

This table shows wage data from the Bureau of Labor Statistics, which does not report data for proprietors or the value of benefits.

Source: U.S. Department of Labor (2016).

1 **Table 3-46. Wayne County Employment and Wages by Industry, 2015 (2015 \$)**

Industry	Employment	% of Total Employment	Avg. Annual Wages	% Above or Below Avg.
Total	967		\$28,797	
Private	710	73.4%	\$25,777	-10.5%
Non-Services Related	175	18.1%	\$39,354	36.7%
Natural Resources and Mining	46	4.8%	\$43,336	50.5%
Agriculture, forestry, fishing & hunting	na	na	na	na
Mining (incl. fossil fuels)	na	na	na	na
Construction	124	12.8%	\$38,747	34.6%
Manufacturing (Incl. forest products)	5	0.5%	\$17,778	-38.3%
Services Related	535	55.3%	\$21,336	-25.9%
Trade, Transportation, and Utilities	162	16.8%	\$23,246	-19.3%
Information	na	na	na	na
Financial Activities	0	0.0%	na	na
Professional and Business Services	na	na	na	na
Education and Health Services	91	9.4%	\$30,413	5.6%
Leisure and Hospitality	252	26.1%	\$16,219	-43.7%
Other Services	21	2.2%	\$22,376	-22.3%
Unclassified	0	0.0%	na	na
Government	258	26.7%	\$36,996	28.5%
Federal Government	82	8.5%	\$52,325	81.7%
State Government	22	2.3%	\$57,111	98.3%
Local Government	154	15.9%	\$25,960	-9.9%

2 This table shows wage data from the Bureau of Labor Statistics, which does not report data for proprietors or the value of
 3 benefits.

4 Source: U.S. Department of Labor (2016).

5 **3.17.5.3 Personal Income**

6 Personal income is income received from all sources, including income received from participation in
 7 production as well as from government and business transfer payments. Total personal income includes
 8 labor earnings and non-labor income, which includes dividends, interest, and rent, and also transfer
 9 payments. (The definitions of these categories, and important components of these categories, are
 10 provided in Section 3.17.1.1.) Trends in high-level categories of total personal income for the two
 11 counties in the study area are presented in Tables 3-47 and 3-48. Table 3-49 shows how the two counties
 12 compared to state and national totals in 2015.

13 The key trend shown in these tables is the long-term decrease in labor earnings as a percentage of total
 14 personal income, and the corresponding increase in non-labor income as a percentage of total personal
 15 income, reflecting national trends. Statewide, the percentage of income from non-labor sources has

1 increased from 22.4% in 1970 to 32.2% as of 2015; nationally non-labor income increased from 22.7% in
 2 1970 to 36.1% in 2015 (per EPS-HDT).

3 Both components of non-labor income—dividends, interest, and rent; and transfer payments—have
 4 increased statewide and nationally. Within transfer payments, income maintenance benefits (welfare) and
 5 unemployment insurance compensation income have remained relatively stable as a percentage of total
 6 income, while retirement and other income have increased. These trends reflect an aging population. As
 7 the average age has increased, a greater percentage of the population has entered retirement and left the
 8 workforce. In addition, income from dividends, interest, and rent has increased in Utah and nationally, as
 9 the wealth of upper income and upper middle income portions of the population has increased over recent
 10 decades.

11 Within the study area, non-labor income has become even more important than it is statewide and
 12 nationally. In 2015, non-labor income comprised 37.7% of total personal income in Emery County, and
 13 45.6% in Wayne County. As with the state and nation, both components of non-labor income—dividends,
 14 interest, and rent; and transfer payments—have increased significantly in both counties since 1970.
 15 However, in both counties in 2015 the dividends, interest, and rent component was smaller than the
 16 transfer payments component. This is likely the result of an aging and somewhat poorer population in
 17 both counties, relative to the state and nation.

18 **Table 3-47. Components of Personal Income, Emery County, 1970–2015 (1,000s of 2015 \$)**

Source of Income	1970	1980	1990	2000	2015	Change 2000–2015
Total Personal Income	85,452	243,843	234,839	269,191	318,751	49,560
Labor Earnings	64,761	196,911	173,578	191,439	198,482	7,043
Non-Labor Income	20,692	46,933	61,261	82,380	120,269	37,889
Dividends, Interest, and Rent	9,635	23,655	30,350	34,584	43,545	8,961
Age-Related Transfer Payments	6,279	12,198	16,112	26,982	51,375	24,393
Hardship-Related Transfer Payments	2,130	4,126	8,312	14,773	18,239	3,466
Other Transfer Payments	2,435	6,893	6,434	5,986	7,110	1,124
Percent of Total						% Change 2000–2015
Total Personal Income						18.4%
Labor Earnings	75.8%	80.8%	73.9%	71.1%	62.3%	3.7%
Non-Labor Income	24.2%	19.2%	26.1%	30.6%	37.7%	46.0%
Dividends, Interest, and Rent	11.3%	9.7%	12.9%	12.8%	13.7%	25.9%
Age-Related Transfer Payments	7.3%	5.0%	6.9%	10.0%	16.1%	90.4%
Hardship-Related Transfer Payments	2.5%	1.7%	3.5%	5.5%	5.7%	23.5%
Other Transfer Payments	2.8%	2.8%	2.7%	2.2%	2.2%	18.8%

19 All income data in the table above are reported by *place of residence*. Labor earnings and non-labor income may not add to total
 20 personal income due to adjustments made by the Bureau of Economic Analysis.
 21 Source: U.S. Department of Commerce (2016a).

1 **Table 3-48. Components of Personal Income, Wayne County, 1970–2015 (1,000s of 2015 \$)**

Source of Income	1970	1980	1990	2000	2015	Change 2000–2015
Total Personal Income	22,950	39,674	42,805	62,817	84,359	21,542
Labor Earnings	16,420	26,238	25,966	40,163	45,928	5,765
Non-Labor Income	6,529	13,436	16,839	23,693	38,431	14,738
Dividends, Interest, and Rent	3,612	7,673	9,135	13,010	19,126	6,116
Age-Related Transfer Payments	1,776	3,944	5,219	7,007	13,214	6,207
Hardship-Related Transfer Payments	0	765	1,339	2,279	4,137	1,858
Other Transfer Payments	415	932	1,121	1,343	1,954	611
Percent of Total						% Change 2000–2015
Total Personal Income						34.3%
Labor Earnings	71.5%	66.1%	60.7%	63.9%	54.4%	14.4%
Non-Labor Income	28.4%	33.9%	39.3%	37.7%	45.6%	62.2%
Dividends, Interest, and Rent	15.7%	19.3%	21.3%	20.7%	22.7%	47.0%
Age-Related Transfer Payments	7.7%	9.9%	12.2%	11.2%	15.7%	88.6%
Hardship-Related Transfer Payments	0.0%	1.9%	3.1%	3.6%	4.9%	81.5%
Other Transfer Payments	1.8%	2.3%	2.6%	2.1%	2.3%	45.5%

All income data in the table above are reported by *place of residence*. Labor earnings and non-labor income may not add to total personal income due to adjustments made by the Bureau of Economic Analysis.

Source: U.S. Department of Commerce (2016a).

2 **Table 3-49. Components of Non-Labor Income, 2015, Percent of Total Personal Income**

Source of Income	Emery County	Wayne County	Utah	United States
Total Non-Labor Income	37.7%	45.6%	32.2%	36.1%
Dividends, Interest, Rent	13.7%	22.7%	18.6%	18.8%
Age-Related Transfer Payments	16.1%	15.7%	7.5%	9.7%
Social Security	10.6%	10.0%	4.7%	5.6%
Medicare	5.5%	5.7%	2.8%	4.1%
Hardship-Related Payments	5.7%	4.9%	3.6%	5.5%
Medicaid	3.3%	1.8%	1.9%	3.6%
Income maintenance ("welfare")	2.2%	2.5%	1.6%	1.7%
Unemployment ins. compensation	0.3%	0.6%	0.2%	0.2%

Source of Income	Emery County	Wayne County	Utah	United States
Other Transfer Payments	2.2%	2.3%	2.4%	2.1%
Veterans benefits	0.4%	0.7%	0.6%	0.7%
Education and training assistance	0.3%	0.3%	0.6%	0.4%
All other, incl. Workers' comp.	1.5%	1.4%	1.2%	1.0%

Source: U.S. Department of Commerce (2016a).

3.17.5.4 Public Finance

BLM public lands and federal mineral estate managed within the study area affect government budgets at local (county, city, town, school district, and special district), state, and federal levels based on revenues from sales taxes, property taxes, Payments in Lieu of Taxes (PILT), mineral royalties, severance taxes, fees, and other funding sources. Likewise, lands and federal mineral estate in the study area result in government expenditures for management, law enforcement, and other activities.

3.17.5.5 Federal Government Revenues

The federal government's Office of Natural Resources Revenue (ONRR) collects royalties and rents from leases of federal lands for production of coal, oil, gas, and other leasable minerals. Royalties for oil and gas are generally 12.5% of the value of production. Annual rental payments for oil and gas are \$1.50 per acre for the first 5 years and \$2.00 per acre each subsequent year. Rents for oil and gas are only paid on undeveloped oil and gas leases, which typically expire after 10 years if not developed. Other minerals have different royalty and rental rates, as defined in 43 CFR Chapter II, Subchapter C, Minerals Management.

Royalties and rents are collectively referred to as mineral lease revenue. The federal government also collects bonuses on certain leases. Bonus payments are one-time payments (based on competitive bids) to the federal government for a leased parcel of federal land for a 10-year period for oil and gas.

The federal government returns approximately 49% of the total collected revenues to the state in which the mineral production occurred.² In Utah, these payments are then distributed by the state by appropriation or statutory formula (Utah Code 59-21-1).

Utah received from the federal government \$67.9 million in total mineral lease payments in Fiscal Year (FY) 2016 (BLM ONRR year). This represents a steep decline from recent years, due presumably to lower mineral prices and reduced production. The state allocates approximately 42% of mineral lease payments to the Permanent Community Impact Board (PCIB). The PCIB, in turn, distributes funds to county and local governmental entities for a wide variety of projects. These monies can be in the form of outright grants and/or low-interest loans. The PCIB funds projects statewide on a competitive basis, and not necessarily to each county proportionate to its relative share of minerals production. The majority of the remaining mineral lease payments are distributed to counties, unusually proportionate to production within that county. Utah's total mineral lease payments to counties were \$26,740,984 in FY 2016 (Utah

² The state share is sometimes said to be 50%. However, since FY 2008, Congress has annually required a 2% deduction (equivalent to 1% of total mineral revenues) from each year's state payments as part of the Interior, Environment, and Related Agencies Appropriations Acts to partially cover the costs of administering the federal mineral leasing program. This is a simpler form of an authority known as "net receipts sharing" that was in place until 2000. The state share was 50% between 2000 and 2008. Additional information is available at: <http://www.whitehouse.gov/sites/default/files/omb/budget/fy2012/assets/int.html>, Mineral Leasing and Associated Payments section.

1 Department of Transportation 2016). The counties are then legally required to distribute these monies to
2 quasi-governmental entities known as Special Service Districts.

3 In FY 2016, the state distributed \$577,774 in mineral lease payments to Emery County, and no monies to
4 Wayne County. The PCIB distributed \$2,608,585 in loans and grants to Emery County in 2016, and
5 \$395,000 to Wayne County in grants (PCIB 2016).

6 BLM Field Offices collect fees and other revenue for a variety of other uses of BLM-managed lands.
7 These revenue sources include right-of-way (ROW) rents, recreation fees, grazing fees, various permit
8 fees, and more. Revenues from sales of land and vegetative and mineral materials, along with ROW rents,
9 mostly go to the federal treasury, while recreation fees are generally retained by the Field Office. Section
10 3 grazing permit fees generate revenue for the U.S. Treasury, of which 12.5% is returned to the local
11 Grazing Board via the state in which the grazing lands are located. This money is then disbursed to local
12 ranchers through the local Grazing Board, using a 40/60 matching-funds formula, for use in range
13 improvements and maintenance projects, per the Taylor Grazing Act, Section 10.

14 In FY 2015, BLM payments from the above totaled \$104,406 and \$42,631, respectively, to Emery and
15 Wayne Counties (EPS-HDT 2016). A Profile of Federal Land Payments. (Downloaded 12-19-2016 from
16 <https://headwaterseconomics.org/tools/economic-profile-system/#fedpayments-report-section>).

17 **3.17.5.6 State Government Revenues**

18 As noted above, the federal government through ONRR pays the State of Utah 49% of the federal mineral
19 lease and bonus revenues it collects from lands in the state. The state retains some of this revenue for state
20 purposes, and distributes some to local governments. The State of Utah collects several taxes and fees that
21 derive from natural resources on both private lands and public lands.

- 22 • Oil and Gas Severance Tax. The tax ranges from 3% to 5% based on the value of the oil or gas,
23 and 4% for natural gas liquids. Value is measured at the well or when the product leaves the field
24 where it is produced.
- 25 • Oil and Gas Conservation Fee. The fee is 0.2% of the value at the well.
- 26 • Income Taxes. There are various state income tax rates, depending on individual or corporate
27 status, type of corporation, taxable income, etc. The state requires 5% withholding on most
28 mineral production income (Utah Code 59-6-102).

29 The amounts collected through the taxes and fees above are a function of sales prices and actual
30 production, making estimates of future collections tenuous at best. Most severance tax revenues are
31 remitted directly to the State's General Fund, making them available for expenditures as the legislature
32 sees fit. There is no direct correspondence between a particular county's natural resource production and
33 the amount (if any) of severance tax revenues flowing indirectly back to a county. Oil and gas operations
34 also produce revenue for the state through sales taxes on purchases of goods. In addition, employees of
35 these firms, as well as their suppliers, indirectly contribute to state revenues through income taxes, and
36 through sales taxes on re-spending of income.

37 **3.17.5.7 Local Government Revenues**

38 Local governments benefit from several sources of revenue related to public lands and minerals, including
39 the following.

- 40 • Recreation, travel, and tourism-related revenues – primarily a variety of sales and use taxes that
41 generate revenue as visitors to BLM public lands spend money on lodging, restaurants, other
42 food, gas, equipment rentals, guide services, and other supplies and services. These taxes may be

1 collected and retained by local government, or collected by the state but distributed back to local
2 government. Businesses in this industry also pay property taxes to local governments.

- 3 • Natural resource-related revenues – including sales and use taxes from mining and agricultural
4 businesses, property taxes on natural resources properties (including buildings and other
5 improvements on public lands), property taxes on agricultural lands (ranching on private land is
6 often closely tied to public grazing lands), distributions of federal mineral royalties received from
7 the state, and distributions from or tied to BLM and USFS revenue collections such as grazing
8 fees.
- 9 • Landownership-related revenues – in particular, PILT that replace property taxes that would
10 otherwise be collected if land were privately owned. PILT payments totaled \$1,266,020 and
11 \$471,940, respectively, to Emery and Wayne Counties (EPS-HDT 2016). A Profile of Federal
12 Land Payments. Downloaded 12-19-2016 from [https://headwaterseconomics.org/tools/economic-](https://headwaterseconomics.org/tools/economic-profile-system/#fedpayments-report-section)
13 [profile-system/#fedpayments-report-section](https://headwaterseconomics.org/tools/economic-profile-system/#fedpayments-report-section)).

14 **3.17.6 Government Expenditures**

15 ***3.17.6.1 State and Local Government Expenditures and Services***

16 Management of BLM-administered land may affect state and local expenditures. For instance, recreation
17 on public lands requires some support from local government for road maintenance, law enforcement, and
18 search and rescue. Heavy truck traffic from mineral development and production may significantly impact
19 roads. It is difficult to separate expenditures related to BLM-administered land from expenditures related
20 to other land. The types of state and local expenditures that may be affected include

- 21 • maintenance of state and local roads,
- 22 • law enforcement personnel and equipment,
- 23 • emergency medical services,
- 24 • search and rescue teams,
- 25 • conservation and wildlife management,
- 26 • fire management,
- 27 • solid waste collection and disposal, and
- 28 • public utilities.

29 These expenditures may be affected in two ways. First, increased use of public land resources may result
30 in greater needs for the types of services and infrastructure listed above. For instance, increased
31 backcountry recreational use may put greater demands on local search and rescue teams. Increased heavy
32 truck traffic from oil and gas development may increase road maintenance needs. In addition, in less
33 common cases where use of public land resources leads to substantially increased employment
34 opportunities (such as in an energy development boom), population in study area communities may
35 increase, which often leads to increased demand for the services and infrastructure listed above, and may
36 lead to additional needs, such as increased school space, teachers, and other public facilities and
37 personnel.

38 ***3.17.6.2 BLM Expenditures***

39 BLM expenditures related to federal lands benefit the local economy because federal salaries to land
40 management staff that reside in the study area and federal contracts to businesses located in or with
41 employees residing in the study area represent inflows of money.

1 **BLM Public Land Uses and Values**

2 This section profiles some of the uses of BLM public lands in the planning area. It describes some of the
3 economic and social implications of those uses, including quantitative values where available. As noted in
4 the introduction chapter of this section, social and economic impacts from MLP decisions are most likely
5 to occur with respect to a) oil and gas development and production, and b) recreation. Therefore, these
6 two resource uses are addressed in detail below.

7 **3.17.6.3 Oil and Gas**

8 The BLM has prepared a Reasonably Foreseeable Development (RFD) Scenario for oil and gas for the
9 two-county planning area (see Appendix A). As the RFD reports, neither county currently produces oil
10 and gas. As of early 2017, there was zero employment in oil and gas or related industries in either county
11 (U.S. Department of Commerce 2016b). Nonetheless, there is potential for successful oil and gas
12 exploration and development within the planning area. This is predicated on the relative success of oil and
13 gas operations in the adjacent Moab MLP planning area over the past few decades, and is more fully
14 described in the RFD. The RFD projects a total of 30 wells drilled over the planning horizon of 15 years,
15 with a 60% success rate. This level of activity assumes all BLM lands would be available with standard
16 restrictions. Since the San Rafael Desert RFD is heavily predicated on the Moab MLP model, the impact
17 analyses of Chapter 4 will rely on the assumptions for costs contained in the that model.

18 Authorized and pending federal oil and gas leases within the SRD MLPA cover a total of 82,454 acres.
19 This is approximately 16% of the SRD MLPA. In addition there have been 97,452 acres of land
20 nominated for leasing, but deferred since 2011.

21 **3.17.7 Recreation**

22 **3.17.7.1 Status and Trends in the Socioeconomic Study Area**

23 The two counties of the study area are rich in outdoor recreational resources. These resources are enjoyed
24 by local residents and attract many non-residents. Visitation for outdoor recreation—whether passive
25 pursuits like scenic drives or high-energy active sports like mountain biking and OHV riding—supports a
26 vibrant tourism industry. This industry is an important economic base for the study area, as shown in the
27 Economic Conditions section above.

28 The Utah Office of Tourism has commissioned the Gardner Institute at the University of Utah to compile
29 data on recreation and tourism use by county in Utah. The data include information on numbers of visitors
30 as well as employment and taxes generated by this visitation. Table 3-50 presents selected economic data
31 related to leisure and hospitality for the two counties and the state of Utah. Although the percentage of the
32 labor force in this industry is similar for Emery County and the State, the percentage for Wayne County is
33 about triple the State average. This is likely due to the presence of a major national park (Capitol Reef) in
34 the county.

1 **Table 3-50. Tourism Spending, Employment, and Tax Revenue for Emery and Wayne Counties**
 2 **and State of Utah, 2015**

	Emery County	Wayne County	Utah
Leisure and Hospitality			
Taxable Sales	\$15,610,165	\$15,417,965	\$6,606,009,002
Employment	272	252	133,613
Percentage of Total Employment	11.9	35.5	11.9
Tax Revenues ³	\$934,381	\$385,363	\$143,328,028

3 Source: Gardner Policy Institute (2015).

4 **3.17.7.2 BLM Resource Use**

5 BLM public lands in the study area are used for a wide variety of recreational pursuits. The BLM
 6 categorizes recreation in three ways: dispersed recreation, developed recreation, and activities managed
 7 under special recreation permits.

8 *Dispersed Recreation* – This refers to all recreation occurring outside of developed recreation sites.
 9 Popular dispersed uses include hiking, backpacking, mountain biking, OHV riding, hunting, rock
 10 climbing, photography, automobile touring/sightseeing, bird watching, camping, rock hounding, and
 11 visiting archeological sites.

12 *Developed Recreation* – Developed recreation sites incorporate visitor use infrastructure such as roads,
 13 parking areas, and facilities to protect the resource and support recreational users in their pursuit of
 14 activities, experiences, and benefits. Visitor use infrastructure is a management tool that can minimize
 15 resource impacts, concentrate use, and reduce visitor conflicts.

16 *Special Recreation Permitting* – SRPs are issued to manage visitor use, protect natural and cultural
 17 resources, and accommodate commercial recreational uses and may be issued for 10 years or less with
 18 annual renewal. Commercial SRPs are issued to outfitters, guides, vendors, recreation clubs, and
 19 commercial competitive event organizers providing recreational opportunities or services without
 20 employing permanent facilities.

21 All recreation activities provide socioeconomic value. The value may be as simple as increased quality of
 22 life for the participants, which can be measured as described in the section on non-market values. In
 23 addition, recreationists often spend money in order to recreate. Local recreationists pay for gas to reach a
 24 site, and may buy equipment, purchase food and drink, and make other purchases locally. Non-local
 25 recreationists may do all this, and pay for lodging, restaurants, guides and outfitters, etc. All of these
 26 actions generate local economic activity. Expenditures by non-local recreationists are particularly
 27 important as they represent new income in the region.

28 The market-based economic impacts of recreation on BLM public lands can be estimated using the
 29 IMPLAN model. The general economic impact estimation methodology is as follows.

- 30 • Quantify recreational visitation to the area of interest (i.e., BLM public lands in the SRD MLP
 31 planning area).

³ Includes county transient room tax, municipal transient room tax, resort communities sales tax, restaurant tax and motor vehicle leasing tax.

- 1 • Estimate the local (Emery and Wayne Counties) expenditures of the recreational users associated
- 2 with their recreational visits.
- 3 • Multiply visitation by expenditures per visit to determine total expenditures.
- 4 • Allocate the total expenditures to the various economic sectors (lodging, retail, services, etc.) to
- 5 which the various portions of the expenditures accrue.
- 6 • Run these value allocations through the IMPLAN economic impact model to determine direct,
- 7 indirect, and induced economic impacts.

8 With respect to Step 1, recreational use is tracked in the BLM’s Recreation Management Information
 9 System (RMIS), based on data from traffic counters, visitor registers, and other sources. Recent recreation
 10 use levels in the MLP planning area are shown in Table X. These figures include recreational use under
 11 SRPs as well as general use (dispersed recreation and developed site recreation).

12 [SWCA removed table based on comment from Tyler Ashcroft regarding data accuracy for San Rafael
 13 MLP planning area.]

14 To use these data in economic impact modeling, it is necessary to parse the visits into market segments,
 15 and apply expenditure estimates for each market segment. The best data for this purpose come from
 16 studies⁴ conducted by the National Park Service (NPS) for various types of categories, including one
 17 appropriate for the MLP area. The NPS has been able to identify spending patterns by type of use (e.g.,
 18 local vs. nonlocal, day vs. overnight, camping vs. commercial lodging, etc.). A particular locality can then
 19 input total recreation visitor days allocated by type of visit, which then provides input data for IMPLAN.

20 Table 3-51, Table 3-52, and Table 3-53 present the results of the IMPLAN analysis for each market
 21 segment.

22 **Table 3-51. Economic Impacts of MLP BLM Public Land Recreation, Day Use Market Segment,**
 23 **2011**

Type of Impact	Employment (jobs)	Labor Income	Value Added	Economic Output
Direct Impact	16.2	\$626,775	\$1,046,176	\$1,302,342
Indirect Impact	1.0	\$34,327	\$58,930	\$105,052
Induced Impact	2.2	\$71,006	\$149,042	\$236,012
Total Impact	19.4	\$732,107	\$1,254,148	\$1,643,405

24 **Table 3-52. Economic Impacts of MLP BLM Public Land Recreation, Non-Local Camping Market**
 25 **Segment, 2011**

Type of Impact	Employment (jobs)	Labor Income	Value Added	Economic Output
Direct Impact	84.0	\$3,903,827	\$6,566,006	\$6,847,238
Indirect Impact	3.7	\$133,824	\$247,095	\$426,764
Induced Impact	13.0	\$413,120	\$864,969	\$1,372,675
Total Impact	100.7	\$4,450,770	\$7,678,070	\$8,646,677

⁴ Cullinane Thomas C., and L. Koontz. 2016. 2015 National Park visitor spending effects: Economic contributions to local communities, states, and the nation. Natural Resource Report NPS/NRSS/EQD/NRR—2016/1200. National Park Service, Fort Collins, Colorado.

1 **Table 3-53. Economic Impacts of MLP BLM Public Land Recreation, Non-Local Lodging Market**
 2 **Segment, 2011**

Type of Impact	Employment (jobs)	Labor Income	Value Added	Economic Output
Direct Impact	655.9	\$16,753,244	\$27,555,188	\$46,440,450
Indirect Impact	64.1	\$2,221,352	\$4,031,874	\$7,216,056
Induced Impact	61.0	\$1,940,455	\$4,062,719	\$6,447,538
Total Impact	781.0	\$20,915,051	\$35,649,782	\$60,104,045

3 The tables above demonstrate that the economic impacts of overnight recreational visitor use of BLM
 4 lands in the area are significantly larger than the economic impacts of recreational day use, which is
 5 predominantly by local residents. The economic impacts of recreationists who use local lodging are
 6 significantly higher than the impacts of those who camp, largely due to the higher cost of a night in
 7 lodging versus a camping site, and the additional expenditures (e.g., restaurant meals) of most lodgers
 8 compared to most campers. It is important to note that not all of these economic impacts, particularly for
 9 the camping and lodging segments, should be attributed to BLM public lands only, let alone to the MLP
 10 planning area. Visitors to BLM lands in the study area often visit other attractions such as national and
 11 state parks on the same trip.

12 **3.17.8 Nonmarket Values**

13 In addition to the economic benefits described in previous sections, it is important to also consider
 14 nonmarket values associated with BLM activities in Emery and Wayne Counties. Unlike gasoline or
 15 employee wages, these values either do not have a market or (in the case of property values) do have a
 16 market but are difficult to quantify. Despite the difficulties associated with measurement of these values,
 17 it is well accepted that the natural and cultural resources of an area, and the open space the area may
 18 provide, can have a dollar value. For example, it is common for real estate investors to pay more for view
 19 lots or for property adjacent to open space, or for people to make financial donations to help protect old-
 20 growth forests, endangered species, or other sensitive resources.

21 There are many types of nonmarket values, three of which are considered in this discussion: the economic
 22 benefits to local communities from the amenity values provided by open space and scenic landscapes; the
 23 economic benefits to individuals such as the unpriced value recreationists experience; and ecosystem
 24 service values, which refers to the ways that healthy ecosystems support, enable, or protect human
 25 activity. Each is considered in turn below.

26 **3.17.9 Economic Benefits to Local Economies**

27 There is a body of evidence suggesting that “natural amenities” such as scenery, access to recreation, and
 28 the presence of protected areas (such as designated wildernesses or other forms of protection) have
 29 positive economic benefits for communities possessing such amenities. A study by Headwaters
 30 Economics (2007) summarizes much of the available research and reaches several conclusions.

- 31 • Retirees are attracted to areas which possess high levels of natural amenities.
- 32 • Entrepreneurs and employees who are not dependent on a particular workplace location (“cyber-
 33 commuters”) are attracted to areas that possess high levels of natural amenities.
- 34 • A positive relationship exists between environmental protection and in-migration, retaining
 35 businesses and attracting new businesses.

36 There is no evidence to suggest that protection of public lands is detrimental to local economies.

1 **3.17.10 Economic Benefits to Individuals**

2 The term nonmarket values refers to the benefits individuals attribute to experiences of the environment
 3 or uses of natural and cultural resources that do not involve market transactions and therefore lack prices.
 4 Examples include the benefits received from wildlife viewing, hiking in a wilderness, or hunting for
 5 recreation. Estimates of nonmarket values supplement estimates of income generated from commodity
 6 uses to provide a more complete picture of the economic implications of proposed resource management
 7 decisions.

8 Although there are difficulties associated with measurement of nonmarket values, it is well accepted that
 9 the natural and cultural resources of an area and the open space the area may provide can have dollar
 10 values. For example, it is common for people to make financial donations to help protect old-growth
 11 forests, endangered species, or other sensitive resources.

12 In examining nonmarket values, economists often distinguish between “use value” and “non-use value.”
 13 Use value refers to the benefits an individual derives from some direct experience or activity, such as
 14 climbing a spectacular peak, hunting, or wildlife viewing. In contrast, non-use value refers to the utility or
 15 psychological benefit some people derive from the existence of some environmental condition that may
 16 never be directly experienced: an unspoiled canyon or the continued presence of an endangered species.

17 Nonmarket use values have been studied extensively for a wide variety of recreation “goods.” To help the
 18 reader understand the potential nonmarket value of some of the planning area’s natural and cultural
 19 resources, examples of a range of typical nonmarket use values—consumer surplus values—for recreation
 20 activities are summarized in Table 3-54, adapted from a recent Oregon State University report
 21 (Rosenberger 2011). This report summarizes the findings from 353 studies (totaling 2,703 different value
 22 estimates) covering the United States Canada from 1958 to 2006, and separates the studies by region.
 23 These data indicate that visitors may be getting great value for their recreation activities in the study area,
 24 and may be more willing as a result to visit here and continue to contribute their spending to the local
 25 economy.

26 **Table 3-54. Recreation Consumer Surplus Values per Person per Day by Activity and Region (2010**
 27 **\$)**

Activity	Western United States			Total (United States and Canada)		
	N	Mean	SE	N	Mean	SE
Backpacking	2	\$39.85	15.1	38	\$13.33	2.2
Bicycling	---	---	---	19	\$42.67	5.6
Camping	58	\$21.68	3.0	80	\$19.98	2.4
Freshwater fishing	302	\$81.81	4.4	809	\$61.21	2.2
Saltwater fishing	40	\$143.46	18.4	123	\$109.39	10.2
Nonmotorized boating	45	\$112.12	18.0	85	\$107.36	12.8
Beach	20	\$57.81	15.7	68	\$58.98	8.1
Hiking	70	\$55.54	7.5	86	\$60.63	7.9
Big game hunting	171	\$78.91	5.0	459	\$69.69	2.8
Small game hunting	34	\$72.94	14.8	70	\$52.51	8.3
Waterfowl hunting	31	\$58.10	10.4	130	\$48.88	4.0

Activity	Western United States			Total (United States and Canada)		
	N	Mean	SE	N	Mean	SE
Motorized boating	20	\$48.55	20.3	75	\$40.27	6.7
Mountain biking	15	\$180.67	36.2	16	\$172.95	34.7
Off-road vehicle	6	\$42.02	5.7	13	\$35.64	4.0
Picnicking	8	\$19.06	1.9	19	\$20.70	4.1
Rock climbing	6	\$34.63	4.0	14	\$60.52	18.5
Sightseeing	12	\$44.28	11.9	22	\$45.94	9.8
Swimming	8	\$28.88	7.2	14	\$26.24	4.7
Wildlife viewing	91	\$63.99	6.3	324	\$48.72	2.8
General recreation	83	\$31.97	4.2	146	\$47.73	5.5
Other recreation	64	\$33.25	6.5	93	\$34.51	4.9
Total	1,086	\$69.34	2.3	2,703	\$59.60	1.3

N = number of estimates on an activity reported across the literature

Mean = mean consumer surplus per visitor-day for that activity in 2010 dollars

SE = standard error of the mean, with larger values relative to the mean indicating larger response variability

Source: Rosenberger (2011).

1 By applying the range of values in Table 3-54 to recreational usage figures (visitor days), or a range from
2 specific individual studies that are most comparable to the planning area, an estimate of the recreation-
3 related nonmarket use value, the consumer surplus, can be derived for the planning area. The resulting
4 figure represents the total nonmarket use value recreationists derive from these activities, or alternatively,
5 can be seen as the total additional amount recreationists would be willing to pay for the related recreation
6 activities if a fee for participation were required.

7 With respect to non-use values, economists differentiate various types, including option values and
8 existence values. Option value represents the benefits from having natural or cultural resources available
9 for future use, whereas existence value reflects the benefits derived from knowing these resources simply
10 exist. Evidence for the existence of these non-use values is ample. Local, state, and national taxpayers
11 support a large variety of conservation and protection programs (e.g., NPS, state parks, local parks and
12 parkways, open space initiatives, etc.) through their tax dollars—programs that are very popular but
13 support many resources that many taxpayers will never visit. A large number of non-profits are devoted to
14 a wide variety of conservation and wildlife-related causes; many if not most donors to these groups derive
15 no direct benefit from their contributions. Giving USA reported charitable contributions by individuals,
16 foundations, and corporations totaled \$373.25 billion in 2015, of which \$10.68 billion went to the
17 “environment/animals” sector (Giving USA 2016). Examples of individual organizations with substantial
18 contributions include the World Wildlife Fund with over \$305 million in contributions from all sources in
19 2016 (World Wildlife Fund 2016). The Nature Conservancy, with over 1 million members, primarily in
20 the United States, received over \$578 million in contributions (The Nature Conservancy 2016). Although
21 this generalized evidence of non-use values is clear, estimating non-use values for specific resources is
22 difficult and often controversial. BLM guidance recommends that use values be emphasized rather than
23 non-use values (BLM 2010c).

1 **3.17.11 Economic Benefits from Ecosystem Services**

2 Nonmarket values of open space and well-managed natural resources also include a broad range of human
3 benefits resulting from healthy ecosystem conditions and functions. These benefits include potable water
4 from groundwater recharge, flood control from intact wetlands, and carbon sequestration from healthy
5 forests and certain agricultural lands. These human benefits from ecosystems are known as “ecosystem
6 services” (Ruhl et al. 2007).

7 The value of open space as a natural system is receiving increased world-wide attention. Both private
8 firms and governmental entities are discovering that it can be less costly to protect these kinds of
9 resources than to correct damage that may result from not considering these resources. A commonly cited
10 example is the value of protecting municipal watersheds, which may be less costly than treating polluted
11 water sources.

1 **3.18 HEALTH AND SAFETY**

2 The analysis area for health and safety is the planning area. The analysis area was selected because it
3 represents the area in which health and safety may be affected by activities on BLM-administered land.

4 A management priority for the BLM is ensuring health and human safety on the public lands it
5 administers. The BLM's goals are to effectively manage safety hazards and hazardous materials, protect
6 the health and safety of public land users, protect the natural and environmental resources, minimize
7 future hazardous risks including costs and liabilities, and mitigate physical hazards in compliance with all
8 applicable laws, regulations, and policies. The BLM follows its national, state, and local contingency
9 plans as they apply to emergency responses. These plans are also consistent with federal and state laws
10 and regulations.

11 The planning area is located in a remote area with little industrial activity and no current production of oil
12 and gas. The closest community is Green River, Utah, north of the planning area. No residential dwellings
13 are located in the planning area, and no occupied permanent structures exist on BLM-administered lands
14 within the planning area. Temporary, secondary living quarters (i.e., trailers) exist in association with
15 livestock grazing operations in the planning area. The Green River Municipal Airport is located on private
16 land within the planning area.

17 Most of the roads in the planning area are unpaved and provide access to resources such as grazing
18 allotments, range improvements, and recreational opportunities on federal lands. Interstate 70 crosses the
19 northern portion of the planning area, and State Route 24 runs along the western border. Most of the
20 county roads within the planning area are unmaintained or only occasionally maintained (e.g., bladed
21 once or twice per year). Roads in the planning area are used for recreation such as OHV use and scenic
22 driving or are used to access national parks and sites for camping, climbing, hiking, canyoneering, and
23 cultural and paleontological resource viewing.

24 Worker safety for oil and gas development on BLM-administered public land is regulated under the
25 Occupational Safety and Health Act of 1970, as amended (29 USC 651 et seq.). This act requires
26 employers and operators to provide a safe and healthy workplace for employees and requires the BLM to
27 track and monitor reportable incidents of accidents and injury.

28 **3.18.1 Hazardous Materials**

29 The planning area currently has no production of oil and gas. There are no known hazardous materials in
30 the planning area.

31 The EPA and federal, state, and local governments have numerous laws and policies designed to protect
32 the public. Two federal laws are described here:

33 The Resource Conservation and Recovery Act (RCRA), passed in 1976, establishes a comprehensive
34 program for managing hazardous wastes from the time they are produced until their disposal. EPA
35 regulations define solid wastes as any “discarded materials,” with a list of exclusions. Solid waste does
36 not refer to a waste’s physical state; it can include solid, liquid, or contained gaseous material that is being
37 discarded. A “hazardous waste” is a solid waste that is listed by the EPA as a hazardous waste or exhibits
38 any of the characteristics of hazardous wastes (ignitability, corrosivity, reactivity, or toxicity), except for
39 those wastes listed as exempt. On July 6, 1988, the EPA determined that wastes from oil and gas
40 exploration, development, and production would not be regulated as hazardous wastes under RCRA. A
41 rule of thumb was developed to determine whether wastes from exploration, development, and production
42 are likely to be considered exempt or non-exempt from RCRA regulations. If the waste came from
43 downhole or if the waste was generated by contact with the oil and gas production stream during removal
44 of produced water or other contaminants, it is likely to be considered exempt from RCRA by the EPA.

1 Typical wastes associated with the oil and gas production include trash, sanitary wastes, produced water,
2 and produced hydrocarbons. Based on the rule of thumb, these are generally exempt from RCRA
3 regulations.

4 The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), enacted in
5 1980, addresses the release (e.g., spilling, leaking, dumping, or accumulation) or threat of release of
6 hazardous substances into the environment. Although many oil and gas constituent wastes are exempt from
7 RCRA hazardous waste regulations, certain contaminants are still subject to regulations as hazardous
8 substances under CERCLA. The UDEQ administers hazardous waste regulations for oil and gas activities in
9 Utah.

10 The EPA hazardous substances reportable quantities list and the Emergency Planning and Community
11 Right-to-Know Act (EPCRA) list in 40 CFR 302–312 (EPA 2010) provides reportable quantities for
12 hazardous chemicals. Storage of hazardous chemicals at quantities greater than the reportable quantities
13 must be reported to the EPA, as required by the EPCRA regulations. Any release of a hazardous
14 substance above the specified reportable quantity for that hazardous substance must be reported to the
15 EPA.

16

CHAPTER 4—ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

The purpose of this chapter is to analyze and disclose the potential effects of the federal action on the human environment. The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act of 1969 (NEPA) states that the “human environment” shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment (40 Code of Federal Regulations [CFR] 1508.14). The federal action is the Bureau of Land Management’s (BLM) selection of a master leasing plan (MLP) and possible land use plan amendments on which future land use actions will be based.

This chapter objectively evaluates the potential environmental impacts of implementing each management alternative described in Chapter 2. Chapter 3 describes the existing conditions of the resources and resource uses that would be affected by the management alternatives. The organization of this chapter parallels that of Chapter 3, in that the resource programs are presented in the same order. Because resources and resource uses are often interrelated, one section may refer to another.

4.1.1 Types of Impacts

Throughout this chapter, the terms *impact* and *effect* are used interchangeably. Impacts can be direct, indirect, or cumulative. Impacts may be positive (beneficial) or negative (adverse). The analysis of impacts compares the types and intensity of impacts among the alternatives. In some cases, adverse impacts that occur to resource values or uses under a particular alternative are of a lower intensity as compared to other alternatives. In these cases, the reduction of an impact is considered a positive effect on the affected resource values or uses, as it compares to other alternatives. Table 4-1 provides an overview of the general types of impacts discussed in this chapter.

Table 4-1. Types of Impacts

Type	Description
Direct impacts	Direct impacts occur at the same time and place as the action responsible for the impact. For example, removal of vegetative cover caused by facility construction would be considered a direct impact to vegetation resources.
Indirect impacts	Indirect impacts are temporally and spatially removed from the action responsible for the impact, but are related to the action through a process of cause and effect. For example, removal of vegetative cover caused by facility construction that consequently results in increased surface runoff and sedimentation of nearby streams would be considered an indirect impact to water resources. Indirect impacts may reach beyond the natural and physical environment (i.e., environmental impact) to include growth-inducing effects and other effects related to induced changes to resource uses (i.e., non-environmental impact).
Cumulative impacts	Cumulative impacts result from the incremental impact of an action when added to other past, present, and reasonably foreseeable actions, regardless of which agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over time.

1 4.1.2 Methods of Analysis

2 The BLM manages public lands in accordance with the Federal Land Policy and Management Act of
3 1976 (FLPMA) and other applicable laws. The FLPMA requires the BLM to manage public lands and
4 resources according to the principles of multiple use and sustained yield, including recognizing the
5 nation's needs for domestic sources of minerals, food, timber, and fiber. To ensure that the BLM meets its
6 mandate of multiple use in land management actions, the impacts of the alternatives on resources and
7 resource uses are identified and assessed as part of the planning process.

8 The analysis of the alternatives in this environmental assessment (EA) focuses on identifying the types of
9 impacts anticipated to occur and estimating their potential intensity. The analysis is organized by resource
10 program and discloses the potential impacts to each resource program from implementing each of the
11 proposed alternatives. The impact analysis for Alternative A (No Action) was prepared first to serve as
12 the baseline for alternative comparison. It is important to note that management decisions for each
13 resource or resource use directly or indirectly relate to each other; therefore, impacts to one particular
14 resource program may also apply to other programs. It is recommended that the reader review all impact
15 analyses to attain a comprehensive description of the impacts to the resource or resource use in question.

16 Potential impacts to certain land use activities can be compared spatially among the alternatives by using
17 geographic information system (GIS) data. The locations of resources and management thereof are shown
18 on Maps 2-1 through 2-15. These maps should be reviewed in conjunction with the impact analyses.

19 Acreage calculations used in this analysis are approximate values for alternative comparison and analytic
20 purposes only and do not reflect exact measurements of on-the-ground resources and actions. These
21 acreage values were calculated using Esri ArcGIS Desktop 10.4.1 software. The projection of GIS data
22 that was analyzed to provide the acreage calculations is Universal Transverse Mercator (UTM) zone 12
23 north, based on the North American Datum of 1983 (NAD83).

24 4.1.3 Assumptions

25 Assumptions for analysis are made to assist in determining the potential environmental, social, and
26 economic impacts of the alternatives (Chapter 2) on the affected environment (Chapter 3). They are based
27 on expected trends (e.g., population growth or decline within and adjacent to the planning area), expected
28 demands (e.g., increases in certain kinds of recreational use), and the likelihood of resource development
29 (e.g., the reasonably foreseeable development [RFD] scenario for oil and gas). Assumptions are for
30 analysis purposes only. They are presumed true for the purpose of equitably comparing the alternatives;
31 do not constrain or define management; and are based on observations, historical trends, and professional
32 judgment. Assumptions are generally made for the expected life of the San Rafael Desert master leasing
33 plan (MLP), unless otherwise stated. General assumptions applicable to all resources and resource uses
34 are described below. Resource-specific assumptions are described under each resource program in the
35 sections that follow.

36 The anticipated level of oil and gas development under each alternative is an important assumption used
37 in the preparation of the analysis for each resource considered in this section. The BLM prepared an RFD
38 scenario (see Appendix A) to project a baseline scenario of oil and gas exploration, development,
39 production, and reclamation activity in the planning area during the next 15 years. The RFD was used to
40 predict the number of oil and gas wells and associated surface disturbance from oil and gas development
41 on BLM-administered public lands for each alternative. To complete these estimates, the total number of
42 wells, surface disturbance, and disturbance associated with geophysical exploration as identified in the
43 RFD was multiplied by the percentage of BLM-administered lands open for oil and gas leasing subject to
44 standard terms and conditions, or open to leasing subject to CSU/TL stipulations for each alternative.
45 Lands open to leasing subject to an NSO stipulation or as closed to leasing were not considered open.
46 Actual surface disturbance under each alternative could be higher or lower than these estimates, and these
47 calculations do not provide a limit on oil and gas activity or surface disturbance for any alternative.

1 Additionally, the calculations do not consider factors such as the ability to access oil and gas resources in
 2 areas managed with NSO stipulations from adjacent open lands, or from adjacent private or state lands, or
 3 the possibility of some CSU stipulations limiting the density of oil and gas development in areas open to
 4 leasing. Based on this analysis, Table 4-2 lists the projected oil and gas development and associated
 5 surface disturbance under each alternative on BLM-administered public lands in the planning area over
 6 the next 15 years.

7 **Table 4-2. Projected Oil and Gas Development and Surface Disturbance on Bureau of Land**
 8 **Management–Administered Public Lands by Alternative (over the next 15 years)**

Action	Alternative A	Alternative B	Alternative C	Alternative D
Number of wells	28	7	27	23
Gross surface disturbance from oil and gas wells (acres disturbed)	541	127	517	440
Net surface disturbance from oil and gas wells after reclamation (acres disturbed)	86	20	82	70
Gross geophysical surface disturbance (acres disturbed)	305	72	292	248
Net geophysical surface disturbance after reclamation (acres disturbed)	61	14	58	50

9 In addition to the assumptions related to the RFD, the following general assumptions were used in the
 10 environmental effects analysis:

- 11 • The decisions proposed in the alternatives apply to public lands and areas that require federal
 12 permitting or authorization. However, cumulative impact analyses also consider decisions made
 13 for resources managed by other entities or individuals.
- 14 • The planning criteria described in Chapter 1 apply to all alternatives.
- 15 • The alternatives would be implemented as described in Chapter 2 and associated appendices.
- 16 • Implementation actions would comply with valid existing rights and all federal laws, regulations,
 17 and policies.
- 18 • Authorized existing leases would be subject to the specific lease stipulations that were applied
 19 under previous land use plans and identified in the lease at the time of issuance. However, the
 20 resource protection measures identified in the MLP/EA would also apply to the areas currently
 21 under lease where they do not conflict with the rights granted to the holder of the lease. The
 22 federal government retains certain rights when issuing an oil and gas lease. Although the BLM
 23 may not unilaterally add a new stipulation to an existing lease that it has already issued, the BLM
 24 can subject development of existing leases to reasonable conditions, as necessary, through the
 25 application of conditions of approval at the time of permitting.
- 26 • Exceptions to mineral leasing stipulations are found in Appendix B. Those exceptions, which
 27 affect analytic comparisons, are specifically addressed in this chapter.
- 28 • Reference in the MLP/EA to “mineral” leasing or development applies to oil and gas. However,
 29 reference to the Three Rivers mineral withdrawal refers to locatable minerals.
- 30 • Sufficient funding and personnel would be available to implement the MLP/EA.

- 1 • The temporal extent of direct and indirect impacts to resources associated with mineral
2 development would be generally 15 to 20 years in shrub communities and 20 to 25 years in desert
3 communities from the cessation of operations when reclamation is complete and impacts are fully
4 mitigated.
- 5 • Worst-case scenario situations are not analyzed, although it is acknowledged that these unlikely
6 events could occur.
- 7 • Best management practices (BMPs) are measures applied on a site-specific basis to reduce or
8 eliminate adverse impacts. For any proposed oil and gas activities in the planning area,
9 appropriate BMPs would be selected on a case-by-case basis to meet the site-specific
10 requirements of the project and local environment from the list of BMPs listed in Appendix C or
11 Appendix E, depending on the alternative selected.
- 12 • Oil and gas operators would be required to conform to the BLM's *Surface Operating Standards*
13 *and Guidelines for Oil and Gas Development - The Gold Book* (BLM 2007b).
- 14 • Precise, quantitative estimates of impacts generally are not possible because the exact locations of
15 future actions are unknown.

16 **4.1.4 Availability of Data and Incomplete Information**

17 The best available data were used in the preparation of the analysis contained in the MLP/EA. However,
18 certain information is unavailable or requires site-specific information to analyze. Because of a lack of
19 quantitative data or specific oil and gas leasing or development proposals, some impacts can be discussed
20 only in qualitative terms. Subsequent project-level NEPA documents will provide the opportunity to
21 collect site-specific data and analyze these data in quantitative terms.

22 **4.2 AIR QUALITY**

23 This section presents potential impacts to air quality from implementation of the management actions
24 presented in Chapter 2. Existing conditions for air quality in the analysis area are described in Chapter 3.

25 **4.2.1 Assumptions**

- 26 • All federal and state air quality requirements would be met.
- 27 • The quantitative analysis includes only emissions from oil and natural gas well development on
28 BLM-administered public lands. Activities related to other resources and uses, such as recreation,
29 lands and realty actions, prescribed burning, vegetation management, and transportation, are
30 assumed to be minor sources of emissions (or do not have well-defined emission rates and levels)
31 and therefore were not quantified.
- 32 • BMPs would be followed for all soil- and surface-disturbing activities related to oil and gas
33 leasing and development.
- 34 • Changes in air quality from pollution could impair scenic quality by obscuring distant views;
35 however, the Clean Air Act sets limits on the allowable degradation of visibility in Class I areas
36 (e.g., Canyonlands National Park). Dust or haze that originates from the planning area cannot
37 exceed the allowable prevention of significant deterioration scenic air quality standards for air
38 pollutants in Canyonlands National Park.
- 39 • The *Moab Master Leasing Plan and Draft Resource Management Plan Amendments/Draft*
40 *Environmental Impact Statement for the Moab and Monticello Field Offices* (Moab MLP) (BLM
41 2015) contains a detailed analysis of emissions, pollutants, and impacts to air quality from

1 proposed oil and gas development in a 785,567-acre planning area. Based on the proximity of the
 2 Moab MLP planning area to the San Rafael MLP/EA planning area (the Green River forms part
 3 of the west boundary of the Moab MLP planning area and part of the east boundary of the San
 4 Rafael MLP/EA planning area), the similarity of the oil and gas fields beneath each planning
 5 area, and the similarity of the proposed types of development, the Moab MLP air analysis is used
 6 in this section to estimate certain impacts from oil and gas development.

- 7 • Generic emissions estimates and profiles are used to estimate nitrogen oxides (NO_x), inhalable
 8 particles (generally 10 micrometers in diameter and smaller [PM₁₀]) and fine inhalable particles
 9 (generally 2.5 micrometers and smaller [PM_{2.5}]), sulfur dioxide (SO₂), volatile organic compound
 10 (VOC), and hazardous air pollutant (HAP) emissions for a variety of oil and gas activities and
 11 equipment (see Section 4.2.2).

12 4.2.2 Oil and Gas Development Emissions Estimates

13 Emissions estimates for oil and gas development in the planning area were calculated using the *Oil*
 14 *Template from the Emissions Inventory Toolkit* developed for the BLM by URS Corporation (URS 2012).
 15 The template calculates emissions of criteria pollutants (NO_x, PM_{2.5}, PM₁₀, and SO₂), VOCs, HAPs, and
 16 direct greenhouse gases (GHGs) (carbon dioxide [CO₂], methane [CH₄], and nitrous oxide [N₂O]) based
 17 on the level of production and number of wells drilled. GHGs are discussed in Section 4.3. Carbon
 18 monoxide (CO) was not included in this emissions analysis because there is very little potential for
 19 emissions of this pollutant to cause or contribute to any recognizable air quality issue; PM and ozone (O₃)
 20 (and its NO_x and VOC precursor gases) are the primary pollutants of concern in the analysis area, and
 21 both Emery and Wayne Counties are currently in attainment with the CO National Ambient Air Quality
 22 Standards (NAAQS). A summary of pollutant emissions from projected oil and gas development in the
 23 San Rafael MLP/EA planning area is shown in Table 4-3. The table discloses estimated annual emissions
 24 from construction, operations, maintenance, and reclamation based on the drilling of two wells per year
 25 for 15 years (for a total of 30 wells) (see Appendix A). This drilling assumption comes from a reasonably
 26 foreseeable development scenario (RFD) for oil and gas in the planning area developed by the BLM in
 27 September 2016. The RFD projects the level of oil and gas activity that can reasonably be expected to
 28 occur in the planning area over the next 15 years. RFD projections are based on local geology, current and
 29 historical trends in oil and gas activity, and forecasts of crude oil and natural gas markets (see Appendix
 30 A).

31 **Table 4-3. Emissions from Projected Oil and Gas Development in the Planning Area**

Planning Area Oil and Gas Development	Total Annual Emissions (tons per year)					
	NO _x	PM ₁₀	PM _{2.5}	SO ₂	VOCs	HAPs
Construction	2.8	47.1	6.4	0.02	5.4	0.2
Operations	6.9	336.2	33.8	0.03	5,570.0	131.6
Maintenance	3.8	117.2	11.8	0.08	1.5	0.2
Reclamation	0.6	0.7	0.1	0.02	0.05	0.01
Total Annual Emissions	14.0	501.1	52.2	0.2	5,576.9	132.0

32 Note: Numbers may not add up due to rounding.

1 The 2014 annual emissions inventories for Emery and Wayne Counties are shown in Table 3-3, Chapter
2 3. Estimated NO_x emissions from oil and gas development in the planning area would represent a 0.1%
3 increase to the total 2014 Emery County NO_x emissions and a 4.3% increase to the total 2014 Wayne
4 County NO_x emissions. Estimated PM₁₀ emissions would represent a 9.7% increase to the total 2014
5 Emery County PM₁₀ emissions and a 42.4% increase to the total 2014 Wayne County PM₁₀ emissions.
6 Estimated PM_{2.5} emissions would represent a 4.2% increase to the total 2014 Emery County PM_{2.5}
7 emissions and a 31.5% increase to the total 2014 Wayne County PM_{2.5} emissions. Estimated SO₂
8 emissions would represent a 0.003% increase to the total 2014 Emery County SO₂ emissions and a 10.5%
9 increase to the total 2014 Wayne County SO₂ emissions. Estimated VOC emissions would represent a
10 15.5% increase to the total 2014 Emery County VOC emissions and a 25.1% increase to the total 2014
11 Wayne County VOC emissions. These calculations are conservative in that they assume that all emissions
12 would occur in each of the counties; this is essentially double counting project emissions. Emissions
13 would actually be split between the two counties, and the increases to each county's emissions would be
14 smaller. In addition, all oil and gas development would not be completed in 1 year but would be spaced
15 over 15 years.

16 Based on these data and the current NAAQS attainment status of both counties (see Section 3.2.2.1 and
17 Tables 3-2 and 3-3), the projected emissions from oil and gas development shown in Table 4-3 would not
18 contribute to exceedances of the NAAQS.

19 **4.2.3 Moab MLP Air Quality Analysis**

20 **4.2.3.1 Far-Field Dispersion Modeling Analysis**

21 The Moab MLP far-field modeling analysis examined multiple source impacts to NAAQS and air
22 quality-related values (AQRVs) in the planning area using the CALMET/CALPUFF dispersion modeling
23 system. Three years of meteorological datasets were used to evaluate year-to-year variability and how
24 variability impacts modeled concentrations.

25 The analysis modeled for three emissions scenarios, each assuming the drilling of 232 wells (BLM 2015):

- 26 • High scenario: no aggregation of wells on pads, 100% of wells go into production (232 wells),
27 50% dust control, more unpaved roads
- 28 • Medium scenario: no aggregation of wells on pads, 60% of wells go into production (140 wells),
29 50% dust control, fewer unpaved roads
- 30 • Low scenario: aggregation of four wells per one pad, 60% of wells go into production (140
31 wells), 70% dust control, smallest amount of unpaved roads

32 The projected oil and gas development in the planning area is substantially lower than all three Moab
33 MLP scenarios for oil and gas development. Alternative A is projected to have 17 producing wells,
34 Alternative B is projected to have four producing wells, Alternative C is projected to have 16 producing
35 wells, and Alternative D is projected to have 14 producing wells (these projections assume a 60% success
36 rate for all wells drilled under all alternatives). Alternative A's 17 producing wells in the planning area
37 comprise 7.3% of the wells in the Moab MLP's high scenario and 12.1% of the wells in the low scenario.
38 Based on these percentages, the use of the Moab MLP's modeling results for this analysis is conservative.

39 **NAAQS**

40 Maximum modeled concentrations at Arches and Canyonlands National Parks showed no exceedances of
41 the NAAQS for any criteria pollutant for any of the modeled scenarios (BLM 2015). Based on these
42 modeling results, no NAAQS exceedances are expected from planning area oil and gas development for
43 any of the alternatives.

1 **Visibility**

2 The Moab MLP calculated visibility impacts from potential 24-hour primary PM₁₀, secondary sulfate and
3 nitrate PM, and elemental carbon concentrations in Arches and Canyonlands National Parks. Results were
4 compared to natural background conditions as recommended in the *Federal Land Managers' Air Quality*
5 *Related Values Group (FLAG) Phase I Report – Revised 2010* (FLAG 2010). Both the BLM 10% change
6 in extinction (1.0 deciview [dv]) “just noticeable change” threshold and the National Park Service 5%
7 change in extinction (0.5 dv) “half a noticeable change” adverse impacts threshold were used to assess the
8 significance of potential impacts (BLM 2015).

9 Visibility impacts ranged from greater than 0.5 dv on 159 days at Canyonlands National Park during the
10 2008 meteorological year for the high emissions scenario, to no visibility impacts greater than 1.0 dv at
11 any park for any meteorological year under the low emissions scenario. Under the low emissions
12 scenario, visibility was impaired only in the 2008 meteorological year in Canyonlands National Park,
13 where there were 22 days exceeding 0.5 dv (no days exceeded 1.0 dv) (BLM 2015). PM₁₀, primarily road
14 dust from truck traffic on unpaved roads, was the main pollutant of concern under both the high and
15 medium emissions scenarios. NO_x played a greater role in visibility impacts in the low emissions
16 scenario. The specific meteorological year used in the analysis also influenced modeled impacts.
17 Meteorology in 2008 had substantially greater levels of impacts compared to the previous 2 years of data,
18 which indicates sensitivity to meteorological variability. Because of the large role particulates play,
19 adverse visibility impacts can most likely be tied to drier, hotter, and/or windier conditions (BLM 2015).

20 As discussed in Section 3.2.2.2 and shown in Table 3-6, visibility for Canyonlands National Park from
21 2006 to 2015 indicates that there is no statistically significant trend on the 20% of clearest days. Visibility
22 improved on the 20% of haziest days during this time period. Overall, visibility shows impairment based
23 on comparisons with the natural condition haze index. The NPS indicates that visibility at Canyonlands
24 National Park warrants moderate concern.

25 Because the maximum projected producing wells in Alternative A comprise 12.1% of the producing wells
26 in the low scenario in the Moab MLP, visibility impacts are expected to be below the 1.0-dv threshold
27 under all four alternatives. Although it is possible that visibility impacts from oil and gas development in
28 the planning area could exceed the 0.5-dv threshold on certain days in years with dry, hot, and/or windy
29 conditions, it is considered unlikely based on the low number of wells for all alternatives. The Moab MLP
30 notes that visibility impacts in the area appear to be especially sensitive to emissions of PM₁₀ (e.g., road
31 dust), and to a lesser extent elemental carbon (e.g., diesel soot) and NO_x. The proximity of emission
32 sources, particularly PM sources, plays a large role in the magnitude and frequency of modeled adverse
33 visibility impacts to the AQRVs of the national parks (BLM 2015).

34 **Deposition**

35 All modeled values of sulfur and nitrogen deposition were near or below the deposition analysis
36 thresholds (DATs) of 0.005 kilogram per hectare per year for total nitrogen and total sulfur for all of the
37 modeled scenarios, with the exception of the high and medium emissions scenarios for nitrogen
38 deposition in Arches and Canyonlands National Parks for the 2008 meteorological year (BLM 2015).
39 Under the low emissions scenario, all modeled values were below the DAT for both total nitrogen and
40 total sulfur, with the exception of the 2008 value for nitrogen deposition in Canyonlands National Park
41 (0.00857 kilogram per hectare per year) (BLM 2015). The DATs are NPS screening level values for the
42 additional modeled amount of sulfur and nitrogen deposition within federal areas from new or modified
43 sources (NPS 2010b).

44 As discussed in Section 3.2.2.2 and shown in Table 3-7, wet deposition data for Canyonlands National
45 Park from 2009 to 2015 indicate that there is no statistically significant trend for sulfate in precipitation.
46 The trend for nitrate in precipitation is improving during this time period. However, NPS indicates that
47 wet nitrogen deposition warrants significant concern at Canyonlands National Park based on the highly

1 sensitive park ecosystem. Dry deposition of nitrogen and sulfur has been relatively unchanged or slightly
2 decreasing in Canyonlands National Park from 2009 to 2014; however, it is not known if this trend is
3 statistically significant.

4 Because the maximum projected producing wells in Alternative A comprise 12.1% of the producing wells
5 in the low scenario in the Moab MLP, total sulfur and total nitrogen deposition from oil and gas
6 development in the planning area are not expected to exceed the DATs.

7 **4.2.3.2 Near-Field Dispersion Modeling Analysis**

8 Near-field modeling evaluates impacts of single or closely grouped sources to nearby receptors, typically
9 those less than 1 kilometer (0.6 mile) away. Specific characteristics of the source to be modeled (e.g.,
10 emission rates, stack heights) are required for this type of modeling. This type of data was not available
11 for the Moab MLP because of its programmatic nature (the Moab MLP is a planning document for oil,
12 gas, and potash leasing rather than a specific analysis of one leasing project). Instead, the BLM evaluated
13 previous near-field modeling for specific projects in and near the Moab MLP planning area for relevance
14 to management decisions. The previous projects consisted of the Fidelity Cane Creek project (the addition
15 of nine exploratory wells to eight producing wells) and the Monument Buttes project (a proposal for
16 drilling 5,750 wells) (BLM 2015). Based on its large size, air quality impact data from the Monument
17 Buttes project are not applicable to the MLP/EA and are not included here.

18 For the Fidelity Cane Creek project, the Moab MLP indicated that predicted impacts to air quality in
19 Canyonlands and Arches National Parks from this project's emissions were "minimal and generally
20 below guideline criteria" (BLM 2015). Modeling results indicated no adverse effect on visibility from the
21 proposed project in Canyonlands and Arches National Parks. Predicted nitrogen deposition worst-case
22 project emissions were comparably low but slightly above the DAT. The deposition modeling represented
23 a short-term, worst-case prediction and was "not directly comparable to the long-term deposition impacts
24 reflected in the DAT" (BLM 2015). Additionally, deposition modeling used a simplified 1-year
25 meteorological dataset instead of a three-dimensional wind field-based dataset for 3 years, which would
26 likely show lower deposition rates than presented (BLM 2015).

27 Based on its size and location, the Fidelity Cane Creek project air quality modeling results would be
28 applicable to proposed oil and gas development in the planning area.

29 **4.2.3.3 Ozone Analysis**

30 The 2013 *Western Regional Air Partnership (WRAP) West-wide Jump-start Air Quality Modeling Study*
31 (*WestJumpAQMS*) was designed to provide regional technical analysis and support for O₃ and particulate
32 transport and attainment demonstrations across the West (WRAP 2014). The goals of the study included
33 incorporating all of the recent western modeling analyses into a single modeling database; performing a
34 comprehensive model performance evaluation in an open technical forum; performing a comprehensive
35 source apportionment analysis to evaluate local, regional, international, and natural source impacts on O₃
36 and PM_{2.5} concentrations across the West; and developing a modeling platform to be used to conduct
37 regional air quality planning, National Environmental Policy Act (NEPA) analyses, and state
38 implementation plan analyses in the West.

39 The Moab MLP used the WestJumpAQMS modeling study to evaluate O₃ impacts from oil and gas
40 development in the Moab MLP planning area. Canyonlands National Park was chosen as a source
41 receptor to evaluate local and regional emission source impacts on O₃. Key points from this analysis
42 include the following (BLM 2015):

- 43 • A modeled highest O₃ day at Canyonlands National Park on May 10, 2008, showing large-scale
44 regional background data, indicated that almost 90% of modeled O₃ on that day was from outside
45 the region, with sources in Utah making up the next largest contribution at 3.4%. For comparison,

1 the Utah contribution was 29.7% on the modeled highest O₃ day that same year for Salt Lake
2 City, a large metropolitan area, which reflects a much larger number of emission sources in Salt
3 Lake City compared to the Moab MLP planning area.

- 4 • Meteorological conditions can play a dominant role in source contributions to monitored or
5 modeled values. Predominant winds can transport O₃ from outside the Moab MLP planning area
6 into the Moab MLP planning area.
- 7 • Based on source apportionment by state contribution data, sources in the Moab MLP planning
8 area are unlikely to significantly contribute to modeled or monitored O₃ concentrations. However,
9 they do contribute *incrementally* to both Moab MLP planning area and regional O₃
10 concentrations.
- 11 • The WestJumpAQMS source apportionment tool allows the user to specify source contributions
12 by type (e.g., mobile source, fire, oil and gas). In a modeled Moab MLP planning area O₃
13 concentration of 70.0 parts per billion (ppb), 11.7 ppb or 16.7% are from regional sources,
14 indicating that regional sources may play an important role in ozone levels for a particular area
15 like the Moab MLP planning area. Oil and gas emissions account for less than 1% of the regional
16 source category emissions. Mobile sources such as cars and trucks make up the largest single
17 category, followed by natural sources and by point sources such as power plants. This is not an
18 unusual source category breakdown for rural airsheds in the western United States.
- 19 • Emissions of O₃ precursor gases in the Moab MLP cumulative impact analysis area (which
20 includes airsheds adjacent to the Moab MLP planning area) were found to contribute a relatively
21 minor amount to modeled O₃ concentrations. The largest contributors of O₃ precursor gases were
22 mobile sources, followed by point sources.
- 23 • The ratio of emissions in the Moab MLP planning area to total regional emissions is unlikely to
24 change to a significant degree over the life of the Moab MLP planning period. Overall, oil, gas,
25 and potash emissions may increase observed monitored values in the Moab MLP planning area,
26 but the region will continue to be only slightly impacted by emissions in the Moab MLP planning
27 area.
- 28 • Contributions from ozone-precursor-generating activities in the Moab MLP planning area will not
29 be a determinant factor in O₃ concentrations approaching or exceeding the NAAQS.
- 30 • Reasonable controls to reduce the emissions of O₃ precursors from oil and gas activities should be
31 required to reduce the relatively minor contribution that emission sources in the Moab MLP
32 cumulative impact analysis area have on regional O₃ formation and transport.

33 As discussed in Section 3.2.2.1 and shown in Table 3-4, Canyonlands National Park O₃ monitoring data
34 from 2009 to 2015 reflect a statistically significant improving trend. During this time period, there were
35 no exceedances of the 2008 O₃ NAAQS and one exceedance of the 2015 O₃ NAAQS (in 2012). Based on
36 this trend, the analysis and conclusions reached in the Moab MLP, and the lower level of development
37 projected for the planning area (than that proposed in the Moab MLP), oil and gas development in the
38 planning area is not expected to noticeably contribute to regional O₃ formation and transport. It could
39 have a minor contribution to monitored O₃ concentrations in Canyonlands National Park. Because these
40 concentrations are currently showing an improving trend, it is unlikely that the proposed oil and gas
41 development would contribute to NAAQS exceedances in the park.

42 **4.2.4 Impacts Common to All Alternatives**

43 This section discusses air quality impacts that are common to all alternatives.

1 Criteria pollutant (including fugitive dust), HAP, and VOC emissions from project activities would have
2 short-term adverse impacts to air quality in the analysis area and could temporarily reduce visibility or
3 contribute to deposition in the local area. These impacts would vary with the stage of project activity
4 (construction, operations, maintenance, or reclamation) and would end once reclamation is complete.
5 Impacts are not anticipated at the regional level.

6 Attaching lease notices and stipulations to permitted activities, not allowing mineral leasing and other
7 surface-disturbing activities, and using air quality BMPs would reduce impacts to air quality by limiting
8 activities that increase air emissions, including fugitive dust.

9 Compliance with the NAAQS and with the Utah state implementation plan (Utah Air Quality Board
10 2006), along with a quantitative analysis of potential air quality impacts for project-specific
11 developments, would help maintain air quality in the planning area.

12 An increase in fugitive dust from oil and gas production in the planning area could affect snowpacks.
13 According to the BLM's *Colorado Plateau Rapid Ecoregional Assessment Report*, "one of the farthest
14 reaching implications of wind-borne sediment is its effect on snowpack in downwind mountain ranges
15 and ultimately, on water yield to the Colorado River and its tributaries" (BLM 2012g). Modeling has
16 found that dust is reducing the flow on the Colorado River by 5%. In addition, early snowmelt from
17 accumulated dust is greater than the early snowmelt predicted for temperature and precipitation changes
18 caused by climate change. Areas near oil and gas wells are one of the factors that contribute to dust
19 production (BLM 2012g). Fugitive dust impacts would vary by alternative. Based on the amount of
20 estimated surface disturbance and air quality BMPs, Alternative A has the potential to create the most
21 fugitive dust, followed by Alternatives C, D, and B.

22 Prohibiting or avoiding surface-disturbing activities during the migratory bird nesting season (April 15
23 through August 1) and restricting surface-disturbing activities near special status species' habitats and in
24 pronghorn fawning season (May 15 through June 15) could reduce air emissions during these timeframes.
25 However, these restrictions could compress air emissions into the remaining months (such as fall and
26 winter).

27 **4.2.5 Impacts from Alternative A (No Action)**

28 Under Alternative A, approximately 399,462 acres would be open to oil and gas leasing subject to
29 standard terms and conditions, approximately 19,083 acres would be open to oil and gas leasing subject to
30 CSU and/or TL stipulations, approximately 33,627 acres would be open to oil and gas leasing subject to
31 an no surface occupancy (NSO) stipulation, and approximately 220 acres would be closed to oil and gas
32 leasing. Reasonably foreseeable development under Alternative A is estimated to consist of 28 wells.
33 These wells would result in approximately 541 acres of surface disturbance, of which 86 acres would
34 remain unreclaimed in 15 years. Geophysical survey operations under Alternative A would be anticipated
35 to result in 305 acres of surface disturbance, of which approximately 61 acres would be unreclaimed in 15
36 years. This is the largest amount of anticipated surface disturbance and developed wells under all four
37 alternatives. Of the 28 developed wells, 17 are expected to become successful producing wells under
38 Alternative A (see Appendix A).

39 No lease stipulations for air quality would be applied under Alternative A.

40 Under Alternative A, no BMPs would be applied specifically to protect air quality; however, BMPs
41 requiring interim reclamation, the repair of eroded roads, final reclamation, the drilling multiple wells
42 from a single well pad, and the use of common rights-of-way (ROWS) would help limit impacts to air
43 quality.

44 Under Alternative A, several air quality lease notices would be attached to all issued leases. A condition
45 of approval would be attached to all applications for permit to drill (APDs) requiring that new and
46 replacement internal oil and gas field engines shall not emit more than 1 or 2 grams of NO_x per

1 horsepower-hour, depending on the engine design. In addition, a list of air quality mitigation measures
2 would be applied to any development proposals on leases, including keeping all internal combustion
3 equipment in working order, using water or other dust suppressants at construction sites and along roads,
4 and equipping drill rigs with Tier II or better engines. Finally, BMPs would be required for any
5 development project, including the use of low-bleed or no-bleed pneumatic pump valves and tank
6 emission controls to +95% efficiency. The conditions of approval, mitigation measures, and BMPs in
7 these lease notices would reduce some impacts to air quality.

8 **4.2.5.1** *Suspended and Protested Lease Decisions*

9 Under Alternative A, 45,043 acres of the suspended and protested leases would be issued subject to
10 standard terms and conditions, and 113 acres of protested leases would be issued subject to NSO
11 stipulations. If the leases were subsequently developed, the impacts to air quality from issuing the leases
12 subject to the terms and conditions contained within the Price and Richfield ROD/RMPs (BLM 2008a,
13 2008b) (Alternative A-2) would be the same as the impacts to air quality from managing them as open or
14 NSO described in this section. If the BLM were to rescind the suspensions on the suspended leases
15 (Alternative A-1) and the leases were subsequently developed, the impacts to air quality that would occur
16 in the leased areas would be the same as those described for areas managed as open to leasing subject to
17 standard terms and conditions. Under Alternative A-2, the suspended leases would be subject to the
18 conditions, including stipulations and BMPs, in the Richfield ROD/RMP (BLM 2008b). Because there
19 are no air quality stipulations or BMPs in the Richfield ROD/RMP, impacts to air quality from oil and gas
20 development in the suspended and protested lease areas would be the same as under Alternative A-1
21 where the leasing categories are the same. However, it is possible that Alternative A-2 stipulations for
22 other resources, such as the CSU and/or TL stipulation that surface-disturbing activities must meet visual
23 resource management (VRM) Class II objectives or the NSO stipulation for slopes greater than 40%,
24 could slightly reduce fugitive dust emissions when compared to Alternative A-1.

25 Under both Alternatives A-1 and A-2, if a lessee proposes to develop these leases (e.g., drill a well), the
26 BLM would evaluate the lessee's proposal in a site-specific environmental review. If during the site-
27 specific environmental review process the BLM determines that additional mitigation measures are
28 required to protect air quality, those mitigation measures would be included as conditions of approval to
29 future site-specific authorizations (e.g., emission control requirements).

30 **4.2.6** **Impacts from Alternative B**

31 Under Alternative B, no acreage would be open to oil and gas leasing subject to standard terms and
32 conditions, approximately 98,164 acres would be open to oil and gas leasing subject to CSU and/or TL
33 stipulations, approximately 324,161 acres would be open to oil and gas leasing subject to an NSO
34 stipulation, and approximately 30,068 acres would be closed to oil and gas leasing. Reasonably
35 foreseeable development under Alternative B is estimated to consist of seven wells. These wells would
36 result in approximately 127 acres of surface disturbance, of which 20 acres would remain unreclaimed in
37 15 years. Geophysical survey operations under Alternative B would be anticipated to result in 72 acres of
38 surface disturbance, of which approximately 14 acres would be unreclaimed in 15 years. This is the
39 smallest amount of anticipated surface disturbance and developed wells under all four alternatives. Of the
40 seven developed wells, four are expected to become successful producing wells under Alternative B (see
41 Appendix A).

42 Alternative B would apply a CSU and/or TL stipulation to mitigate impacts to air quality requiring that all
43 new and replacement internal combustion gas field engines not emit more than 1 or 2 grams of NO_x per
44 horsepower-hour, depending on the design-rated horsepower of the engine. Alternative B would also
45 apply a CSU and/or TL stipulation to mitigate impacts to regional ozone formation and AQRVs in nearby
46 national parks requiring 1) that drill rig engines meet Tier II or better standards as necessary based on air
47 quality conditions; 2) that stationary internal combustion engines meet a standard of 1 or 2 grams of NO_x

1 per horsepower-hour, depending on the design-rated horsepower of the engine; 3) the use of low-bleed or
2 no-bleed pneumatic controllers; 4) the use of dehydrator VOC emission controls; and 5) the use of VOC
3 emission controls. Alternative B would also apply an air quality CSU and/or TL stipulation requiring the
4 use of a combustor or other best available technologies in the absence of a pipeline to capture gas
5 associated with production from an oil well. Venting or open flaring of gases would be prohibited. To
6 mitigate PM, Alternative B would apply a CSU stipulation requiring a fugitive dust control plan for oil
7 and gas activities that disturb an area larger than 0.25 acre or that would result in substantial increases in
8 truck traffic on unpaved or untreated surfaces. There would be no exceptions, modifications, or waivers to
9 these stipulations.

10 Multiple BMPs would be applied under Alternative B for air quality and fugitive dust, including using
11 dust suppressants, properly maintaining vehicles and construction equipment to minimize exhaust
12 emissions, restricting vehicle speed, watering or chemically stabilizing unpaved roads, covering or
13 treating loaded haul trucks to minimize loss of material, centralizing gas processing facilities, carpooling,
14 using solar power to power well site equipment when possible, installing vapor recovery tanks on all oil
15 and condensate tanks, and using controls to reduce elemental carbons and NO_x from engines.

16 Under Alternative B, stipulations for other resources such as lands with wilderness characteristics
17 (LWCs), recreation, soils, water resources, areas of critical environmental concern (ACECs), the Old
18 Spanish National Historic Trail (OST), wild and scenic rivers, visual resources, and wildlife would also
19 help limit impacts to air quality because the amount of surface disturbance would be reduced. For
20 example, an NSO stipulation would be applied to visual resource inventory (VRI) and VRM Class II
21 areas and to special recreation management areas (SRMAs), key observation points (KOPs), and
22 recreation focus areas.

23 Alternative B would have the smallest impact to air quality among the four alternatives, based on the low
24 amount of projected wells and surface disturbance (seven wells; 199 acres), the percentage of the
25 planning area that would have an NSO stipulation or be closed to development (78.3%), and the CSU
26 and/or TL stipulations and BMPs that would be implemented to control pollutant emissions.

27 **4.2.6.1 *Suspended and Protested Lease Decisions***

28 Under Alternative B, the BLM would cancel all suspended leases, resolve the protests on the protested
29 leases, and deny the leases. Air quality in the areas of suspended and protested leases would not be
30 affected by oil and gas activities resulting from operators exploring for and developing oil and gas
31 resources. However, air quality in the areas of suspended and protested leases could be affected by
32 development in other parts of the planning area.

33 **4.2.7 *Impacts from Alternative C***

34 Under Alternative C, 37,865 acres would be open to oil and gas leasing subject to standard terms and
35 conditions, approximately 362,127 acres would be open to oil and gas leasing subject to CSU and/or TL
36 stipulations, approximately 52,208 acres would be open to oil and gas leasing subject to an NSO
37 stipulation, and approximately 192 acres would be closed to oil and gas leasing. Reasonably foreseeable
38 development under Alternative C is estimated to consist of 27 wells. These wells would result in
39 approximately 517 acres of surface disturbance, of which 82 acres would remain unreclaimed in 15 years.
40 Geophysical survey operations under Alternative C would be anticipated to result in 292 acres of surface
41 disturbance, of which approximately 58 acres would be unreclaimed in 15 years. This is slightly less than
42 the anticipated surface disturbance and developed wells under Alternative A, but more than the
43 anticipated surface disturbance and developed wells under Alternatives B and D. Of the 27 developed
44 wells, 16 are expected to become successful producing wells under Alternative C (see Appendix A).

1 Alternative C would apply a CSU and/or TL stipulation to mitigate impacts to regional O₃ formation and
2 AQRVs in nearby national parks requiring 1) that drill rig engines meet Tier II or better standards as
3 necessary based on air quality conditions; 2) that stationary internal combustion engines meet a standard
4 of 1 or 2 grams NO_x per horsepower-hour, depending on the design-rated horsepower of the engine; 3) the
5 use of low-bleed or no-bleed pneumatic controllers; 4) the use of dehydrator VOC emission controls; and
6 5) the use of tank VOC emission controls. Alternative C would also apply an air quality CSU and/or TL
7 stipulation requiring, where feasible, the use of a combustor or other best available technologies in the
8 absence of a pipeline to capture gas associated with production from an oil well. Venting or open flaring
9 of gases would be prohibited except in circumstances identified in existing rules. There would be no other
10 exceptions, modifications, or waivers to these stipulations.

11 Alternative C would apply the same BMPs as Alternative B.

12 Under Alternative C, stipulations for other resources such as LWCs, natural areas, recreation, soils, water
13 resources, ACECs, the OST, wild and scenic rivers, and wildlife would also help limit impacts to air
14 quality because the amount of surface disturbance would be reduced. For example, an NSO stipulation
15 would be applied to the Dirty Devil/French Springs LWC units, including Horseshoe Canyon South, and
16 within 1 mile of the Horseshoe Canyon rim.

17 A condition of approval would be attached to all APDs under Alternative C requiring that new and
18 replacement internal oil and gas field engines shall not emit more than 1 or 2 grams of NO_x per
19 horsepower-hour, depending on the engine design.

20 Impacts to air quality from Alternative C would be greater than under Alternatives B and D, but less than
21 Alternative A, based on the amount of projected wells and surface disturbance (27 wells; 809 acres), the
22 percentage of the planning area that would have an NSO stipulation or be closed to development (11.6%),
23 and the CSU and/or TL stipulations and BMPs that would be implemented to control pollutant emissions.

24 **4.2.7.1** *Suspended and Protested Lease Decisions*

25 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
26 standard terms, 39,766 acres would be issued subject to CSU or TL stipulations, and 318 acres would be
27 issued subject to NSO stipulations. If the leases were subsequently developed, the impacts of modifying
28 the terms and conditions of the suspended and protested leases and issuing the leases consistent with
29 Alternative C would be the same as the impacts to air quality described in this section from managing
30 areas as open to leasing subject to standard terms and conditions, open to leasing subject to CSU or TL
31 stipulations, or open to leasing subject to NSO stipulations.

32 **4.2.8** **Impacts from Alternative D**

33 Under Alternative D, no acreage would be open to oil and gas leasing subject to standard terms and
34 conditions, approximately 339,884 acres would be open to oil and gas leasing subject to CSU and/or TL
35 stipulations, approximately 92,170 acres would be open to oil and gas leasing subject to an NSO
36 stipulation, and approximately 20,339 acres would be closed to oil and gas leasing. Reasonably
37 foreseeable development under Alternative D is estimated to consist of 23 wells. These wells would result
38 in approximately 440 acres of surface disturbance, of which 70 acres would remain unreclaimed in 15
39 years. Geophysical survey operations under Alternative D would be anticipated to result in 248 acres of
40 surface disturbance, of which approximately 50 acres would be unreclaimed in 15 years. This is the less
41 than the anticipated surface disturbance and developed wells under Alternatives A and C, but more than
42 the anticipated surface disturbance and developed wells under Alternative B. Of the 23 developed wells,
43 14 are expected to become successful producing wells under Alternative D (see Appendix A).

1 Alternative D would apply the same CSU and/or TL stipulation to mitigate impacts to air quality as
2 Alternative B, requiring that all new and replacement internal combustion gas field engines not emit more
3 than 1 or 2 grams of NO_x per horsepower-hour, depending on the design-rated horsepower of the engine.
4 Alternative D would also apply a CSU and/or TL stipulation to mitigate impacts to regional O₃ formation
5 and AQRVs in nearby national parks requiring 1) that drill rig engines meet Tier II or better standards as
6 necessary based on air quality conditions; 2) that stationary internal combustion engines meet a standard
7 of 1 or 2 grams NO_x per horsepower-hour, depending on the design-rated horsepower of the engine; 3) the
8 use of low-bleed or no-bleed pneumatic controllers; 4) the use of dehydrator VOC emission controls; and
9 5) the use of tank VOC emission controls. Alternative D would also apply an air quality CSU and/or TL
10 stipulation requiring the use of a combustor or other best available technologies in the absence of a
11 pipeline to capture gas associated with production from an oil well. Evaluation of all reasonable and
12 technically feasible gas capture technologies would be required as part of operator plan approvals.
13 Venting or open flaring of gases would be prohibited, except in circumstances identified in existing rules.
14 In the case of an exception, a visual screen would be required to minimize skyglow, glare, and adverse
15 visual effects on night sky resources. To mitigate PM, Alternative D would apply a CSU stipulation
16 requiring a fugitive dust control plan for oil and gas activities that disturb an area larger than 0.25 acre or
17 that would result in substantial increases in truck traffic on unpaved or untreated surfaces.

18 Alternative D would apply the same BMPs as Alternative B.

19 Under Alternative D, stipulations for other resources such as LWCs, natural areas, recreation, soils, water
20 resources, ACECs, the OST, and wildlife would also help limit impacts to air quality. For example, a
21 CSU and/or TL stipulation would be applied to avoid areas with high wind erosion potential, and an NSO
22 stipulation would be applied to the Tidwell Draw and Dry Lake Archaeological District ACECs under
23 this alternative.

24 Impacts to air quality under Alternative D would be greater than under Alternative B, but less than
25 Alternatives A and C, based on the amount of projected wells and surface disturbance (23 wells; 688
26 acres), the percentage of the planning area that would have an NSO stipulation or be closed to
27 development (24.9%), and the CSU and/or TL stipulations and BMPs that would be implemented to
28 control pollutant emissions

29 **4.2.8.1 *Suspended and Protested Lease Decisions***

30 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to CSU
31 or TL stipulations, and 3,132 acres would be issued subject to NSO stipulations. If the leases were
32 subsequently developed, the impacts of modifying the terms and conditions of the suspended and
33 protested leases and issuing the leases consistent with Alternative D would be the same as the impacts to
34 air quality from managing lands as open to leasing subject to CSU or TL stipulations, or open to leasing
35 subject to NSO stipulations described in this section.

36 **4.3 CLIMATE CHANGE**

37 This section presents potential impacts to climate change from implementation of the management actions
38 presented in Chapter 2. Existing conditions for climate change in the analysis area are described in
39 Chapter 3.

40 **4.3.1 Assumptions**

- 41 • All federal and state air quality requirements would be met.

- The quantitative analysis includes only GHG emissions from oil and natural gas well development on BLM-administered public lands. Activities related to other resources and uses, such as recreation, lands and realty actions, prescribed burning, vegetation management, and transportation, are assumed to be minor sources of GHG emissions or are not well-defined concerning GHG emission rates and levels, and therefore GHG emissions from these activities were not quantified.
- Generic emissions estimates and profiles were used to estimate GHG emissions for a variety of oil and gas activities and equipment.

4.3.2 Oil and Gas Development GHG Emissions Estimates

CEQ Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews (CEQ 2016:10) recommends that agencies “use the projected GHG emissions associated with proposed actions as a proxy for assessing proposed actions’ potential effects on climate change in NEPA analysis.” In addition, the CEQ recommends inclusion of a qualitative summary discussion of the impacts of GHG emissions. Section 3.3 contains a qualitative summary discussion of general GHG emission impacts, and this section provides estimated GHG emissions from the projected oil and gas development in the planning area.

Direct GHG emissions estimates for oil and gas development in the planning area were calculated using the Oil Template from the Emissions Inventory Toolkit developed for the BLM by URS Corporation (URS 2012). The template calculates direct emissions of criteria pollutants (NO_x, PM_{2.5}, PM₁₀, SO₂), VOCs, HAPs, and GHGs (CO₂, CH₄, and N₂O) based on the level of production and number of wells drilled. Criteria pollutant, VOC, and HAP emissions are discussed in Section 4.2.2. A summary of direct GHG emissions from projected oil and gas development in the planning area is shown in Table 4-4. The table discloses estimated annual emissions from construction, operations, maintenance, and reclamation based on the drilling of two wells per year for 15 years for a total of 30 wells (see Appendix A).

Table 4-4. Direct GHG Emissions from Projected Oil and Gas Development in the Planning Area

Planning Area Oil and Gas Development	Total Annual GHG Emissions (tons per year)			
	CO ₂	CH ₄	N ₂ O	CO ₂ e*
Construction	4,664.1	18.6	0.1	4,611.4
Operations	4,353.4	1,638.7	0.1	35,216.3
Maintenance	520.2	0.004	0.03	480.3
Reclamation	76.2	0.001	0.001	69.5
Total annual emissions	9,613.9	1,657.3	0.3	40,377.6

*Total CO₂e emissions are calculated using the global warming potential (GWP) of each gas. GWPs were developed to allow comparisons of global warming impacts between different gases. The GWP is a measure of the total energy that a gas absorbs over a particular period of time (usually 100 years) compared to CO₂. The larger the GWP, the more warming the gas causes. CO₂e is calculated by multiplying the mass emissions of the GHG by the GWP for the GHG. CO₂e totals in this column are in metric tons.

Note: Numbers may not match due to rounding.

1 Indirect GHG emissions would also occur from the combustion of the oil and gas extracted from the
 2 planning area (Table 4-5). Indirect GHG emissions are estimated based on the speculative annual oil and
 3 gas production for 30 operating wells at build-out (year 15). This is a conservative estimate because
 4 Alternative A is projected to have 17 producing wells, Alternative B is projected to have four producing
 5 wells, Alternative C is projected to have 16 producing wells, and Alternative D is projected to have 14
 6 producing wells (assuming a 60% success rate for all wells drilled). Indirect GHG emissions are
 7 calculated only for CO₂ based on combustion of the product. For the purposes of the emissions estimates,
 8 the BLM assumed that each oil well would produce an average of 550 barrels of oil per day and that each
 9 natural gas well would produce an average of 238 million cubic feet per day.

10 **Table 4-5. Indirect GHG Emissions from Projected Oil and Gas Development in the Planning Area**

Fuel Type	Annual Production	Annual CO ₂ Emissions (tons per year)
Oil	6,022,500 barrels per year	2,589,675
Natural gas	2,606,100 million cubic feet per year	142,598
Total emissions	N/A	2,732,273

11 Note: The indirect emissions factor for oil is 0.43 metric tons of CO₂ per barrel. The indirect emissions factor for natural gas is 0.054717 metric
 12 tons of CO₂ per million cubic feet (EPA 2017c).

13 Because it is not possible to assign a “significance” value or impact to these numbers, the emissions
 14 estimates themselves are presented as a proxy for impact. This is consistent with CEQ guidance (CEQ
 15 2016).

16 **4.3.2.1 Uncertainties of GHG Calculations**

17 Although estimates of potential GHG emissions associated with reasonably foreseeable oil and gas
 18 development have been presented, there is significant uncertainty in these estimates because eventual
 19 production volumes are unknown and because of the variability in flaring, construction, and
 20 transportation.

21 There is also uncertainty with regard to the net effects of reasonably foreseeable oil and gas development
 22 on climate; although BLM actions may contribute to the climate change phenomenon, the specific effects
 23 of those actions on the global climate are speculative, given the current state of the science. Inconsistencies
 24 in the results of scientific models designed to predict climate change on regional or local scales limit the
 25 ability to quantify potential future impacts of decisions made at this level. Determining the significance of
 26 any discrete amount of GHG emissions is beyond the limits of existing science at this time.

27 **End Uses**

28 The GHG emissions estimates provide a complete GHG lifecycle of a well from site inspection to
 29 potential indirect emissions through combustion. Rough estimates were possible using publicly available
 30 information and future production estimates for reasonably foreseeable development. With respect to
 31 indirect CO₂ emissions estimates, it is a difficult to discern with certainty what end uses might be
 32 reasonably foreseeable for the fuels extracted from a particular leasehold. For instance, end uses of fossil
 33 fuels extracted from federal leases can include combustion of transportation fuels, combustion of fuel oils
 34 for heating and electricity generation, production of asphalt and road oil, and production of the feedstocks
 35 used to make chemicals, plastics, and synthetic materials. At this time, there is uncertainty with regard to
 36 the actual development that may occur in the planning area.

1 It is important to note that the BLM does not exercise control over the specific end use of the oil and gas
2 produced from any individual federal lease. The BLM has no authority to direct or regulate the end use of
3 produced oil and/or gas. As a result, the BLM can only provide an estimate of potential GHG emissions
4 using national approximations of where or how the end use may occur based on the variety of potential
5 end uses for oil, condensate, and natural gas.

6 **Availability of Input Data**

7 As noted above, the CEQ recommends that agencies use projected GHG emissions as a proxy for
8 assessing a proposed action’s potential climate change impacts. Emissions estimates were made based on
9 readily available data and reasonable assumptions about potential future development.

10 **4.3.2.2 Monetizing Costs and Benefits: Social Cost of Greenhouse Gases**

11 The 2016 CEQ guidance states that “NEPA does not require monetizing costs and benefits” and allows
12 for agency discretion in including monetized assessment of the impacts of GHGs in NEPA documents
13 (CEQ 2016). The BLM finds that including monetary estimates of the social cost of GHGs in its NEPA
14 analysis for the proposed oil and gas development in the planning area would not be useful. There is no
15 court case or existing guidance requiring the inclusion of the social cost of carbon in the NEPA context.
16 Estimating the social cost of carbon is challenging because it is intended to model effects on the welfare
17 of future generations at a global scale caused by additional carbon emissions occurring in the present.
18 Although the Interagency Working Group on Social Cost of Carbon, convened by the U.S. Office of
19 Management and Budget, has developed estimates of the social cost of CO₂, CH₄, and NO_x emissions, the
20 inclusion of meaningful monetary estimates of the social cost of carbon would not provide additional
21 pertinent information to the decision maker in this case.

22 Given the global nature of climate change, estimating the social cost of carbon for an individual decision
23 requires assessing the impact of the project on the global market for the commodity in question. While the
24 BLM is able to estimate the GHG emissions associated with reasonably foreseeable oil and gas
25 development, this EA does not estimate the net effect of this action on global GHG emissions or climate
26 change. Depending on the global demand for oil and gas, the net effect of this project may be partially
27 offset by changes in production in other locations. Accounting for this potential substitution effect is
28 technically challenging.

29 **4.3.2.3 Possible Future Best Management Practices, Standard Operating Procedures, 30 and/or Mitigation Measures**

31 The BLM holds regulatory jurisdiction over portions of natural gas and petroleum systems identified in
32 the EPA’s Inventory of U.S. Greenhouse Gas Emissions and Sinks (EPA 2016m). Exercise of this
33 regulatory jurisdiction has led to the development of BMPs for application to oil and natural gas drilling
34 and production to help ensure that energy development is conducted in an environmentally responsible
35 manner. The BLM encourages industry to incorporate and implement these BMPs to reduce impacts to air
36 quality and climate change by addressing emissions, surface disturbance, and dust from field production
37 and operations. Typical BMPs include the following:

- 38 • Open burning of garbage or refuse would not occur at well sites or other facilities.
- 39 • Drill rigs would be equipped with Tier II or better diesel engines.
- 40 • Vent emissions from stock tanks and natural gas triethylene glycol (TEG) dehydrators would be
41 controlled by routing the emissions to a flare or similar control device, which would reduce
42 emissions by 95% or greater.

- 1 • All internal combustion equipment would be kept in good working order.
- 2 • Flare hydrocarbon gases at high temperatures in order to reduce emissions of incomplete
- 3 combustion through the use of multi-chamber combustors.
- 4 • Water dirt roads during periods of high use to reduce fugitive dust emissions.
- 5 • Co-locate wells and production facilities to reduce new surface disturbances.
- 6 • Use natural gas-fired or electric drill rig engines.
- 7 • Use selective catalytic reducers and low-sulfur fuel for diesel-fired drill rig engines.
- 8 • Adhere to the BLM's Notice to Lessees 4A concerning the venting and flaring of gas on federal
- 9 leases for natural gas emissions that cannot be economically recovered.
- 10 • Protect hydraulic fracturing sand from wind erosion.
- 11 • Implement directional drilling and horizontal completion technologies, where one well provides
- 12 access to petroleum resources that would normally require the drilling of several vertical
- 13 wellbores.
- 14 • Require that vapor recovery systems be maintained and functional in areas where petroleum
- 15 liquids are stored.
- 16 • Perform interim reclamation to reclaim areas of pads not required for production facilities and to
- 17 reduce the amount of dust from pads.

18 **4.3.3 Impacts Common to All Alternatives**

19 Attaching lease notices and stipulations to permitted activities, not allowing mineral leasing, and the use
 20 of air quality and climate change BMPs would reduce impacts to climate change by limiting activities that
 21 increase GHG emissions.

22 Compliance with the NAAQS and the Utah State Implementation Plan, along with quantitative analysis of
 23 potential air quality impacts for project-specific developments, would help maintain air quality in the
 24 planning area and reduce climate change impacts.

25 The primary sources of GHG gas emissions from oil and gas development in the planning area would be
 26 fossil fuel combustion (e.g., from vehicles driving to and from well sites and from engines that drive drill
 27 rigs); fugitive methane that escapes from oil and gas wells, oil storage, and various types of processing
 28 equipment; and the combustion of produced oil and gas.

29 Oil and gas development in the planning area will increase GHG emissions that contribute to climate
 30 change impacts.

31 On the Colorado Plateau, climate change is expected to intensify the hydrologic cycle (resulting in more-
 32 intense runoff), reduce streamflow, cause declines in native fish diversity, increase soil erosion, increase
 33 non-native species populations, increase the frequency and intensity of fire, and shift vegetation
 34 composition, diversity, and growth (BLM 2012g). Some of these impacts, such as increased soil erosion
 35 and increased frequency and intensity of fire, could reduce air quality in the analysis area through fugitive
 36 dust and other pollutant emissions, which could trigger additional federal protections for air quality.
 37 However, the projected oil and gas development in the planning area would not necessarily be subject to
 38 the full extent of these expected climate change impacts because of its relatively short project life.

1 **4.3.4 Impacts from Alternative A (No Action)**

2 Under Alternative A, approximately 399,462 acres would be open to oil and gas leasing subject to
3 standard terms and conditions; approximately 19,083 acres would be open to oil and gas leasing subject to
4 CSU/TL stipulations; approximately 33,627 acres would be open to oil and gas leasing subject to an NSO
5 stipulation; and approximately 220 acres would be closed to oil and gas leasing. Reasonably foreseeable
6 development under Alternative A is estimated to consist of 28 wells. Of the 28 developed wells, 17 would
7 be expected to become successful producing wells under this alternative (see Appendix A). Alternative A
8 would result in the greatest number of developed and producing wells of all four alternatives.

9 No lease stipulations for air quality or climate change would be applied under Alternative A. There are no
10 BMPs under Alternative A that would be applied specifically to limit GHG emissions; however, BMPs
11 that require centralizing production facilities, the drilling of multiple wells from a single well pad, and
12 bioremediation of oil field wastes and spills could help limit GHG emissions. In addition, the BLM's
13 Alternative A condition of approval for applications for permits to drill, which establishes emissions
14 limitations on internal gas field engines, could reduce GHG emissions.

15 **4.3.4.1 *Suspended and Protested Lease Decisions***

16 Under Alternative A, 45,043 acres of the suspended and protested leases would be issued subject to
17 standard terms and conditions and 113 acres of protested leases would be issued subject to NSO
18 stipulations. If the leases were subsequently developed, the impacts on climate change from issuing the
19 leases subject to the terms and conditions contained within the Price and Richfield Field Offices'
20 ROD/RMPs (Alternative A-2) would be the same as the impacts on climate change from managing them
21 as open subject to standard terms and conditions or subject to NSO stipulations, as described in this
22 section. If the BLM were to rescind the suspensions on the suspended leases (Alternative A-1) and the
23 leases were subsequently developed, the impacts on climate change that would occur in the leased areas
24 would be the same as those described for climate change in areas open to leasing subject to standard terms
25 and conditions. Under Alternative A-2, the suspended leases would be subject to the conditions, including
26 stipulations and BMPs, in the Richfield Field Office ROD/RMP. Because there are no climate change or
27 air quality stipulations or BMPs in that ROD/RMP, impacts to climate change from oil and gas
28 development in the suspended and protested lease areas would be the same as under Alternative A-1,
29 where the leasing categories are the same.

30 Under both Alternatives A-1 and A-2, if a lessee proposes to develop these leases (e.g., drill a well), the
31 BLM would evaluate the lessee's proposal in a site-specific environmental review. If during the site-
32 specific environmental review process the BLM determines that additional mitigation measures are
33 required to protect resources of concern, those mitigation measures would be included as conditions of
34 approval to future site-specific authorizations (e.g., application of appropriate BMPs).

35 **4.3.5 Impacts from Alternative B**

36 Under Alternative B, no acreage would be open to oil and gas leasing subject to standard terms and
37 conditions; approximately 98,164 acres would be open to oil and gas leasing subject to CSU/TL
38 stipulations; approximately 324,161 acres would be open to oil and gas leasing subject to an NSO
39 stipulation; and approximately 30,068 acres would be closed to oil and gas leasing. Reasonably
40 foreseeable development under Alternative B is estimated to consist of seven wells. Of the seven
41 developed wells, four would be expected to become successful producing wells under this alternative (see
42 Appendix A). Alternative B would result in the fewest developed and producing wells under all four
43 alternatives.

44 Although there are no stipulations under Alternative B specifically for climate change, the air quality
45 stipulations for this alternative (see Section 4.2.6) would help reduce GHG emissions. There would be no
46 exceptions, modifications, or waivers to these stipulations.

1 Multiple BMPs would be applied under Alternative B for greenhouse gases, including the proper
2 maintenance of vehicles and construction equipment to minimize exhaust emissions, vehicle speed
3 restrictions, use of telemetry and well automation to remotely monitor and control production, use of
4 centrally stored water that is piped to the well pads through a temporary surface line, centralizing or
5 consolidating gas processing facilities (e.g., separation, dehydration, sweetening), carpooling, use of solar
6 power to power well site equipment when possible, installation of vapor recovery tanks on all oil and
7 condensate tanks, and use of controls to reduce elemental carbons and NO_x from engines.

8 Alternative B would have the smallest impact on climate change of the four alternatives, based on the
9 extent of development and production (seven wells developed and four producing wells).

10 **4.3.5.1** *Suspended and Protested Lease Decisions*

11 Under Alternative B, the BLM would cancel all suspended leases and resolve the protests on the protested
12 leases and deny the leases. Climate change would not be affected by greenhouse gas emissions resulting
13 from operators exploring for and developing oil and gas resources in suspended and protested lease areas.

14 **4.3.6** **Impacts from Alternative C**

15 Under Alternative C, 37,865 acres would be open to oil and gas leasing subject to standard terms and
16 conditions; approximately 362,127 acres would be open to oil and gas leasing subject to CSU/TL
17 stipulations; approximately 52,208 acres would be open to oil and gas leasing subject to an NSO
18 stipulation; and approximately 192 acres would be closed to oil and gas leasing. Reasonably foreseeable
19 development under Alternative C is estimated to consist of 27 wells. Of the 27 developed wells, 16 would
20 be expected become successful producing wells under this alternative (see Appendix A). Alternative C
21 would result in slightly fewer developed and producing wells than would Alternative A but more than
22 would Alternatives B and D.

23 Although there are no stipulations under Alternative C specifically for climate change, the air quality
24 stipulations for this alternative (see Section 4.2.7) would help reduce GHG emissions. Venting or flaring
25 would be prohibited except in circumstances identified in existing rules. Allowing exceptions for venting
26 or flaring as identified in existing rules would increase GHG emissions; such emissions would be similar
27 to the emissions from Alternative A, which does not prohibit venting or flaring.

28 Alternative C would apply the same BMPs as would Alternative B.

29 Impacts to climate change under Alternative C would be greater than those under Alternatives B and D
30 but slightly less than those under Alternative A, based on the extent of development and production (27
31 wells developed and 16 producing wells).

32 **4.3.6.1** *Suspended and Protested Lease Decisions*

33 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
34 standard terms and conditions, 39,766 acres would be issued subject to CSU/TL stipulations, and 318
35 acres would be issued subject to NSO stipulations. If the leases were subsequently developed, the impacts
36 of modifying the terms and conditions of the suspended and protested leases and issuing the leases
37 consistent with Alternative C would be the same as the impacts to climate change described in this section
38 from managing areas as open to leasing subject to standard terms and conditions, open to leasing subject
39 to CSU/TL stipulations, or open to leasing subject to NSO stipulations.

40 **4.3.7** **Impacts from Alternative D**

41 Under Alternative D, no acreage would be open to oil and gas leasing subject to standard terms and
42 conditions; approximately 339,884 acres would be open to oil and gas leasing subject to CSU/TL
43 stipulations; approximately 92,170 acres would be open to oil and gas leasing subject to an NSO
44 stipulation; and approximately 20,339 acres would be closed to oil and gas leasing. Reasonably

1 foreseeable development under Alternative D is estimated to consist of 23 wells. Of the 23 developed
2 wells, 14 would be expected become successful producing wells under this alternative (see Appendix A).
3 Alternative D would result in fewer developed and producing wells than would Alternatives A and C but
4 more than would Alternative B.

5 Although there are no stipulations under Alternative D specifically for climate change, the air quality
6 stipulations for this alternative (see Section 4.2.8) would help reduce GHG emissions. Venting or flaring
7 would be prohibited except in circumstances identified in existing rules. Allowing exceptions for venting
8 or flaring as identified in existing rules would increase GHG emissions; such emissions would be similar
9 to the emissions from Alternative A, which does not prohibit venting or flaring.

10 Alternative D would apply the same BMPs as would Alternative B.

11 Impacts to climate change under Alternative D would be greater than those under Alternative B but less
12 than those under Alternatives A and C, based on the extent of development and production (23 wells
13 developed and 14 producing wells).

14 **4.3.7.1 *Suspended and Protested Lease Decisions***

15 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to
16 CSU/TL stipulations, and 3,132 acres would be issued subject to NSO stipulations. If the leases were
17 subsequently developed, the impacts of modifying the terms and conditions of the suspended and
18 protested leases and issuing the leases consistent with Alternative D would be the same as the impacts to
19 climate change from managing lands as open to leasing subject to CSU/TL stipulations, or open to leasing
20 subject to NSO stipulations, as described in this section.

21 **4.4 SOIL RESOURCES**

22 This section presents potential impacts to soil resources from implementing management actions
23 presented in Chapter 2. Existing conditions concerning soil resources are described in Chapter 3.

24 **4.4.1 Assumptions**

- 25 • Wind and water erosion are the primary mechanisms for loss of soil productivity.
- 26 • Wind erosion can impact soil productivity in a similar manner as water erosion.
- 27 • Eroded soil can be deposited as sediment at any point downslope or can be transported to the
28 drainage network and ultimately to water bodies such as streams, rivers, lakes, and reservoirs.
- 29 • The amount of sediment from upland soil erosion that is transported to streams and other water
30 bodies is dependent on distance to the water body, slope, soil texture, filtering capacity of upland
31 and riparian vegetation, storm intensity, duration, and runoff generated.
- 32 • The removal of vegetation or biological soils crusts increases soil susceptibility to erosion via
33 wind and water erosion by decreasing soil strength, reducing infiltration, increasing runoff,
34 altering soil structure, and reducing protection of the surface from raindrop impact.
- 35 • Vegetation and biological soil crusts increase soil organic matter, aggregation of soil particles,
36 and soil porosity, all of which increase soil resistance to erosion.
- 37 • Management actions that mitigate adverse impacts to soil and vegetation resources can help
38 minimize soil erosion and sediment, salt, and excess nutrient loading to water bodies.
- 39 • Short-term erosion impacts depend on soil texture and type, porosity and permeability, landscape
40 position, slope of the land, magnitude and type of disturbance, type of vegetation, and the length
41 of time it takes for the disturbed area to become revegetated with a self-sustaining, perennial plant
42 community.

- Long-term erosion impacts are those impacts that continue after vegetation has become reestablished. They are due in part to changes in the vegetation community but to a greater extent to a surface area that remains void of vegetation, such as pads and roads.
- When all other factors are held constant, the degree to which soils are impacted (i.e., erosion may occur) are proportional to the area disturbed.

4.4.2 Impacts Common to All Alternatives

The following discussions represent impacts on soil resources that would not vary by alternative.

Management of the Big Flat Tops ACEC as closed to oil and gas leasing and development would prevent surface disturbance, thereby maintaining vegetation, maintaining soil stabilization, preventing erosion and fugitive dust, and protecting biological crusts. This management would preclude impacts to soil resources from oil and gas development, including soil compaction and soil loss resulting from removal of vegetation, surface disturbance, and subsequent wind and water erosion within the ACEC.

Under all alternatives, surface-disturbing projects on steep slopes would be limited. Within the Price Field Office, surface-disturbing activities on slopes ranging from 21% to 40% would require an erosion-control strategy and topsoil segregation or restoration plan to be approved by the BLM before construction. In the Richfield Field Office, projects involving construction on slopes greater than 30% would be avoided. If an action cannot be avoided, rerouted, or relocated, then the proposed project would include an erosion-control strategy, reclamation, and site plan, with a detailed survey and design completed by a certified engineer. These actions would reduce the potential impacts on soils located on steep slopes, which are particularly susceptible to wind and water erosion following disturbances from oil and gas exploration and development.

4.4.3 Impacts from Alternative A (No Action)

Under Alternative A, approximately 399,462 acres would be open to oil and gas leasing subject to standard terms and conditions, approximately 19,083 acres would be open to oil and gas leasing subject to CSU and TL stipulations, approximately 33,626 acres would be open to oil and gas leasing subject to a NSO stipulation, and approximately 220 acres would be closed to oil and gas leasing. Table 4-6 shows the acres of sensitive soils that occur within the planning area within the areas that are open and closed for oil and gas leasing, as well as the acres of each type that occur within the areas stipulated as NSO, CSU, and TL for Alternative A.

Table 4-6. Sensitive Soils by Oil and Gas Leasing Category in Alternative A

Sensitive Soil Category	Open (acres)	CSU and TL (acres)	NSO (acres)	Closed (acres)
Slopes				
< 20%	380,552	18,155	29,518	168
21%–30%	9,494	453	1,646	12
31%–40%	4,266	207	915	7
> 40%	5,150	268	1,547	34
Saline Soils (Mancos Shale–derived soils)	21,804	3,392	267	0
Soils with High Erosion Potential	245,721	7,806	14,729	2

1 Under Alternative A, BLM would not apply a lease stipulation to minimize or mitigate wind erosion and
2 emissions of fugitive dust in areas characterized by fine sandy soils with high wind erosion potential.
3 These decisions would allow surface disturbance and disruption of existing soil crusts in these sandy soils
4 that are sensitive to disturbance and wind erosion and have been observed to be difficult to reclaim from
5 past disturbances. Surface disturbance in these areas could cause destabilization of dunes, loss of soil
6 crusts, increased wind and water erosion, and increased emissions of fugitive dust.

7 Under Alternative A, BLM would also not apply a TL stipulation requiring avoidance of disturbance to
8 saline soils in the Mancos Shale during the wet portions of the year. These soils are highly sensitive to
9 surface disturbance, and their erosion rates are easily accelerated. If a TL is not applied in these areas,
10 surface oil and gas exploration and development activities, including soil disturbance and mobilization of
11 soils from vehicle use, could occur during the wetter portions of the year. This disturbance could lead to
12 the erosion of saline soils and could affect the water quality of downstream waterbodies such as the Green
13 and Colorado Rivers. Effects could include increased salinity, selenium, and sediment loads and
14 associated water chemistry parameters (TDS, total suspended solids, etc.).

15 Under Alternative A, BLM would allow exceptions or modifications of the stipulation in the Price
16 ROD/RMP (BLM 2008a) that prohibits surface disturbance on slopes greater than 40%. Although BLM
17 would only allow exceptions or modifications to this stipulation when a more detailed analysis is
18 conducted and shows that impacts can be mitigated, allowing exceptions or modifications to this
19 stipulation would increase surface disturbance and soil destabilization in an area where the risk of soil
20 erosion is exceptionally high. Even with the implementation of measures and strategies to reduce the risk
21 of soil erosion, some loss of soils, increased wind and water erosion, and increased emissions of fugitive
22 dust would likely occur.

23 Under Alternative A, approximately 399,462 acres would be open to oil and gas leasing subject to
24 standard terms and conditions, and approximately 19,083 acres would be open to oil and gas leasing
25 subject to CSU and TL stipulations. None of the CSU or TL stipulations under Alternative A would
26 reduce impacts on soil resources. Managing these areas identified as open to leasing and development
27 subject to standard lease terms and conditions or CSU and TL stipulations would allow the development
28 of well pads and associated infrastructure, which would involve land-clearing and surface disturbances.
29 These actions remove and disturb vegetation and biological soil crusts, expose soils to the erosive forces
30 of water and wind, and result in soil erosion and a reduction of soil productivity in both the short term,
31 during construction activities, and in the long term, as permanent structures, such as well pads and roads
32 are maintained. Impacts could include reduced soil productivity; loss of soils from water and wind
33 erosion; long-term soil destabilization as a result of difficulties in reclamation; and increases in sediment,
34 salinity, and other soil-based pollutants in nearby waterways.

35 Under Alternative A, approximately 33,626 acres would be open to oil and gas leasing subject to an NSO
36 stipulation, and approximately 220 acres would be closed to oil and gas leasing. Applying an NSO
37 stipulation or closing areas to oil and gas leasing would prevent surface-disturbing activities from oil and
38 gas development within 100-year floodplains, steep slopes, natural springs, natural areas, SRMAs, and
39 ACECs. The NSO stipulations and decisions to close areas to leasing could protect soil resources present
40 in these areas from surface disturbance, prevent soil loss, reduce erosion and fugitive dust, prevent
41 mobilization of saline soil materials, and protect biological soil crusts. However, under Alternative A,
42 BLM would allow some exceptions, modifications, or waivers for NSO stipulations (e.g., in SRMAs
43 where oil and gas exploration and development would not impair identified scenic and primitive or semi-
44 primitive recreational resources, or on steep slopes where a more detailed analysis is conducted and
45 shows that impacts can be mitigated). Granting exceptions, modifications, or waivers to NSO stipulations
46 would allow impacts on soil resources from oil and gas development in areas where NSO stipulations are
47 applied. These impacts would be similar to the impacts on soils that would occur in areas that are open to
48 oil and gas leasing subject to standard terms and conditions.

1 Under Alternative A, geophysical operations could be allowed on lands closed to leasing or subject to
2 NSO stipulations under certain circumstances in the Richfield Field Office and would be allowed
3 consistent with existing regulations for geophysical exploration in the Price Field Office. Allowing
4 geophysical operations in areas closed to mineral leasing or subject to NSO stipulations would allow for
5 impacts to soil resources similar to the impacts to soils from geophysical operations that would occur in
6 areas that are open to oil and gas leasing subject to standard terms and conditions.

7 The BMPs that would be applied to oil and gas leases under Alternative A would require interim
8 reclamation of the well and access road to prevent and reduce soil erosion, beginning as soon as
9 practicable after a well is placed in production. Facilities would be grouped on the pads to allow for
10 maximum interim reclamation. Interim reclamation would include road cuts and fills and would extend to
11 within close proximity of the wellhead and production facilities. Final reclamation of all oil and gas
12 disturbance would involve recontouring of all disturbed areas, including access roads, to the original
13 contour or a contour that blends with the surrounding topography, and revegetating all disturbed areas.
14 Roads would follow the contour of the land where practical, and existing oil and gas roads that are in
15 eroded condition would be brought to BLM standards within a reasonable period of time. These
16 stipulations and BMPs would minimize impacts to soil resources by minimizing soil loss and erosion.

17 Under Alternative A, BLM estimates that 28 oil and gas wells would be drilled in the planning area over
18 the next 15 years. These wells would result in approximately 541 acres of surface disturbance, of which
19 86 acres would remain unreclaimed in 15 years. Geophysical survey operations under Alternative A are
20 anticipated to result in 305 acres of surface disturbance, of which approximately 61 acres would be
21 unreclaimed in 15 years. BMPs that would be applied to oil and gas leases under Alternative A for
22 reclamation and soils, including requirements for interim reclamation, would indirectly benefit soil
23 resources by minimizing soil loss and erosion. However, because of the difficulty in reclaiming surface
24 disturbances in the planning area, the areas that are reclaimed would not be anticipated to return to natural
25 conditions until 20 to 25 years or more after initial reclamation.

26 Out of all alternatives considered in the MLP/EA, Alternative A would be anticipated to result in the
27 greatest surface disturbance and impacts to soils. As described previously, surface disturbance can result
28 in increased erosion of soils, including increases in windblown dust that can be deposited on snow-
29 covered mountain peaks and cause earlier and faster snowmelt events. Although the magnitude of the
30 surface disturbance and the resulting increases in windblown dust under Alternative A would be minor
31 compared to the existing surface disturbance and associated generation of windblown dust in the
32 Colorado Plateau region, Alternative A would have the greatest anticipated surface disturbance and
33 resulting contribution to regional production, transport, and deposition of dust on snow-covered peaks.
34 The dust generated by oil and gas activities under Alternative A could have a minor contribution to earlier
35 and faster snowmelt events and reduced water yield to the Colorado River and its tributaries.

36 **4.4.3.1 *Suspended and Protested Lease Decisions***

37 Under Alternative A, 45,043 acres of suspended and protested leases would be issued subject to standard
38 terms and conditions, and 113 acres of protested leases would be issued subject to NSO stipulations.
39 Protested leases would be resolved and issued with terms and conditions that are consistent with the Price
40 ROD/RMP (BLM 2008a). The areas encompassed by the suspended and protested leases contain
41 sensitive soil resources, including steep slopes and sandy soils that are difficult to reclaim and are highly
42 susceptible to wind and water erosion.

43 Under Alternative A-1, BLM would rescind the suspensions on suspended leases. If those leases were
44 subsequently developed, the impacts to soils in the leased areas could be the same as those described in
45 this section as open to leasing subject to standard terms and conditions.

46 Under Alternative A-2, suspended leases would be subject to the terms and conditions contained within
47 the Richfield ROD/RMP (BLM 2008b). If those leases were subsequently developed, the impacts to soils

1 from issuing the leases subject to the terms and conditions contained within the Price and Richfield RMPs
 2 would be the same as the impacts described in this section to those managed as open or NSO. Under
 3 Alternative A-2, the suspended leases would be subject to the conditions, including reclamation
 4 stipulations and BMPs included in the Richfield ROD/RMP. Modifying the stipulations to be consistent
 5 with the Richfield ROD/RMP (Alternative A-2) would reduce long-term impacts to soils by improving
 6 the reclamation of disturbances, reestablishing vegetation, stabilizing soils, and preventing erosion
 7 resulting from oil and gas development activities compared to Alternative A-1.

8 **4.4.4 Impacts from Alternative B**

9 Under Alternative B, 0 acres would be open to oil and gas leasing subject to standard terms and
 10 conditions, approximately 98,164 acres would be open to oil and gas leasing subject to CSU and TL
 11 stipulations, approximately 324,161 acres would be open to oil and gas leasing subject to a NSO
 12 stipulation, and approximately 30,068 acres would be closed to oil and gas leasing. Table 4-7 shows the
 13 acres of sensitive soils that occur within the planning area within the areas that are open and closed for oil
 14 and gas leasing, as well as the acres of each type that occur within the areas stipulated as NSO, CSU, and
 15 TL for Alternative B.

16 **Table 4-7. Sensitive Soils by Oil and Gas Leasing Category in Alternative B**

Sensitive Soil Category	Open (acres)	CSU and TL (acres)	NSO (acres)	Closed (acres)
Slopes				
< 20%	0	95,068	307,719	25,607
21%–30%	0	1,634	8,243	1,728
31%–40%	0	704	3,742	948
> 40%	0	758	4,457	1,785
Saline Soils (Mancos Shale–derived soils)	0	7,630	15,728	2,106
Soils with High Erosion Potential	0	61,635	197,233	9,391

17 Under Alternative B, BLM would apply a lease stipulation to minimize or mitigate wind erosion and
 18 emissions of fugitive dust in areas characterized by fine sandy soils with high wind erosion potential.
 19 These decisions would help prevent loss and degradation of soils sensitive to disturbance and wind
 20 erosion, including sandy soils that have been observed to be difficult to reclaim from past disturbances.
 21 This stipulation would help reduce destabilization of dunes, promote the formation of biological soil
 22 crusts in disturbed areas, decrease wind and water erosion, and decrease emissions of fugitive dust.
 23 Because this decision would reduce production of fugitive dust, it could also help reduce the planning
 24 area’s contributions to regional dust-on-snow issues.

25 Under Alternative B, TL stipulations would prevent surface disturbance on saline soils in the Mancos
 26 Shale–derived soils (Map 2-9). These stipulations would not allow surface-disturbing activities from
 27 December 1 to April 15 when the area receives the most moisture and when soils are commonly wet. This
 28 stipulation includes heavy equipment traffic on existing roads associated with drilling and completion
 29 operations. This TL would reduce the impacts of disturbance to saline soils compared with Alternative A,
 30 including reducing the amount of erosion of saline soils that could affect the water quality of downstream
 31 waterbodies such as the Green and Colorado Rivers. Effects that would be reduced include increased
 32 salinity, selenium, and sediment loads and associated water chemistry parameters (TDS, total suspended
 33 solids, etc.).

1 Under Alternative B, BLM would not allow exceptions or modifications of the stipulation in the Price
2 RMP that prohibits surface disturbance on slopes greater than 40%. Not allowing exceptions or
3 modifications to this stipulation would preclude surface disturbance and soil destabilization in an area
4 where risk of soil erosion is exceptionally high. This measure would reduce the risk of soil erosion, loss
5 of soils, increased wind and water erosion, and increased emissions of fugitive dust compared to
6 Alternative A.

7 Under Alternative B, approximately 98,164 acres would be open to oil and gas leasing subject to CSU
8 and TL stipulations. The CSU stipulations applied under Alternative B could minimize impacts to soil
9 resources in the planning area by limiting the amount of surface-disturbing activities associated with oil
10 and gas leasing and development, thereby maintaining vegetation, stabilizing soil, and limiting erosion.
11 For example, applying a CSU requiring a fugitive dust control plan for oil and gas activities that would
12 disturb a surface area larger than 0.25 acre, or that would result in substantial increases in truck traffic on
13 unpaved or untreated surfaces could reduce the loss of soil resources to wind and water erosion, including
14 reducing the production of fugitive dust and contributions to regional dust-on-snow issues.

15 Under Alternative B, approximately 324,161 acres would be open to oil and gas leasing subject to an
16 NSO stipulation, and approximately 30,068 acres would be closed to oil and gas leasing. Applying an
17 NSO stipulation or closing areas to oil and gas leasing would prevent surface-disturbing activities from
18 oil and gas development within large portions of the planning area. In areas that are closed to leasing,
19 soils would be protected from disturbance. The NSO stipulations could protect soil resources present in
20 these areas from surface disturbance, prevent soil loss, reduce erosion and fugitive dust, prevent
21 mobilization of saline soil materials, and protect biological soil crusts. Under Alternative B, BLM would
22 not allow exceptions, modifications, or waivers to most NSO stipulations. Not allowing exceptions,
23 modifications, or waivers would reduce impacts to soils in areas that would be subject to NSO
24 stipulations compared to Alternative A.

25 Under Alternative B, geophysical operations would not be permitted in areas closed to leasing, and only
26 heliport geophysical operations would be allowed in areas that are managed subject to NSO stipulations.
27 This management of geophysical operations would provide better protection for soils in areas managed as
28 closed to oil and gas leasing or open subject to NSO stipulations, including prevention of surface
29 disturbance, soil loss, and fugitive dust, and would reduce erosion resulting from geophysical operations
30 compared to Alternative A.

31 Alternative B would require implementation of updated BMPs to minimize the potential resource impacts
32 associated with oil and gas developments. Compared to the BMPs in Alternative A, these BMPs include
33 measures to reduce fugitive dust, protect soil and water resources, improve reclamation success, reduce
34 impacts on vegetation, and prevent the spread of noxious weeds and invasive species. These BMPs would
35 reduce the long-term impacts of oil and gas development on soils by minimizing the area of disturbed
36 land and promoting improved reclamation planning and practices, including use of erosion-control
37 structures and improved topsoil salvage. The revised BMPs would improve reclamation practices
38 compared to Alternative A by protecting topsoil, which would be carefully stripped and stockpiled
39 separately from all other soil materials along with organic matter and debris to help sustain biological
40 activity. Compared to Alternative A, these BMPs would reduce the time required to stabilize soils and
41 reestablish vegetation on areas disturbed by oil and gas activities and promote a more rapid return to
42 natural conditions in disturbed areas.

43 Under Alternative B, BLM estimates that seven oil and gas wells would be drilled in the planning area
44 over the next 15 years. These wells would result in approximately 127 acres of surface disturbance, of
45 which 20 acres would remain unreclaimed in 15 years. Geophysical survey operations under Alternative
46 B are anticipated to result in 72 acres of surface disturbance, of which approximately 14 acres would be
47 unreclaimed in 15 years. The BMPs that would be applied to oil and gas leases under Alternative B would

1 promote more rapid and successful reclamation of surface disturbance compared to Alternative A,
2 indirectly benefiting soil resources by minimizing soil loss and erosion.

3 Among the alternatives considered in the MLP/EA, Alternative B would be anticipated to result in the
4 least surface disturbance and impacts to soils. As described previously, surface disturbance can result in
5 increased erosion of soils, including increases in windblown dust that can be deposited on snow-covered
6 mountain peaks, which can cause earlier and faster snowmelt events. The magnitude of the surface
7 disturbance and the resulting increases in windblown dust under Alternative B would be minor compared
8 to the existing surface disturbance and associated generation of windblown dust in the Colorado Plateau
9 region. Among the alternatives considered in the MLP/EA, Alternative B would have the least anticipated
10 surface disturbance and resulting contribution to regional production, transport, and deposition of dust on
11 snow-covered peaks. The dust generated by oil and gas activities under Alternative B could have a minor
12 contribution to earlier and faster snowmelt events and reduced water yield to the Colorado River and its
13 tributaries.

14 **4.4.4.1 Suspended and Protested Lease Decisions**

15 Under Alternative B, BLM would cancel all suspended leases and resolve the protests on the protested
16 leases and deny the leases. The soils in the areas of suspended and protested leases would not be affected
17 by oil and gas activities resulting from operators exploring for and developing oil and gas resources.
18 Current soil conditions and trends would be anticipated to continue for the foreseeable future.

19 **4.4.5 Impacts from Alternative C**

20 Under Alternative C, approximately 37,866 acres would be open to oil and gas leasing subject to standard
21 terms and conditions, approximately 362,127 acres would be open to oil and gas leasing subject to CSU
22 and TL stipulations, approximately 52,207 acres would be open to oil and gas leasing subject to a NSO
23 stipulation, and approximately 191 acres would be closed to oil and gas leasing. Table 4-8 shows the
24 acres of sensitive soils that occur within the planning area within the areas that are open and closed for oil
25 and gas leasing, as well as the acres of each type that occur within the areas stipulated as NSO, CSU, and
26 TL for Alternative C.

27 **Table 4-8. Sensitive Soils by Oil and Gas Leasing Category in Alternative C**

Sensitive Soil Category	Open (acres)	CSU and TL (acres)	NSO (acres)	Closed (acres)
Slopes				
< 20%	35,436	347,661	45,154	142
21%–30%	1,359	7,375	2,861	10
31%–40%	563	3,244	1,581	6
> 40%	508	3,847	2,611	33
Saline Soils (Mancos Shale–derived soils)	0	23,218	2,245	0
Soils with High Erosion Potential	0	249,055	19,204	0

28 Under Alternative C, BLM would apply a lease stipulation to minimize or mitigate wind erosion and
29 emissions of fugitive dust in areas characterized by fine sandy soils with high wind erosion potential and
30 would not allow exceptions or modifications of stipulations in the Price RMP that prohibit surface
31 disturbance on slopes greater than 40%. These decisions would be the same as the corresponding
32 decisions for Alternative B and would be anticipated to have the same soil resource impacts and benefits.

1 Under Alternative C, TL stipulations would prevent surface disturbance on saline soils in the Mancos
2 Shale-derived soils (Map 2-9). These stipulations would not allow surface-disturbing activities from
3 December 1 to April 15 when the area receives the most moisture and when soils are commonly wet;
4 however, heavy equipment traffic on existing roads associated with drilling and completion operations
5 would not be subject to this timing restriction. This TL would reduce the impacts of disturbance to saline
6 soils, as compared with Alternative A, including reducing the amount of erosion of saline soils that could
7 affect the water quality of downstream waterbodies such as the Green and Colorado Rivers, but it would
8 allow for more disturbance than permitted under Alternative B. Effects that would be reduced include
9 increased salinity, selenium, and sediment loads and associated water chemistry parameters (TDS, total
10 suspended solids, etc.).

11 Under Alternative C, approximately 37,866 acres would be open to oil and gas leasing subject to standard
12 terms and conditions. Managing these areas identified as open to leasing and development subject to
13 standard lease terms and conditions would allow the development of well pads and associated
14 infrastructure, which would involve land-clearing and surface disturbances. These actions remove and
15 disturb vegetation and biological soil crusts, expose soils to the erosive forces of water and wind, and
16 result in soil erosion and reduction of soil productivity in both the short term, during construction
17 activities, and in the long term, as permanent structures, such as well pads and roads are maintained.
18 Impacts could include reduced soil productivity; loss of soils from water and wind erosion; long-term soil
19 destabilization as a result of difficulties in reclamation; and increases in sediment, salinity, and other soil-
20 based pollutants in nearby waterways.

21 Under Alternative C, approximately 362,127 acres would be open to oil and gas leasing subject to CSU
22 and TL stipulations. The CSU stipulations applied under Alternative C could minimize impacts to soil
23 resources in the planning area by limiting the amount of surface-disturbing activities associated with oil
24 and gas leasing and development, thereby maintaining vegetation, stabilizing soil, and limiting erosion.
25 Under Alternative C, CSU stipulations would be applied for steep slopes, PFYC 4 and 5 areas, areas
26 characterized by fine sandy soils with high wind erosion potential, lands identified as having wilderness
27 characteristics in the Labyrinth Canyon unit, the Labyrinth Canyon SRMA, portions of Dirty
28 Devil/Robbers Roost SRMA, recreation focus areas, the Tidwell Draw site in the Uranium Mining
29 District, the Old Spanish Trail high potential sites and route segments, and areas designated as VRM
30 Class II. Alternative C also includes CSU stipulations that would limit the density of oil and gas
31 development. These decisions would be made for resources including recreation focus areas, lands
32 identified as having wilderness characteristics in the Labyrinth Canyon unit, and the Labyrinth Canyon
33 SRMA. In these areas, the stipulations that would limit the density of oil and gas development would also
34 reduce the intensity of impacts on soil resources, including soil compaction, damage to biological soil
35 crusts, and wind and water erosion. Under Alternative C, the Tidwell Draw Uranium District ACEC
36 would be managed as CSU, which could allow for more disturbance to soils within the ACEC than would
37 be permitted under Alternatives A or B, where the ACEC would be managed as NSO.

38 Under Alternative C, 52,207 acres would be open to oil and gas leasing subject to an NSO stipulation;
39 and approximately 191 acres would be closed to oil and gas leasing. In Alternative C, applying an NSO
40 stipulation to oil and gas leasing or closing areas to leasing would prevent surface-disturbing activities
41 from oil and gas development within the Three Rivers locatable mineral withdrawal, natural areas, within
42 1 mile of Labyrinth Canyon rim, within 1 mile of Horseshoe Canyon rim, within 1 mile of key
43 observation points, and within the Green River WSR suitable section from the confluence of the San
44 Rafael River to Canyonlands National Park. The NSO stipulations could also protect soil resources from
45 vegetation removal, prevent soil loss and fugitive dust, reduce erosion, and prevent loss of biological soil
46 crusts resulting from oil and gas development. The Big Flat Tops ACEC would be closed to leasing and
47 would provide similar benefits as applying NSO stipulations. Under Alternative C, BLM would allow
48 some exceptions, modifications, or waivers to some of the NSO stipulations; however, fewer exceptions,
49 modifications, or waivers would be granted compared to Alternative A. Allowing fewer exceptions,

1 modifications, or waivers would reduce impacts to soils in areas that would be subject to NSO
2 stipulations compared to Alternative A.

3 Under Alternative C, geophysical operations would not be permitted in areas closed to leasing and would
4 be allowed in areas that are managed subject to NSO stipulations, though no new road construction or
5 improvements would be permitted, and BLM would require full reclamation of all surface disturbance.
6 This management of geophysical operations would provide better protection for soils in areas managed as
7 closed to oil and gas leasing or open subject to NSO stipulations compared to Alternative A by preventing
8 surface disturbance and soil erosion, and by reclamation practices.

9 Similar to Alternative B, under Alternative C, the BMPs that are currently used for oil and gas leases in
10 the planning area would be updated to include additional state-of-the-art BMPs. The benefits to soil
11 resources in the planning area from updating the BMPs under Alternative C would be the same as those
12 described under Alternative B.

13 Under Alternative C, BLM estimates that 27 wells oil and gas wells would be drilled in the planning area
14 over the next 15 years. These wells would result in approximately 517 acres of surface disturbance, of
15 which 82 acres would remain unreclaimed in 15 years. Geophysical survey operations under Alternative
16 C is anticipated to result in 292 acres of surface disturbance, of which approximately 58 acres would be
17 unreclaimed in 15 years. The BMPs that would be applied to oil and gas leases under Alternative C would
18 promote more rapid and successful reclamation of surface disturbance compared to Alternative A,
19 indirectly benefiting soil resources by minimizing soil loss and erosion.

20 Alternative C would be anticipated to result in less surface disturbance and impacts to soils compared to
21 Alternative A, but more surface disturbance and impacts compared to Alternative B. As described
22 previously, surface disturbance can result in increased erosion of soils, including increases in windblown
23 dust that can be deposited on snow-covered mountain peaks, which can cause earlier and faster snowmelt
24 events. The magnitude of the surface disturbance and the resulting increases in windblown dust under
25 Alternative C would be minor compared to the existing surface disturbance and associated generation of
26 windblown dust in the Colorado Plateau region. Alternative C would have less anticipated surface
27 disturbance and resulting contribution to regional production, transport, and deposition of dust on snow-
28 covered peaks compared to Alternative A, and more than Alternative B. The dust generated by oil and gas
29 activities under Alternative C could have a minor contribution to earlier and faster snowmelt events and
30 reduced water yield to the Colorado River and its tributaries.

31 **4.4.5.1** *Suspended and Protested Lease Decisions*

32 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
33 standard terms, 39,766 acres would be issued subject to CSU or TL stipulations, and 318 acres would be
34 issued subject to NSO stipulations. If the leases were subsequently developed, the impacts of modifying
35 the terms and conditions of the suspended and protested leases and issuing the leases consistent with
36 Alternative C would be the same as the impacts on soils described in this section from managing areas as
37 open to leasing subject to standard terms and conditions, open to leasing subject to CSU or TL
38 stipulations, or open to leasing subject to NSO stipulations described for Alternative C.

39 **4.4.6 Impacts from Alternative D**

40 Under Alternative D, 0 acres would be open to oil and gas leasing subject to standard terms and
41 conditions, approximately 339,885 acres would be open to oil and gas leasing subject to CSU and TL
42 stipulations, approximately 92,169 acres would be open to oil and gas leasing subject to a NSO
43 stipulation, and approximately 20,340 acres would be closed to oil and gas leasing. Table 4-9 shows the
44 acres of sensitive soils that occur within the planning area within the areas that are open and closed for oil
45 and gas leasing, as well as the acres of each type that occur within the areas stipulated as NSO, CSU, and
46 TL for Alternative D.

1 **Table 4-9. Sensitive Soils by Oil and Gas Leasing Category in Alternative D**

Sensitive Soil Category	Open (acres)	CSU and TL (acres)	NSO (acres)	Closed (acres)
Slopes				
< 20%	0	328,492	82,974	16,928
21%–30%	0	5,958	4,428	1,220
31%–40%	0	2,560	2,157	678
> 40%	0	2,875	2,610	1,514
Saline Soils (Mancos Shale–derived soils)	0	18,759	6,630	75
Soils with High Erosion Potential	0	222,850	39,298	6,110

2 Under Alternative D, BLM would apply a lease stipulation to minimize or mitigate wind erosion and
3 emissions of fugitive dust in areas characterized by fine sandy soils with high wind erosion potential,
4 would not allow exceptions or modifications of stipulations in the Price RMP that prohibit surface
5 disturbance on slopes greater than 40%, and would apply the same TL stipulations to prevent surface
6 disturbance on saline soils in the Mancos Shale–derived soils as would be applied under Alternative C.
7 These decisions would be the same as the corresponding decisions for Alternative C and would be
8 anticipated to have the same soil resource impacts and benefits.

9 Under Alternative D, approximately 339,885 acres would be open to oil and gas leasing subject to CSU
10 and TL stipulations. The CSU stipulations applied under Alternative D, especially those that would limit
11 the density of oil and gas development, could reduce the intensity and extent of disturbance to soils. Areas
12 where CSU stipulations that would limit oil and gas development density under Alternative D include
13 LWC units (with the exception of the Labyrinth Canyon LWC unit) and the Cone and Cottonwood Wash
14 recreation focus areas. The density limitations in these areas under Alternative D would require lower
15 density oil and gas development and result in reduced disturbance of soils compared to Alternative C.
16 Applying a CSU requiring a fugitive dust control plan for oil and gas activities that would disturb a
17 surface area larger than 0.25 acre, or that would result in substantial increases in truck traffic on unpaved
18 or untreated surfaces, could reduce the impacts of fugitive dust on snowpack.

19 Under Alternative D, approximately 92,169 acres would be open to oil and gas leasing subject to an NSO
20 stipulation, and approximately 20,340 acres would be closed to oil and gas leasing. The NSO stipulations
21 under Alternative D would be applied for Dirty Devil/French Springs and Horseshoe Canyon South non-
22 WSA lands with wilderness characteristics; lands identified as having wilderness characteristics during
23 the 2016 inventory in the Labyrinth Canyon unit; the Labyrinth Canyon SRMA; portions of Dirty
24 Devil/Robbers Roost SRMA; all lands within 1 mile of the Green River Labyrinth Canyon rim that are
25 north of the San Rafael River; the Fossil Point, Dry Lake, Trin Alcove/Three Canyon, Saucer
26 Basin/Moonshine Wash, Keg Knoll, Sweetwater Reef, and Horseshoe Canyon Trailhead recreation focus
27 areas; all lands within 1 mile of key observation points and travel corridors; the Dry Lake Archaeological
28 District ACEC; the Uranium Mining District ACEC (Tidwell Draw); all lands within 1 mile of high
29 potential sites and route segments along the Old Spanish Trail, steep slopes; areas within public water
30 reserves, 100-year floodplains and areas within 660 feet of intermittent and perennial streams, rivers,
31 riparian areas, wetlands, water wells, and springs; and areas within 100 feet of ephemeral streams. Areas
32 that would be closed to oil and gas leasing would include the Big Flat Tops ACEC, the Three Rivers
33 locatable mineral withdrawal, all lands within 1 mile of the Green River Labyrinth Canyon rim south of
34 the San Rafael River, all lands within 1 mile of the Horseshoe Canyon rim, and the Green River suitable
35 segment from the confluence of the San Rafael River to Canyonlands National Park. The NSO
36 stipulations and decisions to close areas to oil and gas leasing could also protect soil resources from

1 vegetation removal, prevent soil loss and fugitive dust, reduce erosion, and prevent loss of biological soil
2 crusts resulting from oil and gas development.

3 Under Alternative D, the BLM would allow minimal exceptions, modifications, or waivers to NSO
4 stipulations. Fewer exceptions, modifications, or waivers would be granted compared to Alternatives A
5 and C. Allowing fewer exceptions, modifications, or waivers would reduce impacts to soils, including soil
6 erosion and fugitive dust in areas that would be subject to NSO stipulations, compared to Alternatives A
7 and C.

8 Under Alternative D, geophysical operations would be managed in the same manner and would be
9 anticipated to have the same impacts as Alternative C.

10 Similar to Alternatives B and C, under Alternative D, the areas that are currently used for oil and gas
11 leases in the planning area would be updated to include additional state-of-the-art BMPs. The benefits to
12 soil resources in the planning area from updating the BMPs under Alternative D would be the same as
13 those described under Alternative B.

14 Under Alternative D, the BLM estimates that 23 oil and gas wells would be drilled in the planning area
15 over the next 15 years. These wells would result in approximately 440 acres of surface disturbance, of
16 which 70 acres would remain unreclaimed in 15 years. Geophysical survey operations under Alternative
17 D are anticipated to result in 248 acres of surface disturbance, of which approximately 50 acres would be
18 unreclaimed in 15 years. BMPs that would be applied to oil and gas leases under Alternative D would
19 promote more rapid and successful reclamation of surface disturbance compared to Alternative A,
20 indirectly benefiting soil resources by minimizing soil loss and erosion.

21 Alternative D would be anticipated to result in less surface disturbance and impacts to soils compared to
22 Alternatives A and C, but more surface disturbance and impacts compared to Alternative B. As described
23 previously, surface disturbance can result in increased erosion of soils, including increases in windblown
24 dust that can be deposited on snow-covered mountain peaks, which can cause earlier and faster snowmelt
25 events. The magnitude of the surface disturbance and the resulting increases in windblown dust under
26 Alternative D would be minor compared to the existing surface disturbance and associated generation of
27 windblown dust in the Colorado Plateau region. Alternative D would have less anticipated surface
28 disturbance and resulting contribution to regional production, transport, and deposition of dust on snow-
29 covered peaks compared to Alternatives A and C, and more than Alternative B. The dust generated by oil
30 and gas activities under Alternative D could have a minor contribution to earlier and faster snowmelt
31 events and reduced water yield to the Colorado River and its tributaries.

32 **4.4.6.1** *Suspended and Protested Lease Decisions*

33 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to CSU
34 or TL stipulations, and 3,132 acres would be issued subject to NSO stipulations. If the leases were
35 subsequently developed, the impacts of modifying the terms and conditions of the suspended and
36 protested leases and issuing the leases consistent with Alternative D would be the same as the impacts on
37 soils from managing lands as open to leasing subject to CSU or TL stipulations, or open to leasing subject
38 to NSO stipulations described for Alternative D.

39 **4.5 WATER RESOURCES**

40 This section presents the potential impacts to water and riparian resources from implementing the
41 management actions presented in Chapter 2. Existing conditions concerning water and riparian resources
42 are described in Chapter 3.

1 **4.5.1 Assumptions**

- 2 • Alternatives that would have fewer restrictive stipulations around surface water resources,
3 riparian areas, and soils sensitive to erosion would have greater impacts on riparian areas and
4 surface water resources.
- 5 • The degree of impact attributed to any one disturbance or series of disturbances would be
6 influenced by several factors, including location in the watershed; the type, time, and degree of
7 disturbance; existing vegetation; precipitation; and mitigating actions applied to the disturbance.
- 8 • Current trends in plant succession and vegetation health would continue.
- 9 • Where assessments for rangeland health standards have been conducted, riparian plant
10 communities are functioning properly or are in the process of achieving proper functioning
11 condition.
- 12 • Noxious and invasive weeds would continue to be introduced and spread as a result of ongoing
13 vehicle traffic in and out of the planning area, recreational activities, wildlife and livestock
14 grazing and movements, and surface-disturbing activities.
- 15 • Weed and pest control would be carried out in coordination with the appropriate County weed
16 and pest control district and owners of adjacent properties.
- 17 • A regulatory requirement applied to all oil and gas leases, regardless of management
18 classification, represents an obligation for all drilling operations to implement casing and
19 cementing programs that are conducted in a manner that protects and/or isolates all usable
20 groundwater zones.

21 **4.5.2 Impacts Common to All Alternatives**

22 The following discussions represent impacts on soil resources that would not vary by alternative.

23 For all alternatives, the potential impacts on groundwater resources from oil and gas extraction, including
24 hydraulic fracturing, could result in contamination of aquifers during drilling through the introduction of
25 drilling fluids, cross-contamination of aquifers when drilling fluids introduced into one aquifer travel
26 upward into shallower units due to improperly sealed well casings, and contamination of shallow aquifers
27 and surface water by improperly managed or closed reserve pits. Additionally, although unlikely, it is
28 possible for casings to fail, causing extended fracture growth and allowing hydraulic fracturing fluid to
29 migrate into source water zones.

30 For all alternatives, attaching lease notices and requiring conservation measures for all surface-disturbing
31 activities for western yellow-billed cuckoo, southwestern willow flycatcher, and Colorado River
32 endangered fish species would limit impacts from oil and gas development on riparian and aquatic
33 habitats for these species. Because these species rely on the limited riparian and aquatic habitats in the
34 planning area, these lease notices would also minimize damage to or loss of riparian areas and help
35 protect surface water resources in the planning area by limiting surface disturbance or other oil and gas
36 development activities in or adjacent to the Green and San Rafael Rivers.

37 Attaching lease notices and requiring mitigation measures for all surface-disturbing activities to protect
38 Utah and BLM sensitive species (e.g., bluehead sucker) would limit impacts from oil and gas
39 development to these species and their habitat because the BLM would require assessments to determine
40 whether a species is present and, depending on the results of the assessments, the implementation of
41 avoidance measures for that species during exploration and development. Because these species occupy
42 the aquatic and riparian habitats in the planning area, these lease notices would also help reduce impacts
43 on surface water resources in the planning area by limiting surface disturbance or other oil and gas
44 development activities in or adjacent to the Green and San Rafael Rivers.

1 Management of the Big Flat Tops ACEC as closed to oil and gas leasing and development would prevent
2 surface disturbance, thereby maintaining vegetation and preventing increased runoff, erosion, and
3 sedimentation. This management would preclude impacts to water resources from oil and gas
4 development including increased runoff and sedimentation resulting from the removal of vegetation,
5 surface disturbance, and subsequent erosion within the ACEC.

6 **4.5.3 Impacts from Alternative A (No Action)**

7 Under Alternative A, approximately 399,462 acres would be open to oil and gas leasing subject to
8 standard terms and conditions; approximately 19,083 acres would be open to oil and gas leasing subject to
9 CSU/TL stipulations; approximately 33,627 acres would be open to oil and gas leasing subject to NSO
10 stipulations; and approximately 220 acres would be closed to oil and gas leasing.

11 Under Alternative A, the BLM estimates that 28 oil and gas wells would be drilled in the planning area
12 over the next 15 years. These wells would result in approximately 541 acres of surface disturbance, of
13 which 86 acres would remain unreclaimed in 15 years. Geophysical survey operations under Alternative
14 A are anticipated to result in 305 acres of surface disturbance, of which approximately 61 acres would be
15 unreclaimed in 15 years. The BMPs that would be applied to oil and gas leases under Alternative A for
16 reclamation, including requirements for interim reclamation, would indirectly benefit water and riparian
17 resources by minimizing erosion, sedimentation, and water quality degradation. However, because of the
18 difficulty of reclaiming surface disturbances in the planning area, the areas that are reclaimed would not
19 be anticipated to return to natural conditions until 20 to 25 years or more after initial reclamation. Among
20 all alternatives, Alternative A would be anticipated to result in the greatest surface disturbance and
21 impacts to water and riparian resources.

22 Managing areas identified as open to leasing and development subject to standard lease terms and
23 conditions or CSU/TL stipulations would allow the development of well pads and associated
24 infrastructure, which would involve land clearing and surface disturbances. These actions would result in
25 the removal of vegetative cover, soil compaction, and increased erosion rates due to the exposure of soil
26 particles to wind and water. There is a close correlation between the condition of soil and vegetation and
27 water quality. Removal of vegetation and biological soil crusts generally increases the rate at which water
28 flows off the land. Substantial disturbance to soil, including compaction of soil or decreased vegetative
29 cover would increase water runoff. Soil disturbance would also alter the timing and duration of runoff;
30 reduce infiltration capacity; and accelerate erosion, sedimentation, and the addition of nutrients and
31 sediment loads to stream channels, thereby degrading water quality, channel structure, and overall
32 watershed health. As the amount of surface disturbance increases, the ability of a watershed to buffer high
33 flows, filter water and sediment, and provide habitat, such as stream cover, decreases. Impacts to impaired
34 waters, like the San Rafael River, would include increased TDS loads and the inability to meet TMDL
35 requirements. These impacts would occur in the short term (during construction activities) and in the long
36 term as permanent structures such as well pads and roads are maintained.

37 Applying NSO stipulations or closing areas to oil and gas leasing under Alternative A would prevent
38 surface-disturbing activities from oil and gas development from occurring within 100-year floodplains,
39 steep slopes, natural springs, natural areas, SRMAs, ACECs, and along the Green River where it is
40 suitable for wild and scenic river designation. The NSO stipulations and decisions to close areas to
41 leasing could protect water and riparian resources present in these areas from surface disturbance, reduce
42 erosion and sedimentation, prevent mobilization of saline soil materials, and protect riparian habitat, as
43 well as protect groundwater quality. However, under Alternative A, the BLM would allow some
44 exceptions, modifications, or waivers for NSO stipulations (e.g., in SRMAs where oil and gas exploration
45 and development would not impair identified scenic and primitive or semi-primitive recreational
46 resources, or on steep slopes where a more detailed analysis shows that impacts can be mitigated).
47 Granting exceptions, modifications, or waivers to NSO stipulations would allow for impacts on water and
48 riparian resources from oil and gas development in areas where NSO stipulations are applied. These

1 impacts would be similar to the impacts on water and riparian resources that would occur in areas that are
2 open to oil and gas leasing subject to standard terms and conditions.

3 Under Alternative A, geophysical operations could be allowed on lands closed to leasing or subject to
4 NSO stipulations under certain circumstances in the Richfield Field Office and would be allowed
5 consistent with existing regulations for geophysical exploration in the Price Field Office. Allowing
6 geophysical operations in areas closed to mineral leasing or subject to NSO stipulations would allow for
7 impacts on water and riparian resources such as surface disturbance, erosion, and sedimentation and
8 degradation of water quality resulting from geophysical operations.

9 The BMPs that would be applied to oil and gas leases under Alternative A would require interim
10 reclamation of the well and access roads to prevent and reduce soil erosion, beginning as soon as
11 practicable after a well is placed in production. Final reclamation of all oil and gas disturbance would
12 involve 1) recontouring all disturbed areas, including access roads, to the original contours or to contours
13 that blend with the surrounding topography and 2) revegetating all disturbed areas. Roads would follow
14 the contours of the land where practical, and existing oil and gas roads that are in eroded condition would
15 be brought to BLM standards within a reasonable period of time. Any spills or wastes that result from oil
16 and gas activities would require bioremediation. These stipulations and BMPs would minimize impacts to
17 water and riparian resources by minimizing soil erosion, sedimentation, and impacts on water quality
18 from soil pollutants.

19 The process of drilling for oil and gas requires consumptive water use. Within the planning area, a typical
20 well drilled to the primary target formation would involve about 294,000 gallons of water. The water is
21 used as a drilling medium, for mixing cement, and for various cleanup operations. Therefore, for the oil
22 and gas wells projected in Alternative A, a total of about 8.2 million gallons of water could be used in the
23 next 15 years. The source of this water would be primarily municipalities and private sources. Water
24 obtained from aquifers and surface water could result in the drawing down of the water table and the
25 reduction of available water resources for wildlife, vegetation, springs, streams, or public consumption.
26 Withdrawal could affect local groundwater flow patterns and create changes in the quality and quantity of
27 the remaining groundwater. However, detailed impacts of this water use cannot be addressed until site-
28 specific operations identify the water source.

29 **4.5.3.1 Surface Water**

30 Under Alternative A, the Price Field Office would protect water quality by implementing appropriate
31 BMPs such as those found in the Utah Nonpoint Source Management Plan (UDEQ 2013) and other
32 reference documents for protection of soil, water, and riparian resources. The Richfield Field Office
33 would continue working cooperatively with the UDWQ to monitor water quality at designated sampling
34 stations. The BLM would not take specific actions to implement the nonpoint source water quality
35 program, reducing their ability to meet state and federal water quality standards and meet TMDL
36 requirements for the San Rafael River.

37 The BLM would apply an NSO stipulation under Alternative A within buffers around natural springs.
38 Within the Richfield Field Office area, the size of the buffer with no surface disturbance or occupancy
39 would be based on hydrological, riparian, and other factors necessary to protect the water quality of the
40 springs. If these factors cannot be determined, a 330-foot buffer zone from the outer edge would be
41 maintained. Exceptions in the Richfield Field Office area would be allowed if it can be shown that 1)
42 there are no practical alternatives, 2) all long-term impacts can be fully mitigated, or 3) the activity will
43 benefit and enhance the riparian area. Within the Price Field Office area, the NSO stipulation would apply
44 within a buffer around natural springs, the size of which would be based on geophysical, riparian, and
45 other factors necessary to protect the water quality of the spring. If these factors cannot be determined, a
46 660-foot buffer zone would be maintained. No exceptions would be allowed in the Price Field Office. The
47 decision to apply an NSO stipulation around springs would protect surface water and groundwater quality

1 by preventing surface disturbance and associated erosion and sedimentation in areas adjacent to important
2 surface water resources and by preventing loss of riparian vegetation and important habitat for riparian-
3 dependent species.

4 Additionally, NSO stipulations in the Price Field Office would apply to the 100-year floodplain, or within
5 330-feet of the stream's centerline, whichever is greater, along all perennial and intermittent streams,
6 streams with perennial reaches, and riparian areas, including along the San Rafael and Green Rivers. This
7 action would protect water quality and riparian habitat by preventing surface disturbance and associated
8 sedimentation and water pollution from oil and gas operations in the areas directly adjacent to surface
9 waters. The Richfield Field Office does not include stipulations for these surface water resources, which
10 could result in loss of riparian vegetation, disturbance and erosion within streams, and loss of aquatic and
11 riparian habitat from oil and gas exploration and development.

12 The BLM would not apply a lease stipulation under Alternative A to minimize disturbance within and
13 near ephemeral streams. These decisions would allow surface disturbance to occur within and along
14 ephemeral streams, which could alter timing and duration of runoff; reduce infiltration capacity; and
15 accelerate erosion, sedimentation, and the addition of nutrients and sediment loads to stream channels,
16 including the San Rafael and Green Rivers. The changes in the timing and duration of runoff and
17 introduced pollutants could degrade water quality, affect stream and river channel structure, and decrease
18 overall watershed health.

19 Under Alternative A, the BLM Richfield Field Office would implement appropriate BMPs outlined in the
20 Richfield Field Office ROD/RMP designed to protect water quality for all ground-disturbing activities.
21 The Price Field Office would implement BMPs from other documents such as those found in the Utah
22 Nonpoint Source Management Plan (UDEQ 2013). BMPs would reduce the amount of erosion and
23 potential pollutants (e.g., sediment, salt, and excess nutrients) that would end up in runoff, protecting
24 water quality in streams and waterways, including the San Rafael and Green Rivers.

25 Under Alternative A, the Green River suitable segment from the confluence of the San Rafael River to
26 Canyonlands National Park (Map 2-5) would be managed as NSO. Prohibiting surface exploration and
27 development for oil and gas would protect riparian and water resources along the WSR suitable segment
28 of the Green River from vegetation loss, soil erosion, sedimentation, and contamination of surface water.
29 Allowing oil and gas resources under NSO stipulations to be developed by directionally drilling from
30 nearby lands would include some risk for groundwater contamination, which could end up in the Green
31 River through seeps and springs.

32 As described in Section 4.4, under Alternative A, the BLM would not apply a timing limitation stipulation
33 requiring avoidance of disturbance to saline soils in the Mancos Shale during the wet portions of the year.
34 These soils are highly sensitive to surface disturbance, and their erosion rates are easily accelerated. If a
35 timing limitation stipulation is not applied in these areas, surface oil and gas exploration and development
36 activities including soil disturbance could occur during the wetter portions of the year. This disturbance
37 could lead to erosion of saline soils and could affect water quality of downstream water bodies, including
38 the San Rafael, Green, and Colorado Rivers. Effects could include increased salinity, selenium, sediment
39 loads, and associated water chemistry parameters (e.g., TDS and total suspended solids).

40 Additionally, under Alternative A, the BLM would allow exceptions to or modifications of stipulations in
41 the Price Field Office ROD/RMP that prohibits surface disturbance on slopes greater than 40%. While the
42 BLM would only allow exceptions or modifications to this stipulation when a more detailed analysis
43 shows that impacts can be mitigated, allowing exceptions or modifications to this stipulation would
44 increase surface disturbance and soil destabilization in an area where risk of soil erosion is exceptionally
45 high. Even with the implementation of measures and strategies to reduce the risk of soil erosion, increased
46 water erosion and sedimentation downstream would likely occur.

1 **4.5.3.2 Groundwater**

2 The BLM would not apply additional BMPs under Alternative A to protect shallow aquifers and potential
3 unconsolidated aquifers. Shallow and unconsolidated aquifers are susceptible to contamination during
4 drilling through the introduction of drilling fluids and contamination of groundwater and surface water
5 from improperly managed or closed reserve pits. This management decision would not implement
6 additional risk-reducing measures beyond required oil and gas well casing and cementing programs that
7 are intended to protect against contamination of groundwater and aquifers.

8 **4.5.3.3 Riparian Resources**

9 Under Alternative A, the BLM would apply an NSO stipulation within buffers around natural springs.
10 Within the Richfield Field Office area, the size of the buffer with no surface disturbance or occupancy
11 would be based on hydrological, riparian, and other factors necessary to protect the water quality of the
12 springs. If these factors cannot be determined, a 330-foot buffer zone from the outer edge would be
13 maintained. Exceptions would be allowed in the Richfield Field Office area if it can be shown that 1)
14 there are no practical alternatives, 2) all long-term impacts can be fully mitigated, or 3) the activity would
15 benefit and enhance the riparian area. Within the Price Field Office area, the NSO stipulation would apply
16 within a buffer around natural springs, the size of which would be based on geophysical, riparian, and
17 other factors necessary to protect the water quality of the spring. If these factors cannot be determined, a
18 660-foot buffer zone would be maintained. No exceptions would be allowed in the Price Field Office. The
19 decision to apply an NSO stipulation around springs would protect surface water and groundwater quality
20 and prevent the loss of riparian vegetation and important habitat for riparian-dependent species.

21 Additionally, NSO stipulations in the Price Field Office area would apply to the 100-year floodplain, or
22 within 330-feet of the stream's centerline, whichever is greater, along all perennial and intermittent
23 streams, streams with perennial reaches, and riparian areas, protecting water quality and riparian habitat.
24 The Richfield Field Office does not include stipulations for these surface water resources, which could
25 result in the loss of riparian vegetation, disturbance and erosion within streams, and the loss of aquatic
26 and riparian habitat.

27 Under Alternative A, the Green River WSR suitable segment from the confluence of the San Rafael River
28 to Canyonlands National Park would be managed as NSO. Prohibiting surface exploration and
29 development for oil and gas would protect riparian areas along the WSR suitable segment of the Green
30 River from vegetation loss, soil erosion, and sedimentation.

31 **4.5.3.4 Suspended and Protested Lease Decisions**

32 Under Alternative A, 45,043 acres of suspended and protested leases would be issued subject to standard
33 terms and conditions, and 113 acres of protested leases would be issued subject to NSO stipulations.
34 Protested leases would be resolved and issued with terms and conditions that are consistent with the Price
35 Field Office ROD/RMP. The areas encompassed by the suspended and protested leases contain sensitive
36 soil resources including steep slopes and sandy soils that are difficult to reclaim and that are highly
37 susceptible to wind and water erosion and therefore contribute to sedimentation and affect water quality.
38 The suspended lease areas also include intermittent and ephemeral streams, riparian areas, and public
39 water reserves within the Upper Dirty Devil watershed (HUC 10 1407000403) and the Robbers Roost
40 watershed (HUC 10 1407000402), which both drain into the Dirty Devil River and then into the Colorado
41 River. The protested lease areas contain a high density of intermittent and ephemeral streams and springs,
42 and are located near the San Rafael River in three watersheds: Cottonwood Wash (HUC 10 1406000907),
43 Lower San Rafael River (HUC 10 1406000910), and Moonshine Wash (HUC 10 1406000909), which all
44 drain into the San Rafael River and then into the Green River.

1 If the protested leases were issued with terms and conditions that are consistent with the Price Field
2 Office ROD/RMP, impacts on water and riparian resources, including intermittent and ephemeral
3 streams, springs, and riparian areas would be the same as those described above for Alternative A.

4 Under Alternative A-1, the BLM would rescind the suspensions on suspended leases. The leases were
5 issued under the direction of the Henry Mountain Management Framework Plan without specific
6 stipulations to protect seeps, springs, intermittent and ephemeral streams, or public water reserves. If a
7 lessee proposes to develop these leases (e.g., drill a well), the BLM would evaluate the lessee's proposal
8 in a site-specific environmental review. If during the site-specific environmental review process the BLM
9 determines that additional mitigation measures are required to protect resources of concern, those
10 mitigation measures would be included as conditions of approval to future site-specific authorizations.
11 For the water resources present in the suspended lease areas, the BLM would likely add conditions of
12 approval similar to the stipulations in the Richfield Field Office ROD/RMP. Therefore, if those leases
13 were subsequently developed, the impacts on water and riparian areas in the leased areas would be the
14 same as those described for surface water and groundwater and riparian resources for Alternative A.

15 Under Alternative A-2, the suspended leases would be subject to the conditions, stipulations, and BMPs
16 included in the Richfield Field Office ROD/RMP, such as the stipulation to implement appropriate BMPs
17 designed to protect water quality for all ground-disturbing activities. Modifying the stipulations to be
18 consistent with the Richfield Field Office ROD/RMP (Alternative A-2) would ensure that the leases are
19 issued with stipulations to reduce long-term impacts on water and riparian resources by improving the
20 reclamation of disturbances, stabilizing soils, and protecting water quality by preventing introduction of
21 sediment and pollutants resulting from oil and gas development activities compared to those under
22 Alternative A-1. However, because the BLM would likely require similar or the same stipulations as
23 conditions of approval during subsequent site-specific environmental review process, the impacts of
24 Alternative A-2 would be the same as the impacts of Alternative A-1.

25 **4.5.4 Impacts from Alternative B**

26 Under Alternative B, 0 acres would be open to oil and gas leasing subject to standard terms and
27 conditions; approximately 98,164 acres would be open to oil and gas leasing subject to CSU/TL
28 stipulations; approximately 324,161 acres would be open to oil and gas leasing subject to NSO
29 stipulations; and approximately 30,068 acres would be closed to oil and gas leasing.

30 Under Alternative B, the BLM estimates that seven oil and gas wells would be drilled in the planning area
31 over the next 15 years. These wells would result in approximately 127 acres of surface disturbance, of
32 which 20 acres would remain unreclaimed in 15 years. Geophysical survey operations under Alternative
33 B are anticipated to result in 72 acres of surface disturbance, of which approximately 14 acres would be
34 unreclaimed in 15 years. The BMPs that would be applied to oil and gas leases under Alternative B would
35 promote more rapid and successful reclamation of surface disturbance compared to those under
36 Alternative A, indirectly benefiting water resources by minimizing erosion, sedimentation, and declines in
37 water quality. Among all alternatives, Alternative B would be anticipated to result in the least amount of
38 surface disturbance and impacts to water and riparian areas.

39 Under Alternative B, the application of CSU/TL stipulations could minimize impacts to water and
40 riparian resources in the planning area by limiting the amount of surface-disturbing activities associated
41 with oil and gas leasing and development, thereby limiting erosion and potential pollutants (sediment,
42 salt, and excess nutrient loading) that would end up in runoff and that could affect the water quality of
43 downstream watersheds. Additionally, stipulations to protect surface water and groundwater quality and
44 aquifers would prevent contamination associated with drilling operations from oil and gas leasing and
45 development.

1 Applying NSO stipulations or closing areas to oil and gas leasing under Alternative B would prevent
2 surface-disturbing activities from oil and gas development within large portions of the planning area (Map
3 2-2-B). The NSO stipulations could protect water and riparian resources by preventing disturbance within
4 and near springs, riparian areas, and ephemeral streams, thereby preventing vegetation loss, soil erosion,
5 and increased runoff and transport of salts and sediments to nearby surface water bodies, and could also
6 protect groundwater quality and flow conditions, recharge areas, spring flows, and surface water quality.

7 The BLM would not allow exceptions, modifications, or waivers to most NSO stipulations under
8 Alternative B. Not allowing exceptions, modifications, or waivers would reduce impacts to water and
9 riparian resources in areas that would be subject to NSO stipulations compared to Alternative A.

10 Under Alternative B, geophysical operations would not be permitted in areas closed to leasing, and only
11 heliport geophysical operations would be allowed in areas that are managed as NSO. This management of
12 geophysical operations would provide better protection for water and riparian resources in areas managed
13 as closed to oil and gas leasing or open subject to NSO stipulations, including prevention of surface
14 disturbance, erosion, sedimentation, and the degradation of water quality resulting from geophysical
15 operations compared to Alternative A.

16 Alternative B would require implementation of updated BMPs to minimize the potential resource impacts
17 associated with oil and gas developments. Compared to Alternative A, these BMPs include measures to
18 minimize disturbance in intermittent and perennial streams and ephemeral drainages, and would protect
19 groundwater quality during drilling operations and from contamination from reserve pits. The BMPs
20 would reduce the long-term impacts of oil and gas development on water and riparian areas by
21 minimizing the area of disturbed lands, especially along streams and drainages, promoting improved
22 reclamation planning and practices and improved erosion control, and preventing groundwater
23 contamination due to drilling activities and from use of reserve pits. The revised BMPs would improve
24 groundwater protections in shallow or nonconsolidated aquifers compared to those under Alternative A
25 by requiring closed loop drilling, lined reserve pits, or no surface pits.

26 Within the planning area, a typical well drilled to the primary target formation would involve
27 approximately 294,000 gallons of water. Water used as a drilling medium, for mixing cement, and for
28 various cleanup operations for the oil and gas wells projected in Alternative B would total approximately
29 2.1 million gallons of water that could be used in the next 15 years. The source of this water is primarily
30 municipalities and private sources. Water obtained from aquifers and surface water could result in the
31 drawing down of the water table and a reduction of available water resources for wildlife, vegetation,
32 springs, streams, or public consumption. Withdrawal could affect local groundwater flow patterns and
33 create changes in the quality and quantity of the remaining groundwater. However, detailed impacts of
34 this water use cannot be addressed until site specific operations identify the water source.

35 **4.5.4.1 Surface Water**

36 Under Alternative B, the BLM would take appropriate actions to maintain water quality by working with
37 the Utah Division of Water Quality and other agencies in accordance with the MOU regarding
38 implementing the nonpoint source water quality program in the State of Utah. This MOU addresses the
39 development of monitoring data and BMPs to protect water resources. The BLM would meet state and
40 federal water quality standards, including designated beneficial uses and anti-degradation requirements,
41 including on impaired waters such as the San Rafael River.

42 The BLM would apply an NSO stipulation under Alternative B to preclude oil and gas activities within
43 public water reserves and 100-year floodplains, and within 660 feet of intermittent and perennial streams,
44 rivers, riparian areas, wetlands, water wells, and springs. The NSO stipulation would reduce impacts to
45 surface water resources and riparian areas in the planning area compared with Alternative A, by
46 increasing the size of the NSO buffers and not allowing for exceptions. This would prevent vegetation
47 loss, soil erosion, and increased runoff and transport of salts and sediments to nearby surface water
48 bodies, and would also protect groundwater quality and flow conditions, recharge areas, spring flows, and
49 surface water quality.

1 The BLM would also apply an NSO stipulation under Alternative B to prevent surface disturbance along
2 ephemeral streams. This stipulation would preclude oil and gas activities within 100 feet of ephemeral
3 streams (Map 2-11). The NSO stipulation would reduce the impacts of oil and gas activities on water
4 quality compared with Alternative A by reducing the amount of erosion and potential pollutants (e.g.,
5 sediment, salt, and excess nutrient loading) that would end up in runoff and that could affect the water
6 quality of downstream waterbodies, including the San Rafael, Green, and Colorado Rivers.

7 Applying a TL stipulation under Alternative B for oil and gas leases prohibiting surface-disturbing
8 activities on saline soils in the Mancos Shale–derived soils from December 1 to May 31 could provide
9 additional protections to the Colorado River system’s water resources by minimizing soil runoff and
10 erosion. In addition, this stipulation could help to maintain water quality by limiting potential salt and
11 selenium loading to surface water and downstream waterbodies, including the Green and Colorado
12 Rivers.

13 Additionally, under Alternative B, the BLM would not allow exceptions or modifications to the
14 stipulation in the Price Field Office ROD/RMP that prohibits surface disturbance on slopes greater than
15 40%. Not allowing exceptions or modifications to this stipulation would preclude surface disturbance and
16 soil destabilization in an area where risk of soil erosion is exceptionally high. This measure would reduce
17 the risk of increased water erosion, sedimentation, and movement of pollutants downstream compared to
18 Alternative A.

19 **4.5.4.2 Groundwater**

20 Under Alternative B, the BLM would apply stipulations to protect surface and groundwater resources.
21 BMPs would prevent the potential contamination of surface and groundwater as a result of drilling
22 operations. BMPs include the use of closed-loop drilling systems in sensitive areas or where there is
23 shallow groundwater; substituting less-toxic products for conventional drilling products, such as mud and
24 pipe dope; avoiding construction of reserve pits in areas of shallow groundwater; and using semi-closed-
25 loop or closed-loop drilling systems and lining pits with impermeable liners to prevent contamination of
26 groundwater and soils. These decisions would reduce the impacts on water quality compared with those
27 under Alternative A by reducing the potential for contamination of surface water and groundwater.

28 The BLM would also apply stipulations under Alternative B to protect shallow aquifers and potential
29 unconsolidated aquifers. BMPs specify that oil and gas exploration and development in areas identified
30 with shallow unconfined aquifers and potential unconsolidated aquifers would require additional
31 mitigation such as closed loop drilling; no surface pits; off-site location of production storage facilities; a
32 spill prevention, control, and countermeasure plan; and a storm water management plan. A water
33 monitoring plan may be required to ensure the effectiveness of mitigation to protect water resources. This
34 measure would reduce the risk of contamination and degradation of water quality within aquifers
35 compared to Alternative A.

36 **4.5.4.3 Riparian**

37 Under Alternative B, the BLM would apply an NSO stipulation to preclude oil and gas activities within
38 public water reserves and 100-year floodplains, and within 660 feet of intermittent and perennial streams,
39 rivers, riparian areas, wetlands, water wells, and springs. The NSO stipulation would reduce impacts to
40 riparian areas in the planning area compared with Alternative A by increasing the size of the NSO buffers
41 and not allowing for exceptions. This would prevent vegetation loss, soil erosion, and increased runoff
42 and transport of salts and sediments to nearby surface water bodies, and would also protect groundwater
43 quality and flow conditions, recharge areas, spring flows, and surface water quality.

44 Under Alternative B, the Green River WSR suitable segment from the confluence of the San Rafael River
45 to Canyonlands National Park would be closed to leasing. Managing the area as closed to leasing for oil
46 and gas development would protect riparian and water resources along the WSR suitable segment of the
47 Green River from vegetation loss, soil erosion, sedimentation, and introduction of pollutants into surface
48 water and groundwater as a result of surface disturbance and hydraulic fracturing.

1 **4.5.4.4** *Suspended and Protested Lease Decisions*

2 Under Alternative B, the BLM would cancel all suspended leases and resolve the protests on the protested
3 leases and deny the leases. Water and riparian resources in the areas of suspended and protested leases
4 would not be directly affected by oil and gas exploration and development activities. Current water and
5 riparian conditions and trends would be anticipated to continue for the foreseeable future.

6 **4.5.5 Impacts from Alternative C**

7 Under Alternative C, approximately 37,865 acres would be open to oil and gas leasing subject to standard
8 terms and conditions; approximately 362,127 acres would be open to oil and gas leasing subject to
9 CSU/TL stipulations; approximately 52,208 acres would be open to oil and gas leasing subject to NSO
10 stipulations; and approximately 192 acres would be closed to oil and gas leasing.

11 Under Alternative C, the BLM estimates that 27 oil and gas wells would be drilled in the planning area
12 over the next 15 years. These wells would result in approximately 517 acres of surface disturbance, of
13 which 82 acres would remain unreclaimed in 15 years. Geophysical survey operations under Alternative
14 C are anticipated to result in 292 acres of surface disturbance, of which approximately 58 acres would be
15 unreclaimed in 15 years. The BMPs that would be applied to oil and gas leases under Alternative C would
16 promote more rapid and successful reclamation of surface disturbance compared to those under
17 Alternative A, indirectly benefiting water resources by minimizing erosion and sedimentation. Alternative
18 C would be anticipated to result in less surface disturbance and fewer impacts to water and riparian
19 resources than under Alternative A but more surface disturbance and impacts than under Alternative B.

20 Managing areas identified as open to leasing and development subject to standard lease terms and
21 conditions would allow the development of well pads and associated infrastructure, which would involve
22 land clearing and surface disturbances. These actions expose soils and result in soil erosion and
23 sedimentation of downstream waters in both the short term during construction activities and in the long
24 term as permanent structures such as well pads and roads are maintained. Impacts could include altered
25 timing and duration of runoff; reduced infiltration capacity; and accelerated erosion, sedimentation, and
26 the addition of nutrients and sediment loads to stream channels, thereby degrading water quality, channel
27 structure, and overall watershed health.

28 The CSU/TL stipulations applied under Alternative C could minimize impacts to water and riparian
29 resources in the planning area by limiting the amount of surface-disturbing activities associated with oil
30 and gas leasing and development, thereby maintaining vegetation, stabilizing soil, and limiting erosion.
31 Under Alternative C, TL stipulations would be applied to saline soils, and CSU stipulations would be
32 applied for steep slopes, PFYC 4 and 5 areas, areas characterized by fine sandy soils with high wind
33 erosion potential, lands identified as having wilderness characteristics in the Labyrinth Canyon unit, the
34 Labyrinth Canyon SRMA, portions of the Dirty Devil/Robbers Roost SRMA, all recreation focus areas,
35 the Tidwell Draw site in the Uranium Mining District, the Old Spanish Trail high potential sites and route
36 segments, and in areas designated as VRM Class II.

37 Alternative C also includes CSU stipulations that would limit the density of oil and gas development.
38 These decisions would be made for resources including recreation focus areas, lands identified as having
39 wilderness characteristics in the Labyrinth Canyon unit, and the Labyrinth Canyon SRMA. In these areas,
40 the stipulations that would limit the density of oil and gas development would also reduce the intensity of
41 impacts on water resources, including vegetation loss, soil erosion, and increased runoff and transport of
42 salts and sediments to nearby surface water bodies.

43 In Alternative C, applying NSO stipulations to oil and gas leasing or closing areas to leasing would
44 prevent surface-disturbing activities from oil and gas development within the Three Rivers locatable
45 mineral withdrawal, natural areas, areas within 1 mile of Labyrinth Canyon rim, areas within 1 mile of
46 Horseshoe Canyon rim, areas within 1 mile of key observation points, and the Green River WSR suitable

1 section from the confluence of the San Rafael River to Canyonlands National Park. The NSO stipulations
2 could also protect water and riparian resources from vegetation loss, soil erosion, increased runoff, and
3 transport of salts and sediments to nearby surface water bodies including the San Rafael and Green
4 Rivers. NSO stipulations could also protect groundwater quality and flow conditions, recharge areas,
5 spring flows, and surface water quality. The Big Flat Tops ACEC would be closed to leasing, which
6 would provide similar benefits as applying NSO stipulations. Under Alternative C, the BLM would allow
7 some exceptions, modifications, or waivers to some of the NSO stipulations; however, fewer exceptions,
8 modifications, or waivers would be granted compared to Alternative A. Allowing fewer exceptions,
9 modifications, or waivers would reduce impacts to water and riparian resources in areas that would be
10 subject to NSO stipulations as compared to Alternative A.

11 Under Alternative C, geophysical operations would not be permitted in areas closed to leasing and would
12 be allowed in areas that are managed as NSO, although no new road construction or improvements would
13 be permitted and the BLM would require full reclamation of all surface disturbance. This management of
14 geophysical operations would provide better protection for water in areas managed as closed to oil and
15 gas leasing or open subject to NSO stipulations compared to Alternative A by preventing surface
16 disturbance, erosion, sedimentation, and degradation of water quality, and by improving reclamation
17 practices.

18 As described under Alternative B, the BMPs that are currently used for oil and gas leases in the planning
19 area would be updated under Alternative C to include additional state-of-the-art BMPs. The benefits to
20 water and riparian resources in the planning area from updating the BMPs under Alternative C would be
21 the same as those described under Alternative B.

22 Within the planning area, a typical well drilled to the primary target formation would involve
23 approximately 294,000 gallons of water. Water used as a drilling medium, for mixing cement, and for
24 various cleanup operations for the oil and gas wells projected in Alternative C would total approximately
25 7.9 million gallons of water that could be used in the next 15 years. The source of this water is primarily
26 municipalities and private sources. Water obtained from aquifers and surface water could result in the
27 drawing down of the water table and reduction of available water resources for wildlife, vegetation,
28 springs, streams, or public consumption. Withdrawal could affect local groundwater flow patterns and
29 create changes in the quality and quantity of the remaining groundwater. However, detailed impacts of
30 this water use cannot be addressed until site specific operations identify the water source.

31 **4.5.5.1 Surface Water**

32 Under Alternative C, the BLM would take the same actions as would be applied under Alternative B to
33 maintain water quality by working with the Utah Division of Water Quality and other agencies in
34 accordance with the MOU regarding implementing the nonpoint source water quality program in the State
35 of Utah. The BLM would not allow exceptions or modifications of stipulations in the Price RMP that
36 prohibit surface disturbance on slopes greater than 40%. These decisions would be the same as the
37 corresponding decisions for Alternative B and would be anticipated to have the same water and riparian
38 resource impacts and benefits.

39 The BLM would apply an NSO stipulation under Alternative C to preclude oil and gas exploration and
40 development within public water reserves and 100-year floodplains, and within 330 feet of intermittent
41 and perennial streams, rivers, riparian areas, wetlands, water wells, and springs. This stipulation would
42 reduce the impacts of oil and gas activities on water quality and riparian resources compared with
43 Alternative A, including reducing the amount of disturbance occurring in close proximity to riparian areas
44 with the potential to affect water quality, but would allow for more disturbance near riparian areas than
45 would be permitted under Alternative B. This stipulation would prevent vegetation loss, soil erosion, and
46 increased runoff and transport of salts and sediments to nearby surface water bodies, and would also
47 protect groundwater quality and flow conditions, recharge areas, spring flows, and surface water quality.

1 Under Alternative C, the BLM would apply an NSO stipulation to preclude oil and gas activities within
2 100 feet of ephemeral streams. An exception could be granted for road and pipeline crossings. Roads and
3 pipelines crossing ephemeral steams would be constructed in accordance with BMPs outlined in
4 Appendix C. This stipulation would reduce the impacts of oil and gas activities on ephemeral streams
5 compared with Alternative A, including reducing the amount of disturbance along ephemeral drainages,
6 erosion, and sedimentation in waters downstream, but the exceptions would allow for more disturbance
7 near ephemeral streams than would be permitted under Alternative B. This stipulation would prevent
8 vegetation loss, soil erosion, and increased runoff and transport of salts and sediments to nearby surface
9 water bodies.

10 Applying a TL stipulation for oil and gas leases under Alternative C prohibiting surface-disturbing
11 activities on saline soils in the Mancos Shale-derived soils from December 1 to May 31 could provide
12 additional protections to the Colorado River system's water resources by minimizing soil runoff and
13 erosion. However, heavy equipment traffic on existing roads associated with drilling and completion
14 operations would not be subject to this timing restriction. This TL would reduce the impacts of
15 disturbance to saline soils, as compared with Alternative A, including reducing the amount of erosion of
16 saline soils that could affect the water quality of downstream waterbodies such as the Green and Colorado
17 Rivers, but it would allow for more disturbance than permitted under Alternative B. Effects that would be
18 reduced include increased salinity, selenium, and sediment loads and associated water chemistry
19 parameters (e.g., TDS and total suspended solids).

20 **4.5.5.2 Groundwater**

21 The BLM would apply the same stipulations to protect surface and groundwater resources, and to protect
22 shallow aquifers and potential unconsolidated aquifers as would be applied under Alternative B. These
23 decisions would be the same as the corresponding decisions for Alternative B and would be anticipated to
24 have the same soil resource impacts and benefits.

25 **4.5.5.3 Riparian Resources**

26 Under Alternative C, the BLM would apply an NSO stipulation to preclude oil and gas exploration and
27 development within public water reserves and 100-year floodplains, and within 330 feet of intermittent
28 and perennial streams, rivers, riparian areas, wetlands, water wells, and springs. This stipulation would
29 reduce the impacts of oil and gas activities on water quality and riparian resources compared with
30 Alternative A, including reducing the amount disturbance occurring in close proximity to riparian areas
31 with the potential to affect water quality, but would allow for more disturbance near riparian areas than
32 permitted under Alternative B. This stipulation would prevent vegetation loss, soil erosion, and increased
33 runoff and transport of salts and sediments to nearby surface water bodies, including the San Rafael and
34 Green Rivers, and would also protect groundwater quality and flow conditions, recharge areas, spring
35 flows, and surface water quality.

36 Under Alternative C, the Green River WSR suitable segment from the confluence of the San Rafael River
37 to Canyonlands National Park (Map 2-5) would be managed as NSO. This decision would be the same as
38 the corresponding decision for Alternative A and would be anticipated to have the same impacts and
39 benefits to water and riparian resources.

40 **4.5.5.4 Suspended and Protested Lease Decisions**

41 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
42 standard terms, 39,766 acres would be issued subject to CSU/TL stipulations, and 318 acres would be
43 issued subject to NSO stipulations. The areas encompassed by the suspended and protested leases contain
44 sensitive soil resources including steep slopes and sandy soils that are difficult to reclaim and highly
45 susceptible to wind and water erosion and that therefore contribute to sedimentation and affect water

1 quality. The suspended lease areas also include intermittent and ephemeral streams, riparian areas, and
2 public water reserves within the Upper Dirty Devil watershed (HUC 10 1407000403) and the Robbers
3 Roost watershed (HUC 10 1407000402), which both drain into the Dirty Devil River and then into the
4 Colorado River. The protested lease areas contain a high density of intermittent and ephemeral streams
5 and springs, and are located near the San Rafael River in three watersheds: Cottonwood Wash (HUC 10
6 1406000907), Lower San Rafael River (HUC 10 1406000910), and Moonshine Wash (HUC 10
7 1406000909), which all drain into the San Rafael River and then into the Green River. If the leases were
8 subsequently developed, the impacts of modifying the terms and conditions of the suspended and
9 protested leases and issuing the leases consistent with Alternative C would be the same as the impacts on
10 water and riparian resources described for Alternative C.

11 **4.5.6 Impacts from Alternative D**

12 Under Alternative D, 0 acres would be open to oil and gas leasing subject to standard terms and
13 conditions; approximately 339,884 acres would be open to oil and gas leasing subject to CSU and TL
14 stipulations; approximately 92,170 acres would be open to oil and gas leasing subject to an NSO
15 stipulation; and approximately 20,339 acres would be closed to oil and gas leasing.

16 Under Alternative D, the BLM estimates that 23 oil and gas wells would be drilled in the planning area
17 over the next 15 years. These wells would result in approximately 440 acres of surface disturbance, of
18 which 70 acres would remain unreclaimed in 15 years. Geophysical survey operations under Alternative
19 D is anticipated to result in 248 acres of surface disturbance, of which approximately 50 acres would be
20 unreclaimed in 15 years. The BMPs that would be applied to oil and gas leases under Alternative D would
21 promote more rapid and successful reclamation of surface disturbance compared to Alternative A,
22 indirectly benefiting water resources by minimizing erosion and sedimentation. Alternative D would be
23 anticipated to result in less surface disturbance and fewer impacts to water and riparian resources
24 compared to Alternatives A and C but more surface disturbance and impacts compared to Alternative B.

25 Under Alternative D, TL/CSU stipulations, especially those that would limit the density of oil and gas
26 development, could reduce the intensity and extent of disturbance to soils, thereby reducing the amount of
27 erosion and potential pollutants (e.g., sediment, salt, and excess nutrient loading) that would end up in
28 runoff and that could affect water quality of downstream watersheds. TL stipulations would be applied to
29 saline soils; areas where CSU stipulations that would limit oil and gas development density under
30 Alternative D include LWC units (with the exception of the Labyrinth Canyon LWC unit) and The Cone
31 and Cottonwood Wash recreation focus areas. The density limitations in these areas under Alternative D
32 would require lower-density oil and gas development and would result in reduced surface disturbance and
33 impacts to water and riparian resources compared to Alternative C.

34 NSO stipulations would be applied under Alternative D for the Dirty Devil/French Springs LWS units
35 and the Horseshoe Canyon South non-WSA lands with wilderness characteristics; lands identified as
36 having wilderness characteristics during the 2016 inventory in the Labyrinth Canyon unit; the Labyrinth
37 Canyon SRMA; portions of the Dirty Devil/Robbers Roost SRMA; all lands within 1 mile of the Green
38 River Labyrinth Canyon rim that are north of the San Rafael River; the Fossil Point, Dry Lake, Trin
39 Alcove/Three Canyon, Saucer Basin/Moonshine Wash, Keg Knoll, Sweetwater Reef, and Horseshoe
40 Canyon Trailhead recreation focus areas; all lands within 1 mile of KOPs and travel corridors; the Dry
41 Lake Archaeological District ACEC; the Tidwell Draw ACEC; all lands within 1 mile of high-potential
42 sites and route segments along the Old Spanish Trail; steep slopes; areas within public water reserves and
43 100-year floodplains and within 660 feet of intermittent and perennial streams, rivers, riparian areas,
44 wetlands, water wells, and springs; and areas within 100 feet of ephemeral streams. Areas that would be
45 closed to oil and gas leasing would include the Big Flat Tops ACEC, the Three Rivers locatable mineral
46 withdrawal, all lands within 1 mile of the Green River Labyrinth Canyon rim south of the San Rafael
47 River, all lands within 1 mile of the Horseshoe Canyon rim, and the Green River suitable segment from
48 the confluence of the San Rafael River to Canyonlands National Park. The NSO stipulations and

1 decisions to close areas to oil and gas leasing could also protect water and riparian resources from
2 vegetation loss, soil erosion, and increased runoff and transport of salts and sediments to nearby surface
3 water bodies, and could also protect groundwater quality and flow conditions, recharge areas, spring
4 flows, and surface water quality.

5 The BLM would allow minimal exceptions, modifications, or waivers to NSO stipulations under
6 Alternative D. Fewer exceptions, modifications, or waivers would be granted compared to those under
7 Alternatives A and C. Allowing fewer exceptions, modifications, or waivers would reduce impacts to
8 water and riparian resources including soil erosion, increased runoff, sedimentation, and degradation of
9 water quality in areas that would be subject to NSO stipulations as compared to Alternatives A and C.

10 Under Alternative D, geophysical operations in areas managed as closed to leasing of NSO would be
11 conducted in the same manner and would be anticipated to have the same impacts on water and riparian
12 resources as Alternative C.

13 As described in Alternative B, the BMPs that are currently used for oil and gas leases in the planning area
14 would be updated under Alternative D to include additional state-of-the-art BMPs. The benefits to water
15 and riparian resources in the planning area from updating the BMPs under Alternative D would be the
16 same as those described under Alternative B.

17 Within the planning area, a typical well drilled to the primary target formation would involve about
18 294,000 gallons of water. Water used as a drilling medium, for mixing cement, and for various cleanup
19 operations for the oil and gas wells projected in Alternative D would total approximately 6.8 million
20 gallons of water that could be used in the next 15 years. The source of this water would be primarily
21 municipalities and private sources. Water obtained from aquifers and surface water could result in the
22 drawing down of the water table and a reduction of available water resources for wildlife, vegetation,
23 springs, streams, or public consumption. Withdrawal could affect local groundwater flow pattern and
24 create changes in quality and quantity of the remaining groundwater. However, detailed impacts of this
25 water use cannot be addressed until site specific operations identify the water source.

26 **4.5.6.1 Surface Water**

27 The BLM would take appropriate actions under Alternative D to maintain water quality by working with
28 the Utah Division of Water Quality and other agencies in accordance with the MOU regarding
29 implementing the nonpoint source water quality program in the State of Utah. NSO stipulations for the
30 buffer around intermittent and perennial streams, rivers, riparian areas, wetlands, water wells, and springs
31 would be 660 feet, the same as Alternative B. These decisions would be the same as the corresponding
32 decisions for Alternative B and would be anticipated to have the same water and riparian resource impacts
33 and benefits.

34 Under Alternative D, the BLM would apply an NSO stipulation to preclude oil and gas activities within
35 100 feet of ephemeral streams, with the same exceptions for road and pipeline crossings as Alternative C.
36 The BLM would not allow exceptions or modifications to the stipulation in the Price Field Office
37 ROD/RMP that prohibits surface disturbance on slopes greater than 40%, and would apply the same TL
38 stipulations that would prevent surface disturbance on saline soils in the Mancos Shale-derived soils as
39 would be applied under Alternative C. These decisions would be the same as the corresponding decisions
40 for Alternative C and would be anticipated to have the same water and riparian resource impacts and
41 benefits.

1 **4.5.6.2 Groundwater**

2 Under Alternative D, the BLM would apply the same stipulations to protect surface and groundwater
3 resources and to protect shallow aquifers and potential unconsolidated aquifers as would be applied under
4 Alternative B. These decisions would be the same as the corresponding decisions for Alternative B and
5 would be anticipated to have the same water and riparian resource impacts and benefits.

6 **4.5.6.3 Riparian Resources**

7 Under Alternative D, the BLM would apply NSO stipulations around intermittent and perennial streams,
8 rivers, riparian areas, wetlands, water wells, and springs within a buffer of 660 feet, the same as
9 Alternative B. This decision would be the same as the corresponding decision for Alternative B and
10 would be anticipated to have the same water and riparian resource impacts and benefits.

11 Under Alternative D, the Green River WSR suitable segment from the confluence of the San Rafael River
12 to Canyonlands National Park (Map 2-5) would be closed to leasing. This decision would be the same as
13 the corresponding decision for Alternative B and would be anticipated to have the same water and
14 riparian resource impacts and benefits.

15 **4.5.6.4 Suspended and Protested Lease Decisions**

16 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to
17 CSU/TL stipulations, and 3,132 acres would be issued subject to NSO stipulations. The areas encompassed
18 by the suspended and protested leases contain sensitive soil resources including steep slopes and sandy
19 soils that are difficult to reclaim and are highly susceptible to wind and water erosion and therefore
20 contribute to sedimentation and affect water quality. The suspended lease areas also include intermittent
21 and ephemeral streams, riparian areas, and public water reserves within the Upper Dirty Devil watershed
22 (HUC 10 1407000403) and the Robbers Roost watershed (HUC 10 1407000402), which both drain into
23 the Dirty Devil River and then into the Colorado River. The protested lease areas contain a high density of
24 intermittent and ephemeral streams and springs, and are located near the San Rafael River in three
25 watersheds: Cottonwood Wash (HUC 10 1406000907), Lower San Rafael River (HUC 10 1406000910),
26 and Moonshine Wash (HUC 10 1406000909), which all drain into the San Rafael River and then into the
27 Green River. If the leases were subsequently developed, the impacts of modifying the terms and conditions
28 of the suspended and protested leases and issuing the leases consistent with Alternative C would be the
29 same as the impacts on water and riparian resources described for Alternative C.

30 **4.6 VEGETATION**

31 This section presents potential impacts to vegetation resources from implementing management actions
32 presented in Chapter 2. Existing conditions concerning vegetation resources are described in Chapter 3.

33 **4.6.1 Assumptions**

- 34 • Adequate vegetative ground cover and species composition for site stabilization typically would
35 occur within 15 to 20 years in shrub communities and 20 to 25 years in desert communities.
- 36 • In disturbed areas, re-establishment of a vegetative landscape and plant composition similar to
37 adjacent undisturbed lands, including trees and shrubs, could take in excess of 100 years.
- 38 • All plant communities would be managed toward achieving a mix of species composition, cover,
39 and age classes across the landscape.
- 40 • The degree of impact attributed to any one disturbance or series of disturbances would be
41 influenced by several factors, including location; the type, time, and degree of disturbance; and
42 existing vegetation, precipitation, and mitigating actions applied to the disturbance.

- Noxious and invasive weeds would continue to be introduced and spread as a result of ongoing vehicle traffic in and out of the planning area, recreational activities, wildlife and livestock grazing and movements, and surface-disturbing activities.

4.6.2 Impacts Common to All Alternatives

The following discussions represent impacts to vegetation resources that would not vary by alternative.

Management of the Big Flat Tops ACEC as closed to oil and gas leasing and development would preclude impacts from oil and gas development, including surface disturbance, loss of vegetation, and introduction and spread of non-native, invasive species and noxious weeds into the relict vegetation community present within the ACEC.

Controlling noxious weed species, preventing the infestation and spread of invasive species, and developing cooperating agreements with other federal, state, local, and private organizations to control invasive and noxious weed species would reduce the introduction and spread of non-native, invasive species and noxious weeds throughout the planning area.

Lease notices and associated management of the following special status species would preclude impacts from oil and gas development to habitats for these species: Mexican spotted owl (*Strix occidentalis lucida*), southwestern willow flycatcher (*Empidonax traillii extimus*), yellow-billed cuckoo (*Coccyzus americanus*), bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*). This management would prevent surface disturbance, loss of vegetation, and the introduction and spread of non-native, invasive species and noxious weeds into the vegetation community present in these species' habitats, including the 100-year floodplain of the Green River and possibly some riparian areas within the planning area.

4.6.3 Impacts from Alternative A (No Action)

Under Alternative A, approximately 399,462 acres (88%) would be open to oil and gas leasing subject to standard terms and conditions, approximately 19,083 acres (4%) would be open to oil and gas leasing subject to CSU/TL stipulations, approximately 33,627 acres (7%) would be open to oil and gas leasing subject to NSO stipulations, and approximately 220 acres (0%) would be closed to oil and gas leasing.

Under Alternative A, the BLM estimates that 28 oil and gas wells would be drilled in the planning area over the next 15 years. These wells would result in approximately 541 acres of surface disturbance and removal of vegetation, of which 86 acres would remain unreclaimed in 15 years. Geophysical survey operations under Alternative A are anticipated to result in 305 acres of surface disturbance and the removal of vegetation, of which approximately 61 acres would be unreclaimed in 15 years. The BMPs that would be applied to oil and gas leases under Alternative A would promote reclamation of surface disturbance to some degree. However, because of the difficulty of reclaiming surface disturbances in the planning area, the areas that are reclaimed would not be anticipated to return to natural conditions until 20 to 25 years or more after initial reclamation.

Managing the areas identified as open to leasing and development subject to standard lease terms and conditions would result in the damage or removal of vegetation from the development of well pads and associated infrastructure. Invasive, non-native plant species and noxious weeds could be introduced and spread by vehicles and machinery during development activities, which could change habitat composition and function, making habitat inhospitable for native plant species and could lead to further losses of native vegetation. These impacts to vegetation would be limited, to some degree, by the implementation of BMPs described later in this section.

1 The TL stipulations under Alternative A would prevent surface disturbance during specific timeframes,
 2 which could support vegetation growth during the periods of closure; however, disturbance and
 3 vegetation removal could still occur outside of the seasonal closures, ultimately leading to some loss of
 4 vegetation from oil and gas development. The CSU stipulations could reduce the intensity and extent of
 5 disturbance to vegetation in areas such as steep slopes, SRMAs, areas adjacent to the Old Spanish Trail,
 6 and VRM Class II areas by minimizing surface disturbance, vegetation damage or removal, soil loss,
 7 erosion, and the introduction and spread of invasive, non-native plant species and noxious weeds.

8 Under Alternative A, applying an NSO stipulation or closing areas to oil and gas leasing would prevent
 9 surface-disturbing activities from oil and gas development within 100-year floodplains, steep slopes,
 10 natural springs, natural areas, SRMAs, and ACECs. The NSO stipulations could protect vegetation
 11 resources from damage or removal, prevent soil loss, and reduce erosion. The prevention of surface
 12 disturbance would reduce the potential for the introduction and spread of invasive, non-native plant
 13 species and noxious weeds, supporting the native vegetation communities and ecosystems. However,
 14 under Alternative A, the BLM would allow some exceptions, modifications, or waivers for NSO
 15 stipulations (e.g., in SRMAs where oil and gas exploration and development would not impair identified
 16 scenic and primitive or semi-primitive recreational resources, or on steep slopes when a more detailed
 17 analysis shows that impacts can be mitigated). Granting exceptions, modifications, or waivers to NSO
 18 stipulations would allow for impacts to vegetation resources from oil and gas development in areas where
 19 NSO stipulations are applied. These impacts would be similar to the impacts to vegetation that would
 20 occur in areas that are open to oil and gas leasing subject to standard terms and conditions.

21 Under Alternative A, geophysical operations could be allowed on lands closed to leasing or subject to
 22 NSO stipulations under certain circumstances in the Richfield Field Office and would be allowed
 23 consistent with existing regulations for geophysical exploration in the Price Field Office. Allowing
 24 geophysical operations in areas closed to mineral leasing or subject to NSO stipulations would allow for
 25 impacts to vegetation resources similar to the impacts to vegetation that would occur in areas that are
 26 open to oil and gas leasing subject to standard terms and conditions.

27 As described in Chapter 3, vegetation communities were identified using land cover data developed by
 28 the SWReGAP (Prior-Magee et al. 2007). Table 4-10 presents the acres of each land cover type that occur
 29 within the planning area within the areas that are closed to oil and gas leasing, open to oil and gas leasing
 30 subject to standard terms and conditions, and open to oil and gas leasing subject to NSO or CSU/TL
 31 stipulations.

32 **Table 4-10. Land Cover Types by Oil and Gas Leasing Category under Alternative A**

Land Cover Type	Open (acres)	CSU/TL (acres)	NSO (acres)	Closed (acres)
Colorado Plateau Blackbrush-Mormon-Tea Shrubland	184,190	7,983	11,120	14
Colorado Plateau Mixed Bedrock Canyon and Tableland	25,515	1,162	4,922	126
Colorado Plateau Pinyon-Juniper Shrubland	1,466	43	116	1
Colorado Plateau Pinyon-Juniper Woodland	290	56	4	2
Developed, Medium - High Intensity	269	19	0	0
Disturbed, Oil Well	7	0	0	0
Inter-Mountain Basins Active and Stabilized Dune	87,439	2,054	9,169	1
Inter-Mountain Basins Big Sagebrush Shrubland	107	0	1	0

Land Cover Type	Open (acres)	CSU/TL (acres)	NSO (acres)	Closed (acres)
Inter-Mountain Basins Greasewood Flat	7713	1247	898	0
Inter-Mountain Basins Mat Saltbush Shrubland	35,998	4,134	2,891	46
Inter-Mountain Basins Mixed Salt Desert Scrub	5,142	1,159	595	23
Inter-Mountain Basins Semi-Desert Grassland	14,114	384	45	1
Inter-Mountain Basins Semi-Desert Shrub Steppe	8,846	95	60	7
Inter-Mountain Basins Shale Badland	7,604	382	532	0
Invasive Annual and Biennial Forbland	954	63	360	0
Invasive Annual Grassland	3	0	0	0
Invasive Southwest Riparian Woodland and Shrubland	450	97	1,542	0
Open Water	75	35	425	0
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	31	3	35	0
Southern Colorado Plateau Sand Shrubland	19,246	167	912	0

1 The climate in the planning area is arid, and past reclamation of disturbances has been difficult, including
2 the reestablishment of vegetation on oil and gas well pads, roads, and areas that have been disturbed from
3 seismic activities. Alternative A contains some stipulations and BMPs that would help improve
4 reclamation success. Under Alternative A, the use and perpetuation of native plant species would be
5 emphasized in reclamation actions. However, when restoring or rehabilitating disturbed or degraded
6 rangelands, non-intrusive, non-native plant species may be used. The BMPs that would be applied to oil
7 and gas leases under Alternative A would require interim reclamation of the well and access road and
8 would begin as soon as practicable after a well is placed in production. Facilities would be grouped on the
9 pads to allow for maximum interim reclamation. Interim reclamation would include road cuts and fills
10 and would extend to within close proximity of the wellhead and production facilities. Final reclamation of
11 all oil and gas disturbance would involve recontouring all disturbed areas, including access roads, to the
12 original contour or a contour that blends with the surrounding topography and revegetating all disturbed
13 areas. Even with these stipulations and BMPs, it is anticipated that reclamation of some disturbances and
14 reestablishment of vegetation on areas disturbed by oil and gas activities would be difficult and could take
15 20 to 25 years or more under Alternative A.

16 **4.6.3.1 *Suspended and Protested Lease Decisions***

17 Under Alternative A, 45,043 acres of the suspended and protested leases would be issued subject to
18 standard terms and conditions, and 113 acres of protested leases would be issued subject to NSO
19 stipulations. If the leases were subsequently developed, the impacts to vegetation from issuing the leases
20 subject to the terms and conditions contained within the Price and Richfield ROD/RMPs (Alternative A-
21 2) would be the same as the impacts to vegetation from managing them as open or NSO described in this
22 section. If BLM were to rescind the suspensions on the suspended leases (Alternative A-1) and the leases
23 were subsequently developed, the impacts to vegetation that would occur in the leased areas could be the
24 same as those described for managing vegetation as open to leasing subject to standard terms and
25 conditions. Under Alternative A-2, the suspended leases would be subject to the conditions, including
26 reclamation stipulations and BMPs included in the Richfield ROD/RMP. Modifying the stipulations to be
27 consistent with the Richfield ROD/RMP (Alternative A-2) would improve the reclamation of
28 disturbances, including reestablishment of vegetation and prevention of introduction and spread of non-

1 native, invasive plant species and noxious weeds resulting from oil and gas development activities
2 compared to Alternative A-1.

3 Under both Alternatives A-1 and A-2, if a lessee proposes to develop these leases (e.g., drill a well), the
4 BLM would evaluate the lessee's proposal in a site-specific environmental review. If during the site-
5 specific environmental review process the BLM determines that additional mitigation measures are
6 required to protect resources of concern, those mitigation measures would be included as conditions of
7 approval to future site-specific authorizations (e.g., application of appropriate BMPs).

8 **4.6.4 Impacts from Alternative B**

9 Under Alternative B, 0 acre (0%) would be open to oil and gas leasing subject to standard terms and
10 conditions, approximately 98,164 acres (22%) would be open to oil and gas leasing subject to CSU/TL
11 stipulations, approximately 324,161 acres (72%) would be open to oil and gas leasing subject to NSO
12 stipulations, and approximately 30,068 (7%) acres would be closed to oil and gas leasing.

13 Under Alternative B, the BLM estimates that seven oil and gas wells would be drilled in the planning area
14 over the next 15 years. These wells would result in approximately 127 acres of surface disturbance and
15 the removal of vegetation, of which 20 acres would remain unreclaimed in 15 years. Geophysical survey
16 operations under Alternative B are anticipated to result in 72 acres of surface disturbance and the removal
17 of vegetation, of which approximately 14 acres would be unreclaimed in 15 years. The BMPs that would
18 be applied to oil and gas leases under Alternative B would promote more rapid and successful reclamation
19 of surface disturbance compared to Alternative A. However, because of the difficulty of reclaiming
20 surface disturbances in the planning area, some reclaimed areas would not be anticipated to return to
21 natural conditions until up to 20 to 25 years after initial reclamation.

22 The TL stipulations under Alternative B would prevent surface disturbance during specific timeframes,
23 which could support vegetation growth during the periods of closure; however, disturbance and
24 vegetation removal could still occur outside of the seasonal closures, ultimately leading to some loss of
25 vegetation from oil and gas development. The CSU stipulations applied under Alternative B could reduce
26 the intensity and extent of disturbance to vegetation in the planning area. Applying a CSU stipulation that
27 requires a fugitive dust control plan for oil and gas activities that would disturb a surface area larger than
28 0.25 acre, or that would result in substantial increases in truck traffic on unpaved or untreated surfaces,
29 could reduce the impacts of dust on vegetation near the dust-producing activities including decreased
30 transpiration and photosynthesis. Applying a CSU stipulation that requires use of BMPs to minimize or
31 mitigate wind erosion and emissions of fugitive dust would substantially improve reclamation success and
32 reestablishment of vegetation removed as a result of oil and gas operations in the planning area by
33 preventing erosion of soils and loss of seed material necessary for reestablishment of vegetation.

34 Under Alternative B, applying an NSO stipulation or closing areas to oil and gas leasing would prevent
35 surface-disturbing activities from oil and gas development within large portions of the planning area (Map
36 2-2-B). In areas that open subject to NSO stipulations or closed to leasing, vegetation would be protected
37 from damage and removal or from the introduction and spread of invasive, non-native plant species and
38 noxious weeds resulting from oil and gas development. The NSO stipulations could also protect
39 vegetation resources from damage or removal, prevent soil loss, and reduce erosion resulting from oil and
40 gas development. The prevention of surface disturbance would reduce the potential for the introduction
41 and spread of invasive, non-native plant species and noxious weeds, supporting the native vegetation
42 communities and ecosystems. Under Alternative B, the BLM would not allow exceptions, modifications,
43 or waivers to most NSO stipulations. Not allowing exceptions, modifications, or waivers would reduce
44 impacts to vegetation in areas that would be subject to NSO stipulations compared to Alternative A,
45 which would allow more exceptions, modifications, or waivers.

1 Under Alternative B, geophysical operations would not be permitted in areas closed to leasing, and only
 2 heliport geophysical operations would be allowed in areas that are open subject to NSO stipulations. This
 3 management of geophysical operations would provide better protection for vegetation in areas managed
 4 as closed to oil and gas leasing or open subject to NSO stipulations, including prevention of surface
 5 disturbance, damage or removal of vegetation, and introduction and spread of invasive, non-native plant
 6 species and noxious weeds compared to Alternative A.

7 As described in Chapter 3, vegetation communities were identified using land cover data developed by
 8 the SWReGAP (Prior-Magee et al. 2007). Table 4-11 presents the acres of each land cover type that occur
 9 within the planning area within the areas that are closed to oil and gas leasing, open to oil and gas leasing
 10 subject to standard terms and conditions, and open to oil and gas leasing subject to NSO or CSU/TL
 11 stipulations.

12 **Table 4-11. Land Cover Types by Oil and Gas Leasing Category under Alternative B**

Land Cover Type	Open (acres)	CSU/TL (acres)	NSO (acres)	Closed (acres)
Colorado Plateau Blackbrush-Mormon-Tea Shrubland	0	43,214	148,063	12,031
Colorado Plateau Mixed Bedrock Canyon and Tableland	0	5,044	20,917	5,764
Colorado Plateau Pinyon-Juniper Shrubland	0	199	1,301	126
Colorado Plateau Pinyon-Juniper Woodland	0	25	313	14
Developed, Medium - High Intensity	0	58	226	3
Disturbed, Oil Well	0	0	0	7
Inter-Mountain Basins Active and Stabilized Dune	0	17,577	77,023	4,064
Inter-Mountain Basins Big Sagebrush Shrubland	0	4	103	1
Inter-Mountain Basins Greasewood Flat	0	3,188	5,528	1,142
Inter-Mountain Basins Mat Saltbush Shrubland	0	10,664	28,655	3,750
Inter-Mountain Basins Mixed Salt Desert Scrub	0	1,537	3,960	1,422
Inter-Mountain Basins Semi-Desert Grassland	0	3,220	11,293	31
Inter-Mountain Basins Semi-Desert Shrub Steppe	0	3,561	5,391	56
Inter-Mountain Basins Shale Badland	0	3,595	4,807	116
Invasive Annual and Biennial Forbland	0	110	1,120	147
Invasive Annual Grassland	0	0	3	0
Invasive Southwest Riparian Woodland and Shrubland	0	0	1,746	343
Open Water	0	0	0	535
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	0	0	53	17
Southern Colorado Plateau Sand Shrubland	0	6,166	13,660	500

1 Under Alternative B, only native species would be used when restoring or rehabilitating disturbed areas,
2 and the BMPs that are currently used for oil and gas leases in the planning area would be updated to
3 include additional state-of-the-art BMPs. Compared to Alternative A, these BMPs include measures to
4 reduce fugitive dust, protect soil and water resources, improve reclamation success, reduce impacts on
5 vegetation, and prevent the spread of noxious weeds and invasive species. These BMPs would reduce the
6 long-term impacts of oil and gas development to vegetation by minimizing the area of disturbed land and
7 promoting improved reclamation planning and practices, including improved topsoil salvage, seedbed
8 preparation, and seeding, and preventing livestock from grazing the reclaimed area until vegetation is
9 reestablished. The revised BMPs would also reduce the introduction and spread of non-native, invasive
10 plant species and noxious weeds compared to Alternative A by improving equipment cleaning and by the
11 coordination, planning, and execution of noxious weed prevention measures. Compared to Alternative A,
12 these BMPs would reduce the time required to reestablish vegetation on areas disturbed by oil and gas
13 activities and promote a more rapid return to natural conditions in disturbed areas.

14 **4.6.4.1 *Suspended and Protested Lease Decisions***

15 Under Alternative B, the BLM would cancel all suspended leases and resolve the protests on the protested
16 leases and deny the leases. The vegetation in the areas of suspended and protested leases would not be
17 affected by oil and gas activities resulting from operators exploring for and developing oil and gas
18 resources. Current vegetation conditions and trends conditions would be anticipated to continue for the
19 foreseeable future.

20 **4.6.5 Impacts from Alternative C**

21 Under Alternative C, approximately 37,865 acres (8%) would be open to oil and gas leasing subject to
22 standard terms and conditions, approximately 362,127 acres (80%) would be open to oil and gas leasing
23 subject to CSU/TL stipulations, approximately 52,208 acres (12%) would be open to oil and gas leasing
24 subject to NSO stipulations, and approximately 192 acres (0%) would be closed to oil and gas leasing.

25 Under Alternative C, the BLM estimates that 27 oil and gas wells would be drilled in the planning area
26 over the next 15 years. These wells would result in approximately 517 acres of surface disturbance and
27 removal of vegetation, of which 82 acres would remain unreclaimed in 15 years. Geophysical survey
28 operations under Alternative C are anticipated to result in 292 acres of surface disturbance and removal of
29 vegetation, of which approximately 58 acres would be unreclaimed in 15 years. The BMPs that would be
30 applied to oil and gas leases under Alternative C would promote more rapid and successful reclamation of
31 surface disturbance compared to Alternative A. However, because of the difficulty of reclaiming surface
32 disturbances in the planning area, some reclaimed areas would not be anticipated to return to natural
33 conditions until up to 20 to 25 years after initial reclamation.

34 Managing the areas identified as open to leasing and development subject to standard lease terms and
35 conditions would result in the damage or removal of vegetation from the development of well pads and
36 associated infrastructure. Invasive, non-native plant species and noxious weeds could be introduced and
37 spread by vehicles and machinery during development activities, which could change habitat composition
38 and function, making habitat inhospitable for native plant species and could lead to further losses of
39 native vegetation.

40 The TL stipulations under Alternative C would prevent surface disturbance during specific timeframes,
41 which could support vegetation growth during the periods of closure; however, disturbance and
42 vegetation removal could still occur outside of the seasonal closures, ultimately leading to some loss of
43 vegetation from oil and gas development. The CSU stipulations applied under Alternative C, especially
44 those that would limit the density of oil and gas development, could reduce the intensity and extent of
45 disturbance to vegetation. These areas include the Labyrinth Canyon LWC, SRMAs, recreation focus
46 areas, areas designated as VRM Class II, and areas within 2 miles of the Old Spanish Trail. Similar to

1 Alternative B, Alternative C would also require the use of BMPs to minimize or mitigate wind erosion
 2 and emissions of fugitive dust, which would substantially improve reclamation success and
 3 reestablishment of vegetation removed as a result of oil and gas operations in the planning area by
 4 preventing erosion of soils and loss of seed material necessary for reestablishment of vegetation. Under
 5 Alternative C, the Tidwell Draw Uranium District ACEC would be managed subject to a CSU stipulation,
 6 which could allow for more disturbance and removal of vegetation within the ACEC than would be
 7 permitted under Alternatives A or B, where the ACEC would be managed subject to an NSO stipulation.

8 Under Alternative C, applying an NSO stipulation to oil and gas leasing would prevent surface-disturbing
 9 activities from oil and gas development within the Three Rivers locatable mineral withdrawal, designated
 10 natural areas, within 1 mile of the Labyrinth Canyon rim, within 1 mile of Horseshoe Canyon rim, within
 11 1 mile of key observation points, and the Green River suitable section from the confluence of the San
 12 Rafael River to Canyonlands National Park. The NSO stipulations could also protect vegetation resources
 13 from damage or removal, prevent soil loss, and reduce erosion resulting from oil and gas development.
 14 The prevention of surface disturbance would reduce the potential for the introduction and spread of
 15 invasive, non-native plant species and noxious weeds, supporting the native vegetation communities and
 16 ecosystems. Under Alternative C, the BLM would allow exceptions, modifications, or waivers to some of
 17 the NSO stipulations; however, fewer exceptions, modifications, or waivers would be granted compared
 18 to Alternative A. Allowing fewer exceptions, modifications, or waivers would reduce impacts to
 19 vegetation in areas that would be subject to NSO stipulations compared to Alternative A, which would
 20 allow more exceptions, modifications, or waivers.

21 Under Alternative C, geophysical operations would not be permitted in areas closed to leasing and would
 22 be allowed in areas that are managed subject to NSO stipulations, though no new road construction or
 23 improvements would be permitted, and the BLM would require full reclamation of all surface
 24 disturbance. This management of geophysical operations would provide better protection for vegetation in
 25 areas managed as closed to oil and gas leasing or open subject to NSO stipulations, including prevention
 26 of surface disturbance and damage or removal of vegetation, improved reclamation practices, and reduced
 27 likelihood of introduction and spread of invasive, non-native plant species and noxious weeds compared
 28 to Alternative A.

29 As described in Chapter 3, vegetation communities were identified using land cover data developed by
 30 the SWReGAP (Prior-Magee et al. 2007). Table 4-12 presents the acres of each land cover type that occur
 31 within the planning area within the areas that are closed to oil and gas leasing, open to oil and gas leasing
 32 subject to standard terms and conditions, and open to oil and gas leasing subject to NSO or CSU/TL
 33 stipulations.

34 **Table 4-12. Land Cover Types by Oil and Gas Leasing Category under Alternative C**

Land Cover Type	Open (acres)	CSU/TL (acres)	NSO (acres)	Closed (acres)
Colorado Plateau Blackbrush-Mormon-Tea Shrubland	11,951	173,117	18,240	0
Colorado Plateau Mixed Bedrock Canyon and Tableland	3,204	20,325	8,080	116
Colorado Plateau Pinyon-Juniper Shrubland	64	1,402	160	0
Colorado Plateau Pinyon-Juniper Woodland	11	327	13	2
Developed, Medium - High Intensity	6	276	5	0
Disturbed, Oil Well	0	0	7	0
Inter-Mountain Basins Active and Stabilized Dune	15,002	72,842	10,820	0

Land Cover Type	Open (acres)	CSU/TL (acres)	NSO (acres)	Closed (acres)
Inter-Mountain Basins Big Sagebrush Shrubland	0	107	1	0
Inter-Mountain Basins Greasewood Flat	837	7,020	2,001	0
Inter-Mountain Basins Mat Saltbush Shrubland	2,905	34,222	5,897	46
Inter-Mountain Basins Mixed Salt Desert Scrub	426	4,474	1,996	23
Inter-Mountain Basins Semi-Desert Grassland	197	14,292	55	1
Inter-Mountain Basins Semi-Desert Shrub Steppe	1,317	7,524	161	5
Inter-Mountain Basins Shale Badland	1,228	6,811	478	0
Invasive Annual and Biennial Forbland	102	780	494	0
Invasive Annual Grassland	0	3	0	0
Invasive Southwest Riparian Woodland and Shrubland	0	0	2,089	0
Open Water	0	0	535	0
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	0	0	70	0
Southern Colorado Plateau Sand Shrubland	615	18,605	1,106	0

1 Under Alternative C, the use and perpetuation of native plant species would be emphasized in reclamation
2 actions. However, when restoring or rehabilitating disturbed or degraded rangelands, non-intrusive, non-
3 native plant species may be used. Unlike Alternative B, this would allow for the use of non-native species
4 in reclamation as needed. Additionally, similar to Alternative B, under Alternative C, the BMPs that are
5 currently used for oil and gas leases in the planning area would be updated to include additional state-of-
6 the-art BMPs. The benefits to vegetation resources in the planning area from updating the BMPs under
7 Alternative C would be the same as those described under Alternative B.

8 **4.6.5.1 *Suspended and Protested Lease Decisions***

9 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
10 standard terms, 39,766 acres would be issued subject to CSU/TL stipulations, and 318 acres would be
11 issued subject to NSO stipulations. If the leases were subsequently developed, the impacts of modifying
12 the terms and conditions of the suspended and protested leases and issuing the leases consistent with
13 Alternative C would be the same as the impacts to vegetation described in this section from managing
14 areas as open to leasing subject to standard terms and conditions, open to leasing subject to CSU/TL
15 stipulations, or open to leasing subject to NSO stipulations.

16 **4.6.6 Impacts from Alternative D**

17 Under Alternative D, 0 acre (0%) would be open to oil and gas leasing subject to standard terms and
18 conditions, approximately 339,884 acres (75%) would be open to oil and gas leasing subject to CSU/TL
19 stipulations, approximately 92,170 acres (20%) would be open to oil and gas leasing subject to a NSO
20 stipulation, and approximately 20,339 acres (4%) would be closed to oil and gas leasing.

21 Under Alternative D, the BLM estimates that 23 oil and gas wells would be drilled in the planning area
22 over the next 15 years. These wells would result in approximately 440 acres of surface disturbance and
23 removal of vegetation, of which 70 acres would remain unreclaimed in 15 years. Geophysical survey
24 operations under Alternative C are anticipated to result in 248 acres of surface disturbance and the

1 removal of vegetation, of which approximately 50 acres would be unreclaimed in 15 years. The BMPs
2 that would be applied to oil and gas leases under Alternative D would promote more rapid and successful
3 reclamation of surface disturbance compared to Alternative A. However, because of the difficulty of
4 reclaiming surface disturbances in the planning area, some reclaimed areas would not be anticipated to
5 return to natural conditions until up to 20 to 25 years after initial reclamation.

6 The TL stipulations under Alternative D would prevent surface disturbance during specific timeframes,
7 which could support vegetation growth during the periods of closure; however, disturbance and
8 vegetation removal could still occur outside of the seasonal closures, ultimately leading to some loss of
9 vegetation from oil and gas development. The CSU stipulations applied under Alternative D, especially
10 those that would limit the density of oil and gas development, could reduce the intensity and extent of
11 disturbance to vegetation. Areas where CSU stipulations would be applied under Alternative D that would
12 limit oil and gas development density include LWC units, with the exception of the Labyrinth Canyon
13 LWC unit and The Cone and Cottonwood Wash recreation focus areas. The density limitations in these
14 areas under Alternative D would require lower density oil and gas development and would result in
15 reduced removal of vegetation compared to Alternative C. Applying a CSU stipulation requiring a
16 fugitive dust control plan for oil and gas activities that would disturb a surface area larger than 0.25 acre,
17 or that would result in substantial increases in truck traffic on unpaved or untreated surfaces, could reduce
18 the impacts of dust to vegetation (including decreased transpiration and photosynthesis) near the dust-
19 producing activities. Similar to Alternative B, Alternative D would also require the use of BMPs to
20 minimize or mitigate wind erosion and emissions of fugitive dust and would substantially improve
21 reclamation success and reestablishment of vegetation removed as a result of oil and gas operations in the
22 planning area by preventing erosion of soils and loss of seed material necessary for reestablishment of
23 vegetation.

24 In Alternative D, applying an NSO stipulation to oil and gas leasing would prevent surface-disturbing
25 activities from oil and gas development within existing natural areas; the Labyrinth Canyon LWC unit;
26 SRMAs; all lands within 1 mile of the Green River Labyrinth Canyon rim that are north of the San Rafael
27 River; the Fossil Point, Dry Lake, Trin Alcove/Three Canyon, Saucer Basin/Moonshine Wash, Keg
28 Knoll, Sweetwater Reef, and Horseshoe Canyon Trailhead recreation focus areas; lands within 1 mile of
29 key observation points and travel corridors; Tidwell Draw Uranium Mining District ACEC; lands within
30 1 mile of portions of the Old Spanish Trail; steep slopes; and areas near 100-year floodplains and other
31 surface water resources. The NSO stipulations could also protect vegetation resources from damage or
32 removal, prevent soil loss, and reduce erosion resulting from oil and gas development. The prevention of
33 surface disturbance would reduce the potential for the introduction and spread of invasive, non-native
34 plant species and noxious weeds, supporting the native vegetation communities and ecosystems.

35 Under Alternative D, the BLM would allow minimal exceptions, modifications, or waivers to NSO
36 stipulations. Fewer exceptions, modifications, or waivers would be granted compared to Alternatives A
37 and C. Allowing fewer exceptions, modifications, or waivers would reduce impacts to vegetation
38 including vegetation damage, removal, and introduction of invasive, non-native plant species and noxious
39 weeds in areas that would be subject to NSO stipulations compared to Alternatives A and C.

40 Under Alternative D, geophysical operations in areas closed to leasing or managed subject to NSO
41 stipulations would be managed in the same manner as Alternative C. The types of impacts to vegetation in
42 these areas would be similar to the impacts to vegetation described for Alternative C; however, under
43 Alternative D, there would be more areas managed as closed to leasing or open subject to NSO
44 stipulations compared to Alternative C. Additionally, under Alternatives D, the BLM predicts that there
45 would be slightly fewer geophysical exploration activities compared to Alternative C. Therefore,
46 Alternative D would have fewer impacts to vegetation from geophysical exploration compared to
47 Alternative C.

1 As described in Chapter 3, vegetation communities were identified using land cover data developed by
 2 the SWReGAP (Prior-Magee et al. 2007). Table 4-13 presents the acres of each land cover type that occur
 3 within the planning area within the areas that are closed to oil and gas leasing, open to oil and gas leasing
 4 subject to standard terms and conditions, and open to oil and gas leasing subject to NSO or CSU/TL
 5 stipulations.

6 **Table 4-13. Land Cover Types by Oil and Gas Leasing Category in Alternative D**

Land Cover Type	Open (acres)	CSU/TL (acres)	NSO (acres)	Closed (acres)
Colorado Plateau Blackbrush-Mormon-Tea Shrubland	0	148,756	43,861	10,691
Colorado Plateau Mixed Bedrock Canyon and Tableland	0	16,455	10,525	4,746
Colorado Plateau Pinyon-Juniper Shrubland	0	1,290	213	123
Colorado Plateau Pinyon-Juniper Woodland	0	306	31	14
Developed, Medium - High Intensity	0	167	120	0
Disturbed, Oil Well	0	0	7	1
Inter-Mountain Basins Active and Stabilized Dune	0	83,835	12,613	2,216
Inter-Mountain Basins Big Sagebrush Shrubland	0	75	32	1
Inter-Mountain Basins Greasewood Flat	0	6,244	3,371	242
Inter-Mountain Basins Mat Saltbush Shrubland	0	30,107	12,437	525
Inter-Mountain Basins Mixed Salt Desert Scrub	0	3,749	2,631	539
Inter-Mountain Basins Semi-Desert Grassland	0	14,089	431	24
Inter-Mountain Basins Semi-Desert Shrub Steppe	0	8,232	725	50
Inter-Mountain Basins Shale Badland	0	7,581	899	38
Invasive Annual and Biennial Forbland	0	768	570	39
Invasive Annual Grassland	0	0	3	0
Invasive Southwest Riparian Woodland and Shrubland	0	0	1,762	327
Open Water	0	0	25	509
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	0	0	55	15
Southern Colorado Plateau Sand Shrubland	0	18,229	1,856	241

7 Under Alternative D, the requirements for plant species to be used in reclamation and the benefits to
 8 vegetation resources from this management would be the same as Alternative C. Additionally, similar to
 9 Alternatives B and C, under Alternative D, the BMPs that are currently used for oil and gas leases in the
 10 planning area would be updated to include additional state-of-the-art BMPs. The benefits to vegetation
 11 resources in the planning area from updating the BMPs under Alternative D would be the same as those
 12 described under Alternative B.

1 **4.6.6.1** *Suspended and Protested Lease Decisions*

2 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to CSU
3 or TL stipulations, and 3,132 acres would be issued subject to NSO stipulations. If the leases were
4 subsequently developed, the impacts of modifying the terms and conditions of the suspended and
5 protested leases and issuing the leases consistent with Alternative D would be the same as the impacts to
6 vegetation from managing lands as open to leasing subject to CSU/TL stipulations, or open to leasing
7 subject to NSO stipulations described in this section.

8 **4.7 CULTURAL RESOURCES**

9 This section presents potential impacts to cultural resources from implementation of the management
10 actions presented in Chapter 2. Existing conditions for cultural resources in the analysis area are described
11 in Chapter 3.

12 **4.7.1 Evaluating Impacts to Cultural Resources**

13 Most of the cultural resources documented in the planning area are archaeological sites—both prehistoric
14 and historic in age. The principal concern for impacts to these sites relates to disturbance of artifacts,
15 features, and/or architecture present at the site in ways that reduce their integrity, alter their association
16 with traditional values, and reduce the potential to recover data relevant to important questions in history
17 or prehistory. Archaeological data consist of both objects (in the broad sense of artifacts, features,
18 architecture, etc.) and the spatial relationships between these objects. The ability to interpret and
19 understand these sites and their placement in the past is based on recovering not only the objects—or
20 material culture—themselves, but also recovering the spatial relationships between these different aspects
21 of material culture. Accordingly, surface and subsurface disturbances that change these important spatial
22 relationships have the greatest potential for adverse impacts to cultural resources. These impacts can
23 include elimination or reduction of the physical integrity and setting of a site, including National Register
24 of Historic Places (NRHP)—eligible sites, landscapes, sacred sites, and cultural theme areas. Other impacts
25 can include disruption or reduction of the religious values of sites and areas, reduction or loss of the data
26 potential of a site, or damage to traditional collection areas.

27 Once an archaeological site has been impacted, the effect typically cannot be reversed. Accordingly,
28 impacts to cultural resources from surface disturbance are long term and permanent. Nonetheless, short-
29 term effects from visual or auditory impacts may occur, and these can often be mitigated or
30 accommodated. Potential impacts to specific cultural resources from the proposed alternatives are
31 difficult to quantify precisely. The alternatives do not stipulate exact locations for surface-disturbing
32 activities, nor are the specific locations of all cultural resources in the planning area fully known. Still, it
33 is possible to estimate impacts based on the proposed general locations of activities within the planning
34 area that have a high, medium, or low probability of containing cultural resources.

35 To estimate the distribution of cultural resources within the planning area, a site location model was
36 developed using available site documentation. Through extensive study of archaeological sites throughout
37 the West, researchers have identified a number of key factors that influence site locations and types,
38 including elevation, slope, aspect, distance to permanent and/or intermittent water, and the presence or
39 absence of resources of interest (food resources, mineral resources, etc.). Using many of these factors, a
40 site location model for the planning area was developed in an effort to better estimate the potential
41 impacts of each alternative. This model was then used to rank all portions of the planning area as having
42 either high, medium, or low probability for the occurrence of cultural sites (Table 4-14).

1

Table 4-14. Probability for the Occurrence of Cultural Sites

Site Probability	Estimated Acreage	Percentage of Lands in the Planning Area
High	3,750	1%
Medium	31,459	7%
Low	416,111	92%

2 **4.7.2 Assumptions**

- 3 • Protection for all cultural resources would occur in accordance with federal laws and BLM
4 regulations and agreements, regardless of whether the resources are specifically identified in the
5 MLP/EA.
- 6 • Adverse impacts to cultural resources from surface-disturbing activities would occur primarily at
7 the time the initial surface disturbance occurs. Therefore, the projected numbers for short-term
8 surface disturbance are used to quantify impacts to cultural resources.
- 9 • There is a direct correlation between the number of sites that could be impacted by various
10 mineral actions and the degree, nature, and quantity of surface-disturbing activities allowed
11 within the planning area. In general, the more surface disturbance associated with mineral
12 development, the greater the likelihood for adverse impacts to cultural resources.
- 13 • The cultural resources site location model is sufficient for management purposes and for
14 comparing alternative impacts.

15 **4.7.3 Impacts Common to All Alternatives**

16 All leases may be found to contain historic properties and/or resources protected under the National
17 Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves
18 Protection and Repatriation Act, Executive Order 13007, or other statues and executive orders. The BLM
19 would not approve any ground-disturbing activities that may affect any such properties or resources until
20 it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM
21 may require modification to exploration or development proposals to protect such properties, or it may
22 disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided,
23 minimized, or mitigated.

24 **4.7.4 Impacts from Alternative A (No Action)**

25 Under Alternative A, approximately 399,276 acres would be managed as open to leasing with standard
26 terms and conditions. An additional 18,932 acres would be managed with CSU/TL stipulations. Together
27 these comprise approximately 93% of the planning area. Within this area, projected development would
28 occur, and the associated surface disturbance could adversely impact cultural resources.

29 The remaining 7% of the planning area would be subject to either NSO stipulations (32,921 acres) or
30 would be closed to leasing (192 acres). These major constraints would protect cultural resources within
31 these areas by precluding surface mineral development.

32 Under Alternative A, cultural viewsheds are not addressed. This means that a lease notice requiring a
33 viewshed assessment for NRHP-eligible cultural sites or for properties of traditional religious and cultural
34 importance to an Indian tribe may not be applied.

1 The entire planning area has been assessed for the potential for the occurrence of cultural resources. Each
 2 acre of the planning area has been ranked as having high, medium, or low probability of containing
 3 cultural resources (see Table 4-14). Per oil and gas leasing category, Table 4-15 presents the total acreage,
 4 by alternative, for areas having a high, medium, or low probability of containing cultural resources.

5 **Table 4-15. Probability for the Occurrence of Cultural Sites by Alternative and Oil and Gas**
 6 **Leasing Category**

Cultural Site Occurrence Probability	Alternative A	Alternative B	Alternative C	Alternative D
Open (acres)				
High probability	2,787	N/A	772	N/A
Medium probability	25,958	N/A	2,539	N/A
Low probability	370,530	N/A	34,531	N/A
CSU and TL (acres)				
High probability	303	399	2,454	1,950
Medium probability	1,826	6,963	24,206	19,933
Low probability	16,803	90,735	335,280	317,804
NSO (acres)				
High probability	587	3,058	451	1,544
Medium probability	3,557	21,094	4,595	8,254
Low probability	28,778	299,829	46,301	82,272
Closed (acres)				
High probability	74	293	74	257
Medium probability	118	3,402	118	3,272
Low probability	0	25,548	0	16,036

7

8 **4.7.5 Impacts from Alternative B**

9 Applying a lease notice throughout the planning area to mitigate the potential impacts to traditional
 10 cultural properties (TCPs) or to other culturally important resources identified through consultation could
 11 provide protections to these localities from surface-disturbing activities and from indirect visual impacts.
 12 Mitigation would be developed through further consultation with affected groups, and may include
 13 measures to maintain the viewshed and intrinsic values, as well as the auditory, visual, and esthetic
 14 settings of the resources.

15 Applying a lease notice throughout the planning area requiring viewshed analysis for cultural sites that
 16 are eligible for the NRHP or for properties of traditional religious and cultural importance to an Indian
 17 tribe could provide protections to these localities from indirect visual impacts. If project-specific analysis
 18 shows that the oil and gas development would have adverse effects to historic properties, the project may
 19 require relocation or redesign.

1 Applying a lease notice in areas having a high probability of containing cultural resources and informing
2 the lessee or operator of the higher likelihood of encountering cultural resource concerns (i.e., potential
3 adverse effects requiring mitigation) within these areas could provide protections to these localities from
4 surface-disturbance impacts. In all, 3,750 acres of the planning area have been characterized as having a
5 high probability of containing cultural resources.

6 Under Alternative B, 3,351 acres of areas having a high probability of containing cultural resources are
7 managed with an NSO stipulation or as closed. These major constraints would protect areas with a high
8 probability of containing cultural resources by precluding development.

9 **4.7.6 Impacts from Alternative C**

10 Impacts from applying a lease notice throughout the planning area to mitigate the potential impacts to
11 TCPs or other culturally important resources identified through consultation would be the same as those
12 described under Alternative B.

13 Impacts from applying a lease notice throughout the planning area requiring viewshed analysis for
14 NRHP-eligible cultural sites or for properties of traditional religious and cultural importance to an Indian
15 tribe would be the same as those described under Alternative A.

16 Impacts from applying a lease notice to areas having a high probability of containing cultural resources
17 and informing the lessee or operator of the higher likelihood of encountering cultural resource concerns
18 (i.e., potential adverse effects requiring mitigation) within these areas would be the same as those
19 described under Alternative B.

20 In Alternative C, 525 acres of areas having a high probability of containing cultural resources are
21 managed with an NSO stipulation or as closed. These major constraints would protect areas these areas by
22 precluding development.

23 **4.7.7 Impacts from Alternative D**

24 Impacts from applying a lease notice throughout the planning area to mitigate the potential impacts to
25 TCPs or to cultural plants identified through consultation would be the same as those described under
26 Alternative B.

27 Applying a lease notice throughout the planning area requiring viewshed analysis for cultural sites that
28 are determined eligible for the NRHP when location, setting, or feeling contribute to the overall integrity
29 of a site, or for properties of traditional religious and cultural importance to an Indian tribe could provide
30 protections to these localities from indirect visual impacts. If project-specific analysis shows that the oil
31 and gas development would have adverse effects to the historic properties, the project may require
32 relocation or redesign.

33 Impacts from applying a lease notice to areas having a high probability of containing cultural resources
34 and informing the lessee or operator of the higher likelihood of encountering cultural resource concerns
35 (i.e., potential adverse effects requiring mitigation) within these areas would be the same as those
36 described under Alternative B.

37 In Alternative D, 1,801 acres of areas having a high probability of containing cultural resources are
38 managed with an NSO stipulation or as closed. These major constraints would protect these areas by
39 precluding development.

1 **4.8 PALEONTOLOGICAL RESOURCES**

2 This section presents potential impacts to paleontological resources from implementing management
3 actions presented in Chapter 2. Existing conditions concerning paleontological resources are described in
4 Chapter 3. The loss of any identifiable paleontological resource that could yield important information
5 about the history of life on Earth or that embodies the distinctive characteristics of a type of organism,
6 environment, period of time, or geographic region, would result in an adverse impact. Impacts to
7 paleontological resources primarily concern the potential destruction of non-renewable paleontological
8 resources and the loss of information associated with these resources. Impacts can also include the
9 unlawful or unauthorized collection of paleontological resource remains. If fossiliferous bedrock or
10 surficial sediments are disturbed, the disturbance could result in the destruction of paleontological
11 resources and subsequent loss of information.

12 **4.8.1 Assumptions**

- 13 • Surveys would be required in areas categorized as Potential Fossil Yield Classification (PFYC) 4 5.
- 14 • Scientifically significant paleontological resources would continue to be found within the
15 planning area throughout several geologic formations exposed at the surface.
- 16 • Inventories required prior to surface disturbance in high-probability areas would result in the
17 identification and evaluation of previously undiscovered resources, which the BLM would then
18 manage accordingly.

19 **4.8.2 Impacts Common to All Alternatives**

20 Under all alternatives, attaching lease notices, stipulations, and other requirements to permitted activities
21 would further prevent adverse impacts to paleontological resources. Along with on-site evaluations,
22 surface disturbances under all alternatives could expose fossils that would otherwise have been buried
23 until exposed by natural erosion. These premature fossil discoveries would thereby enhance scientific
24 knowledge.

25 **4.8.3 Impacts from Alternative A (No Action)**

26 Under Alternative A, approximately 418,545 acres would be available for oil and gas leasing and
27 development, would be managed as either open with standard terms and conditions or with CSU and/or
28 TL stipulations, and would comprise approximately 93% of the BLM-administered land in the planning
29 area. The remaining 7% of BLM-administered land in the planning area (approximately 33,847 acres)
30 would be managed as NSO or closed to leasing. Table 4-16 lists the acres of oil and gas leasing categories
31 by PFYC.

32 **Table 4-16. Oil and Gas Leasing Categories by PFYC under Alternative A**

PFYC	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed (acres)
2	245,164	8,961	21,741	28
3	124,024	7,475	5,540	67
5	30,274	2,648	6,346	125

1 Under Alternative A, surface-disturbing activities on lands managed as open or as CSU and/or TL could
2 damage or destroy unidentified paleontological resources. These impacts could occur directly or through
3 soil compaction and removal, which can lead to accelerated erosion and exposure of fossils. Impacts to
4 unidentified paleontological resources would often be greater than impacts to previously identified
5 resources (and thereby either avoided or subjected to mitigation measures) because recording and
6 evaluating these unidentified resources would not occur before they are damaged. However, the potential
7 for impacts would be reduced because an inventory would be required before surface disturbance. These
8 impacts would complicate mitigation procedures and result in a loss of scientific information. If
9 paleontological resources that are discovered during disturbing activities remain salvageable, further
10 impacts could be mitigated through recovery of the fossil material and related data. The highest potential
11 for impacts to paleontological resources under Alternative A would be on the approximately 30,274 acres
12 of land managed as open subject to standard terms and conditions that occur within PFYC 5 areas.

13 On lands managed as NSO, major constraints on surface disturbance would protect paleontological
14 resources within these areas. The potential for impacts to paleontological resources from oil and gas
15 development would be eliminated on lands closed to oil and gas leasing. Among the alternatives,
16 Alternative A would have the least amount of land managed as NSO or closed to leasing, and the largest
17 amount of land available (managed as open or CSU and/or TL) for oil and gas leasing in PFYC 5 areas.

18 Under Alternative A, adverse impacts to vertebrate and significant non-vertebrate paleontological
19 resources resulting from authorized surface-disturbing activities would be mitigated. Where there is a
20 moderate or high potential to affect scientifically significant paleontological resources, on-the-ground
21 paleontological inventories would be required prior to permitting surface-disturbing activities. Such
22 inventories would help to avoid areas where impacts to scientifically significant paleontological resources
23 occur. A stipulation would also be applied that addresses unanticipated discoveries. This stipulation
24 would mandate work stoppage (or avoidance), a notification to the authorized officer, and the protection
25 of the material and geological context if any paleontological resources were discovered during
26 disturbance activities.

27 **4.8.3.1** *Suspended and Protested Lease Decisions*

28 Under Alternative A, 45,043 acres of the suspended and protested leases would be issued subject to
29 standard terms and conditions, and 113 acres of protested leases would be issued subject to NSO
30 stipulations. If the leases were subsequently developed, the impacts to paleontological resources from
31 issuing the leases subject to the terms and conditions contained within the Price and Richfield
32 ROD/RMPs (BLM 2008a, 2008b) (Alternative A-2) would be the same as the impacts to paleontological
33 resources from managing them as open or NSO as described in this section. If the BLM were to rescind
34 the suspensions on the suspended leases (Alternative A-1) and the leases were subsequently developed,
35 the impacts to paleontological resources that would occur in the leased areas could be the same as those
36 described for managing lands as open to leasing subject to standard terms and conditions. Under
37 Alternative A-2, the suspended leases would be subject to the conditions, including reclamation
38 stipulations and BMPs included in the Richfield ROD/RMP (BLM 2008b).

39 **4.8.4** **Impacts from Alternative B**

40 Under Alternative B, approximately 98,164 acres would be available for oil and gas leasing and
41 development, would be managed with CSU and/or TL stipulations, and would comprise approximately
42 23% of the BLM-administered land in the planning area. The remaining 77% of BLM-administered land
43 in the planning area (approximately 354,229 acres) would be managed as NSO or closed to leasing. Table
44 4-17 lists the acres of oil and gas leasing categories by PFYC.

1 **Table 4-17. Oil and Gas Leasing Categories by PFYC under Alternative B**

PFYC	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed (acres)
2	0	59,864	198,780	17,249
3	0	25,441	103,630	8,035
5	0	12,859	21,750	4,784

2 Under Alternative B, surface-disturbing activities on lands managed as CSU and/or TL could impact
 3 paleontological resources in the same manner as described for lands managed as CSU and/or TL under
 4 Alternative A. The highest potential for impacts to paleontological resources under Alternative B would
 5 be on the approximately 12,859 acres of land managed as CSU and/or TL that occur within PFYC 5 areas.
 6 However, a CSU stipulation requiring surveying and monitoring for all surface-disturbing oil and gas
 7 activities in PFYC 5 areas would help reduce the potential for adverse impacts to paleontological
 8 resources. Where monitoring encounters vertebrate and vertebrate trace fossils during oil and gas
 9 operations, all operations would be required to cease until the authorized officer determines whether the
 10 site can be avoided, can be protected, or must be fully excavated.

11 On lands managed as NSO, major constraints on surface disturbance would protect paleontological
 12 resources within these areas. Lands closed to oil and gas leasing would eliminate the potential for impacts
 13 to paleontological resources from oil and gas development. Among the alternatives, Alternative B would
 14 have the largest amount of land managed as NSO or closed to leasing, and the least amount of land
 15 available (managed as CSU and/or TL) for oil and gas leasing in PFYC 5 areas.

16 **4.8.4.1 *Suspended and Protested Lease Decisions***

17 Under Alternative B, BLM would cancel all suspended leases, resolve the protests on the protested leases,
 18 and deny the leases. The paleontological resources in the areas of suspended and protested leases would
 19 not be affected by operators exploring for and developing oil and gas resources.

20 **4.8.5 *Impacts from Alternative C***

21 Under Alternative C, approximately 399,992 acres would be available for oil and gas leasing and
 22 development, would be managed as either open with standard terms and conditions or with CSU and/or
 23 TL stipulations, and would comprise approximately 88% of the BLM-administered land in the planning
 24 area. The remaining 12% of BLM-administered land in the planning area (approximately 52,401 acres)
 25 would be managed as NSO or closed to leasing. Table 4-18 lists the acres of oil and gas leasing categories
 26 by PFYC.

27 **Table 4-18. Oil and Gas Leasing Categories by PFYC under Alternative C**

PFYC	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed (acres)
2	7,926	237,716	30,251	0
3	28,674	96,030	12,335	67
5	1,265	28,381	9,622	125

1 Under Alternative C, surface-disturbing activities on lands managed as open subject to standard terms and
 2 conditions or CSU and/or TL could impact paleontological resources in the same manner as described for
 3 lands managed as open or CSU and/or TL under Alternative A. The highest potential for impacts to
 4 paleontological resources under Alternative C would be on the approximately 1,265 acres of land
 5 managed as open subject to standard terms and conditions that occur within PFYC 5 areas.

6 On the approximately 28,381 acres of land managed as CSU and/or TL in PFYC 5 areas, a stipulation
 7 requiring surveying and monitoring for all surface-disturbing oil and gas activities would help reduce the
 8 potential for adverse impacts to paleontological resources. Where monitoring encounters vertebrate and
 9 vertebrate trace fossils during oil and gas operations, all operations would be required to cease until the
 10 authorized officer determines whether the site can be avoided, can be protected, or must be fully
 11 excavated.

12 On lands managed as NSO, major constraints on surface disturbance would protect paleontological
 13 resources within these areas. Lands closed to oil and gas leasing would eliminate the potential for impacts
 14 to paleontological resources from oil and gas development. Among the alternatives, Alternative C would
 15 have the third largest amount of land managed as NSO or closed to leasing, and the second largest amount
 16 of land available (managed as open or CSU and/or TL) for oil and gas leasing in PFYC 5 areas.

17 **4.8.5.1 Suspended and Protested Lease Decisions**

18 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
 19 standard terms, 39,766 acres would be issued subject to CSU and/or TL stipulations, and 318 acres would
 20 be issued subject to NSO stipulations. If the leases were subsequently developed, the impacts of
 21 modifying the terms and conditions of the suspended and protested leases and issuing the leases
 22 consistent with Alternative C would be the same as the impacts to paleontological resources described in
 23 this section from managing areas as open to leasing subject to standard terms and conditions, open to
 24 leasing subject to CSU and/or TL stipulations, or open to leasing subject to NSO stipulations.

25 **4.8.6 Impacts from Alternative D**

26 Under Alternative D, approximately 339,884 acres would be available for oil and gas leasing and
 27 development, would be managed with CSU and/or TL stipulations, and would comprise approximately
 28 75% of the BLM-administered land in the planning area. The remaining 25% of BLM-administered land
 29 in the planning area (approximately 112,509 acres) would be managed as NSO or closed to leasing. Table
 30 4-19 lists the acres of oil and gas leasing categories by PFYC.

31 **Table 4-19. Oil and Gas Leasing Categories by PFYC under Alternative D**

PFYC	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed (acres)
2	0	214,563	48,317	13,013
3	0	97,678	33,490	5,938
5	0	27,643	10,362	1,388

32 Under Alternative D, surface-disturbing activities on lands managed as CSU and/or TL could impact
 33 paleontological resources in the same manner as described for lands managed as CSU and/or TL under
 34 Alternative A. The highest potential for impacts to paleontological resources under Alternative D would
 35 be on the approximately 27,643 acres of land managed as CSU and/or TL that occur within PFYC 5 areas.
 36 However, like Alternatives B and C, this alternative has a CSU stipulation requiring surveying and
 37 monitoring for all surface-disturbing oil and gas activities in PFYC 5 areas, which would help reduce the

1 potential for adverse impacts to paleontological resources. Where monitoring encounters vertebrate and
2 vertebrate trace fossils during oil and gas operations, all operations would be required to cease until the
3 authorized officer determines whether the site can be avoided, can be protected, or must be fully
4 excavated.

5 On lands managed as NSO, major constraints on surface disturbance would protect paleontological
6 resources within these areas. Lands closed to oil and gas leasing would eliminate the potential for impacts
7 to paleontological resources from oil and gas development. Among the alternatives, Alternative D would
8 have the second largest amount of land managed as NSO or closed to leasing, and the second least
9 amount of land available (managed as CSU and/or TL) for oil and gas leasing in PFYC 5 areas.

10 **4.8.6.1 *Suspended and Protested Lease Decisions***

11 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to CSU
12 or TL stipulations, and 3,132 acres would be issued subject to NSO stipulations. If the leases were
13 subsequently developed, the impacts of modifying the terms and conditions of the suspended and
14 protested leases and issuing the leases consistent with Alternative D would be the same as the impacts to
15 paleontological resources from managing lands as open to leasing subject to CSU or TL stipulations, or
16 open to leasing subject to NSO stipulations described in this section.

17 **4.9 VISUAL RESOURCES AND NIGHT SKIES**

18 This section presents potential impacts to visual resources and night skies from implementing
19 management actions presented in Chapter 2. Existing conditions concerning visual resources and night
20 skies management are described in Chapter 3.

21 **4.9.1 Assumptions**

- 22 • All proposed actions would comply with BLM VRM guidelines and policy.
- 23 • All air quality impacts would comply with PSD class standards and policies of the NPS.
- 24 • Contrast rating analyses would be completed during project-level implementation as appropriate.
- 25 • All management actions that permit surface disturbance could have adverse impacts on visual
26 resources to some degree by introducing new visual elements onto the landscape or intensifying
27 existing visual elements by altering the line, form, color, and/or textures that characterize the
28 existing landscape.

29 **4.9.2 Impacts Common to All Alternatives**

30 Employing dust abatement measures to comply with Utah Administrative Code (UAC) R307-205 and
31 maintaining air quality in accordance with UAC R307-205 would support visual quality by promoting
32 clear scenic vistas.

33 The Big Flat Tops ACEC is inventoried as visual resource inventory (VRI) Class I and is closed to
34 leasing under all alternatives; for these reasons, there would be no impacts to the visual resources of this
35 ACEC under any alternatives.

36 Artificial lighting used during night-time oil and gas development activities could have an adverse impact
37 to night skies. Viewsheds of visually sensitive areas outside the planning area may be affected by the use
38 of artificial lighting during oil and gas development activities.

1 **4.9.3 Impacts from Alternative A (No Action)**

2 Under Alternative A, approximately 418,545 acres would be available for oil and gas leasing and
 3 development, would be managed as either open with standard terms and conditions or with CSU and/or
 4 TL stipulations, and would comprise approximately 93% of the BLM-administered land in the planning
 5 area. The remaining 7% of BLM-administered land in the planning area (approximately 33,847 acres)
 6 would be managed as NSO or closed to leasing. Table 4-20 lists the acres of oil and gas leasing categories
 7 by VRI Class. Table 4-21 lists the acres of oil and gas leasing categories by VRM Class.

8 **Table 4-20. Oil and Gas Leasing Categories by VRI Class under Alternative A**

VRI Class	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed
I	0	0	0	0
II	14,942	109	6,382	9
III	25,679	2,727	2,841	19
IV	358,805	16,243	24,395	192

9 **Table 4-21. Oil and Gas Leasing Categories by VRM Class under Alternative A**

VRM Class	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed
I	5	0	0	220
II	20	2,418	11,796	0
III	357,037	13,086	21,291	0
IV	42,379	3,570	494	0

10 Under Alternative A, areas managed as open subject to standard terms and conditions or as CSU and/or
 11 TL (approximately 2,443 acres) could experience oil and gas development activities that affect visual
 12 resources in those areas. Potential visual impacts caused by oil and gas development include an increase
 13 in visual contrasts of line, form, color, and texture created by well pads, drill rigs, and other infrastructure.
 14 Under this alternative, a CSU stipulation would be applied to all areas designated as VRM Class II. In
 15 VRM Class II areas, any surface-disturbing activities must retain the existing character of the landscape.
 16 To meet the requirements of VRM Class II, the level of change to the landscape should be low;
 17 management activities may be seen but should not attract the attention of the casual observer. Any change
 18 to the landscape must repeat the basic elements of form, line, color, and texture found in the predominant
 19 natural features of the characteristic landscape. Surface-disturbing activities that are determined to be
 20 compatible and consistent with resource values are exempted. The CSU stipulation does not address
 21 impacts to night skies. Thus, these areas could experience impacts to night skies resulting from artificial
 22 lighting used during night-time oil and gas development activities.

23 Among the alternatives, Alternative A would have the largest acreage of VRI Classes I and II areas
 24 (15,068 acres) and VRM Classes I and II areas (2,443 acres) managed as open subject to standard terms
 25 and conditions or CSU and/or TL.

26 Under Alternative A, the Dirty Devil/Robbers Roost SRMA would be managed so that VRM Class II
 27 areas and canyon rims within the viewshed of all canyons (approximately 0.25 mile) are managed as
 28 NSO. This would affect approximately 10,382 acres of the SRMA. Exceptions would be considered if oil
 29 and gas exploration and development would not impair identified scenic and primitive or semi-primitive
 30 recreational resources. The NSO stipulation would eliminate the potential for visual impacts caused by oil

1 and gas development, such as the increase in visual contrasts of line, form, color, and texture created by
2 well pads, drill rigs, and other infrastructure. The NSO stipulation would also eliminate the potential for
3 oil and gas development to cause night sky impacts in these areas. However, there would be a potential
4 for fugitive dust to affect the VRI and VRM Class II areas if horizontal drilling occurs on adjacent lands.
5 The remainder of the Dirty Devil/Robbers Roost SRMA (approximately 4,647) would be subject to CSU
6 and/or timing limitations. Areas managed as CSU and/or TL could experience oil and gas development
7 activities that affect visual resources in those areas. Potential visual impacts caused by oil and gas
8 development include an increase in visual contrasts of line, form, color, and texture created by well pads,
9 drill rigs, and other surface structures.

10 Alternative A includes no specific restrictions on venting or open flaring of gas captured during oil well
11 production. Thus, open flaring could impact night skies under this alternative.

12 Examples of potential mitigation measures that could minimize potential impacts to visual resources
13 under all alternatives include the following:

- 14 • Selecting well pad sites that have low visibility. Low visibility techniques include locating
15 facilities on low-lying ground, avoiding locations near prominent natural features, avoiding
16 ridgetops and slopes, considering locating well pads away from main roads, and using natural and
17 artificial features to screen well pads and facilities from scenic areas.
- 18 • Using paints and stains on structures that allow them to blend in with the surrounding landscape.
- 19 • Designing access roads and pipelines to follow the contour of the landforms or mimic lines in
20 vegetation.
- 21 • Blending or "feathering" the borders of disturbed areas to reduce line, form, and color contrasts.

22 **4.9.3.1 *Suspended and Protested Lease Decisions***

23 Under Alternative A, 45,043 acres of the suspended and protested leases would be issued subject to
24 standard terms and conditions, and 113 acres of protested leases would be issued subject to NSO
25 stipulations. Protested leases are within a 3-mile buffer of two key observation points (KOPs) (Bull
26 Bottom and Trin Alcove/Three Canyon). Protested leases also overlap VRI Class II areas near these two
27 KOPs, as well as the Saucer Basin/Moonshine Wash recreation focus area. Suspended leases overlap the
28 Sweetwater Reef recreation focus area. If the leases were subsequently developed, the impacts to visual
29 resources and night skies from issuing the leases subject to the terms and conditions contained within the
30 Price and Richfield ROD/RMPs (BLM 2008a, 2008b) (Alternative A-2) would be the same as the impacts
31 to visual resources and night skies from managing them as open or NSO as described in this section.
32 Under Alternative A-2, the suspended leases would be subject to the conditions, including reclamation
33 stipulations and BMPs included in the Richfield ROD/RMP.

34 If the BLM were to rescind the suspensions on the suspended leases (Alternative A-1) and the leases were
35 subsequently developed, the impacts to visual resources and night skies that would occur in the leased
36 areas could be the same as those described for managing lands as open to leasing subject to standard
37 terms and conditions.

38 **4.9.4 *Impacts from Alternative B***

39 Under Alternative B, approximately 98,164 acres would be available for oil and gas leasing and
40 development, would be managed with CSU and/or TL stipulations, and would comprise approximately
41 23% of the BLM-administered land in the planning area. The remaining 77% of BLM-administered land
42 in the planning area (approximately 354,229 acres) would be managed as NSO or closed to leasing. Table
43 4-22 lists the acres of oil and gas leasing categories by VRI Class. Table 4-23 lists the acres of oil and gas
44 leasing categories by VRM Class.

1 **Table 4-22. Oil and Gas Leasing Categories by VRI Class under Alternative B**

VRI Class	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed
I	0	0	0	0
II	0	0	14,193	7,250
III	0	7,668	16,502	7,086
IV	0	90,493	293,423	15,719

2 **Table 4-23. Oil and Gas Leasing Categories by VRM Class under Alternative B**

VRM Class	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed
I	0	0	30	195
II	0	0	4,689	9,544
III	0	63,357	307,785	20,272
IV	0	34,805	11,636	0

3 Under Alternative B, areas managed as CSU and/or TL (approximately 98,164 acres) could experience oil
 4 and gas development activities that affect visual resources in those areas. Potential visual impacts caused
 5 by oil and gas development include an increase in visual contrasts of line, form, color, and texture created
 6 by well pads, drill rigs, and other surface structures. However, all areas managed as CSU and/or TL under
 7 this alternative are in VRI Class III or IV and VRM Class III or IV areas.

8 Among the alternatives, Alternative B would have the smallest acreage of VRI Classes I and II areas
 9 (0 acres) and VRM Classes I and II areas (0 acres) managed as open subject to standard terms and
 10 conditions or CSU and/or TL.

11 Under this alternative, an NSO stipulation with no exceptions, modifications, or waivers would be applied
 12 to all areas inventoried as VRI Class II or designated as VRM Class II. The VRI Class II areas in the
 13 planning area include Moonshine Wash, Trin Alcove/Three Canyon, and other viewpoints on the Green
 14 River Labyrinth Canyon rim. The VRM Class II areas in the planning area primarily include areas in the
 15 southeast part of the planning area north and south of the Keg Knoll area and around the Horseshoe
 16 Canyon Trailhead, as well as areas in the northwest part of the planning area overlooking the San Rafael
 17 River (see Map 2-14).

18 Managing VRI and VRM Class II areas with an NSO stipulation would help preserve visual resources in
 19 these visually sensitive locations of the planning area. The NSO stipulation would eliminate the potential
 20 for visual impacts caused by oil and gas development, such as the increase in visual contrasts of line,
 21 form, color, and texture created by well pads, drill rigs, and other surface structures. The NSO stipulation
 22 would prevent such surface disturbance, which would help retain the existing character of the landscape.
 23 The NSO stipulation would also eliminate the potential for oil and gas development to cause night sky
 24 impacts in these areas. However, there would be a potential for fugitive dust to affect VRI and VRM
 25 Class II areas if horizontal drilling occurs on adjacent lands.

26 Under Alternative B, the Labyrinth Canyon SRMA and the Dirty Devil/Robbers Roost SRMA (outside
 27 the WSA) would be managed as NSO with no exceptions, modifications, or waivers. The NSO stipulation
 28 would eliminate the potential for visual impacts caused by oil and gas development in these SRMAs.
 29 People using these areas would not be impacted by the visual contrast associated with oil and gas

1 development. The NSO stipulation would also eliminate the potential for oil and gas development to
2 cause night sky impacts to these SRMAs. However, there would be a potential for fugitive dust to affect
3 these SRMAs if horizontal drilling occurs on adjacent lands.

4 All lands within 1 mile of the Green River Labyrinth Canyon rim and Horseshoe Canyon rim would be
5 closed to leasing under this alternative. Closure to leasing would eliminate the potential for visual impacts
6 caused by oil and gas development in these areas. Closing these lands to leasing would also eliminate the
7 potential for oil and gas development to cause night sky impacts in these areas. However, there would be
8 a potential for fugitive dust to affect these areas if horizontal drilling occurs on adjacent lands.

9 Under Alternative B, the following recreation focus areas would also be managed as NSO with no
10 exceptions, modifications, or waivers: Fossil Point, Dry Lake Archaeological District, Three Canyon,
11 Saucer Basin/Moonshine Wash, The Cone, Keg Knoll, Sweetwater Reef, Cottonwood Wash, and
12 Horseshoe Canyon Trailhead.

13 All lands within 3 miles of the following KOPs (Map 2-7) would also be managed as NSO with no
14 exceptions, modifications, or waivers: Keg Knoll, Wolverton Overlook, Horseshoe Canyon Trailhead,
15 Trin Alcove/Three Canyon, and Bull Bottom.

16 Under this alternative, all lands within 3 miles of the following travel corridors would be managed as
17 NSO with no exceptions, modifications, or waivers: Lower San Rafael Road from State Route 24 to
18 Horseshoe Canyon and Lower San Rafael Road from Green River to Horseshoe Canyon (Map 2-8-B).

19 Managing these areas as NSO would eliminate potential visual impacts from oil and gas development.
20 People using these recreation focus areas and travel corridors would not be impacted by the visual
21 contrast associated with oil and gas development. However, there would be a potential for fugitive dust to
22 affect the visual resources of these recreation focus areas and travel corridors if horizontal drilling occurs
23 on adjacent lands.

24 Under this alternative, a planning area-wide CSU would prohibit venting or open flaring of gas captured
25 during oil well production. This would eliminate potential impacts to night skies from open flaring.

26 Under Alternative B, to minimize impacts to night skies, a planning area-wide CSU stipulation would
27 require operators to apply various measures affecting artificial lighting. These measures include limiting
28 artificial lighting during nighttime operations to those that are necessary for safety, using shielding and
29 aiming techniques, limiting the height of light poles, using motion sensors or timers for lighting, and
30 selecting lights that are not bluish in color or broad spectrum. This CSU would help reduce the potential
31 adverse impacts that oil and gas development might have on night skies in the planning area and sensitive
32 areas adjacent to the planning area because it would help direct lighting downward rather than above
33 horizons, it would limit the use of artificial lighting when operations do not require it, and it would result
34 in artificial lighting that uses a less visible spectrum.

35 Prior to APD approval, operators would be required to submit a lighting plan to the BLM. These lighting
36 plans would include information such as the number of lights and lumen output, fixture design, and lamp
37 color temperature. Requiring a lighting plan would help the BLM and operators identify potential
38 mitigation measures to reduce the potential adverse impacts that oil and gas development might have on
39 night skies in the planning area and sensitive areas adjacent to the planning area.

40 **4.9.4.1 *Suspended and Protested Lease Decisions***

41 Under Alternative B, the BLM would cancel all suspended leases, resolve the protests on the protested
42 leases, and deny the leases. The visual resources and night skies in the areas of suspended and protested
43 leases would not be affected by operators exploring for and developing oil and gas resources.

1 **4.9.5 Impacts from Alternative C**

2 Under Alternative C, approximately 399,992 acres would be available for oil and gas leasing and
 3 development, would be managed as either open with standard terms and conditions or with CSU and/or
 4 TL stipulations, and would comprise approximately 88% of the BLM-administered land in the planning
 5 area. The remaining 12% of BLM-administered land in the planning area (approximately 52,401 acres)
 6 would be managed as NSO or closed to leasing. Table 4-24 lists the acres of oil and gas leasing categories
 7 by VRI Class. Table 4-25 lists the acres of oil and gas leasing categories by VRM Class.

8 **Table 4-24. Oil and Gas Leasing Categories by VRI Class under Alternative C**

VRI Class	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed
I	0	0	0	0
II	2,602	10,958	7,882	9
III	1,334	22,041	7,891	19
IV	33,928	329,095	36,420	192

9 **Table 4-25. Oil and Gas Leasing Categories by VRM Class under Alternative C**

VRM Class	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed
I	0	6	27	192
II	0	3,976	10,258	0
III	31,745	318,646	41,023	0
IV	6,119	39,481	843	0

10 Under Alternative C, areas managed as open subject to standard terms and conditions and areas managed
 11 as CSU and/or TL (approximately 399,992 acres) could experience oil and gas development activities that
 12 affect visual resources in those areas. Potential visual impacts caused by oil and gas development include
 13 an increase in visual contrasts of line, form, color, and texture created by well pads, drill rigs, and other
 14 surface structures.

15 Among the alternatives, Alternative C would have the second largest acreage of VRI Classes I and II
 16 areas (13,579 acres) and VRM Classes I and II areas (3,982 acres) managed as open subject to standard
 17 terms and conditions or CSU and/or TL.

18 Under Alternative C, a CSU stipulation would be applied to all areas designated as VRM Class II. The
 19 VRM Class II areas in the planning area primarily include areas in the southeast part of the planning area
 20 north and south of the Keg Knoll area and around the Horseshoe Canyon Trailhead, as well as areas in the
 21 northwest part of the planning area overlooking the San Rafael River. The CSU would require that, prior
 22 to authorizing any surface-disturbing activity, a visual resource contrast rating would be completed in
 23 accordance with BLM Manual 8431 (BLM 1986). Mitigation measures would then be identified to retain
 24 the existing character of the landscape.

25 Managing VRM Class II areas with this CSU stipulation would help minimize impacts to visual resources
 26 in these visually sensitive parts of the planning area. The CSU stipulation's required mitigation measures
 27 would minimize the potential for visual impacts caused by oil and gas development, such as the increase

1 in visual contrasts of line, form, color, and texture created by well pads, drill rigs, access roads, and other
2 associated surface disturbance and structures. The human-made structures and surface disturbance
3 associated with oil and gas development would contrast with the undisturbed natural landscape and could
4 be seen from the VRM KOPs.

5 Under Alternative C, all lands in the Labyrinth Canyon SRMA would be managed as CSU. The CSU
6 applies spacing requirements for well pads, co-location requirements for production facilities, a
7 requirement that pipelines and utilities be paced along existing roads to the extent practical, an interim
8 reclamation requirement, and a requirement that final reclamation fully restore the original landform and
9 that travel routes be restored to their original character. This CSU would help minimize potential impacts
10 to visual resources in this SRMA by reducing density of well pads and co-locating surface-disturbing
11 activities and structures where possible. The Dirty Devil/Robbers Roost SRMA would be managed in the
12 same manner and with the same potential visual impacts as are described under Alternative A.

13 All lands within 1 mile of the Green River Labyrinth Canyon rim and Horseshoe Canyon rim would be
14 managed as NSO under this alternative with no exceptions, modifications, or waivers. Managing these
15 areas as NSO would eliminate potential visual impacts from oil and gas development in these areas.
16 People using these areas would not be impacted by the visual contrast associated with oil and gas
17 development. However, there would be a potential for fugitive dust to affect the visual resources of these
18 areas if horizontal drilling occurs on adjacent lands.

19 Under Alternative C, the following recreation focus areas would also be managed as CSU: Fossil Point,
20 Dry Lake Archaeological District, Three Canyon, Saucer Basin/Moonshine Wash, The Cone, Keg Knoll,
21 Sweetwater Reef, Cottonwood Wash, and Horseshoe Canyon Trailhead. The CSU applies spacing
22 requirements for well pads (at least 160 acres apart), co-location requirements for production facilities, a
23 requirement that pipelines and utilities be paced along existing roads to the extent practical, an interim
24 reclamation requirement, and a requirement that final reclamation fully restore the original landform and
25 that travel routes be restored to their original character. This CSU would help minimize potential impacts
26 to visual resources in these recreation focus areas by reducing density of well pads and co-locating
27 surface-disturbing activities and structures where possible.

28 Under this alternative, all lands within 1 mile of the following KOPs would be managed as NSO with no
29 exceptions, modifications, or waivers: Keg Knoll, Wolverton Overlook, Horseshoe Canyon Trailhead,
30 Trin Alcove/Three Canyon, and Bull Bottom. Managing these areas as NSO would eliminate potential
31 visual impacts from oil and gas development. People using these areas would not be impacted by the
32 visual contrast associated with oil and gas development. However, there would be a potential for fugitive
33 dust to affect the visual resources of these areas if horizontal drilling occurs on adjacent lands.

34 Under this alternative, venting or open flaring of gas captured during oil well production would be
35 prohibited except in circumstances identified in existing rules. This would help reduce the potential
36 impact on night skies from open flaring.

37 **4.9.5.1 *Suspended and Protested Lease Decisions***

38 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
39 standard terms, 39,766 acres would be issued subject to CSU or TL stipulations, and 318 acres would be
40 issued subject to NSO stipulations. Protested leases are within a 3-mile buffer of two KOPs (Bull Bottom
41 and Trin Alcove/Three Canyon). Protested leases also overlap VRI Class II areas near these two KOPs, as
42 well as the Saucer Basin/Moonshine Wash recreation focus area. Suspended leases overlap the
43 Sweetwater Reef recreation focus area. If the leases were subsequently developed, the impacts of
44 modifying the terms and conditions of the suspended and protested leases and issuing the leases
45 consistent with Alternative C would be the same as the impacts to visual resources and night skies
46 described in this section from managing areas as open to leasing subject to standard terms and conditions,
47 open to leasing subject to CSU or TL stipulations, or open to leasing subject to NSO stipulations.

1 **4.9.6 Impacts from Alternative D**

2 Under Alternative D, approximately 339,884 acres would be available for oil and gas leasing and
 3 development, would be managed with CSU and/or TL stipulations, and would comprise approximately
 4 75% of the BLM-administered land in the planning area. The remaining 25% of BLM-administered land
 5 in the planning area (approximately 112,509 acres) would be managed as NSO or closed to leasing. Table
 6 4-26 lists the acres of oil and gas leasing categories by VRI Class. Table 4-27 lists the acres of oil and gas
 7 leasing categories by VRM Class.

8 **Table 4-26. Oil and Gas Leasing Categories by VRI Class under Alternative D**

VRI Class	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed
I	0	0	0	0
II	0	4,452	10,006	6,984
III	0	14,835	9,345	7,086
IV	0	320,573	72,806	6,256

9 **Table 4-27. Oil and Gas Leasing Categories by VRM Class under Alternative D**

VRM Class	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed
I	0	2	28	195
II	0	2,288	3,618	8,327
III	0	292,415	87,239	11,760
IV	0	45,166	1,277	0

10 Under Alternative D, areas managed as open subject to standard terms and conditions and areas managed
 11 as CSU and/or TL (approximately 339,884 acres) could experience oil and gas development activities that
 12 affect visual resources in those areas. Potential visual impacts caused by oil and gas development include
 13 an increase in visual contrasts of line, form, color, and texture created by well pads, drill rigs, and other
 14 surface structures.

15 Among the alternatives, Alternative D would have the second smallest acreage of VRI Classes I and II
 16 areas (4,454 acres) and VRM Classes I and II areas (2,290 acres) managed as open subject to standard
 17 terms and conditions or CSU and/or TL.

18 Under this alternative, a CSU stipulation for oil and gas leasing would be applied to all areas inventoried
 19 as VRI Class II or designated as VRM Class II. The VRI Class II areas in the planning area include
 20 Moonshine Wash, Trin Alcove/Three Canyon, and other viewpoints on the Green River Labyrinth
 21 Canyon rim (see Map 2-14). The VRM Class II areas in the planning area primarily include locations in
 22 the southeast part of the planning area north and south of the Keg Knoll area and around the Horseshoe
 23 Canyon Trailhead, as well as locations in the northwest part of the planning area overlooking the San
 24 Rafael River. The CSU would require that, prior to authorizing any surface-disturbing activity, a visual
 25 resource contrast rating would be completed in accordance with BLM Manual 8431 (BLM 1986).
 26 Mitigation measures would then be identified to retain the existing character of the landscape.

27 Managing VRI and VRM Class II areas with this CSU stipulation would help minimize impacts to visual
 28 resources in these visually sensitive parts of the planning area. The CSU stipulation's required mitigation

1 measures would minimize the potential for visual impacts caused by oil and gas development, such as the
2 increase in visual contrasts of line, form, color, and texture created by well pads, drill rigs, and other
3 surface structures.

4 Under Alternative D, the Labyrinth Canyon SRMA would be managed in the same manner and with the
5 same potential visual impacts as are described under Alternative B. The Dirty Devil/Robbers Roost
6 SRMA would be managed in the same manner and with the same potential visual impacts as are
7 described under Alternative A.

8 All lands within 1 mile of the Green River Labyrinth Canyon rim that are north of the San Rafael River
9 would be managed as NSO with no exceptions, modifications, or waivers. Managing these areas as NSO
10 would eliminate potential visual impacts from oil and gas development. People using these areas would
11 not be impacted by the visual contrast associated with oil and gas development. However, there would be
12 a potential for fugitive dust to affect the visual resources of these areas if horizontal drilling occurs on
13 adjacent lands.

14 All lands within 1 mile of the Green River Labyrinth Canyon rim that are south of the San Rafael River
15 would be closed to oil and gas leasing and development. Closure to leasing would eliminate the potential
16 for visual impacts caused by oil and gas development in these areas. People using these areas would not
17 be impacted by the visual contrast associated with oil and gas development. However, there would be a
18 potential for fugitive dust to affect these areas if horizontal drilling occurs on adjacent lands.

19 All lands within 1 mile of the Horseshoe Canyon rim would be managed in the same manner and with the
20 same potential visual impacts as are described under Alternative B.

21 Under this alternative, the following recreation focus areas would be managed as NSO with no
22 exceptions, modifications, or waivers: Fossil Point, Dry Lake Archaeological District, Three Canyon,
23 Saucer Basin/Moonshine Wash, Keg Knoll, Sweetwater Reef, and Horseshoe Canyon Trailhead.

24 All lands within 1 mile of the following KOPs would be managed as NSO with no exceptions,
25 modifications, or waivers: Keg Knoll, Wolverton Overlook, Horseshoe Canyon Trailhead, Trin
26 Alcove/Three Canyon, and Bull Bottom.

27 All lands within 1 mile of the following travel corridors would be managed as NSO with no exceptions,
28 modifications, or waivers: Lower San Rafael Road from Saucer Basin Road to Horseshoe Canyon and
29 Lower San Rafael Road from the San Rafael River to Horseshoe Canyon (Map 2-8-D).

30 Managing these areas as NSO would eliminate potential visual impacts from oil and gas development.
31 People using these recreation focus areas and travel corridors would not be impacted by the visual
32 contrast associated with oil and gas development. However, there would be a potential for fugitive dust to
33 affect the visual resources of these recreation focus areas and travel corridors if horizontal drilling occurs
34 on adjacent lands.

35 Under Alternative D, The Cone and Cottonwood Wash recreation focus areas would be managed as CSU.
36 The CSU stipulation applies spacing requirements for well pads (at least 1 mile apart), co-location
37 requirements for production facilities, a requirement that pipelines and utilities be paced along existing
38 roads to the extent practical, an interim reclamation requirement, and a requirement that final reclamation
39 fully restore the original landform and that travel routes be restored to their original character. This CSU
40 would help minimize potential impacts to visual resources in these recreation focus areas by reducing
41 density of well pads and co-locating surface-disturbing activities and structures where possible.

42 Under Alternative D, artificial lighting used during night-time oil and gas development activities could
43 have an adverse impact to night skies. Viewsheds of visually sensitive areas outside of the planning area
44 may be affected by the use of artificial lighting during night-time oil and gas development activities.

1 Under this alternative, venting or open flaring of gas captured during oil well production would be
2 prohibited except in circumstances identified in existing rules. In the case of an exception, a visual screen
3 must be used to minimize skyglow, glare, and adverse visual effects to night sky resources.

4 **4.9.6.1 *Suspended and Protested Lease Decisions***

5 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to CSU
6 or TL stipulations, and 3,132 acres would be issued subject to NSO stipulations. Protested leases are
7 within a 3-mile buffer of two KOPs (Bull Bottom and Trin Alcove/Three Canyon). Protested leases also
8 overlap VRI Class II areas near these two KOPs, as well as the Saucer Basin/Moonshine Wash recreation
9 focus area. Suspended leases overlap the Sweetwater Reef recreation focus area. If the leases were
10 subsequently developed, the impacts of modifying the terms and conditions of the suspended and
11 protested leases and issuing the leases consistent with Alternative D would be the same as the impacts to
12 visual resources and night skies from managing lands as open to leasing subject to CSU or TL stipulations
13 or open to leasing subject to NSO stipulations described in this section.

14 **4.10 AUDITORY MANAGEMENT (SOUNDSCAPES)**

15 This section presents potential impacts to soundscapes from implementation of the management actions
16 presented in Chapter 2. Existing conditions for soundscapes in the analysis area are described in Chapter
17 3.

18 **4.10.1 Assumptions**

- 19 • Visitors to the analysis area could be impacted by noise from oil and gas development, including
20 equipment use and vehicle noise associated with well pad construction, well drilling and
21 completion, well head operation, and operation and maintenance activities.
- 22 • The primary driver of the intensity of noise impacts resulting from oil and gas development
23 would be the management decisions for noise under each alternative. Management decisions for
24 other resources would affect noise impacts to a lesser degree.
- 25 • All other factors held constant, alternatives that would be anticipated to result in more oil and gas
26 development would be likely to produce more noise and have a higher impact to the existing
27 soundscape.

28 **4.10.2 Description of General Impacts in the Analysis Area**

29 As described in Chapter 3, portions of the analysis area can be compared to an agricultural area such as a
30 tomato field or to a small town or quiet suburban area. A typical day-night average sound level for a
31 tomato field on a farm is 44 A-weighted decibels (dBA), whereas a small town cul-de-sac and wooded
32 residential area both have a typical day-night average sound level of 50 dBA (EPA 1974). However,
33 much of the analysis area (and especially more remote parts such as the recreation focus areas and KOPs)
34 likely has average sound levels well below 44 to 50 dBA. Background sound levels in these areas may be
35 similar to a representative sound level of 20 dBA from leaves rustling in Canyonlands National Park
36 (Ambrose and Burson 2004). Noise levels associated with oil and gas sources can range from 62 to 145
37 dBA (see Table 3-24).

38 Noise-sensitive human receptors, primarily consisting of recreation users in the Labyrinth Canyon and the
39 Dirty Devil/Robbers Roost SRMAs, in Horseshoe Canyon, and in the five KOPs (Bull Bottom,
40 TrinAlcove/Three Canyon, Wolverton Overlook, Keg Knoll, and the Horseshoe Canyon Trailhead),
41 would experience elevated noise levels when near oil and gas development. Assuming a background
42 noise level of 50 dBA in the analysis area, noise at 62 dBA from a natural gas compressor would be

1 perceived as approximately twice as loud as the background noise. Noise at 87 dBA from oil and gas
2 operations would be perceived as over eight times louder than the background noise. Assuming a
3 background noise level of 20 dBA in the analysis area, noise at 62 dBA from a natural gas compressor
4 would be perceived as approximately 16 times as loud as the background noise. Noise at 87 dBA from oil
5 and gas operations would be perceived as over 64 times louder than the background noise. Such noise
6 would reduce the quality of the visitor recreation experience on public lands and could affect human
7 health at higher levels such as 145 dBA.

8 In portions of the analysis area near State Route 24 and Interstate 70, ambient noise levels depend on the
9 volume, speed, and quantity of nearby traffic. As described in Chapter 3, a medium-sized truck traveling
10 at 50 miles per hour has a perceived relative loudness of 80 dBA from 50 feet away, and a modified
11 motorcycle traveling at the same speed has a perceived relative loudness of 90 dBA from 50 feet away
12 (FHWA 1980). Depending on the traffic on State Route 24 and Interstate 70, noise levels associated with
13 oil and gas sources near these roads may be more likely to blend into background traffic noise.

14 The perception of noise levels by human receptors is affected by the distance of the receptor from the
15 noise source. Attenuation or a reduction in sound intensity occurs as a result of distance (and of the
16 presence of obstacles or certain atmospheric conditions). Therefore, alternatives that limit oil and gas
17 development near noise-sensitive human receptors in the Labyrinth Canyon and the Dirty Devil/Robbers
18 Roost SRMAs, in Horseshoe Canyon, and in the five KOPs would have lower noise impacts.

19 **4.10.3 Impacts Common to All Alternatives**

20 This section discusses soundscape impacts that would not vary by alternative.

21 For all oil and gas leases under all alternatives, a special status species lease notice would be attached that
22 includes a requirement for noise emissions to be reduced to 45 dBA at 0.5 mile from suitable Mexican
23 spotted owl habitat, including canyon rims, when permanent actions may impact owls or their habitat. A
24 noise analysis would also be required for the placement of permanent noise-generating facilities under
25 this lease notice. A special status species lease notice would also be attached to all leases for the yellow-
26 billed cuckoo under all alternatives. This lease notice would include a requirement for the use of noise-
27 reduction measures to ensure noise levels at the edge of suitable yellow-billed cuckoo habitat do not
28 exceed baseline conditions. Both lease notices would reduce overall noise impacts in areas with Mexican
29 spotted owl and yellow-billed cuckoo habitat.

30 Climate change would not increase or decrease noise impacts for any of the alternatives.

31 **4.10.4 Impacts from Alternative A (No Action)**

32 Under Alternative A, approximately 399,462 acres would be open to oil and gas leasing subject to
33 standard terms and conditions, approximately 19,083 acres would be open to oil and gas leasing subject to
34 CSU and/or TL stipulations, approximately 33,627 acres would be open to oil and gas leasing subject to a
35 NSO stipulation, and approximately 220 acres would be closed to oil and gas leasing. Reasonably
36 foreseeable development under Alternative A is estimated to consist of 28 wells and 541 acres of surface
37 disturbance in areas open to oil and gas leasing.

38 Auditory management would not be specifically addressed under Alternative A because there is no
39 auditory management direction in the current Price and Richfield ROD/RMPs (BLM 2008a, 2008b). No
40 lease stipulations would be applied under Alternative A to decrease noise impacts and to protect natural
41 soundscapes in the analysis area. One noise BMP, the use of noise-reduction techniques and designs to
42 reduce noise from compressors or other motorized equipment, would be applied to oil and gas leasing and
43 development. This BMP would reduce noise from oil and gas development activities and associated
44 impacts to noise-sensitive human receptors.

1 Under Alternative A, an NSO stipulation would be applied to portions of the Dirty Devil/Robbers Roost
2 SRMA, which would minimize impacts to noise-sensitive human receptors in these areas. However, the
3 remaining portions of the SRMA would allow oil and gas development with CSU stipulations. Although
4 CSU stipulations could reduce some of the noise impacts, noise-sensitive human receptors in these areas
5 would still be affected. In addition, adjacent areas would be open to oil and gas leasing subject to standard
6 terms and conditions. Noise impacts in adjacent areas could be detectable by noise-sensitive human
7 receptors in the SRMA depending on the distance and sound intensity of the noise source. An NSO
8 stipulation would be applied to the Green River suitable segment from the confluence of the San Rafael
9 River to Canyonlands National Park under Alternative A (which includes portions of the Labyrinth
10 Canyon SRMA). The NSO stipulation would limit impacts to noise-sensitive human receptors where it is
11 in effect; however, other portions of the Labyrinth Canyon SRMA would be open to oil and gas leasing
12 subject to standard terms and conditions. Noise-sensitive human receptors in or adjacent to the areas open
13 to oil and gas leasing would experience noise impacts. Impacts to noise-sensitive human receptors in
14 Horseshoe Canyon and in the Horseshoe Canyon Trailhead KOP would be limited by NSO and CSU
15 stipulations along the west rim of the canyon. CSU stipulations would generally provide less reduction in
16 noise impacts than NSO stipulations because some surface would still be permitted. Alternative A does
17 not stipulate protections for the remaining four KOPs; they are generally located in or adjacent to areas
18 open to oil and gas leasing subject to standard terms and conditions. Noise-sensitive human receptors in
19 these KOPs would experience noise impacts. Other resource TL stipulations under Alternative A would
20 prevent noise during specific timeframes such as the fawning season for pronghorn and the migratory bird
21 nesting season; however, noise would still occur outside of these seasonal closures. The CSU limitations
22 under Alternative A would reduce noise in certain areas such as white-tailed prairie dog habitat and steep
23 slopes (greater than 30%). Applying NSO stipulations under Alternative A (to portions of the Dirty
24 Devil/Robbers Roost SRMA, the Dirty Devil/French Springs Units 1 and 3 and Horseshoe Canyon South
25 LWCs, steep slopes [greater than 40%], the Tidwell Draw ACEC, the Dry Lake Archaeological District
26 ACEC, portions of the Green River, and areas with specific water resources) or closing areas to oil and
27 gas leasing would reduce or prevent oil and gas development noise from reaching noise-sensitive human
28 receptors in these areas.

29 However, under Alternative A, the BLM would allow some exceptions, modifications, and waivers for
30 TL stipulations in pronghorn habitat and for migratory birds, and for CSU stipulations in white-tailed
31 prairie dog habitat. Exceptions for NSO stipulations in portions of the Dirty Devil/Robbers Roost SRMA,
32 the Dry Lake Archaeological District ACEC, steep slopes (greater than 40%), and in areas with specific
33 water resources would be allowed. Granting exceptions, modifications, or waivers to TL, CSU, and NSO
34 stipulations would allow for noise impacts from oil and gas development in areas where such stipulations
35 are applied. These impacts would be similar to the noise impacts that would occur in areas that are open
36 to oil and gas leasing subject to standard terms and conditions.

37 ***4.10.4.1 Suspended and Protested Lease Decisions***

38 Under Alternative A, 45,043 acres of the suspended and protested leases would be issued subject to
39 standard terms and conditions, and 113 acres of protested leases would be issued subject to NSO
40 stipulations. If the leases were subsequently developed, the types of impacts to soundscapes from issuing
41 the leases subject to the terms and conditions contained within the Price and Richfield ROD/RMPs (BLM
42 2008a, 2008b) (Alternative A-2) would be the same as the impacts to soundscapes described from
43 managing them as open to leasing subject to standard terms and conditions described in this section; the
44 NSO areas would not be large enough to eliminate sound impacts from oil and gas development. If the
45 BLM were to rescind the suspensions on the suspended leases (Alternative A-1) and the leases were
46 subsequently developed, the impacts to soundscapes that would occur in the leased areas would be the
47 same as those described for managing areas as open to leasing subject to standard terms and conditions.
48 Under Alternative A-2, the suspended leases would be subject to the conditions, including stipulations
49 and BMPs included in the Richfield ROD/RMP (BLM 2008b). Although the Richfield ROD/RMP

1 contains no auditory management direction and would not require noise stipulations, it has a noise BMP
2 that would reduce noise from oil and gas development activities and associated impacts to noise-sensitive
3 human receptors (BLM 2008b).

4 Because some of the protested leases are located in or very close to the Labyrinth Canyon SRMA and in
5 the Bull Bottom and Trin Alcove/Three Canyon KOPs, and because these leases would be issued subject
6 to standard terms and conditions, noise-sensitive human receptors in these areas could experience
7 degradation of the soundscape from oil and gas development. The noise BMP that would be applied under
8 Alternative A-2 would limit some of the noise impact. Similarly, the suspended leases are very close to
9 the Dirty Devil/Robbers Roost SRMA. Noise-sensitive human receptors in the SRMA, especially
10 receptors along the canyon rims, could experience degradation of the soundscape from oil and gas
11 development.

12 Under both Alternatives A-1 and A-2, if a lessee proposes to develop these leases (e.g., drill a well), the
13 BLM would evaluate the lessee's proposal in a site-specific environmental review. If during the site-
14 specific environmental review process the BLM determines that additional mitigation measures are
15 required to protect resources of concern, those mitigation measures would be included as conditions of
16 approval to future site-specific authorizations (e.g., application of appropriate BMPs).

17 **4.10.5 Impacts from Alternative B**

18 Under Alternative B, 0 acres would be open to oil and gas leasing subject to standard terms and
19 conditions, approximately 98,164 acres would be open to oil and gas leasing subject to CSU and/or TL
20 stipulations, approximately 324,161 acres would be open to oil and gas leasing subject to a NSO
21 stipulation, and approximately 30,068 acres would be closed to oil and gas leasing. Reasonably
22 foreseeable development under Alternative B is estimated to consist of seven wells and 127 acres of
23 surface disturbance in areas with CSU, TL, and/or NSO stipulations.

24 Alternative B would apply a noise CSU stipulation requiring that noise levels from production equipment
25 do not exceed 45 decibels as measured at 350 feet from the source. Alternative B would also apply a noise
26 CSU stipulation requiring that noise levels be mitigated so that there is no change in the natural ambient
27 sound as recorded in Canyonlands National Park. No exceptions, modifications, or waivers would be
28 allowed for these stipulations. The first CSU stipulation would reduce noise levels from operating wells
29 to estimated background levels that exist in some portions of the analysis area, such as areas near dirt
30 roads, near parking areas, or near livestock operations (44–50 dBA); however, noise levels would still
31 exceed the 20-dBA background level present in more remote portions of the analysis area. At the 45-
32 decibel level, which can be described as between very quiet and quiet (see Table 3-23), noise-sensitive
33 human receptors in more remote areas may still hear noise from oil and gas activities above background
34 noise levels when near the noise source. In portions of the analysis area near State Route 24 and Interstate
35 70, the CSU stipulation could reduce oil and gas noise levels to below that of traffic noise levels. The
36 second stipulation protects the soundscape of Canyonlands National Park by ensuring that sound levels in
37 the park are not impacted by noise from oil and gas development near the park. This stipulation would
38 likely reduce noise near Canyonlands National Park to levels similar to 20 dBA, minimizing noise
39 impacts in these areas. The CSU stipulations under Alternative B would promote more noise reduction
40 than the BMP prescribed under Alternative A because they require mitigation to estimated background
41 levels.

42 Alternative B would apply BMPs that require the minimization of noise by using best available
43 technology (e.g., installation of multi-cylinder pumps, installation of hospital grade sound-reducing
44 mufflers, placement of exhaust systems to direct noise away from noise-sensitive human receptors) and
45 that require the location of drill pads, roads, and facilities below ridgelines or behind topographic features
46 to minimize auditory effects. These BMPs are more stringent than the BMP prescribed under Alternative
47 A and would further reduce noise impacts.

1 Under Alternative B, an NSO stipulation would be applied for the Labyrinth Canyon and Dirty
2 Devil/Robbers Roost SRMAs that would minimize impacts to noise-sensitive human receptors in the
3 SRMAs. Areas adjacent to both SRMAs would either be NSO or have CSU and/or TL limitations, which
4 would reduce the chance of noise impacts traveling from outside the SRMAs to noise-sensitive human
5 receptors in the SRMAs. Impacts to noise-sensitive human receptors in Horseshoe Canyon and in the
6 Horseshoe Canyon Trailhead KOP would not occur under Alternative B because they would be closed to
7 oil and gas development, along with adjacent areas. Alternative B would attach an NSO stipulation
8 (within 3 miles of each KOP) to protect all five KOPs. Noise-sensitive human receptors in these KOPs
9 would not likely experience noise impacts.

10 In addition to the CSU stipulations for noise, other resource TL stipulations under Alternative B to protect
11 saline soils in the Mancos Shale, pronghorn during fawning season, and migratory bird nesting would
12 prevent noise during specific timeframes. Noise would still occur outside of these seasonal closures, but it
13 would be mitigated by the noise stipulations. CSU limitations for other resources under Alternative B
14 would reduce noise in certain areas such as areas with soils that have high wind erosion potential, steep
15 slopes (greater than 30%), white-tailed prairie dog habitat, and areas with special status plants. Applying
16 NSO stipulations under Alternative B (to LWCs, nine recreation focus areas, the Labyrinth Canyon
17 SRMA, the Dirty Devil/Robbers Roost SRMA, KOPs, steep slopes [greater than 40%], the Tidwell Draw
18 ACEC, the Dry Lake Archaeological District ACEC, the OST, VRI and VRM Class II areas, and areas
19 with specific water resources) or closing areas to oil and gas leasing would prevent oil and gas
20 development noise from reaching noise-sensitive human receptors in these areas. Alternative B would
21 also apply an NSO stipulation within 3 miles of the Lower San Rafael Road from State Route 24 to
22 Horseshoe Canyon and from Green River to Horseshoe Canyon, which would reduce noise in these areas.

23 Under Alternative B, the BLM would allow some exceptions, modifications, and waivers for TL
24 stipulations for saline soils in the Mancos Shale, for pronghorn habitat, for migratory birds, and for CSU
25 stipulations in white-tailed prairie dog habitat. Granting exceptions, modifications, or waivers to TL,
26 CSU, and NSO stipulations would allow for noise impacts from oil and gas development in areas where
27 such stipulations are applied. However, these impacts to the primary noise-sensitive human receptors
28 would be mitigated by the two noise stipulations.

29 **4.10.5.1 *Suspended and Protested Lease Decisions***

30 Under Alternative B, the BLM would cancel all suspended leases, resolve the protests on the protested
31 leases, and deny the leases. The soundscapes in the areas of suspended and protested leases would not be
32 affected by oil and gas exploration or development activities. Current soundscape conditions and trends
33 would be anticipated to continue for the foreseeable future.

34 **4.10.6 Impacts from Alternative C**

35 Under Alternative C, 37,865 acres would be open to oil and gas leasing subject to standard terms and
36 conditions, approximately 362,127 acres would be open to oil and gas leasing subject to CSU and/or TL
37 stipulations, approximately 52,208 acres would be open to oil and gas leasing subject to a NSO
38 stipulation, and approximately 192 acres would be closed to oil and gas leasing. Reasonably foreseeable
39 development under Alternative C is estimated to consist of 27 wells and 517 acres of surface disturbance
40 in areas open to oil and gas leasing.

41 Alternative C would apply a noise CSU stipulation requiring that noise levels be mitigated so that there is
42 no change in the natural ambient sound as recorded in Canyonlands National Park. No exceptions,
43 modifications, or waivers would be allowed for this stipulation. This stipulation protects the soundscape
44 of Canyonlands National Park by ensuring that sound levels in the park are not impacted by noise from
45 nearby oil and gas development. Oil and gas development in the analysis area near Canyonlands National
46 Park would require noise mitigation and would have noise levels that do not impact noise-sensitive

1 human receptors; however, development in portions of the analysis area that are located at a greater
2 distance from the park would not require mitigation and would cause noise levels to exceed the estimated
3 background levels (20 dBA in more remote areas and 44 to 50 dBA in other areas such as near dirt roads,
4 near parking areas, or near livestock operations). The CSU stipulation under Alternative C would promote
5 less noise reduction than those stipulations prescribed under Alternative B (and Alternative D) because it
6 only addresses oil and gas leasing and development near Canyonlands National Park. However,
7 Alternative C's stipulation provides more noise mitigation for some of the noise-sensitive human
8 receptors than the BMP under Alternative A.

9 Alternative C would apply the same BMPs as Alternative B; these BMPs would have the same impacts
10 and benefits to soundscapes as described in Alternative B.

11 Under Alternative C, an NSO stipulation would be applied to portions of the Dirty Devil/Robbers Roost
12 SRMA that would reduce impacts to noise-sensitive human receptors in these areas; however, noise
13 impacts could occur in other portions of the SRMA or from adjacent areas that are open to oil and gas
14 leasing subject to standard terms and conditions or subject to CSU and/or TL limitations. A CSU
15 stipulation would be applied for the Labyrinth Canyon SRMA under Alternative C, which would limit
16 impacts to noise-sensitive human receptors in the SRMA by spacing well pads at least 320 acres apart and
17 away from the viewshed of the Green River. Noise-sensitive human receptors in this SRMA would
18 experience some noise, but the intensity and frequency of the impact would be reduced when compared to
19 areas open to oil and gas development subject to standard terms and conditions. Impacts to noise-sensitive
20 human receptors in Horseshoe Canyon and in the Horseshoe Canyon Trailhead KOP would be minimized
21 by an NSO stipulation within 1 mile of the canyon rim. Alternative C would also apply an NSO
22 stipulation (within 1 mile of each KOP) for all five KOPs. Noise-sensitive human receptors at these KOPs
23 would be unlikely to experience noise impacts.

24 In addition to the CSU stipulation for noise, other resource TL stipulations under Alternative C to protect
25 saline soils in the Mancos Shale, pronghorn during fawning season, and migratory bird nesting would
26 prevent noise during specific timeframes; however, noise would still occur outside of these seasonal
27 closures. CSU stipulations for other resources under Alternative C would reduce noise in LWCs in
28 Labyrinth Canyon, recreation focus areas, the Labyrinth Canyon SRMA, soils with high wind erosion
29 potential, steep slopes (greater than 30%), the Tidwell Draw ACEC, the OST, white-tailed prairie dog
30 habitat, and areas with special status plants. Applying NSO stipulations under Alternative C (to the Three
31 Rivers Mineral Withdrawal, the Dirty Devil/French Springs Units 1 and 3 and Horseshoe Canyon South
32 LWCs, portions of the Dirty Devil/Robbers Roost SRMA, Green River Labyrinth Canyon rim and
33 Horseshoe Canyon rim, KOPs, steep slopes (greater than 40%), areas with specific water resources, the
34 Dry Lake Archaeological District ACEC, and portions of the Green River) or closing areas to oil and gas
35 leasing would prevent oil and gas development noise from reaching noise-sensitive human receptors in
36 these areas.

37 However, under Alternative C, the BLM would allow some exceptions, modifications, and waivers for TL
38 stipulations for saline soils in the Mancos Shale, for pronghorn habitat, for migratory birds, and for CSU
39 stipulations in white-tailed prairie dog habitat and the OST. Exceptions for NSO stipulations in portions
40 of the Dirty Devil/Robbers Roost SRMA and for some water resources would be allowed. Granting
41 exceptions, modifications, or waivers to TL, CSU, and NSO stipulations would allow for noise impacts
42 from oil and gas development in areas where such stipulations are applied. These impacts would be
43 similar to the noise impacts that would occur in areas that are open to oil and gas leasing subject to
44 standard terms and conditions, unless the impacts occurred near Canyonlands National Park, in which
45 case they would be mitigated.

1 **4.10.6.1 *Suspended and Protested Lease Decisions***

2 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
3 standard terms, 39,766 acres would be issued subject to CSU and/or TL stipulations, and 318 acres would
4 be issued subject to NSO stipulations. If the leases were subsequently developed, the impacts of
5 modifying the terms and conditions of the suspended and protested leases and issuing the leases
6 consistent with Alternative C would be the same as the impacts to soundscapes described in this section
7 from managing areas as open to leasing subject to standard terms and conditions, open to leasing subject
8 to CSU and/or TL stipulations, and open to leasing subject to NSO stipulations.

9 Because some of the protested leases under Alternative C are located in or very close to the Labyrinth
10 Canyon SRMA and in the Bull Bottom and Trin Alcove/Three Canyon KOPs, and because most of these
11 leases would be issued with a CSU and/or TL stipulation, noise-sensitive human receptors in these areas
12 could experience noise from oil and gas development during specific periods (when timing limitations are
13 not in effect) that would reduce the quality of the recreation experience. Similarly, the suspended leases
14 are very close to the Dirty Devil/Robbers Roost SRMA. Because most of the suspended leases would be
15 issued with a CSU and/or TL stipulation, noise-sensitive human receptors in the SRMA could experience
16 noise from oil and gas development during specific time periods.

17 **4.10.7 Impacts from Alternative D**

18 Under Alternative D, 0 acres would be open to oil and gas leasing subject to standard terms and
19 conditions, approximately 339,884 acres would be open to oil and gas leasing subject to CSU and/or TL
20 stipulations, approximately 92,170 acres would be open to oil and gas leasing subject to a NSO
21 stipulation, and approximately 20,339 acres would be closed to oil and gas leasing. Reasonably
22 foreseeable development under Alternative D is estimated to consist of 23 wells and 440 acres of surface
23 disturbance in areas with CSU, TL, and/or NSO stipulations.

24 Alternative D would implement the same noise stipulations on oil and gas leases as Alternative B.
25 Alternative D would apply a CSU stipulation requiring that noise levels from production equipment do
26 not exceed 45 decibels as measured at 350 feet from the source. Alternative D would also apply a noise
27 CSU stipulation requiring that noise levels be mitigated so that there is no change in the natural ambient
28 sound as recorded in Canyonlands National Park. No exceptions, modifications, or waivers would be
29 allowed for these stipulations. The first CSU stipulation would reduce noise levels from operating wells
30 to estimated background levels that exist in some portions of the analysis area, such as near dirt roads,
31 near parking areas, or near livestock operations (44–50 dBA); however, noise levels would still exceed
32 the 20-dBA background level present in more remote portions of the analysis area. At the 45-decibel
33 level, which can be described as between very quiet and quiet (see Table 3-23), noise-sensitive human
34 receptors in more remote areas may still hear noise from oil and gas activities above background noise
35 levels when close to the noise source. In portions of the analysis area near State Route 24 and Interstate
36 70, the CSU stipulation could reduce oil and gas noise levels to below that of traffic noise levels. The
37 second stipulation protects the soundscape of Canyonlands National Park by ensuring that sound levels in
38 the park are not impacted by noise from oil and gas development near the park. This stipulation would
39 likely reduce noise near Canyonlands National Park to levels similar to 20 dBA, minimizing noise
40 impacts in these areas.

41 Alternative D would apply the same BMPs as Alternatives B and C; these BMPs would have the same
42 impacts and benefits to soundscapes as described in Alternative B.

43 Under Alternative D, an NSO stipulation would be applied to the Labyrinth Canyon SRMA that would
44 minimize impacts to noise-sensitive human receptors in the SRMA. An NSO stipulation would be applied
45 to portions of the Dirty Devil/Robbers Roost SRMA that would reduce impacts to noise-sensitive human
46 receptors in these areas; however, other portions of the SRMA would be subject to CSU and/or TL
47 stipulations. Noise-sensitive human receptors in portions of the SRMA where oil and gas development is

1 subject to CSU and/or TL stipulations would experience some noise, but the intensity and frequency of
2 the impact would be reduced when compared to areas open to oil and gas development subject to standard
3 terms and conditions. Impacts to noise-sensitive human receptors in Horseshoe Canyon and in the
4 Horseshoe Canyon Trailhead KOP would be minimized by an NSO stipulation within 1 mile of the
5 canyon rim. Alternative D would also apply an NSO stipulation (within 1 mile of each KOP) to protect all
6 five KOPs. Noise-sensitive human receptors at these KOPs would be unlikely to experience noise
7 impacts.

8 In addition to the CSU stipulations for noise, other resource TL stipulations under Alternative D to protect
9 saline soils in the Mancos Shale, pronghorn during fawning season, and migratory bird nesting would
10 prevent noise during specific timeframes. Noise would still occur outside of these seasonal closures, but it
11 would be mitigated by the noise stipulations. CSU limitations for other resources under Alternative D
12 would reduce noise in LWCs, two recreation focus areas, soils with high wind erosion potential, steep
13 slopes (greater than 30%), white-tailed prairie dog habitat, and areas with special status plants. Applying
14 NSO stipulations under Alternative D (in the Labyrinth Canyon LWC Unit, the Dirty Devil/French
15 Springs Units 1 and 3 and Horseshoe Canyon South LWCs, seven recreation focus areas, the Labyrinth
16 Canyon SRMA, portions of the Dirty Devil/Robbers Roost SRMA, Horseshoe Canyon rim, Green River
17 Labyrinth Canyon rim, KOPs, steep slopes (greater than 40%), the Tidwell Draw ACEC, the Dry Lake
18 Archaeological District ACEC, the OST, and areas with specific water resources) or closing areas to oil
19 and gas leasing would prevent oil and gas development noise from reaching noise-sensitive human
20 receptors in these areas. Alternative D would also apply an NSO stipulation within 1 mile of the Lower
21 San Rafael Road from Saucer Basin Road to Horseshoe Canyon and from the San Rafael River to
22 Horseshoe Canyon, which would reduce noise in these areas.

23 Under Alternative D, the BLM would allow some exceptions, modifications, and waivers for TL
24 stipulations for saline soils in the Mancos Shale, for pronghorn habitat, for migratory birds, and for CSU
25 stipulations for white-tailed prairie dog habitat. Exceptions and waivers for NSO stipulations in portions
26 of the Dirty Devil/Robbers Roost SRMA, for some water resources, and for the OST would be allowed.
27 Granting exceptions, modifications, or waivers to TL, CSU, and NSO stipulations would allow for noise
28 impacts from oil and gas development in areas where such stipulations are applied. However, these
29 impacts would be mitigated by the two noise stipulations.

30 ***4.10.7.1 Suspended and Protested Lease Decisions***

31 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to CSU
32 and/or TL stipulations and 3,132 acres would be issued subject to NSO stipulations. If the leases were
33 subsequently developed, the impacts of modifying the terms and conditions of the suspended and
34 protested leases and issuing the leases consistent with Alternative D would be the same as the impacts on
35 soundscapes from managing lands as open to leasing subject to CSU and/or TL stipulations, or open to
36 leasing subject to NSO stipulations described in this section.

37 Because some of the protested leases under Alternative D are located in or very close to the Labyrinth
38 Canyon SRMA and in the Bull Bottom and Trin Alcove/Three Canyon KOPs and because most of these
39 leases would be issued with a CSU and/or TL stipulation, noise-sensitive human receptors in these areas
40 could experience noise from oil and gas development during specific periods (when timing limitations are
41 not in effect) that would reduce the quality of the recreation experience. Similarly, the suspended leases
42 are very close to the Dirty Devil/Robbers Roost SRMA. Because most of the suspended leases would be
43 issued with a CSU and/or TL stipulation, noise-sensitive human receptors in the SRMA could experience
44 noise from oil and gas development during specific time periods.

1 **4.11 SPECIAL STATUS SPECIES**

2 This section presents potential impacts to habitat for special status species from implementing the
3 management actions presented in Chapter 2. Existing conditions concerning special status species are
4 described in Chapter 3.

5 **4.11.1 Assumptions**

- 6 • Local populations are naturally affected by non-human-caused factors such as climate, natural
7 predation, disease outbreaks, natural fire regimes, and competition for available habitat from
8 other native species.
- 9 • Climatic fluctuation (e.g., drought) would continue to influence the health and productivity of
10 special status species habitat on an annual basis.
- 11 • Actions affecting one special status species would have similar impacts on other species that use
12 the same habitats or areas.
- 13 • Surface-disturbing activities could lead to modification (positive or negative), loss (short-term or
14 long-term), or fragmentation of special status species habitat and/or the loss or gain of
15 individuals, depending on the amount of area disturbed, species affected, and location of the
16 disturbance.
- 17 • Changes in air, water, and habitat quality could lead to direct impacts and could have cumulative
18 impacts on species survival.
- 19 • Impacts to special status species could be more significant than impacts to non-special status
20 species.
- 21 • The USFWS would be consulted on any action that could affect any listed plant, fish, or wildlife
22 species or their habitat. Consultation with the USFWS, as required by the ESA, would ensure
23 additional protection for special status species from oil and gas leasing and development. The
24 USFWS would have jurisdiction over the management of federally listed plant, fish, and wildlife
25 populations, critical habitat, and migratory birds.
- 26 • The total amount of new surface disturbance allowed by an alternative is a good index of
27 potential impacts to special status species. Success of reclamation measures prescribed as a
28 condition of development is unknown, and the potential impact of surface disturbance on special
29 status species populations could be underestimated.
- 30 • Adequate vegetative ground cover and species composition for site stabilization typically would
31 occur within 15 to 20 years in shrub communities and 20 to 25 years in desert communities.
- 32 • In disturbed areas, re-establishment of a vegetative landscape and plant composition similar to
33 adjacent undisturbed lands, including trees and shrubs, could take in excess of 100 years.
- 34 • The health of fisheries in the planning area is directly related to the overall health and functional
35 capabilities of riparian and wetland resources, which in turn reflect watershed health.

36 **4.11.2 Impacts Common to All Alternatives**

37 The following discussions represent impacts to special status species that would not vary by alternative.

38 Attaching stipulations for special status species to permitted activities and requiring the use of BMPs
39 would limit negative impacts to those species and their habitats through such actions as preventing
40 surface disturbance in and near their habitats, which would prevent habitat degradation and damage;
41 reducing the introduction and spread of non-native, invasive species and noxious weeds; minimizing the
42 presence of humans and noise from machinery and vehicles associated with mineral leasing; limiting the
43 potential for direct mortality as a result of damage to burrows or collisions with oil and gas equipment and
44 traffic; and reducing habitat fragmentation.

1 For all alternatives, attaching lease notices and requiring conservation measures for all surface-disturbing
2 activities for Jones cycladenia, Wright fishhook cactus, western yellow-billed cuckoo, southwestern
3 willow flycatcher, Colorado River endangered fish, and the Mexican spotted owl would ensure
4 compliance with the ESA and limit impacts from oil and gas development to these species. Such lease
5 notices would minimize damage to or loss of these species' habitats resulting from surface disturbance or
6 other oil and gas development activities. These lease notices include prohibiting surface disturbance in the
7 100-year floodplain of the Green River and associated back waters to protect Colorado River endangered
8 fish, protecting Mexican spotted owl occupied habitat by prohibiting temporary activities from March 1
9 through August 31 and permanent actions year-round within 0.5 mile of a Protected Activity Center,
10 precluding surface-disturbing activities within a 100-meter buffer of suitable habitat year-long and within
11 0.25 mile of occupied breeding habitat during the breeding season to protect the southwestern willow
12 flycatcher, and precluding surface-disturbing activities within 0.25 mile of occupied habitat in riparian
13 areas from June 15 through August 31 to protect the western yellow-billed cuckoo.

14 Attaching lease notices and requiring mitigation measures for all surface-disturbing activities to protect
15 Utah and BLM sensitive species (e.g., burrowing owl, bluehead sucker, Jones indigo bush, and hole-in-
16 the-rock prairie clover) would limit impacts from oil and gas development to these species because the
17 BLM would require assessments to determine whether a species is present and, depending on the results
18 of the assessments, the implementation of avoidance measures for that species during exploration and
19 development.

20 Management of the Big Flat Tops ACEC as closed to oil and gas leasing and development would prevent
21 impacts from oil and gas development including surface disturbance, loss of vegetation, and the
22 introduction and spread of non-native, invasive species and noxious weeds on special status species
23 present in the ACEC.

24 Controlling noxious weed species and preventing the infestation and spread of invasive species as well as
25 developing cooperating agreements with other federal, state, local, and private organizations to control
26 invasive and noxious weed species would reduce the introduction and spread of non-native, invasive
27 species and noxious weeds in the planning area. Non-native, invasive species and noxious weeds degrade
28 the habitats of special status species; management actions to prevent their introduction and spread would
29 benefit all special status species.

30 Management actions to protect wildlife, migratory birds, and raptors would benefit special status species
31 in the planning area. Depending on the alternative, the BLM would implement different management
32 actions in habitats that are occupied by wildlife, migratory birds, and raptors (e.g., prohibiting surface-
33 disturbing activities in crucial pronghorn habitat during fawning season and application of seasonal
34 restrictions and spatial buffers on known raptor nests). Special status species that share these habitats
35 would also be protected by the stipulations and would benefit from the undisturbed habitat and forage; the
36 reduction in the potential for the introduction and spread of invasive, non-native plant species; and the
37 reduced presence of humans and machinery associated with oil and gas exploration and development.
38 Some of these management actions would protect riparian and upland vegetation, reduce sedimentation
39 and siltation of streambeds, and support water quality for fish habitat.

40 Under all alternatives, avoiding surface-disturbing activities in occupied migratory bird habitat during the
41 nesting season would minimize and prevent impacts such as noise, human presence, physical destruction
42 of nests, and nest failure and abandonment to special status species that are migratory birds (e.g., western
43 yellow-billed cuckoo, bald eagle, bobolink, and burrowing owl). Oil and gas exploration and development
44 activities could still occur in migratory bird habitats outside of the nesting season, which could result in
45 the removal and modification of migratory bird habitats and disturbance or displacement of migratory
46 birds that are special status species during foraging, sheltering, migration, and other activities.

47 Management actions that support good air quality (e.g., the use of dust mitigation measures) could reduce
48 impacts to vegetation and stream channels from dust accumulation and airborne pollutants. These actions
49 would support healthy foliage for special status plant and wildlife species and healthy water quality for
50 special status fish species.

1 On the Colorado Plateau, climate change is expected to intensify the hydrologic cycle (e.g., causing more
 2 intense runoff), reduce streamflow, cause declines in native fish diversity, increase soil erosion, increase
 3 non-native species populations, increase the frequency and intensity of fire, and shift vegetation
 4 composition, diversity, and growth (Bryce et al. 2012). A reduction in streamflow, more-intense runoff
 5 resulting in increased erosion, and declines in native fish diversity could all negatively affect special
 6 status fish species in the long term. An increased frequency and intensity of fire and shifts in vegetation
 7 composition, diversity, and growth could have negative or positive impacts on the current habitat
 8 compositions of special status species. For example, climate and soil modeling to predict future
 9 vegetation conditions in the Colorado Plateau ecoregion indicates that a potential shift in major vegetation
 10 types through time is expected based on plant functional groups (BLM 2012g). The modeling predicts
 11 that climate conditions will change to favor more grasses and shrubland subtropical xeromorphic (e.g.,
 12 Gambel oak and western juniper) (Bryce et al. 2012). Based on this information, special status species
 13 whose habitats consist primarily of grasses and subtropical xeromorphic shrubland may benefit from
 14 changing conditions while species that require different habitats may be negatively impacted. Modeling
 15 was conducted on a limited number of mammal, bird, and fish species to examine each species' response
 16 to potential exposure to climate change. Each of the mammal species modeled showed a unique signature
 17 in the climate model results; bird and fish species also showed species-specific patterns (Bryce et al.
 18 2012). Based on this analysis, climate change would likely have different impacts on different special
 19 status species in the planning area. Climate change impacts cannot necessarily be generalized across
 20 species.

21 **4.11.3 Impacts from Alternative A (No Action)**

22 Under Alternative A, approximately 399,462 acres would be open to oil and gas leasing subject to
 23 standard terms and conditions; approximately 19,083 acres would be open to oil and gas leasing subject to
 24 CSU/TL stipulations; approximately 33,627 acres would be open to oil and gas leasing subject to an NSO
 25 stipulation; and approximately 220 acres would be closed to oil and gas leasing. For those special status
 26 plant, fish, and wildlife species with designated, modeled, or mapped habitat in the planning area, Table
 27 4-28 presents the habitat that would be located in each leasing category under each alternative.

28 **Table 4-28. Special Status Species Habitat by Oil and Gas Leasing Category in All Alternatives**

Oil and Gas Leasing Category	Acres of Special Status Species Habitat			
	Alternative A	Alternative B	Alternative C	Alternative D
Modeled habitat for Jones cycladenia (threatened plant species)				
Open				
Highest probability	105,484.7	0.0	5,435.3	0.0
Medium-high probability	13,121.2	0.0	130.0	0.0
Medium-low probability	135,067.4	0.0	20,186.8	0.0
Low probability	19,424.7	0.0	8,255.9	0.0
CSU/TL				
Highest probability	4,138.3	32,549.1	100,249.6	92,067.2
Medium-high probability	1,687.3	1,914.2	14,373.1	12,480.8
Medium-low probability	4,498.6	30,805.5	116,072.8	113,776.4
Low probability	495.7	158.4	7,875.3	11,645.6

Oil and Gas Leasing Category	Acres of Special Status Species Habitat			
	Alternative A	Alternative B	Alternative C	Alternative D
NSO				
Highest probability	7,887.9	74,760.0	11,843.4	16,291.4
Medium-high probability	63.2	12,588.9	370.8	2,022.3
Medium-low probability	7,951.7	112,671.5	11,266.7	29,983.4
Low probability	11,920.9	25,572.7	15,710.2	17,019.8
Closed				
Highest probability	17.4	10,291.2	0.0	9,169.7
Medium-high probability	194.3	562.9	192.0	562.8
Medium-low probability	8.6	4,049.4	0.0	3,766.5
Low probability	0.0	6,110.3	0.0	3,176.0
Suitable habitat for Wright fishhook cactus (endangered plant species)				
Open	1,806.5	0.0	1,122.5	0.0
CSU/TL	384.9	1,317.3	1,034.6	2,094.4
NSO	0.0	874.1	34.3	97.0
Closed	0.0	0.0	0.0	0.0
Designated Critical Habitat for the Colorado pikeminnow (endangered fish species)				
Open	78.2	0.0	0.0	0.0
CSU/TL	37.4	0.0	0.0	0.0
NSO	427.7	0.0	543.4	24.7
Closed	0.0	543.4	0.0	518.7
Designated Critical Habitat for the razorback sucker (endangered fish species)				
Open	79.3	0.0	0.0	0.0
CSU/TL	37.4	0.0	0.0	0.0
NSO	433.9	0.0	550.6	25.0
Closed	0.0	550.6	0.0	525.6
Modeled habitat for the Mexican spotted owl (threatened wildlife species)*				
Open	25,074.3/35.2	0.0/0.0	1,065.1/0.0	0.0/0.0
CSU/TL	1,289.7/0.0	9,513.0/0.0	23,875.8/26.8	22,309.0/26.8
NSO	3,085.8/9.8	16,741.4/26.8	4,517.0/18.2	4,239.5/0.0
Closed	71.9/0.9	3,267.3/19.2	63.9/0.9	2,973.2/19.2

Oil and Gas Leasing Category	Acres of Special Status Species Habitat			
	Alternative A	Alternative B	Alternative C	Alternative D
Mapped colonies of white-tailed prairie dog (BLM sensitive wildlife species)				
Open	0.0	0.0	0.0	0.0
CSU/TL	4,964.5	3,955.2	5,229.4	4,699.4
NSO	320.0	1,329.3	55.2	585.1
Closed	0.0	0.0	0.0	0.0

1 *Acreage listed first is from the 1997 Willey-Spotsky Mexican Spotted Owl Habitat Model (foraging habitat); acreage listed
2 second is from the 2007 model (nesting habitat).

3 For special status species listed under the ESA but with no designated, modeled, or mapped habitat in the
4 planning area (i.e., humpback chub, bonytail, California condor, southwestern willow flycatcher, and
5 western yellow-billed cuckoo) and for BLM sensitive plant and wildlife species that may occur in the
6 planning area (Tables 3-25 and 3-26), impacts from oil and gas leasing and development would likely be
7 proportional to the amount of projected disturbance under Alternative A. Impacts would consist of those
8 described for wildlife in Section 4.12.3. The bonytail has been known to occur in the San Rafael River.
9 The California condor has suitable foraging habitat in the planning area, and the southwestern willow
10 flycatcher and western yellow-billed cuckoo have suitable nesting habitat in the riparian environment of
11 the San Rafael and Green Rivers in the planning area (Section 3.11.1).

12 Under Alternative A, the BLM estimates that 28 oil and gas wells would be drilled in the planning area
13 over the next 15 years. These wells would result in approximately 541 acres of surface disturbance and
14 impacts on special status species habitat, of which 86 acres would remain unreclaimed in 15 years.
15 Geophysical survey operations under Alternative A are anticipated to result in 305 acres of surface
16 disturbance and impacts on special status species habitat, of which approximately 61 acres would be
17 unreclaimed in 15 years. Alternative A is anticipated to result in more oil and gas leasing, exploration,
18 and development activities than the other alternatives analyzed in this EA. As a result, Alternative A
19 would have the largest impact on special status species and their habitats in the planning area. Impacts
20 would be similar to those described for wildlife in Section 4.12.3.

21 Allowing oil and gas leasing on 399,462 acres subject to standard terms and conditions (open) would
22 result in the damage or removal of special status species habitat from the development of well pads and
23 associated infrastructure. Invasive, non-native plant species could be introduced and spread by vehicles
24 and machinery during development activities, which could change habitat composition and function,
25 reducing forage quality and usable habitat for special status species. Runoff from development could lead
26 to streambank erosion, vegetation loss, sedimentation of streambeds, and stream channel alteration,
27 reducing habitat quality for special status fish. Direct mortality of special status species could occur as a
28 result of damage to burrows or collisions with oil and gas equipment and traffic. Displacement of special
29 status species from occupied habitats would likely occur as a result of equipment noise and human
30 presence associated with oil and gas exploration and development. The largest land cover types in the
31 open areas that could be developed are Colorado Plateau Blackbrush-Mormon-Tea Shrubland (184,190
32 acres) and Inter-Mountain Basins Active and Stabilized Dune (87,439 acres), although all vegetation
33 types present in the planning area would have some areas open for development (Table 4-10). These
34 vegetation communities provide habitat for special status species described in Chapter 3, such as
35 burrowing owl, kit fox, white-tailed prairie dog, short-eared owl, Jones cycladenia, flat-top buckwheat,
36 Paria spurge, Jane's globemallow, and other sensitive raptors, reptiles, and amphibians.

1 Applying CSU/TL stipulations under Alternative A to oil and gas leasing could reduce loss, damage, or
2 degradation of special status species habitat within 19,083 acres. More specifically, impacts would be
3 reduced to white-tailed prairie dog habitat through application of a special status species lease stipulation
4 that prohibits surface-disturbing activities within 660 feet of prairie dog colonies identified within prairie
5 dog habitat. No permanent aboveground facilities would be allowed within the 660-foot buffer. This
6 stipulation would also provide habitat protections from disturbance associated with oil and gas
7 development for other special status species associated with prairie dogs, such as burrowing owls.
8 Exceptions, modifications, and waivers would be allowed for this stipulation. Granting exceptions,
9 modifications, or waivers to this stipulation would allow for impacts to the white-tailed prairie dog and its
10 habitat from oil and gas development in areas where CSU/TL stipulations are applied.

11 CSU/TL stipulations under Alternative A for other wildlife, such as prohibiting surface-disturbing
12 activities in crucial pronghorn habitat during fawning season and closing migratory bird nesting areas
13 during the nesting season, would prevent surface disturbance during specific timeframes, which could
14 protect special status species during the periods of closure from disturbance by humans or machinery.
15 Disturbance, damage, or loss of habitat could occur outside of the seasonal closures, ultimately leading to
16 some loss of special status species habitat from oil and gas development. Other CSU/TL stipulations
17 under Alternative A could reduce disturbance to steep slopes and VRM Class II areas, minimizing surface
18 disturbance, habitat damage, habitat loss, erosion, runoff, and the introduction and spread of invasive,
19 non-native plant species. The largest land cover types that are covered by CSU/TL stipulations are
20 Colorado Plateau Blackbrush-Mormon-Tea Shrubland (7,983 acres) and Inter-Mountain Basins Mat
21 Saltbush Shrubland (4,134 acres), although most vegetation types present in the planning area would have
22 some areas managed as CSU/TL (Table 4-10). These vegetation communities provide habitat for special
23 status species described in Chapter 3, including burrowing owl, kit fox, white-tailed prairie dog, short-
24 eared owl, Jones cycladenia, flat-top buckwheat, Paria spurge, rushpink skeletonplant, maystem
25 blazingstar, Jane's globemallow, and sensitive raptors, reptiles, and amphibians; these habitat areas would
26 receive some reduction in surface disturbance or disruption from this management.

27 Applying an NSO stipulation under Alternative A for oil and gas leasing would prevent surface-
28 disturbing activities in 33,627 acres of the planning area. The NSO stipulation would protect special
29 status species habitat from damage, removal, or degradation; reduce the presence of infrastructure,
30 humans, and machinery; and reduce habitat fragmentation. Preventing future mineral development
31 disturbance caused by roads, structures, drilling operations, and human activity could reduce a majority of
32 stressors to special status species, reduce disruption of habitat, and allow for continued habitat
33 connectivity. NSO stipulations under Alternative A would be applied to the Dirty Devil/French Springs
34 natural area; the Horseshoe Canyon South natural area; portions of the Dirty Devil/Robbers Roost
35 SRMA; the Dry Lake ACEC; the Tidwell Draw ACEC; the Green River suitable segment from the
36 confluence of the San Rafael River to Canyonlands National Park, steep slopes, and areas within 330 feet
37 of springs, floodplains, perennial and intermittent streams, streams with perennial reaches, and riparian
38 areas and wetlands. Through the prevention of surface disturbance, these NSO stipulations would reduce
39 the potential for the introduction and spread of invasive, non-native plant species; support intact habitats
40 that allow for migration corridors; and support desired forage and cover for special status species. The
41 NSO stipulations that protect water resources would apply to riparian and aquatic habitats, including
42 those along the San Rafael and Green Rivers. These habitats support special status fish in the planning
43 area and provide important water sources and riparian breeding, foraging, nesting, and sheltering habitat
44 for special status species including southwestern willow flycatcher and yellow-billed cuckoo. The NSO
45 stipulations could prevent soil loss, erosion, or sedimentation of streambeds; support good water quality;
46 and provide protection of habitat for special status fish. The land cover types that would receive the most
47 protection under the NSO stipulation are Colorado Plateau Blackbrush-Mormon-Tea Shrubland (11,120
48 acres) and Inter-Mountain Basins Active and Stabilized Dune (9,169 acres), although most vegetation
49 types present in the planning area would have some areas managed as NSO (Table 4-10).

1 Under Alternative A, the BLM would allow some exceptions, modifications, or waivers for NSO
2 stipulations (e.g., in the Dirty Devil/Robbers Roost SRMA where oil and gas exploration and
3 development would not impair identified scenic and primitive or semi-primitive recreational resources, or
4 on steep slopes when a more detailed analysis is conducted and shows that impacts can be mitigated).
5 Granting exceptions, modifications, or waivers to NSO stipulations would allow for impacts to special
6 status species and their habitats from oil and gas development in areas where NSO stipulations are
7 applied. These impacts would be similar to the impacts on special status species and their habitats that
8 would occur in areas that are open to oil and gas leasing subject to standard terms and conditions.

9 The BLM would allow geophysical operations under Alternative A on lands closed to leasing or subject to
10 NSO stipulations under certain circumstances in the Richfield Field Office; geophysical operations would
11 also be allowed in the Price Field Office consistent with existing regulations for geophysical exploration.
12 Allowing geophysical operations in areas closed to mineral leasing or subject to NSO stipulations would
13 allow for impacts on special status species and their habitats similar to the impacts on these resources that
14 would occur in areas that are open to oil and gas leasing subject to standard terms and conditions.

15 The BMPs that would be applied to oil and gas leases under Alternative A would promote reclamation of
16 surface disturbance to some degree. However, because of the difficulty of reclaiming surface disturbances
17 in the planning area, reclaimed areas would not be anticipated to return to natural conditions for 20 to 25
18 years or more after initial reclamation. The BMPs for Alternative A also include the monitoring of
19 wildlife to evaluate the effects of oil and gas development, the possible use of seasonal restrictions on
20 public vehicular access where there are wildlife conflict issues, and the use of noise reduction techniques
21 and designs to reduce noise from compressors or other motorized equipment. Where development does
22 occur, these measures would help reduce impacts to special status species such as habitat degradation,
23 species displacement and disturbance, and accidental mortality.

24 Even with the NSO stipulations, CSU/TL stipulations, lease notices, and BMPs, it is anticipated that
25 impacts on special status species and their habitats would occur under Alternative A because of the
26 projected total number of wells (28 wells) and associated surface disturbance (846 acres).

27 ***4.11.3.1 Suspended and Protested Lease Decisions***

28 Under Alternative A, 45,043 acres of the suspended and protested leases would be issued subject to
29 standard terms and conditions and 113 acres of the suspended and protested leases would be issued subject
30 to NSO stipulations. The areas encompassed by the suspended and protested leases contain modeled
31 habitats for Mexican spotted owl and Jones cycladenia, as well as habitats for other special status plants
32 and wildlife described in Chapter 3. Some of the protested leases are located near the San Rafael River,
33 which provides riparian and aquatic habitat for special status species such as bonytail and razorback sucker
34 and which may provide habitat for yellow-billed cuckoo and southwestern willow flycatcher. If the leases
35 were subsequently developed, the impacts on these resources from issuing the leases subject to the terms
36 and conditions contained within the Price and Richfield Field Offices' ROD/RMPs (Alternative A-2)
37 would be the same as the impacts from managing them as open or NSO described in this section. If the
38 BLM were to rescind the suspensions on the suspended leases (Alternative A-1) and the leases were
39 subsequently developed, the impacts on special status species and their habitats that would occur in the
40 leased areas would be the same as those described for special status species habitats as open to leasing
41 subject to standard terms and conditions. The application of special status species lease notices common to
42 all alternatives would help protect special status species in the areas of suspended and protested leases.

43 Under both Alternatives A-1 and A-2, if a lessee proposes to develop these leases (e.g., drill a well), the
44 BLM would evaluate the lessee's proposal in a site-specific environmental review. If during the site-
45 specific environmental review process the BLM determines that additional mitigation measures are
46 required to protect resources of concern, those mitigation measures would be included as conditions of
47 approval to future site-specific authorizations (e.g., application of appropriate BMPs).

4.11.4 Impacts from Alternative B

Under Alternative B, 0 acres would be open to oil and gas leasing subject to standard terms and conditions; approximately 98,164 acres would be open to oil and gas leasing subject to CSU/TL stipulations; approximately 324,161 acres would be open to oil and gas leasing subject to an NSO stipulation; and approximately 30,068 acres would be closed to oil and gas leasing. For those special status plant, fish, and wildlife species with designated, modeled, or mapped habitat in the planning area, Table 4-28 presents the habitat that would be located in each leasing category under each alternative (including Alternative B).

For special status species that are listed under the ESA but that have no designated, modeled, or mapped habitat in the planning area (i.e., humpback chub, bonytail, California condor, southwestern willow flycatcher, and western yellow-billed cuckoo) and for BLM sensitive plant and wildlife species that may occur in the planning area (Tables 3-25 and 3-26), impacts from oil and gas leasing and development would likely be proportional to the amount of projected disturbance under Alternative B. Impacts would consist of those described for wildlife in Section 4.12.3. The bonytail has been known to occur in the San Rafael River. The California condor has suitable foraging habitat in the planning area, and the southwestern willow flycatcher and western yellow-billed cuckoo have suitable nesting habitat in the riparian environment of the San Rafael and Green Rivers in the planning area (Section 3.11.1).

The BLM estimates that seven oil and gas wells would be drilled in the planning area over the next 15 years under Alternative B. These wells would result in approximately 127 acres of surface disturbance and impacts on special status species habitat, of which 20 acres would remain unreclaimed in 15 years. Geophysical survey operations under Alternative B are anticipated to result in 72 acres of surface disturbance and impacts on special status species habitat, of which approximately 14 acres would be unreclaimed in 15 years. Alternative B is anticipated to result in the smallest amount of oil and gas leasing, exploration, and development activities of the alternatives analyzed in this EA. As a result, Alternative B would be anticipated to have the smallest impact on special status species and their habitats in the planning area. Impacts would consist of those described for wildlife in Section 4.12.3 and would generally be the same type as would occur under Alternative A (e.g., disturbance and displacement of special status species and loss, degradation, and fragmentation of habitat).

Applying CSU/TL special status species stipulations under Alternative B to oil and gas leasing would reduce loss, damage, or degradation of special status species habitat within 98,164 acres. More specifically, impacts would be reduced to white-tailed prairie dog habitat through application of a special status species lease stipulation that prohibits surface-disturbing activities within 660 feet of prairie dog colonies identified within prairie dog habitat. No permanent aboveground facilities would be allowed within the 660-foot buffer. This stipulation would also provide habitat protections from disturbance associated with oil and gas development for other special status species associated with prairie dogs, such as burrowing owls. Exceptions, modifications, and waivers would be allowed for this stipulation, but they would be more stringent than those allowed for Alternative A. For example, under Alternative B, the BLM authorized officer would not be able to grant exceptions if there is no reasonable location to develop a lease and avoid colonies due to the size of the town. Granting exceptions, modifications, or waivers to this stipulation under Alternative B would allow for impacts on the white-tailed prairie dog and its habitat from oil and gas development in areas where CSU/TL stipulations are applied; however, the impacts would need to be adequately mitigated. Under Alternative B, a CSU/TL stipulation would also apply to surface-disturbing activities within 300 feet of occupied Jones cycladenia and Wright fishhook cactus habitat, and surveys would be required in all modeled habitats. No exceptions, modifications, or waivers would be allowed for this stipulation. These stipulations would help ensure that any individual Jones cycladenia and Wright fishhook cactus that are present in the planning area are located and avoided during oil and gas exploration and development, although requiring surveys in all modeled habitats would increase costs for oil and gas operators. Under Alternative B, a lease notice would also be applied for the kit fox that requires surveys and prohibits surface-disturbing activities within 660 feet of an occupied kit

1 fox den. This lease notice would help prevent negative impacts on kit fox including accidental destruction
2 of dens or disturbance to active dens when compared to Alternative A because surveys would be required
3 in all habitats and an avoidance distance for active dens is identified.

4 CSU/TL stipulations for other wildlife under Alternative B (e.g., prohibiting surface-disturbing activities
5 in crucial pronghorn habitat during fawning season, applying seasonal restrictions and spatial buffers on
6 all known raptor nests, and closing migratory bird nesting areas during nesting season) could prevent
7 surface disturbance during specific timeframes. Special status species that use these habitats would also
8 be protected by the stipulations during the periods of closure and would benefit from the undisturbed
9 habitat and forage, the reduction in the potential for the introduction and spread of invasive and non-
10 native plant species, and the reduced presence of humans and machinery associated with oil and gas
11 exploration and development. The mitigation and management of raptors and their habitats under
12 Alternative B would also benefit special status species raptors and migratory birds by protecting nesting
13 and foraging habitat, reducing disturbance from humans and development activities, and protecting cover,
14 forage, and habitat corridors. Disturbance and damage or loss of habitat to special status species could
15 occur outside of the seasonal closures, ultimately leading to some loss of habitat from oil and gas
16 development.

17 Other CSU/TL stipulations under Alternative B could reduce disturbance to soils with high wind erosion
18 potential, saline soils in the Mancos Shale, and steep slopes, minimizing surface disturbance, habitat
19 damage, habitat loss, erosion, runoff, and the introduction and spread of invasive, non-native plant
20 species. Alternative B would also include CSU stipulations for night skies and noise, which would help
21 limit disruption from humans and machinery to special status species. The largest land cover types that
22 are covered by CSU/TL stipulations are Colorado Plateau Blackbrush-Mormon-Tea Shrubland (43,214
23 acres) and Inter-Mountain Basins Active and Stabilized Dune (17,577 acres), although most vegetation
24 types present in the planning area would have some areas managed as CSU/TL (Table 4-11). These
25 vegetation communities provide habitat for special status species described in Chapter 3 such as
26 burrowing owl, kit fox, white-tailed prairie dog, short-eared owl, Jones cycladenia, flat-top buckwheat,
27 Paria spurge, Jane's globemallow, and special status raptors, reptiles, and amphibians; these habitat areas
28 would receive some reduction in surface disturbance or disruption from this management.

29 Under Alternative B, applying an NSO stipulation or closing areas to oil and gas leasing would prevent
30 surface-disturbing activities from oil and gas leasing development within 354,229 acres. The NSO and
31 closed stipulations would protect special status species habitat from damage, removal, or degradation;
32 reduce the presence of infrastructure, humans, and machinery; and limit habitat fragmentation. Preventing
33 future mineral development disturbance caused by roads, structures, drilling operations, and human
34 activity could reduce a majority of stressors to special status species, reduce disruption of habitat, and
35 allow for continued habitat connectivity. NSO stipulations under Alternative B would be applied for lands
36 with wilderness characteristics, the Labyrinth Canyon SRMA, the Dirty Devil/Robbers Roost SRMA,
37 recreation focus areas, lands within 3 miles of KOPs, lands within 3 miles of the priority travel corridors,
38 the Dry Lake ACEC, the Tidwell Draw ACEC, lands within 3 miles of the Old Spanish Trail, steep slopes
39 (greater than 40%), VRI and VRM Class II areas, areas within 100 feet of ephemeral streams, areas
40 within public water reserves, areas within 100-year floodplains, and areas within 660 feet of intermittent
41 and perennial streams, rivers, riparian areas, wetlands, water wells, and springs. Areas closed to oil and
42 gas leasing would include the Dirty Devil/French Springs LWC units, the Horseshoe Canyon South
43 Natural Area, the Three Rivers locatable mineral withdrawal, all lands within 1 mile of the Green River
44 Labyrinth Canyon rim, all lands within 1 mile of the Horseshoe Canyon rim, and the Green River suitable
45 segment from the confluence of the San Rafael River to Canyonlands National Park.

46 The NSO stipulations and decisions to close areas to oil and gas leasing under Alternative B would reduce
47 the potential for the introduction and spread of invasive, non-native plant species; support intact habitats
48 that allow for migration corridors; and support desired forage and cover for special status species. The
49 NSO stipulations that protect water resources would apply to riparian and aquatic habitats, including those

1 along the San Rafael and Green Rivers. These areas provide habitat for threatened and endangered species
2 including yellow-billed cuckoo, southwestern willow flycatcher, Colorado pikeminnow, razorback sucker,
3 and bonytail, as well as other special status fisheries in the planning area. These areas also provide
4 important water sources and riparian breeding, foraging, nesting, and sheltering habitat for other special
5 status species. The NSO stipulations and closed areas could prevent soil loss, erosion, or sedimentation of
6 streambeds; support good water quality; and provide protection of habitat for special status fish. Under
7 Alternative B, the NSO stipulations would provide a larger area of protection around sensitive aquatic and
8 riparian habitats compared to Alternative A. The land cover types that would receive the largest area of
9 habitat protected under the NSO stipulation and areas closed to leasing are Colorado Plateau Blackbrush-
10 Mormon-Tea Shrubland (148,063 acres NSO and 12,031 acres closed) and Inter-Mountain Basins Active
11 and Stabilized Dune (77,023 acres NSO and 4,064 acres closed), although most vegetation types present in
12 the planning area would have some areas managed as NSO or closed (Table 4-11).

13 Under Alternative B, the BLM would not allow exceptions, modifications, or waivers to most NSO
14 stipulations. Not allowing exceptions, modifications, or waivers would reduce impacts to special status
15 species and their habitats in areas that would be subject to NSO stipulations when compared to
16 Alternative A, which would allow more exceptions, modifications, or waivers.

17 Geophysical operations would not be permitted under Alternative B in areas closed to leasing, and only
18 heliport geophysical operations would be allowed in areas that are managed as NSO. This management of
19 geophysical operations would provide better protection for special status species and their habitats in
20 areas managed as closed to oil and gas leasing or subject to NSO stipulations, including prevention of
21 surface disturbance, damage or removal of vegetation, and introduction and spread of invasive, non-native
22 plant species and noxious weeds, when compared to Alternative A.

23 The BMPs that would be applied to oil and gas leases under Alternative B would promote more rapid and
24 successful reclamation of surface disturbance (and a more rapid return to functioning special status
25 species habitat) compared to Alternative A. However, because of the difficulty of reclaiming surface
26 disturbances in the planning area, reclaimed areas would not be anticipated to return to natural conditions
27 for 20 to 25 years or more after initial reclamation. Compared to Alternative A, the BMPs for Alternative
28 B include measures that would reduce impacts on special status species and their habitats from oil and gas
29 development, including measures to protect soil and water resources, improve reclamation success,
30 prevent the spread of noxious weeds and invasive species, mitigate unavoidable impacts on wildlife
31 habitats, and exclude wildlife from hazardous areas such as open pits, tanks, and trenches. These BMPs
32 would reduce the impacts of oil and gas development on special status species and their habitats by
33 minimizing the area of disturbed land, avoiding impacts from known oil and gas development that are
34 hazardous to wildlife (e.g., produced water ponds), promoting improved reclamation planning and
35 practices, and compensating for unavoidable loss of habitat values. The revised BMPs would also reduce
36 the introduction and spread of non-native, invasive plant species and noxious weeds compared to
37 Alternative A by improving equipment cleaning and improving the coordination, planning, and execution
38 of noxious weed prevention measures.

39 ***4.11.4.1 Suspended and Protested Lease Decisions***

40 Under Alternative B, the BLM would cancel all suspended leases and resolve the protests on the protested
41 leases and deny the leases. Special status species and their habitats that occupy the areas of suspended and
42 protested leases would not be affected by oil and gas activities resulting from operators exploring for and
43 developing oil and gas resources. Current trends in special status species populations and habitat
44 conditions in these areas would be anticipated to continue for the foreseeable future.

4.11.5 Impacts from Alternative C

Under Alternative C, approximately 37,865 acres would be open to oil and gas leasing subject to standard terms and conditions; approximately 362,127 acres would be open to oil and gas leasing subject to CSU/TL stipulations; approximately 52,208 acres would be open to oil and gas leasing subject to NSO stipulations; and approximately 192 acres would be closed to oil and gas leasing. For those special status plant, fish, and wildlife species with designated, modeled, or mapped habitat in the planning area, Table 4-28 presents the habitat that would be located in each leasing category under each alternative (including Alternative C).

For special status species that are listed under the ESA but that have no designated, modeled, or mapped habitat in the planning area (i.e., humpback chub, bonytail, California condor, southwestern willow flycatcher, and western yellow-billed cuckoo) and for BLM sensitive plant and wildlife species that may occur in the planning area (Tables 3-25 and 3-26), impacts from oil and gas leasing and development would likely be proportional to the amount of projected disturbance under Alternative C. Impacts would consist of those described for wildlife in Section 4.12.3. The bonytail has been known to occur in the San Rafael River. The California condor has suitable foraging habitat in the planning area, and the southwestern willow flycatcher and western yellow-billed cuckoo have suitable nesting habitat in the riparian environment of the San Rafael and Green Rivers in the planning area (Section 3.11.1).

Under Alternative C, the BLM estimates that 27 wells oil and gas wells would be drilled in the planning area over the next 15 years. These wells would result in approximately 517 acres of surface disturbance and impacts on special status species habitat. Of this 517-acre area, 82 acres would remain unreclaimed in 15 years. Geophysical survey operations under Alternative C are anticipated to result in 292 acres of surface disturbance and impacts on special status species habitat, of which approximately 58 acres would be unreclaimed in 15 years. Alternative C would be anticipated to result in slightly less oil and gas leasing, exploration, and development activities over the next 15 years in the planning area compared to Alternative A. Alternative C would have slightly fewer overall impacts on special status species and their habitats compared to Alternative A and substantially more impacts on these resources compared to Alternative B. The types of impacts on special status species and their habitats under Alternative C would be the same as those that would occur under Alternatives A and B and the same as those described for wildlife in Section 4.12.3 (e.g., disturbance and displacement of special status species and loss, degradation, and fragmentation of habitat).

Allowing oil and gas leasing on 37,865 acres subject to standard terms and conditions (open) would result in the damage or removal of special status species habitat from the development of well pads and associated infrastructure. Invasive, non-native plant species could be introduced and spread by vehicles and machinery during development activities, which could change habitat composition and function, reducing forage quality and usable habitat for special status species. Runoff from development could reduce habitat quality for special status fish by causing streambank erosion, vegetation loss, sedimentation of streambeds, and stream channel alteration. Direct mortality of special status species could occur as a result of damage to burrows or nests and collisions with oil and gas equipment and traffic. Displacement of special status species from occupied habitats would likely occur as a result of equipment noise and human presence associated with oil and gas exploration and development. The largest land cover types in the open areas that could be developed are Colorado Plateau Blackbrush-Mormon-Tea Shrubland (11,951 acres) and Inter-Mountain Basins Active and Stabilized Dune (15,002 acres), although most vegetation types present in the planning area would have some areas open (Table 4-12). These vegetation communities provide habitat for special status species described in Chapter 3 such as burrowing owl, kit fox, white-tailed prairie dog, short-eared owl, Jones cycladenia, flat-top buckwheat, Paria spurge, Jane's globemallow, raptors, reptiles, and amphibians; these habitat areas would receive some reduction in surface disturbance or disruption from this management.

1 Applying CSU/TL stipulations under Alternative C to oil and gas leasing could reduce loss, damage, or
2 degradation of special status species habitat within 362,127 acres. More specifically, impacts would be
3 reduced to white-tailed prairie dog habitat through the application of the same special status species lease
4 stipulation for this species as that included under Alternative B. This stipulation would also provide
5 habitat protections from disturbance associated with oil and gas development for other special status
6 species associated with prairie dogs, such as burrowing owls. A special status species CSU/TL stipulation
7 would also apply to surface-disturbing activities within 300 feet of occupied Jones cycladenia and Wright
8 fishhook cactus habitat under Alternative C. Surveys would be required in all modeled habitat where there
9 is a moderate potential for occupation. No exceptions, modifications, or waivers would be allowed for the
10 plant stipulations. This survey stipulation is less stringent than the survey stipulation under Alternative B
11 (which requires surveys in all modeled habitats). Under the Alternative C survey requirement, there is a
12 possibility that some plants could be missed. However, the costs would be lower for oil and gas operators.
13 Under Alternative C, a lease notice would also be applied for the kit fox that requires surveys and
14 prohibits surface-disturbing activities within 660 feet of an occupied kit fox den. This lease notice would
15 help prevent negative impacts on kit fox including accidental destruction of dens or disturbance to active
16 dens when compared to Alternative A because surveys would be required in all habitats and an avoidance
17 distance for active dens is identified.

18 Under Alternative C, the BLM would apply the same CSU/TL stipulations for other wildlife (pronghorn
19 habitat, migratory birds, and raptors) as would be applied under Alternative B. The impacts and benefits
20 to special status species of applying these stipulations would be the same as those described for these
21 management actions under Alternative B. Other CSU/TL stipulations under Alternative C could reduce
22 disturbance to lands with wilderness characteristics in the Labyrinth Canyon Unit, recreation focus areas,
23 the Labyrinth Canyon SRMA, saline soils in the Mancos Shale, soils with high wind erosion potential,
24 steep slopes, the Tidwell Draw ACEC, areas within 2 miles of the Old Spanish Trail, and VRM Class II
25 areas. Other stipulations could minimize surface disturbance, habitat damage, habitat loss, erosion, runoff,
26 and the introduction and spread of invasive, non-native plant species. Alternative C would also include a
27 CSU/TL stipulation that could reduce the effects of noise, including displacement from otherwise suitable
28 habitats, on special status species in the planning area; however, this stipulation would be less protective
29 in areas farther away from the Horseshoe Canyon unit of Canyonlands National Park when compared to
30 Alternative B.

31 Alternative C contains some CSU stipulations that would limit the density of oil and gas development. As
32 densities of wells, roads, and facilities increase in wildlife habitat, habitat within and near well fields may
33 become progressively less effective until most animals no longer use these areas (Sawyer 2002).
34 Therefore, CSU stipulations that limit oil and gas development density could benefit special status species
35 and their habitats to a greater degree than other CSU stipulations applied under Alternative C by reducing
36 the intensity and extent of disturbance to habitats, reducing displacement of wildlife, and maintaining
37 habitat effectiveness. The largest land cover types covered by the CSU/TL stipulations are Colorado
38 Plateau Blackbrush-Mormon-Tea Shrubland (173,117 acres) and Inter-Mountain Basins Active and
39 Stabilized Dune (72,842 acres), although most vegetation types present in the planning area would have
40 some areas managed as CSU/TL (Table 4-12). These vegetation communities provide habitat for special
41 status species described in Chapter 3 such as burrowing owl, kit fox, white-tailed prairie dog, short-eared
42 owl, Jones cycladenia, flat-top buckwheat, Paria spurge, Jane's globemallow, and special status raptors,
43 reptiles, and amphibians; these habitat areas would receive some reduction in surface disturbance or
44 disruption from this management.

45 Under Alternative C, applying an NSO stipulation or closing areas to oil and gas leasing would prevent
46 surface-disturbing activities from oil and gas leasing development on 52,400 acres. The NSO and closed
47 stipulations could protect special status species habitat from damage, removal, or degradation; reduce the
48 presence of infrastructure, humans, and machinery; and reduce habitat fragmentation. Preventing future
49 mineral development disturbance caused by roads, structures, drilling operations, and human activity could

1 reduce a majority of stressors to special status species, reduce disruption of habitat, and allow for continued
2 habitat connectivity. The NSO stipulations under Alternative C would be applied for the Dirty
3 Devil/French Springs natural area and the Horseshoe Canyon South natural area, the Three Rivers
4 locatable mineral withdrawal, portions of the Dirty Devil/Robbers Roost SRMA, all lands within 1 mile of
5 the Green River Labyrinth Canyon rim, all lands within 1 mile of Horseshoe Canyon rim, all lands within 1
6 mile of KOPs, the Green River suitable segment from the confluence of the San Rafael River to
7 Canyonlands National Park, steep slopes (greater than 40%), the Dry Lake Archaeological District ACEC,
8 areas within 100 feet of ephemeral streams, areas within public water reserves, areas within 100-year
9 floodplains, and areas within 330 feet of intermittent and perennial streams, rivers, riparian areas, wetlands,
10 water wells, and springs. Areas closed to oil and gas leasing would include the Big Flat Tops ACEC.

11 Through the prevention of surface disturbance, the Alternative C NSO stipulations would reduce the
12 potential for the introduction and spread of invasive, non-native plant species; support intact habitats that
13 allow for migration corridors; and support desired forage and cover for special status species. The NSO
14 stipulations that protect water resources would apply to riparian and aquatic habitats, including those
15 along the San Rafael and Green Rivers. These areas provide habitat for threatened and endangered species
16 including yellow-billed cuckoo, southwestern willow flycatcher, Colorado pikeminnow, razorback
17 sucker, and bonytail, as well as other special status species fisheries in the planning area. These areas also
18 provide important water sources and riparian breeding, foraging, nesting, and sheltering habitat for other
19 special status species. The NSO stipulations could prevent soil loss, erosion, or sedimentation of
20 streambeds; support good water quality; and provide protection of habitat for special status fish. The NSO
21 stipulations under Alternative C would provide a smaller area of protection around these sensitive aquatic
22 and riparian habitats when compared to that of Alternative B. Similar to Alternative B, NSO stipulations
23 would be applied for ephemeral streams under Alternative C; they would not be applied under Alternative
24 A. The NSO stipulation for ephemeral streams would protect important desert washes that affect water
25 quality in downstream perennial waters inhabited by special status fish. The land cover types that would
26 receive the largest area of habitat protected under the NSO stipulation and areas closed to leasing are
27 Colorado Plateau Blackbrush-Mormon-Tea Shrubland (18,240 acres NSO) and Inter-Mountain Basins
28 Active and Stabilized Dune (10,820 acres NSO), although most vegetation types present in the planning
29 area would have some areas managed as NSO or closed (Table 4-12).

30 Under Alternative C, the BLM would allow exceptions, modifications, or waivers to some of the NSO
31 stipulations; however, fewer exceptions, modifications, or waivers would be granted compared to those
32 under Alternative A. Allowing fewer exceptions, modifications, or waivers would reduce impacts to
33 special status species and their habitats in areas that would be subject to NSO stipulations compared to
34 Alternative A.

35 Under Alternative C, geophysical operations would not be permitted in areas closed to leasing and would
36 be allowed in areas that are managed as NSO, though no new road construction or road improvements
37 would be permitted and the BLM would require full reclamation of all surface disturbance. Compared to
38 Alternative A, this management of geophysical operations would provide better protection for special
39 status species and their habitats in areas managed as closed to oil and gas leasing or open subject to NSO
40 stipulations, including prevention of surface disturbance and associated special status species
41 displacement, habitat loss, and degradation; improved reclamation practices; and reduced likelihood of
42 introduction and spread of invasive, non-native plant species and noxious weeds.

43 The BMPs that would be applied for Alternative C are the same as those that would be applied for
44 Alternative B; the benefits of using the BMPs would be the same as those described for Alternative B.
45 The BMPs that would be applied to oil and gas leases under Alternative C would promote more rapid and
46 successful reclamation of surface disturbance compared to the BMPs that would be applied under
47 Alternative A. However, because of the difficulty of reclaiming surface disturbances in the planning area,
48 some reclaimed areas would not be anticipated to return to natural conditions until up to 20 to 25 years
49 after initial reclamation.

1 **4.11.5.1 *Suspended and Protested Lease Decisions***

2 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
3 standard terms, 39,766 acres would be issued subject to CSU/TL stipulations, and 318 acres would be
4 issued subject to NSO stipulations. The areas encompassed by the suspended and protested leases contain
5 modeled habitats for Mexican spotted owl and Jones cycladenia, as well as habitats for other special
6 status plants and wildlife described in Chapter 3. Some of the protested leases are located near the San
7 Rafael River, which provides riparian and aquatic habitat for special status species such as bonytail and
8 razorback sucker, and which may provide habitat for yellow-billed cuckoo and southwestern willow
9 flycatcher. If the leases were subsequently developed, the impacts of modifying the terms and conditions
10 of the suspended and protested leases and issuing the leases consistent with Alternative C would be the
11 same as the impacts on those resources from managing them as open to leasing subject to standard terms
12 and conditions, open to leasing subject to CSU/TL stipulations, or open to leasing subject to NSO
13 stipulations described in this section. Under Alternative C, portions of protested leases would be issued
14 with stipulations that would limit oil and gas development density to no greater than one well pad per 160
15 acres. Compared to Alternative A, which would also issue the leases subject to varying stipulations,
16 issuing the suspended and protested leases with these stipulations could reduce the intensity and extent of
17 disturbance to special status species habitats that would occur if the leases were subsequently developed,
18 reducing displacement of species and maintaining habitat effectiveness.

19 **4.11.6 Impacts from Alternative D**

20 Under Alternative D, 0 acres would be open to oil and gas leasing subject to standard terms and
21 conditions; approximately 339,884 acres would be open to oil and gas leasing subject to CSU/TL
22 stipulations; approximately 92,170 acres would be open to oil and gas leasing subject to NSO
23 stipulations; and approximately 20,339 acres would be closed to oil and gas leasing. For those special
24 status plant, fish, and wildlife species with designated, modeled, or mapped habitat in the planning area,
25 Table 4-28 presents the habitat that would be located in each leasing category under each alternative
26 (including Alternative D).

27 For special status species listed under the ESA but with no designated, modeled, or mapped habitat in the
28 planning area (i.e., humpback chub, bonytail, California condor, southwestern willow flycatcher, and
29 western yellow-billed cuckoo) and for BLM sensitive plant and wildlife species that may occur in the
30 planning area (Tables 3-25 and 3-26), impacts from oil and gas leasing and development would likely be
31 proportional to the amount of projected disturbance under Alternative D. Impacts would consist of those
32 described for wildlife in Section 4.12.3. The bonytail has been known to occur in the San Rafael River.
33 The California condor has suitable foraging habitat in the planning area, and the southwestern willow
34 flycatcher and western yellow-billed cuckoo have suitable nesting habitat in the riparian environment of
35 the San Rafael and Green Rivers in the planning area (Section 3.11.1).

36 Under Alternative D, the BLM estimates that 23 oil and gas wells would be drilled in the planning area
37 over the next 15 years. These wells would result in approximately 440 acres of surface disturbance and
38 impacts on special status species habitat, of which 70 acres would remain unreclaimed in 15 years.
39 Geophysical survey operations under Alternative D are anticipated to result in 248 acres of surface
40 disturbance and impacts on special status species; of this 248-acre area, approximately 50 acres would be
41 unreclaimed in 15 years. Alternative D would be anticipated to result in slightly less oil and gas leasing,
42 exploration, and development activity over the next 15 years in the planning area compared to that under
43 Alternatives A and C. As a result, Alternative D would be anticipated to have slightly fewer overall
44 impacts on special status species and their habitats compared to those under Alternatives A and C, and
45 substantially more impacts on these resources compared to those under Alternative B. The types of
46 impacts on special status species and their habitats under Alternative D would be the same as those that
47 would occur under the other alternatives. These impacts are the same as those described for wildlife in
48 Section 4.12.6 (e.g., disturbance and displacement of special status species and loss, degradation, and
49 fragmentation of habitat).

1 Applying CSU/TL stipulations in Alternative D to oil and gas leasing could reduce loss, damage, or
2 degradation of special status species habitat within 339,884 acres. Under Alternative D, the BLM would
3 apply the same special status species CSU/TL stipulations on white-tailed prairie dog, kit fox, Jones
4 cycladenia, and Wright fishhook cactus as would be applied under Alternative C. Therefore, the impacts
5 and benefits of applying these stipulations on special status species and their habitats in the planning area
6 would be the same as those described for these management actions under Alternative C.

7 Under Alternative D, the BLM would apply the same CSU/TL stipulations for other wildlife (pronghorn
8 habitat, migratory birds, and raptors) as would be applied under Alternatives B and C. The impacts and
9 benefits to special status species of applying these stipulations would be the same as those described for
10 these management actions under Alternative B. Other CSU/TL stipulations applied under Alternative D
11 could reduce impacts to lands with wilderness characteristics (with the exception of the Labyrinth Canyon
12 Unit), The Cone and Cottonwood Wash recreation focus areas, all lands between 1 to 3 miles of KOPs
13 and key travel corridors, saline soils in the Mancos Shale, soils with high wind erosion potential, steep
14 slopes, all lands within 1 to 3 miles from high potential sites and route segments along the Old Spanish
15 Trail, and VRI and VRM Class II areas. Alternative D would also include the same CSU/TL stipulations
16 as Alternative B to reduce the effects of noise and light from oil and gas development on special status
17 species in the planning area.

18 Alternative D contains some CSU stipulations that would limit the density of oil and gas development.
19 These stipulations would be applied in lands with wilderness characteristics with the exception of the
20 Labyrinth Canyon Unit and The Cone and Cottonwood Wash recreation focus areas. The CSU
21 stipulations that would limit the density of oil and gas development under Alternative D would be more
22 restrictive and would cover a larger geographic area than would similar stipulations that would be applied
23 under Alternative C. As densities of wells, roads, and facilities increase in wildlife habitat, habitat within
24 and near well fields becomes progressively less effective until most animals no longer use these areas
25 (Sawyer 2002). Therefore, CSU stipulations that limit oil and gas development density could benefit
26 special status species and their habitats to a greater degree than could other types of CSU stipulations
27 applied under Alternatives A and C by reducing the intensity and extent of disturbance to special status
28 species habitats, reducing displacement of wildlife, and maintaining habitat effectiveness. The largest
29 areas of land cover types that are covered by the CSU/TL stipulations are Colorado Plateau Blackbrush-
30 Mormon-Tea Shrubland (148,756 acres) and Inter-Mountain Basins Active and Stabilized Dune (83,835
31 acres), although most vegetation types present in the planning area would have some areas managed as
32 CSU/TL (Table 4-13). These vegetation communities provide habitat for special status species described
33 in Chapter 3 such as burrowing owl, kit fox, white-tailed prairie dog, short-eared owl, Jones cycladenia,
34 flat-top buckwheat, Paria spurge, Jane's globemallow, raptors, reptiles, and amphibians; these habitat
35 areas would receive some reduction in surface disturbance or disruption from this management.

36 Under Alternative D, applying an NSO stipulation or closing areas to oil and gas leasing would prevent
37 surface-disturbing activities from oil and gas leasing development within 112,509 acres. The NSO and
38 closed stipulations would protect special status species habitat from damage, removal, or degradation;
39 reduce the presence of infrastructure, humans, and machinery; and reduce habitat fragmentation.
40 Preventing future mineral development disturbance caused by roads, structures, drilling operations, and
41 human activity could reduce a majority of stressors to special status species, reduce disruption of habitat,
42 and allow for continued habitat connectivity. The NSO stipulations under Alternative D would be applied
43 to the Dirty Devil/French Springs and Horseshoe Canyon South natural areas, lands with wilderness
44 characteristics in the Labyrinth Canyon Unit, the Labyrinth Canyon SRMA, portions of the Dirty
45 Devil/Robbers Roost SRMA, all lands within 1 mile of the Green River Labyrinth Canyon rim that are
46 north of the San Rafael River, all lands within 1 mile of Horseshoe Canyon rim, seven recreation focus
47 areas (Fossil Point, Dry Lake, Three Canyon, Saucer Basin/Moonshine Wash, Keg Knoll, Sweetwater
48 Reef, and Horseshoe Canyon Trailhead), areas within 1 mile of KOPs and key travel corridors, steep
49 slopes (greater than 40%), the Dry Lake Archaeological District ACEC, Tidwell Draw ACEC, all lands

1 within 1 mile of high potential sites and route segments along the Old Spanish Trail, areas within 100 feet
2 of ephemeral streams, areas within public water reserves, areas within 100-year floodplains, and areas
3 within 660 feet of intermittent and perennial streams, rivers, riparian areas, wetlands, water wells, and
4 springs. Areas that would be closed to oil and gas leasing would include the Big Flat Tops ACEC, the
5 Three Rivers locatable mineral withdrawal, all lands within 1 mile of the Green River Labyrinth Canyon
6 rim south of the San Rafael River, all lands within 1 mile of the Horseshoe Canyon rim, and the Green
7 River suitable segment from the confluence of the San Rafael River to Canyonlands National Park.

8 Through the prevention of surface disturbance, the Alternative D NSO stipulations and decisions to close
9 areas to oil and gas leasing would reduce the potential for the introduction and spread of invasive, non-
10 native plant species; support intact habitats that allow for migration corridors; and support desired forage
11 and cover for special status species. Under Alternative D, riparian and aquatic habitats in the planning
12 area, including those along the San Rafael and Green Rivers would either be closed to oil and gas leasing
13 or open subject to NSO stipulations. These areas provide habitat for threatened and endangered species
14 including yellow-billed cuckoo, southwestern willow flycatcher, Colorado pikeminnow, razorback
15 sucker, and bonytail, as well as other special status species fisheries in the planning area. These areas also
16 provide important water sources and riparian breeding, foraging, nesting, and sheltering habitat for other
17 special status species. The closures and NSO stipulations under Alternative D would provide larger areas
18 of protection around these sensitive aquatic and riparian habitats compared to the areas under Alternatives
19 A and C, and the same area of protection as that under Alternative B. Similar to Alternatives B and C,
20 NSO stipulations would be applied for ephemeral streams under Alternative D; these stipulations would
21 not be applied under Alternative A. The NSO stipulation for ephemeral streams would protect important
22 desert washes that provide special status species habitat and affect water quality in downstream perennial
23 waters. The NSO stipulations could prevent soil loss, erosion, or sedimentation of streambeds; support
24 good water quality; and provide protection of habitat for special status fish. The land cover types that
25 would receive the largest area of habitat protected under the NSO stipulation and areas closed to leasing
26 are Colorado Plateau Blackbrush-Mormon-Tea Shrubland (43,861 acres NSO and 10,691 acres closed)
27 and Inter-Mountain Basins Active and Stabilized Dune (12,613 acres NSO and 2,216 acres closed),
28 although most vegetation types present in the planning area would have some areas managed as NSO or
29 closed (Table 4-13).

30 Under Alternative D, the BLM would allow minimal exceptions, modifications, or waivers to NSO
31 stipulations. Fewer exceptions, modifications, or waivers would be granted compared to Alternatives A
32 and C. Allowing fewer exceptions, modifications, or waivers would reduce impacts to special status
33 species and their habitats in areas that would be subject to NSO stipulations, when compared to
34 Alternatives A and C.

35 Under Alternative D, geophysical operations would be managed in the same manner and would be
36 anticipated to have the same impacts as under Alternative C.

37 The BMPs for Alternative D and the benefits of using the BMPs would be the same as those described for
38 Alternatives B and C.

39 ***4.11.6.1 Suspended and Protested Lease Decisions***

40 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to
41 CSU/TL stipulations, and 3,132 acres would be issued subject to NSO stipulations. The areas
42 encompassed by the suspended and protested leases contain modeled habitats for Mexican spotted owl
43 and Jones cycladenia, as well as habitats for other special status plants and wildlife described in Chapter
44 3. Some of the protested leases are located near the San Rafael River, which provides riparian and aquatic
45 habitat for special status species such as bonytail and razorback sucker, and which may provide habitat
46 for yellow-billed cuckoo and southwestern willow flycatcher. If the leases were subsequently developed,
47 the impacts of modifying the terms and conditions of the suspended and protested leases and issuing the

1 leases consistent with Alternative D would be the same as the impacts on those resources from managing
2 them as open to leasing subject to CSU/TL stipulations, or open to leasing subject to NSO stipulations
3 described in this section. Under Alternative D, portions of the suspended and protested leases would be
4 issued with stipulations that would limit oil and gas development density to no greater than one well pad
5 per 640 acres. Compared to Alternatives A and C, which would also issue the leases subject to varying
6 stipulations, issuing the suspended and protested leases with these stipulations would reduce the intensity
7 and extent of disturbance to special status species habitats that could occur if the leases were subsequently
8 developed, reducing displacement of species and maintaining habitat effectiveness.

9 **4.12 WILDLIFE AND FISHERIES**

10 This section presents potential impacts to habitat for wildlife and fish from implementing management
11 actions presented in Chapter 2. Existing conditions concerning wildlife and fisheries resources are
12 described in Chapter 3.

13 **4.12.1 Assumptions**

- 14 • Local populations of native wildlife and fish are naturally affected by non-human-caused factors
15 such as climate, natural predation, disease outbreaks, natural fire regimes, and competition for
16 available habitat from other native species.
- 17 • Climatic fluctuation in the planning area would continue to influence the health and productivity
18 of wildlife habitat on an annual basis.
- 19 • The more acreage of habitat protected from surface disturbance or human presence, the less
20 potential for adverse impacts to targeted species.
- 21 • Substantial modifications to habitat suitability can impact the survivability and viability of
22 populations (e.g., higher winter mortality, reduced reproductive success).
- 23 • Crucial winter ranges, transitional ranges, migration corridors, and birthing areas are important
24 wildlife habitat.
- 25 • Natural variability in wildlife health, population levels, and habitat conditions would continue in
26 the planning area. Periods of mild or severe weather as well as outbreaks of wildlife disease or
27 insects/diseases that impact habitat could impact wildlife population levels.
- 28 • Precise, quantitative estimates of impacts generally are not possible because the exact locations of
29 future actions are unknown, population data for wildlife species are often lacking, or habitat types
30 affected by surface-disturbing activities cannot be predicted.
- 31 • The health of fisheries in the planning area is directly related to the overall health and functional
32 capabilities of riparian and wetland resources, which in turn reflect watershed health.
- 33 • Any activities that affect the ecological condition of the watershed and its vegetative cover could
34 directly or indirectly affect the aquatic environment. The degree of impact attributed to any one
35 disturbance or series of disturbances is influenced by location within the watershed, time and
36 degree of disturbance, existing vegetation, and hydrologic condition.
- 37 • In general, surface disturbance impacting one species would have similar impacts to other species
38 using the same habitats or areas.
- 39 • Ground-disturbing activities could lead to modification (positive or negative), loss (short-term or
40 long-term), or fragmentation of wildlife habitat and/or loss or gain of individuals, depending on
41 the amount of area disturbed, species affected, and location of the disturbance.

- 1 • The total amount of new surface disturbance allowed by an alternative is a good index of
2 potential impacts to wildlife and fish.
- 3 • Adequate vegetative ground cover and species composition for site stabilization typically would
4 occur within 15 to 20 years in shrub communities and 20 to 25 years in desert communities.
- 5 • In disturbed areas, re-establishment of a vegetative landscape and plant composition similar to
6 adjacent undisturbed lands, including trees and shrubs, could take in excess of 100 years.

7 **4.12.2 Impacts Common to All Alternatives**

8 The following discussions represent impacts to wildlife and fisheries that would not vary by alternative.

9 Oil and gas leasing stipulations to protect migratory birds and their nesting habitats in the planning area
10 would be similar under all alternatives. Alternatives B, C, and D would update the language contained in
11 the existing BLM ROD/RMPs to clarify the requirements for protecting migratory birds and their nesting
12 habitats. However, the on-the-ground management of oil and gas operations to protect migratory birds
13 would not change. Under all alternatives, avoiding surface-disturbing activities in occupied migratory bird
14 habitat during the nesting season would avoid and minimize impacts to migratory bird breeding activities.
15 Impacts such as noise, human presence, and physical destruction of active migratory birds nests and
16 young could result in mortality of migratory birds and nest failure or abandonment. Other wildlife species
17 that use these habitats during these sensitive periods could also be protected from disturbance. Oil and gas
18 exploration and development activities could still occur in migratory bird habitats outside of the nesting
19 season, which could result in the removal and modification of migratory bird habitats and disturbance or
20 displacement of migratory birds during foraging, sheltering, migration, and other activities.

21 Management of the Big Flat Tops ACEC as closed to oil and gas leasing and development would
22 preclude impacts from oil and gas development including surface disturbance; loss of vegetation;
23 introduction and spread of non-native, invasive species and noxious weeds; and other impacts to wildlife
24 habitat present in the ACEC. The ACEC is located on a large bluff that is not accessible to most large
25 mammals. Therefore, this management would benefit species that can access the ACEC, such as
26 migratory birds, raptors, bats, and small non-game species that can scale the cliffs.

27 Controlling noxious weed species; preventing the infestation and spread of invasive species; and
28 developing cooperating agreements with other federal, state, local, and private organizations to control
29 invasive and noxious weed species would reduce the introduction and spread of non-native, invasive
30 species and noxious weeds throughout the planning area. Non-native, invasive species and noxious weeds
31 degrade wildlife habitats, and management actions to prevent their introduction and spread would benefit
32 all wildlife species.

33 Management of threatened and endangered species including Mexican spotted owl, southwestern willow
34 flycatcher, yellow-billed cuckoo, bonytail, Colorado pikeminnow, humpback chub, and razorback sucker
35 would protect riparian and upland vegetation, reduce sedimentation and siltation of streambeds, and
36 support water quality for fish habitat. The prevention of surface disturbance could reduce the potential for
37 the introduction and spread of invasive, non-native plant species, providing additional protection to
38 stream health and fish habitat. Wildlife that use riparian, upland, and wetland habitat that would be
39 protected by these stipulations would benefit from the undisturbed habitat and forage and from the
40 reduced presence of humans and machinery associated with oil and gas exploration and development.
41 Fish that use the same waterways as bonytail, Colorado pikeminnow, humpback chub, and razorback
42 sucker such as speckled dace (*Rhinichthys osculus*), flannelmouth sucker (*Catostomus latipinnis*),
43 bluehead sucker (*Catostomus discobolus*), and roundtail chub (*Gila robusta*) would be protected by the
44 decisions that would avoid and minimize oil and gas activity in these important fish habitats in the
45 planning area.

1 **4.12.3 Impacts from Alternative A (No Action)**

2 Under Alternative A, approximately 399,462 acres would be open to oil and gas leasing subject to
 3 standard terms and conditions, approximately 19,083 acres would be open to oil and gas leasing subject to
 4 CSU/TL stipulations, approximately 33,627 acres would be open to oil and gas leasing subject to an NSO
 5 stipulation, and approximately 220 acres would be closed to oil and gas leasing. Table 4-29 presents the
 6 designated wildlife habitats that would be located in each leasing category under each alternative.

7 **Table 4-29. Wildlife Habitats by Oil and Gas Leasing Category under Alternatives A through D**

Leasing Category	Alternative A (acres)	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)
Mule deer year-long substantial (34,608 acres in the planning area)				
Open	14,911	0	2,262	0
CSU/TL	1,835	291	4,862	4,055
NSO	8,683	10,049	18,306	9,778
Closed	0	15,089	0	11,596
Pronghorn year-long substantial (154,880 acres in the planning area)				
Open	119,267	0	27,240	0
CSU/TL	6,388	43,844	94,078	103,394
NSO	6,991	85,156	11,328	26,073
Closed	0	3,646	0	3,179
Pronghorn Year-long Crucial (264,278 acres in the planning area)				
Open	219,305	0	0	0
CSU/TL	5,591	33,584	218,783	180,522
NSO	8,809	186,485	14,927	40,625
Closed	196	13,833	192	12,754
Bighorn sheep year-long substantial (413 acres in the planning area)				
Open	0	0	0	0
CSU/TL	28	0	0	0
NSO	373	0	402	0
Closed	0	402	0	402
Bighorn sheep year-long crucial (3,684 acres in the planning area)				
Open	320	0	0	0
CSU/TL	20	0	26	29
NSO	3,242	29	3,557	3,554
Closed	1	3,554	0	0

1 Under Alternative A, the BLM estimates that 28 oil and gas wells would be drilled in the planning area
2 over the next 15 years. These wells would result in approximately 541 acres of surface disturbance and
3 impacts to wildlife habitat, of which 86 acres would remain unreclaimed in 15 years. Geophysical survey
4 operations under Alternative A are anticipated to result in 305 acres of surface disturbance and impacts to
5 wildlife habitat, of which approximately 61 acres would be unreclaimed in 15 years. The BMPs that
6 would be applied to oil and gas leases under Alternative A would promote reclamation of surface
7 disturbance to some degree. However, because of the difficulty of reclaiming surface disturbances in the
8 planning area, the areas that are reclaimed would not be anticipated to return to natural conditions until 20
9 to 25 years or more after initial reclamation.

10 Alternative A would be anticipated to result in more oil and gas leasing, exploration, and development
11 activities and associated surface disturbance among the alternatives analyzed in the MLP/EA. As a result,
12 Alternative A would be anticipated to have the greatest impacts to fish and wildlife and their habitats in
13 the planning area. These impacts would include disturbance and displacement of wildlife and loss,
14 degradation, and fragmentation of wildlife habitat. Direct habitat loss or degradation of habitat would
15 force wildlife to relocate to other areas where competition for forage and other habitat resources would
16 increase. Increased competition for resources could lead to decreased health and reproduction and could
17 result in increased predation or mortality. As habitat fragmentation occurs and the density of wells, roads,
18 and facilities increases, habitat in and near well fields would become progressively less effective until
19 most animals no longer use these areas. Animals that remain within the affected zones would be subjected
20 to increased physiological stress. Where development occurs near sensitive habitat for big game, such as
21 winter range or other limited habitat, the health of the populations could be impacted through reduced
22 reproduction or by limiting the availability of valuable forage resources during sensitive timeframes
23 (Sawyer 2002).

24 Under Alternative A, the lease notices for management of raptors and their habitats would be included on
25 oil and gas leases issued by the BLM (see Table 2-9; SSS-12 through SSS-16). The BLM would manage
26 raptors and their habitats as identified in *Best Management Practices for Raptors and Their Associated*
27 *Habitats in Utah* (BLM 2006) and *Utah Field Office Guidelines for Raptor Protection from Human and*
28 *Land use Disturbances* (Romin and Muck 2002). This management would directly benefit raptor species
29 such as red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk (*Buteo regalis*), bald and golden eagles
30 (*Haliaeetus leucocephalus* and *Aquila chrysaetos*), and peregrine falcon (*Falco peregrinus*) and their
31 habitat by reducing disturbing activities and human presence, allowing species to remain in desired
32 habitat for hunting, nesting, and reproduction. Maintaining and enhancing habitat for raptors would
33 directly benefit those species by providing desired nesting and foraging habitat. Other wildlife species
34 would also benefit from spatial buffers and habitat protection from reduced disturbance from humans and
35 development activities, protecting cover, forage, and habitat corridors.

36 Under Alternative A, timing limitations are not identified for crucial pronghorn habitats in the planning
37 area under the management direction in the existing ROD/RMPs. Since the completion of the existing
38 ROD/RMPs in 2008, the Utah Division of Wildlife Resources (UDWR) has mapped substantial and
39 crucial value pronghorn habitat in the planning area. Because the pronghorn habitat was identified after
40 the completion of the ROD/RMPs in 2008, it is likely that the BLM would apply a timing limitation to
41 proposed oil and gas leasing parcels located in crucial pronghorn habitat during site-specific leasing
42 environmental analysis. However, if the TL stipulations were not applied, pronghorn could be disturbed
43 during sensitive calving timeframes. These timeframes are important for successful reproduction and
44 maintenance of healthy herds. Disturbance during these timeframes could result in pronghorn expending
45 energy to move away from oil and gas activity, possibly making calves more susceptible to predation.

46 Under Alternative A, management actions for BLM-sensitive species including white-tailed prairie dog
47 (*Cynomys leucurus*) and the notification of operators that lands may include potential habitat for species
48 on the Utah Sensitive Species List would benefit wildlife in the planning area. In habitats that are
49 occupied by these sensitive species, the BLM would implement management actions such as precluding

1 surface disturbance within 660 feet of occupied white-tailed prairie dog colonies. Other wildlife that use
2 the habitats would also be protected by these stipulations and would benefit from the undisturbed habitat
3 and forage; the reduction in the potential for the introduction and spread of invasive, non-native plant
4 species; and the reduced presence of humans and machinery associated with oil and gas exploration and
5 development.

6 Allowing oil and gas leasing on 399,462 acres subject to standard terms and conditions (open) would
7 result in the damage or removal of wildlife habitat from the development of well pads and associated
8 infrastructure. Invasive, non-native plant species could be introduced and spread by vehicles and
9 machinery during development activities, which could change habitat composition and function, reducing
10 forage quality and usable habitat for wildlife species. Runoff from development could lead to streambank
11 erosion, vegetation loss, sedimentation of streambeds, and stream channel alteration, which would reduce
12 the quality of habitat for fish and aquatic species. Direct mortality of wildlife could occur as a result of
13 damage to burrows or nests and collisions with oil and gas equipment and traffic. Displacement of
14 wildlife from occupied habitats would likely occur as a result of equipment noise and human presence
15 associated with oil and gas exploration and development. The largest areas of vegetation within the areas
16 open to oil and gas leasing subject to standard terms and conditions that could be developed would be
17 Colorado Plateau Blackbrush-Mormon-Tea Shrubland (184,190 acres) and Inter-Mountain Basins Active
18 and Stabilized Dune (87,439 acres), although all vegetation types present in the planning area would have
19 some areas open to oil and gas leasing (Table 4-10). These vegetation types provide habitat for fish and
20 wildlife described in Chapter 3, including upland game, migratory birds, raptors, reptiles, amphibians,
21 other non-game species, and native pollinators.

22 Applying CSU/TL stipulations in Alternative A to oil and gas leasing could reduce loss, damage, or
23 degradation of fish and wildlife habitat within 19,083 acres. Under Alternative A, there are no specific TL
24 stipulations that would be applied to fish or wildlife habitats that have not been discussed as common to
25 all alternatives (e.g., migratory bird TL stipulations). The TL stipulations applied to migratory birds could
26 prevent surface disturbance during specific timeframes, which could protect fish and wildlife during the
27 periods of closure from disruption or disturbance from humans or machinery. Adjusting the timing of
28 disturbance could allow wildlife to remain in desired habitat during sensitive timeframes and within
29 important habitat. Disturbance, damage, or loss of habitat could occur outside of the seasonal closures,
30 ultimately leading to some loss of habitat from oil and gas development. The CSU stipulations could
31 reduce disturbance to steep slopes, areas within the Dirty Devil/Robbers Roost SRMA, and VRM Class II
32 areas, minimizing surface disturbance, habitat loss or damage, erosion, runoff, and the introduction and
33 spread of invasive, non-native plant species. The largest areas of vegetation within the areas subject to
34 CSU/TL stipulations would be Colorado Plateau Blackbrush-Mormon-Tea Shrubland (7,983 acres) and
35 Inter-Mountain Basins Mat Saltbush Shrubland (4,134 acres), although most vegetation types present in
36 the planning area would have some areas managed subject to CSU/TL stipulations (Table 4-10). These
37 vegetation types provide habitat for fish and wildlife described in Chapter 3, including upland game,
38 migratory birds, raptors, reptiles, amphibians, other non-game species, and native pollinators, which
39 would receive some reduction in surface disturbance or disruption from this management.

40 Applying an NSO stipulation in Alternative A for oil and gas leasing would prevent surface-disturbing
41 activities from oil and gas leasing development within the 33,627 acres. The NSO stipulation could
42 protect wildlife habitat from damage, removal, or degradation; reduce the presence of infrastructure,
43 humans, and machinery; and reduce habitat fragmentation. Removing future disturbance from roads,
44 structures, drilling operations, and human disturbance from mineral development could reduce most
45 stressors and disruption of habitat and could allow for continued habitat connectivity. The NSO
46 stipulations under Alternative A would be applied for portions of the Dirty Devil/Robbers Roost SRMA;
47 the Dry Lake Archaeological District ACEC; the Tidwell Draw ACEC; the Green River suitable segment
48 from the confluence of the San Rafael River to Canyonlands National Park; steep slopes; and areas within
49 330 feet of springs, floodplains, perennial and intermittent streams, streams with perennial reaches, and

1 riparian areas springs. These NSO stipulations could prevent future habitat fragmentation and barriers in
2 migration corridors for big game and other migratory wildlife species, allowing wildlife to move between
3 crucial winter ranges, fawning/calving/birthing area, and breeding or nesting habitat, and providing
4 overall habitat protection. The prevention of surface disturbance would reduce the potential for the
5 introduction and spread of invasive, non-native plant species, supporting intact habitat and desired forage
6 and cover for wildlife. The largest areas of vegetation within the areas subject to an NSO stipulation
7 would be Colorado Plateau Blackbrush-Mormon-Tea Shrubland (11,120 acres) and Inter-Mountain
8 Basins Active and Stabilized Dune (9,169 acres), although most vegetation types present in the planning
9 area would have some areas managed subject to NSO stipulations (Table 4-10). Of particular note, the
10 NSO stipulations would apply to riparian and aquatic habitats, including those along the San Rafael and
11 Green Rivers. These habitats support all of the fisheries in the planning area and provide important water
12 sources and riparian breeding, foraging, nesting, and sheltering habitat for many wildlife species. The
13 NSO stipulation could prevent soil loss, erosion, or sedimentation of streambeds, and could support water
14 quality and provide protection of habitat for fisheries and other aquatic species.

15 Under Alternative A, the BLM would allow some exceptions, modifications, or waivers for NSO
16 stipulations (e.g., in SRMAs where oil and gas exploration and development would not impair identified
17 scenic and primitive or semi-primitive recreational resources, or on steep slopes a more detailed analysis
18 is conducted and shows that impacts can be mitigated). Granting exceptions, modifications, or waivers to
19 NSO stipulations would allow for impacts to fish and wildlife and their habitats from oil and gas
20 development in areas where NSO stipulations are applied. These impacts would be similar to the impacts
21 to fish and wildlife and their habitats that would occur in areas that are open to oil and gas leasing subject
22 to standard terms and conditions.

23 Under Alternative A, the BLM would allow geophysical operations on lands closed to leasing or subject
24 to NSO stipulations under certain circumstances in the Richfield Field Office and would be allowed
25 consistent with existing regulations for geophysical exploration in the Price Field Office. Allowing
26 geophysical operations in areas closed to mineral leasing or subject to NSO stipulations would allow for
27 impacts to fish and wildlife and their habitats similar to the types of impacts to these resources that would
28 occur in areas that are open to oil and gas leasing subject to standard terms and conditions. These impacts
29 would be allowed in areas where impacts from oil and gas drilling and production would be precluded by
30 the application of NSO stipulations or closing the areas to leasing. Because less surface disturbance is
31 anticipated from geophysical operations than from oil and gas drilling, the magnitude of the impacts from
32 geophysical operations would be anticipated to be less than the impacts from oil and gas exploration and
33 production.

34 BMPs that would be applied to oil and gas development under Alternative A would help reduce impacts
35 to fish and wildlife and their habitats where development does occur. Measures such as interim
36 reclamation of well sites and access roads, completion of final reclamation and revegetation activities,
37 raptor perch avoidance devices on powerlines, drilling multiple wells from a single well pad where
38 feasible, noise reduction techniques, and monitoring of wildlife to evaluate the effects of oil and gas
39 development would help avoid and minimize impacts to fish and wildlife including habitat loss and
40 fragmentation, displacement and disturbance, and accidental mortality. Even with these stipulations and
41 BMPs, it is anticipated that impacts to fish and wildlife and their habitats would occur under Alternative
42 A. Additionally, reclamation of some disturbances and reestablishment of vegetation on areas disturbed
43 by oil and gas activities would be difficult and would take 20 to 25 years or more under Alternative A.

44 ***4.12.3.1 Suspended and Protested Lease Decisions***

45 Under Alternative A, 45,043 acres of the suspended and protested leases would be issued subject to
46 standard terms and conditions, and 113 acres of protested leases would be issued subject to NSO
47 stipulations. The areas encompassed by the suspended and protested leases contain pronghorn crucial and
48 substantial value year-long habitat, as well as other habitats for upland game, migratory birds, raptors,

1 reptiles, amphibians, other non-game species, and native pollinators described in Chapter 3. If the leases
2 were subsequently developed, the impacts to these resources from issuing the leases subject to the terms
3 and conditions contained within the Price and Richfield ROD/RMPs (Alternative A-2) would be the same
4 as the impacts to those resources from managing them as open or NSO described in this section. If the
5 BLM were to rescind the suspensions on the suspended leases (Alternative A-1) and the leases were
6 subsequently developed, the impacts to fish and wildlife and their habitats that would occur in the leased
7 areas could be the same as those described for managing fish and wildlife habitats as open to leasing
8 subject to standard terms and conditions. Under both Alternatives A-1 and A-2, if a lessee proposes to
9 develop these leases (e.g., drill a well), the BLM would evaluate the lessee's proposal in a site-specific
10 environmental review. If during the site-specific environmental review process the BLM determines that
11 additional mitigation measures are required to protect resources of concern, those mitigation measures
12 would be included as conditions of approval to future site-specific authorizations (e.g., application of
13 appropriate BMPs).

14 **4.12.4 Impacts from Alternative B**

15 Under Alternative B, 0 acre would be open to oil and gas leasing subject to standard terms and conditions,
16 approximately 98,164 acres would be open to oil and gas leasing subject to CSU/TL stipulations,
17 approximately 324,161 acres would be open to oil and gas leasing subject to an NSO stipulation, and
18 approximately 30,068 acres would be closed to oil and gas leasing. Table 4-29 presents the designated
19 wildlife habitats that would be located in each leasing category under each alternative.

20 Under Alternative B, the BLM estimates that seven oil and gas wells would be drilled in the planning area
21 over the next 15 years. These wells would result in approximately 127 acres of surface disturbance and
22 impacts to fish and wildlife habitat, of which 20 acres would remain unreclaimed in 15 years.
23 Geophysical survey operations under Alternative B are anticipated to result in 72 acres of surface
24 disturbance and impacts to fish and wildlife habitat, of which approximately 14 acres would be
25 unreclaimed in 15 years. The BMPs that would be applied to oil and gas leases under Alternative B would
26 promote more rapid and successful reclamation of surface disturbance compared to Alternative A by
27 setting site-specific reclamation planning and implementation standards and implementing state-of-the-art
28 reclamation practices. However, because of the difficulty of reclaiming surface disturbances in the
29 planning area, some reclaimed areas would not be anticipated to return to natural conditions until up to 20
30 to 25 years after initial reclamation.

31 Alternative B would be anticipated to result in the fewest oil and gas leasing, exploration, and
32 development activities and the least associated surface disturbance among the alternatives analyzed in the
33 MLP/EA. As a result, Alternative B would be anticipated to have the fewest impacts to fish and wildlife
34 and their habitats in the planning area. The types of impacts to fish and wildlife and their habitats under
35 Alternative B would be the same as would occur under Alternative A, but of a different magnitude. The
36 impacts would include disturbance and displacement of wildlife and loss, degradation, and fragmentation
37 of wildlife habitat. Direct habitat loss or degradation of habitat would force wildlife to relocate to other
38 areas where competition for forage and other habitat resources would increase. Increased competition for
39 resources could lead to decreased health and reproduction and could result in increased predation or
40 mortality. As habitat fragmentation occurs and the density of wells, roads, and facilities increases, habitat
41 within and near well fields would become progressively less effective until most animals no longer use
42 these areas. Animals that remain within the affected zones would be subjected to increased physiological
43 stress. Where development occurs near sensitive habitat for big game, such as winter range or other
44 limited habitat, the health of the populations could be impacted through reduced reproduction or by
45 limiting the availability of valuable forage resources during sensitive timeframes (Sawyer 2002).

46 Under Alternative B, the BLM would apply seasonal restrictions (TL) and spatial buffers (CSU) on all
47 known raptor nests in accordance with *Utah Field Office Guidelines for Raptor Protection from Human
48 and Land use Disturbances* (Romin and Muck 2002). This management would provide similar benefits to

1 raptors and their habitats as the lease notices that would be applied under Alternative A. These benefits
2 include reducing disturbing activities and human presence around sensitive nesting locations, which
3 allows species to remain in desired habitat for hunting, nesting, and reproduction. However, some impacts
4 to raptor habitats could still occur outside areas managed subject to TL/CSU stipulations. In addition,
5 under Alternative B, operators would be required to mitigate unavoidable impacts to raptors and their
6 habitats. The amount and type of mitigation would be based on losses in habitat value. Mitigation of
7 unavoidable impacts to raptor habitats would benefit raptors by ensuring the presence and effectiveness of
8 habitat features important for nesting, foraging, sheltering, and other important raptor life functions are
9 not degraded by oil and gas activity in the planning area. Because many other species also use similar
10 habitats as raptors, the mitigation and management of raptors and their habitats under Alternative B would
11 also benefit other species in the same manner.

12 The BLM would apply a TL stipulation restricting surface-disturbing activities in crucial pronghorn
13 habitat from May 15 through June 15 under Alternative B. These timeframes are important for successful
14 reproduction and maintenance of healthy pronghorn herds. Disturbance during these timeframes could
15 result in pronghorn expending energy to move away from oil and gas activity, possibly making calves
16 more susceptible to predation. Applying a TL stipulation would prevent disturbance to pronghorn from oil
17 and gas operations during these sensitive time periods. Under Alternative B, the BLM would also apply a
18 lease notice to inform the lessee or operator that compensatory mitigation may be required for all
19 disturbances in crucial pronghorn habitat. Mitigation should be planned to offset the loss of habitat
20 directly and indirectly affected by oil and gas operations. This lease notice would help avoid, minimize,
21 and reduce over time the impacts of oil and gas activities on pronghorn habitats that occur outside of the
22 sensitive calving period. These habitat impacts can include loss, degradation, and fragmentation of
23 habitat, introduction and spread of noxious weeds, and avoidance of habitats as a result of noise and
24 human presence, which can result in a reduction of carrying capacity and reduced pronghorn populations.
25 Mitigation that could be required under Alternative B includes development of water sources, vegetation
26 enhancement, habitat restoration and reclamation, and fencing upgrades. These mitigation efforts would
27 provide similar benefits to other fish and wildlife species that use habitats similar to pronghorn in the
28 planning area.

29 Under Alternative B, management actions for BLM-sensitive species including white-tailed prairie dog
30 and kit fox (*Vulpes macrotis*) would benefit other wildlife species in the planning area. In habitats that are
31 occupied by these sensitive species, the BLM would implement management actions such as precluding
32 surface disturbance within 660 feet of occupied white-tailed prairie dog colonies and kit fox dens. Other
33 wildlife that use the habitats would also be protected by these stipulations and would benefit from the
34 undisturbed habitat and forage; the reduction in the potential for the introduction and spread of invasive,
35 non-native plant species; and the reduced presence of humans and machinery associated with oil and gas
36 exploration and development.

37 Applying CSU/TL stipulations in Alternative B to oil and gas leasing could reduce loss, damage, or
38 degradation of fish and wildlife habitat within 98,164 acres. Under Alternative B, the TL stipulations
39 applied for pronghorn and saline soils in the Mancos Shale would prevent surface disturbance during
40 specific timeframes, which could protect fish and wildlife during the periods of closure from disruption or
41 disturbance from humans or machinery. Adjusting timing of disturbance could allow wildlife to remain in
42 desired habitat during sensitive timeframes and within important habitat. Disturbance, damage, or loss of
43 habitat could occur outside of the seasonal closures, ultimately leading to some loss of habitat from oil
44 and gas development. The CSU stipulations applied under Alternative B could reduce disturbance to steep
45 slopes, PFYC 4 and 5 areas, and areas characterized by fine sandy soils with high wind erosion potential.
46 These measures would minimize surface disturbance; habitat loss or damage; erosion; runoff; and the
47 introduction and spread of invasive, non-native plant species. Alternative B would also include CSU
48 stipulations that could reduce the effects of noise, including displacement from otherwise suitable
49 habitats, on wildlife throughout the planning area. The largest areas of vegetation within the areas subject

1 to CSU/TL stipulations would be Colorado Plateau Blackbrush-Mormon-Tea Shrubland (43,214 acres)
2 and Inter-Mountain Basins Active and Stabilized Dune (17,577 acres), although most vegetation types
3 present in the planning area would have some areas managed with CSU/TL stipulations (Table 4-11).
4 These vegetation types provide habitat for fish and wildlife described in Chapter 3, including upland
5 game, migratory birds, raptors, reptiles, amphibians, other non-game species, and native pollinators,
6 which would receive some reduction in surface disturbance or disruption from this management.

7 Under Alternative B, applying an NSO stipulation or closing areas to oil and gas leasing would prevent
8 surface-disturbing activities from oil and gas leasing development within 354,229 acres. The NSO and
9 closed stipulations could protect wildlife habitat from damage, removal, or degradation; reduce the
10 presence of infrastructure, humans, and machinery; and reduce habitat fragmentation. Removing future
11 disturbance from roads, structures, drilling operations, and human disturbance from mineral development
12 could reduce most stressors and disruption of habitat and could allow for continued habitat connectivity.
13 The NSO stipulations under Alternative B would be applied for all lands identified by the BLM as having
14 wilderness characteristics during the 2016 wilderness characteristics inventory; the Labyrinth Canyon and
15 Dirty Devil/Robbers Roost SRMAs; recreation focus areas; lands within 3 miles of key observation
16 points; lands within 3 miles of priority travel corridors; the Dry Lake Archeological District and Tidwell
17 Draw ACECs; lands within 3 miles of the Old Spanish Trail; steep slopes; public water reserves; 100-year
18 floodplains and within 660 feet of intermittent and perennial streams, rivers, riparian areas, wetlands,
19 water wells, and springs within 100 feet of ephemeral streams; and areas designated as VRM Class II and
20 inventoried as VRI Class II. Areas closed to oil and gas leasing would include the Dirty Devil/French
21 Springs and Horseshoe Canyon South non-WSA lands with wilderness characteristics, the Three Rivers
22 locatable mineral withdrawal, all lands within 1 mile of the Green River Labyrinth Canyon rim, all lands
23 within 1 mile of the Horseshoe Canyon rim, and the Green River suitable segment from the confluence of
24 the San Rafael River to Canyonlands National Park.

25 The NSO stipulations and decisions to close areas to oil and gas leasing under Alternative B could
26 prevent future habitat fragmentation and barriers in migration corridors for big game and other migratory
27 wildlife species, allowing wildlife to move between crucial winter ranges, fawning/calving/birthing area,
28 and breeding or nesting habitat, and providing overall habitat protection. The prevention of surface
29 disturbance would reduce the potential for the introduction and spread of invasive, non-native plant
30 species, supporting intact habitat and desired forage and cover for wildlife. The largest areas of vegetation
31 within the areas subject to an NSO stipulation and areas closed to leasing would be Colorado Plateau
32 Blackbrush-Mormon-Tea Shrubland (148,063 acres NSO and 12,031 acres closed) and Inter-Mountain
33 Basins Active and Stabilized Dune (77,023 acres NSO and 4,064 acres closed), although most vegetation
34 types present in the planning area would have some areas managed subject to NSO stipulations or
35 managed as closed (Table 4-11). Of particular note, the NSO stipulations would apply to riparian and
36 aquatic habitats, including those along the San Rafael and Green Rivers, and large areas of the Green
37 River would be closed to leasing. These habitats support all of the fisheries in the planning area and
38 provide important water sources and riparian breeding, foraging, nesting, and sheltering habitat for many
39 wildlife species. The NSO stipulations under Alternative B would provide a larger area of protection
40 around these sensitive aquatic and riparian habitats compared to Alternative A. The NSO stipulations and
41 closed areas could prevent soil loss, erosion, or sedimentation of streambeds, and could support water
42 quality and provide protection of habitat for fisheries and other aquatic species.

43 Under Alternative B, the BLM would not allow exceptions, modifications, or waivers to most NSO
44 stipulations. Not allowing exceptions, modifications, or waivers would reduce impacts to fish and wildlife
45 and their habitats in areas that would be subject to NSO stipulations compared to Alternative A, which
46 would allow more exceptions, modifications, or waivers.

47 Under Alternative B, geophysical operations would not be permitted in areas closed to leasing, and only
48 heliport geophysical operations would be allowed in areas that are managed subject to NSO stipulations.
49 This management of geophysical operations would provide better protection for fish and wildlife and their

1 habitats in areas managed as closed to oil and gas leasing or open subject to NSO stipulations, including
2 prevention of surface disturbance; damage or removal of vegetation; and introduction and spread of
3 invasive, non-native plant species and noxious weeds compared to Alternative A. Similar to Alternative
4 A, the magnitude of the impacts from geophysical operations would be anticipated to be less than the
5 impacts from oil and gas exploration and production because less surface disturbance is anticipated from
6 geophysical operations than from oil and gas drilling.

7 Under Alternative B, only native plant species would be used when restoring or rehabilitating disturbed
8 areas, and the BMPs that are currently used for oil and gas leases in the planning area would be updated
9 to include additional state-of-the-art BMPs. Compared to Alternative A, these BMPs include measures
10 that would reduce impacts to fish and wildlife and their habitats from oil and gas development, including
11 measures to protect soil and water resources; improve reclamation success; prevent the spread of noxious
12 weeds and invasive species; mitigate unavoidable impacts on wildlife habitats; and exclude wildlife from
13 hazardous areas including open pits, tanks, and trenches. These BMPs would reduce the impacts of oil
14 and gas development to fish and wildlife and their habitats by minimizing the area of disturbed land,
15 avoiding impacts from known oil and gas development that are hazardous on wildlife (e.g., produced
16 water ponds), promoting improved reclamation planning and practices, and compensating for unavoidable
17 loss of habitat values. The revised BMPs would also reduce the introduction and spread of non-native,
18 invasive plant species and noxious weeds compared to Alternative A by improving equipment cleaning,
19 and coordination, planning, and executing noxious weed prevention measures. Compared to Alternative
20 A, these BMPs would reduce the time required to reestablish vegetation on areas disturbed by oil and gas
21 activities and promote a more rapid return to functioning wildlife habitat in disturbed areas.

22 **4.12.4.1 *Suspended and Protested Lease Decisions***

23 Under Alternative B, the BLM would cancel all suspended leases and resolve the protests on the protested
24 leases and deny the leases. The fish and wildlife and their habitats that occupy the areas of suspended and
25 protested leases would not be affected by oil and gas activities resulting from operators exploring for and
26 developing oil and gas resources. Current trends in fish and wildlife populations and habitat conditions
27 would be anticipated to continue for the foreseeable future.

28 **4.12.5 Impacts from Alternative C**

29 Under Alternative C, approximately 37,865 acres would be open to oil and gas leasing subject to standard
30 terms and conditions, approximately 362,127 acres would be open to oil and gas leasing subject to
31 CSU/TL stipulations, approximately 52,208 acres would be open to oil and gas leasing subject to an NSO
32 stipulation, and approximately 192 acres would be closed to oil and gas leasing. Table 4-29 presents the
33 designated wildlife habitats that would be located in each leasing category under each alternative.

34 Under Alternative C, the BLM estimates that 27 oil and gas wells would be drilled in the planning area
35 over the next 15 years. These wells would result in approximately 517 acres of surface disturbance and
36 impacts to fish and wildlife habitat, of which 82 acres would remain unreclaimed in 15 years.
37 Geophysical survey operations under Alternative C are anticipated to result in 292 acres of surface
38 disturbance and impacts to fish and wildlife habitat, of which approximately 58 acres would be
39 unreclaimed in 15 years. The BMPs that would be applied to oil and gas leases under Alternative C would
40 promote more rapid and successful reclamation of surface disturbance compared to Alternative A by
41 setting site-specific reclamation planning and implementation standards and implementing state-of-the-art
42 reclamation practices. However, because of the difficulty of reclaiming surface disturbances in the
43 planning area, some reclaimed areas would not be anticipated to return to natural conditions until up to 20
44 to 25 years after initial reclamation

1 Alternative C would result in slightly fewer oil and gas leasing, exploration, and development activities
2 and less associated surface disturbance over the next 15 years in the planning area compared to
3 Alternative A. As a result, Alternative C would have slightly fewer overall impacts to fish and wildlife
4 and their habitats compared to Alternative A, and substantially more impacts on these resources compared
5 to Alternative B. The types of impacts to fish and wildlife and their habitats under Alternative C would be
6 the same as those that would occur under Alternatives A and B, but of a different magnitude.

7 Under Alternative C, the BLM would apply the same seasonal restrictions (TL) and spatial buffers (CSU)
8 on known raptor nests, crucial pronghorn habitats, and BLM-sensitive species including white-tailed
9 prairie dog and kit fox as would be applied under Alternative B. Therefore, the impacts and benefits of
10 applying these stipulations on fish and wildlife and their habitats in the planning area would be the same
11 as those described for these management actions under Alternative B.

12 Allowing oil and gas leasing on 37,865 acres subject to standard terms and conditions (open) would result
13 in the damage or removal of wildlife habitat from the development of well pads and associated
14 infrastructure. Invasive, non-native plant species could be introduced and spread by vehicles and
15 machinery during development activities, which could change habitat composition and function, reducing
16 forage quality and usable habitat for wildlife species. Runoff from development could lead to streambank
17 erosion, vegetation loss, sedimentation of streambeds, and stream channel alteration, which would reduce
18 the quality of habitat for fish and aquatic species. Direct mortality of wildlife could occur as a result of
19 damage to burrows or nests and collisions with oil and gas equipment and traffic. Displacement of
20 wildlife from occupied habitats would likely occur as a result of equipment noise and human presence
21 associated with oil and gas exploration and development. The largest areas of vegetation within the areas
22 open to oil and gas leasing subject to standard terms and conditions that could be developed would be
23 Colorado Plateau Blackbrush-Mormon-Tea Shrubland (11,951 acres) and Inter-Mountain Basins Active
24 and Stabilized Dune (15,002 acres), although most vegetation types present in the planning area would
25 have some areas open (Table 4-12). These vegetation types provide habitat for fish and wildlife described
26 in Chapter 3, including upland game, migratory birds, raptors, reptiles, amphibians, other non-game
27 species, and native pollinators.

28 Applying CSU/TL stipulations in Alternative C to oil and gas leasing could reduce loss, damage, or
29 degradation of fish and wildlife habitat within 362,127 acres. Under Alternative C, the TL stipulations
30 applied for pronghorn and saline soils in the Mancos Shale would prevent surface disturbance during
31 specific timeframes, which could protect fish and wildlife during the periods of closure from disruption or
32 disturbance from humans or machinery. Adjusting timing of disturbance could allow wildlife to remain in
33 desired habitat during sensitive timeframes and within important habitat. Disturbance, damage, or loss of
34 habitat could occur outside of the seasonal closures, ultimately leading to some loss of habitat from oil
35 and gas development. The CSU stipulations applied under Alternative C could reduce disturbance to steep
36 slopes, PFYC 4 and 5 areas, areas characterized by fine sandy soils with high wind erosion potential,
37 lands identified as having wilderness characteristics in the Labyrinth Canyon unit, the Labyrinth Canyon
38 SRMA, portions of Dirty Devil/Robbers Roost SRMA, recreation focus areas, the Tidwell Draw site in
39 the Uranium Mining District, the Old Spanish Trail to high potential sites and route segments, and in
40 areas designated as VRM Class II. These measures would minimize surface disturbance, habitat loss or
41 damage, erosion, runoff, and the introduction and spread of invasive, non-native plant species. Alternative
42 C would also include CSU stipulations that could reduce the effects of noise, including displacement from
43 otherwise suitable habitats, on wildlife throughout the planning area. However, these stipulations that
44 would reduce the effects of noise on wildlife would be somewhat less protective in areas further away
45 from the Horseshoe Canyon Unit of Canyonlands National Park compared to Alternative B.

1 Alternative C contains some CSU stipulations that would limit the density of oil and gas development. As
2 densities of wells, roads, and facilities increase in wildlife habitat, habitat within and near well fields
3 become progressively less effective at providing for the breeding, feedings, and sheltering needs of
4 wildlife until most animals no longer use these areas (Sawyer 2002). Therefore, CSU stipulations that
5 limit oil and gas development density could benefit fish and wildlife and their habitats to a greater degree
6 than other CSU stipulations applied under Alternative C by reducing the intensity and extent of
7 disturbance to wildlife habitats, reducing displacement of wildlife, and maintaining habitat effectiveness.
8 The largest areas of vegetation within the areas subject to CSU/TL stipulations would be Colorado
9 Plateau Blackbrush-Mormon-Tea Shrubland (173,117 acres) and Inter-Mountain Basins Active and
10 Stabilized Dune (72,842 acres), although most vegetation types present in the planning area would have
11 some areas managed subject to CSU/TL stipulations (Table 4-12). These vegetation types provide habitat
12 for fish and wildlife described in Chapter 3, including upland game, migratory birds, raptors, reptiles,
13 amphibians, other non-game species, and native pollinators, which would receive some reduction in
14 surface disturbance or disruption from this management.

15 Under Alternative C, applying an NSO stipulation or closing areas to oil and gas leasing would prevent
16 surface-disturbing activities from oil and gas leasing development within 52,400 acres. The NSO and
17 closed stipulations could protect wildlife habitat from damage, removal, or degradation; reduce the
18 presence of infrastructure, humans, and machinery; and reduce habitat fragmentation. Removing future
19 disturbance from roads, structures, drilling operations, and human disturbance from mineral development
20 could reduce most stressors and disruption of habitat and could allow for continued habitat connectivity.
21 The NSO stipulations under Alternative C would be applied for Dirty Devil/French Springs and
22 Horseshoe Canyon South non-WSA lands with wilderness characteristics; the Three Rivers locatable
23 mineral withdrawal; portions of Dirty Devil/Robbers Roost SRMA; all lands within 1 mile of the Green
24 River Labyrinth Canyon rim; all lands within 1 mile of Horseshoe Canyon rim; all lands within 1 mile of
25 key observation points; the Green River suitable segment from the confluence of the San Rafael River to
26 Canyonlands National Park; steep slopes; within public water reserves; within 100-year floodplains;
27 within 330 feet of intermittent and perennial streams, rivers, riparian areas, wetlands, water wells, and
28 springs; and within 100 feet of ephemeral streams. Areas closed to oil and gas leasing would include the
29 Big Flat Tops ACEC.

30 The NSO stipulations and decisions to close areas to oil and gas leasing under Alternative C could
31 prevent future habitat fragmentation and barriers in migration corridors for big game and other migratory
32 wildlife species, allowing wildlife to move between crucial winter ranges, fawning/calving/birthing area,
33 and breeding or nesting habitat, and providing overall habitat protection. The prevention of surface
34 disturbance would reduce the potential for the introduction and spread of invasive, non-native plant
35 species, supporting intact habitat and desired forage and cover for wildlife. The largest areas of vegetation
36 within the areas subject to an NSO stipulation and areas closed to leasing would be Colorado Plateau
37 Blackbrush-Mormon-Tea Shrubland (18,240 acres NSO) and Inter-Mountain Basins Active and
38 Stabilized Dune (10,820 acres NSO), although most vegetation types present in the planning area would
39 have some areas managed subject to NSO stipulations or managed as closed (Table 4-12). Of particular
40 note, the NSO stipulations would apply to riparian and aquatic habitats, including those along the San
41 Rafael and Green Rivers. These habitats support all of the fisheries in the planning area and provide
42 important water sources and riparian breeding, foraging, nesting, and sheltering habitat for many wildlife
43 species. The NSO stipulations under Alternative C would provide a smaller area of protection around
44 these sensitive aquatic and riparian habitats compared to Alternative B. Similar to Alternative B, NSO
45 stipulations would be applied for ephemeral streams under Alternative C, which are not applied under
46 Alternative A. The NSO stipulation for ephemeral streams would protect important desert washes that
47 provide important wildlife habitat and affect water quality in downstream perennial waters. The NSO
48 stipulations and closed areas could prevent soil loss, erosion, or sedimentation of streambeds, and could
49 support water quality and provide protection of habitat for fisheries and other aquatic species.

1 Under Alternative C, the BLM would allow exceptions, modifications, or waivers to some of the NSO
2 stipulations; however, fewer exceptions, modifications, or waivers would be granted compared to
3 Alternative A. Allowing fewer exceptions, modifications, or waivers would reduce impacts to fish and
4 wildlife and their habitats in areas that would be subject to NSO stipulations compared to Alternative A,
5 which would allow more exceptions, modifications, or waivers.

6 Under Alternative C, geophysical operations would not be permitted in areas closed to leasing and would
7 be allowed in areas that are managed subject to NSO stipulations, though no new road construction or
8 improvements would be permitted, and the BLM would require full reclamation of all surface
9 disturbance. This management of geophysical operations would provide better protection for fish and
10 wildlife and their habitats in areas managed as closed to oil and gas leasing or open subject to NSO
11 stipulations, including prevention of surface disturbance and associated wildlife displacement; prevention
12 of habitat loss and degradation damage; improved reclamation practices; and reduced likelihood of
13 introduction and spread of invasive, non-native plant species and noxious weeds compared to Alternative
14 A. Similar to Alternative A, the magnitude of the impacts from geophysical operations would be
15 anticipated to be less than the impacts from oil and gas exploration and production because less surface
16 disturbance is anticipated from geophysical operations than from oil and gas drilling.

17 Similar to Alternative B, under Alternative C, the BMPs that are currently used for oil and gas leases in
18 the planning area would be updated to include additional state-of-the-art BMPs. The benefits to fish and
19 wildlife and their habitats in the planning area from updating the BMPs under Alternative C would be the
20 same as those described under Alternative B.

21 **4.12.5.1 *Suspended and Protested Lease Decisions***

22 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
23 standard terms, 39,766 acres would be issued subject to CSU/TL stipulations, and 318 acres would be
24 issued subject to NSO stipulations. The areas encompassed by the suspended and protested leases contain
25 pronghorn crucial and substantial value year-long habitat, as well as other habitats for upland game,
26 migratory birds, raptors, reptiles, amphibians, other non-game species, and native pollinators described in
27 Chapter 3. If the leases were subsequently developed, the impacts of modifying the terms and conditions
28 of the suspended and protested leases and issuing the leases consistent with Alternative C would be the
29 same as the impacts to those resources from managing them as open to leasing subject to standard terms
30 and conditions, open to leasing subject to CSU/TL stipulations, or open to leasing subject to NSO
31 stipulations described in this section. Under Alternative C, portions of protested leases would be issued
32 with stipulations that would limit oil and gas development density to no greater than one well pad per 160
33 acres. Compared to Alternative A, which would also issue the leases subject to varying stipulations,
34 issuing the suspended and protested leases with these stipulations could reduce the intensity and extent of
35 disturbance to wildlife habitats that could occur if the leases were subsequently developed, reducing
36 displacement of wildlife and maintaining habitat effectiveness.

37 **4.12.6 Impacts from Alternative D**

38 Under Alternative D, 0 acre would be open to oil and gas leasing subject to standard terms and conditions,
39 approximately 339,884 acres would be open to oil and gas leasing subject to CSU/TL stipulations,
40 approximately 92,170 acres would be open to oil and gas leasing subject to an NSO stipulation, and
41 approximately 20,339 acres would be closed to oil and gas leasing. Table 4-29 presents the designated
42 wildlife habitats that would be located in each leasing category under each alternative.

43 Under Alternative D, the BLM estimates that 23 oil and gas wells would be drilled in the planning area
44 over the next 15 years. These wells would result in approximately 440 acres of surface disturbance and
45 impacts to fish and wildlife habitat, of which 70 acres would remain unreclaimed in 15 years.
46 Geophysical survey operations under Alternative C would result in 248 acres of surface disturbance and

1 impacts to fish and wildlife habitat, of which approximately 50 acres would be unreclaimed in 15 years.
2 The BMPs that would be applied to oil and gas leases under Alternative D would promote more rapid and
3 successful reclamation of surface disturbance compared to Alternative A by setting site-specific
4 reclamation planning and implementation standards and implementing state-of-the-art reclamation
5 practices. However, because of the difficulty of reclaiming surface disturbances in the planning area,
6 some reclaimed areas would not be anticipated to return to natural conditions until up to 20 to 25 years
7 after initial reclamation.

8 Alternative D would be anticipated to result in slightly fewer oil and gas leasing, exploration, and
9 development activities and less associated surface disturbance over the next 15 years in the planning area
10 compared to Alternatives A and C. As a result, Alternative D would be anticipated to have slightly fewer
11 overall impacts on fish and wildlife and their habitats compared to Alternatives A and C, and substantially
12 fewer impacts to these resources compared to Alternative B. The types of impacts to fish and wildlife and
13 their habitats under Alternative D would be the same as those that would occur under Alternatives A, B,
14 and C but of a different magnitude.

15 Under Alternative D, the BLM would apply the same seasonal restrictions (TL) and spatial buffers (CSU)
16 on known raptor nests, crucial pronghorn habitats, and white-tailed prairie dog and kit fox as would be
17 applied under Alternatives B and C. Therefore, the impacts and benefits of applying these stipulations on
18 fish and wildlife and their habitats would be the same as those described for the management actions
19 under Alternatives B and C.

20 Applying CSU/TL stipulations in Alternative D to oil and gas leasing could reduce loss, damage, or
21 degradation of fish and wildlife habitat within 339,884 acres. Under Alternative D, the TL stipulations
22 applied for pronghorn and saline soils in the Mancos Shale would prevent surface disturbance during
23 specific timeframes, which could protect fish and wildlife during the periods of closure from disruption or
24 disturbance from humans or machinery. Adjusting timing of disturbance could allow wildlife to remain in
25 desired habitat during sensitive timeframes and within important habitat. Disturbance, damage or loss of
26 habitat could occur outside of the seasonal closures, ultimately leading to some loss of habitat from oil
27 and gas development. The CSU stipulations applied under Alternative D could reduce disturbance to
28 steep slopes, PFYC 4 and 5 areas, areas characterized by fine sandy soils with high wind erosion
29 potential, lands identified by BLM as having wilderness characteristics during the 2016 wilderness
30 characteristics inventory with the exception of the Labyrinth Canyon unit, portions of Dirty
31 Devil/Robbers Roost SRMA, the Cone and Cottonwood Wash recreation focus areas, all lands between 1
32 – 3 miles of the key observation points and travel corridors, all lands within 1-3 miles from high potential
33 sites and route segments along the Old Spanish Trail, and areas inventoried as VRI Class II or designated
34 as VRM Class II. Alternative D would also include CSU stipulations that could reduce the effects of
35 noise, including displacement from otherwise suitable habitats, on wildlife throughout the planning area.

36 Additionally, Alternative D contains some CSU stipulations that would limit the density of oil and gas
37 development. These stipulations would be applied in lands identified by BLM as having wilderness
38 characteristics during the 2016 wilderness characteristics inventory with the exception of the Labyrinth
39 Canyon unit and the Cone and Cottonwood Wash recreation focus areas. The CSU stipulations that would
40 limit the density of oil and gas development under Alternative D would be more restrictive and would
41 cover a larger geographic area than similar stipulations that would be applied under Alternative C. As
42 densities of wells, roads, and facilities increase in wildlife habitat, habitat within and near well fields
43 becomes progressively less effective at providing for the breeding, feedings, and sheltering needs of
44 wildlife until most animals no longer use these areas (Sawyer 2002). Therefore, CSU stipulations that
45 limit oil and gas development density could benefit fish and wildlife and their habitats to a greater degree
46 than other CSU stipulations applied under Alternatives C or D by reducing the intensity and extent of
47 disturbance to wildlife habitats, reducing displacement of wildlife, and maintaining habitat effectiveness.
48 The largest areas of vegetation within the areas subject to CSU/TL stipulations would be Colorado
49 Plateau Blackbrush-Mormon-Tea Shrubland (148,756 acres) and Inter-Mountain Basins Active and

1 Stabilized Dune (83,835 acres), although most vegetation types present in the planning area would have
2 some areas managed subject to CSU/TL stipulations (Table 4-13). These vegetation types provide habitat
3 for fish and wildlife described in Chapter 3 including upland game, migratory birds, raptors, reptiles,
4 amphibians, other non-game species, and native pollinators; which would receive some reduction in
5 surface disturbance or disruption from this management.

6 Under Alternative D, applying an NSO stipulation or closing areas to oil and gas leasing would prevent
7 surface-disturbing activities from oil and gas leasing development within 112,509 acres. The NSO and
8 closed stipulations could protect wildlife habitat from damage, removal, or degradation; reduce the
9 presence of infrastructure, humans, and machinery; and reduce habitat fragmentation. Removing future
10 disturbance from roads, structures, drilling operations, and human disturbance from mineral development
11 could reduce most stressors and disruption of habitat and could allow for continued habitat connectivity.
12 The NSO stipulations under Alternative D would be applied to Dirty Devil/French Springs and Horseshoe
13 Canyon South non-WSA lands with wilderness characteristics; lands identified as having wilderness
14 characteristics during the 2016 inventory in the Labyrinth Canyon unit; the Labyrinth Canyon and
15 portions of Dirty Devil/Robbers Roost SRMAs; all lands within 1 mile of the Green River Labyrinth
16 Canyon rim that are north of the San Rafael River; the Fossil Point, Dry Lake, Trin Alcove/Three
17 Canyon, Saucer Basin/Moonshine Wash, Keg Knoll, Sweetwater Reef, and Horseshoe Canyon Trailhead
18 recreation focus areas; all lands within 1 mile of key observation points and travel corridors; the Dry Lake
19 Archeological District and Tidwell Draw ACECs; all lands within 1 mile of high potential sites and route
20 segments along the Old Spanish Trail; steep slopes; areas within public water reserves; areas within 100-
21 year floodplains and within 660 feet of intermittent and perennial streams, rivers, riparian areas, wetlands,
22 water wells, and springs; and areas within 100 feet of ephemeral streams. Areas that would be closed to
23 oil and gas leasing would include the Big Flat Tops ACEC, the Three Rivers locatable mineral
24 withdrawal, all lands within 1 mile of the Green River Labyrinth Canyon rim south of the San Rafael
25 River, all lands within 1 mile of the Horseshoe Canyon rim, and the Green River suitable segment from
26 the confluence of the San Rafael River to Canyonlands National Park.

27 The NSO stipulations and decisions to close areas to oil and gas leasing under Alternative D could
28 prevent future habitat fragmentation and barriers in migration corridors for big game and other migratory
29 wildlife species, allowing wildlife to move between crucial winter ranges, fawning/calving/birthing area,
30 and breeding or nesting habitat, and providing overall habitat protection. The prevention of surface
31 disturbance would reduce the potential for the introduction and spread of invasive, non-native plant
32 species, supporting intact habitat and desired forage and cover for wildlife. The largest areas of vegetation
33 within the areas subject to an NSO stipulation and within areas closed to leasing would be Colorado
34 Plateau Blackbrush-Mormon-Tea Shrubland (43,861 acres NSO and 10,691 acres closed) and Inter-
35 Mountain Basins Active and Stabilized Dune (12,613 acres NSO and 2,216 acres closed), although most
36 vegetation types present in the planning area would have some areas managed subject to NSO stipulations
37 or managed as closed (Table 4-13).

38 Under Alternative D, riparian and aquatic habitats in the planning area, including those along the San
39 Rafael and Green Rivers, would either be closed to oil and gas leasing or open subject to NSO
40 stipulations. These habitats support all of the fisheries in the planning area and provide important water
41 sources and riparian breeding, foraging, nesting, and sheltering habitat for many wildlife species. The
42 NSO stipulations under Alternative D would provide a larger areas of protection around these sensitive
43 aquatic and riparian habitats compared to Alternatives A and C, and the same area of protection as
44 Alternative B. Similar to Alternatives B and C, NSO stipulations would be applied for ephemeral streams
45 under Alternative D, which would not be applied under Alternative A. The NSO stipulation for ephemeral
46 streams would protect important desert washes that provide important wildlife habitat and affect water
47 quality in downstream perennial waters. The NSO stipulations and closed areas could prevent soil loss,
48 erosion, or sedimentation of streambeds, and could support water quality and provide protection of habitat
49 for fisheries and other aquatic species.

1 Under Alternative D, the BLM would allow minimal exceptions, modifications, or waivers to NSO
2 stipulations. Fewer exceptions, modifications, or waivers would be granted compared to Alternatives A
3 and C. Allowing fewer exceptions, modifications, or waivers would reduce impacts to fish and wildlife
4 and their habitats in areas that would be subject to NSO stipulations compared to Alternatives A and C.

5 Under Alternative D, geophysical operations would be managed in the same manner and would be
6 anticipated to have the same impacts as they would under Alternative C.

7 Similar to Alternatives B and C, under Alternative D, the BMPs that are currently used for oil and gas
8 leases in the planning area would be updated to include additional state-of-the-art BMPs. The benefits to
9 fish and wildlife and their habitats in the planning area from updating the BMPs under Alternative D
10 would be the same as those described under Alternative B.

11 **4.12.6.1 *Suspended and Protested Lease Decisions***

12 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to
13 CSU/TL stipulations, and 3,132 acres would be issued subject to NSO stipulations. The areas
14 encompassed by the suspended and protested leases contain pronghorn crucial and substantial value year-
15 long habitat, as well as other habitats for upland game, migratory birds, raptors, reptiles, amphibians,
16 other non-game species, and native pollinators described in Chapter 3. If the leases were subsequently
17 developed, the impacts of modifying the terms and conditions of the suspended and protested leases and
18 issuing the leases consistent with Alternative D would be the same as the impacts to those resources from
19 managing them as open to leasing subject to CSU/TL stipulations, or open to leasing subject to NSO
20 stipulations described in this section. Under Alternative D, portions of the suspended and protested leases
21 would be issued with stipulations that would limit oil and gas development density to no greater than
22 more well pad per 640 acres. Compared to Alternatives A and C, which would also issue the leases
23 subject to varying stipulations, issuing the suspended and protested leases with these stipulations would
24 reduce the intensity and extent of disturbance to wildlife habitats that could occur if the leases were
25 subsequently developed, reducing displacement of wildlife and maintaining habitat effectiveness.

26 **4.13 LANDS WITH WILDERNESS CHARACTERISTICS**

27 This section presents potential impacts to lands with wilderness characteristics (LWCs) from
28 implementing actions presented in Chapter 2. Existing conditions concerning LWCs are described in
29 Chapter 3.

30 **4.13.1 Assumptions**

- 31 • The BLM would continue to manage LWCs that are identified as “Natural Areas” in the
32 ROD/RMPs to protect their wilderness characteristics.
- 33 • Impacts to LWCs include those that affect the size, naturalness, solitude, or primitive recreation
34 opportunities within inventoried LWCs.

35 **4.13.2 Impacts from Alternative A (No Action)**

36 **4.13.2.1 *Lands with Wilderness Characteristics***

37 Under Alternative A, approximately 213,802 acres of LWCs would be open to oil and gas leasing subject
38 to standard terms and conditions, approximately 10,759 acres would be open to oil and gas leasing subject
39 to CSU/TL stipulations, approximately 25,455 acres would be open to oil and gas leasing subject to an
40 NSO stipulation, and approximately 2 acres would be closed to oil and gas leasing. Table 4-30 lists acres
41 of oil and gas leasing categories for each LWC group.

1 **Table 4-30. LWC Groups by Oil and Gas Leasing Category under Alternative A**

LWC Group	Open (acres)	CSU/TL (acres)	NSO (acres)	Closed (acres)
Sweetwater Reef	69,140	2	28	0
San Rafael River	116,890	550	4,772	0
Units 5 and 7	4,999	0	9,045	0
Dirty Devil/French Springs	18	9,077	4,491	2
Labyrinth	22,755	1,130	7,119	0

2 **Sweetwater Reef Group**

3 Under Alternative A, there would be no oil and gas stipulations specific to the Sweetwater Reef group,
 4 and only small portions of the group would have stipulations applied for other resources. Therefore,
 5 nearly all of the Sweetwater Reef group (approximately 69,140 acres or 99.9%) would be managed as
 6 open subject to standard terms and conditions. Managing the areas identified as open to leasing and
 7 development subject to standard lease terms and conditions could result in the surface disturbance from
 8 the development of well pads and associated infrastructure. The surface disturbance, noise, and human
 9 activity associated with oil and gas development in these areas could lead to the loss of scenic values,
 10 naturalness, opportunities for primitive and unconfined recreation, and solitude. Oil and gas development
 11 in these areas could also lead to the development of roads and facilities and an increase in noise, and dust
 12 that would diminish wilderness characteristics. Surface-disturbing activities could affect the size of LWCs
 13 by reducing or eliminating portions of LWCs where mineral development occurs. Some units could be
 14 bisected, or mineral development could result in the need to eliminate areas from the LWC unit through
 15 the creation of cherry stems. This could result in some areas, or entire LWC units, no longer meeting the
 16 minimum size criterion (5,000 acres); the creation of cherry stems could also affect size and naturalness
 17 of LWCs.

18 **San Rafael River Group**

19 Under Alternative A, there would be no oil and gas stipulations specific to the San Rafael River group.
 20 Therefore, most of the San Rafael River group (approximately 116,890 acres or 95.6%) would be
 21 managed as open subject to standard terms and conditions. The potential impacts to LWCs in the areas
 22 open subject to standard terms and conditions would be the same in nature as the impacts described for
 23 the Sweetwater Reef group.

24 Under Alternative A, NSO and CSU stipulations applied to protect other resources from potential adverse
 25 impacts of oil and gas development could also help protect LWCs from potential adverse impacts. For
 26 example, Alternative A would apply a CSU stipulation for VRM Class II areas in the planning area, some
 27 of which would overlap LWCs in the San Rafael River group. This CSU stipulation would help protect
 28 these LWCs from potential changes to the landscape that might affect the naturalness of the areas.
 29 However, this CSU stipulation would apply to only 0.5% of the San Rafael River group. Alternative A
 30 would also apply NSO stipulations for areas within the San Rafael River group with slopes greater than
 31 40%, as well as around natural springs, areas within the 100-year floodplain of all perennial and
 32 intermittent streams, streams with perennial reaches, and riparian areas. These NSO stipulations would
 33 help protect LWCs from the potential adverse impacts of oil and gas development in these areas.
 34 However, these NSO stipulations would apply to only 3.9% of the San Rafael River group. Because such
 35 a small area would be managed subject to CSU or NSO stipulations, there is a potential for surface-
 36 disturbing activities to affect the size of LWCs by reducing or eliminating portions of LWCs where
 37 mineral development occurs.

1 **Units 5 and 7 Group**

2 Under Alternative A, there would be no oil and gas stipulations specific to the Units 5 and 7 group.
3 Approximately 4,999 acres (approximately 35.6%) of the Units 5 and 7 group would be open subject to
4 standard terms and conditions. The potential impacts to these 4,999 acres would be the same in nature as
5 the impacts described for the Sweetwater Reef group. However, Alternative A applies an NSO stipulation
6 to the Dry Lake Archaeological District ACEC, which is within the Units 5 and 7 group. This NSO could
7 help protect the LWCs in the Units 5 and 7 group from the potential adverse impacts of oil and gas
8 development. This NSO stipulation would apply to approximately 64.4% of the Units 5 and 7 group.
9 However, under Alternative A, the BLM may grant an exception to the NSO stipulation if it is determined
10 that no other economic and technically feasible access is available to reach and drain the fluid mineral
11 resources of the area. If exceptions are granted to the NSO stipulation, the effects on the wilderness
12 characteristics in the Units 5 and 7 group would be the same as the effects of managing the area as open
13 to oil and gas leasing subject to standard terms and conditions.

14 **Dirty Devil/French Springs Group**

15 Under Alternative A, the BLM would manage most of the Dirty Devil/French Springs group
16 (approximately 66.8%) as CSU/TL. Approximately 32.0% of the Dirty Devil/French Springs group would
17 be managed subject to an NSO stipulation. NSO and CSU stipulations applied to protect other resources
18 from the potential adverse impacts of oil and gas development would also help protect LWCs from
19 potential adverse impacts. For example, Alternative A would manage all VRM Class II areas and canyon
20 rims within the viewshed of all canyons in the Dirty Devil/Robbers Roost SRMA (outside of the WSA) as
21 NSO. The rest of the SRMA would be subject to CSU/TL stipulations. Managing these areas subject to
22 NSO stipulations with no exceptions, waiver, or modifications would minimize surface disturbance from
23 oil and gas development, which typically consists of soil and vegetation disturbance and the presence of
24 permanent structures that can result in degradation to the scenic values and naturalness of LWCs.
25 Managing these areas subject to NSO stipulations would also help prevent oil and gas development's
26 impacts to opportunities for primitive and unconfined recreation, as well as solitude in the Dirty
27 Devil/French Springs group. All other LWCs in the Dirty Devil/French Springs group (approximately
28 0.1%) would be managed as open subject to standard terms and conditions.

29 **Labyrinth Group**

30 Under Alternative A, there would be no oil and gas stipulations specific to the Labyrinth group. Most of
31 the Labyrinth group (approximately 22,755 acres or 73.4%) would be managed as open subject to
32 standard terms and conditions, whereas approximately 3.6% would be managed subject to CSU
33 stipulations, and 23.0% would be managed subject to an NSO stipulation. The potential impacts to the
34 area that would be open subject to standard terms and conditions would be the same in nature as the
35 impacts described for the Sweetwater Reef group. The NSO and CSU stipulations applied to protect other
36 resources from the potential adverse impacts of oil and gas development would also help protect LWCs
37 from potential adverse impacts.

38 For example, Alternative A would apply a CSU stipulation for VRM Class II areas in the planning area,
39 some of which would overlap LWCs in the Labyrinth group (approximately 3.6%). This CSU stipulation
40 would help protect these LWCs from potential changes to the landscape that might affect the naturalness
41 of the areas. Because most of the Labyrinth group would be managed as open, there is a potential for
42 surface-disturbing activities to affect the size of LWCs by reducing or eliminating portions of LWCs
43 where mineral development occurs.

1 In total, NSO stipulations would apply to approximately 23.0% of the Labyrinth group. Alternative A
2 would apply NSO stipulations for areas within the Labyrinth group, including the Green River Wild and
3 Scenic River–suitable segment from the confluence of the San Rafael River to Canyonlands National
4 Park, with slopes greater than 40%, as well as around natural springs, areas within the 100-year
5 floodplain of all perennial and intermittent streams, streams with perennial reaches, and riparian areas.
6 These NSO stipulations would help protect LWCs from potential adverse impacts of oil and gas
7 development in these areas.

8 **4.13.2.2 Natural Areas**

9 Under Alternative A, the BLM would manage the Dirty Devil/French Springs and Horseshoe Canyon
10 South natural areas as open to leasing subject to NSO stipulations with no exceptions, modifications, or
11 waivers. Managing these natural areas subject to NSO stipulations would prevent potential impacts to
12 their wilderness characteristics including surface disturbance, noise, and human activity associated with
13 oil and gas development within the natural areas. Additionally, the NSO stipulations would prevent
14 development in the natural areas that could bisect or result in the need to eliminate areas from the natural
15 areas through the creation of cherry stems. However, because lands adjacent to the Dirty Devil/French
16 Springs and Horseshoe Canyon South Natural Areas would be managed as open to leasing subject to
17 CSU/TL stipulations or standard terms and conditions, oil and gas development including development of
18 roads and facilities and an increase in traffic, noise, and dust on adjacent lands could result in the loss of
19 some of the scenic values, naturalness, opportunities for primitive and unconfined recreation, and solitude
20 within portions of the natural areas.

21 **4.13.2.3 Wilderness Study Areas**

22 The Dirty Devil, Horseshoe Canyon South, and Horseshoe Canyon North WSAs are adjacent to the
23 planning area. These WSAs are closed to leasing; however, the adjacent lands within the planning area
24 would be open to leasing subject to standard, CSU/TL, or NSO stipulations under Alternative A. In areas
25 where the adjacent lands are managed open to leasing subject to standard or CSU/TL stipulations, oil and
26 gas development including development of roads and facilities and an increase in traffic, noise, and dust
27 on adjacent lands could result in the loss of some of the scenic values, naturalness, opportunities for
28 primitive and unconfined recreation, and solitude within portions of the WSAs.

29 **Suspended and Protested Lease Decisions**

30 The protested leases are located within the San Rafael River group (approximately 3,467 acres) and
31 Labyrinth group (approximately 399 acres). A small portion of the suspended leases overlaps the
32 Sweetwater Reef group (approximately 186 acres). The suspended leases are also adjacent to LWCs in the
33 Dirty Devil/French Springs natural area and the Dirty Devil WSA. Because the portions of the suspended
34 leases fall within an area that would be managed under the current Richfield ROD/RMP as open to
35 leasing subject to standard terms and conditions, there would be no difference between the impacts of
36 Alternatives A-1 and A-2 on LWCs. If the leases were issued and subsequently developed, the impacts to
37 LWCs would be the same as the impacts to LWCs from managing them as open to leasing subject to
38 standard terms and conditions described in this section. In areas where mineral development occurs, soil
39 and vegetation disturbance and the presence of permanent structures would degrade the scenic values and
40 naturalness of LWCs. The noise of construction and operation of oil and gas facilities, including the
41 presence of work crews, vehicles, and equipment, would degrade opportunities for solitude and conflict
42 with primitive recreational opportunities. Surface-disturbing activities could affect the size of LWCs by
43 reducing or eliminating portions of LWCs where mineral development occurs. Some units could be
44 bisected, or mineral development could result in the need to eliminate areas from the LWC unit through
45 the creation of cherry stems. This could result in some areas of the affected LWC units or portions of
46 them no longer meeting the minimum size criterion (5,000 acres); the creation of cherry stems could also

1 affect size and naturalness of LWCs. Oil and gas leasing could also lead to the development of roads and
2 facilities that would increase traffic, noise, and dust that could diminish wilderness characteristics.

3 **4.13.3 Impacts from Alternative B**

4 **4.13.3.1 Lands with Wilderness Characteristics**

5 Under Alternative B, 0 acre of LWCs would be open to oil and gas leasing subject to standard terms and
6 conditions, 0 acre would be open to oil and gas leasing subject to CSU/TL stipulations, approximately
7 227,674 acres would be open to oil and gas leasing subject to an NSO stipulation, and approximately
8 22,344 acres would be closed to oil and gas leasing. Table 4-31 lists acres of oil and gas leasing
9 categories for each LWC group.

10 **Table 4-31. LWC Groups by Oil and Gas Leasing Category under Alternative B**

LWC Group	Open (acres)	CSU/TL (acres)	NSO (acres)	Closed (acres)
Sweetwater Reef	0	0	69,170	0
San Rafael River	0	0	122,212	0
Units 5 and 7	0	0	14,044	0
Dirty Devil/French Springs	0	0	9,171	4,417
Labyrinth	0	0	17,348	13,656

11 Under Alternative B, the use of BMPs (see Appendix C) could reduce the effects of mineral leasing and
12 development on LWCs by limiting facility visibility and noise, reducing traffic, and limiting other
13 mineral-related impacts to the scenic values, naturalness, opportunities for primitive and unconfined
14 recreation, and solitude of the LWCs. BMPs to reduce night sky impacts would provide a more ideal
15 setting for opportunities for primitive and unconfined recreation. BMPs to mitigate mineral operation
16 noise would decrease mineral operation impacts to the background setting, which would protect
17 opportunities for primitive and unconfined recreation, as well as solitude.

18 **Sweetwater Reef Group**

19 Under Alternative B, the Sweetwater Reef group would be managed as open to leasing subject to an NSO
20 stipulation. The NSO stipulation would protect the LWCs in the Sweetwater Reef group from the
21 potential adverse impacts of oil and gas development, which typically consist of soil and vegetation
22 disturbance and the presence of permanent structures that can result in degradation to the scenic values
23 and naturalness of LWCs. Managing these areas subject to NSO stipulations would also help minimize oil
24 and gas development's impacts on opportunities for primitive and unconfined recreation, as well as
25 solitude in these LWCs. Managing these areas subject to NSO stipulations would also prevent mineral
26 development, which could result in the need to eliminate areas from the LWC units. Although unlikely,
27 impacts to LWCs could occur under Alternative B if the areas are leased and the operator chooses to
28 construct surface facilities and access the leased minerals from adjacent private or SITLA lands. In the
29 event that operators access the minerals through surface facilities on private or SITLA lands, the impacts
30 to the Sweetwater Reef group could include localized loss of scenic values, naturalness, opportunities for
31 primitive and unconfined recreation, and solitude around the areas where the surface facilities are
32 installed.

1 **San Rafael River Group**

2 Under Alternative B, the San Rafael River group would be managed subject to an NSO stipulation. The
3 NSO stipulation would protect the LWCs in the San Rafael River group from the potential adverse
4 impacts of oil and gas development in the same manner that is described above for the NSO stipulation
5 applied to the Sweetwater Reef group under Alternative B.

6 **Units 5 and 7 Group**

7 Under Alternative B, the Units 5 and 7 group would be managed subject to an NSO stipulation. The NSO
8 stipulation would protect the LWCs in the Units 5 and 7 group from the potential adverse impacts of oil
9 and gas development in the same manner that is described above for the NSO stipulation applied to the
10 Sweetwater Reef group under Alternative B.

11 **Dirty Devil/French Springs Group**

12 Under Alternative B, the BLM would close the non-WSA LWCs in the Dirty Devil/French Springs group
13 (identified as a natural area in the Richfield ROD/RMP) to leasing, as well as close all lands within 1 mile
14 of the Horseshoe Canyon rim to leasing. This would total 4,417 acres or approximately 32.5% of the
15 Dirty Devil/French Springs group. Closing these lands to leasing would prevent impacts to wilderness
16 characteristics that typically result from oil and gas development, including eliminating the risk of
17 operators accessing minerals from adjacent private or SITLA parcels. All other LWCs in the Dirty
18 Devil/French Springs group (approximately 67.5%) would be managed subject to an NSO stipulation,
19 which would protect the LWCs from the potential adverse impacts of oil and gas development in the same
20 manner that is described above for the NSO stipulation applied to the Sweetwater Reef group under
21 Alternative B.

22 **Labyrinth Group**

23 Under Alternative B, the BLM would close all lands within 1 mile of the Green River Labyrinth Canyon
24 rim to leasing, which would comprise approximately 44.0% of the Labyrinth group. Closing these lands
25 to leasing would prevent impacts to wilderness characteristics that typically result from oil and gas
26 development. All other LWCs in the Labyrinth group (approximately 56.0%) would be managed subject
27 to an NSO stipulation, which would protect the LWCs from the potential adverse impacts of oil and gas
28 development in the same manner that is described above for the NSO stipulation applied to the
29 Sweetwater Reef group under Alternative B.

30 **4.13.3.2 Natural Areas**

31 Under Alternative B, the BLM would close the Dirty Devil/French Springs and Horseshoe Canyon South
32 natural areas to leasing, and the adjacent lands would be managed subject to NSO stipulations. Closing
33 the natural areas to leasing would prevent impacts to wilderness characteristics from oil and gas
34 development within the natural areas. The management of the adjacent lands as open subject to NSO
35 stipulations would also prevent impacts that could result in the loss of some of the scenic values,
36 naturalness, opportunities for primitive and unconfined recreation, and solitude within portions of the
37 natural areas.

38 **4.13.3.3 Wilderness Study Areas**

39 The Dirty Devil, Horseshoe Canyon South, and Horseshoe Canyon North WSAs are adjacent to the
40 planning area. These WSAs are closed to leasing.

41 The Dirty Devil WSA is partially adjacent to the Dirty Devil/French Springs group, which would be
42 managed subject to an NSO stipulation under Alternative B. In these areas, the wilderness characteristics

1 in the WSA would be further protected by the NSO stipulations applied to adjacent lands. The Dirty Devil
 2 WSA is also partially adjacent to an area that would be open to leasing subject to CSU/TL stipulations
 3 under this alternative. In these areas, oil and gas development including development of roads and
 4 facilities and an increase in traffic, noise, and dust on adjacent lands could result in the loss of some of the
 5 scenic values, naturalness, opportunities for primitive and unconfined recreation, and solitude within
 6 portions of the WSA.

7 Horseshoe Canyon South and Horseshoe Canyon North WSAs are adjacent to areas that would be
 8 managed subject to NSO stipulations or closed to leasing under Alternative B. In these areas, the
 9 wilderness characteristics in the WSAs would be further protected by the decisions to close adjacent lands
 10 to leasing or apply NSO stipulations.

11 **Suspended and Protested Lease Decisions**

12 Under Alternative B, the BLM would cancel all suspended leases and resolve the protests on the protested
 13 leases and deny the leases. Protested leases are located within the San Rafael River group (approximately
 14 3,467 acres) and Labyrinth group (approximately 399 acres). A small portion of suspended leases overlap
 15 the Sweetwater Reef group (approximately 186 acres). Because these leases would be cancelled and
 16 denied, the LWCs in the areas of suspended and protested leases would not be affected by operators
 17 exploring for and developing oil and gas resources.

18 **4.13.4 Impacts from Alternative C**

19 ***4.13.4.1 Lands with Wilderness Characteristics***

20 Under Alternative C, approximately 25,496 acres of LWCs would be open to oil and gas leasing subject
 21 to standard terms and conditions, approximately 185,328 acres would be open to oil and gas leasing
 22 subject to CSU/TL stipulations, approximately 39,194 acres would be open to oil and gas leasing subject
 23 to an NSO stipulation, and 0 acre would be closed to oil and gas leasing. Table 4-32 lists acres of oil and
 24 gas leasing categories for each LWC group.

25 **Table 4-32. LWC Groups by Oil and Gas Leasing Category under Alternative C**

LWC Group	Open (acres)	CSU/TL (acres)	NSO (acres)	Closed (acres)
Sweetwater Reef	0	69,067	103	0
San Rafael River Area	25,139	89,891	7,181	0
Units 5 and 7	339	2,242	11,463	0
Dirty Devil/French Springs	18	8,144	5,427	0
Labyrinth Units	0	15,984	15,020	0

26 Under Alternative C, the use of BMPs (see Appendix C) could reduce the effects of mineral leasing and
 27 development on LWCs in the same manner as described for Alternative B.

28 **Sweetwater Reef Group**

29 Under Alternative C, LWCs in the San Rafael River group would be managed as open subject to standard
 30 terms and conditions. However, CSU stipulations applied to protect other resources from the potential
 31 adverse impacts of oil and gas development would apply to most of the Sweetwater Reef group and
 32 would help protect LWCs from potential adverse impacts. Approximately 99.9% of the Sweetwater Reef
 33 group would be managed subject to CSU stipulations. For example, to prevent potential adverse impacts

1 to recreation, the Sweetwater Reef recreation focus area, which is located within the Sweetwater Reef
2 group, would be managed subject to CSU stipulations. The CSU stipulation for the recreation focus area
3 would require that well pads be placed no closer than 160 acres apart. Production facilities would be co-
4 located and designed to minimize surface impacts. Pipelines and utilities would be buried, to the extent
5 practical, and placed along existing roads. Interim reclamation of roadway disturbance would be required.
6 Reclamation of well head/production facilities would be required to minimize long-term disturbance. Full
7 restoration of the original landform would be required during final reclamation. Restoring travel routes to
8 their original character would also be required. These actions could reduce the impacts that oil and gas
9 development have on scenic values, naturalness, opportunities for primitive and unconfined recreation, as
10 well as solitude within the Sweetwater Reef group. Despite the minimization of impacts on these
11 wilderness characteristics within the recreation focus area, surface-disturbing activities would be allowed
12 and would have the potential to affect the size of LWCs by reducing or eliminating the presence of
13 wilderness character in portions of LWCs where mineral development occurs.

14 **San Rafael River Group**

15 Under Alternative C, LWCs in the San Rafael River group would be managed as open subject to standard
16 terms and conditions. However, NSO and CSU stipulations applied to protect other resources from the
17 potential adverse impacts of oil and gas development would also help protect LWCs from potential
18 adverse impacts. CSU stipulations would apply to approximately 73.6% of the San Rafael River group,
19 and NSO stipulations would apply to approximately 5.9% of the group, leaving approximately 20.6%
20 managed as open to leasing subject to standard terms and conditions. For example, a CSU stipulation
21 would be applied to all areas designated as VRM Class II that would require that a visual resource
22 contrast rating be completed in accordance with BLM Manual 8431 (Visual Resource Contrast Rating)
23 (BLM 1986), and that mitigation measures be identified to retain the existing character of the landscape.
24 Because the San Rafael River group contains VRM Class II areas, this CSU would help protect LWCs in
25 the San Rafael River group from the potential adverse impacts of oil and gas development that might
26 affect the naturalness of the LWCs.

27 Several recreation focus areas in the planning area would be managed subject to a CSU stipulation under
28 Alternative C, which would require that well pads be placed no closer than 160 acres apart. The recreation
29 focus areas that are subject to this CSU stipulation and that overlap the San Rafael River group include
30 Saucer Basin/Moonshine Wash, Cottonwood Wash, and The Cone. The impacts of this CSU stipulation to
31 wilderness characteristics are summarized above for the Sweetwater Reef group.

32 **Units 5 and 7 Group**

33 Under Alternative C, LWCs in the Units 5 and 7 group would be managed as open subject to standard
34 terms and conditions. However, NSO and CSU stipulations applied to protect other resources from the
35 potential adverse impacts of oil and gas development would also help protect LWCs from potential
36 adverse impacts. CSU stipulations would apply to approximately 16.0% of the Units 5 and 7 group, and
37 NSO stipulations would apply to approximately 81.6% of the group, leaving approximately 2.4% of the
38 group managed as open subject to standard terms and conditions. The NSO stipulations applied within the
39 Units 5 and 7 group would be applied for the Dry Lake Archeological District ACEC and to all lands
40 within 1 mile of the Green River Labyrinth Canyon rim. The areas would be managed subject to an NSO
41 stipulation with no exceptions, modifications, or waivers. Because this area overlaps the Units 5 and 7
42 group and because no exceptions, modifications, or waivers would be permitted, this NSO would also
43 help prevent potential adverse impacts to LWCs in the Units 5 and 7 group.

44 Several recreation focus areas in the planning area would be managed with a CSU stipulation that would
45 require that well pads be placed no closer than 160 acres apart under Alternative C. The recreation focus
46 areas that are subject to this CSU stipulation and that overlap the Units 5 and 7 group include Fossil Point

1 and Dry Lake. The impacts of this CSU stipulation to wilderness characteristics are summarized above for
2 the Sweetwater Reef group.

3 **Dirty Devil/French Springs Group**

4 Under Alternative C, LWCs in the Dirty Devil/French Springs group would be managed as open subject
5 to standard terms and conditions. However, NSO and CSU stipulations applied to protect other resources
6 from the potential adverse impacts of oil and gas development would also help protect LWCs from
7 potential adverse impacts. In total, CSU stipulations would apply to approximately 59.9% of the Dirty
8 Devil/French Springs group, and NSO stipulations would apply to approximately 39.9%, leaving less than
9 1% of the group managed as open.

10 Under Alternative C, the BLM would apply the same NSO stipulations to the Dirty Devil/French Springs
11 and Horseshoe Canyon South natural areas as under Alternative A. Managing these 3,871 acres
12 (approximately 28.5% of the group) subject to NSO stipulations with no exceptions, waivers, or
13 modifications would help prevent surface disturbance from oil and gas development, which typically
14 consists of soil and vegetation disturbance and the presence of permanent structures that can result in
15 degradation to the scenic values and naturalness in this portion of the LWC group. Managing these areas
16 subject to NSO stipulations would also help prevent oil and gas development's impacts on opportunities
17 for primitive and unconfined recreation, as well as solitude, in the Dirty Devil/French Springs group.

18 Under Alternative C, the BLM would manage all lands within 1 mile of Horseshoe Canyon rim and
19 Horseshoe Canyon Trailhead subject to NSO stipulations with no exceptions, modifications, or waivers.
20 Because these areas overlap the Dirty Devil/French Springs group, these NSO stipulations would also
21 help protect LWCs in the Dirty Devil/French Springs group from the potential adverse impacts of oil and
22 gas development.

23 Several recreation focus areas in the planning area would be managed with a CSU stipulation that would
24 require that well pads be placed no closer than 160 acres apart under Alternative C. The Horseshoe
25 Canyon Trailhead recreation focus area would be subject to this CSU stipulation, and it overlaps the Dirty
26 Devil/French Springs group. The impacts of this CSU stipulation to wilderness characteristics are
27 summarized above for the Sweetwater Reef group.

28 **Labyrinth Group**

29 Under Alternative C, the Labyrinth Canyon LWC Unit within the Labyrinth group would have a CSU
30 stipulation applied that would not allow any disturbance within the watershed of the Green River and
31 would require that well pads would be placed no closer than 320 acres apart. Other restrictions would also
32 apply in this area, as described in Chapter 2. These restrictions also apply to the Labyrinth Canyon
33 SRMA. These actions could reduce the impacts that oil and gas development have on wilderness
34 characteristics, including scenic values, naturalness, opportunities for primitive and unconfined
35 recreation, as well as solitude within the LWCs in the Labyrinth Canyon group. The requirement that well
36 pads be placed no closer than 320 acres apart would provide additional protections for wilderness
37 characteristics compared to similar stipulations that would require that well pads be placed no closer than
38 160 acres apart. However, these stipulations would permit surface-disturbing activities and mineral
39 development within the LWC units, and these activities would have the potential to affect the size of
40 LWCs by reducing or eliminating the presence of wilderness character in portions of LWCs where
41 mineral development occurs.

42 Under this alternative, NSO and CSU stipulations applied to protect other resources from the potential
43 adverse impacts of oil and gas development would also help protect LWCs from potential adverse
44 impacts. In total, CSU stipulations would apply to approximately 51.6% of the Labyrinth group, and NSO
45 stipulations would apply to approximately 48.4% of the group. NSO stipulations would apply to the
46 Horseshoe Canyon South natural area; all lands within 1 mile of the Keg Knoll, Wolverton Overlook,
47 Trin Alcove/Three Canyon, and Bull Bottom KOPs; and all lands within 1 mile of Green River Labyrinth

1 Canyon rim. These NSO stipulations would have no exceptions, modifications, or waivers. These NSO
2 stipulations would help protect LWCs in the Labyrinth group from the potential adverse impacts of oil
3 and gas development.

4 Several recreation focus areas in the planning area would be managed with a CSU stipulation that would
5 require that well pads be placed no closer than 160 acres apart under Alternative C. The recreation focus
6 areas that are subject to this CSU stipulation and that overlap the Labyrinth group are Three Canyon and
7 Keg Knoll. The impacts of this CSU stipulation to wilderness characteristics are summarized above for
8 the Sweetwater Reef group.

9 **4.13.4.2 Natural Areas**

10 Under Alternative C, the BLM would manage the Dirty Devil/French Springs and Horseshoe Canyon
11 South natural areas subject to NSO stipulations with no exceptions, waivers, or modifications. These NSO
12 stipulations would help prevent impacts to wilderness characteristics within the natural areas that
13 typically result from oil and gas development. The areas adjacent to the natural areas would be managed
14 subject to an NSO stipulation (Dirty Devil/French Springs) and both NSO and CSU/TL stipulations
15 (Horseshoe Canyon South). The management of the adjacent lands as open subject to NSO stipulations
16 would also prevent impacts that could result in the loss of some of the scenic values, naturalness,
17 opportunities for primitive and unconfined recreation, and solitude within portions of the natural areas. In
18 areas where the adjacent lands would be managed as open subject to CSU/TL stipulations, oil and gas
19 operations on adjacent lands could result in the loss of some of the scenic values, naturalness,
20 opportunities for primitive and unconfined recreation, and solitude within portions of the natural areas.

21 **4.13.4.3 Wilderness Study Areas**

22 The Dirty Devil, Horseshoe Canyon South, and Horseshoe Canyon North WSAs are adjacent to the
23 planning area. These WSAs are closed to leasing.

24 The Dirty Devil WSA is adjacent to areas within the planning area that would be managed subject to NSO
25 stipulations and also areas that would be open to leasing subject to standard terms and conditions under
26 Alternative C. In areas where the WSA is adjacent to areas that would be managed subject to an NSO
27 stipulation, the wilderness characteristics in the WSA would be further protected by the NSO stipulations
28 applied to adjacent lands. In areas adjacent to lands open to leasing subject to standard terms and
29 conditions, oil and gas development including development of roads and facilities and an increase in
30 traffic, noise, and dust on adjacent lands could result in the loss of some of the scenic values, naturalness,
31 opportunities for primitive and unconfined recreation, and solitude within portions of the WSA.

32 Horseshoe Canyon South and Horseshoe Canyon North WSAs are adjacent to areas that would be
33 managed subject to NSO stipulations and open to leasing subject to CSU/TL stipulations under
34 Alternative C. In areas adjacent to lands that would be managed subject to an NSO stipulation, the
35 wilderness characteristics in the WSAs would be further protected by the decisions to apply NSO
36 stipulations. In areas adjacent to lands open to leasing subject to CSU/TL stipulations, oil and gas
37 development including development of roads and facilities and an increase in traffic, noise, and dust on
38 adjacent lands could result in the loss of some of the scenic values, naturalness, opportunities for
39 primitive and unconfined recreation, and solitude within portions of the WSA.

40 **Suspended and Protested Lease Decisions**

41 Under Alternative C, protested leases are located within the San Rafael River group (approximately 3,467
42 acres) and Labyrinth group (approximately 399 acres). A small portion of suspended leases overlaps the
43 Sweetwater Reef group (approximately 186 acres). If the leases were subsequently developed, the impacts
44 of modifying the terms and conditions of the suspended and protested leases and issuing the leases

1 consistent with Alternative C would be the same as the impacts on the San Rafael River and Sweetwater
2 Reef groups described in this section.

3 The approximately 186 acres of suspended leases overlapping the Sweetwater Reef recreation focus area
4 in the Sweetwater Reef group would be managed subject to CSU stipulations. The protested leases
5 overlapping the Saucer Basin/Moonshine Wash recreation focus area (approximately 2,071 acres) in the
6 San Rafael River group, and the protested leases overlapping the Three Canyon recreation focus area
7 (approximately 399 acres) in the Labyrinth group would also be managed subject to CSU stipulations.
8 These CSU stipulations would require that well pads be placed no closer than 160 acres apart. Production
9 facilities would be co-located and designed to minimize surface impacts. Pipelines and utilities would be
10 buried, to the extent practical, and placed along existing roads. Interim reclamation of roadway
11 disturbance would be required. Reclamation of well head/production facilities would be required to
12 minimize long-term disturbance. Full restoration of the original landform would be required during final
13 reclamation. Restoring travel routes to their original character would also be required. These actions could
14 reduce the impacts that oil and gas development have on scenic values, naturalness, opportunities for
15 primitive and unconfined recreation, as well as solitude within the affected groups. Despite the
16 minimization of impacts to these wilderness characteristics within the recreation focus area, surface-
17 disturbing activities would be allowed and would have the potential to affect the size of LWCs by
18 reducing or eliminating the presence of wilderness character in portions of LWCs where mineral
19 development occurs.

20 The approximately 1,396 acres of protested leases that do not overlap recreation focus areas in the San
21 Rafael River group would be managed as open subject to CSU/TL stipulations. The stipulations in these
22 areas would largely be related to seasonal avoidance of crucial pronghorn habitats. Where mineral
23 development occurs in these areas, soil and vegetation disturbance and the presence of permanent
24 structures would degrade the scenic values and naturalness of LWCs. The noise of construction and
25 operation of oil and gas facilities, including the presence of work crews, vehicles, and equipment, would
26 degrade opportunities for solitude and conflict with primitive recreational opportunities. Surface-
27 disturbing activities could affect the size of LWCs by reducing or eliminating portions of LWCs where
28 mineral development occurs. Some units could be bisected or mineral development could result in the
29 need to eliminate areas from the LWC unit through the creation of cherry stems. This could result in some
30 areas, or entire LWC units, no longer meeting the minimum size criterion (5,000 acres); the creation of
31 cherry stems could also affect size and naturalness of LWCs. Oil and gas leasing could also lead to the
32 development of roads and facilities that would increase traffic, noise, and dust that could diminish
33 wilderness characteristics.

34 **4.13.5 Impacts from Alternative D**

35 ***4.13.5.1 Lands with Wilderness Characteristics***

36 Under Alternative D, 0 acre of LWCs would be open to oil and gas leasing subject to standard terms and
37 conditions, approximately 161,667 acres would be open to oil and gas leasing subject to CSU/TL
38 stipulations, approximately 70,265 acres would be open to oil and gas leasing subject to an NSO
39 stipulation, and 18,085 acres would be closed to oil and gas leasing. Table 4-33 lists acres of oil and gas
40 leasing categories for each LWC group.

1 **Table 4-33. LWC Groups by Oil and Gas Leasing Category under Alternative D**

LWC Group	Open (acres)	CSU/TL (acres)	NSO (acres)	Closed (acres)
Sweetwater Reef	0	52,848	16,322	0
San Rafael River Area	0	100,335	21,877	0
Units 5 and 7	0	1,520	11,434	1,090
Dirty Devil/French Springs	0	6,964	3,284	3,340
Labyrinth Units	0	0	17,348	13,656

2 Under Alternative D, the use of BMPs (see Appendix C) could reduce the effects of mineral leasing and
 3 development on LWCs in the same manner as described for Alternative B.

4 **Sweetwater Reef Group**

5 Under Alternative D, CSU stipulations would apply to approximately 76.4% of the Sweetwater Reef
 6 group, and NSO stipulations would apply to approximately 23.6% of the group. An NSO stipulation with
 7 no exceptions, modifications, or waivers would apply to the Sweetwater Reef recreation focus area, which
 8 falls within the Sweetwater Reef group. The CSU stipulation applied to the LWC group under Alternative
 9 D would not allow well pads to be placed closer than 640 acres apart. Production facilities would be co-
 10 located and designed to minimize surface impacts. Pipelines and utilities would be buried, to the extent
 11 practical, and placed along existing roads. Interim reclamation of roadway disturbance would be required.
 12 Reclamation of well head/production facilities would be required to minimize long-term disturbance. Full
 13 restoration of the original landform would be required during final reclamation. Restoring travel routes to
 14 their original character would also be required. The CSU stipulation would reduce the amount of surface
 15 disturbance from oil and gas development permitting within the LWC group compared to Alternative C.
 16 The CSU stipulation could reduce the impacts that oil and gas development have on scenic values,
 17 naturalness, opportunities for primitive and unconfined recreation, as well as solitude within the
 18 Sweetwater Reef group. Despite the minimization of impacts to these wilderness characteristics, surface-
 19 disturbing activities would be allowed and would have the potential to affect the size of LWCs by
 20 reducing or eliminating the presence of wilderness character in portions of LWCs where mineral
 21 development occurs.

22 Under this alternative, NSO and CSU stipulations applied to protect other resources from the potential
 23 adverse impacts of oil and gas development would also help protect LWCs from potential adverse
 24 impacts. For example, a recreation-related stipulation would manage the Sweetwater Reef recreation
 25 focus area as NSO with no exceptions, modification, or waivers. Because this area overlaps the
 26 Sweetwater Reef group, this NSO would help protect LWCs in this group from the potential adverse
 27 impacts of oil and gas development.

28 **San Rafael River Group**

29 Under Alternative D, approximately 82.1% of the San Rafael River group would be managed subject to
 30 CSU stipulations, and approximately 17.9% of the group would be managed subject to an NSO
 31 stipulation. The San Rafael River group would be managed with the same CSU stipulation that would be
 32 applied to the Sweetwater Reef group. This management would have the same effects on wilderness
 33 characteristics as described for the Sweetwater Reef group.

34 NSO and CSU stipulations applied to protect other resources from the potential adverse impacts of oil and
 35 gas development would also help protect LWCs from potential adverse impacts. For example, a CSU
 36 stipulation for all areas inventoried as VRI Class II or designated as VRM Class II would require that,
 37 prior to authorizing surface-disturbing activities, a visual resource contrast rating be completed and

1 mitigation measures be identified that retain the existing character of the landscape. Because VRI Class II
2 and VRM Class II areas overlap the San Rafael River group, this CSU stipulation would help protect the
3 naturalness of the LWCs in this group.

4 Under Alternative D, the Saucer Basin/Moonshine Wash recreation focus area would be managed subject
5 to an NSO stipulation with no exceptions, modification, or waivers. Because this area overlaps the San
6 Rafael River group, this NSO would help protect LWCs in this group from the potential adverse impacts
7 of oil and gas development. Another recreation-related CSU stipulation would be applied to The Cone
8 and Cottonwood Wash recreation focus areas. This CSU stipulation would require that well pads be
9 placed no closer than 640 acres apart. This CSU stipulation would have the same impacts as the CSU
10 stipulation applied to the San Rafael River group.

11 **Units 5 and 7 Group**

12 Under Alternative D, approximately 7.8% of the Units 5 and 7 group would be closed to leasing,
13 approximately 10.8% of the group would be managed subject to CSU stipulations, and approximately
14 81.4% of the group would be managed subject to an NSO stipulation. The Units 5 and 7 group would be
15 managed with the same CSU stipulation that would be applied to the Sweetwater Reef group. This
16 management would have the same effects on wilderness characteristics as described for the Sweetwater
17 Reef group.

18 NSO and CSU stipulations applied to protect other resources from the potential adverse impacts of oil and
19 gas development would also help protect LWCs from potential adverse impacts. Under Alternative D, the
20 Fossil Point and Dry Lake recreation focus areas would be managed subject to an NSO stipulation with
21 no exceptions, modification, or waivers. Because these areas overlap the Units 5 and 7 group, this NSO
22 stipulation would help protect LWCs in this group from the potential adverse impacts of oil and gas
23 development.

24 **Dirty Devil/French Springs Group**

25 Under Alternative D, approximately 24.6% of the Dirty Devil/French Springs group would be closed to
26 leasing, approximately 51.3% of the group would be managed subject to CSU stipulations, and
27 approximately 24.2% of the group would be managed subject to an NSO stipulation. The Dirty
28 Devil/French Springs group would be managed with the same CSU stipulation that would be applied to
29 the Sweetwater Reef group. This management would have the same effects on wilderness characteristics
30 as described for the Sweetwater Reef group.

31 The BLM would manage the Dirty Devil/French Springs natural area, which is located within the Dirty
32 Devil/French Springs group, subject to an NSO stipulation with no exceptions, waivers, or modifications.
33 Managing this area subject to an NSO stipulation with no exceptions, waiver, or modifications would
34 minimize surface disturbance from oil and gas development, which typically consists of soil and
35 vegetation disturbance and the presence of permanent structures that can result in degradation to the
36 scenic values and naturalness of LWCs. Managing these areas subject to an NSO stipulation would also
37 help minimize oil and gas development's impacts on opportunities for primitive and unconfined
38 recreation, as well as solitude in the Dirty Devil/French Springs group.

39 The BLM would manage areas within 1 mile of the Horseshoe Canyon rim as closed to leasing under
40 Alternative D. This management would preclude impacts to wilderness characteristics from oil and gas
41 exploration and development in portions of the Dirty Devil/French Springs group located within 1 mile of
42 the Horseshoe Canyon rim.

43 **Labyrinth Group**

44 Under Alternative D, NSO stipulations would apply to approximately 56.0% of the Labyrinth Canyon
45 group, and the remaining 44.0% of the group would be closed to leasing. Managing the LWCs in the

1 Labyrinth Canyon group subject to NSO stipulations with no exceptions, waivers, or modifications would
2 minimize surface disturbance from oil and gas development, which typically consists of soil and
3 vegetation disturbance and the presence of permanent structures that can result in degradation to the
4 scenic values and naturalness of LWCs. Managing these areas subject to an NSO stipulation would also
5 help minimize oil and gas development's impacts to opportunities for primitive and unconfined
6 recreation, as well as solitude in the Labyrinth Canyon group. Although unlikely, there is some potential
7 that impacts to LWCs in the Labyrinth Canyon group under Alternative D if the areas are leased and the
8 operator chooses to construct surface facilities and access the leased minerals from adjacent private or
9 SITLA lands. In the event that operators access the minerals through surface facilities on private or
10 SITLA lands, the impacts to the Sweetwater Reef group could include localized loss of scenic values,
11 naturalness, opportunities for primitive and unconfined recreation, and solitude around the areas where
12 the surface facilities are installed.

13 Under Alternative D, the BLM would close all lands to leasing within 1 mile of the Horseshoe Canyon
14 rim. Because this area overlaps the Labyrinth group, this stipulation would protect LWCs in this group
15 from the potential adverse impacts of oil and gas development.

16 **4.13.5.2 Natural Areas**

17 Under Alternative D, the BLM would manage the Dirty Devil/French Springs and Horseshoe Canyon
18 South natural areas subject to an NSO stipulation with no exceptions, waivers, or modifications.
19 Additionally, portions of the Horseshoe Canyon South natural area would be closed to leasing as a result
20 of a decision to close to leasing areas within 1 mile of the Horseshoe Canyon rim. These NSO stipulations
21 and decisions to close the areas to leasing would help prevent impacts to wilderness characteristics within
22 the natural areas that typically result from oil and gas development.

23 The areas adjacent to the natural areas would be managed subject to an NSO stipulation (Dirty
24 Devil/French Springs) and both NSO stipulations and would be closed to leasing (Horseshoe Canyon
25 South). The management of the adjacent lands as open subject to NSO stipulations or closed to leasing
26 would also prevent impacts that could result in the loss of some of the scenic values, naturalness,
27 opportunities for primitive and unconfined recreation, and solitude within portions of the natural areas.

28 **4.13.5.3 Wilderness Study Areas**

29 The Dirty Devil, Horseshoe Canyon South, and Horseshoe Canyon North WSAs are adjacent to the
30 planning area. These WSAs are closed to leasing.

31 The Dirty Devil WSA is adjacent to areas within the planning area that would be managed subject to an
32 NSO stipulation and also areas that would be open to leasing subject to CSU/TL stipulations under
33 Alternative D. In areas where the WSA is adjacent to areas that would be managed subject to an NSO
34 stipulation, the wilderness characteristics in the WSA would be further protected by the NSO stipulations
35 applied to adjacent lands. In areas adjacent to lands open to leasing subject to CSU/TL stipulations, oil
36 and gas development including development of roads and facilities and an increase in traffic, noise, and
37 dust on adjacent lands could result in the loss of some of the scenic values, naturalness, opportunities for
38 primitive and unconfined recreation, and solitude within portions of the WSA.

39 Horseshoe Canyon South and Horseshoe Canyon North WSAs are adjacent to areas that would be
40 managed subject to CST/TL stipulations, NSO stipulations, and closed to leasing under Alternative D. In
41 areas adjacent to lands that would be managed subject to NSO stipulations or closed to leasing, the
42 wilderness characteristics in the WSAs would be further protected by the decisions to close adjacent lands
43 to leasing or to apply NSO stipulations. In areas adjacent to lands open to leasing subject to CSU/TL
44 stipulations, oil and gas development, including development of roads and facilities and increased traffic,
45 noise, and dust on adjacent lands, could result in the loss of some of the scenic values, naturalness,
46 opportunities for primitive and unconfined recreation, and solitude within portions of the WSAs.

1 **Suspended and Protested Lease Decisions**

2 Under Alternative D, protested leases are located within the San Rafael River group (approximately 3,467
3 acres) and Labyrinth group (approximately 399 acres). A small portion of suspended leases overlaps the
4 Sweetwater Reef group (approximately 186 acres). If the leases were subsequently developed, the impacts
5 of modifying the terms and conditions of the suspended and protested leases and issuing the leases
6 consistent with Alternative D would be the same as the impacts to the San Rafael River and Sweetwater
7 Reef groups described in this section.

8 The approximately 186 acres of suspended leases overlapping the Sweetwater Reef recreation focus area
9 in the Sweetwater Reef group would be managed subject to an NSO stipulation with no exceptions,
10 modifications, or waivers. The protested leases overlapping the Saucer Basin/Moonshine Wash recreation
11 focus area (approximately 2,071 acres) in the San Rafael River group, and the protested leases
12 overlapping the Three Canyon recreation focus area (approximately 399 acres) in the Labyrinth group
13 would also be managed subject to an NSO stipulation with no exceptions, modifications, or waivers.
14 Managing these areas subject to NSO stipulations with no exceptions, modifications, or waivers would
15 help prevent adverse impacts to the wilderness characteristics of the LWCs in these groups.

16 Approximately 1,396 acres of protested leases that do not overlap recreation focus areas in the San Rafael
17 River group would be managed subject to a CSU stipulation. The CSU stipulation and its potential
18 impacts to LWC are described above for the San Rafael River group.

19 **4.14 RECREATION**

20 This section presents potential impacts to recreation, including recreation in SRMAs and recreation focus
21 areas, from implementation of the management actions presented in Chapter 2. Existing conditions for
22 recreation in the analysis area are described in Chapter 3.

23 **4.14.1 Assumptions**

- 24 • The demand for most recreation activities would continue to increase. The compound growth rate
25 over the last 10 years was 3.1%. This trend is expected to persist.
- 26 • Most recreation use in the planning area is for private use.
- 27 • Recreation use is dispersed throughout the planning area; however, recreation use in some areas
28 is more concentrated.
- 29 • SRMAs would continue to be managed to provide opportunities that meet recreational user
30 demand, expectations, and needs.

31 **4.14.2 Impacts Common to All Alternatives**

32 This section discusses recreation impacts that would not vary by alternative.

33 Attaching lease notices and stipulations to permitted activities and the use of BMPs would help protect
34 the recreation experience by placing limits or constraints on oil and gas development in areas where
35 recreation often occurs (e.g., NSO stipulations in SRMAs or CSU stipulations in recreation focus areas,
36 and minimizing noise with best available technology).

37 Compliance with air quality standards and dust abatement requirements could help maintain the quality of
38 recreation experiences by protecting existing scenery and viewsheds.

39 Avoiding construction on slopes greater than 30%, prohibiting construction on slopes greater than 40%,
40 and prohibiting surface occupancy in the Dry Lake ACEC could reduce impacts to recreation by limiting
41 the amount of surface disturbance and oil and gas infrastructure.

1 Climate change may affect the seasons and times of the year that recreation visitation occurs. If climate
 2 change extends the summer season (making temperatures hotter for longer periods of time), recreation
 3 visits may be compressed into shorter spring and fall seasons; crowding and overuse could occur. Climate
 4 change impacts on resources such as vegetation could make them more susceptible to harm from
 5 recreation uses. Climate change could also change water levels in the San Rafael River and Green River,
 6 which could affect the availability and quality of the recreation visitor experience in these areas, possibly
 7 reducing visitor use.

8 **4.14.3 Impacts from Alternative A (No Action)**

9 Under Alternative A, approximately 399,462 acres would be open to oil and gas leasing subject to
 10 standard terms and conditions; approximately 19,083 acres would be open to oil and gas leasing subject to
 11 CSU/TL stipulations; approximately 33,627 acres would be open to oil and gas leasing subject to an NSO
 12 stipulation; and approximately 220 acres would be closed to oil and gas leasing. Reasonably foreseeable
 13 development under Alternative A is estimated to consist of 28 wells. These wells would result in
 14 approximately 541 acres of surface disturbance, of which 86 acres would remain unreclaimed in 15 years.
 15 Geophysical survey operations under Alternative A are anticipated to result in 305 acres of surface
 16 disturbance, of which approximately 61 acres would be unreclaimed in 15 years. This is the largest
 17 amount of anticipated surface disturbance and developed wells under all four alternatives.

18 Under Alternative A, the following lease stipulation for recreation would be applied: an NSO stipulation
 19 would prohibit surface occupancy for leases within VRM Class II areas and canyon rims within
 20 viewsheds of canyons (approximately 0.25 mile) in the Dirty Devil/Robbers Roost SRMA to protect
 21 scenic values and opportunities for primitive and semi-primitive recreation. The BLM would consider
 22 exceptions if oil and gas exploration and development would not impair identified scenic and semi-
 23 primitive recreational resources. The remainder of the SRMA would be subject to CSU/TL stipulations.

24 There are no BMPs under Alternative A that would be applied specifically to protect recreation; however,
 25 BMPs requiring interim reclamation, the painting of above ground facilities, the following of land
 26 contours with new roads, the recontouring of all disturbed areas during reclamation, the burial of power
 27 and flow lines, the drilling of multiple wells from a single well pad, noise reduction techniques, screening
 28 facilities from view, proper placement of facilities (below ridgelines and hilltops), and the use of common
 29 ROW corridors would reduce visual and noise impacts to recreation visitors.

30 **4.14.3.1 SRMAs**

31 Portions of two SRMAs are located in the planning area: the Dirty Devil/Robbers Roost SRMA and the
 32 Labyrinth Canyon SRMA.

33 **Dirty Devil/Robbers Roost SRMA**

34 Table 4-34 shows the oil and gas categories for the Dirty Devil/Robbers Roost SRMA in the planning
 35 area for all four alternatives, including Alternative A.

36 **Table 4-34. Oil and Gas Leasing Categories in the Dirty Devil/Robbers Roost SRMA in the**
 37 **Planning Area (all alternatives)**

Oil and Gas Leasing Categories	Dirty Devil/Robbers Roost SRMA in the Planning Area (acres)			
	Alternative A	Alternative B	Alternative C	Alternative D
Open	0.2	0.0	0.0	0.0
CSU/TL	10,382.2	0.1	8439.7	7,088.5

Oil and Gas Leasing Categories	Dirty Devil/Robbers Roost SRMA in the Planning Area (acres)			
	Alternative A	Alternative B	Alternative C	Alternative D
NSO	4,647.0	9,471.4	6,592.3	3,599.9
Closed	2.5	5,560.4	0.0	4,343.5

1 Under Alternative A, the majority of the Dirty Devil/Robbers Roost SRMA in the planning area (69.1%)
2 would have a CSU/TL stipulation. The remainder of the SRMA in the planning area (30.9%) would be
3 managed subject to NSO stipulations, as described in Section 4.14.3. CSU/TL stipulations, such as
4 avoiding construction on steep slopes and prohibiting surface disturbance during pronghorn fawning
5 season and migratory bird nesting season, could reduce overall impacts to recreation in the SRMA during
6 the seasonal limitations; however, the quality of the recreation experience would still be degraded outside
7 seasonal closures due to the noise, dust, increased traffic, and visual intrusions of oil and gas
8 development. Applying an NSO stipulation or closing areas to oil and gas leasing would prevent impacts
9 to the recreation experience, with the possible exception of traffic, noise, nighttime lighting, and dust
10 coming from adjacent areas if horizontal drilling is possible.

11 The NSO stipulation for the Dirty Devil/Robbers Roost SRMA would protect scenic values and
12 opportunities for primitive and semi-primitive recreation in the SRMA's VRM Class II areas and canyon
13 rims for a radius of approximately 0.25 mile. Exceptions to the NSO stipulation would be considered if
14 identified scenic and primitive or semi-primitive recreational resources would not be impaired. The NSO
15 stipulation would protect the canyon rims, and the CSU/TL stipulations would protect the rim trailheads
16 and top-of-rim camping in the SRMA. Together, these stipulations would protect primitive and semi-
17 primitive recreation experiences such as boating, canyoneering, backpacking, and hiking at or near the
18 SRMA's canyon rims (with the possible exception of impacts from adjacent areas as described above).

19 Labyrinth Canyon SRMA

20 Table 4-35 shows the oil and gas categories for the Labyrinth Canyon SRMA in the planning area for all
21 four alternatives, including Alternative A.

22 **Table 4-35. Oil and Gas Leasing Categories in the Labyrinth Canyon SRMA in the Planning Area**
23 **(all alternatives)**

Oil and Gas Leasing Categories	Labyrinth Canyon SRMA in the Planning Area (acres)			
	Alternative A	Alternative B	Alternative C	Alternative D
Open	3,963.5	0.0	0.0	0.0
CSU/TL	97.0	0.0	2,374.5	0.0
NSO	5,626.0	2,990.4	7,337.7	3,204.9
Closed	25.8	6,721.9	0.0	6,507.4

24 Under Alternative A, the majority of the Labyrinth Canyon SRMA in the planning area (57.9%) would be
25 managed as open subject to NSO stipulations. The NSO areas would include many of the in-canyon
26 experiences and canyon rims in the SRMA, which would help protect the primitive boating experience
27 along this portion of the Green River. The remainder of the SRMA in the planning area (40.8%) would be
28 managed as open subject to standard lease terms and conditions, managed as open subject to CSU/TL

1 stipulations (1.0%), and managed as closed to leasing (0.3%). Applying an NSO stipulation or closing
 2 areas to oil and gas leasing would prevent impacts to the recreation experience, with the possible
 3 exception of traffic, noise, nighttime lighting, and dust coming from adjacent areas if horizontal drilling is
 4 possible. CSU/TL stipulations (e.g., avoiding construction on steep slopes, and prohibiting surface
 5 disturbance during pronghorn fawning season and migratory bird nesting season) could reduce overall
 6 impacts to recreation in the SRMA during the seasonal limitations; however, the quality of the recreation
 7 experience would still be degraded outside seasonal closures due to the noise, dust, increased traffic, and
 8 visual intrusions of oil and gas development. Areas that are open to oil and gas drilling would have the
 9 greatest potential for adverse impacts to the quality of the recreation experience.

10 Alternative A includes an NSO stipulation for the Green River suitable segment from the confluence of
 11 the San Rafael River to Canyonlands National Park. This stipulation could eliminate visual and noise
 12 impacts that are incompatible with the recreation setting of the river in the SRMA, which includes quiet,
 13 solitude, and outstanding scenery (with the possible exception of impacts from adjacent areas as described
 14 above).

15 ***Price Field Office ROS***

16 As discussed in Chapter 3, BLM management objectives in the Price Field Office ROD-RMP specify use
 17 of the ROS only in SRMAs. Within SRMAs, the BLM Price Field Office manages for the ROS classes
 18 identified in the inventory (BLM 2008a). The only SRMA in the planning area managed by the Price
 19 Field Office is the Labyrinth Canyon SRMA. The Richfield Field Office does not use the ROS for
 20 management purposes.

21 Table 4-36 shows oil and gas leasing categories for ROS classes in the portion of the Labyrinth Canyon
 22 SRMA in the planning area for all four alternatives, including Alternative A.

23 **Table 4-36. Oil and Gas Leasing Categories for ROS Classes in the Labyrinth Canyon SRMA in**
 24 **the Planning Area (all alternatives)**

Oil and Gas Leasing Categories	ROS Classes in the Labyrinth Canyon SRMA in the Planning Area (acres)				
	Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural
Alternative A					
Open	0.1	1,794.3	2,140.6	28.4	0.0
CSU/TL	0.0	58.8	38.2	0.0	0.0
NSO	1,559.0	1,941.1	2,126.0	0.0	0.0
Closed	12.2	0.0	13.5	0.0	0.0
Alternative B					
Open	0.0	0.0	0.0	0.0	0.0
CSU/TL	0.0	0.0	0.0	0.0	0.0
NSO	121.7	389.7	2,479.0	0.0	0.0
Closed	1,449.7	3,404.5	1,839.3	28.4	0.0

Oil and Gas Leasing Categories	ROS Classes in the Labyrinth Canyon SRMA in the Planning Area (acres)				
	Primitive	Semi-Primitive Nonmotorized	Semi-Primitive Motorized	Roaded Natural	Rural
Alternative C					
Open	0.0	0.0	0.0	0.0	0.0
CSU/TL	2.6	309.4	2,062.5	0.0	0.0
NSO	1,568.8	3,484.7	2,255.8	28.4	0.0
Closed	0.0	0.0	0.0	0.0	0.0
Alternative D					
Open	0.0	0.0	0.0	0.0	0.0
CSU/TL	0.0	0.0	0.0	0.0	0.0
NSO	121.7	389.7	2,671.8	21.8	0.0
Closed	1,449.7	3,404.5	1,646.6	6.6	0.0

1 Under Alternative A, most of the Labyrinth Canyon SRMA that is classified as primitive would have an
2 NSO stipulation or would be closed to leasing. Most of the semi-primitive nonmotorized areas would
3 have an NSO stipulation (51.2%) or would be open to leasing subject to standard terms and conditions
4 (47.3%). Likewise, most of the semi-primitive motorized areas would have an NSO stipulation (49.2%)
5 or would be open to leasing subject to standard terms and conditions (49.6%). The roaded natural areas in
6 the SRMA would be classified as open to leasing subject to standard terms and conditions. There are no
7 rural areas in the SRMA.

8 The largest impact from oil and gas development on the desired characteristics of the ROS settings in the
9 Labyrinth Canyon SRMA would occur in the semi-primitive nonmotorized and semi-primitive motorized
10 areas that are classified as open to leasing subject to standard terms and conditions. According to the Price
11 Field Office ROD/RMP (BLM 2008a), semi-primitive nonmotorized areas should be characterized by
12 elements such as distance from roads (at least 1.0 mile) or isolation by topography, a natural setting with
13 some subtle modifications, rare and isolated structures, and little or no evidence of motorized routes.
14 Semi-primitive motorized areas should be characterized by distance from roads (0.25 mile from interstate
15 or state roads); a natural setting with moderate modifications; isolated structures; and strong evidence of
16 motorized trails, routes, and roads. Oil and gas leasing and development would introduce visual, light,
17 dust, and noise impacts through surface disturbance, infrastructure, vehicles, and equipment that would
18 detract from the semi-primitive settings of these classes. Related traffic and roads would impact semi-
19 primitive nonmotorized areas to a greater extent than semi-primitive motorized areas, because semi-
20 primitive nonmotorized areas should be characterized by few or no motorized routes.

21 Where NSO stipulations are in effect in semi-primitive nonmotorized or semi-primitive motorized areas,
22 the semi-primitive quality and desired ROS characteristics of these areas would not be impacted by oil
23 and gas development, with the possible exception of traffic, noise, nighttime lighting, and dust coming
24 from adjacent areas if horizontal drilling is possible. CSU/TL stipulations specified for other resources,
25 such as avoiding construction on steep slopes and prohibiting surface disturbance during pronghorn
26 fawning season and migratory bird nesting season, could reduce overall impacts to semi-primitive areas;
27 however, impacts would still occur outside seasonal closures.

1 **4.14.3.2 Recreation Focus Areas**

2 Table 4-37 shows the oil and gas categories for the nine recreation focus areas in the analysis area for all
3 four alternatives, including Alternative A.

1 **Table 4-37. Oil and Gas Leasing Categories in the Recreation Focus Areas (all alternatives)**

Oil and Gas Leasing Categories	Recreation Focus Areas in the Planning Area (acres)								
	Fossil Point	Dry Lake	Three Canyon	Saucer Basin/Moonshine Wash	The Cone	Keg Knoll	Sweetwater Reef	Cottonwood Wash	Horseshoe Canyon Trailhead
Alternative A									
Open	2,207.9	48.0	10,559.6	12,312.6	10,716.1	3,473.2	6,961.6	3,136.5	46.1
CSU/TL	9.8	1.5	67.8	3.6	0.0	0.0	0.0	0.0	1,100.9
NSO	2,476.5	11,206.8	2,667.5	836.8	306.5	3,387.6	6.1	153.8	849.2
Closed	0.0	0.0	0.0	0.0	0.0	25.5	0.0	0.0	0.1
Alternative B									
Open	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CSU/TL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NSO	2,847.5	8,234.4	6,108.8	13,153.0	11,022.6	3,414.8	6,967.7	3,290.3	130.4
Closed	1,846.8	3,021.9	7,186.0	0.0	0.0	3,471.5	0.0	0.0	1,865.9
Alternative C									
Open	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CSU/TL	1,047.0	47.8	5,517.7	11,826.6	10,099.6	2,414.3	6,908.7	3,160.4	130.4
NSO	3,647.2	11,208.5	7,777.2	1,326.4	923.1	4,471.9	59.0	129.9	1,865.9
Closed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alternative D									
Open	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CSU/TL	0.0	0.0	0.0	0.0	9,295.7	0.0	0.0	3,021.5	0.0
NSO	4,068.9	10,357.2	6,169.3	13,153.0	1,726.9	3,414.8	6,967.7	268.8	268.4
Closed	625.3	899.0	7,125.6	0.0	0.0	3,471.5	0.0	0.0	1,727.9

2

1 Under Alternative A, most of the recreation focus areas would be managed subject to NSO stipulations
2 and open under standard terms and conditions:

- 3 • Fossil Point: 52.8% NSO and 47.0% open
- 4 • Dry Lake: 99.6% NSO and 0.4% open
- 5 • Three Canyon: 20.1% NSO and 79.4% open
- 6 • Saucer Basin/Moonshine Wash: 6.4% NSO and 93.6% open
- 7 • The Cone: 2.8% NSO and 97.2% open
- 8 • Keg Knoll: 49.2% NSO and 50.4% open
- 9 • Sweetwater Reef: 0.1% NSO and 99.9% open
- 10 • Cottonwood Wash: 4.7% NSO and 95.3% open

11 The exception would be Horseshoe Canyon Trailhead, of which 55.1% would be managed subject to
12 CSU/TL stipulations, 42.5% would be managed subject to NSO stipulations, and 2.3% would be managed
13 as open subject to standard terms and conditions.

14 Based on the percentage of lands open to oil and gas leasing subject to standard terms and conditions
15 under Alternative A, recreationists in the Three Canyon, Saucer Basin/Moonshine Wash, The Cone, and
16 Sweetwater Reef recreation focus areas would be most likely to experience impacts from oil and gas
17 development. The recreation experience in the Dry Lake recreation focus area would be the most
18 protected through the use of NSO stipulations.

19 Under Alternative A, in portions of the recreation focus areas open to oil and gas leasing and development
20 subject to standard terms and conditions, the quality of the recreation experience could decrease as a
21 result of oil and gas exploration and development. Increased human activity; surface disturbance; and the
22 presence of wells and associated oil and gas infrastructure, equipment, and vehicles would increase road
23 traffic, noise, nighttime lighting, and dust while creating a negative visual impact in otherwise natural
24 areas. Visual impacts and noise would reduce the naturalness of the recreation focus areas for
25 backcountry users and would reduce opportunities for solitude. The increase in noise associated with oil
26 and gas equipment and changes in night skies from lighting associated with oil and gas development
27 would affect recreation settings. Recreationists could be displaced to other areas.

28 Portions of recreation focus areas with NSO stipulations would not be impacted by oil and gas
29 development, with the possible exception of traffic, noise, nighttime lighting, and dust coming from
30 adjacent areas if horizontal drilling is possible. Closing portions of recreation focus areas would eliminate
31 impacts and protect viewsheds, air quality, and soundscapes for recreation. CSU/TL stipulations, such as
32 avoiding construction on steep slopes and prohibiting surface disturbance during pronghorn fawning
33 season and migratory bird nesting season, could reduce overall impacts; however, impacts to the quality
34 of the recreation experience would still occur outside seasonal closures.

35 **4.14.3.3 *Horseshoe Canyon Unit***

36 Alternative A would specify few management decisions for recreation near the Horseshoe Canyon Unit of
37 Canyonlands National Park; however, management for the adjacent SRMAs and Horseshoe Canyon
38 South natural area would provide some protection for recreation experiences. The Horseshoe Canyon
39 South natural area would be managed as open to oil and gas leasing subject to NSO stipulations, which
40 would prevent surface occupancy within this area to protect, preserve, and maintain its wilderness
41 characteristics. There are no exceptions, modifications, or waivers to this stipulation. The recreation
42 experience would be protected in the portions of the Dirty Devil/Robbers Roost and Labyrinth Canyon
43 SRMAs that are managed as open to leasing subject to NSO stipulations, in the Horseshoe Canyon South
44 natural area, and in the adjacent Horseshoe Canyon Unit of Canyonlands National Park, with the possible

1 exception of traffic, noise, and dust coming from nearby areas if horizontal drilling is possible. Areas of
2 the SRMAs that are managed with CSU/TL stipulations would partially protect the recreation experience,
3 but would allow for some road traffic, noise, nighttime lighting, and dust. Not protecting all of the
4 Horseshoe Canyon rim with NSO stipulations under Alternative A would allow for impacts to the
5 recreation experience in this area. In addition, not protecting the travel corridors to Horseshoe Canyon
6 (the Lower San Rafael Road from State Route 24 and the Lower San Rafael Road from Green River)
7 would allow for impacts to the recreation experience, primarily the loss of scenic viewsheds and the
8 potential for noise and light pollution.

9 Of the Horseshoe Canyon Trailhead recreation focus area, 55.1% would be managed subject to CSU/TL
10 stipulations, 42.5% would be managed subject to NSO stipulations, and 2.3% would be managed as open
11 subject to standard terms and conditions. The Horseshoe Canyon Trailhead is also a KOP. Portions of the
12 recreation focus area that would be managed subject to NSO stipulations would generally be protected
13 from impacts to the recreation experience resulting from oil and gas exploration and development. The
14 portions of the recreation focus area that are open to leasing subject to standard terms and conditions
15 would not be protected. Areas open to leasing subject to CSU stipulations would limit some of the oil and
16 gas development impacts to the recreation experience.

17 **4.14.3.4 Visual Landscape**

18 Under Alternative A, there are no specific recreation stipulations to protect the recreation experience at
19 the five KOPs. However, the Bull Bottom, Trin Alcove/Three Canyon, Wolverton Overlook, and
20 Horseshoe Canyon Trailhead KOPs would be protected by the NSO and CSU stipulations for the Dirty
21 Devil/Robbers Roost SRMA and the Green River wild and scenic river suitable segment. Where NSO
22 stipulations are in place, the recreation experience at the KOPs would be protected; however, the
23 viewsheds from these KOPs may be impacted because oil and gas development would be open subject to
24 standard terms and conditions in the viewsheds. The visual landscape from the KOPs is an important
25 resource for recreation users; development in the viewshed would detract from the quality of the
26 recreation experience. Where CSU stipulations are in place, some impacts to the recreation experience at
27 each KOP could occur, including road traffic, noise, nighttime lighting, dust, and a reduction in the
28 quality of the scenic view because of nearby oil and gas development. The Keg Knoll KOP is located in
29 or adjacent to areas open to leasing subject to standard terms and conditions; the recreation experience
30 and setting at this KOP would not be protected under Alternative A.

31 Other impacts to visual resources are discussed in Section 4.9.

32 **4.14.3.5 Motorized and Mechanized Recreation**

33 As discussed in Chapter 3, both motorized recreation (OHV) and mechanized recreation (mountain
34 biking) occur in the planning area. Of the four alternatives, Alternative A would result in the largest
35 amount of surface disturbance (846 acres) and the largest number of wells (28 wells). Therefore, it would
36 likely have the greatest impact on motorized and mechanized recreation. Oil and gas development could
37 increase the number of roads available for motorized recreation, if recreation access to such roads is
38 permitted. However, negative impacts to the motorized recreation experience would occur through
39 increased road traffic and dust, potential deterioration of roads shared by all users, and changes to scenic
40 values.

41 There are no designated trails for mountain biking in the analysis area, but mountain biking use occurs on
42 some slickrock expanses and roads in the planning area. Negative impacts to the mechanized recreation
43 experience would occur from increased road traffic, dust, noise, and human activity due to oil and gas
44 development. In addition, visual impacts from oil and gas development in otherwise natural areas would
45 detract from the quality of the recreation experience for mountain bikers.

1 **4.14.3.6 *Suspended and Protested Lease Decisions***

2 Under Alternative A, 45,043 acres of the suspended and protested leases would be issued subject to
3 standard terms and conditions, and 113 acres of protested leases would be issued subject to NSO
4 stipulations. If the leases were subsequently developed, the impacts on recreation from issuing the leases
5 subject to the terms and conditions contained within the Price and Richfield Field Offices ROD/RMPs
6 (Alternative A-2) would be the same as the impacts to recreation from managing areas as open to leasing
7 subject to standard terms and conditions or subject to NSO stipulations described in this section. If the
8 BLM were to rescind the suspensions on the suspended leases (Alternative A-1) and the leases were
9 subsequently developed, the impacts on recreation that would occur in the leased areas would be the same
10 as those described for areas open to leasing subject to standard terms and conditions. Under Alternative
11 A-2, the suspended leases would be subject to the conditions, including stipulations and BMPs, in the
12 Richfield Field Office ROD/RMP. The recreation lease stipulation for the Dirty Devil/Robbers Roost
13 SMRA would not impact the areas with suspended and protested leases. However, recreation BMPs that
14 would be applied under Alternative A-2 (e.g., painting aboveground facilities) would reduce impacts to
15 the recreation experience from oil and gas development on suspended and protested leases. There would
16 be no similar reduction to impacts under Alternative A-1.

17 Portions of the suspended leases are in or adjacent to the Sweetwater Reef recreation focus area, and
18 portions of the protested leases are in the Saucer Basin/Moonshine and Three Canyon recreation focus
19 areas. Some of the protested leases are also in or very close to the Labyrinth Canyon SRMA and in the
20 Bull Bottom and Trin Alcove/Three Canyon KOPs. Because the portions of the leases in the two
21 recreation focus areas, the Labyrinth Canyon SRMA, and the two KOPs are mostly open to oil and gas
22 leasing and would be subject to standard terms and conditions if the leases were subsequently developed,
23 recreation users in these areas would experience impacts to the quality of the recreation experience and
24 the recreation setting. Increased human activity, surface disturbance, the presence of wells and associated
25 oil and gas infrastructure, equipment, and vehicles would increase road traffic, noise, nighttime lighting,
26 and dust while creating a negative visual impact in otherwise natural areas. Visual impacts and noise
27 would reduce the naturalness of these areas for backcountry users and reduce opportunities for solitude.
28 The increase in noise associated with oil and gas equipment and changes in night skies from lighting
29 associated with oil and gas development would affect recreation settings. Recreationists may be displaced
30 to other areas. The application of recreation BMPs would help limit impacts to these areas under
31 Alternative A-2 (e.g., screening facilities from view).

32 Under both Alternatives A-1 and A-2, if a lessee proposes to develop the leases (e.g., drill a well), the
33 BLM would evaluate the lessee's proposal in a site-specific environmental review. If during the site-
34 specific environmental review process the BLM determines that additional mitigation measures are
35 required to protect resources of concern, those mitigation measures would be included as conditions of
36 approval to future site-specific authorizations (e.g., application of appropriate BMPs).

37 **4.14.4 Impacts from Alternative B**

38 Under Alternative B, no acreage would be open to oil and gas leasing subject to standard terms and
39 conditions; approximately 98,164 acres would be open to oil and gas leasing subject to CSU/TL
40 stipulations; approximately 324,161 acres would be open to oil and gas leasing subject to an NSO
41 stipulation; and approximately 30,068 acres would be closed to oil and gas leasing. Reasonably
42 foreseeable development under Alternative B is estimated to consist of seven wells. These wells would
43 result in approximately 127 acres of surface disturbance, of which 20 acres would remain unreclaimed in
44 15 years. Geophysical survey operations under Alternative B are anticipated to result in 72 acres of
45 surface disturbance, of which approximately 14 acres would be unreclaimed in 15 years. This is the
46 smallest amount of anticipated surface disturbance and developed wells under all four alternatives.

1 The following lease stipulations for recreation would be applied under Alternative B to protect recreation
2 uses and experiences and to protect sensitive viewpoints:

- 3 • All nine recreation focus areas, the Labyrinth Canyon SRMA, and the Dirty Devil/Robbers Roost
4 SRMA would be managed subject to NSO stipulations.
- 5 • The five KOPs (Keg Knoll, Wolverton Overlook, Horseshoe Canyon Trailhead, Trin
6 Alcove/Three Canyon, and Bull Bottom) would be managed subject to NSO stipulations for a
7 radius of 3.0 miles.
- 8 • The Lower San Rafael Road from State Route 24 to Horseshoe Canyon and from Green River to
9 Horseshoe Canyon would be managed subject to NSO stipulations for a radius of 3.0 miles.

10 There would be no exceptions, modifications, or waivers to any of these stipulations.

11 There are no BMPs under Alternative B that would be applied specifically to protect recreation; however,
12 BMPs requiring the use of natural or artificial features to help screen facilities, designing linear facilities
13 to follow landform contours or mimic vegetation lines, painting aboveground facilities to blend into the
14 background, avoiding straight-line edges on well pads, utilizing liquid gathering systems to eliminate
15 surface storage tanks and reduce truck trips, minimizing noise with best available technology, limiting the
16 use of artificial lighting, and using light shielding and aiming techniques would reduce visual, noise, and
17 night sky impacts to recreation visitors.

18 Under Alternative B, stipulations for other resources such as air quality, night skies, visual resources,
19 lands with wilderness characteristics, soils, water resources, ACECs, the Old Spanish Trail, and the
20 soundscape would also help limit impacts to recreation. For example, an NSO stipulation would be
21 applied to lands with wilderness characteristics and to areas within 100 feet of ephemeral streams.

22 **4.14.4.1 SRMAs**

23 Portions of two SRMAs are located in the planning area: Dirty Devil/Robbers Roost SRMA and
24 Labyrinth Canyon SRMA.

25 **Dirty Devil/Robbers Roost SRMA**

26 Table 4-34 shows the oil and gas categories for the Dirty Devil/Robbers Roost SRMA in the planning
27 area for all four alternatives, including Alternative B.

28 Under Alternative B, the majority of the Dirty Devil/Robbers Roost SRMA in the planning area (63.0%)
29 is NSO. The remainder of the SRMA in the planning area (37.0%) would be closed to oil and gas leasing.
30 The NSO stipulation for the Dirty Devil/Robbers Roost SRMA would protect recreational settings, uses,
31 and experiences in this area. Applying this stipulation and closing areas to oil and gas leasing would
32 prevent impacts to recreation, with the possible exception of traffic, noise, nighttime lighting, and dust
33 coming from adjacent areas if horizontal drilling is possible.

34 **Labyrinth Canyon SRMA**

35 Table 4-35 shows the oil and gas categories for the Labyrinth Canyon SRMA in the planning area for all
36 four alternatives, including Alternative B.

37 Under Alternative B, the majority of Labyrinth Canyon SRMA in the planning area (69.2%) would be
38 categorized as closed to leasing. The remainder of the SRMA in the planning area (30.8%) would be
39 managed subject to NSO stipulations. The NSO stipulation for the Labyrinth Canyon SRMA would
40 protect recreational settings, uses, and experiences in this area. Applying this stipulation and closing areas
41 to oil and gas leasing would prevent impacts to recreation, with the possible exception of traffic, noise,
42 nighttime lighting, and dust coming from adjacent areas if horizontal drilling is possible. There is a small

1 possibility that access to leased areas managed subject to NSO stipulations could occur from parcels of
2 land owned by SITLA; oil and gas leasing and development could occur in the SRMA on SITLA lands.

3 Overall, Alternative B would provide more protection to SRMAs and their associated recreation
4 experiences in the planning area than would the other alternatives because under Alternative B no areas
5 would be managed subject to CSU/TL stipulations or would be open to leasing subject to standard terms
6 and conditions (see Table 4-35).

7 ***Price Field Office ROS***

8 Table 4-36 shows oil and gas leasing categories for ROS classes in the portion of Labyrinth Canyon
9 SRMA in the planning area for all four alternatives, including Alternative B.

10 Under Alternative B, 7.7% of the Labyrinth Canyon SRMA in the planning area that is classified as
11 primitive would be managed subject to NSO stipulations, and 92.3% would be closed to oil and gas
12 leasing and development. The semi-primitive nonmotorized areas in the SRMA would be managed
13 subject to NSO stipulations (10.3%) or would be closed (89.7%). Likewise, most of the semi-primitive
14 motorized areas would have an NSO stipulation (57.4%) or would be closed (42.6%). The roaded natural
15 areas in the SRMA would be classified as closed. There are no rural areas in the SRMA.

16 There would be no impact from oil and gas development on the desired characteristics of the ROS
17 settings in the Labyrinth Canyon SRMA under Alternative B, because the NSO stipulations and closed
18 areas would cover all of the SRMA in the planning area. The quality of the recreation experience would
19 not be impacted by oil and gas development, with the possible exception of traffic, noise, nighttime
20 lighting, and dust coming from adjacent areas if horizontal drilling is possible. There is a small possibility
21 that access to leased areas managed as NSO could occur from parcels of land owned by SITLA; oil and
22 gas leasing and development could occur in the SRMA on SITLA lands.

23 Alternative B would provide more protection to desired ROS settings (primarily the semi-primitive
24 nonmotorized and semi-primitive nonmotorized settings) in the portions of the Labyrinth Canyon SRMA
25 in the planning area than would Alternatives A and C (see Table 4-36). Alternative B would offer a
26 similar level of protection for desired ROS settings as would Alternative D.

27 ***4.14.4.2 Recreation Focus Areas***

28 Table 4-37 shows the oil and gas categories for the nine recreation focus areas in the analysis area for all
29 four alternatives, including Alternative B.

30 Under Alternative B, all of the recreation focus areas would be managed subject to NSO stipulations
31 and/or would be closed to oil and gas leasing:

- 32 • Fossil Point: 60.7% NSO and 39.3% closed
- 33 • Dry Lake: 73.2% NSO and 26.8% closed
- 34 • Three Canyon: 45.9% NSO and 54.1% closed
- 35 • Saucer Basin/Moonshine Wash: 100% NSO
- 36 • The Cone: 100% NSO
- 37 • Keg Knoll: 49.6% NSO and 50.4% closed
- 38 • Sweetwater Reef: 100% NSO
- 39 • Cottonwood Wash: 100% NSO
- 40 • Horseshoe Canyon Trailhead: 6.5% NSO and 93.5% closed

1 Under this alternative, the recreation experience in all of the recreation focus areas would be protected
2 through the use of the NSO stipulation and/or closure to oil and gas leasing and development. There
3 would be no visual, noise, nighttime lighting, or dust impacts in the recreation focus areas, with the
4 possible exception of such impacts coming from adjacent areas if horizontal drilling is possible. There is a
5 small possibility that access to leased areas managed as NSO could occur from parcels of land owned by
6 SITLA; oil and gas leasing and development could occur in the recreation focus areas on SITLA lands.

7 Overall, Alternative B would provide more protection to recreation focus areas and their associated
8 recreation experiences than would the other alternatives because no areas would be managed subject to
9 CSU/TL stipulations or would be open to leasing subject to standard terms and conditions (see Table 4-37).

10 **4.14.4.3 Horseshoe Canyon Unit**

11 Alternative B would provide several management decisions for recreation near the Horseshoe Canyon
12 Unit of Canyonlands National Park to protect sensitive viewpoints. The Horseshoe Canyon Trailhead
13 KOP would be managed subject to NSO stipulations for a radius of 3.0 miles, and the Horseshoe Canyon
14 Trailhead recreation focus area would be managed subject to NSO stipulations. In addition, the Lower
15 San Rafael Road from State Route 24 to Horseshoe Canyon and from Green River to Horseshoe Canyon
16 would be managed subject to NSO stipulations for a radius of 3.0 miles. This stipulation would protect
17 the recreation experience for visitors using the travel corridors to access recreation areas, including scenic
18 viewsheds and a semi-primitive experience. Alternative B would also close lands in the planning area that
19 are adjacent to the Horseshoe Canyon Unit, because they are part of the Dirty Devil/Robbers Roost
20 SRMA. There are no exceptions, modifications, or waivers to these stipulations. These stipulations and
21 closures would protect the recreation experience in and near the Horseshoe Canyon Unit (including travel
22 corridors), with the possible exception of traffic, noise, and dust coming from adjacent areas if horizontal
23 drilling is possible. The travel corridors would be protected for a 3.0-mile radius; it is unlikely that
24 horizontal drilling would impact visitors on these roads.

25 **4.14.4.4 Visual Landscape**

26 Under Alternative B, the five KOPs would be managed subject to NSO stipulations for a radius of 3.0
27 miles. Based on this stipulation, the recreation experience and settings at these KOPs would be protected
28 from impacts caused by oil and gas leasing and development. In addition, the application of a 3.0-mile
29 radius would protect scenic viewsheds for recreation users at each KOP.

30 The NSO stipulations for recreation under Alternative B would also protect scenic values and the visual
31 landscape for recreationists in the portions of the SRMAs in the planning area, in the nine recreation focus
32 areas, and along the Horseshoe Canyon travel corridor. Stipulations for visual resources under Alternative
33 B would also prohibit surface occupancy in VRI Class II and VRM Class II areas with no exceptions,
34 modifications, or waivers. A CSU/TL stipulation for night skies under this alternative would also limit
35 night sky impacts by requiring operators to implement specific light-restricting BMPs.

36 Other impacts to visual resources are discussed in Section 4.9.

37 **4.14.4.5 Motorized and Mechanized Recreation**

38 Of the four alternatives, Alternative B is expected to result in the least amount of surface disturbance (199
39 acres) and the smallest number of wells (seven wells). Therefore, it would have a lower impact on
40 motorized and mechanized recreation than would the other alternatives with one exception: the possible
41 addition of new roads for oil and gas development would be limited, with little opportunity to expand
42 available road use for motorized recreation (assuming recreation access to oil and gas roads would be
43 allowed). Some negative impacts to the motorized recreation experience would occur through increased
44 road traffic and dust, potential deterioration of roads shared by all users, and changes to scenic values, but
45 these impacts would be minimized by recreation and other stipulations under Alternative B.

1 Some negative impact to the mechanized recreation experience would occur from increased road traffic,
2 dust, noise, human activity, and changes to viewsheds due to oil and gas development; these impacts
3 would detract from the quality of the recreation experience for mountain bikers. However, as with
4 motorized recreation, such impacts would be minimized by recreation and other stipulations under
5 Alternative B.

6 **4.14.4.6 *Suspended and Protested Lease Decisions***

7 Under Alternative B, the BLM would cancel all suspended leases and would resolve the protests on the
8 protested leases and deny the leases. Recreation users in areas of suspended and protested leases would
9 not be affected by oil and gas activities resulting from operators exploring for and developing oil and gas
10 resources (unless these areas are leased in the future subject to the leasing decisions in the revised plan).
11 Current recreation conditions and trends would be anticipated to continue for the foreseeable future.

12 **4.14.5 Impacts from Alternative C**

13 Under Alternative C, 37,865 acres would be open to oil and gas leasing subject to standard terms and
14 conditions; approximately 362,127 acres would be open to oil and gas leasing subject to CSU/TL
15 stipulations; approximately 52,208 acres would be open to oil and gas leasing subject to an NSO
16 stipulation; and approximately 192 acres would be closed to oil and gas leasing. Reasonably foreseeable
17 development under Alternative C is estimated to consist of 27 wells. These wells would result in
18 approximately 517 acres of surface disturbance, of which 82 acres would remain unreclaimed in 15 years.
19 Geophysical survey operations under Alternative C is anticipated to result in 292 acres of surface
20 disturbance, of which approximately 58 acres would be unreclaimed in 15 years. This is slightly less than
21 the anticipated surface disturbance and developed wells under Alternative A, but more than the
22 anticipated surface disturbance and developed wells under Alternatives B and D.

23 The following lease stipulations for recreation would be applied under Alternative C to protect
24 recreational uses and experiences, scenic values, opportunities for primitive and semi-primitive
25 recreation, and sensitive viewpoints:

- 26 • The nine recreation focus areas would have a CSU/TL stipulation: Well pads would be placed no
27 closer than 160 acres (four wells per square mile) apart; production facilities would be co-located
28 and designed to minimize surface impacts; pipelines and utilities would be buried to the extent
29 practical and placed along existing roads; interim reclamation of roadway disturbance and
30 reclamation of well pads to well head/production facilities would be required to minimize long-
31 term surface disturbance; and the original landform would be fully restored during final
32 reclamation (travel routes would also be fully restored to their original character).
- 33 • The Labyrinth Canyon SRMA would have the same CSU/TL stipulation as would the recreation
34 focus areas, except that wells would be placed no closer than 320 acres apart and no disturbance
35 would be allowed within the viewshed of the Green River.
- 36 • The Dirty Devil/Robbers Roost SRMA would be managed subject to NSO stipulations for leases
37 within VRM Class II areas and canyon rims within viewsheds of canyons (approximately 0.25
38 mile).
- 39 • Green River Labyrinth Canyon rim, Horseshoe Canyon rim, and the five KOPs would be
40 managed subject to NSO stipulations within 1.0 mile of the rims and each KOP.

41 The NSO stipulation for the Dirty Devil/Robbers Roost SRMA would allow exceptions if oil and gas
42 exploration and development would not impair identified scenic and primitive or semi-primitive
43 recreation. There would be no other exceptions, modifications, or waivers to the stipulations.

44 There are no BMPs under Alternative C that would be applied specifically to protect recreation; however,
45 the BMPs for other resources described under Alternative B would also apply to Alternative C. These
46 BMPs would reduce visual, noise, and night sky impacts to recreation visitors.

1 Under Alternative C, stipulations for other resources such as lands with wilderness characteristics, natural
2 areas, soils, water resources, ACECs, the Old Spanish Trail, wild and scenic rivers, and the soundscape
3 would also help limit impacts to recreation. For example, an NSO stipulation would be applied along the
4 Green River from the confluence of the San Rafael River to Canyonlands National Park and a CSU/TL
5 stipulation would be applied to mitigate noise levels so that there would be no change in the natural
6 ambient sounds as recorded in Canyonlands National Park.

7 **4.14.5.1 SRMAs**

8 **Dirty Devil/Robbers Roost SRMA**

9 Table 4-34 shows the oil and gas categories for the Dirty Devil/Robbers Roost SRMA in the planning
10 area for all four alternatives, including Alternative C.

11 Under Alternative C, 43.9% of the Dirty Devil/Robbers Roost SRMA in the planning area would be
12 managed subject to NSO stipulations, and 56.1% would be managed subject to CSU/TL. Applying an
13 NSO stipulation would prevent impacts to the recreation setting and experience, with the possible
14 exception of traffic, noise, nighttime lighting, and dust coming from adjacent areas if horizontal drilling is
15 possible. The CSU/TL stipulation for recreation, as described above, requires the placement of well pads
16 no closer than 320 acres apart and prohibits disturbance within the viewshed of the Green River. This
17 stipulation would reduce the frequency and intensity of impacts from oil and gas development to the
18 recreation setting; however, some impacts would still occur in these areas. Visual, light, and noise
19 impacts from surface disturbance, infrastructure, vehicles, and equipment would still detract from the
20 recreation experience.

21 The NSO stipulation for the Dirty Devil/Robbers Roost SRMA would protect scenic values and
22 opportunities for primitive and semi-primitive recreation in the SRMA's VRM Class II areas and within
23 0.25 mile of canyon rims. Exceptions to the NSO stipulation would be considered if identified scenic and
24 primitive or semi-primitive recreational resources would not be impaired by oil and gas development.

25 **Labyrinth Canyon SRMA**

26 Table 4-35 shows the oil and gas categories for the Labyrinth Canyon SRMA in the planning area for all
27 four alternatives, including Alternative C.

28 Under Alternative C, the majority of the Labyrinth Canyon SRMA in the planning area (75.6%) would be
29 managed subject to NSO stipulations. The remainder of the SRMA in the planning area (24.4%) would be
30 managed subject to CSU/TL stipulations. Applying an NSO stipulation would prevent impacts to the
31 recreation experience, with the possible exception of traffic, noise, nighttime lighting, and dust coming
32 from adjacent areas if horizontal drilling is possible. CSU/TL stipulations such as prohibiting disturbance
33 within the viewshed of the Green River, spacing well pads, burying pipelines and utilities, and
34 implementing specific reclamation requirements, would lessen the frequency and intensity of impacts to
35 recreation; however, some impacts from oil and gas development would still occur in these areas. Visual,
36 light, and noise impacts from surface disturbance, infrastructure, vehicles, and equipment would still
37 detract from the recreation experience.

38 Alternative C would apply an NSO stipulation within 1.0 mile of the Green River Labyrinth Canyon rim.
39 When compared to Alternative A, which would apply an NSO stipulation to the rim only, Alternative C
40 would provide more protection for recreationists on the river and at the canyon rims. The quality of the
41 recreation experience and setting (e.g., scenic viewsheds, quiet, and opportunities for a primitive
42 experience) would be better protected under this alternative at these locations than it would under
43 Alternative A.

1 Overall, Alternative C would provide more protection to SRMAs and their associated recreation
2 experiences in the planning area than would Alternative A but less protection than would Alternatives B
3 and D, which have fewer acres with CSU/TL stipulations and more acres closed to oil and gas leasing
4 (see Table 4-35).

5 ***Price Field Office ROS***

6 Table 4-36 shows oil and gas leasing categories for ROS classes in the portion of Labyrinth Canyon
7 SRMA in the planning area for all four alternatives, including Alternative C.

8 Under Alternative C, 99.8% of the Labyrinth Canyon SRMA in the planning area that is classified as
9 primitive would have an NSO stipulation. The majority of the semi-primitive nonmotorized areas (91.8%)
10 would have an NSO stipulation. Of the semi-primitive motorized areas, 52.2% would have an NSO
11 stipulation and 47.8% would have a CSU/TL stipulation. The roaded natural areas in the SRMA would be
12 managed subject to NSO stipulations. There are no rural areas in the SRMA.

13 The largest impact from oil and gas development on the desired characteristics of the ROS settings in the
14 Labyrinth Canyon SRMA would occur in the semi-primitive motorized class and a small area of the semi-
15 primitive nonmotorized class with CSU/TL stipulations. The CSU/TL stipulations, which include
16 prohibiting disturbance within the viewshed of the Green River, spacing well pads, burying pipelines and
17 utilities, and implementing specific reclamation requirements, would lessen the frequency and intensity
18 impacts to the semi-primitive ROS settings in the Labyrinth Canyon SRMA. However, oil and gas
19 development would still have visual, light, and noise impacts through surface disturbance, infrastructure,
20 vehicles, and equipment that would detract from semi-primitive settings of these classes. Related traffic
21 and roads would impact semi-primitive nonmotorized areas to a greater extent than they would semi-
22 primitive motorized areas, because semi-primitive nonmotorized areas should be characterized by few or
23 no motorized routes.

24 Where NSO stipulations are in effect, the desired ROS characteristics of these areas would not be
25 impacted by oil and gas development, with the possible exception of traffic, noise, nighttime lighting, and
26 dust coming from adjacent areas if horizontal drilling is possible. There is a small possibility that access
27 to leased areas managed as NSO could occur from parcels of land owned by SITLA; oil and gas leasing
28 and development could occur in the SRMA on SITLA lands.

29 ***4.14.5.2 Recreation Focus Areas***

30 Table 4-37 shows the oil and gas categories for the nine recreation focus areas in the analysis area for all
31 four alternatives, including Alternative C.

32 Under Alternative C, all of the recreation focus areas would be managed subject to NSO and CSU/TL
33 stipulations:

- 34 • Fossil Point: 77.7% NSO and 22.3% CSU/TL
- 35 • Dry Lake: 99.6% NSO and 0.4% CSU/TL
- 36 • Three Canyon: 58.5% NSO and 41.5% CSU/TL
- 37 • Saucer Basin/Moonshine Wash: 10.1% NSO and 89.9% CSU/TL
- 38 • The Cone: 8.4% NSO and 91.6% CSU/TL
- 39 • Keg Knoll: 64.9% NSO and 35.1% CSU/TL
- 40 • Sweetwater Reef: 0.8% NSO and 99.2% CSU/TL
- 41 • Cottonwood Wash: 3.9% NSO and 96.1% CSU/TL
- 42 • Horseshoe Canyon Trailhead: 93.5% NSO and 6.5% CSU/TL

1 Based on the percentages of lands with CSU/TL stipulations, recreationists in the Saucer
2 Basin/Moonshine Wash, The Cone, Sweetwater Reef, and Cottonwood Wash recreation focus areas
3 would be most likely to experience impacts from oil and gas development. The recreation experience in
4 the Dry Lake and Horseshoe Canyon Trailhead recreation focus areas would be the most protected
5 through the use of NSO stipulations.

6 Under Alternative C, in portions of the recreation focus areas with a CSU/TL stipulation, oil and gas
7 leasing and development would be limited as discussed in Section 4.14.5. Wells would be spaced no
8 closer than 160 acres apart, which would reduce impacts to recreation when compared to areas that are
9 leased as open to oil and gas development subject to standard terms and conditions (which would have no
10 well spacing requirements). These CSU/TL limitations would lessen the intensity and frequency of
11 impacts to the recreation setting and experience. However, some impacts from oil and gas development
12 would still occur in these areas and would detract from the recreation experience. Increased human
13 activity, surface disturbance, the presence of wells and associated oil and gas infrastructure, equipment,
14 and vehicles would increase road traffic, noise, nighttime lighting, and dust, and would create a negative
15 visual impact in otherwise natural areas. Visual impacts and noise would reduce the naturalness of the
16 recreation focus areas for backcountry users and would reduce opportunities for solitude.

17 Portions of recreation focus areas with NSO stipulations would not be impacted by oil and gas
18 development, with the possible exception of traffic, noise, and dust coming from adjacent areas if
19 horizontal drilling is possible.

20 Overall, Alternative C would provide more protection to recreation focus areas and their associated
21 recreation experiences in the planning area than would Alternative A but less protection than would
22 Alternatives B and D, which have fewer acres with CSU/TL stipulations and more acres closed to oil and
23 gas leasing (see Table 4-37).

24 **4.14.5.3 Horseshoe Canyon Unit**

25 Alternative C would specify several management decisions for recreation near the Horseshoe Canyon
26 Unit of Canyonlands National Park to protect recreation experiences along the rim of the canyon. Under
27 Alternative C, areas within 1.0 mile of the Horseshoe Canyon rim and within 1.0 mile of the Horseshoe
28 Canyon Trailhead KOP would be managed subject to NSO stipulations. There are no exceptions,
29 modifications, or waivers to these stipulations. These stipulations would protect the recreation experience
30 immediately near and in the Horseshoe Canyon Unit, with the possible exception of traffic, noise, and
31 dust coming from adjacent areas if horizontal drilling is possible.

32 A small portion of the Horseshoe Canyon Trailhead recreation focus area (6.5%) would have a CSU/TL
33 stipulation. Although the CSU/TL stipulation would limit some of the effects of oil and gas development
34 to the recreation experience, recreationists would still be impacted as discussed in Section 4.14.5.3. The
35 remainder of the Horseshoe Canyon Trailhead recreation focus area would be managed as open to oil and
36 gas leasing subject to NSO stipulations.

37 Under Alternative C, an NSO stipulation would be applied to Horseshoe Canyon South Natural Area that
38 would prevent surface occupancy within this area to protect, preserve, and maintain its wilderness
39 characteristics. There are no exceptions, modifications, or waivers to this stipulation. The recreation
40 experience would be protected in this area, with the possible exception of traffic, noise, and dust coming
41 from adjacent areas if horizontal drilling is possible. Not protecting the travel corridors to Horseshoe
42 Canyon (the Lower San Rafael Road from State Route 24 and the Lower San Rafael Road from Green
43 River) would allow for impacts to visitors using these roads to reach recreation destinations, including the
44 loss of scenic viewsheds and the potential for noise and light pollution.

1 **4.14.5.4 Visual Landscape**

2 Under Alternative C, the five KOPs would be managed subject to NSO stipulations for a radius of 1.0
3 mile. Based on this stipulation, the recreation experience and settings at these KOPs would be protected
4 from impacts caused by oil and gas leasing and development. The application of a 1.0-mile radius would
5 provide some protection for scenic views from each KOP. This protection of viewsheds would be less
6 than that provided under Alternative B (which stipulates a 3.0-mile radius) but more than that provided
7 under Alternative A (which does not provide a radius).

8 The NSO and CSU/TL stipulations for recreation under Alternative C would protect scenic values and the
9 visual landscape for recreationists primarily in the Dirty Devil/Robbers Roost SRMA (within VRM Class
10 II areas and canyon rims within viewsheds of canyons) within 1.0 mile of the Green River Labyrinth
11 Canyon rim and within 1.0 mile of the Horseshoe Canyon rim, and limit impacts to visual resources in the
12 recreation focus areas and Labyrinth Canyon SRMA.

13 Other impacts to visual resources are discussed in Section 4.9.

14 **4.14.5.5 Motorized and Mechanized Recreation**

15 Of the four alternatives, Alternative C is expected to result in the second-largest amount of surface
16 disturbance (809 acres) and the second-largest number of wells (27 wells). Therefore, it would likely have
17 a greater impact on motorized and mechanized recreation than would Alternatives B and D. Oil and gas
18 development could increase the number of roads available for motorized recreation, if recreation access to
19 such roads is permitted. Negative impacts to the motorized recreation experience would occur through
20 increased road traffic and dust, potential deterioration of roads shared by all users, and changes to scenic
21 values. The intensity and frequency of the impacts would be reduced by the recreation CSU/TL and NSO
22 stipulations for this alternative.

23 Negative impacts to the mechanized recreation experience would occur from increased road traffic, dust,
24 noise, human activity, and changes to viewsheds due to oil and gas development; these impacts would
25 detract from the quality of the recreation experience for mountain bikers. However, as for motorized
26 recreation, such impacts would be reduced by the recreation stipulations under Alternative C.

27 **4.14.5.6 Suspended and Protested Lease Decisions**

28 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
29 standard terms, 39,766 acres would be issued subject to CSU/TL stipulations, and 318 acres would be
30 issued subject to NSO stipulations. If the leases were subsequently developed, the impacts of modifying
31 the terms and conditions of the suspended and protested leases and issuing the leases consistent with
32 Alternative C would be the same as the impacts on recreation from managing areas as open to leasing
33 subject to standard terms and conditions, open to leasing subject to CSU/TL stipulations, or open to
34 leasing subject to NSO stipulations described in this section. Under Alternative C, some leases would be
35 issued with stipulations that would limit oil and gas development density through well pad spacing.
36 Compared to Alternative A, issuing the suspended and protested leases with these stipulations would
37 reduce the intensity of impacts to recreation if the leases were subsequently developed.

38 Portions of the suspended leases are in or adjacent to the Sweetwater Reef recreation focus area, and
39 portions of the protested leases are in the Saucer Basin/Moonshine and Three Canyon recreation focus
40 areas. Some of the protested leases are also in or very close to the Labyrinth Canyon SRMA and in the
41 Bull Bottom and Trin Alcove/Three Canyon KOPs. Oil and gas development in or near these recreation
42 focus areas, KOPs, and the Labyrinth Canyon SRMA would result in increased human activity, surface
43 disturbance, and the presence of wells and associated oil and gas infrastructure, equipment, and vehicles,
44 which would increase road traffic, noise, nighttime lighting, and dust. Visual impacts and noise would
45 reduce the naturalness of these areas for backcountry users and would reduce opportunities for solitude.

1 The increase in noise associated with oil and gas equipment and changes in night skies from lighting
2 associated with oil and gas development would affect recreation settings. Recreationists may be displaced
3 to other areas.

4 The recreation focus areas and Labyrinth Canyon SRMA would have CSU/TL stipulations that would
5 limit (but not eliminate) impacts to recreation in the protested or suspended lease areas. If areas of the
6 Labyrinth Canyon SRMA that have NSO stipulations intersect protested lease areas, there would be no
7 impacts to recreation in these lease areas. The Bull Bottom and Trin Alcove/Three Canyon KOPs would
8 have NSO stipulations within 1.0 mile of each KOP, which would prevent impacts to recreation within
9 the 1.0-mile radius.

10 There are no BMPs under Alternative C that would be applied specifically to protect recreation in
11 suspended or protested lease areas; however, the BMPs for other resources described under Alternative B
12 would also apply to Alternative C. These BMPs would reduce visual, noise, and night sky impacts to
13 recreation visitors.

14 **4.14.6 Impacts from Alternative D**

15 Under Alternative D, no acreage would be open to oil and gas leasing subject to standard terms and
16 conditions; approximately 339,884 acres would be open to oil and gas leasing subject to CSU/TL
17 stipulations; approximately 92,170 acres would be open to oil and gas leasing subject to an NSO
18 stipulation; and approximately 20,339 acres would be closed to oil and gas leasing. Reasonably
19 foreseeable development under Alternative D is estimated to consist of 23 wells. These wells would result
20 in approximately 440 acres of surface disturbance, of which 70 acres would remain unreclaimed in 15
21 years. Geophysical survey operations under Alternative D are anticipated to result in 248 acres of surface
22 disturbance, of which approximately 50 acres would be unreclaimed in 15 years. This is the less than the
23 anticipated surface disturbance and developed wells under Alternatives A and C but more than the
24 anticipated surface disturbance and developed wells under Alternative B.

25 The following lease stipulations for recreation would be applied under Alternative D to protect
26 recreational uses and experiences, to protect scenic values and opportunities for primitive and semi-
27 primitive recreation, and to protect sensitive viewpoints:

- 28 • Seven of the nine recreation focus areas (Fossil Point, Dry Lake, Trin Alcove/Three Canyon,
29 Saucer Basin/Moonshine Wash, Keg Knoll, Sweetwater Reef, and Horseshoe Canyon Trailhead)
30 would be managed subject to NSO stipulations.
- 31 • The remaining two recreation focus areas (The Cone and Cottonwood Wash) would have a
32 CSU/TL stipulation: well pads would be placed no closer than 640 acres (one well per square
33 mile) apart; production facilities would be co-located and designed to minimize surface impacts;
34 pipelines and utilities would be buried, to the extent practical, and placed along existing roads;
35 interim reclamation of roadway disturbance and reclamation of well pads to well head/production
36 facilities would be required to minimize long-term surface disturbance, and the original landform
37 would be fully restored during final reclamation (travel routes would also be fully restored to
38 their original character).
- 39 • The Labyrinth Canyon SRMA would be managed subject to NSO stipulations.
- 40 • The Dirty Devil/Robbers Roost SRMA would be managed subject to NSO stipulations for leases
41 within VRM Class II areas and canyon rims within viewsheds of canyons (approximately 0.25
42 mile). The NSO stipulation for the Dirty Devil/Robbers Roost SRMA would allow exceptions if
43 oil and gas exploration and development would not impair identified scenic and primitive or
44 semi-primitive recreation.

- 1 • Horseshoe Canyon rim and the five KOPs would be managed subject to NSO stipulations within
2 1.0 mile of the rim and each KOP.
- 3 • Green River Labyrinth Canyon rim would be managed subject to NSO stipulations within 1.0
4 mile of the rim north of the San Rafael River.
- 5 • The five KOPs would also have the following CSU/TL stipulation: prior to authorizing any
6 surface-disturbing activities within 1.0 to 3.0 miles of the KOPs, a viewshed analysis would be
7 completed. If an area is determined to be within the viewshed, a visual resource contrast rating,
8 including visual simulations, would be completed in accordance with BLM Manual 8431. Site-
9 specific mitigation measures would be identified for all disturbances that are visible within 1.0 to
10 3.0 miles that minimize visual impacts, regardless of the area's VRM class.
- 11 • The Lower San Rafael Road from Saucer Basin Road to Horseshoe Canyon and from the San
12 Rafael River to Horseshoe Canyon would be managed subject to NSO stipulations for a radius of
13 1.0 mile. These travel corridors would also have the same CSU/TL stipulation as the KOPs,
14 except that mitigation measures would be identified for all disturbances that are visible within 3.0
15 miles, instead of 1.0 to 3.0 miles.

16 There are no BMPs under Alternative D that would be applied specifically to protect recreation; however,
17 the BMPs for other resources described under Alternative B would also apply to Alternative D. These
18 BMPs would reduce visual, noise, and night sky impacts to recreation visitors.

19 Under Alternative D, stipulations for other resources such as lands with wilderness characteristics, natural
20 areas, soils, water resources, ACECs, the Old Spanish Trail, night skies, and the soundscape would also
21 help limit impacts to recreation. For example, an NSO stipulation would be applied to the Dirty
22 Devil/French Springs and Horseshoe Canyon South natural areas and a CSU/TL stipulation would be
23 applied to areas with high wind erosion potential.

24 **4.14.6.1 SRMAs**

25 **Dirty Devil/Robbers Roost SRMA**

26 Table 4-34 shows the oil and gas categories for the Dirty Devil/Robbers Roost SRMA in the planning
27 area for all four alternatives, including Alternative D.

28 Under Alternative D, 23.9% of the Dirty Devil/Robbers Roost SRMA in the planning area would be
29 managed subject to NSO stipulations, 47.2% would be managed subject to CSU/TL stipulations, and
30 28.9% would be closed to oil and gas leasing and development. Closing areas to oil and gas leasing and
31 development and applying an NSO stipulation to portions of the Dirty Devil/Robbers Roost SRMA would
32 protect recreational uses and experiences in these areas, with the possible exception of traffic, noise,
33 nighttime lighting, and dust coming from adjacent areas if horizontal drilling is possible. There is a small
34 possibility that access to leased areas managed subject to NSO stipulations could occur from parcels of
35 land owned by SITLA; oil and gas leasing and development could occur in the SRMA on SITLA lands.
36 Approximately half of the SRMA would be managed subject to CSU/TL stipulations. CSU/TL
37 stipulations would reduce the frequency and intensity of impacts from oil and gas development to the
38 recreation setting; however, some impacts would still occur in these areas. Visual, light, and noise
39 impacts from surface disturbance, infrastructure, vehicles, and equipment would still detract from the
40 recreation experience.

41 The NSO stipulation for the Dirty Devil/Robbers Roost SRMA would protect scenic values and
42 opportunities for primitive and semi-primitive recreation in the SRMA's VRM Class II areas and within
43 0.25 mile of canyon rims. Exceptions to the NSO stipulation would be considered if identified scenic and
44 primitive or semi-primitive recreational resources would not be impaired by oil and gas development.

1 **Labyrinth Canyon SRMA**

2 Table 4-35 shows the oil and gas categories for the Labyrinth Canyon SRMA in the planning area for all
3 four alternatives, including Alternative D.

4 Under Alternative D, the Labyrinth Canyon SRMA in the planning area would be managed subject to
5 NSO stipulations (33.0%) or closed (67.0%). The NSO stipulation and closure of areas in the Labyrinth
6 Canyon SRMA would protect recreational settings, uses, and experiences in this area. Impacts to
7 recreation from oil and gas development would be prevented, with the possible exception of traffic, noise,
8 nighttime lighting, and dust coming from adjacent areas if horizontal drilling is possible.

9 Overall, Alternative D would provide more protection to SRMAs in the planning area than would
10 Alternatives A and C, because it would have fewer areas open to oil and gas leasing with standard terms
11 and conditions or managed subject to CSU/TL stipulations. Alternative D provides similar protection to
12 the SRMAs as Alternative B but would have some areas with CSU/TL stipulations (see Table 4-35) in the
13 Dirty Devil/Robbers Roost SRMA that would experience impacts from oil and gas development.

14 ***Price Field Office ROS***

15 Table 4-36 shows oil and gas leasing categories for ROS classes in the portion of Labyrinth Canyon
16 SRMA in the planning area for all four alternatives, including Alternative D.

17 Under Alternative D, 7.7% of the Labyrinth Canyon SRMA in the planning area that is classified as
18 primitive would be managed subject to NSO stipulations and 92.3% would be closed to leasing and
19 development. The semi-primitive nonmotorized areas in the SRMA would have an NSO stipulation
20 (10.3%) or would be closed (89.7%). Likewise, the semi-primitive motorized areas in the SRMA would
21 have an NSO stipulation (61.9%) or would be closed (38.1%). The roaded natural areas in the SRMA
22 would be managed subject to NSO stipulations (76.8%) or closed (23.2%). There are no rural areas in the
23 SRMA.

24 There would be no impact from oil and gas development on the desired characteristics of the ROS
25 settings in the Labyrinth Canyon SRMA under Alternative D, because the NSO stipulations and closed
26 areas cover all of the SRMA in the planning area. The quality of the recreation experience would not be
27 impacted by oil and gas leasing development, with the possible exception of traffic, noise, nighttime
28 lighting, and dust coming from adjacent areas if horizontal drilling is possible. There is a small possibility
29 that access to leased areas managed as NSO could occur from parcels of land owned by SITLA; oil and
30 gas leasing and development could occur in the SRMA on SITLA lands.

31 Alternative D would provide more protection to desired ROS settings in portions of the Labyrinth Canyon
32 SRMA in the planning area than would Alternatives A and C because it has no areas that are open subject
33 to standard terms and conditions or to CSU/TL stipulations. It offers a similar level of protection for
34 desired ROS settings as Alternative B (see Table 4-36).

35 ***4.14.6.2 Recreation Focus Areas***

36 Table 4-37 shows the oil and gas categories for the nine recreation focus areas in the analysis area for all
37 four alternatives, including Alternative D.

38 Under Alternative D, seven of the recreation focus areas would be managed subject to NSO stipulations
39 and/or closed:

- 40 • Fossil Point: 86.7% NSO and 13.3% closed
- 41 • Dry Lake: 92.0% NSO and 8.0% closed
- 42 • Three Canyon: 46.4% NSO and 53.6% closed

- 1 • Saucer Basin/Moonshine Wash: 100% NSO
- 2 • Keg Knoll: 49.6% NSO and 50.4% closed
- 3 • Sweetwater Reef: 100% NSO
- 4 • Horseshoe Canyon Trailhead: 13.4% NSO and 86.6% closed

5 The two remaining recreation focus areas would be managed subject to NSO and CSU/TL stipulations:

- 6 • The Cone: 15.7% NSO and 84.3% CSU/TL
- 7 • Cottonwood Wash: 8.2% NSO and 91.8% CSU/TL

8 Based on the percentage of lands with CSU/TL stipulations, The Cone and Cottonwood Wash recreation
9 focus areas would be most likely to experience impacts from oil and gas development. The recreation
10 experience in the remaining recreation focus areas would be protected through the use of the NSO
11 stipulation and/or closure to oil and gas leasing and development. There would be no visual, noise,
12 nighttime lighting, or dust impacts in these recreation focus areas, with the possible exception of such
13 impacts coming from adjacent areas if horizontal drilling is possible. There is a small possibility that
14 access to leased areas managed subject to NSO stipulations could occur from parcels of land owned by
15 SITLA; oil and gas leasing and development could occur in the recreation focus areas on SITLA lands.

16 Under Alternative D, in portions of The Cone and Cottonwood Wash recreation focus areas with CSU/TL
17 stipulations, oil and gas leasing and development would be limited as discussed in Section 4.14.6. These
18 limitations would lessen the intensity and frequency of impacts to the recreation setting and experience.
19 However, some impacts from oil and gas development would still occur in these areas and would detract
20 from the recreation experience. Increased human activity, surface disturbance, the presence of wells and
21 associated oil and gas infrastructure, equipment, and vehicles would increase road traffic, noise, nighttime
22 lighting, and dust, and would create a negative visual impact in otherwise natural areas. Visual impacts
23 and noise would reduce the naturalness of the recreation focus areas for backcountry users and would
24 reduce opportunities for solitude.

25 **4.14.6.3 Horseshoe Canyon Unit**

26 Alternative D would specify multiple management decisions for recreation near the Horseshoe Canyon
27 Unit of Canyonlands National Park to protect recreation uses and experiences along the rim of the canyon
28 and in and near the park. Under Alternative D, the Horseshoe Canyon Trailhead recreation focus area,
29 areas within 1.0 mile of the Horseshoe Canyon rim, and areas within 1.0 mile of the Horseshoe Canyon
30 Trailhead KOP would all be managed subject to NSO stipulations. In addition, the Lower San Rafael
31 Road from Saucer Basin Road to Horseshoe Canyon and from the San Rafael River to Horseshoe Canyon
32 would be managed subject to NSO stipulations for a radius of 1.0 mile, protecting the Horseshoe Canyon
33 Unit's primary travel corridors. This NSO stipulation would protect scenic viewsheds for a 1.0-mile
34 radius around the roads that visitors use to reach Horseshoe Canyon and would minimize impacts such as
35 noise, light pollution, and opportunities for a semi-primitive experience. There are no exceptions,
36 modifications, or waivers to these stipulations.

37 A CSU/TL stipulation would also be specified under Alternative D to protect the Horseshoe Canyon
38 Trailhead KOP and the main travel corridors to Horseshoe Canyon. This stipulation would require
39 viewshed analyses before any surface-disturbing activities within 1.0 to 3.0 mile and possibly visual
40 resource contrast ratings and site-specific mitigation measures.

41 These stipulations would protect the recreation setting and experience in and near the Horseshoe Canyon
42 Unit, as well as its main travel corridors, with the possible exception of traffic, noise, and dust coming
43 from adjacent areas if horizontal drilling is possible.

1 **4.14.6.4 Visual Landscape**

2 Under Alternative D, the five KOPs would be managed subject to NSO stipulations for a radius of 1.0
3 mile, and all lands between 1.0 to 3.0 miles from each KOP would be managed subject to CSU
4 stipulations. Based on this stipulation, the recreation experience and setting at these KOPs would be
5 protected from impacts caused by oil and gas leasing and development. The application of a 1.0-mile
6 radius would provide some protection for scenic views from each KOP. The application of a CSU
7 stipulation within a 1.0 to 3.0-mile radius would reduce the frequency and intensity of viewshed impacts
8 around each KOP. In addition, Alternative D would require a viewshed analysis from applicable KOPs
9 before any surface disturbance is authorized and the possible implementation of mitigation measures for
10 any visual impacts. These measures would provide more protection for viewsheds than that provided
11 under Alternatives A and C but less protection for viewsheds than that provided under Alternative B.

12 The NSO stipulations for recreation under Alternative D would protect scenic values and the visual
13 landscape for recreationists in seven of the nine recreation focus areas, in the portion of the Labyrinth
14 Canyon SRMA in the planning area, in VRM Class II areas and canyon rims within the viewsheds of
15 canyons in the Dirty Devil/Robbers Roost SRMA, at Horseshoe Canyon rim, at Green River Labyrinth
16 Canyon rim north of the San Rafael River, and along the Horseshoe Canyon travel corridors (within 1.0
17 mile). The Cone and Cottonwood Wash recreation focus areas would have a CSU/TL stipulation, which
18 would lessen the impacts of oil and gas leasing and development on the visual landscape.

19 In addition, stipulations for visual resources under Alternative D would require visual resource contrast
20 ratings in VRI and VRM Class II areas. A CSU/TL stipulation for night skies under this alternative would
21 limit night sky impacts by requiring operators to implement specific light-restricting BMPs.

22 Other impacts to visual resources are discussed in Section 4.9.

23 **4.14.6.5 Motorized and Mechanized Recreation**

24 Of the four alternatives, Alternative D is expected to result in the second-lowest amount of surface
25 disturbance (688 acres) and number of wells (23 wells). Therefore, Alternative D would have a larger
26 impact on motorized and mechanized recreation than would Alternative B but less than would
27 Alternatives A and C. Oil and gas development could increase the number of roads available for
28 motorized recreation, if recreation access to such roads is permitted. Some negative impacts to the
29 motorized recreation experience would occur through increased road traffic and dust, potential
30 deterioration of roads shared by all users, and changes to scenic values. These impacts would be limited
31 by recreation and other stipulations under Alternative D.

32 Some negative impact to the mechanized recreation experience would occur from increased road traffic,
33 dust, noise, human activity, and changes to viewsheds due to oil and gas development; these impacts
34 would detract from the quality of the recreation experience for mountain bikers. However, as with
35 motorized recreation, such impacts would be limited by recreation and other stipulations under
36 Alternative D.

37 **4.14.6.6 Suspended and Protested Lease Decisions**

38 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to
39 CSU/TL stipulations, and 3,132 acres would be issued subject to NSO stipulations. If the leases were
40 subsequently developed, the impacts of modifying the terms and conditions of the suspended and
41 protested leases and issuing the leases consistent with Alternative D would be the same as the impacts on
42 recreation from managing areas as open to leasing subject to CSU/TL stipulations or open to leasing
43 subject to NSO stipulations described in this section. Under Alternative D, some of the leases would be
44 issued with stipulations that would limit oil and gas development density (well pads would be placed no
45 closer than 640 acres apart). Compared to Alternatives A and C, issuing the suspended and protested

1 leases with these stipulations would reduce the intensity of the impact to the recreation experience and
2 setting if the leases were subsequently developed.

3 Portions of the suspended leases are located in or adjacent to the Sweetwater Reef recreation focus area,
4 and portions of the protested leases are located in the Saucer Basin/Moonshine and Three Canyon
5 recreation focus areas. Some of the protested leases are also located in or very close to the Labyrinth
6 Canyon SRMA and in the Bull Bottom and Trin Alcove/Three Canyon KOPs. The three recreation focus
7 areas and the Labyrinth Canyon SRMA would have NSO stipulations that would prevent impacts to
8 recreation in the protested or suspended lease areas. The NSO stipulations would generally minimize
9 impacts from oil and gas development on recreation users in the recreation focus areas or KOPs.
10 However, development of leases that are located near the recreation focus areas and KOPs (in areas that
11 would be open for oil and gas development subject to CSU/TL limitations) could impact recreation users
12 through increased traffic, noise, dust, and nighttime lighting.

13 There are no BMPs under Alternative D that would be applied specifically to protect recreation in
14 protested or suspended lease areas; however, the BMPs for other resources described under Alternative B
15 would also apply to Alternative D. These BMPs would reduce visual, noise, and night sky impacts to
16 recreation visitors.

17 **4.15 OIL AND GAS RESOURCES**

18 This section presents potential impacts to oil and gas leasing from implementing management actions
19 presented in Chapter 2. Existing conditions concerning oil and gas management are described in Chapter
20 3. The following section lists the assumptions that apply to the analysis of potential impacts to oil and gas
21 resources.

22 **4.15.1 Assumptions**

- 23 • Minerals and energy management policies dictated by law, regulation, statute, or policy
24 (including standard lease terms or other stipulations) would be applied equally across all
25 alternatives.
- 26 • Oil and gas exploration and development could continue to occur in the planning area during the
27 planning period.
- 28 • Leaseholders have the right to explore, develop, and produce oil and gas resources from any
29 valid, existing lease, even if the area containing the lease were proposed to be closed to future
30 leasing.
- 31 • A valid, existing oil and gas lease is a legal contract secured by a leaseholder before the effective
32 date of the planning area notice of intent for the MLP process.
- 33 • Managing areas subject to NSO stipulations would restrict surface disturbance on BLM-managed
34 lands. However, private and state lands that are intermixed throughout the planning area would
35 have no such restriction and could be developed. Therefore, it is conceivable that there could be
36 surface disturbance and other adverse impacts from oil and gas development within areas subject
37 to NSO stipulations that are not under BLM jurisdiction.
- 38 • The resource protection measures identified in the MLP/EA will also apply to areas currently
39 under lease where they do not conflict with the rights granted to the holder of the lease. While the
40 BLM may not unilaterally add a new stipulation to an existing lease that it has already issued, the
41 BLM can subject the development of existing leases to reasonable measures in order to minimize
42 impacts to other resource values. These reasonable measures would be applied as Conditions of
43 Approval to post-lease actions (e.g., permits to drill) and may include, but are not limited to,
44 modification to siting or design of facilities, timing of operations, and specification of interim and
45 final reclamation measures.

- 1 • Directional and/or horizontal drilling could be used to access hydrocarbon resources under areas
2 constrained by surface use restrictions (e.g., NSO restrictions).
- 3 • Directional and/or horizontal drilling viability and offset distance vary with the target formation,
4 the top depth of the target formation, and formation productivity.
- 5 • Based on past BLM drilling experience, plugging and closure procedures have been shown to be
6 effective in protecting groundwater resources.
- 7 • Adequate vegetative ground cover and species composition for site stabilization typically would
8 occur within 15 to 20 years in shrub communities and 20 to 25 years in desert communities.
- 9 • Re-establishment of slow-growing vegetation, such as trees and shrubs, in disturbed areas would
10 create a vegetative landscape similar to adjacent undisturbed lands in excess of 100 years.
- 11 • Dry holes would be abandoned and successfully reclaimed within 15 to 20 years in shrub
12 communities and 20 to 25 years in desert communities. Re-establishment of slow growing
13 vegetation, such as trees and shrubs, in disturbed areas would create a vegetative landscape
14 similar to adjacent undisturbed lands in excess of 100 years.
- 15 • Geophysical exploration would beneficially impact oil and gas development by providing data
16 necessary for prudent placement of well pads, resulting in potentially higher success rates and
17 less total drilling.

18 The BLM prepared a RFD scenario (see Appendix A) to project a baseline scenario of oil and gas
19 exploration, development, and production, as well as reclamation activity in the planning area over the
20 next 15 years. The RFD was used to predict the number of oil and gas wells and associated surface
21 disturbance from oil and gas development on BLM-administered public lands for each alternative. To
22 complete these estimates, the total number of wells, surface disturbance, and disturbance associated with
23 geophysical exploration as identified in the RFD was multiplied by the percentage of BLM-administered
24 lands open for oil and gas leasing subject to standard terms and conditions, or open to leasing subject to
25 CSU/TL stipulations for each alternative. Lands open to leasing subject to an NSO stipulation or as closed
26 to leasing were not considered open. Actual surface disturbance under each alternative could be higher or
27 lower than these estimates, and these calculations do not provide a limit on oil and gas activity or surface
28 disturbance for any alternative. Additionally, the calculations do not consider factors such as the ability to
29 access oil and gas resources in areas managed subject to NSO stipulations from adjacent open lands or on
30 adjacent private or state lands, or the possibility of some CSU stipulations limiting the density of oil and
31 gas development in areas open to leasing.

32 Table 4-38 lists the projected oil and gas development and associated surface disturbance under each
33 alternative on BLM-administered land in the planning area over the next 15 years. Among the
34 alternatives, the number of projected wells ranges between seven and 28.

1 **Table 4-38. Projected Oil and Gas Development and Surface Disturbance on Bureau of Land**
 2 **Management Lands (over the next 15 years)**

Action	Alternative A	Alternative B	Alternative C	Alternative D
Wells	28	7	27	23
Gross surface disturbance (acres disturbed)	541	127	517	440
Net surface disturbance after reclamation (acres disturbed)	86	20	82	70
Gross geophysical surface disturbance (acres disturbed)	305	72	292	248
Net geophysical surface disturbance (acres disturbed)	61	14	58	50

3 **4.15.2 Impacts Common to All Alternatives**

4 Meeting state and federal air quality standards could result in additional emissions control requirements
 5 that could result in delays and extra costs for oil and gas operations on federal lands.

6 Requiring project-specific analyses to use quantitative air quality analysis methods (i.e., modeling), when
 7 appropriate, would result in potential delays and additional costs.

8 Applying an NSO stipulation to lands would require the use of more costly directional and horizontal
 9 drilling to access the underlying federal oil and gas resources.

10 Applying lease notices for complying with mitigation requirements for raptors, migratory birds, and
 11 species listed under the ESA (USFWS 2017) and included on the Utah BLM sensitive species list (BLM
 12 2010b, 2011) could result in delays and additional costs to oil and gas operations. For example, surface-
 13 disturbing activities are to be avoided in occupied migratory bird habitat during the nesting season (April
 14 15 through August 1). Buffers around habitat for sensitive and federally listed species where surface-
 15 disturbing activities are precluded could also result in fewer acres available for oil and gas development.
 16 Prohibiting surface-disturbing activities within the 100-year floodplain of the Green River and associated
 17 backwaters to protect federally listed fish species would require the use of more costly directional and
 18 horizontal drilling to access any underlying federal oil and gas resources in these areas. Stipulations
 19 associated with sensitive and federally listed species are discussed in more detail in Section 4.11.

20 Timing limitations for wildlife and special status species do not substantially vary across alternatives.
 21 Timing limitations vary by species, and overlapping timing limitations can occur on some acreages. The
 22 greater the overlap of timing restrictions for different species, the greater the potential economic cost to
 23 oil and gas operators. Timing limitations aimed at mitigating potential impacts to wildlife are discussed in
 24 more detail in Section 4.12. Though these seasonal restrictions can seem cumbersome, upfront work
 25 between the BLM and applicants early in the development stage of these projects can simplify survey
 26 needs, ensure that there is an ample window of time to complete projects or develop project plans, ensure
 27 that federal acts are not violated, and minimize impacts to protected and state sensitive species and big
 28 game. Accurate surveys completed at the correct time would help to avoid delays, facilitate project
 29 planning, and allow accurate environmental analysis that is less likely to be litigated, thus allowing the
 30 project to move forward in a timely fashion.

1 **4.15.3 Impacts from Alternative A (No Action)**

2 **4.15.3.1 Oil and Gas Suspended Lease Decisions**

3 As discussed in Section 3.15.3.2, there are 16 leases (approximately 38,769 acres) in the planning area
4 that are currently suspended. Under Alternative A-1, these suspensions would be rescinded. The leases
5 are in areas managed as open subject to standard terms and conditions. Areas open subject to standard
6 terms and conditions have the most flexibility for oil and gas exploration and development, and therefore
7 this decision would provide beneficial impacts for the oil and gas program. Oil and gas operations
8 conducted in open areas also generally impose the least economic cost to operators.

9 Under Alternative A-2, the terms and conditions on the 16 suspended leases would be modified to be
10 consistent with the Richfield ROD/RMP (BLM 2008b). Potential impacts to oil and gas development
11 from the stipulations that would apply to these leases are described in more detail in Section 4.15.3.3. The
12 BLM would offer the lessee the option of either accepting the new lease terms or having the lease
13 cancelled. Cancellation would be done through a BLM administrative process and would require that the
14 BLM refund any bonus bids and lease payments.

15 **4.15.3.2 Lease Protest Resolution**

16 Under Alternative A, the lease protests on four leases (described in Section 3.15.3.2) would be resolved
17 and the protested leases would be issued with terms and conditions that are consistent with the Price
18 ROD/RMP (BLM 2008a). These leases include approximately 6,274 acres that would be managed as
19 open subject to standard terms and conditions. The leases in areas open subject to standard terms and
20 conditions would have the most flexibility for oil and gas exploration and development, which would
21 provide beneficial impacts for the oil and gas program. Oil and gas operations conducted in open areas
22 also generally impose the least economic cost to operators. Approximately 113 acres would be managed
23 as NSO. The NSO stipulation could increase the complexity of oil and gas operations and slow down
24 production. Development in NSO areas would require the use of more costly methods, such as directional
25 and horizontal drilling, to access oil and gas resources. The NSO stipulation would preclude the use of the
26 surface for the development of oil and gas, but would still allow the recovery of these resources at a
27 greater economic cost. The BLM would offer the lessee the option of either accepting the new lease terms
28 or having the lease cancelled. Cancellation would be done through a BLM administrative process and
29 would require that the BLM refund any bonus bids and lease payments.

30 **4.15.3.3 Oil and Gas Leasing Stipulations**

31 Under Alternative A, approximately 418,545 acres would be available for oil and gas leasing and
32 development, managed as either open with standard terms and conditions (approximately 399,462 acres)
33 or with CSU and/or TL stipulations (approximately 19,083 acres), comprising approximately 93% of the
34 BLM-administered land in the planning area. Table 4-39 lists the acres of oil and gas leasing categories
35 by alternative. The approximately 399,462 acres subject to standard terms and conditions (open) would
36 provide the most flexibility for oil and gas exploration and development. Oil and gas operations
37 conducted in open areas generally impose the least economic cost to operators. The approximately 19,083
38 acres managed with CSU and/or TL stipulations may result in additional economic costs and delays for
39 oil and gas operators by limiting the siting of operations and requiring specialized equipment, design
40 considerations, and erosion control plans. TL stipulations would result in additional economic costs and
41 delays by requiring surveys, avoidance of occupied areas, rerouting of roads and pipelines, and re-siting
42 of oil and gas facilities, or extra operational time if the surface disturbance window does not
43 accommodate an individual project schedule and timeline and if project activities need to be postponed.

1 **Table 4-39. Oil and Gas Leasing Categories under Each Alternative**

Alternative	Open (acres)	CSU and/or TL (acres)	NSO (acres)	Closed (acres)
Alternative A	399,462	19,083	33,627	220
Alternative B	0	98,164	324,161	30,068
Alternative C	37,865	362,127	52,208	192
Alternative D	0	339,884	92,170	20,339

2 The remaining 7% of the BLM-administered land in the planning area would be subject to NSO
 3 stipulations (approximately 33,627 acres) or closed to mineral leasing (approximately 220 acres). NSO
 4 stipulations could increase the complexity of oil and gas operations and slow production. Development in
 5 NSO areas would require the use of more costly methods, such as directional and horizontal drilling, to
 6 access oil and gas resources. NSO stipulations would preclude the use of the surface for the development
 7 of oil and gas but would still allow the recovery of these resources at a greater economic cost. Precluding
 8 surface disturbance in areas with NSO stipulations would decrease the number of wells drilled during the
 9 planning period. The closure of approximately 220 acres to oil and gas leasing in Alternative A would
 10 eliminate opportunities to develop oil and gas resources in those areas.

11 The projection for oil and gas development for Alternative A is 28 wells over 15 years.

12 Under the Richfield Field Office ROD/RMP (BLM 2008b), geophysical operations are subject to oil and
 13 gas leasing restrictions under 43 CFR 3150. However, the BLM will consider approving geophysical
 14 operations proposed for lands that are designated as NSO or closed to leasing when 1) the circumstances
 15 or relative resource values in the areas have changed, 2) less-restrictive requirements could be developed
 16 to protect the resource of concern, or 3) operations could be conducted without causing unacceptable
 17 impact to the resources of concern. Because regulations applicable to geophysical operations are already
 18 in effect, this would have no impact on the existing costs and time associated with oil and gas geophysical
 19 operations.

20 Under the Price Field Office ROD/RMP (BLM 2008a), geophysical operations are allowed, consistent
 21 with existing regulations for geophysical exploration. Because regulations applicable to geophysical
 22 operations are already in effect, this would have no impact on the existing costs and time associated with
 23 oil and gas geophysical operations.

24 This alternative would apply BMPs from the Price ROD/RMP (RMP Appendix R-14) (BLM 2008a) and
 25 the Richfield ROD/RMP (RMP Appendix 15) (BLM 2008b) that typically apply to oil and gas
 26 development. These measures are summarized in Appendix E. These BMPs could increase the economic
 27 costs associated with oil and gas development and could delay some oil and gas development activities.

28 **4.15.4 Impacts from Alternative B**

29 **4.15.4.1 Oil and Gas Suspended Lease Decisions**

30 As discussed in Section 3.15.3.2, there are 16 leases (approximately 38,769 acres) in the planning area
 31 that are currently suspended. Under Alternative B, all the suspended leases would be cancelled.
 32 Approximately 5,971 acres of area covered by the suspended leases would be managed as CSU and/or
 33 TL. Approximately 23,065 acres of the area covered by the suspended leases would be managed as NSO.
 34 Approximately 838 acres of the area covered by the suspended leases would be closed to leasing.
 35 Potential impacts to oil and gas development from the stipulations that would apply to these areas are
 36 described in more detail in Section 4.15.3.3.

1 **4.15.4.2 Lease Protest Resolution**

2 Under Alternative B, the lease protests on four leases (described in Section 3.15.3.2) would be resolved
3 and the leases would be denied. The four protested lease areas compose a total of approximately 6,388
4 acres, with approximately 2,513 acres managed as CSU and/or TL and approximately 3,875 acres
5 managed as NSO. Potential impacts to oil and gas development from these stipulations are described in
6 more detail in Section 4.15.3.3.

7 **4.15.4.3 Oil and Gas Leasing Stipulations**

8 Under Alternative B, approximately 98,164 acres would be managed with CSU and/or TL stipulations,
9 covering approximately 22% of the BLM-administered land in the planning area (see Table 4-39). No
10 acres would be managed for oil and gas leasing subject to standard terms and conditions (open). The
11 approximately 98,164 acres managed with CSU and/or TL stipulations may result in additional economic
12 costs and delays to oil and gas operators by limiting the siting of operations and requiring specialized
13 equipment, design considerations, and erosion control plans. TL stipulations would result in additional
14 economic costs and delays by requiring surveys, avoidance of occupied areas, rerouting of roads and
15 pipelines, and re-siting of oil and gas facilities, or extra operational time if the surface disturbance
16 window does not accommodate an individual project schedule and timeline and if project activities need
17 to be postponed.

18 The remaining 78% of the planning area would be subject to NSO stipulations (approximately 324,161
19 acres) or closed to mineral leasing (approximately 30,068 acres). NSO stipulations could increase the
20 complexity of oil and gas operations and slow production. Development in NSO areas would require the
21 use of more costly methods, such as directional and horizontal drilling, to access oil and gas resources.
22 NSO stipulations would preclude the use of the surface for the development of oil and gas but would still
23 allow the recovery of these resources at a greater cost. Precluding surface disturbance in areas with NSO
24 stipulations would decrease the number of wells drilled during the planning period. The closure of
25 approximately 30,068 acres to oil and gas leasing under Alternative B would eliminate opportunities to
26 develop oil and gas resources in those areas. Among the acres closed to leasing would be the area covered
27 by the Three Rivers locatable mineral withdrawal.

28 The projection for oil and gas development for Alternative B is seven wells over 15 years. This is the
29 fewest wells projected for any of the alternatives, followed by Alternatives D, C, and A. The large
30 acreage closed to leasing (approximately 7% of the planning area) or managed as NSO (approximately
31 72% of the planning area) under Alternative B is the primary reason that this alternative has the lowest
32 number of projected wells.

33 This alternative would apply restrictions to geophysical operations, including not allowing geophysical
34 operations in areas closed to leasing and only allowing heliport geophysical operations in areas that are
35 managed as NSO. Requiring heliport geophysical operations in NSO areas would increase economic costs
36 for operators.

37 Under this alternative, restrictions on surface-disturbing activities within habitat for threatened,
38 endangered, and sensitive species would limit oil and gas development. These restrictions are described in
39 more detail in Section 4.11.

40 This alternative would require implementation of BMPs that minimize the potential resource impacts
41 associated with oil and gas development (see Appendix C for a list of BMPs by resource). These BMPs
42 could increase the economic costs associated with oil and gas development and could delay some oil and
43 gas development activities.

1 **4.15.5 Impacts from Alternative C**

2 **4.15.5.1 Oil and Gas Suspended Lease Decisions**

3 As discussed in Section 3.15.3.2, there are 16 leases in the planning area that are currently suspended.
4 Under Alternative C, the lease terms and conditions on the suspended leases would be modified to be
5 consistent with Alternative C. The stipulations that would be applied to these leases are described in more
6 detail in Section 4.15.4.3. The BLM would offer the lessee the option of either accepting the new lease
7 terms or having the lease cancelled. Cancellation would be done through a BLM administrative process
8 and would require that the BLM refund any bonus bids and lease payments.

9 **4.15.5.2 Lease Protest Resolution**

10 Under Alternative C, the lease protests on four leases (described in Section 3.15.3.2) would be resolved
11 and the leases would be issued with terms and conditions that are consistent with Alternative C. The
12 stipulations that would be applied to these leases are described in more detail in Section 4.15.4.3. The
13 BLM would offer the lessee the option of either accepting the new lease terms or having the lease
14 cancelled. Cancellation would be done through a BLM administrative process and would require that the
15 BLM refund any bonus bids and lease payments.

16 **4.15.5.3 Oil and Gas Leasing Stipulations**

17 Under Alternative C, approximately 399,992 acres would be available for oil and gas leasing and
18 development and would be managed as either open with standard terms and conditions (approximately
19 37,865 acres) or with CSU and/or TL stipulations (approximately 362,175 acres), comprising
20 approximately 88% of the BLM-administered land in the planning area (see Table 4-39). The
21 approximately 37,865 acres subject to standard terms and conditions (open) would provide the most
22 flexibility for oil and gas exploration and development, which would provide beneficial impacts for the
23 oil and gas program. Oil and gas operations conducted in open areas generally impose the least economic
24 cost to operators. The approximately 362,175 acres managed with CSU and/or TL stipulations may result
25 in additional economic costs and delays to oil and gas operators by limiting the siting of operations and
26 requiring specialized equipment, design considerations, and erosion control plans. Approximately 15,984
27 acres (4%) of the lands proposed to be managed under CSU/TL stipulations under this alternative would
28 be managed with a more restrictive CSU stipulation in the Labyrinth LWC Units and in the Labyrinth
29 Canyon SRMA. Note that the Labyrinth LWC unit overlaps the Labyrinth Canyon SRMA in its entirety.
30 These stipulations would require that well pads be placed no closer than 320 acres apart and that no
31 disturbance would be allowed within the viewshed of the Green River. These decisions could cause
32 adverse impacts by limiting development and increasing economic costs. TL stipulations would result in
33 additional economic costs and delays by requiring surveys, avoidance of occupied areas, rerouting of
34 roads and pipelines, and re-siting of oil and gas facilities, or extra operational time if the surface
35 disturbance window does not accommodate an individual project schedule and timeline and if project
36 activities need to be postponed.

37 The remaining 12% of the BLM-administered land in the planning area would be subject to NSO
38 stipulations (approximately 52,208 acres) or closed to mineral leasing (approximately 192 acres). NSO
39 stipulations could increase the complexity of oil and gas operations and slow production. Development in
40 NSO areas would require the use of more costly methods, such as directional and horizontal drilling, to
41 access oil and gas resources. NSO stipulations would preclude the use of the surface for the development
42 of oil and gas, but would still allow the recovery of these resources at a greater economic cost. Precluding
43 surface disturbance in areas with NSO stipulations would decrease the number of wells drilled during the
44 planning period. Among the acres managed as NSO would be the areas covered by the Three Rivers
45 locatable mineral withdrawal. The closure of approximately 192 acres to oil and gas leasing in Alternative
46 C would eliminate opportunities to develop oil and gas resources in those areas.

1 The projection for oil and gas development for Alternative C is 27 wells over 15 years. After Alternative
2 A, this is the second-highest number of wells projected for any of the alternatives, followed by
3 Alternatives D and B. Alternative C also has the second-highest number of acres that would be managed
4 as open (approximately 8% of the planning area) and the second-lowest number of acres that would be
5 managed as NSO (approximately 12% of the planning area).

6 Under this alternative, geophysical operations would not be allowed in areas closed to leasing.
7 Geophysical operations would be allowed in areas managed as NSO under the following conditions:

- 8 • No new road construction or road improvements
- 9 • No staging areas
- 10 • Full reclamation of all surface disturbance
- 11 • No geophysical operations in crucial pronghorn habitat from May 15 through June 15

12 These restrictions on geophysical operations could increase economic costs for operators and could delay
13 some oil and gas development activities.

14 Under this alternative, restrictions on surface-disturbing activities within habitat for threatened,
15 endangered, and sensitive species would limit oil and gas development. These restrictions are described in
16 more detail in Section 4.11.

17 This alternative would require implementation of BMPs that minimize the potential resource impacts
18 associated with oil and gas development (see Appendix C for a list of BMPs by resource). These BMPs
19 could increase the economic costs associated with oil and gas development and could delay some oil and
20 gas development activities.

21 **4.15.6 Impacts from Alternative D**

22 ***4.15.6.1 Oil and Gas Suspended Lease Decisions***

23 As discussed in Section 3.15.3.2, there are 16 leases in the planning area that are currently suspended.
24 Under Alternative D, the lease terms and conditions on the suspended leases would be modified to be
25 consistent with Alternative D. The stipulations that would be applied to these leases are described in more
26 detail in Section 4.15.5.3. The BLM would offer the lessee the option of either accepting the new lease
27 terms or having the lease cancelled. Cancellation would be done through a BLM administrative process
28 and would require that the BLM refund any bonus bids and lease payments.

29 ***4.15.6.2 Lease Protest Resolution***

30 Under Alternative D, the lease protests on four leases (described in Section 3.15.3.2) would be resolved
31 and the leases would be issued with terms and conditions that are consistent with Alternative D. The
32 stipulations that would be applied to these leases are described in more detail in Section 4.15.5.3. The
33 BLM would offer the lessee the option of either accepting the new lease terms or having the lease
34 cancelled. Cancellation would be done through a BLM administrative process and would require that the
35 BLM refund any bonus bids and lease payments.

36 ***4.15.6.3 Oil and Gas Leasing Stipulations***

37 Under Alternative D, approximately 339,884 acres would be managed with CSU and/or TL stipulations,
38 comprising approximately 75% of the BLM-administered land in the planning area (see Table 4-39). No
39 acres would be managed for oil and gas leasing subject to standard terms and conditions (open). The
40 approximately 339,884 acres managed with CSU and/or TL stipulations may result in additional
41 economic costs and delays to oil and gas operators by limiting the siting of operations and requiring

1 specialized equipment, design considerations, and erosion control plans. Approximately 161,667 acres of
2 LWC units would be managed with a CSU stipulation, 48% of all lands managed as CSU under this
3 alternative. The LWC stipulations would require that well pads be placed no closer than 640 acres apart
4 and that no disturbance would be allowed within the viewshed of the Green River. These stipulations
5 would be far more restrictive to oil and gas development than stipulations under Alternative C, where
6 only the Labyrinth LWC unit (15,984 acres) would have a 320-acre spacing requirement between wells.
7 These decisions would cause adverse impacts by limiting development and increasing economic costs. TL
8 stipulations would result in additional economic costs and delays by requiring surveys, avoidance of
9 occupied areas, rerouting of roads and pipelines, and re-siting of oil and gas facilities, or extra operational
10 time if the surface disturbance window does not accommodate an individual project schedule and timeline
11 and project activities need to be postponed.

12 The remaining 25% of the BLM-administered land in the planning area would be subject to NSO
13 stipulations (approximately 92,170 acres) or closed to mineral leasing (approximately 20,339 acres). NSO
14 stipulations could increase the complexity of oil and gas operations and slow production. Development in
15 NSO areas would require the use of more costly methods, such as directional and horizontal drilling, to
16 access oil and gas resources. NSO stipulations would preclude the use of the surface for the development
17 of oil and gas, but would still allow the recovery of these resources at a greater economic cost. Precluding
18 surface disturbance in areas with NSO stipulations would decrease the number of wells drilled during the
19 planning period. Among the acres managed as NSO would be areas covered by the Three Rivers locatable
20 mineral withdrawal. The closure of approximately 20,339 acres to oil and gas leasing in Alternative B
21 would eliminate opportunities to develop oil and gas resources in those areas.

22 The projection for oil and gas development for Alternative D is 23 wells over 15 years. This is the
23 second-lowest number of wells projected for any of the alternatives; it is more than for Alternative B but
24 less than for Alternatives C and A. The large acreage closed to leasing (approximately 4% of the planning
25 area) or managed as NSO (approximately 20% of the planning area) under Alternative D is the primary
26 reason that this alternative has the second-lowest number of projected wells.

27 Under this alternative, geophysical operations would not be allowed in areas closed to leasing.
28 Geophysical operations would be allowed in areas managed as NSO under the following conditions:

- 29 • No new road construction or road improvements
- 30 • No staging areas
- 31 • Full reclamation of all surface disturbance
- 32 • No geophysical operations in crucial pronghorn habitat from May 15 through June 15

33 These restrictions on geophysical operations could increase economic costs for operators and could delay
34 some development activities.

35 Under this alternative, restrictions on surface-disturbing activities within habitat for threatened,
36 endangered, and sensitive species would limit oil and gas development. These restrictions are described in
37 more detail in Section 4.11.

38 This alternative would require implementation of BMPs that minimize the potential resource impacts
39 associated with oil and gas development (see Appendix C for a list of BMPs by resource). These BMPs
40 could increase the economic costs associated with oil and gas development and could delay some oil and
41 gas development activities.

1 **4.16 SPECIAL DESIGNATIONS**

2 **4.16.1 Areas of Critical Environmental Concern**

3 This section presents potential impacts to areas of critical environmental concern from implementing
 4 management actions presented in Chapter 2. Existing conditions concerning ACECs are described in
 5 Chapter 3.

6 **4.16.1.1 Assumptions**

- 7 • The analysis of effects on ACECs from the implementation of management actions is limited to
 8 the protection of relevant and important values and the prevention of damage to them.

9 **4.16.1.2 Dry Lake Archaeological District Area of Critical Environmental Concern**

10 **Impacts from Alternative A**

11 Applying an NSO stipulation to mineral leasing in the Dry Lake Archaeological District ACEC would
 12 prevent surface disturbance from mineral development, which would protect cultural resources, prevent
 13 erosion and runoff from development activities, and protect the relevant and important values of the
 14 ACEC. However, under Alternative A, an exception would be allowed in circumstances in which there is
 15 no other economic and technically feasible access to the fluid mineral resources of the area. The required
 16 block cultural survey and treatment plan would lay out mitigation measures to prevent adverse effects to
 17 historic properties depending on the site type. However, the treatment plan would not prevent surface
 18 disturbance or visual intrusions in the ACEC. The introduction of visual, atmospheric, or audible
 19 elements could diminish the integrity of the cultural landscape and result in adverse effects to the relevant
 20 and important values of the ACEC.

21 Table 4-40 shows the acreage of mineral leasing categories for the Dry Lake Archaeological District
 22 ACEC for each alternative.

23 **Table 4-40. ACECs by Mineral Leasing Category**

Oil and Gas Leasing Categories	Alternative A	Alternative B	Alternative C	Alternative D
Dry Lake Archaeological District ACEC				
Open and CSU/TL	0	0	0	0
NSO	18,009	14,212	18,009	16,802
Closed	0	3,797	0	1,207
Tidwell Draw ACEC				
Open	0	0	0	0
CSU/TL	0	0	899	0
NSO	899	899	0	899
Closed	0	0	0	0
Big Flat Tops ACEC				
Open, CSU/TL, and NSO	0	0	0	0
Closed	192	192	192	192

1 **Suspended and Protested Lease Decisions**

2 There are no suspended or protested leases within the Dry Lake Archaeological District ACEC, and
3 therefore there would be no impacts related to these decisions.

4 **Impacts from Alternatives B, C, and D**

5 Applying an NSO stipulation to mineral leasing in the Dry Lake Archaeological District ACEC would
6 prevent surface disturbance from mineral development, which would protect cultural resources, prevent
7 erosion and runoff from development activities, and protect the relevant and important values of the
8 ACEC. There would be no exceptions to the NSO allocation under this alternative.

9 Under Alternatives B and D, approximately 3,797 acres and 1,207 acres, respectively, would be closed to
10 oil and gas leasing to protect other resource values. Although this would not change the impacts from oil
11 and gas leasing within the ACEC because both NSO stipulations and closed designations do not allow for
12 surface disturbance, there would be indirect beneficial impacts to the Dry Lake Archaeological District
13 ACEC from preventing surface disturbance outside the ACEC. This would protect portions of the
14 viewshed from the ACEC and could protect the area’s location, setting, or feeling; the setting that
15 contributes to the overall integrity of a cultural resource site; or properties of traditional religious and
16 cultural importance.

17 Applying lease notices for cultural resources under Alternatives B, C, and D to mitigate the potential impacts to
18 traditional cultural properties through consultation and to protect high-potential sites would provide additional
19 protections and therefore beneficial impacts to the ACEC through avoidance of sites and maintenance of the existing
20 landscape. Alternatives B and D would add stipulations requiring a viewshed analysis to maintain and protect the
21 viewshed and intrinsic values of the ACEC, whereas Alternatives A and C would have no such requirement.
22 Alternative B would require a viewshed analysis for cultural sites that are eligible for the National Register of
23 Historic Places, which would offer slightly greater protections than would Alternative D, which would require only
24 a viewshed analysis for eligible sites when the location, setting, or feeling contribute to the overall integrity of a site
25 or for properties of traditional religious and cultural importance to a Native American tribe.

26 **Suspended and Protested Lease Decisions**

27 There are no suspended or protested leases within the Dry Lake Archaeological District ACEC, and
28 therefore there would be no impacts related to these decisions.

29 **4.16.1.3 Tidwell Draw (Uranium Mining Districts Area of Critical Environmental**
30 **Concern)**

31 **Impacts from Alternatives A, B, and D**

32 Applying an NSO stipulation to mineral leasing in the Tidwell Draw ACEC would prevent surface
33 disturbance from mineral development, which would protect historic resources, prevent erosion and
34 runoff from development activities, and protect the relevant and important values of the ACEC. There
35 would be no exceptions to the NSO allocation under these alternatives.

36 Table 4-40 shows the acreage of mineral leasing categories for the Tidwell Draw ACEC.

37 **Suspended and Protested Lease Decisions**

38 There are no suspended or protested leases within the Tidwell Draw ACEC, and therefore there would be
39 no impacts related to these decisions.

1 **Impacts from Alternative C**

2 Applying a CSU stipulation to mineral leasing in the Tidwell Draw ACEC would allow for surface
3 disturbance within the ACEC. However, no surface disturbance would be allowed that would adversely
4 impact the physical evidence of past mining activities. Additionally, compensatory mitigation including
5 restoration of historic sites, conducting oral histories, or developing interpretive materials may be
6 required. Therefore, there would be no impacts to the relevant and important values of the ACEC.

7 **Suspended and Protested Lease Decisions**

8 There are no suspended or protested leases within the Tidwell Draw ACEC, and therefore there would be
9 no impacts related to these decisions.

10 **4.16.1.4 Big Flat Tops Area of Critical Environmental Concern**

11 **Impacts Common to All Alternatives**

12 The Big Flat Tops ACEC would be closed to oil and gas leasing under all alternatives, which would
13 preclude impacts to the relevant and important values of the ACEC from oil and gas development
14 including surface disturbance, loss of vegetation, and introduction and spread of non-native, invasive
15 species and noxious weeds into the relict vegetation community.

16 Table 4-40 shows the acreage of mineral leasing categories for the Big Flat Tops ACEC.

17 **Suspended and Protested Lease Decisions**

18 There are no suspended or protested leases within the Big Flat Tops ACEC, and therefore there would be
19 no impacts related to these decisions.

20 **4.16.2 Wild and Scenic Rivers**

21 This section presents potential impacts to suitable WSRs from implementing management actions
22 presented in Chapter 2. Existing conditions concerning suitable WSRs are described in Chapter 3.

23 **4.16.2.1 Assumptions**

- 24 • The analysis of effects on WSRs is limited to the protection of the outstandingly remarkable
25 values (ORVs) and the prevention of damage to them.
- 26 • Existing suitable WSR designations would continue.

27 **4.16.2.2 Impacts Common to All Alternatives**

28 There would be no impacts to WSRs that are common to all alternatives.

29 **4.16.2.3 Impacts from Alternative A**

30 Applying an NSO stipulation to the suitable WSR segment along the Green River would prevent mineral
31 development and the associated surface disturbance that could adversely impact vegetation, soils, and
32 scenic values within the suitable WSR segment. Preventing surface disturbance could support the ORVs
33 of this river segment.

34 Under Alternative A, areas beyond the protected WSR corridor would be open to oil and gas leasing
35 subject to standard terms and conditions, and in some cases these areas could be visible from the river.
36 Development of oil and gas in these areas would have an adverse impact on the scenery, which is an ORV
37 of the WSR segment.

1 **Suspended and Protested Lease Decisions**

2 There are no suspended or protested leases within the suitable WSR segment along the Green River, and
3 therefore there would be no impacts related to these decisions.

4 **4.16.2.4 Impacts from Alternative C**

5 Applying an NSO stipulation to the suitable WSR segment along the Green River would prevent mineral
6 development and the associated surface disturbance that could adversely impact vegetation, soils, and
7 scenic values within the suitable WSR segment. Preventing surface disturbance could support the ORVs
8 of this river.

9 Under Alternative C, all lands within 1.0 mile of the Green River Labyrinth Canyon rim would be
10 managed subject to NSO stipulations. This would have a beneficial impact by protecting the scenery
11 within the viewshed of the river corridor, which is an ORV of the WSR segment.

12 **Suspended and Protested Lease Decisions**

13 There are no suspended or protested leases within the suitable WSR segment along the Green River, and
14 therefore there would be no impacts related to these decisions.

15 **4.16.2.5 Impacts from Alternatives B and D**

16 Impacts to the suitable WSR segment would be similar to those described under Alternatives A and C,
17 except that oil and gas leasing closures would add further protection to these suitable WSRs where
18 scenery is an ORV. Closing the suitable WSR segment to mineral leasing would preclude drilling from
19 adjacent lands to access the underlying federal mineral resources.

20 Under Alternatives B and D, all lands within 1.0 mile of the Green River Labyrinth Canyon rim along the
21 suitable WSR segment would be closed to oil and gas leasing and development. This would have a
22 beneficial impact by protecting the scenery within the viewshed of the river corridor, which is an ORV of
23 the WSR segment.

24 **Suspended and Protested Lease Decisions**

25 There are no suspended or protested leases within the suitable WSR segment along the Green River, and
26 therefore there would be no impacts related to these decisions.

27 **4.16.3 National Historic Trails**

28 **4.16.3.1 Old Spanish National Historic Trail**

29 This section presents potential impacts to the Old Spanish National Historic Trail (OST) from
30 implementing management actions presented in Chapter 2. Existing conditions concerning the OST are
31 described in Chapter 3.

32 **Assumptions**

- 33 • Under all alternatives, the OST would be managed to safeguard the nature and purposes of the
34 trail. This would minimize adverse impacts to the resources, qualities, values, associated settings,
35 and primary use or uses of the trail.
- 36 • Under all alternatives, proposed management would not substantially interfere with or be
37 incompatible with the nature and purposes of the OST.
- 38 • A majority of the OST within the planning area is leased and could be subject to oil and gas
39 development according to the terms and conditions of the existing leases.

1 **4.16.3.2 Impacts from Alternative A**

2 Under Alternative A, a CSU stipulation would be applied along the OST corridor that would require
3 cultural resources inventories for all federal undertakings. Inventories could be waived if there is
4 extensive previous natural ground disturbance, existing cultural resources inventories indicating no
5 previous human occupation and/or natural resources conditions that make the area unfavorable to the
6 presence of cultural resources. Impacts to cultural resources would be unlikely under this alternative due
7 to the requirements related to the Class III inventories; however, the natural condition of the trail
8 including the scenic integrity could be altered because there could be new surface disturbance and
9 infrastructure present in and along the trail. This would result in adverse impacts to the scenic integrity of
10 the trail.

11 **Suspended and Protested Lease Decisions**

12 There are no suspended or protested leases within the OST, and therefore there would be no impacts
13 related to these decisions.

14 **4.16.3.3 Impacts from Alternative B**

15 Under Alternative B, an NSO stipulation would be applied within 3.0 miles of the OST in the planning
16 area. This stipulation would apply to the congressionally designated route and to any draft refinements of
17 this route. There would be no exceptions, waivers, or modifications to the NSO stipulation.

18 Applying an NSO stipulation along the congressionally designated route and to any draft refinements of
19 this route would preserve the historic and scenic integrity and natural condition of the trail in its entirety,
20 including the viewshed. When compared to the area protected by Alternatives A, C, and D, the area
21 protected by Alternative B would be greater. The NSO stipulation would apply to a 3.0-mile-wide buffer
22 on both sides of the entire OST in the planning area for a total area of 31,102 acres.

23 **Suspended and Protested Lease Decisions**

24 There are no suspended or protested leases within the OST, and therefore there would be no impacts
25 related to these decisions.

26 **4.16.3.4 Impacts from Alternative C**

27 Under Alternative C, a CSU stipulation would be applied to high-potential sites and segments along the
28 congressionally designated OST and to any draft refinements of this route to reduce and potentially
29 eliminate the impacts to the historical integrity of the trail. The stipulation to maintain the current setting
30 within 2.0 miles of the trail (an area covering 22,317 acres) may require modifications to the surface use
31 plan of operations to protect the OST resources, qualities, values, and associated settings, and would
32 preserve the historic and scenic integrity and natural condition of the trail in its entirety, including the
33 viewshed within those 2.0 miles. There would be no exceptions or modifications to the stipulations
34 allowed under this alternative. A waiver of this stipulation would be allowed if it is determined that the
35 OST does not exist within the lease area.

36 However, outside of the 2.0 miles there could be impacts to the scenic integrity and natural condition of
37 the trail if development were to occur within the viewshed of the trail. The protections to the scenic
38 integrity of the OST would be greater under Alternative C than they would be under Alternative A but
39 less so than under Alternatives B and D.

40 **Suspended and Protested Lease Decisions**

41 There are no suspended or protested leases within the OST, and therefore there would be no impacts
42 related to these decisions.

1 **4.16.3.5 Impacts from Alternative D**

2 Under Alternative D, an NSO stipulation would be applied within 1.0 mile (11,452 acres) of the OST within the
3 planning area. This stipulation would apply to the congressionally designated route and to any draft refinements of
4 this route. The stipulation could be waived if the OST does not exist in the lease area. Applying an NSO stipulation
5 along the congressionally designated route and to any draft refinements of this route would preserve the historic
6 integrity and natural condition of the trail in its entirety, including its viewshed.

7 CSU stipulations would be applied within 1 to 3 miles of the OST. The CSU stipulations would require that visual
8 resource contrast ratings, including visual simulations, be completed if the area falls within the viewshed of the trail.
9 Assessing the visual contrasts and simulating the impacts would allow for targeted mitigations, thereby reducing the
10 visual impacts of a proposed action. The protections to the scenic integrity under Alternative D would be greater
11 than those under Alternatives A and C but not as great as the protections under Alternative B.

12 **Suspended and Protested Lease Decisions**

13 There are no suspended or protested leases within the OST, and therefore there would be no impacts
14 related to these decisions.

15 **4.17 SOCIOECONOMICS**

16 [Information to be provided by the BLM for inclusion in the public draft EA.]

17 **4.18 HEALTH AND SAFETY**

18 This section presents the potential impacts to health and safety from implementing management actions
19 presented in Chapter 2. Existing conditions concerning health and safety are described in Chapter 3.

20 **4.18.1 Assumptions**

- 21 • The risk of health and safety impacts is proportional to the level of oil and gas activity in the
22 planning area.
- 23 • The only occupied structures on BLM-administered lands in the planning area are temporary,
24 secondary living quarters (i.e., trailers) in support of livestock grazing.

25 **4.18.2 Impacts from Alternative A (No Action)**

26 Under Alternative A, BLM estimates that 28 oil and gas wells would be drilled in the planning area over
27 the next 15 years. Compared to the other alternatives considered in the MLP/EA, Alternative A is
28 estimated to result in the highest number of oil and gas wells drilled over the next 15 years. Therefore, it
29 is assumed that Alternative A would also result in the greatest use of oil and gas exploration, drilling, and
30 extraction equipment and the highest number of employees and vehicle trips needed for well drilling,
31 completion, operation, and maintenance. For the purposes of this analysis, BLM assumes that the
32 potential risk to health and safety is proportional to the level of oil and gas activity. Therefore, Alternative
33 A would have the highest potential for risk to health and safety among the alternatives considered in the
34 MLP/EA.

35 Because there are no permanent structures on the BLM-administered public lands in the planning area,
36 there would be no anticipated oil and gas development near occupied structures on BLM-administered
37 lands under Alternative A. Health and safety impacts that could occur under Alternative A include a risk
38 of potential injuries to workers from accidents that might occur during oil and gas exploration, well
39 drilling, well stimulation and completion, operation of facilities, and reclamation activities. These
40 accidents may involve explosions, presence of hazardous vapors or chemicals, pinch points on equipment
41 and vehicles, or other industrial accidents. Increased traffic associated with the development and

1 operation of oil and gas facilities would pose a risk for vehicular accidents for both oil and gas workers
2 and the general public visiting and traveling on BLM-administered public lands. Other impacts to health
3 and safety could include spills or the presence of hazardous materials produced by or used in drilling for
4 oil and gas. Hazardous materials that could be produced by oil and gas wells include produced oil, gas,
5 and water, as well as chemicals such as hydrogen sulfide.

6 As described in Section 3.18, health and human safety on BLM-administered public lands is a
7 management priority for the BLM. The potential for impacts to health and safety would be managed in
8 compliance with applicable federal and state laws, regulations, and policies, such as the Occupational
9 Safety and Health Act of 1970, as amended (29 USC 651 et seq.).

10 **4.18.2.1 *Suspended and Protested Lease Decisions***

11 Under Alternative A, 45,043 acres of the suspended and protested leases would be issued subject to
12 standard terms and conditions, and 113 acres of protested leases would be issued subject to NSO
13 stipulations. If the leases were subsequently developed, the possible impacts to health and safety would be
14 the same as those described above for Alternative A. The impacts to health and safety from issuing the
15 leases subject to the terms and conditions contained within the Price and Richfield ROD/RMPs
16 (Alternative A-2) would be the same as the impacts from rescinding the suspensions on the suspended
17 leases (Alternative A-1).

18 **4.18.3 Impacts from Alternative B**

19 Under Alternative B, BLM estimates that seven oil and gas wells would be drilled in the planning area
20 over the next 15 years. Compared to the other alternatives considered in the MLP/EA, Alternative B is
21 estimated to result in the fewest oil and gas wells drilled over the next 15 years. Therefore, it is assumed
22 that Alternative B would also result in the lowest use of oil and gas exploration, drilling, and extraction
23 equipment and the lowest number of employees and vehicle trips needed for well drilling, completion,
24 operation, and maintenance. For the purposes of this analysis, BLM assumes that the potential risk to
25 health and safety is proportional to the level of oil and gas activity. Therefore, Alternative B would have
26 the lowest potential for risk to health and safety among the alternatives considered in the MLP/EA.

27 Because there are no permanent structures on BLM-administered public lands in the planning area, there
28 would be no anticipated oil and gas development near occupied structures on BLM-administered lands
29 under Alternative B. The types of health and safety impacts that could occur under Alternative B would
30 be the same as those described under Alternative A.

31 As described in Section 3.18, health and human safety on BLM-administered public lands is a
32 management priority for BLM. The potential for impacts to health and safety would be managed in
33 compliance with applicable federal and state laws, regulations, and policies, such as the Occupational
34 Safety and Health Act of 1970, as amended (29 USC 651 et seq.).

35 **4.18.3.1 *Suspended and Protested Lease Decisions***

36 Under Alternative B, BLM would cancel all suspended leases and resolve the protests on the protested
37 leases and deny the leases. The existing health and safety conditions in the areas of suspended and
38 protested leases would not be affected by oil and gas activities resulting from operators exploring for and
39 developing oil and gas resources.

40 **4.18.4 Impacts from Alternative C**

41 Under Alternative C, BLM estimates that 27 oil and gas wells would be drilled in the planning area over
42 the next 15 years. Alternative C is estimated to result in only slightly fewer oil and gas wells drilled in the
43 planning area over the next 15 years compared to Alternative A, and more wells than Alternatives B and

1 D. Therefore, it is assumed that Alternative C would also have the second highest use of oil and gas
2 exploration, drilling, and extraction equipment and the second highest number of employees and vehicle
3 trips needed for well drilling, completion, operation, and maintenance. For the purposes of this analysis,
4 BLM assumes that the potential risk to health and safety is proportional to the level of oil and gas activity.
5 Therefore, Alternative C would have the second highest risk to health and safety among the alternatives
6 considered in the MLP/EA.

7 Because there are no permanent structures on BLM-administered public lands in the planning area, there
8 would be no anticipated oil and gas development near occupied structures on BLM-administered lands
9 under Alternative C. The types of health and safety impacts that could occur under Alternative C would
10 be the same as those described under Alternative A.

11 As described in Section 3.18, health and human safety on BLM-administered public lands is a
12 management priority for BLM. The potential for impacts to health and safety would be managed in
13 compliance with applicable federal and state laws, regulations, and policies, such as the Occupational
14 Safety and Health Act of 1970, as amended (29 USC 651 et seq.).

15 ***4.18.4.1 Suspended and Protested Lease Decisions***

16 Under Alternative C, 5,073 acres of the suspended and protested leases would be issued subject to
17 standard terms, 39,766 acres would be issued subject to CSU or TL stipulations, and 318 acres would be
18 issued subject to NSO stipulations. If the leases were subsequently developed, the possible impacts to
19 health and safety would be the same as those described above for Alternative A.

20 **4.18.5 Impacts from Alternative D**

21 Under Alternative D, BLM estimates that 23 oil and gas wells would be drilled in the planning area over
22 the next 15 years. Alternative D is estimated to result in slightly fewer oil and gas wells drilled in the
23 planning area over the next 15 years compared to Alternatives A or C, and more wells than Alternative B.
24 Therefore, it is assumed that Alternative D would also have the third highest use of oil and gas
25 exploration, drilling, and extraction equipment and the third highest number of employees and vehicle
26 trips needed for well drilling, completion, operation, and maintenance. For the purposes of this analysis,
27 BLM assumes that the potential risk to health and safety is proportional to the level of oil and gas activity.
28 Therefore, Alternative D would have the third highest risk to health and safety among the alternatives
29 considered in the MLP/EA.

30 Because there are no permanent structures on BLM-administered public lands in the planning area, there
31 would be no anticipated oil and gas development near occupied structures on BLM-administered lands
32 under Alternative D. The types of health and safety impacts that could occur under Alternative D would
33 be the same as those described under Alternative A.

34 As described in Section 3.18, health and human safety on BLM-administered public lands is a
35 management priority for BLM. The potential for impacts to health and safety would be managed in
36 compliance with applicable federal and state laws, regulations, and policies, such as the Occupational
37 Safety and Health Act of 1970, as amended (29 USC 651 et seq.).

38 ***4.18.5.1 Suspended and Protested Lease Decisions***

39 Under Alternative D, 42,025 acres of the suspended and protested leases would be issued subject to CSU
40 or TL stipulations, and 3,132 acres would be issued subject to NSO stipulations. If the leases were
41 subsequently developed, the possible impacts to health and safety would be the same as those described
42 above for Alternative A.

1 **4.19 CUMULATIVE IMPACTS**

2 This section defines cumulative impacts, describes the methodology used for assessing these impacts,
3 describes projects and activities considered in this assessment, and presents the results organized by
4 resource topic.

5 The CEQ regulations for implementing NEPA define *cumulative impacts* as “The impacts on the
6 environment which result from the incremental impact of the action when added to other past, present,
7 and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person
8 undertakes such other actions. Cumulative impacts can result from individually minor but collectively
9 significant actions taking place over a period of time” (40 CFR 1508.7).

10 The full effect of any single action cannot be determined by considering that action in isolation; rather, it
11 must be determined by considering the likely result of that action in conjunction with many others. The
12 cumulative impact analysis for the MLP/EA evaluates the potential impacts associated with the
13 management alternatives in combination with the potential impacts associated with other relevant
14 activities that have occurred, are occurring, or are likely to occur within the area of analysis.

15 **4.19.1 Impact Assessment Methodology**

16 BLM planning-level decisions are programmatic decisions that allocate resources or specify allowable
17 uses in all or portions of the planning area to emphasize certain management direction. As a result, the
18 cumulative impact analysis is also broad and general in nature. The analysis presents ranges and
19 qualitative conclusions as opposed to bounded quantified details. More detailed cumulative impacts
20 analyses will be considered in subsequent NEPA documents that analyze specific projects or programs
21 based on the information available at the time those analyses are prepared.

22 An analysis and a description of the identifiable effects of past actions are required to the extent they are
23 relevant and useful in analyzing whether the reasonably foreseeable effects of the alternatives may have a
24 continuing, additive, and significant relationship to those present effects. Based on scoping, agencies have
25 discretion in determining what information is useful concerning the effects of past actions for the
26 agency’s analysis of the effects of the present action and alternatives. Effects of past actions and activities
27 on resources are manifested in the current condition of the resource, which is described in Chapter 3
28 (Affected Environment) for resources on BLM-administered public lands in the planning area. Specific
29 information presented in Chapter 3 is not repeated here.

30 CEQ guidance directs the cumulative impact analysis to focus on important issues of national, regional, or
31 local significance. The analysis presented here focuses on alternative mineral leasing and development
32 decisions in conjunction with other past, present, and reasonably foreseeable actions. Not all issues
33 identified for direct or indirect impact assessment in the MLP/EA are analyzed for cumulative effects.
34 Because of the wide geographic scope of a cumulative impact assessment and the variety of activities
35 assessed, cumulative impacts are commonly examined at a more qualitative and less-detailed level than
36 are direct and indirect impacts.

37 Public documents prepared by federal, state, and local government agencies are the primary sources of
38 information regarding past, present, and reasonably foreseeable actions considered in the cumulative
39 effects analysis. Actions undertaken by private persons and entities are assumed to be captured in the
40 information made available by such agencies. Speculative or uncommitted projects are not included in the
41 projections. These projections are not planning decisions, and using them in this analysis does not
42 constitute approval by the BLM or any authorizing agency. Furthermore, these projections do not set a
43 limit or cap on future BLM actions. Unforeseen changes in such factors as economics, public demand,
44 and federal, state, and local laws and policies could result in different outcomes than those projected for
45 this analysis.

1 Potential cumulative impacts are described for each affected resource within a defined cumulative impact
2 analysis area (CIAA), which is also described in Chapter 3 as the analysis area for each resource. The
3 CIAA covers different geographic areas depending on the specific resource being evaluated. CIAAs that
4 extend beyond the planning area are largely for resources that are mobile or that migrate, compared to
5 resources that are stationary. For example, the air quality CIAA is large because it is based on the
6 complex interaction between climatic factors, terrain, and the potential for significant impacts to occur in
7 sensitive areas within the airshed. Smaller CIAAs were established for resources that are stationary such
8 as cultural resources or minerals. In some cases, these CIAAs might be the same as the planning area
9 boundary. Activities and development that occur within or outside the CIAAs have the potential to create
10 cumulative impacts on the specific resource being analyzed.

11 The BLM considered the following factors in this cumulative impact assessment:

- 12 • Federal, non-federal, and private actions
- 13 • The potential for effects to cross political and administrative boundaries
- 14 • Other spatial and temporal characteristics of each affected resource
- 15 • The comparative scale of cumulative impacts across alternatives
- 16 • Scoping comments.

17 Temporal and spatial boundaries used in the cumulative analysis are developed on the basis of resources
18 of concern and actions that might contribute to an impact. The baseline year for the cumulative impacts
19 analysis is 2017. The reasonably foreseeable actions used in this analysis are projected using a 15-year
20 planning horizon.

21 **4.19.2 Projects and Activities Considered**

22 The following current and reasonably foreseeable future activities were identified as having the greatest
23 likelihood to generate potential cumulative impacts when added to activities associated with the
24 alternatives for the MLP/EA:

25 Oil and gas

- 26 • Actions described in the RFD for oil and gas (see Appendix A).

27 Recreation

- 28 • Continued maintenance and use of the Horseshoe Canyon Trailhead (Richfield Field Office)
- 29 • Continued issuance and some increase in BLM Special Recreation Permits and recreationists
30 traveling through the Richfield Field Office portion of the MLP/EA planning area to other
31 destinations. However, the Richfield Field Office ROD/RMP decisions for the Dirty
32 Devil/Robbers Roost SRMA limit the size and number of groups in the area, which will limit
33 opportunities for increased BLM Special Recreation Permits groups, especially in the spring and
34 fall (Richfield Field Office).
- 35 • Continued issuance of BLM Special Recreation Permits for Labyrinth Canyon river trips (Price
36 Field Office)

37 Travel management

- 38 • The Richfield Field Office will be reanalyzing portions of the TMP approved in conjunction with
39 the 2008 Richfield Field Office ROD/RMP. The updated TMP for the Henry Mountains Travel
40 Management Area will include the Richfield Field Office portions of the MLP/EA planning area.
41 It is anticipated that this TMP effort will be started during FY 2017 (Richfield Field Office).
- 42 • Development of the San Rafael Desert TMP (Price Field Office)

1 Livestock grazing

- 2 • Grazing permittees in the Sweetwater, Pasture Canyon, and Jeffery Well Allotments continue to
- 3 look for opportunities to develop water through wells and pipelines to allow for better livestock
- 4 distribution and reduce the need to haul water. Preliminary discussions have occurred regarding a
- 5 pipeline extension from Texas Hill south and regarding wells within Pasture Canyon and Jeffery
- 6 Well Allotments (Richfield Field Office).
- 7 • Development of the Texas Corp Well 1 (Price Field Office)
- 8 • Development of the Dugout Allotment boundary fence (Price Field Office)

9 Paleontological resources

- 10 • Development of additional parking and interpretation infrastructure at Fossil Point (Price Field
- 11 Office)

12 Fish and wildlife

- 13 • Continued implementation of the San Rafael River Restoration Project (Price Field Office)

14 Lands and realty

- 15 • Issuance of the Gillies Ranch Road right-of-way (Price Field Office)
- 16 • Issuance of a right-of-way for the Emery Telcom Fiber Optic Line along State Route 24 (Price
- 17 Field Office)

18 Activities and development that occur within the CIAAs have the potential to create cumulative impacts
19 on the specific resource being analyzed. Anticipated oil and gas projects within the planning area are
20 encompassed by the oil and gas RFD for the planning area. The projects listed above are not presented as
21 an exhaustive list of actions; however, every effort has been made to present a representative list of
22 actions that could contribute to cumulative impacts. Past decisions and management that continue to
23 affect cumulative impacts are described in Chapter 3.

24 **4.19.3 Cumulative Impacts by Resource**

25 ***4.19.3.1 Air Quality***

26 The CIAA used to analyze cumulative impacts to air quality is the planning area, which encompasses
27 approximately 525,000 acres of land, along with the states of Utah, Colorado, Arizona, and New Mexico.
28 These states, which share regional air quality issues with the planning area, are included in the analysis
29 area for the consideration of cumulative impacts.

30 Past and present actions that have affected and would likely continue to affect air quality in the planning
31 area include surface disturbance resulting from oil and gas development and associated infrastructure,
32 geophysical exploration, ranching and livestock grazing, range improvements, recreation (including OHV
33 use), authorization of ROWs for utilities and other uses, and road development. Past and present actions
34 in Utah, Colorado, Arizona, and New Mexico that have affected and would likely continue to affect air
35 quality in the CIAA are too numerous to list here but would include the development of power plants; the
36 development of energy sources such as oil, gas, and coal; the development of highways and roads; and the
37 development of various industries that emit pollutants. The reasonably foreseeable future activities listed
38 in Section 4.19.2, especially oil and gas development, could also result in impacts to air quality. These
39 types of actions and activities can reduce air quality through emissions of criteria pollutants (including
40 fugitive dust), VOCs, and HAPs, as well as contribute to deposition impacts and to a reduction in
41 visibility.

1 As discussed in Section 3.2.2.1, O₃ and PM are of particular concern in the southwestern United States.
2 Section 4.2.3.3 summarizes key points from a regional O₃ analysis conducted for the Moab MLP. In
3 particular, meteorological conditions can play a major role in source contributions to monitored or
4 modeled values: predominant winds can transport O₃ across the region. In addition, for O₃, sources
5 outside the region can contribute to high O₃ concentrations. Finally, oil and gas emissions account for a
6 small amount of regional O₃ source category emissions (BLM 2015). With regard to PM, the Moab MLP
7 concludes that regional ambient PM_{2.5} concentrations are likely well below the NAAQS, based on
8 IMPROVE monitoring at Canyonlands National Park, the lack of large emission sources, and the
9 dispersed population. However, it was noted that little monitoring data exist to validate this conclusion
10 and that PM_{2.5} can contribute to regional haze and visibility degradation in Class I areas at lower ambient
11 concentrations than the NAAQS (BLM 2015).

12 The Moab MLP also examines the state contribution to light extinction as a way to evaluate contributions
13 to visibility from the Moab MLP planning area. Arizona is the dominant source of visibility-reducing
14 components (over 21%), followed by Utah (less than 2%), New Mexico (approximately 1%), then
15 Colorado (less than 0.5%) (BLM 2015). From a regional perspective, Utah's contribution to light
16 extinction is relatively small.

17 Oil and gas leasing and development would continue in the planning area under all alternatives, and the
18 projected development and associated surface-disturbing activities would result in impacts to air quality.
19 However, these impacts would be limited through the use of NSO stipulations, CSU and/or TL
20 stipulations, and the closure of areas to oil and gas development. Under Alternative A, 92.5% of the
21 planning area would be open to oil and gas development subject to standard lease terms and conditions or
22 open to oil and gas development with CSU and/or TL stipulations (7.5% would have an NSO stipulation
23 or be closed to leasing). Under Alternative B, 21.7% of the planning area would be open to oil and gas
24 development subject to standard lease terms and conditions or open to oil and gas development with CSU
25 and/or TL stipulations. Alternative C would result in 88.4% of the planning area as open to oil and gas
26 development subject to standard lease terms and conditions or open to oil and gas development with CSU
27 and/or TL stipulations. Alternative D would result in 75.1% of the planning area as open to oil and gas
28 development subject to standard lease terms and conditions or open to oil and gas leasing with CSU
29 and/or TL stipulations. Based on these percentages, Alternative B would have the lowest cumulative
30 impact to air quality, followed by Alternatives D and C. However, based on the air quality analysis in
31 Section 4.2, none of the alternatives are expected to have noticeable cumulative impacts to air quality at
32 the regional level.

33 **4.19.3.2 Climate Change**

34 Because climate change and global warming are global phenomena, the direct and indirect effects
35 analysis for climate change in Section 4.3 (including GHG emissions from the projected oil and gas
36 development) is also an analysis of the projected development's cumulative effects for the purposes of
37 this NEPA document. Consistent with 2016 CEQ guidance, the BLM has determined that this analysis
38 "will adequately address the cumulative impacts for climate change from the proposed action and its
39 alternatives and a separate cumulative effects analysis for GHG emissions is not needed" (CEQ 2016).

40 **4.19.3.3 Soils**

41 The CIAA used to analyze cumulative impacts to soil resources is the subwatersheds (HUC 12) crossed
42 by the planning area (Map 3-1). The CIAA covers approximately 901,313 acres and was selected because
43 it represents a natural boundary within which changes to soils within the planning area could affect soils,
44 water, vegetation, or other resources on BLM-administered public lands.

45 Past and present actions that have affected and will continue to affect soils in the CIAA include surface
46 disturbance as a result of oil and gas development and associated infrastructure, geophysical exploration,

1 livestock grazing, range improvements, OHV use, authorization of rights-of-way, and recreation. These
2 activities could result in short-term and long-term impacts to soils by contributing to reduced soil
3 productivity, soil compaction, loss of biological soil crusts, soil erosion, and surface runoff. Development
4 activities would also increase the potential for fugitive dust, which could contribute to regional dust-on-
5 snow issues and associated earlier and faster snowmelt events and reduced water yield to the Colorado
6 River and its tributaries. These changes, along with ongoing landscape-scale phenomena including
7 climate change and drought, would lead to a loss of soil productivity and increase in soil erosion and soil
8 loss in the CIAA over time.

9 Oil and gas development and associated infrastructure are anticipated to cause the greatest amount of
10 reasonably foreseeable future surface disturbance and impacts to soils in the planning area through
11 construction of well pads, roads, pipelines, and other infrastructure. The impacts would likely be greater
12 where mineral development is more intense, in areas where development overlaps sensitive soils (e.g.,
13 sandy wind erodible soils, steep slopes, or saline soils), and on state and private lands where relatively
14 less protections are afforded to natural resources. Increased mineral development could lead to an
15 increase in the potential for reduced soil productivity and soil erosion.

16 Under all alternatives in the MLP/EA, the projected oil and gas development would result in surface
17 disturbance, which would contribute to the cumulative impacts to soils. The alternatives that would be
18 anticipated to result in more disturbance associated with oil and gas development would have a larger
19 contribution to the cumulative impacts to soils. Alternative A is anticipated to result in the most surface
20 disturbance associated with oil and gas development, followed in descending order by Alternatives C, D,
21 and B. The application of updated state-of-the-art BMPs to site-specific projects and requirements for
22 reclamation and interim reclamation and protection of biological soil crusts under Alternatives B, C, and
23 D would help minimize and reduce over time the relative contribution of impacts from oil and gas
24 development to the total impact to soils in the CIAA.

25 **4.19.3.4 Water Resources**

26 The CIAA used to analyze cumulative impacts on water and riparian resources is the subwatersheds
27 (HUC 12) crossed by the planning area (Map 3-1). The CIAA covers approximately 901,313 acres and
28 was selected because it represents a natural boundary within which changes to water resources in the
29 planning area could affect water quality, riparian habitats, wildlife, or other resources on BLM-
30 administered public lands.

31 Past and present actions that have affected and will continue to affect water and riparian areas in the
32 CIAA include surface disturbance as a result of oil and gas development and associated infrastructure,
33 geophysical exploration, agriculture, livestock grazing, range improvements, OHV use, authorization of
34 rights-of-way, and recreation. These activities could result in short-term and long-term impacts on water
35 and riparian areas by contributing to loss of vegetation and biological soil crusts, soil erosion, surface
36 runoff, and by introducing sediment and pollutants into waterways. These changes, along with ongoing
37 landscape-scale phenomena including climate change and drought, would lead to an increase in soil
38 erosion and reduction in water quality in the CIAA over time.

39 Oil and gas development and associated infrastructure are anticipated to cause the greatest amount of
40 reasonably foreseeable future surface disturbance and impacts to water and riparian resources in the
41 planning area through construction of well pads, roads, pipelines, and other infrastructure. The impacts
42 would likely be greater where mineral development is more intense, in areas where development overlaps
43 sensitive soils (e.g., sandy wind erodible soils, steep slopes, or saline soils), where development crosses
44 ephemeral drainages or occurs near impaired waters, and on state and private lands where relatively fewer
45 protections are afforded to natural resources. Increased mineral development could lead to an increase in
46 the potential for soil erosion and decreased water quality.

1 Under all alternatives, the projected oil and gas development would result in surface disturbance, which
2 would contribute to the cumulative impacts on surface water, groundwater, and riparian areas. The
3 alternatives that would be anticipated to result in more oil and gas wells and more disturbance associated
4 with oil and gas development would have a larger contribution to the cumulative impacts on water.
5 Alternative A is anticipated to result in the most wells and surface disturbance associated with oil and gas
6 development, followed in descending order by Alternatives C, D, and B. The application of updated state-
7 of-the-art BMPs to site-specific projects and requirements for reclamation and interim reclamation,
8 protection of groundwater, and minimizing disturbance at stream and ephemeral drainage crossings under
9 Alternatives B, C, and D would help minimize and reduce over time the relative contribution of impacts
10 from oil and gas development to the total impact on water and riparian resources in the CIAA.

11 **4.19.3.5 Vegetation**

12 The CIAA used to analyze cumulative impacts to vegetation resources is the subwatersheds (HUC 12)
13 crossed by the planning area (Map 3-1). The CIAA covers approximately 901,313 acres and was selected
14 because it represents a natural boundary within which changes in vegetation within the planning area
15 could affect soil, water, other vegetation, or other resources on BLM-administered public lands.

16 Past and present actions that have affected and will continue to affect vegetation in the CIAA include
17 surface disturbance resulting from oil and gas development and associated infrastructure, geophysical
18 exploration, livestock grazing, range improvements, OHV use, authorization of ROWs, and recreation.
19 These activities could result in short-term and long-term damage or removal of vegetation, soil
20 compaction, soil erosion, and surface runoff. Development activities would also modify the composition
21 and structure of vegetation communities and increase the potential for introduction or spread of invasive,
22 non-native plant species and noxious weeds, especially in disturbed areas and along travel corridors. These
23 changes, along with ongoing landscape-scale phenomena including climate change and drought, would
24 lead to an increased distribution of altered and degraded vegetation communities in the CIAA over time.

25 Oil and gas development and associated infrastructure are anticipated to cause the greatest amount of
26 surface disturbance and impacts to vegetation through construction of well pads, roads, pipelines, and
27 other infrastructure. The impacts would likely be greater where mineral development is more intense, in
28 areas where development overlaps with more sensitive or more difficult to reestablish vegetation (e.g.,
29 sandy soils in desert vegetation communities), and on state and private lands where relatively fewer
30 protections are afforded to natural resources. Increased mineral development could lead to an increase in
31 the potential for vegetation loss and the introduction of invasive, non-native plant species.

32 Under all alternatives in the MLP/EA, the projected oil and gas development and associated surface-
33 disturbing activities would result in vegetation loss, which would contribute to the cumulative impacts for
34 vegetation. The alternatives that would be anticipated to result in more disturbance associated with oil and
35 gas development would have a larger contribution to the cumulative impacts to vegetation. Alternative A
36 is anticipated to result in the most surface disturbance associated with oil and gas development, followed
37 in descending order by Alternatives C, D, and B. The application of updated, state-of-the-art BMPs to
38 site-specific projects and requirements for reclamation and interim reclamation and control of noxious
39 weeds under Alternatives B, C, and D would help minimize and reduce over time the relative contribution
40 of impacts from oil and gas development to the total impact on vegetation in the CIAA.

41 **4.19.3.6 Cultural Resources**

42 The CIAA for cultural resources consists of the public lands within the MLP/EA planning area because
43 the projected development for the alternatives in the MLP/EA would not affect cultural resources outside
44 the planning area. Cumulative impacts to cultural resources within the CIAA can occur to the physical
45 remains of historic properties and can also impact the integrity of the visual setting where the property is
46 located. Current and future actions in the CIAA that are most likely to contribute to the cumulative

1 impacts to cultural resources and resources of religious or traditional importance to Native American
2 tribes include oil and gas leasing and development and updates to the Richfield Field Office travel
3 management plan. These actions are associated with surface-disturbing activities and increased human
4 presence, which could affect cultural resources and cultural landscapes through loss and disturbance,
5 changes in setting, and theft or vandalism.

6 On public lands, these actions would require adherence to cultural resource laws and regulations that
7 would prevent or mitigate potential adverse impacts. However, the potential for cumulative impacts to
8 cultural resources include state and private lands within the planning area, which are not afforded the
9 same protection as on public lands.

10 The mineral development projected in the different alternatives for the MLP/EA would result in surface-
11 disturbing activities, which could contribute to the cumulative impacts to cultural resources. The
12 alternative with the highest amount of area precluded from mineral surface development (i.e., closed to
13 leasing or managed with NSO stipulations) would have the least potential for contributing to cumulative
14 impacts. Conversely, the alternative with the least amount of area precluded from mineral surface
15 development would have the greatest potential for contributing to cumulative impacts. Therefore,
16 Alternative B would contribute the least to cumulative impacts for cultural resources and Alternative A
17 would contribute the most. Alternatives C and D would contribute an intermediate amount. The
18 incremental contribution of the alternatives for the MLP/EA on the cumulative impacts to cultural
19 resources is anticipated to be minimal because cultural resources are managed and protected on public
20 lands in compliance with federal laws, regulations, and policies.

21 ***4.19.3.7 Paleontological Resources***

22 The CIAA used to analyze cumulative impacts to paleontological resources is the 525,000-acre planning
23 area. Surface-disturbing activities associated with oil and gas leasing and development resulting from the
24 alternatives for the MLP/EA are not expected to affect paleontological resources outside the planning
25 area.

26 Past, present, and reasonably foreseeable future actions that have contributed to the cumulative impacts
27 for paleontological resources include cross-country OHV use, dispersed camping, mining, and oil and gas
28 development. Ongoing, permitted activities such as oil and gas development could also inadvertently
29 impact paleontological resources in areas where the potential for significant paleontological resources is
30 high. Beyond authorized ground disturbance, cumulative impacts could occur from erosion, unauthorized
31 collection, and vandalism. These cumulative impacts could result in the unmitigated loss of scientific
32 information and could reduce the educational and interpretative potential of the resource.

33 For oil and gas development that results from the alternatives presented in the MLP/EA, adverse impacts
34 to paleontological resources would be minimized through existing laws, regulations, lease stipulations,
35 and BMPs within areas classified as PFYC 3, 4, and 5. Measures to identify resources in areas with high
36 potential for paleontological resources would allow evaluation by paleontologists in areas that had not
37 been previously studied, and fossils that would have otherwise been destroyed would be avoided or
38 recovered and made available for study. Alternatives that provide the most constraints to oil and gas
39 development and the associated surface-disturbing activities would contribute the least to the cumulative
40 impacts to paleontological resources. Therefore, the incremental contribution to the cumulative impacts
41 for paleontological resources would be the greatest under Alternative A followed in descending order by
42 Alternatives C, D, and B.

1 **4.19.3.8 Visual Resources, Night Skies**

2 The CIAA used to analyze cumulative impacts to visual resources and night skies is the planning area and
3 viewsheds from adjacent national parks. Surface-disturbing activities associated with oil and gas leasing
4 and development resulting from the alternatives for the MLP/EA are not expected to affect visual
5 resources and night skies outside of this CIAA.

6 Past, present, and reasonably foreseeable future actions and conditions within the CIAA that have affected
7 and will likely continue to affect visual resources are mining, oil and gas development, road and trail
8 construction, pipelines, transmission lines, and other structures. However, the CIAA is a relatively
9 undeveloped landscape, with very few cultural modifications.

10 Oil and gas development presents the greatest potential future impacts to visual resources and night skies.
11 Oil and gas development involves the construction of roads, well pads, pipelines, and facilities along with
12 well drilling, production equipment, and vehicle traffic. Visual resources would be impacted because of
13 the incremental increase in visual contrasts of line, form, color, and texture created by well pads, drill
14 rigs, and other surface structures. Oil and gas development would also cause an incremental impact to
15 night skies in the planning area as a result of artificial lighting and flaring that occur during nighttime
16 operations.

17 All the alternatives for the MLP/EA include actions that would mitigate the visual impacts associated
18 with oil and gas development. These actions include employing protections for VRI Class II areas and
19 VRM Class II areas, using BMPs for visual resources, and precluding surface-disturbing activities around
20 certain recreational areas. The objective for VRM Class II is that the oil and gas development activities
21 cannot attract the attention of the casual observer from KOPs. Because of these provisions, the
22 contribution of the alternatives in the MLP/EA to the cumulative impacts for visual resources would be
23 minimized or substantially reduced. As discussed in Section 4.9, because of the level of oil and gas
24 development proposed under each alternative, Alternative B would likely result in the least impact to
25 visual resources, followed by Alternative D, Alternative C, and Alternative A. However, the bulk of the
26 impacts to visual resources in the CIAA will result from other past and present activities. The alternatives
27 would add incrementally to the cumulative impacts caused by these past and present activities, along with
28 reasonably foreseeable future actions.

29 Artificial lighting used during night-time oil and gas development activities could have an adverse impact
30 to night skies. Viewsheds of visually sensitive areas outside of the planning area may be affected by the
31 use of artificial lighting during night-time oil and gas development activities. Alternatives A and C do not
32 include any stipulations that specifically address potential impacts to night skies. Alternative D includes a
33 stipulation that requires that a visual screen be used to minimize skyglow, glare, and adverse visual
34 effects to night sky resources from open flaring. Alternative B applies a planning area-wide CSU
35 stipulation that includes several measures aimed at mitigating impacts to night skies. Thus, Alternative B
36 would likely result in the least impact to night skies, followed by Alternative D, and Alternatives A and
37 C. However, the bulk of the impacts to night skies in the CIAA will result from other existing activities.
38 The alternatives would add incrementally to the cumulative impacts caused by these existing activities,
39 along with reasonably foreseeable future actions.

40 Climate change is an ongoing trend that may impact visual resources in the planning area by affecting
41 precipitation and temperature patterns and resulting in changes to or loss of vegetation in the CIAA, as
42 well as a potential increase in the incidences of wildfire in the CIAA. Changes to or loss of vegetation, as
43 well as increased incidences of wildfire, would cause an increase in visual contrasts of line, form, color,
44 and texture within the CIAA landscape.

1 **4.19.3.9 Auditory Management (Soundscapes)**

2 The CIAA used to analyze cumulative impacts to soundscapes consists of the planning area and adjacent
3 lands that have noise-sensitive human receptors and that could be affected by decisions in the planning
4 area. The adjacent lands are as follows:

- 5 • Portions of the Labyrinth Canyon and Dirty Devil/Robbers Roost SMRAs that are south and east
6 of the planning area and above the rim of the Green River
- 7 • The Horseshoe Canyon unit of Canyonlands National Park

8 Past and present actions that have affected and would likely continue to affect soundscapes in the CIAA
9 include surface disturbance resulting from oil and gas development and associated infrastructure,
10 geophysical exploration, ranching and livestock grazing, range improvements, recreation (including OHV
11 use), authorization of ROWs for utilities and other uses, and road development. These activities could
12 result in short-term and long-term noise in different patterns (continuous, intermittent, or impulsive) that
13 exceed background levels. The reasonably foreseeable future activities listed in Section 4.19.2 could also
14 result in short-term and long-term noise in different patterns that exceed background levels.

15 Oil and gas development and associated infrastructure are anticipated to cause a larger amount of noise
16 than most of the past, present, and future activities, through construction of well pads, roads, pipelines,
17 and other infrastructure, and through operations and maintenance. The impacts would likely be greater
18 where mineral development is more intense and in areas where development overlaps with noise-sensitive
19 human receptors.

20 Under all alternatives, the projected oil and gas development and associated surface-disturbing activities
21 would result in noise. Only unmitigated noise or noise that is partially mitigated would contribute to
22 cumulative impacts from noise. Alternatives B and D would implement the same noise stipulation to
23 reduce noise levels from operating wells to estimated background levels that exist in some portions of the
24 analysis area, such as near dirt roads, near parking areas, or near livestock operations (44–50 dBA);
25 however, noise levels would still exceed the 20-dBA background level present in more remote portions of
26 the analysis area. Alternatives B and D would also implement a stipulation to protect the soundscape of
27 Canyonlands National Park by ensuring that sound levels in the park are not impacted by noise from
28 nearby oil and gas development. This stipulation would likely reduce noise near Canyonlands National
29 Park to levels similar to 20 dBA, minimizing noise impacts in these areas. Under both alternatives, some
30 areas with a 20-dBA background level could experience cumulative noise impacts.

31 Under Alternative A, there would be no lease stipulations or BMPs applied to protect soundscapes. Under
32 Alternative C, noise levels would be mitigated to protect the soundscape of Canyonlands National Park
33 by ensuring that sound levels in the park are not impacted by noise from nearby oil and gas development.
34 Under Alternatives A and C, there would be more cumulative noise impacts in the CIAA than under
35 Alternatives B and D. Alternative A is estimated to result in 28 wells and 541 acres of surface
36 disturbance, and Alternative C is estimated to result in 27 wells and 517 acres of surface disturbance.
37 Based on these projected numbers, Alternative A would have a slightly larger contribution to noise
38 cumulative impacts in the CIAA than Alternative C.

39 **4.19.3.10 Special Status Species**

40 The CIAAs used to analyze cumulative impacts on special status species varies by species' habitats. For
41 special status fish and wildlife species for which habitats have been delineated or modeled by the BLM or
42 another regulatory agency, the CIAA is the extent of the habitats crossed by the planning area. For special
43 status fish and wildlife species for which habitats have not been delineated, the CIAA is the subwatersheds
44 (HUC 12) crossed by the planning area. For special status plants, the CIAA is the extent of identified habitats
45 within the subwatersheds (HUC 12) crossed by the planning area. These CIAAs were selected because they
46 represent the areas within which changes to special status species populations could be observed as a result of
47 impacts on the soil, water, vegetation, or individuals of each species in the planning area.

1 Past and present actions that have affected and will continue to affect special status species and their
2 habitats in the CIAAs include surface disturbance resulting from oil and gas development and associated
3 infrastructure, geophysical exploration, ranching and livestock grazing, range improvements, OHV use,
4 authorization of rights-of-way for utilities and other uses, road development, and recreation. These
5 activities could result in short-term and long-term habitat loss, degradation, and fragmentation.
6 Individuals could be displaced from otherwise suitable habitats because of human presence or other
7 anthropogenic disturbance factors (e.g., traffic, noise, recreation, livestock grazing activities), especially
8 during sensitive time periods such as winter, birthing, nesting, and early rearing of young. Loss of
9 vegetation from development activities would remove cover and forage and would degrade habitat.
10 Special status species populations are more sensitive to these types of impacts than are other wildlife and
11 fish species because many of them rely on unique and rare habitat niches. Additionally, many of these
12 species have experienced declines in population, health, and/or habitat resulting in their designation as a
13 special status species. Over time, these impacts, along with ongoing landscape-scale phenomena
14 including climate change and drought, could reduce the capability of habitats in the planning area to
15 maintain current special status species populations.

16 Of the reasonably foreseeable future activities listed in Section 4.19.2, oil and gas development and
17 associated infrastructure are anticipated to cause the greatest amount of surface disturbance and impacts
18 to special status species and their habitats through construction of well pads, roads, pipelines, and other
19 infrastructure. The impacts would likely be greater where mineral development is more intense and in
20 areas where development overlaps with habitats that are limited (especially important for special status
21 species survival) or difficult to reclaim. The degree of impact would depend on the timing of development
22 activities and whether the amount of activity outpaces the successful reclamation and revegetation efforts
23 in disturbed areas. As development occurs, displacement of special status species could result in increased
24 competition for resources and stresses on special status species and other wildlife occupying undeveloped
25 lands. Impacts may also be greater on state and private lands where relatively fewer protections are
26 afforded to special status species habitats.

27 Under all alternatives, the projected oil and gas development and associated surface-disturbing activities
28 would contribute to the incremental loss, degradation, and fragmentation of special status species habitats
29 and impacts on special status species populations in the CIAAs. All of the alternatives considered in this
30 EA have specific actions that would help avoid, minimize, and mitigate impacts on special status species
31 and their habitats resulting from oil and gas development activities. These actions include CSU/TL and
32 NSO stipulations; lease notices; and BMPs. Despite these stipulations and actions, the alternatives
33 projected to result in more disturbance associated with oil and gas development would have a larger
34 contribution to cumulative impacts on special status species. Under Alternative A, 92.5% of the planning
35 area would be open to oil and gas development subject to standard lease terms and conditions or open to
36 oil and gas development with CSU/TL stipulations, and 7.5% would have an NSO stipulation or be closed
37 to leasing. Under Alternative B, 21.7% of the planning area would be open to oil and gas development
38 subject to standard lease terms and conditions or open to oil and gas development with CSU/TL
39 stipulations. Alternative C would result in 88.4% of the planning area being open to oil and gas
40 development subject to standard lease terms and conditions or open to oil and gas development with
41 CSU/TL stipulations. Alternative D would result in 75.1% of the planning area being open to oil and gas
42 development subject to standard lease terms and conditions or open to oil and gas leasing with CSU/TL
43 stipulations. Based on these percentages, Alternative B would have the smallest cumulative impact to
44 special status species, followed by Alternatives D, C, and A.

45 The application of BMPs to site-specific projects and requirements for off-site mitigation for impacts on
46 various habitats under Alternatives B, C, and D would help minimize and reduce over time the relative
47 contribution of impacts from oil and gas development to the total impact on special status species and
48 their habitats in the CIAAs for these alternatives.

1 **4.19.3.11 Wildlife and Fisheries**

2 The CIAA used to analyze cumulative impacts to wildlife and fisheries varies by species. For species for
3 which habitats have been delineated by the UDWR, the CIAA is the extent of the habitats crossed by the
4 MLP/EA planning area. For species for which habitats have not been delineated by UDWR, the CIAA is
5 the subwatersheds (HUC 12) crossed by the planning area. The CIAAs were selected because they
6 represent the areas within which changes to wildlife and fisheries populations could be observed as a
7 result of impacts to the soil, water, vegetation, or individual animals or fish in the planning area.

8 Past and present actions that have affected and will continue to affect fish and wildlife and their habitats
9 in the CIAA include surface disturbance resulting from oil and gas development and associated
10 infrastructure, geophysical exploration, livestock grazing, range improvements, OHV use, authorization
11 of rights-of-way, and recreation. Many of these activities could result in short-term and long-term habitat
12 loss, degradation, and fragmentation, whereas others (e.g., livestock water developments) may benefit
13 wildlife by providing water sources in areas where availability of water limits wildlife populations.
14 Individuals could be displaced from otherwise suitable habitats because of human presence or other
15 anthropogenic disturbance factors (e.g., traffic, noise, recreation, livestock grazing activities) during
16 sensitive time periods such as winter, birthing, nesting, and early rearing of young. Loss of vegetation
17 from development activities would remove cover and forage, degrade habitat, and could increase forage
18 competition among grazing animals. Over time, these impacts, along with ongoing landscape-scale
19 phenomena including climate change and drought, could reduce the capability of habitats in the planning
20 area to maintain current fish and wildlife populations.

21 Oil and gas development and associated infrastructure are anticipated to cause the greatest amount of
22 surface disturbance and impacts to fish and wildlife and their habitats through construction of well pads,
23 roads, pipelines, and other infrastructure. The impacts would likely be greater where mineral development
24 is more intense or in areas where development occurs in habitats that are limited, especially important for
25 wildlife survival, or difficult to reclaim. The degree of impact would depend on the timing of
26 development activities and whether the amount of activity outpaces the successful reclamation and
27 revegetation efforts in disturbed areas. As development occurs, displacement of wildlife could result in
28 increased competition for resources and stresses on wildlife occupying undeveloped lands. Impacts may
29 also be greater on state and private lands where relatively fewer protections are afforded to fish and
30 wildlife habitats.

31 Under all alternatives in the MLP/EA, the projected oil and gas development and associated surface-
32 disturbing activities would contribute to the incremental loss, degradation, and fragmentation of fish and
33 wildlife habitats and to impacts on fish and wildlife populations in the CIAA. The alternatives that would
34 be anticipated to result in more disturbance associated with oil and gas development would have a larger
35 contribution to the cumulative impacts to fish and wildlife. All of the alternatives considered in the
36 MLP/EA have specific actions that would help avoid, minimize, and mitigate impacts to fish and wildlife
37 and their habitats resulting from oil and gas development activities. These actions include TL, CSU, and
38 NSO stipulations; mitigation actions; and BMPs for fish and wildlife.

39 Despite these stipulation and actions to help avoid, minimize, and mitigate impacts to fish and wildlife
40 and their habitats, alternatives that would be anticipated to result in more disturbance associated with oil
41 and gas development would have a greater contribution to the cumulative impacts to fish and wildlife and
42 their habitats. Alternative A is anticipated to result in the most surface disturbance associated with oil and
43 gas development, followed in descending order by Alternatives C, D, and B. Applying updated state-of-
44 the-art BMPs to site-specific projects and requiring off-site mitigation for impacts to various habitats
45 under Alternatives B, C, and D would help minimize and reduce over time the relative contribution of
46 impacts from oil and gas development to the total impact on fish and wildlife and their habitats in the
47 CIAA for these alternatives.

1 **4.19.3.12 Lands with Wilderness Characteristics**

2 The CIAA for LWC includes the planning area, LWC inventory units that extend outside the planning
3 area, and other adjacent lands that the BLM manages for the preservation of wilderness character (i.e.,
4 WSAs).

5 Past, present, and reasonably foreseeable actions within the CIAA that have affected and will likely
6 continue to affect wilderness characteristics in the planning area include oil and gas development,
7 increasing recreational demands on public lands, OHV use, issuance of rights-of-way, and ongoing travel
8 management planning for both the Price Field Office and Richfield Field Office. These activities could
9 introduce sights, noises, and infrastructure in or adjacent to LWCs, which could impair the feeling of
10 solitude and degrade naturalness. Increasing visitor use in the planning area will likely intensify use of
11 BLM-administered lands, including natural areas and LWCs, potentially impacting wilderness
12 characteristics by reducing opportunities for solitude. As part of the travel management process, the BLM
13 may designate additional routes as closed and open to motor vehicles. Use of these designated travel
14 routes by OHVs and other vehicles in LWCs would also introduce sights and noises that could impair the
15 feeling of solitude and degrade naturalness. Any of these actions could also result in surface-disturbing
16 activities that could affect the size of LWCs by reducing or eliminating portions of LWCs. Some units
17 could be bisected or surface disturbance could result in the need to eliminate areas from the LWC unit
18 through the creation of cherry stems. This could result in some areas, or entire LWC units, no longer
19 meeting the minimum size criterion (5,000 acres).

20 Of all of the reasonably foreseeable future actions in the planning area, oil and gas exploration and
21 development are anticipated to have the largest magnitude of road construction and surface disturbance and
22 therefore the largest impact to wilderness characteristics in the planning area over the next 15 to 20 years.

23 Alternative A does not specifically manage oil and gas development to reduce impacts to LWCs. Under
24 Alternative A, 89.8% of the LWCs in the planning area would be open to leasing subject to standard terms
25 and conditions or open subject to CSU/TL stipulations. Under Alternative A, 10.2% of the LWCs would be
26 open to leasing subject to NSO stipulations. Alternative A has the greatest potential to introduce sights,
27 noises, and infrastructure in or adjacent to LWCs, which could impair the feeling of solitude and degrade
28 naturalness. Over time, under Alternative A, oil and gas exploration and development could contribute to
29 the loss of wilderness character in many areas where leasing and surface occupancy are permitted.

30 Alternative B would manage all LWCs in the planning area as open to leasing subject to NSO
31 stipulations. Under Alternative B, 92.8% of the LWCs in the planning area would be open to leasing
32 subject to NSO stipulations, and 7.2% of the LWCs would be closed to leasing. Alternative B would
33 largely avoid impacts to LWCs from oil and gas development. Therefore, the greatest impacts to LWCs
34 over the next 15 to 20 years under this alternative would come from other resource uses, such as
35 recreation, OHV use, and travel management planning. These resource uses have the potential to
36 introduce sights, noises, and infrastructure in or adjacent to LWCs, which could impair the feeling of
37 solitude and degrade naturalness. However, the magnitude of cumulative impacts to LWCs under
38 Alternative B would be much less than all other alternatives considered in the MLP/EA.

39 Alternative C would make some management decisions that would reduce impacts from oil and gas
40 development on LWCs. Under Alternative C, 84.3% of the LWCs in the planning area would be open to
41 leasing subject to standard terms and conditions or open subject to CSU/TL stipulations. Under
42 Alternative C, 15.7% of the LWCs would be open to leasing subject to NSO stipulations. Alternative C
43 would permit the introduction of sights, noises, and infrastructure in or adjacent to LWCs from oil and
44 gas development, which could impair the feeling of solitude and degrade naturalness. Over time, under
45 Alternative C, oil and gas exploration and development could contribute to the loss of wilderness
46 character in many areas where leasing and surface occupancy are permitted. Oil and gas development
47 would be anticipated to be the largest impact to LWCs over the next 15 to 20 years under Alternative C,
48 and the impacts would be slightly less in magnitude compared to Alternative A.

1 Alternative D would make more management decisions that would reduce impacts from oil and gas
2 development to LWCs compared to Alternatives A and C, but would be less restrictive than Alternative
3 B. Under Alternative D, 64.7% of the LWCs in the planning area would be open to leasing subject
4 CSU/TL stipulations, 28.1% of the LWCs would be open to leasing subject to NSO stipulations, and
5 7.2% of the LWCs would be closed to leasing. In areas managed subject to CSU stipulations, Alternative
6 D would permit the introduction of sights, noises, and infrastructure in or adjacent to LWCs from oil and
7 gas development, which could impair the feeling of solitude and degrade naturalness. The density of oil
8 and gas development would be reduced in LWCs compared to Alternatives A or C. Over time, under
9 Alternative D, oil and gas exploration and development could contribute to the loss of wilderness
10 character in areas where leasing and surface occupancy are permitted. Oil and gas development would be
11 anticipated to be the largest impact to LWCs over the next 15 to 20 years under Alternative D. The
12 impacts to LWCs would be less in magnitude compared to Alternatives A or C.

13 **4.19.3.13 Recreation**

14 The CIAA used to analyze cumulative impacts on recreation consists of the planning area and adjacent
15 lands that could be affected by decisions regarding the planning area. The adjacent lands include the
16 following:

- 17 • The Green River corridor through Labyrinth Canyon and related Green River tributaries.
- 18 • Lands managed by the Moab Field Office east of the Green River and east of the planning area.
19 (Management decisions in the Moab Field Office may affect users' river experiences and users
20 accessing the river from the planning area.)
- 21 • Portions of the Labyrinth Canyon and Dirty Devil/Robbers Roost SRMAs, which are south and
22 east of the planning area and above the rim of the Green River
- 23 • The Horseshoe Canyon unit of Canyonlands National Park

24 Past and present actions that have affected and would likely continue to affect recreation in the CIAA
25 include surface disturbance resulting from oil and gas development and associated infrastructure,
26 geophysical exploration, ranching and livestock grazing, range improvements, authorization of rights-of-
27 way for utilities and other uses, and road development. The reasonably foreseeable future activities listed
28 in Section 4.19.2, especially oil and gas development, could also result in impacts to recreation. These
29 types of actions and activities can reduce the quality of the recreation experience. Some actions such as
30 oil and gas development, road development, and authorization of rights-of-ways for utilities cause
31 impacts such as permanent infrastructure, noise, increased traffic, and reductions in scenic quality and
32 therefore have a greater effect on recreation than other actions such as livestock grazing and restoration
33 projects. This discussion focuses on oil and gas development because cumulative impacts to recreation
34 are primarily driven by this activity.

35 Of all the present actions and RFFAs, oil and gas development and associated infrastructure are
36 anticipated to cause the largest amount of surface disturbance and impacts to recreation through
37 construction of well pads, roads, pipelines, and other infrastructure. Surface disturbance, the presence of
38 oil and gas infrastructure, and vehicles from oil and gas development would increase road traffic, noise,
39 nighttime lighting, and dust for recreation visitors, while creating a negative visual impact in otherwise
40 natural areas. Visual impacts and noise would reduce the naturalness of the planning area for backcountry
41 users and reduce opportunities for solitude. The increase in noise associated with oil and gas equipment
42 and changes in night skies from lighting associated with oil and gas development would affect recreation
43 settings. Other RFFAs may contribute to these impacts (e.g., issuance of a right-of-way for the Emery
44 Telcom Fiber Optic Line along State Route 24 and development of the Texas Corp Well 1 for livestock
45 grazing) but on a smaller scale than oil and gas development. Oil and gas development impacts would
46 likely be greater where mineral development is more intense, in areas where development overlaps areas
47 of concentrated recreation such as recreation focus areas, and on state lands where relatively less

1 protection is afforded to the quality of the recreation experience. Increased mineral development could
2 lead to an increased potential for negative impacts to the quality of the recreation experience and the
3 naturalness of the recreation setting.

4 Oil and gas leasing and development would continue in the planning area under all alternatives, and the
5 projected development and associated surface-disturbing activities would result in impacts to recreation.
6 However, these impacts would be limited through the use of NSO stipulations, CSU/TL stipulations, and
7 the closure of areas to oil and gas development. Under Alternative A, 92.5% of the planning area would
8 be open to oil and gas development subject to standard lease terms and conditions or open to oil and gas
9 development with CSU/TL stipulations (7.5% would have an NSO stipulation or be closed to leasing).
10 Under Alternative B, 21.7% of the planning area would be open to oil and gas development subject to
11 standard lease terms and conditions or open to oil and gas development with CSU/TL stipulations.
12 Alternative C would result in 88.4% of the planning area as open to oil and gas development subject to
13 standard lease terms and conditions or open to oil and gas development with CSU/TL stipulations.
14 Alternative D would result in 75.1% of the planning area open to oil and gas development subject to
15 standard lease terms and conditions or open to oil and gas leasing with CSU/TL stipulations. Based on
16 these percentages, Alternative B would have the least cumulative impact to recreation, followed by
17 Alternatives D and C.

18 **4.19.3.14 Oil and Gas Resources**

19 The CIAA used to analyze cumulative impacts on oil and gas development is the 525,000-acre planning
20 area. Past, present, and reasonably foreseeable future actions and conditions within the CIAA that have
21 affected and that will likely continue to affect oil and gas are market forces, availability of resources for
22 development, regulatory and development constraints, and reservoir/reserve depletion.

23 The management actions proposed in the alternatives for the MLP/EA would cumulatively impact oil and
24 gas development through surface use restrictions (e.g., closures and CSU, TL, and NSO stipulations) that
25 ultimately would decrease the amount of oil and gas development in the planning area. Precluding surface
26 disturbance could prevent the construction of some well pads, access roads, pipelines, and ancillary
27 facilities. Off-site methods such as directional drilling would be required to access oil and gas resources
28 in areas managed with an NSO stipulation. In some cases, an operator could place a well pad, access road,
29 or production facility in a less-sensitive area and drill from the well pad directionally to recover reserves
30 underlying the area prohibited from surface-disturbing activities. The equipment and personnel required
31 for directional drilling could increase the complexity of operations and slow the drilling process. Closures
32 and surface use restrictions could cause an operator to move to nearby private or state land (if similar
33 resources are available with fewer restrictions) and drill wells that could lead to drainage of federal
34 reserves and loss of federal revenue. However, the indirect and cumulative effects of consolidating
35 infrastructure could reduce the need for ancillary infrastructure over the larger region as infrastructure
36 becomes more centralized and less infrastructure would be necessary for the delivery of products.

37 Oil and gas leasing and development would continue under all alternatives. The restrictions imposed by
38 leasing stipulations (CSU, TL, NSO) and closed areas result in impacts to oil and gas development, such
39 as decreased amount of oil and gas extraction, delays in oil and gas extraction, increased requirements and
40 complexity of operations, and additional costs. Under all alternatives, the lease stipulations reduce the
41 well pads that were projected in the RFD scenario for oil and gas on all lands (federal, state, and private)
42 within the planning area over the next 15 years. There are 28 wells projected for Alternative A, seven
43 wells projected for Alternative B, 27 wells projected for Alternative C, and 23 wells projected for
44 Alternative D. Alternative A would allow the greatest number of wells to be developed and would have
45 the fewest restrictions on development, which would result in the largest incremental addition to oil and
46 gas development in the planning area, followed by Alternatives C and D. Alternative B would allow the
47 fewest wells to be developed because of the constraints imposed by lease stipulations and closures, which
48 would result in the smallest incremental addition to oil and gas development in the planning area.

1 Climate change is an ongoing trend that may impact oil and gas development in the planning area.
2 Climate change is expected to result in increased incidences of drought in the planning area, which could
3 impact special status species and, in turn, increase restrictions on oil and gas development in areas where
4 special status species occur.

5 ***4.19.3.15 Special Designations, Areas of Critical Environmental Concern***

6 The cumulative impacts analysis area (CIAA) for ACECs consists of the ACECs in their entirety within
7 and outside the planning area. The ACECs are the Dry Lake Archaeological District ACEC, the Tidwell
8 Draw portion of the Uranium Mining District ACEC, and the Big Flat Tops ACEC. The relevant and
9 important values that were used to establish the ACECs include archaeology, geology, historic mining,
10 and relict vegetation. These values can be adversely impacted by surface-disturbing activities; however,
11 past actions have not resulted in degrading these values to the extent that the areas did not warrant an
12 ACEC designation.

13 Under all alternatives except Alternative C for the Tidwell Draw ACEC, surface-disturbing activities
14 associated with mineral development are precluded in the ACECs. Therefore, the relevant and important
15 values are protected, and there would be minimal potential for contributing to the cumulative impacts for
16 ACECs. With the exceptions of the development of the travel management plans and grazing, most of the
17 RFFAs would not occur within the ACECs and would not add to cumulative impacts. Although surface
18 disturbance would be allowed under Alternative C for the Tidwell Draw ACEC, stipulations preclude any
19 surface disturbance that would impact the physical evidence of past mining activities, thereby protecting
20 the relevant and important values for the ACEC. Therefore, all alternatives would protect the relevant and
21 important values of the ACECs for the foreseeable future. However, climate change and drought could
22 lead to an increased distribution of altered and degraded vegetation communities in the CIAA over time,
23 which would have an impact on the relict vegetation, which is the relevant and important value of the Big
24 Flat Tops ACEC.

25 ***4.19.3.16 Special Designations, Wild and Scenic Rivers***

26 The CIAA for suitable wild and scenic rivers (WSRs) is the suitable Green River segment that runs from
27 the confluence of the Lower San Rafael River and the Green River to the Canyonlands National Park
28 boundary. The ORVs that were used to establish the WSR include cultural resources, recreation, scenic
29 values, fish, and paleontology. These values can be adversely impacted by surface-disturbing activities;
30 however, past actions have not resulted in degrading these values to the extent that the rivers did not
31 warrant designation as suitable for the National Wild and Scenic Rivers System.

32 Past and present actions that have affected and would continue to affect WSRs in the CIAA include
33 surface disturbance outside the WSR corridor resulting from oil and gas development and associated
34 infrastructure, geophysical exploration, livestock grazing, and recreation. Under all alternatives for the
35 MLP/EA, surface-disturbing activities associated with mineral development would be precluded in the
36 suitable WSR segment. However, under Alternative A, scenic values could be compromised by mineral
37 development conducted adjacent to the WSR boundaries where horizontal drilling could be used to access
38 the minerals beneath the WSRs. Therefore, under Alternative A, oil and gas leasing and development
39 could contribute to the incremental impacts on the Green River WSR suitable segment.

40 Alternatives B and D would provide the greatest protections to the Green River suitable WSR segment by
41 closing the WSR corridor and areas within 1.0 mile of the Labyrinth Canyon rim to mineral leasing.
42 Alternative C would provide similar protections by applying an NSO stipulation to these areas. Under
43 these alternatives, oil and gas leasing and development would not contribute to the incremental impacts
44 on the Green River WSR suitable segment.

45 Recreation RFFAs, including the issuance of special recreation permits (SRPs), under all alternatives
46 could contribute incrementally to cumulative impacts because the greater the number of permits, the

1 greater the potential for human-caused impacts such as surface disturbance (including vegetation
2 removal), wildlife disturbance, and water quality degradation. Climate change and drought could lead to
3 an increased distribution of altered and degraded vegetation communities and a decrease or shift in
4 wildlife populations. These changes would have an adverse impact to the recreation, scenic, and fish
5 ORVs and would contribute to the cumulative impacts.

6 **4.19.3.17 Special Designations, National Historic Trails**

7 The CIAA for the Old Spanish National Historic Trail (OST) is the trail corridor plus a 3.0-mile buffer on
8 either side from the Green River Crossing (see Map 2-5) to 3.0 miles west of the western planning area
9 boundary. Management of national historic trails in the planning area is coordinated with the National
10 Park Service and local non-federal partners. The continued collaboration with these partners in managing
11 the trail in accordance with the comprehensive management plan (NPS 1999) could decrease the potential
12 for degradation and assist in the preservation of natural, cultural, and historic trail resources. However, it
13 is important to note that large portions of the OST corridor in the planning area have already been leased
14 for oil and gas development, and, even with collaboration and implementation of the comprehensive
15 management plan, adverse impacts could occur.

16 Past actions that have affected and will continue to affect the integrity of viewsheds in scenic and cultural
17 landscapes along the OST include the presence of power lines, pipelines, roads, and facilities.
18 Additionally, the RFFAs of increased recreational use, grazing, and lands and realty actions could create
19 more surface disturbance through the creation of errant trails, vegetation loss, and development of
20 infrastructure for ROWs. Portions of the trail in the planning area are located on private property and not
21 subject to BLM regulations, which could result in adverse impacts in the form of surface disturbance and
22 changes to the viewshed from infrastructure.

23 Projected mineral development resulting from the alternatives in the MLP/EA could also contribute to
24 cumulative impacts to the visual setting of the OST through the placement of drill rigs, well pads,
25 production facilities, roads, and pipelines. The alternatives in the MLP/EA would provide varying
26 mitigation measures for protecting the historic integrity and condition of the OST, but the contribution to
27 the cumulative impacts under any alternative should be minor due to the protections provided by the law
28 and the comprehensive management plan. Alternative A would provide stipulations for protecting the
29 OST; however, these stipulations would be focused on protecting cultural resources, not the scenic
30 integrity of the trail, and could result in contributing the most to the cumulative impacts to the OST.
31 Alternative B would provide the greatest level of protection and a fewer cumulative impacts to the OST
32 by specifying a 3.0-mile NSO stipulation, which would protect the cultural resources and the scenic and
33 historical integrity of the trail. Alternative C would provide more protection than would Alternative A by
34 employing a CSU stipulation on 2.0 miles of the trail, but Alternative C would provide less protection
35 than would Alternative D, which would provide for an NSO stipulation within 1.0 mile and a CSU
36 stipulation between 1.0 and 3.0 miles. Additionally, climate change and drought could lead to an
37 increased distribution of altered and degraded vegetation communities. These changes could have an
38 adverse impact on the scenic integrity of the OST and could contribute to cumulative impacts.

39 **4.19.3.18 Socioeconomics**

40 [Information to be provided by the BLM for inclusion in the public draft EA.]

41 **4.19.3.19 Health and Safety**

42 The CIAA for health and safety is the planning area. Past, present, and reasonably foreseeable future
43 actions and conditions within the CIAA that have affected and will likely continue to affect health and
44 safety are risks such as heavy equipment use and traffic associated with mining, oil and gas development,
45 livestock grazing, tourism, recreation, vehicle traffic, and construction activities involving roads,
46 pipelines, transmission lines, and other structures.

1 All alternatives would allow oil and gas development in a manner that would incrementally increase the
2 risk of potential health and safety impacts in the planning area. Aside from livestock grazing, future oil
3 and gas development is the primary industrial activity in the planning area that would affect health and
4 safety. As discussed in Section 4.18, the impacts to health and safety for each alternative are expected to
5 be proportional to the number of wells that are expected to be drilled over the next 15 years under each
6 alternative. Alternative A would have the highest potential for health and safety impacts among the
7 alternatives, followed by Alternative C and Alternative D, with Alternative B having the lowest potential
8 for health and safety impacts among the alternatives.

9 Health and safety impacts that could occur from future oil and gas leasing and development include a risk
10 of potential injuries to workers from accidents that might occur during oil and gas exploration, well
11 drilling, well stimulation and completion, operation of facilities, and reclamation activities. These
12 accidents may involve explosions, the presence of hazardous vapors or chemicals, pinch points on
13 equipment and vehicles, or other industrial accidents. Increased traffic associated with the development
14 and operation of oil and gas facilities would pose a risk for vehicular accidents for both oil and gas
15 workers and the general public visiting and traveling on BLM-administered public lands. Other impacts to
16 health and safety could include spills or the presence of hazardous materials produced by or used in
17 drilling for oil and gas. Hazardous materials that could be produced by oil and gas wells include produced
18 oil, gas, and water, as well as chemicals such as hydrogen sulfide. These potential health and safety
19 impacts would add cumulatively to the past, present, and reasonably foreseeable health and safety impacts
20 in the CIAA.

CHAPTER 5—CONSULTATION AND COORDINATION

5.1 INTRODUCTION

This chapter describes the consultation and coordination that occurred prior to and during preparation of the San Rafael Desert Master Leasing Plan and Draft Resource Management Plan Amendments/Draft Environmental Assessment (referred to hereafter as the MLP/EA). The consultation process began with the publication of the notice of intent (NOI) on May 18, 2016, as required by 43 Code of Federal Regulations (CFR) 1610.2(c). The Bureau of Land Management (BLM) decision-making process is conducted in accordance with the requirements of National Environmental Policy Act (NEPA), the regulations of the Council on Environmental Quality (CEQ), and the policies and procedures used by the Department of the Interior and the BLM to implement NEPA. NEPA and its associated regulatory and policy framework require the following: 1) that all federal agencies involve interested members of the public as well as state and local governments, other federal agencies, and federally recognized Native American tribes in their decision making process; 2) that a reasonable range of alternatives is developed; and 3) that all potential impacts of the proposed actions and alternatives are disclosed.

The MLP/EA was prepared by an interdisciplinary team of resource specialists from the Price and Richfield Field Offices and by SWCA Environmental Consultants, the contractor hired to assist in the preparation of the MLP/EA. The BLM and cooperating federal, state, and county agencies provided technical review and support.

This environmental document was prepared in consultation and coordination with various federal, state, and local agencies, organizations, and individuals. Agency consultation and public participation have been accomplished through a variety of formal and informal methods, including scoping meetings, workshops, correspondence, and meetings with various public agencies and interest groups. This chapter summarizes these activities.

5.2 CONSULTATION AND COORDINATION

Federal laws require the BLM to consult with Native American tribes, the State Historic Preservation Office (SHPO), the U.S. Fish and Wildlife Service (USFWS), and the Environmental Protection Agency (EPA) during the planning and NEPA processes. This section documents the specific consultation and coordination efforts undertaken by the BLM throughout the entire process of developing the MLP/EA.

5.2.1 Native American Tribes

The BLM is mandated to consult with Native American tribes to identify cultural values, religious beliefs, and traditional practices that may be affected by actions on federal lands. Laws and executive orders requiring such consultation include the following:

- National Environmental Policy Act of 1969, as amended
- National Historic Preservation Act of 1966, as amended
- American Indian Religious Freedom Act of 1978
- Native American Graves Protection and Repatriation Act of 1990, as amended
- Federal Land Management and Policy Act of 1976
- Archaeological Resources Protection Act of 1979
- Executive Order 11593 – Protection and Enhancement of the Cultural Environment

1 The MLP/EA is considered a major federal project, and the BLM will initiate consultation with the
2 USFWS by submitting a biological assessment (BA) when the proposed MLP for the final EA is
3 determined. The USFWS may concur with the BLM's determination in the BA via a memorandum, or the
4 USFWS will prepare a biological opinion (BO) that advises the BLM on the actions that must be taken to
5 protect federally listed special status species. The BLM will finalize Section 7 consultation before the
6 decision record is signed.

7 **5.2.4 Environmental Protection Agency**

8 The BLM initiated coordination with the EPA early in the planning process. The EPA was contacted
9 about being a cooperating agency, and chose to participate as an informal cooperating agency with special
10 expertise in air and water quality. Along with the other cooperating agencies, the EPA participated in an
11 alternatives development workshop. Additionally, the EPA has been provided a copy of the draft
12 alternatives and draft appendices for review and comment.

13 **5.2.5 Cooperating Agency Involvement**

14 Cooperating agencies are those other federal agencies, state agencies, and local governments that have
15 jurisdiction by law (40 CFR 1508.15) or special expertise (40 CFR 1508.26) and that choose to
16 participate in a cooperating agency role. Cooperating agencies participate in the various steps of the
17 BLM's planning process, as feasible given the constraints of their resources and expertise (43 CFR
18 1601.0-5). The BLM collaborates with cooperating agencies in identifying issues, collecting inventory
19 data, formulating alternatives, estimating effects of the alternatives, and developing a preferred
20 alternative. The following government entities have accepted the BLM's invitation to become cooperating
21 agencies in the planning process for the MLP/EA:

- 22 • Emery County
- 23 • Wayne County
- 24 • State of Utah
- 25 • National Park Service
- 26 • Environmental Protection Agency

27 A cooperating agency scoping meeting was held on June 16, 2016, in Castle Dale, Utah, with the county
28 commissioners and other county representatives from both Emery and Wayne Counties. Additionally, a
29 separate cooperating agency scoping meeting was held on June 16, 2016, in Castle Dale, Utah, with the
30 National Park Service. The purpose of these meetings was to inform these cooperating agencies about the
31 MLP/EA process, provide an update on the baseline inventories (the reasonably foreseeable development
32 scenario, the cultural resources Class I and Class II inventories, and the lands with wilderness
33 characteristics inventory), share the MLP project schedule, and begin a discussion on issues identification.
34 On November 2 and 3, 2016, a cooperating agency alternatives development workshop was held in Castle
35 Dale, Utah. Representatives of all five cooperating agencies attended the 2-day workshop.

36 **5.1 PUBLIC OUTREACH AND PARTICIPATION**

37 The BLM has invited public participation throughout the MLP/EA planning process. Public involvement
38 has included the following:

- 39 • Public scoping
- 40 • Public review and comment period for alternatives
- 41 • Project website
- 42 • Review of the MLP/EA draft

1 **5.2.6 Public Scoping**

2 On May 18, 2016, the Price and Richfield Field Offices initiated the planning process with the publication
3 of the NOI in the *Federal Register*. The NOI announced the Price and Richfield Field Offices' intent to
4 prepare the San Rafael Desert MLP, potential amendments to the Price and Richfield RMPs, and the
5 associated EA. The NOI initiated the scoping period, which ended July 1, 2016. The purpose of scoping,
6 as required by NEPA, is to involve the public in the planning process and use the comments received to
7 identify the issues to be addressed in the MLP/EA (40 CFR 1501.7). These issues assist the BLM in the
8 development of alternatives and analysis that will be evaluated in the EA. Scoping also provides the
9 public an opportunity to learn about the management of public lands and helps the BLM identify the
10 public's concerns regarding resources within the planning area.

11 Two public scoping meetings were held. The first meeting was held in Green River, Utah, on June 15,
12 2016. The second meeting was in Castle Dale, Utah, on June 16, 2016. Each meeting was 2 hours long. A
13 Microsoft Powerpoint presentation with background information was given, and BLM resource
14 specialists from a number of resource areas were available to answer questions and provide additional
15 information about these and other specific issues throughout the meeting.

16 Throughout the scoping period, the BLM received approximately 1,200 comment letters, which included
17 approximately 350 individual comments from 15 unique submissions. These comments came from
18 individuals, other agencies, and special interest groups. All comments were addressed in the development
19 of alternatives.

20 **5.2.7 Public Review And Comment Period for Alternatives**

21 On December 15, 2016, the BLM released draft alternatives for the public to review and comment on.
22 This comment period ended on January 20, 2017. Eight comment letters were received from stakeholders,
23 three comment letters were received from cooperating agencies, and four comment letters were received
24 from individuals, resulting in a total of 134 individual comments.

25 **5.2.8 Project Website**

26 Information regarding the MLP/EA can also be found at the project website (<http://go.usa.gov/cJcPw>).
27 The purpose of the website is to provide notice and access to the public for all pertinent documents
28 associated with the planning process.

29 **5.2.9 Review of the MLP/EA**

30 Public participation will continue with the release of the draft MLP/EA. The public is provided with an
31 opportunity to review and comment on the contents of this document during a 30-day public comment
32 period. After the draft MLP/EA is released to the public, the BLM will analyze all public comments
33 received and will finalize the MLP/EA. After the Proposed San Rafael Desert MLP and RMP
34 Amendments/EA is released to the public, the BLM will conduct a 60-day Governor's Office consistency
35 review and schedule a 30-day protest period. The BLM will resolve all protests on the final Proposed San
36 Rafael Desert MLP and RMP Amendments/EA, and will issue the approved MLP decision record.

37 **5.3 LIST OF PREPARERS**

38 As required by NEPA (40 CFR 1502.17), Tables 5-2 and 5-3 list the people primarily responsible for
39 preparing the MLP/EA and their qualifications. SWCA Environmental Consultants, a contractor selected
40 to prepare the MLP/EA as directed by the BLM, has, in accordance with 40 CFR 150.5(c), certified that it
41 does not have any financial or other interest in the outcome of the decisions to be made pursuant to the
42 MLP/EA.

1 **Table 5-2. Bureau of Land Management Preparers**

Name	Education	Project Role
Leonard Herr	B.S., Natural Resources, Humboldt State University	Air resources
Jeffery Brower		Soil and water resources
Jerrad Goodell		Riparian resources
Amber Koski		Cultural resources, national historic trails
Nicole Lohman		Cultural resources, national historic trails
Michael Leschin		Paleontological resources
Joshua Winkler		Visual resources, areas of critical environmental concern, recreation
Matthew Blocker		Wild and scenic rivers, recreation, wilderness, wilderness characteristics
Bill Stevens	B.A., History, Loyola University Chicago M.A., History, University of Toronto M.B.A., Accounting, University of Chicago Ph.D., Accountancy, University of Illinois at Urbana-Champaign	Socioeconomics
Tyler Ashcroft		Project manager
Jake Palma	B.A., American Studies, Utah State University M.P.A., Public Administration, Southern Utah University	Co-project manager
Leah Lewis		Wildlife, migratory birds, threatened and endangered species, Utah BLM sensitive species
Christine Cimiluca		Vegetation
Sue Fivecoat		Co-project manager (Richfield Field Office)
Myron Jeffs		Visual resources, areas of critical environmental concern, recreation, wilderness, wilderness characteristics (Richfield Field Office)

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1 **Table 5-3. Non-Bureau of Land Management Preparers (SWCA Environmental Consultants)**

Name	Education	Project Role
Deb Reber	B.A., Natural Resource Management, California State University, Chico	Project manager, reviewer, lands with wilderness characteristics, special designations, and oil and gas resources
Reid Persing	B.A., Chemistry, Biochemistry, University of Colorado	Assistant project manager, reviewer, vegetation, special status species, and wildlife and fisheries
Gretchen Semerad	B.S., Biology; Gonzaga University M.S., Environmental Science; Washington State University	Air quality, climate change, auditory management, recreation, and special status species
Jenny Addy	B.S., Conservation and Restoration Ecology; e: Range Ecology, Utah State University	Soil resources and water resources, and health and safety
Kelly Beck	B.S., Anthropology; University of Utah M.A. with distinction, Anthropology; California State University, Chico Ph.D., Anthropology; University of Utah	Cultural resources
Jeremy Eyre	B.A., Political Science; e: International Relations, University of Utah J.D., Law; e: Environmental & Natural Resources, University of Utah	Health and safety, visual resources and night skies, lands with wilderness characteristics, and oil and gas resources
Paige Marchus	B.A., Journalism; Pacific University	Visual resources and night skies
Kari Chalker	B.A., Anthropology, University of Florida M.A., Liberal Education, St. Johns College	Technical editor
Linda Burfitt	B.A., Media Communications, University of Windsor, Ontario A.F., Forestry, Sir Sandford Fleming College, Ontario A.S., Ecosystem Management, Sir Sandford Fleming College, Ontario	Technical editor
Debbi Smith	Certified Microsoft Office Expert in Word, Excel, PowerPoint, Outlook and Publisher	Formatter
Allen Stutz	GIS Certificate of Advanced Study, University of Denver B.S., Biology: Ecology, Evolution, Conservation, University of Washington B.S., Zoology, University of Washington	GIS
Rachel Johnson	B.S., Natural Resources and Environmental Science, Paul Smith's College	GIS

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