

# Previously Issued Oil and Gas Leases in the White River National Forest Final Environmental Impact Statement

## Volume I – Cover through Chapter 3.0



August 2016

BLM/CO/PL-16/013

Colorado River Valley Field Office, Colorado



### ***BLM Mission Statement***

*To sustain the health, diversity, and productivity of America's public lands for the use and enjoyment of present and future generations.*

*The BLM's multiple-use mission, set forth in the Federal Land Policy and Management Act of 1976, mandates that we manage public land resources for a variety of uses, such as energy development, livestock grazing, recreation, and timber harvesting, while protecting a wide array of natural, cultural, and historical resources.*



# United States Department of the Interior

BUREAU OF LAND MANAGEMENT

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In Reply Refer To:  
3100 (CO-922)

JUL 19 2016

Dear Reader:

Enclosed for your review is the Final Environmental Impact Statement (EIS) for Previously Issued Oil and Gas Leases in the White River National Forest. The Final EIS evaluates the environmental impacts that would result from cancelling, reaffirming, or modifying (with additional or different terms) 65 previously issued federal fluid minerals leases underlying White River National Forest (WRNF) lands in western Colorado. These leases were issued between 1995 and 2012, and are located in Mesa, Garfield, Pitkin and Rio Blanco counties, between the towns of De Beque and Carbondale south of Interstate 70, except for one lease northeast of Meeker.

In 2007, the Interior Board of Land Appeals (IBLA) ruled that before including U.S. Forest Service parcels in an oil and gas lease sale, the Bureau of Land Management (BLM) must either formally adopt National Environmental Policy Act (NEPA) analysis completed by the U. S. Forest Service or conduct a NEPA analysis of its own. In response to that decision, the BLM determined that the most current U.S. Forest Service NEPA analysis (prepared in 1993) conducted for the 65 previously issued leases was no longer adequate due to changes in laws, regulations, policies and conditions since the earlier EIS was finalized in 1993. Therefore, the BLM prepared this EIS to evaluate and disclose the potential impacts of a range of management decisions for these leased parcels and the associated reasonably foreseeable oil and gas development in compliance with NEPA and associated regulations.

The BLM developed the alternatives analyzed in the Final EIS in response to issues and concerns raised through public comments, coordination with Cooperating Agencies, and interaction with BLM management and resource specialists. The alternatives are briefly described below.

- Alternative 1 (the No Action Alternative): The BLM would reaffirm the 65 leases as they were issued.
- Alternative 2: The BLM would modify eight of the leases to address inconsistencies by adding stipulations identified in the 1993 EIS and Record of Decision (ROD) that were not attached to the leases as issued.
- Alternative 3: The BLM would modify each of the 65 leases to match the stipulations for future leasing identified in the Proposed Action from the 2014 WRNF Oil and Gas Leasing Final EIS.
- Alternative 4 (the Proposed Action): The BLM would both modify and cancel leases. In areas identified as open to future leasing by the U.S. Forest Service's 2015 Final ROD for Oil and Gas Leasing on Lands Administered by the White River National Forest, lease stipulations would be modified as in Alternative 3. All or part of 25 leases would be cancelled in areas identified in the Final ROD as closed to future leasing.

- h Alternative 5: The BLM would cancel all of the previously issued 65 leases, plug and abandon all producing wells, remove infrastructure, and reclaim well pads and other ancillary facilities.
- h The Preferred Alternative: Based on the analysis presented in this EIS and the comments received on the Draft EIS, the BLM's Preferred Alternative for purposes of this analysis is a combination of portions of Alternatives 2 and 4. Alternative 2 would apply to leases that are producing or committed to an exploratory unit agreement or communitization agreement held by production, and Alternative 4, with minor modifications, would apply to non-producing and non-committed ("undeveloped") leases.

This approach is consistent with the BLM's stated purpose and need for the EIS including: (1) revisiting or reaffirming the previously issued leases, (2) assessing the conformance of those leases with applicable U.S. Forest Service decisions, including recent availability decisions, (3) fulfilling the federal government's policy of fostering the orderly and responsible development of domestic resources, (4) meeting domestic energy needs, and (5) supporting the U.S. Forest Service's management of oil and gas resources under the lands it manages.

The BLM released a Draft EIS to the public on November 20, 2015, with the publication of a Notice of Availability (NOA) in the *Federal Register*. The NOA initiated a public comment period that ended on January 8, 2016. The BLM held public meetings to receive comments on the Draft EIS on December 14, 15, and 16, 2015, in Glenwood Springs, De Beque, and Carbondale, respectively. Agencies, businesses, organizations, and interested parties submitted a total of 60,515 letters on the Draft EIS via mail and email. Each submission varied in content, and ranged from one to many comments that contained technical information, suggestions for improving the content of the Draft EIS, as well as personal opinions. The majority of the submissions were form letters. Substantive comments received and responses to these comments are contained in Appendix E of the Final EIS. Some comments resulted in modifications to the EIS. Changes between draft and final EISs are marked using lines in the left margin; additions are in **bold text**.

The Final EIS is available online at: [http://www.blm.gov/co/st/en/fo/crvfo/existing\\_leases\\_on.html](http://www.blm.gov/co/st/en/fo/crvfo/existing_leases_on.html). Copies of the Final EIS are available from the BLM Colorado River Valley Field Office, 2300 River Frontage Road, Silt, CO, 81652. Project materials may be viewed at the Colorado River Valley Field Office at the address indicated above during regular business hours (8:00 a.m. to 4:30 p.m.), Monday through Friday, except holidays. The publication of the NOA for the Final EIS in the *Federal Register* initiates a 30-day availability period. Following the availability period, the BLM will issue a ROD based on the Final EIS.

For further information please contact Greg Larson, BLM Project Manager at (970) 876-9000.

Sincerely,



Ruth Welch  
State Director

**Final Environmental Impact Statement for  
Previously Issued Oil and Gas Leases on the  
White River National Forest**

August 2016

Lead Agency: U.S. Department of the Interior, Bureau of Land Management, Colorado River Valley Field Office

Cooperating Agencies: U.S. Environmental Protection Agency Region 8, Colorado Division of Natural Resources, Colorado Parks and Wildlife, U.S. Forest Service (White River National Forest), Garfield County, Mesa County, Pitkin County, Rio Blanco County, City of Glenwood Springs, City of Rifle, Town of Carbondale, Town of New Castle, Town of Parachute, Town of Silt

Project Location: Mesa, Garfield, Pitkin, and Rio Blanco counties, Colorado

Contact for EIS: Greg Larson, Project Manager  
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Date Final EIS Notice of Availability Published in Federal Register: August 5, 2016

BLM Authorized Officer Responsible for Preparing the Final EIS: Karl Mendonca, Field Manager

**ABSTRACT**

This Final Environmental Impact Statement (EIS) has been prepared to document and disclose the environmental impacts of reaffirming, modifying, or cancelling 65 previously issued federal fluid minerals leases underlying White River National Forest (WRNF) lands. These leases were issued between 1995 and 2012, and are located in Mesa, Garfield, Pitkin, and Rio Blanco counties. The Forest Service decision that made the 65 parcels considered in this EIS available for oil and gas leasing was documented through the 1993 WRNF Oil and Gas Leasing Record of Decision and reaffirmed in the 2002 White River National Forest Plan. In 2007, in a challenge brought against the issuance of three leases, the Interior Board of Land Appeals (IBLA) held that before including Forest Service parcels in an oil and gas lease sale the BLM must either formally adopt NEPA analysis completed by the Forest Service or conduct a NEPA analysis of its own (see Board of Commissioners of Pitkin County, 173 IBLA 173 [2007]). The 2007 IBLA decision addressed three leases in the WRNF that were later cancelled; however, the 65 existing leases addressed in this EIS share the same NEPA deficiency. With respect to the 65 leases at issue, the IBLA ruled that although the BLM was a cooperating agency on the 1993 WRNF Oil and Gas Leasing EIS, the BLM did not formally adopt the Forest Service NEPA analysis, and therefore did not comply with its NEPA obligations with respect to the issuance of those leases. Following the IBLA's decision, the BLM determined that the WRNF NEPA analysis conducted for the 65 previously issued leases is no longer adequate due to changes in laws, regulations, policies, and conditions since the earlier EIS was finalized in 1993.

The Final EIS discusses the purpose and need for the Proposed Action; alternatives to the Proposed Action; and potential direct, indirect, and cumulative impacts of each alternative. The potential impacts of each alternative are analyzed by using adjusted Reasonable Foreseeable Development Scenario estimates. Six alternatives are analyzed in detail in the FEIS:

1. Alternative 1: Reaffirms all 65 leases (No Action).
2. Alternative 2: Reaffirms 57 leases and addresses lease inconsistencies on 8 leases.
3. Alternative 3: Modifies leases to match stipulations identified in the Proposed Action for the Final EIS for Future Oil and Gas Leasing on the WRNF (2014).
4. Alternative 4: Modifies or cancels leases to match the stipulations and availability decisions of the Final ROD for Future Oil and Gas Leasing on the WRNF (2015f) (Proposed Action).
5. Alternative 5: Cancels all leases; plug and abandon all existing wells.
6. Preferred Alternative: **A combination of Alternatives 2 and 4; it would cancel 25 undeveloped leases in full to match the availability decisions of in the Final ROD for Future Oil and Gas Leasing on the WRNF (2015f) (Alternative 4) and would modify the remaining undeveloped leases as outlined in Alternative 4. Leases that are producing or committed to an exploratory unit agreement or communitization agreement would be treated as outlined in Alternative 2.**

These alternatives were developed by the BLM in response to issues and concerns from public comments submitted during the public scoping period, coordination with Cooperating Agencies, interaction between BLM management and resource specialists, and public and agency comments on the Draft EIS. The BLM also considered alternatives raised during scoping, alternatives development and the Draft EIS public comment period that are not carried forward for detailed analysis.

The 30-day review period for this Final EIS was initiated with publication of the Notice of Availability (NOA) in the Federal Register on August 5, 2016.

## Executive Summary

### ES.1 Introduction

In compliance with the National Environmental Policy Act of 1969, as amended (NEPA), the Bureau of Land Management (BLM) Colorado River Valley Field Office in Silt, Colorado, has prepared this Environmental Impact Statement (EIS) to analyze the potential impacts of cancelling, reaffirming, or modifying (with additional or different terms) 65 federal fluid minerals leases within the White River National Forest (WRNF). These leases were issued between 1995 and 2012, and are located in Mesa, Garfield, Pitkin, and Rio Blanco counties, between the towns of De Beque and Carbondale south of Interstate 70, except for one lease northeast of Meeker (see **Figure ES-1**).

In 2007, the Interior Board of Land Appeals (IBLA) held that before including Forest Service parcels in an oil and gas lease sale the BLM must either formally adopt NEPA analysis completed by the Forest Service or conduct a NEPA analysis of its own (see Board of Commissioners of Pitkin County, 173 IBLA 173 [2007]). The IBLA ruled that although the BLM was a cooperating agency on the Forest Service's 1993 WRNF Oil and Gas Leasing EIS, the BLM did not formally adopt the Forest Service NEPA analysis or prepare its own analysis, and therefore did not comply with its NEPA obligations with respect to the issuance of those leases at issue in that proceeding. **While the 2007 IBLA decision addressed three leases in the WRNF that were later cancelled, the 65 existing leases addressed in this EIS share the same NEPA deficiency identified by the IBLA with respect to those leases.**

Following the IBLA's decision, the BLM determined that the Forest Service NEPA analysis conducted for the previously issued leases is no longer adequate due to changes in laws, regulations, policies, and conditions since the Forest Service's EIS was issued in 1993. Therefore, this EIS evaluates and discloses the potential impacts of leasing those parcels. It does not address future fluid mineral leasing availability, which has recently been addressed in a separate NEPA analysis prepared by the Forest Service, the WRNF Oil and Gas Leasing Final EIS (December 2014). The BLM has incorporated as much of the Forest Service's new NEPA analysis related to future oil and gas leasing on the WRNF as possible into this analysis (**43 CFR 46.120 and 46.135**). The BLM was a cooperating agency on the 2014 WRNF EIS. **The WRNF Oil and Gas Leasing Final Record of Decision (ROD) was released in December 2015.**

### ES.2 Reasonably Foreseeable Development Scenario

For purposes of this analysis, the BLM needed to prepare a Reasonably Foreseeable Development Scenario (RFDS) of potential oil and gas leasing activity within the analysis area. An RFDS is a long-term projection of the likely potential future oil and gas development and production within a defined area and a defined period of time (20 years). An RFDS for the WRNF was prepared by the Forest Service in connection with the Forest Service's recent analysis of future leasing. That analysis was published in September 2010, and was included as Appendix F in the WRNF Oil and Gas Leasing Draft EIS (U.S. Forest Service [USFS] 2012).

As stated in the RFDS (USFS 2010a), its purpose is to provide an estimated projection of unconstrained, future oil and gas exploration and development based on a set of assumptions in order "to evaluate potential effects that might reasonably occur as a result of leasing." The RFDS is based on geology; resource occurrence potential; past and current leasing, exploration, and development activity; and engineering technology, with consideration of economics and physical limitations on access to resources. An RFDS is not a decision, and it does not establish or imply a limit on future development.

The RFDS (USFS 2010a) was used as a starting point for estimating the number of wells likely to be developed within the 65 previously issued leases. The basic assumptions used to develop the estimated unconstrained oil and gas development within the 65 leases are summarized below.

- At least one well can be reasonably foreseen for each of the 65 leases.
- Future development will follow past development trends.
- Almost 4 percent of all wells will be horizontally drilled.
- A total of 444 wells is projected within the 65 leases without taking into account constraints such as No Surface Occupancy (NSO) stipulations.
- The 444 wells would not be evenly distributed across the 65 leases. Rather, the leases have been grouped spatially into zones based on the location of past development, production infrastructure, and access for exploration and production.

### ES.3 Standard Lease Terms and Lease Stipulations

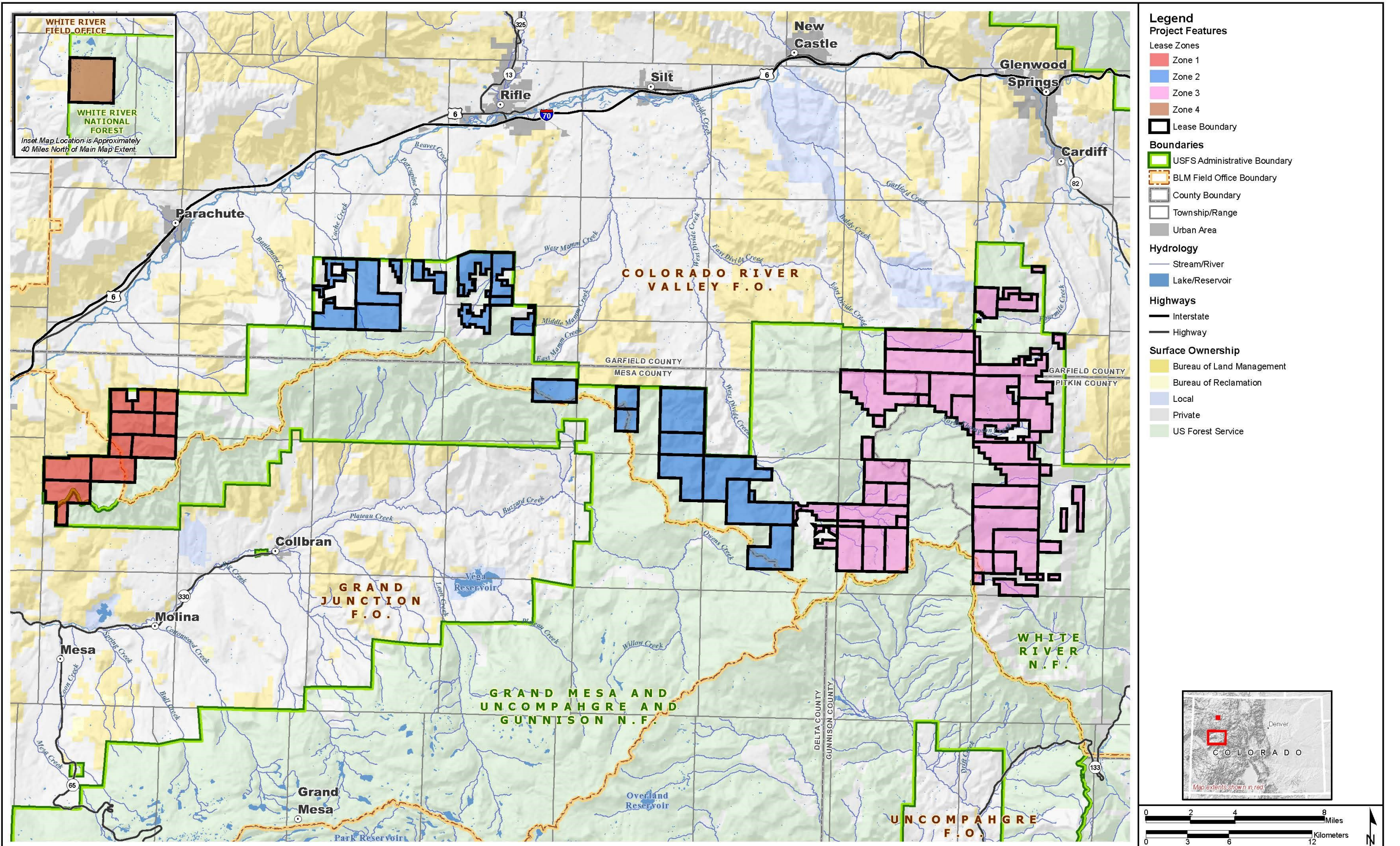
Standard Lease Terms (**SLTs**) establish that the lessee has the right to use as much of the leased lands as is necessary to explore, drill, and extract all the leased resource. **SLTs** allow for reasonable measures that may be required to minimize adverse impacts to other resource values, land uses, or land users to the extent consistent with the lease rights granted. Lease stipulations are conditions placed on a lease that become part of the lease issued by BLM. The purpose of lease stipulations is to minimize potential adverse impacts of exploration and development operations in compliance with applicable management direction. Additional information related to lease stipulations and the specific stipulations considered by the Forest Service to meet the standards and guidelines of the WRNF Forest Plan (USFS 2002b) can be found in Section 1.4.6 of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a). The types of lease stipulations applied and analyzed in this EIS include the following.

- **No Surface Occupancy (NSO)**—Prohibits all surface activities and intended for use only when other stipulations are determined to be inadequate to protect surface resources, especially where the resource protection cannot be accomplished by relocating proposed operations less than 200 meters (approximately 660 feet).
- **Controlled Surface Use (CSU)**—Controls lease activities where resource protection cannot be accomplished adequately with mitigation measures provided by **SLTs**, regulations, and other guidance. It is less restrictive than NSO and applied where use and occupancy is allowed but special operational constraints are needed for specific types of activities without prohibiting all surface activities.
- **Timing Limitations (TL)**—Prohibits surface use during a specified period to protect identified resources and resource values on a seasonal basis.

Exceptions, modifications, or waivers may be issued on a case-by-case basis to exempt the lessee from NSO, CSU, or TL stipulations temporarily or permanently (for the life of the lease) if the conditions under which the stipulation was established do not exist. Modifications and waivers are defined at 43 CFR 3101.1-4.



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Date: 9/17/2015

Figure ES-1 General Location of Leases to be Evaluated

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## **ES.4 Purpose and Need; Decisions to Be Made**

### **ES.4.1 Purpose of the Action**

BLM's purpose for this federal leasing action is to:

- Revisit or reaffirm previous BLM decisions to issue 65 leases underlying Forest Service lands. These leases were issued from 1995 to 2012 following the Forest Service's availability decision considered in the 1993 EIS;
- Assess conformance with the decisions making these lands available for oil and gas leasing in the 1993 EIS, as reaffirmed in the 2002 White River National Forest Plan and consider consistency with the Forest Service's recent availability decisions for lands within the White River National Forest;
- Support the Forest Service in managing oil and gas resources, as required by law and memoranda of understanding between the agencies; and
- Fulfill the federal government's policy to "foster and encourage private enterprise in the development of economically sound and stable industries, and in the orderly and economic development of domestic resources to help assure satisfaction of industrial, security, and environmental needs" (Mining and Minerals Policy Act of 1970) while continuing to sustain the land's productivity for other uses and capability to support biodiversity goals (**Forest Service Minerals Program Policy**).

### **ES.4.2 Need for the Action**

The BLM's need for this federal leasing action is to:

- Meet domestic energy needs under the requirements of the Mineral Leasing Act of 1920, as amended, the Mining and Minerals Policy Act of 1970, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987 ("Reform Act"). The BLM's responsibility under these laws is to regulate the development of oil and gas in the public domain, and to ensure that deposits of oil and gas owned by the United States shall be subject to disposition **in accordance with** the land use planning process.
- Address the NEPA deficiency identified by the 2007 IBLA ruling on the appeal by the Board of Commissioners of Pitkin County **and other groups** that BLM must formally adopt NEPA analysis completed by the Forest Service or conduct a NEPA analysis of its own for issuance of oil and gas leases underlying WRNF lands;
- Support **Forest Service** mineral policy that puts responsibility on field units, with the known presence or potential presence of a mineral or energy resource, to foster and encourage the exploration, development, and production of the mineral or energy resource consistent with Forest Service management direction; and
- Meet BLM's collaborative responsibility under the Reform Act to issue and manage oil and gas leases where the **Forest Service** has issued a land availability decision.

## **ES.5 Decisions to be Made**

### **ES.5.1 Decisions to Be Informed Through This Analysis**

This EIS considers 65 previously issued leases issued in the WRNF that were issued between 1995 and 2012. The decision to be made by the BLM, based on the analysis in this EIS, is whether some or all of the 65 leases should be:

1. Reaffirmed with their current existing stipulations;
2. Modified with additional or different lease terms or additional mitigation measures; or
3. Cancelled.

**Note that several leases, as shown in Table 1-1, expired before or during the preparation of the EIS. These leases have been retained in the EIS and its analysis for continuity, and because the circumstances surrounding the expiration of several of those expired leases are either subject to administrative appeal or are under appeal to the IBLA. For purposes of the ultimate decisions on any of the actions analyzed in this EIS, there will be no decision made by the BLM on any leases that are expired at the time of any final decision.**

### **ES.5.2 Decisions Beyond the Scope of This Analysis**

The decision of whether National Forest System (**NFS**) lands are available or unavailable for oil and gas leasing remains with the Forest Service, although the BLM retains the ultimate discretion whether to issue a lease (43 CFR 3101.7-2). In light of this, the BLM will only consider the currently leased parcels issued without BLM NEPA analysis (65 parcels) and not future leasing availability within the WRNF, which **has been** addressed by the Forest Service separately. This EIS will not directly affect decisions on any pending or proposed Application for Permit to Drill because the Forest Service has the authority to address the NEPA on the proposed Surface Use Plans of Operations that accompany each Application for Permit to Drill.

This is strictly a leasing decision and will not authorize any development on these previously issued leases. Any discussion of development in this EIS is only to facilitate an analysis of the effects of leasing through analysis assumptions based on historic oil and gas development in this region and the 2010 RFDS.

## **ES.6 Scoping, Public Involvement, and Relevant Issues Identified**

### **ES.6.1 Public Scoping Issues**

In early 2014, the BLM held a public scoping period for the project. Substantive scoping comments fell into the following four broad categories: Process, Purpose and Need, Alternatives Development, and Impacts Analysis (including resource-specific concerns and cumulative impacts). The primary public scoping issues are summarized in **Table ES-1** with the locations in this EIS where they are addressed.

### **ES.6.2 Internal Scoping**

Following review of the public scoping comments, the BLM Colorado River Valley Field Office interdisciplinary team met to discuss the external scoping comments and to formulate alternatives to be analyzed in the EIS. This meeting was held to identify issues of concern to the BLM and to discuss how to address the public and agency issues in the EIS. The meeting also helped to more fully develop the conceptual alternatives that were presented in the Notice of Intent.

**Table ES-1 Summary of Primary Scoping Comments**

Resource	Primary Scoping Comments	Where Issues Are Analyzed in EIS
Process	What NEPA deficiencies exist and by what process should the BLM address them? By what authority may the BLM cancel or modify leases?	Sections 1.2 — 1.5
	How can cooperators, affected stakeholders, and other interested parties participate during the NEPA process?	Section 1.7, Chapter 5.0
Purpose and Need	Should the Purpose and Need for agency action extend beyond addressing a NEPA deficiency?	Sections 1.2, 1.3
	What are BLM's and <b>Forest Service's</b> respective roles and decisions to be made?	Section 1.4
Analysis Approach (General)	What RFDS and other development assumptions should be used for EIS analysis? What level of analysis is appropriate for a lease sale EIS?	Section 4.1
	How should the BLM address changed circumstances and new information in a remedial NEPA process?	Chapter 1.0; Chapter 2.0; Section 4.1
Cumulative Impacts	What reasonably foreseeable future actions are appropriate for inclusion in the cumulative impact analyses?	Section 4.1
Air Quality	How would reasonably foreseeable development activities such as drilling, production, vehicle use, and other sources affect air quality?	Section 4.2
	How will the Proposed Action and alternatives address emissions of greenhouse gasses and potential contributions to climate change?	Section 4.2
Geology and Minerals, including Paleontology	What is the potential for seismic activity or other geological instability as a result of reasonably foreseeable development?	Section 4.3
	How would the potential for gas and liquid migration or seismic activity be affected by Mancos shale drilling, hydraulic fracturing, injection of produced water, or other reasonably foreseeable activities?	Sections 4.3, 4.5
	What is the potential for impacts to important paleontological resources from reasonably foreseeable development?	Section 4.3
Soils	How does area soil type affect the potential for erosion, runoff, and subsequent sediment loading? How will impacts from reasonably foreseeable development to sensitive soils be minimized or mitigated?	Section 4.4
Water Resources	How would the projected water use affect long-term availability of water sources?	Section 4.5
	How would the characteristics of the oil/gas formations, aquifer formations, and their interconnectedness affect water quality during activities such as drilling, hydraulic fracturing, or other reasonably foreseeable activities?	Sections 4.3, 4.5
	What are appropriate setbacks for protection of public and private wells, lakes and streams, impaired waters, floodplains, or other water resources?	Chapter 2.0; Section 4.5
	How can the impacts from spills to water quality and other resources be minimized?	Chapter 2.0; Sections 4.5, 4.16
Vegetation and Special Status Species	How would reasonably foreseeable habitat disturbance affect vegetation resources, plant diversity, and ecologically intact/undisturbed locations and special status plant species?	Chapter 2.0; Section 4.6

**Table ES-1 Summary of Primary Scoping Comments**

<b>Resource</b>	<b>Primary Scoping Comments</b>	<b>Where Issues Are Analyzed in EIS</b>
Wildlife and Special Status Species	How would reasonably foreseeable habitat disturbance, vehicle use, and other elements of oil and gas development such as noise affect terrestrial and aquatic wildlife, big game, special status species, and their habitat?	Sections 4.6, 4.7, 4.8
Cultural Resources	How can the BLM protect and conserve cultural resources such as Traditional Cultural Properties, from reasonably foreseeable development?	Chapter 2.0; Section 4.9
	How can the setting of historic tourism be maintained in consideration of reasonably foreseeable development?	Sections 4.9, 4.13
Hazardous Materials	What types and amounts of hazardous materials will be used for oil and gas development? What methods will be used for hazardous materials transport, storage, and usage and disposal? What contingencies exist to handle unexpected contaminations?	Section 4.16
Health and Human Safety	How will the BLM protect public health and safety in and around the analysis area? What are the cumulative and combined impacts of multiple exposures to chemicals and toxic substances such as hydraulic fracturing flues, ozone, and volatile organic compounds on humans?	Chapter 2.0; Section 4.16
Land Use	How would the Proposed Action and alternatives comply with federal, county and local policies concerning development?	Section 4.11
Livestock Grazing	How will the BLM minimize impacts to livestock in and around the analysis area from exposure to hydraulic fracturing fluids, fugitive dust, and as well as impacts from noise or traffic?	Section 4.14
Recreation	How would reasonably foreseeable activities affect access to recreation and the quality of the recreational experience? How would this affect the recreation industry?	Sections 4.13, 4.17
Socioeconomics	How would lease reaffirmation, lease modification, and lease cancellation affect local and regional social and economic conditions?	Section 4.17
	Would reasonably foreseeable development be compatible with the varying social and economic conditions across the analysis area?	Section 4.17
Special Designations	How would the Proposed Action and alternatives comply with the 2001 and 2012 Roadless Rules? How would the alternatives affect the wilderness qualities of Inventoried Roadless Areas and the values of Research Natural Areas?	Chapter 2.0; Section 4.12
Transportation	How will development affect local and regional road system, access and traffic? How will adverse impacts to traffic be minimized?	Chapter 2.0; Section 4.10
<b>Scenic Resources</b>	How would the reasonably foreseeable development affect the general landscape and rural character of the area under each of the alternatives?	Chapter 2.0; Section 4.15

### **ES.6.3 Public Meetings and Comments on the Draft EIS**

The publication of the Notice of Availability (NOA) for the Draft EIS in the Federal Register on November 20, 2015, initiated the public comment period that ended on January 8, 2016. All submissions received during the comment period were analyzed for content. In accordance with NEPA guidelines, the BLM has formally responded to all comments identified as substantive. Appendix E contains additional information regarding public outreach, submissions by type, a description of the content analysis process and comment disposition, a summary of out of scope and non-substantive comments, and all substantive comments with BLM responses.

### **ES.7 Alternatives**

In addition to the No Action Alternative, there are **five** action alternatives analyzed in detail. The alternatives analyzed were developed by the BLM in response to issues and concerns from public comments submitted during the public scoping period, coordination with Cooperating Agencies, and interaction with BLM management and resource specialists. The BLM also considered alternatives raised during the scoping and alternatives development processes that are not carried forward for detailed analysis.

The alternatives analyzed in detail are briefly described below.

#### **ES.7.1 Alternative 1 (No Action)**

Alternative 1 reaffirms the lease stipulations on the 65 leases as they were issued. Under Alternative 1, the BLM would continue to administer the leases with their current stipulations. Those leases that are currently under suspension would be reaffirmed and allowed to be developed at the discretion of the lessee, subject to applicable legal requirements.

#### **ES.7.2 Alternative 2**

Alternative 2 modifies 8 existing leases to address inconsistencies with the 1993 EIS and ROD by adding stipulations identified in the 1993 EIS and ROD that were not attached to the leases as issued. Under this alternative, the BLM would offer the lessee the option of either accepting the new lease stipulations or having the lease cancelled.

#### **ES.7.3 Alternative 3**

Alternative 3 modifies the existing 65 leases to match the stipulations for future leasing identified in the Proposed Action from the WRNF Oil and Gas Leasing Final EIS (USFS 2014a). Although the Forest Service's 2014 Proposed Action (USFS 2014a) does not apply to these 65 leases, Alternative 3 is designed to consider the modification of the 65 leases to match its stipulations for future leasing. Under this alternative, the BLM would offer the lessee the option of either accepting the new lease terms or having the lease cancelled. For **non-producing or non-committed ("undeveloped")** leases, cancellation (if elected by the lessee) would be done through a BLM administrative process and would require that the BLM refund any bonus bids and lease payments. For leases with producing wells, the new stipulations would only apply to new development. Existing wells would remain in production. Should the lessee not accept the new lease stipulations for future development on a producing lease, it may be necessary for the BLM to request judicial action to cancel the lease.

#### **ES.7.4 Alternative 4 (Proposed Action)**

Alternative 4 modifies existing lease stipulations in areas identified as open to future leasing by the Forest Service and cancels all or part of 25 existing leases in areas identified as closed to future leasing. Although the Forest Service's **final** decision on future leasing (USFS 2015f) does not apply to these 65 previously issued leases, this alternative is designed to reflect the Forest Service's future

management objectives for the areas covered by those 65 leases. The primary difference between Alternatives 3 and 4 is that under Alternative 4, some leases or parts of leases would be cancelled to match those areas determined to be closed to leasing in the draft decision. In the areas identified as open to future leasing in the WRNF **Final** ROD (USFS 2015f), the stipulations would be modified to be the same as those in Alternative 3. Under this alternative, the BLM would offer the lessee the option of either accepting the new lease stipulations or having the lease cancelled. For undeveloped leases, cancellation would be done through a BLM administrative process and would require that the BLM refund any bonus bids and lease payments.

#### **ES.7.5 Alternative 5**

Under Alternative 5, all of the previously issued 65 leases would be cancelled. All producing wells would be plugged and abandoned, infrastructure would be removed, roads, well pads, and other ancillary facilities would be reclaimed, and all disturbed areas would be revegetated.

#### **ES.7.6 Preferred Alternative**

**Based on public input received and additional internal assessments, the BLM developed its Preferred Alternatives by combining aspects of Alternatives 2 and 4 above. The Preferred Alternative would cancel in their entirety 25 non-producing or non-committed (“undeveloped”) leases that overlap the area identified as closed to future leasing by the Final ROD (USFS 2015f); would apply Alternative 4 stipulations to the 13 undeveloped leases that are within parts of the WRNF open to future leasing; and would apply Alternative 2 stipulations to 23 leases that are producing or committed to an exploratory unit agreement or communitization agreement and 4 expired leases currently under appeal that had previously been part of the Willow Creek Unit (the Alternative 2 stipulations would apply to these leases only if the unit contraction under appeal is overturned and those leases are reinstated as they have currently expired). With respect to lease that receive new stipulations, the BLM would offer the lessee the option of either accepting the new lease stipulations or having the lease cancelled. For undeveloped leases, cancellation would be done through a BLM administrative process and would require that the BLM refund any bonus bids and lease payments.**

**The Preferred Alternative addresses public comments and concerns while acknowledging recent decisions by the Forest Service with respect to availability for oil and gas development. The Alternative also recognizes the adverse economic impacts and technical challenges for the BLM and local governments associated with any decision to cancel producing or committed leases.**

#### **ES.8 Comparison of Reasonably Foreseeable Future Development under the Action Alternatives**

The numbers of wells predicted to be developed under each alternative was determined by starting with the unconstrained development from the RFDS (USFS 2010); prorating the well numbers projected for each zone based on past development numbers, production potential, and anticipated drilling technology; and considering the constraints on development, such as NSO stipulations and the maximum distance from the surface location to the target formation. **Table ES-2** displays the estimated number of new wells and pads that are used as the basis for the analysis of effects in Chapter 4.0. Because the predicted number of wells and pads was developed by scaling the RFDS projections, there are fractional numbers for wells and pads. These estimates were used for the development of projected surface disturbance, projected water use, transportation needs, staffing requirements, and production forecasts that are used in the impact analysis.



**Table ES-2 Number of Projected Wells by Alternative**

Zone (acres in zone) and Development Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5 <sup>1</sup>	Preferred Alternative
<b>Zone 1 (10,114 acres)</b>						
Vertical/ Directional Wells	19.7	19.7	19.7	19.7	0	<b>19.7</b>
Horizontal wells	16	16	16	16		<b>16</b>
Pads	5.1	5.1	5.1	5.1	0	<b>5.1</b>
<b>Zone 2 (24,938 acres)</b>						
Vertical/ Directional Wells	318.1	318.1	318.1	318.1	-73	<b>318.1</b>
Horizontal wells	1	1	1	1		<b>1</b>
Pads	45.6	45.6	45.6	45.6	-13	<b>45.6</b>
<b>Zone 3 (42,766 acres)</b>						
Vertical/ Directional Wells	50.7	50.7	47.6	17.9	-2	<b>10.6</b>
Horizontal wells	1	1	1	0.4		<b>0.2</b>
Pads	7.4	7.4	6.9	2.6	-3	<b>1.5</b>
<b>Zone 4 (2,562 acres)</b>						
Vertical/ Directional Wells	10	10	10	10	0	<b>10</b>
Horizontal wells	0	0	0	0		<b>0</b>
Pads	1.4	1.4	1.4	1.4	0	<b>1.4</b>
<b>Totals (80,380 acres)</b>						
Vertical/ Directional Wells	398.4	398.4	395.4	365.7	-75	<b>358.4</b>
Horizontal wells	18	18	18	17.4		<b>17.2</b>
Pads	59.5	59.5	59.1	54.7		-16

<sup>1</sup> Under Alternative 5 all leases would be cancelled; therefore, the number of new wells in all zones would be zero.

**Negative numbers in this column account for the number of wells and pads to be reclaimed under Alternative 5, which is the only alternative that requires reclamation of existing wells and pads consequent to their cancellation**

**ES.8.1 Comparison of Alternatives**

**Table ES-3** displays, by alternative, projected surface disturbance (for well pads, roads, and pipelines), as well as projected water use, transportation needs, staffing requirements, and production forecasts for reasonably foreseeable development. The totals shown in the table account for the combination of vertical/directional wells and the number of horizontal wells projected under each alternative. These results are used in the analysis contained in Chapter 4.0.

**Table ES-3 Development Assumptions by Alternatives**

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5 <sup>1</sup>	Preferred Alternative
<b>Zone 1</b>						
Initial Surface Disturbance (acres)	77	77	77	77	0	77
Long-term Surface Disturbance (acres)	33	33	33	33	0	33
Fresh Water Use <sup>2</sup> (acre-feet)	339	339	339	339	0	339
Recycled Water Use (acre-feet)	1,091	1,091	1,091	1,091	0	1,091
Gas Production (Bcf)	126	126	126	126	0	126
Produced Water (gallons)	<b>81,761,565</b>	<b>81,761,565</b>	<b>81,761,565</b>	<b>81,761,565</b>	<b>0</b>	<b>81,761,565</b>
<b>Zone 2</b>						
Initial Surface Disturbance (acres)	684	684	684	684	76	684
Long-term Surface Disturbance (acres)	296	296	296	296	0	296
Fresh Water Use <sup>2</sup> (acre-feet)	675	675	675	675	0	675
Recycled Water Use (acre-feet)	1,702	1,702	1,702	1,702	0	1,702
Gas Production (Bcf)	388	388	388	388	0	388
Produced Water (gallons)	<b>510,837,600</b>	<b>510,837,600</b>	<b>510,837,600</b>	<b>510,837,600</b>	<b>0</b>	<b>510,837,600</b>
<b>Zone 3</b>						
Initial Surface Disturbance (acres)	111	111	104	39	10	23
Long-term Surface Disturbance (acres)	48	48	45	17	0	10
Fresh Water Use <sup>2</sup> (acre-feet)	123	123	117	44	0	26
Recycled Water Use (acre-feet)	323	323	307	115	0	70
Gas Production (Bcf)	67	67	64	24	0	14
Produced Water (gallons)	<b>84,067,200</b>	<b>84,067,200</b>	<b>79,119,600</b>	<b>29,713,855</b>	<b>0</b>	<b>17,681,236</b>

**Table ES-3 Development Assumptions by Alternatives**

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5 <sup>1</sup>	Preferred Alternative
<b>Zone 4</b>						
Initial Surface Disturbance (acres)	21	21	21	21	0	21
Long-term Surface Disturbance (acres)	9	9	9	9	0	9
Fresh Water Use <sup>2</sup> (acre-feet)	21	21	21	21	0	21
Recycled Water Use (acre-feet)	52	52	52	52	0	52
Gas Production (Bcf)	12	12	12	12	0	12
Produced Water (gallons)	15,960,000	15,960,000	15,960,000	15,960,000	0	15,960,000
<b>Totals</b>						
Initial Surface Disturbance (acres)	893	893	886	821	86	805
Long-term Surface Disturbance (acres)	386	386	383	355	0	349
Fresh Water Use <sup>2</sup> (acre-feet)	1,158	1,158	1,152	1,079	0	1,061
Recycled Water Use (acre-feet)	3,168	3,168	3,152	2,960	0	2,914
Gas Production (Bcf)	593	593	590	550	0	540
Produced Water (gallons)	692,626,365	692,626,365	687,678,765	638,273,020	0	626,240,401

<sup>1</sup> Under Alternative 5, all leases would be cancelled; therefore, the number of new wells in all zones would be zero. The Alternative 5 column displays the surface disturbance due to reclamation of existing wells, pads, and roads.

<sup>2</sup> Includes 20% of completion water (for hydraulic fracturing) that is not recycled.

Notes: Bcf = Billion Cubic Feet

Assumptions used to calculate this information are derived from **Tables 2-7, 2-8, and 2-9**.

## ES.9 Summary of Direct and Indirect Impacts

Leasing, by itself, would not affect most resources with the possible exception of socioeconomics but, given that the probable result of leasing is fluid mineral development, the analysis considers the potential impacts of reasonably foreseeable future development. The basis for the analysis of future oil and gas development is the WRNF RFDS (WRNF 2010), which has been scaled to the amount of development feasible under each alternative (see **Table ES-2**). The impact analyses assume that the environmental protection measures required by Forest Service and BLM policies and guidelines would be successfully implemented. It also assumes that operators and lessees would comply with applicable state and federal regulations and conditions of required permits. In general, the highest potential impacts to surface resources would occur in areas with the most wells and the greatest acreage of associated surface in

the lowest acreage of restrictive (i.e., NSO, CSU, and TL) stipulations. Under Alternatives 1 and 2, more projected well development would occur and there are fewer restrictive lease stipulations. Alternative 3 has similar levels of development but more restrictive lease stipulations. Alternative 4 has the same lease stipulations as Alternative 3, but somewhat less development due to lease cancellations. Alternative 5, which would cancel all existing leases, would result in minimal acreage of surface disturbance to remove infrastructure and reclaim disturbed areas and the least amount of overall impacts to resources. **The Preferred Alternative, which incorporates Alternative 2 and 4 stipulations and expands Alternative 4 lease cancellations, would have less projected development than Alternative 4.** Detailed descriptions of impacts are presented in each resource section in Chapter 4.0 and summarized in Chapter 2.0, **Table 2-11**. The summarized impacts assume the implementation of laws, regulations, and environmental protection measures required by permits and policy. The following sections summarize the key conclusions regarding impacts.

### ES.9.1 Air Quality

In general, the highest air quality impacts would be associated with those alternatives that have more potential for oil and gas development activity. The concentrations of directly emitted pollutants such as carbon monoxide, **sulfur** dioxide, and greenhouse gases are expected to increase as a result of increased oil and gas development. Emission estimates for each alternative were not developed for this analysis but it is expected that the potential development **would fall within the range** of emissions considered in the Colorado Air Resources Modeling Management Study (CARMMS) used in this analysis. CARMMS developed high, medium and low emissions scenarios that account for different levels of oil and gas development as well as emission controls. In general the CARMMS modeling determined that no scenario contributes significantly to adverse effects on air quality and air quality related values (visibility and atmospheric pollutant deposition). Because the level of development under all the alternatives falls within the CARMMS scenarios that were modeled, it is reasonably expected that the impacts from all alternatives would not significantly impact air quality. Disclosure of emissions inventories at the project level and monitoring would be required during development and production. The range of annual contribution to global greenhouse gas emissions is estimated to be between 908,770 metric tons of carbon dioxide equivalent and 1,160,586 metric tons of carbon dioxide equivalent— depending on the potential level of development. This annual estimate was developed for the maximum oil and gas production year in 2021.

### ES.9.2 Geology and Minerals

Alternatives 1 and 2 would provide less coverage of lands subject to geologic hazards under NSO stipulations and the resource-specific CSU stipulation as compared to Alternatives 3 and 4. Alternative 5 provides the most protections through cancellation of all leases. **Under the Preferred Alternative, CSU and NSO stipulations for steep slopes and geological hazards would provide limited coverage to unstable areas, but lease cancellation would preclude development in 77 percent of Zone 3.**

Under Alternatives 1 and 2, an estimated total of 593 Bcf of gas would be produced. Alternatives 3, 4, **and the Preferred Alternative** would reduce production to 590, 550, and **540** Bcf of gas, respectively. Alternative 5 would result in a resource loss of an estimated 45 Bcf of gas. **Alternatives 1 and 2 would have minor or no changes in the current management that would restrict development. The stipulations and restrictions proposed under Alternatives 3 and 4 would have a range of effects from increasing the costs of development and production to the potential loss of planning investment. The potential for this to occur would be reduced under the Preferred Alternative, which would retain existing stipulations on producing or committed leases. Alternative 5 would have the greatest impact, by cancelling all 65 leases.**

The reliance on the Potential Fossil Yield Classification system management objectives and stipulations of other resources in Alternatives 1 and 2 would not provide as great a degree of protection as the CSU stipulation for Alternatives 3 and 4. **The Preferred Alternative would apply the CSU stipulation to**

**23 percent of Zone 2 and would cancel 77 percent of the area in Zone 3; protection in the remainder of the zones would rely on the Potential Fossil Yield Classification system and regulatory protections.** There would be no stipulations for the protection of fossil resources for Alternative 5 beyond the Potential Fossil Yield Classification system.

### ES.9.3 Soils

**While the acreage of surface disturbance associated with projected oil and gas development would be similar under Alternatives 1 through 4, Alternative 4 would have a lower risk of adverse impacts to soils based on lease stipulations, modifications, and cancellations. The Preferred Alternative would result in the least surface disturbance (other than under Alternative 5) due to cancellation of leases and associated reduced number of wells to be developed in Zone 3; however, the Preferred Alternative would provide less NSO stipulation coverage in Zone 2 of water erodible soils and for all soils generally than Alternative 4. Alternative 5 would have the least amount of potential risks to erodible soils because all leases would be cancelled, most of the surface disturbance would occur on previously disturbed soils, and reclamation and revegetation would be implemented for the entire analysis area.**

### ES.9.4 Water Resources

Compared to the No Action Alternative, Alternatives 2 through 5 progressively provide increased protection to surface water resources inside the lease boundaries through stipulations that limit surface disturbance and minimize sedimentation. **The Preferred Alternative would provide coverage in the range between Alternatives 2 and 5, depending on the specific parameter compared.** However, the increased coverage to the lease areas may have the opposite impact to the areas outside the leases by causing the disturbance to occur off-lease. Therefore, Alternatives 2 through 4 **and the Preferred Alternative** may increase the risk of impacts to water resources in the areas immediately adjoining the leases. **Alternative 4 and the Preferred Alternative would pose lower risk for off-lease development in Zone 3 because of the cancellation of certain leases. The Preferred Alternative would reduce risk as compared to Alternative 4 by fully cancelling 25 leases in Zone 3.** Alternative 5 would provide the most coverage to water resources, including those outside the lease areas.

There are no groundwater coverage stipulations **under** Alternatives 1 and 2. It may be possible that stipulations for other resources may offer some coverage for groundwater, but stipulations for other resources may not be adequate **to protect groundwater because they do not contain the technological and engineering controls necessary to lower the risk of contamination.** Protection of groundwater resources would rely on operators' compliance with federal and state requirements. Alternatives 3 and 4 have a groundwater stipulation that covers limited areas of potential concern. Alternative 4 provides more potential coverage for groundwater when taking into account the leases that would be cancelled. **The Preferred Alternative would apply the groundwater CSU stipulation to limited areas of Zones 2 and 4. As with Alternatives 3 and 4, the Preferred Alternative would preclude surface disturbance in almost all of Zones 1 and 4 through NSO stipulations intended to cover other resources; however the coverage afforded to Zones 2 and 4 from NSO stipulations and lease cancellations would be about 9 to 18 percent less than under Alternatives 3 and 4.** Alternative 5 would minimize potential impacts to groundwater resources to the greatest extent when compared to the other alternatives.

### ES.9.5 Vegetation Resources

Under Alternative 1 (the No Action Alternative) and Alternative 2 level of NSO coverage afforded to vegetation resources by NSO stipulations would be minimal as development could occur in any vegetation type, including riparian habitat and other suitable habitat for special status species. Under Alternative 3, more riparian and most special status species suitable habitat would be precluded from surface disturbance and covered by CSU stipulations requiring surveys or special development

techniques to minimize disturbance. While both Alternatives 3 and 4 preclude surface disturbance within special status species habitat to a similar degree, Alternative 4 would offer an advantage over Alternative 3 because in Zone 3, much of the surface disturbance in special status species habits would be precluded through lease cancellation, which cannot be exempted. **The Preferred Alternative would offer some resource-related stipulation coverage, some coverage by all NSO stipulations, and some coverage provided by lease cancellation. Relative to Alternatives 3 and 4, the Preferred Alternative would remove potential for surface disturbance (and vegetation removal) in a large portion of Zone 3 due to lease cancellations, but would also decrease some of the stipulation coverage that preclude surface disturbance in Zones 2 and in portions of Zone 3 where leases are not cancelled. Overall, the Preferred Alternative would reduce proposed new surface disturbance relative to Alternatives 1 through 4.** Alternative 5 would minimize the potential for the impacts to vegetation resources to the greatest extent, since all surface disturbance would be associated with reclamation. The potential for the introduction of noxious weeds would be similar under Alternative 1, 2, 3, and 4 but lower under Alternative 5. Under all alternatives, the BLM would retain the ability to relocate operations to some degree and require Best Management Practices or other measures to minimize the potential for noxious weeds to become established or proliferate.

#### ES.9.6 Terrestrial Wildlife Resources

Under Alternative 1, wildlife-specific NSO stipulations would be applied to bighorn sheep ranges and elk and mule deer game winter ranges. With consideration of all NSO stipulations, Zone 1 would be fully covered by NSO, thus potentially protecting all terrestrial wildlife resources, including all bighorn sheep habitat. Within the remaining zones, NSOs would cover a small amount of elk winter range, but no designated mule deer winter ranges, and less than half of bighorn sheep both overall and summer ranges. The Big Game Winter Range TL stipulation that would apply to mule deer and elk winter range within the analysis area would not always cover winter range as it is currently mapped. All known locations of federally listed species would be precluded from surface disturbance. Alternative 2 stipulations would result in a slight increase in coverage to increase elk winter range, elk production areas, and lynx denning habitat as compared to Alternative 1. Under Alternatives 3 and 4, Zone 1 also would be fully precluded from surface disturbance. NSOs for big game **and lease cancellations** would cover a greater percentage of big game sensitive habitats (between 60 and 100 percent), and big game timing stipulations would cover between 71 and 100 percent of big game winter ranges. Moose sensitive habitat would have between 80 and 100 percent coverage. **Under the Preferred Alternative, impacts to mule deer would be similar to Alternative 2, with slight additions to coverage in Zone 3 through lease cancellations. Elk production areas would not be covered by any resource-specific NSO; however, the combination of unrelated NSOs and lease cancellation would cover most habitat areas. Impacts to elk severe winter range and winter concentration areas would be the same as Alternative 2, except in Zone 3 where lease cancellation would cover 100 percent of elk severe winter range. Elk winter range winter range would have coverage ranging from 54 to 91 percent, by zone. Moose habitat would have between 60 percent and 81 percent combined NSO coverage.** All known locations of federally listed species as well as their designated habitat would be covered under NSO stipulations. Alternative 5 would result in the least impact to **wildlife** as disturbance activities would impact a much smaller acreage and would be related to reclamation.

#### ES.9.7 Aquatic Resources

In summary, the highest level of potential impacts to aquatic habitat and species would occur under Alternatives 1 and 2, as indicated by the percentage of perennial streams not subject to resource stipulations. Potential impacts would include habitat loss or alteration and negative changes in water quality. In contrast, there would be **limited** impacts to game fish and special status aquatic species under Alternatives 3 and 4 **and the Preferred Alternative**, since streams that contain these species are subject to aquatic-focused stipulations **or are within leases that would be cancelled under the Preferred Alternative**. There could be impacts to a limited number of perennial streams that do not contain game fish or special status species under Alternatives 3, 4, **and the Preferred Alternative**.

Potential water use from drilling and completion would negatively affect aquatic species if there are new depletions. The estimated volume of potential water use is similar for Alternatives 1 through 4 **and the Preferred Alternative**. Under Alternative 5, there would be no potential alteration of aquatic habitat after reclamation and there would be no water use or depletions related to well drilling or completion within the lease zones.

#### ES.9.8 Cultural Resources

The potential risks to cultural resources derive from the extent of surface disturbance and the relative protection through the limitation of surface disturbance under each alternative. For those alternatives where oil and gas development is projected (Alternatives 1 through 4), Alternative 4 would have the greatest extent of protection from surface disturbance and the fewest sites at risk from construction and development activities, while Alternative 1 would have the least protection and greatest risk. Alternative 5 would have the lowest potential adverse effects on cultural resources due to the low area of projected surface disturbance and the reclamation of existing disturbed areas. **Potential risks to eligible sites under the Preferred Alternative would fall between the range of impacts under Alternative 1 and Alternative 5.** However, it is unlikely that sites that are eligible for the national Register of Historic Places would be adversely affected under any alternative because federal regulations require site-specific surveys before surface-disturbing activities begin and avoidance or mitigation of eligible sites.

#### ES.9.9 Transportation

Within the analysis area the maximum estimated new road construction would take place within Zone 2 under Alternatives 1 and 2. Additionally, the highest average daily vehicle round-trips and total trips would take place within Zone 2 under Alternatives 1 and 2. **Impacts may include temporary conflicts with normal traffic, travel delays, decreased travel speeds, and increased vehicle collision rates with other vehicles or with wildlife and livestock, fugitive dust and noise. Increased traffic would be most noticeable along roads in areas without high levels of existing development.** Impacts to local areas and roads of concern near the Thompson Divide area, Glenwood Springs, and Carbondale also would be greatest under Alternatives 1 and 2, although impacts would be spread along a 20-year development period. **The Preferred Alternative and Alternatives 3 and 4 would produce fewer impacts to transportation resources as a result of the potential development of fewer wells pads and associated wells.** Alternative 5 would produce fewer impacts than Alternative 1 and the least of any alternative as existing wells are plugged and abandoned and lease pads and access roads reclaimed.

#### ES.9.10 Land Use

As compared to Alternative 1, Alternatives 3 and 4 **and the Preferred Alternative** contain the most stipulations, which would limit where and when federal lands and realty authorizations may be modified or issued and how land uses would change. **Lease cancellations under Alternative 4 and the Preferred Alternative would reduce the land use changes and potential for conflicts with county land use plans and zoning in Zone 3. The Preferred Alternative would increase the potential for conflicts with Mesa and Garfield county land use plans and zoning within Zones 1 and 2 relative to Alternative 4, as Alternative 2 stipulation would be applied to producing or committed leases. Under Alternative 5, land uses within the leases would not be modified by mineral development, and the existing wells, associated roads, and pipelines would revert to previous land uses after reclamation is completed.**

#### ES.9.11 Special Designations

Within the analysis area, the maximum net long-term disturbance in acres across all alternatives would be less than 0.8 percent of the analysis area. Under all alternatives, surface disturbance would be precluded in the Lower Battlement Research Natural Area and all Colorado Roadless Areas (CRAs) in Zone 1 through one or more NSO stipulation. Under Alternative 1, NSO stipulations would cover

**49 percent of Zone 2 CRAs and about 5 percent of Zone 3 CRAs. Under Alternatives 3 and 4, NSO coverage and lease cancellations (Alternative 4 only) coverage would be increased to about 100 percent in both zones, with additional constraints provided by CSU stipulations. The Preferred Alternative would cover 88 percent of Zone 2 CRAs and 77 percent of Zone 3 CRA through NSO stipulations and lease cancellation; the additional constraints provided by CSU stipulations would be reduced relative to Alternatives 3 and 4.** Alternative 5 would produce fewer impacts than Alternative 1 and the least of any alternative as existing wells are plugged and abandoned 31 and lease pads and access roads reclaimed within CRAs.

#### ES.9.12 Recreation

Under each alternative, impacts from noise, lights, dust, smell, and activities associated with lease development could cause recreationists to relocate to a more natural setting. The greatest potential for impacts lies within Semi-Primitive Motorized (**SPM**) and Semi-Primitive Non-Motorized (**SPNM**) Recreation Opportunity Spectrum (ROS) Classes, recreation-oriented management areas, or other areas where the characteristics of remoteness and naturalness would be vulnerable. Under Alternative 1 and 2, the RFDS for Zones 2, 3, and 4 could be developed in any ROS class and in backcountry year-round motorized and dispersed recreation management areas (in Zone 1, all surface disturbances would be fully precluded). Under Alternative 3, surface disturbance would be fully precluded in Zone 1, NSO stipulations would generally cover between 80 and 95 percent in **SPM and SPNM** ROS classes in Zones 2, 3, and 4, and a greater portion of management areas with a recreational emphasis would be precluded from surface disturbance. Alternative 4 would be the same as Alternative 3, except in Zone 3, where a combination of lease cancellations and NSO stipulations would decrease the acreage in which development would take place. **The Preferred Alternative would fully preclude surface disturbance in Zone 1 and provide between 69 and 100 percent NSO coverage in SPM and SPNM ROS classes in Zones 2, 3, and 4.** Alternative 5 would result in the least impact to recreation as all disturbance activities would be related to reclamation.

#### ES.9.13 Livestock Grazing

Oil and gas development under Alternatives 1 and 2 would have the greatest potential for impacts to livestock grazing operations within the analysis area due to the least amount of coverage from associated stipulations (25 and 30 percent and the lease areas, respectively). This does not necessarily equate to less surface disturbance under Alternative 2 compared to Alternative 1; however, it would influence where development would take place, some disturbance may occur off-lease or the same amount of disturbance may be concentrated into a smaller area. Under Alternatives 3 and 4, **almost 100 percent of the allotments areas overlapped by leases would receive coverage from stipulations. Under the Preferred Alternative, NSO coverage in Zones 1 and 4 would remain the same, but NSO coverage in some Zone 2 allotments would be reduced. In Zone 3, proposed lease cancellations would eliminate impacts in 6 allotments in Zone 3; the remaining allotment in Zone 3 would receive less than one percent coverage by a NSO stipulation.** Under Alternative 5 stipulations would not affect the associated allotments because no future development would occur and existing wells, pads and roads would be plugged, abandoned, and reclaimed with the intention of returning 86 acres to pre-disturbance condition.

#### ES.9.14 Scenic Resources

Alternative 1, the No Action Alternative, offers the least coverage of high scenic value resources and there is potential for the RFDS to occur in areas with High, Moderate, and Low Scenic Integrity Objectives (SIOs). Development in Moderate SIOs may be inconsistent with the Forest Plan, and on some leases in Zone 2, it may not be possible to locate all new development within areas of lower scenic importance and sensitivity. Alternative 2 would have similar impacts except there would be slightly more NSO and resource-specific CSU coverage in areas of high scenic value. Under Alternative 3, the potential for RFDS development in High and Moderate SIOs would be largely eliminated through NSO



stipulations. A resource-specific CSU would be applied in most areas where development is still possible in Moderate SIO. Alternative 4 would have the same potential impacts as Alternative 3 except in Zone 3, where over 60 percent of the lease area would be cancelled. **With consideration of all NSO stipulations, impacts under the Preferred Alternative would be generally the same as Alternative 4 except that in Zone 2, there would be less coverage provided by NSO stipulations, and in Zone 3, the additional lease cancellations and lower projected development would more effectively prevent surface-disturbing activities in areas of high scenic importance.** Alternative 5 offers the greatest opportunity to maintain or improve high scenic value resources over the long term through cancellation of all leases.

#### **ES.9.15 Hazardous Materials and Human Health and Safety**

Activities conducted under any of the alternatives carry risks of spills and releases of hazardous materials and solid waste. In the absence of stipulations, activities would be carried out in accordance with applicable regulatory programs. **Based on projected development, the No Action Alternative would statistically present the greatest risk for spills, followed by Alternatives 2, 3, 4, the Preferred Alternative, and Alternative 5.** The risks **would be** much less under Alternative 5 compared with the other **five** alternatives since the chemicals and materials used in gas production would not be present. Compared to the No Action Alternative, Alternatives 2, **3, 4, the Preferred Alternative, and Alternative 5 would generally** progressively minimize the potential for impacts to human health and safety through lower levels of development, stipulations that would limit development near public water supply source areas, and reduced vehicle and equipment use. Alternative 4 **and the Preferred Alternative would minimize the risk to human health and safety relative to Alternatives 1, 2, and 3 due to lease cancellation versus NSO stipulations (which may serve to push development off-lease rather than eliminating it entirely).** **The Preferred Alternative would cover a lower percentage of Colorado Source Water Assessment and Protection (CSWAP) and Source Water Protection Plan (SWPP) areas than Alternative 4, but would also have a lower projected development level than Alternative 4.** In comparison to the No Action Alternative and Alternative 2, Alternatives 3, 4, **the Preferred Alternative and 5 progressively** would reduce oil and gas development revenues that would benefit emergency services. Alternative 5 would minimize the risk to human health and safety to the greatest degree by cancelling all leases but would eliminate all lease-related revenue that might fund emergency services.

#### **ES.9.16 Socioeconomics**

Under Alternatives 1 and 2, total future natural gas production is projected to be approximately 312 billion cubic feet (Bcf) over the 20-year period (2017 to 2036) and the future revenue value of the total new natural gas production would be almost \$1.6 billion. Total direct jobs from construction and operation are expected to be 93 full time equivalents (FTEs) in 2017 and increase to 182 FTEs by 2036. **Over the 20-year period the projected job growth would result in an estimated total increase in employment of 2,751 FTEs.**

**Alternative 1 and 2 are projected to generate approximately \$99 million in county government revenues from future lease development that would add an additional 332 government FTEs over the twenty year period. Furthermore, in addition to these direct employment effects, the spending from construction, operations and the public revenue payments are projected to add another 2,101 FTEs in future employment gains over the 20-year period.**

**Under Alternative 3, its future natural gas production is expected to be less than 1 percent lower under Alternatives 3 and consequently its direct employment, public revenue, indirect and induced economic impacts would be approximately the same as those estimated for Alternatives 1 and 2.**

Compared to Alternative 1, future oil and gas activity and production is projected to be 7 percent lower under Alternative 4 and reduced by a total of 9 percent under the Preferred Alternative (289 and 284 Bcf, respectively). Consequently, Alternative 4 and the Preferred Alternative would generate slightly fewer FTEs. Under Alternative 4, total direct jobs from construction and operation are expected to be 86 FTEs in 2017 and increase to 168 FTEs by 2036. Over the 20-year period the projected job growth would result in an estimated total increase in oil and gas employment of 2,542 FTEs. There would be comparable future employment impacts under the Preferred Alternative which is projected to add a total of 2,496 natural gas production and operation FTEs over the 20-year period.

Both Alternative 4 and the Preferred Alternative would also result in slightly lower total county government revenue receipts of approximately \$94 million and \$92 million, respectively, relative to the \$99 million estimated to be generated under Alternatives 1 and 2. This spending is expected to result in additional new direct government employment of approximately 318 FTEs and 314 FTEs, respectively. Over the 20-year period, Alternative 4 and the Preferred Alternative are also expected to result in additional 1,947 and 1,912 FTEs, respectively, of indirect and induced employment.

Under Alternatives 4, 5, and the Preferred Alternative, leaseholders of cancelled leases would be refunded all rental fees and bonus bids. While a percentage of these funds were subsequently distributed to the counties, it is assumed for analysis (in accordance with similar circumstances for lease cancellation under the Roan Plateau settlement agreement), that the State of Colorado would reimburse the federal government for the revenues disbursed by the federal government to the state in connection with the cancelled leases (approximately 49 percent of the total bonus bids and rentals). The precise schedule for that reimbursement by the state is unknown; the BLM is assuming that the reimbursement would occur through offsets for future disbursements to the state from other mineral leases. BLM does not have information about the formula that the state may use to allocate future federal disbursements among local governments. Consequently, it is expected that any economic impact to the region's economy from the lessee refunds would be minor or negligible.

Under Alternative 5, the **plugging** of 75 existing wells is expected to result in a loss of approximately 45 Bcf of natural gas production worth approximately \$188 million, a total employment loss (**including government workers, indirect and induced**) of approximately 333 FTEs and a total future county revenue loss of approximately \$13 million. In addition, Alternative 5 would result in the non-development of leases as foreseen in Alternative 1, and therefore would have the total loss of approximately 357 Bcf of natural gas production worth approximately \$2.0 billion, an employment loss of approximately 5,517 FTEs and a total future county revenue loss of approximately \$128 million.

#### **ES.9.17 Environmental Justice**

No disproportionate and adverse effects to environmental justice communities are expected from any of the action alternatives as no environmental justice communities were identified within the study area.

## List of Acronyms

°F	degrees Fahrenheit
µeq/l	micro-equivalent per liter
µg/m <sup>3</sup>	micrograms per cubic meter
AASHTO	American Association of State Highway and Transportation
ACHP	Advisory Council on Historic Preservation
AEO	Annual Energy Outlook
ALC	Aquatic Life Cold
amsl	above mean sea level
ANC	acid neutralizing capacity
APCD	Air Pollution Control Division
APD	Application for Permit to Drill
APE	Area of Potential Effect
AQRV	air quality related value
AUM	animal unit month
BA	Biological Assessment
BBC	BBC Research and Consulting
Bcf	billion cubic feet
BE	Biological Evaluation
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	Best Management Practice
C&H	Cattle and Horse Allotment
CAA	Clean Air Act
CARMMS	Colorado Air Resources Management Modeling Study
CARMS	Colorado Air Resources Management Modeling Study
CARPP	Comprehensive Air Resource Protection Protocol
CBNG	coalbed natural gas
CCR	Colorado Code of Regulations
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CDWR	Colorado Division of Water Resources
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGS	Colorado Geological Survey

CH <sub>4</sub>	methane
CIAA	Cumulative Impacts Analysis Area
CNHP	Colorado Natural Heritage Program
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> (e)	carbon dioxide equivalent
COA	Condition of Approval
COGCC	Colorado Oil and Gas Conservation Commission
CPW	Colorado Parks and Wildlife
CR	County Road
CRA	Colorado Roadless Area
CRCT	Colorado River Cutthroat Trout
CRR	Colorado Roadless Rule
CRVFO	Colorado River Valley Field Office
CSU	Controlled Surface Use
CSWAP	Colorado Source Water Assessment and Protection
CTL	Closed to Leasing
CWA	Clean Water Act
DAU	Data Analysis Unit
dBA	decibels on the A-weighted scale
DOLA	Colorado Department of Local Affairs
DVF	Future Design Value
E&P	exploration and production
EIS	Environmental Impact Statement
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
EPS-HDT	Economic Profile System-Human Dimension Toolkit
ESA	Endangered Species Act
FLAG	Federal Land Managers' Air Quality Related Values Work Group
FLM	Federal Land Manager
FLPMA	Federal Land Policy and Management Act of 1976
FML	Federal Mineral Lease
FO	Field Office
Forest Service	U.S. Forest Service
FR	Federal Register
FSM	Forest Service Manual
FSVeg	Forest Service Field Sampled Region 2 Vegetation Data
FTE	full time equivalent
GBCT	greenback lineage cutthroat trout
GHG	greenhouse gas

GHMA	General Habitat Management Areas
GIS	Geographic Information System
GJFO	Grand Junction Field Office
GMU	Game Management Unit
GMUGNF	Grand Mesa, Uncompahgre, and Gunnison National Forest
gpm	gallons per minute
H <sub>2</sub> S	hydrogen sulfide
HAP	Hazardous Air Pollutant
HM	Head month
HUC	Hydrologic Unit Code
I-70	Interstate 70
IBLA	Interior Board of Land Appeals
IM	Instruction Memorandum
IMPROVE	Interagency Monitoring of Protected Visual Environments
IPCC	Intergovernmental Panel on Climate Change
IRA	inventoried roadless area
LAC	Level of Acceptable Change
LRMP	Land and Resource Management Plan
MATS	Modeled Attainment Test Software
MBTA	Migratory Bird Treaty Act
Mcf	billion thousand cubic feet
MDP	Master Development Plan
mg/L	milligrams per liter
MIS	Management Indicator Species
MLA	Mineral Leasing Act of 1920
MLRA	Major Land Resource Area
MMPA	Mining and Minerals Policy Act of 1970
MMTCO <sub>2</sub> e	million metric tons of carbon dioxide equivalents
MP	milepost
MWX	Multiwell Experiment
N <sub>2</sub> O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFMA	National Forest Management Act
NFS	National Forest System
NHPA	National Historic Preservation Act of 1966, as amended
NO <sub>2</sub>	nitrogen dioxide
NOI	Notice of Intent
NORM	naturally occurring radioactive materials

NO <sub>x</sub>	oxides of nitrogen
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSO	No Surface Occupancy
NSPS	New Source Performance Standards
O <sub>3</sub>	ozone
OSHA	Occupational Safety and Health Administration
P.L.	Public Law
PBA	Programmatic Biological Assessment
PBO	Programmatic Biological Opinion
PFYC	Potential Fossil Yield Classification
PHMA	Priority Habitat Management Area
PHMSA	Pipeline & Hazardous Materials Safety Administration
PILT	Payments in Lieu of Taxes
PM	particulate matter
PM <sub>10</sub>	particulate matter with an aerodynamic diameter of 10 microns or less
PM <sub>2.5</sub>	particulate matter with an aerodynamic diameter of 10 microns or less
ppb	parts per billion
ppm	parts per million
PSD	prevention of significant deterioration
PUD	Planned Unit Development
RCRA	Resource Conservation and Recovery Act
REL	Reference Exposure Level
RfC	Reference Concentrations for Chronic Inhalation
RFD	Reasonably Foreseeable Development
RFDS	Reasonably Foreseeable Development Scenario
RFFA	reasonably foreseeable future actions
RMP	Resource Management Plan
RNA	Research Natural Areas
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
ROW	right-of-way
RPPA	Roan Plateau Planning Area
SARA	Superfund Amendments and Reauthorization Act
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SHPO	State Historic Preservation Office(r)
SIA	Special Interest Area
SIO	Scenic Integrity Objective
SLT	Standard Lease Term

SO <sub>2</sub>	sulfur dioxide
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
SPM	Semi-primitive Motorized
SPNM	Semi-primitive Non-motorized
SR	State Route
SUPO	Surface Use Plan of Operation
SWAP	Source Water Assessment and Protection
<b>SWMP</b>	<b>Stormwater Management Plan</b>
SWPP	Source Water Protection Plan
TCP	Traditional Cultural Property
TDS	total dissolved solid
TENORM	Technologically Enhanced naturally occurring radioactive materials
TEPC	Threatened, Endangered, Proposed, and Candidate
TIPU	Transportation, Information, Power, and Utilities
TL	Timing Limitation
TPQ	threshold planning quantities
tpy	tons per year
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEIA	U.S. Energy Information Administration
USEPA	U.S. Environmental Protection Agency
USFS	United States Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
WA	Wilderness Area
WEM	Waivers, Exceptions, or Modification
WIZ	Water Influence Zones
WRFO	White River Field Office
WRNF	White River National Forest
WUS	Waters of the U.S.

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## 1.0 Background; Purpose of and Need for Action

### 1.1 Introduction

In compliance with the National Environmental Policy Act of 1969, as amended (NEPA), the Bureau of Land Management (BLM) Colorado River Valley Field Office (CRVFO) in Silt, Colorado, has prepared this Environmental Impact Statement (EIS) to analyze the issuance of 65 federal fluid minerals leases within the White River National Forest (WRNF). These leases were issued between 1995 and 2012, and are located in Mesa, Garfield, Pitkin, and Rio Blanco counties, between the towns of De Beque and Carbondale south of Interstate 70, except for one lease northeast of Meeker (see **Figure 1-1**).

#### 1.1.1 Background

The decision that made the 65 parcels considered in this EIS available for oil and gas leasing was documented through the 1993 WRNF Oil and Gas Leasing Record of Decision (ROD) and reaffirmed in the 2002 WRNF Land and Resource Management Plan (LRMP). Before offering the nominated parcels in an oil and gas lease sale, the BLM obtained consent from the United States (U.S.) Forest Service (Forest Service or USFS) and subsequently issued the leases.

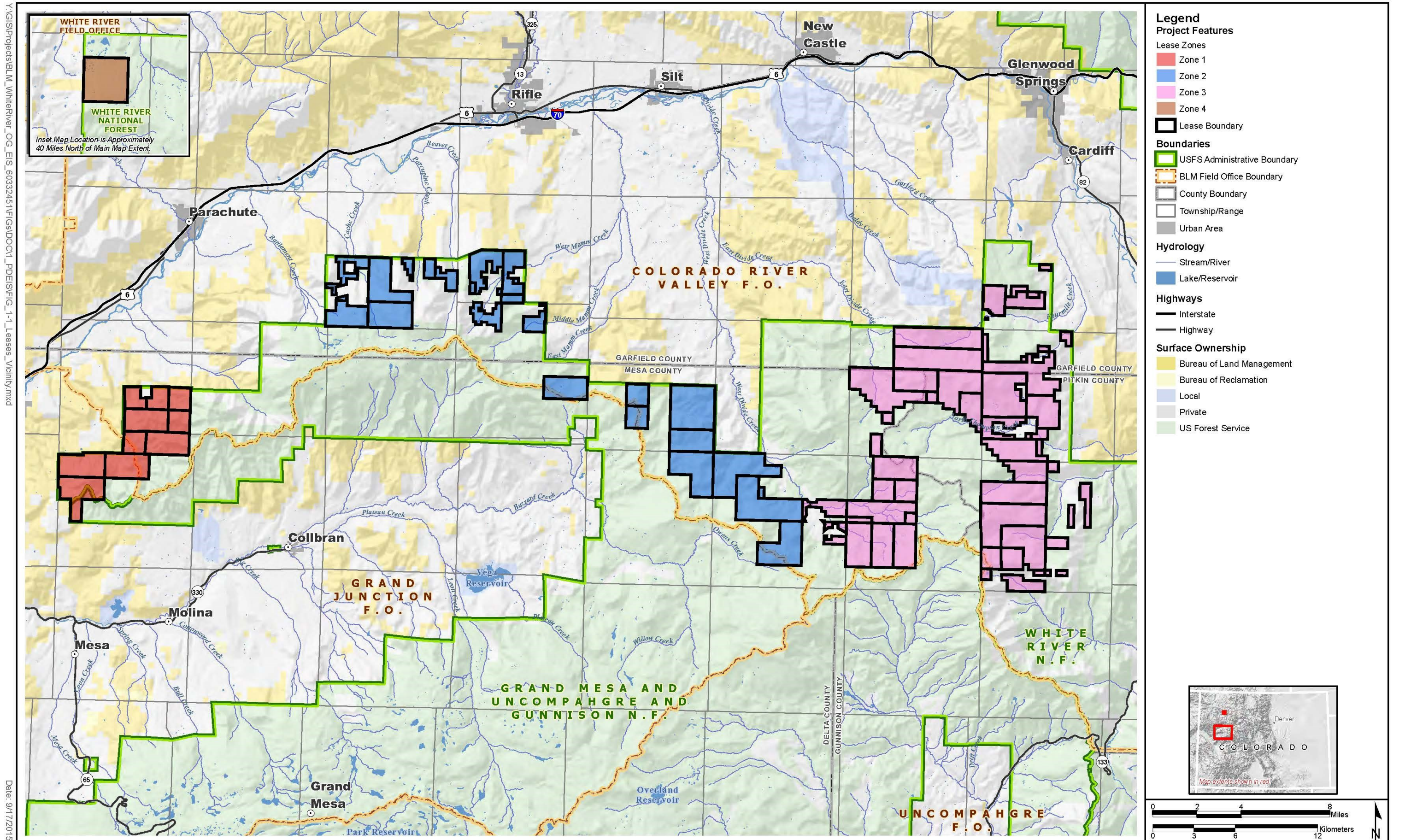
In 2007, the Interior Board of Land Appeals (IBLA) held that before including Forest Service parcels in an oil and gas lease sale the BLM must either formally adopt NEPA analysis completed by the Forest Service or conduct a NEPA analysis of its own (see Board of Commissioners of Pitkin County, 173 IBLA 173 [2007]). The IBLA ruled that although the BLM was a cooperating agency on the Forest Service's 1993 WRNF Oil and Gas Leasing EIS, the BLM did not formally adopt the Forest Service NEPA analysis or prepare its own analysis, and therefore did not comply with its NEPA obligations with respect to the issuance of those leases at issue in that proceeding. **The 2007 IBLA decision only addressed three leases specifically in the WRNF that were later cancelled; all 65 existing leases addressed in this EIS share the same NEPA deficiency identified by the IBLA with respect to those three leases.**

Following the IBLA's decision, the BLM determined that the Forest Service NEPA analysis conducted for the previously issued leases is no longer adequate due to changes in laws, regulations, policies, and conditions since the Forest Service's EIS was issued in 1993.

Examples of changed circumstances since 1993 to be considered in the current EIS include modifications to the federal endangered and threatened species list and guidance, major changes to the National Ambient Air Quality Standards, implementation of the **2012** Colorado Roadless Rule, and new oil and gas drilling and production technologies.

In total, the BLM identified 65 existing leases with effective dates ranging from 1995 to 2012 that were issued based on the 1993 WRNF EIS. Based on the foregoing, the BLM determined that it is necessary to conduct additional NEPA analysis to evaluate the impacts of its leasing decisions within the WRNF. The decision of whether forest system lands are available or unavailable for oil and gas leasing, however, remains with the Forest Service, although the BLM retains the ultimate discretion whether to issue a lease (**Title 43 of the Code of Federal Regulations [CFR], Section 3101.7-2**). As a result, this EIS only considers the 65 currently leased parcels and not future leasing availability, which has recently been addressed in a separate NEPA analysis, the WRNF Oil and Gas Leasing Final EIS published by the Forest Service in December 2014 (USFS 2014a). **The BLM has incorporated by reference as much of the Forest Service's new NEPA analysis of future oil and gas leasing on the WRNF as possible into this analysis (43 CFR 46.120 and 46.135).** The BLM is a cooperating agency on the WRNF EIS.

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Figure 1-1 General Location of Leases to be Evaluated

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### 1.1.2 Leases

The 65 previously issued leases under consideration in this EIS are listed in **Table 1-1** with the current status of each lease. The total area of existing leases is 80,380 acres. Of the 65 leases to be evaluated in this EIS, 34 are either expired or under suspension, 20 are committed to established oil and gas units<sup>1</sup>, and 5 are held by production. The remainder of the 65 leases have a future expiration date. It should be noted that some leases listed in the table have expired since the beginning of the NEPA process and other leases are under appeal and could be eliminated before the completion of the NEPA process. All 65 leases included at the beginning of the NEPA process have been carried forward for consistency of analysis.

**Table 1-1 Status of Existing Leases Under Evaluation**

Lease #	Effective Date	Expiration Date	Status <sup>1,2</sup>
COC 058677	12/1/1995		Committed to Orchard Unit
COC 059630	10/1/1996		Committed to Orchard Unit
COC 066727	09/1/2003		Committed to Orchard Unit
COC 066728	09/1/2003		Committed to Orchard Unit
COC 066729	09/1/2003		Committed to Orchard Unit
COC 066730	09/1/2003		Committed to Orchard Unit
COC 066731	09/1/2003		Committed to Orchard Unit
COC 066732	06/1/2003		Committed to Place Mesa Unit
COC 066733	06/1/2003		Committed to Place Mesa Unit
COC 066926	09/1/2003		Committed to Place Mesa Unit
COC 061121	10/1/1998		Committed to Middleton Creek Unit & Held by Production
COC 066723	06/1/2003	05/31/2014	Under Suspension
COC 066724	06/1/2003		Held by Production
COC 066915	09/1/2003	11/11/2016	Lease automatically extended upon unit termination
COC 066916	09/1/2003	11/11/2016	Lease automatically extended upon unit termination
COC 066917	09/1/2003	11/11/2016	Lease automatically extended upon unit termination
COC 066918	09/1/2003		Held by Production
COC 066920	09/1/2003		Held by Production
COC 067147	04/1/2004		Committed to Middleton Creek Unit
COC 067150	12/1/2003		Held by Allocation (Communitization Agreement COC 073718)
COC 067542	09/1/2004	08/31/2014	Under Suspension
COC 067543	09/1/2004	08/31/2014	Expired
COC 067544	09/1/2004		Held by Production
COC 070013	07/1/2007		Committed to Middleton Creek Unit

<sup>1</sup> The Mineral Leasing Act of February 25, 1920, 41 Stat. 437, as amended, 30 USC Sec. 181et seq., authorizes federal lessees and their representatives unit agreements lessees and their representatives to unite with each other, or jointly or separately with others, in collectively adopting and operating under a unit plan of development or operations of any oil and gas pool, field, or like area, or any part thereof for the purpose of more properly conserving the natural resources thereof whenever determined and certified by the Secretary of the Interior to be necessary or advisable in the public interest (43 CFR 3186.1).

**Table 1-1 Status of Existing Leases Under Evaluation**

Lease #	Effective Date	Expiration Date	Status <sup>1,2</sup>
COC 070014	06/1/2007	05/31/2017	Under suspension
COC 070015	06/1/2007	05/31/2017	Under suspension
COC 070016	06/1/2007	05/31/2017	<b>Under suspension</b>
COC 070361	01/1/2008		Committed to Middleton Creek Unit
COC 072157	01/1/2008	12/31/2017	
COC 075070	01/1/2012	12/31/2021	Under suspension
COC 076123	01/1/2012	12/31/2021	
COC 058835	09/1/1996	11/11/2011	Expired, but subject to appeal
COC 058836	09/1/1996		Under Suspension; committed to Willow Creek Unit
COC 058837	09/1/1996		Under Suspension; committed to Willow Creek Unit
COC 058838	09/1/1996		Under Suspension; committed to Willow Creek Unit
COC 058839	09/1/1996		Under Suspension; well capable of production
COC 058840	09/1/1996	11/11/2011	Expired, but subject to appeal
COC 058841	12/1/1996	11/11/2011	Expired, but subject to appeal
COC 066687	06/1/2003	05/31/2013	Under Suspension
COC 066688	06/1/2003	05/31/2013	Under Suspension
COC 066689	06/1/2003	05/31/2013	Under Suspension
COC 066690	06/1/2003	05/31/2013	Under Suspension
COC 066691	06/1/2003	05/31/2013	Under Suspension
COC 066692	06/1/2003	05/31/2013	Under Suspension
COC 066693	06/1/2003	05/31/2013	Under Suspension
COC 066694	06/1/2003	05/31/2013	Under Suspension
COC 066695	06/1/2003	05/31/2013	Under Suspension
COC 066696	06/1/2003	05/31/2013	Under Suspension
COC 066697	06/1/2003	05/31/2013	Under Suspension
COC 066698	06/1/2003	05/31/2013	Under Suspension
COC 066699	06/1/2003	05/31/2013	Under Suspension
COC 066700	08/1/2003	07/31/2013	Under Suspension
COC 066701	06/1/2003	05/31/2013	Under Suspension
COC 066702	08/1/2003	07/31/2013	Under Suspension
COC 066706	06/1/2003	05/31/2013	Under Suspension
COC 066707	06/1/2003	05/31/2013	Under Suspension
COC 066708	09/1/2003	08/31/2013	Under Suspension
COC 066709	09/1/2003	08/31/2013	Under Suspension
COC 066710	06/1/2003	05/31/2013	Under Suspension
COC 066711	06/1/2003	05/31/2013	Under Suspension
COC 066712	06/1/2003	05/31/2013	Under Suspension
COC 066908	09/1/2003	08/31/2013	Under Suspension



**Table 1-1 Status of Existing Leases Under Evaluation**

Lease #	Effective Date	Expiration Date	Status <sup>1,2</sup>
COC 066909	10/1/2003	09/30/2013	Under Suspension
COC 066913	12/1/2003	11/30/2013	Expired, but subject to appeal
COC 066948	9/1/2003	<b>8/1/2015</b>	<b>Expired, but subject to appeal</b>

<sup>1</sup> Section 39 of the Mineral Leasing Act of 1920 (MLA), as amended, provides for a suspension of operation and production in the interest of conservation of natural resources, which addresses a variety of reasons, including protection of natural resources, initiation of environmental studies that may modify the lease(s); or litigation related to issuance of leases or BLM lease management related issues. The term of a lease suspended under Section 39 shall be extended by adding the suspension period. Per Section 17f of the MLA, “no lease shall be deemed to expire during a suspension of either operations or production.” An operator may request a suspension for a variety of reasons, including extraordinary weather conditions that prevent required surveys or drilling activities, active litigation over title to lease or surface access, or a denial of an operational proposal by the BLM.

<sup>2</sup> **Expired leases have been carried forward for continuity of analysis. However, unless an appeal process results in reinstatement of a lease, the BLM no longer has a decision to make regarding expired leases.**

**1.2 Federal Fluid Mineral Leasing Process on Forest Service Lands**

When **National Forest System (NFS)** lands are proposed for fluid mineral leasing, the Forest Service must verify that the lands have been adequately analyzed in a Forest Plan level leasing analysis, that leasing decisions are based on the analysis, and that there is no new significant information or circumstances requiring further environmental analysis. The Forest Service leasing analysis must comply with the National Forest Management Act and associated regulations at 36 CFR 219 and 36 CFR 228.102, by considering the suitability of lands for leasing and development and making decisions regarding the availability for leasing. Once the analysis is determined to be adequate, the Forest Service can consent to allowing the BLM to issue a lease on those lands. The leases must incorporate the stipulations that were determined to be required in the Forest Service leasing analysis and Forest Plan, as required by 43 CFR 3101.7-2(a), which states the following:

*Where the surface managing agency has consented to leasing with required stipulations, and the Secretary decides to issue a lease, the authorized officer shall incorporate the stipulations into any lease which it may issue. The authorized officer may add additional stipulations.*

Following is a brief summary of the leasing and development process for federal fluid minerals on NFS lands. A more complete description of the leasing process can be found in Section 1.4.2 and Appendix C of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a).

The BLM must either adopt the Forest Service leasing analysis or conduct a separate leasing analysis in compliance with NEPA and its implementing regulations at 40 CFR 1500 – 1508 and Department of the Interior NEPA regulations at 43 CFR Part 46, in considering the effects of leasing on the human environment, including reasonably foreseeable future development. Section 1.5.2 of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a) provides additional information on the BLM’s process and authority for offering leases for sale and issuing leases on the WRNF.

Federal onshore oil and gas leasing requirements are set out in the regulations at 43 CFR 3100. Oil and gas leases are issued with a primary term of 10 years, expiring at the end of the tenth year unless:

- Drilling operations are in progress on or for the benefit of the lease;
- The lease contains a well capable of producing oil or gas in economic quantities;

- The lease is receiving or is entitled to receive an allocation of production under the terms of an approved communitization agreement or unit agreement; or
- The lease is suspended by the BLM.

**The BLM has the authority to cancel a lease if it was improperly issued (43 CFR § 3108.3(d)). The Secretary of the Interior has inherent authority, under her general managerial power over public lands, to cancel leases issued in violation of a statute or regulation. That authority is not superseded by the Mineral Leasing Act (MLA). That authority is reflected in MLA’s implementing regulations. Under this authority, BLM may cancel leases if they were issued in violation of NEPA or other laws. The IBLA has characterized as “void” and “a legal nullity” any lease issued for lands that were not legally available for leasing at the time they were issued. In contrast, it has characterized as “voidable” any lease issued in violation of a procedural requirements, such as NEPA, which does not compel any particular decision. In other words, a void lease is one that suffers from a substantive defect that BLM cannot cure, such as including lands that were not available for BLM to lease at the time they were issued. A voidable, cancelable lease is one that suffers from a procedural defect that BLM may be able to correct at its discretion with further action on its part.**

The lessee may surrender the lease in whole or in part by filing a written request with the BLM State Office. In that case, the lessee is responsible for plugging any existing producing or abandoned wells, and reclaiming any surface disturbance according to the requirements of the permitting agency. Leases without a producible well automatically terminate if the lessee fails to make annual rental payments. A nonproducing lease may be administratively canceled for failure to comply with lease terms. Under certain circumstances, a lessee may request reinstatement of a terminated lease (43 CFR Subpart 3108).

Per 43 CFR 3162.3-1, to develop a lease the operator must submit an Application for Permit to Drill (APD) to the BLM accompanied by a Surface Use Plan of Operations (SUPO) to be approved by the Forest Service. The submittal of the APD and the SUPO trigger a second level of NEPA analysis, onsite reviews, and decision-making that is more site-specific than the analysis prepared prior to lease issuance. At this time, the Forest Service can decide on the conditions for approval of the surface operations and the BLM can decide on the conditions for approval of the subsurface operations. After consulting with the Forest Service, the BLM must approve the application (with or without additional conditions), disapprove the application, or advise the applicant why the decision has been delayed.

### **1.2.1 Reasonably Foreseeable Development Scenario**

The Reasonably Foreseeable Development Scenario (RFDS) provides a long-term projection of the likely potential future oil and gas development and production within a defined area (the WRNF) and a defined period of time (20 years). The WRNF RFDS was prepared by the BLM for the Forest Service in 2010, and was included as Appendix F in the WRNF Oil and Gas Leasing Draft EIS (USFS 2012).

As stated in the RFDS (USFS 2010a), its purpose is to provide an estimated projection of unconstrained, future oil and gas exploration and development based on a set of assumptions in order “to evaluate potential effects that might reasonably occur as a result of leasing.” The RFDS is based on geology; resource occurrence potential; past and current leasing, exploration, and development activity; and engineering technology, with consideration of economics and physical limitations on access to resources. An RFDS is not a decision, and it does not establish or imply a limit on future development.

The RFDS (USFS 2010a) was used as a starting point for estimating the number of wells likely to be developed within the 65 leases that are under evaluation. Using this as the basis for estimating well numbers allows the BLM to build on the previously prepared analysis completed for the Forest Service while focusing on the 65 leases using reasonable assumptions and patterns of observed development.

Its use facilitates an analysis that is consistent with the Forest Service's assumptions and analyses presented in the WRNF Oil and Gas Leasing Final EIS (USFS 2014a), reducing the potential for inconsistencies between the projections for the 65 leases in this EIS and future leasing in the WRNF EIS and enabling better coordination between the Forest Service and the BLM.

The basic assumptions used to develop the estimated unconstrained oil and gas development within the 65 leases are summarized below.

- At least one well can be reasonably foreseen for each of the 65 leases.
- Future development will follow past development trends.
- Almost 4 percent of all wells will be horizontally drilled.
- A total of 444 wells are projected within the 65 leases without taking into account constraints such as No Surface Occupancy (NSO) stipulations.
- The 444 wells would not be evenly distributed across the 65 leases. Rather, the leases have been grouped spatially into zones based on the location of past development, production infrastructure, and access for exploration and production.

The following zones were used to estimate the projected well numbers and types. The leases within each zone are displayed on **Figure 1-1**. It is important to understand that the zones do not constitute management units or legal entities **and are not intended to be used as the basis for any decision resulting from the EIS**. The zones are intended only to be used to facilitate the analysis of indirect effects across the EIS alternatives by grouping the leases geographically and to organize the leases by terrain and development potential where useful to the resource discussions. New oil and gas development could be accessed from existing or new well pads constructed on each lease or on adjacent private or BLM land using directional or horizontal drilling technologies.

#### 1.2.1.1 Zone 1

Zone 1 includes 10 leases at the western edge of the analysis area. There are 131 existing wells within 2 miles of the lease boundaries within this zone and, based on the RFDS, it is projected that there would be 63 new wells developed over the next 20 years, should the leases be made available without constraints. It is estimated that 95 percent of all horizontal wells in the analysis area would occur in this zone. The primary target formations are the Mesa Verde and the Niobrara. Existing infrastructure includes pipelines and roads that were constructed to serve the existing wells in the Orchard and Place Mesa units.

#### 1.2.1.2 Zone 2

Zone 2 includes 21 leases within an area in approximately the center of the east-west alignment of the 65 leases. There are 733 existing wells within 2 miles of the lease boundaries within this zone and, based on the RFDS, it is projected that there would be 318 new wells developed over the next 20 years, should the leases be made available without constraints. New development could be accessed primarily from existing and newly constructed well pads. Most of the successful development has been from the Mesa Verde Formation, but due to a successful horizontal Niobrara well, it is anticipated that future development would be likely to produce from both formations using mainly directional or vertical technologies. It is estimated that 5 percent of all horizontal wells in the analysis area would occur in this zone. Existing infrastructure includes the numerous pipelines and roads that access the existing wells.

#### 1.2.1.3 Zone 3

Zone 3 includes 33 leases within an area in the eastern part of the 65 leases. There are 50 existing wells within 2 miles of the lease boundaries within this zone and, based on the RFDS, it is projected that there

would be 53 new wells developed over the next 20 years, should the leases be made available without constraints. New development would be accessed primarily from newly constructed well pads, with little exploration anticipated. No horizontal wells are expected to be drilled in this zone. Existing infrastructure includes Forest Service roads and pipelines. To successfully develop wells in this zone, road improvements and pipeline installation would be necessary.

**1.2.1.4 Zone 4**

Zone 4 includes only one lease (COC 066948), located approximately 40 miles north of the main analysis area near Meeker, Colorado. There are no existing wells within this zone or within 2 miles of the lease so the projected 10 new wells could only be accessed from newly constructed well pads. No horizontal wells are projected and existing infrastructure is limited to a county road and a pipeline within one mile of the lease boundary.

**1.2.1.5 Summary of Existing and Potential Future Wells by Zone**

**Table 1-2** summarizes the existing wells and projected future unconstrained development in each zone, assuming no constraints such as lease stipulations.

**Table 1-2 Existing Wells and Future Development by Zone**

Current or Future	Well type	Zone 1	Zone 2	Zone 3	Zone 4	Total
Existing wells within 2 miles of lease boundaries	Horizontal	19	1	0	NA	<b>20</b>
	Directional	68	649	3	NA	<b>720</b>
	Vertical	44	83	47	NA	<b>174</b>
	<b>Total</b>	<b>131</b>	<b>733</b>	<b>50</b>	<b>NA</b>	<b>914</b>
Existing well distribution	Percentage of total wells	14.3%	80.2%	5.5%	NA	<b>100%</b>
	Percentage of horizontal wells	95.0%	5.0%	0.0%	NA	<b>100%</b>
Future Projection (Unconstrained)	All wells	63	318	53	10	<b>444</b>
	Horizontal wells	16	1	0	0	<b>17</b>

As defined in the Forest Service RFDS (USFS 2010a, p. 1), the term “unconstrained” in an RFDS means that there are no restrictions on surface use assumed in the baseline scenario.

**1.2.2 Leasing Terminology**

**1.2.2.1 Standard Lease Terms**

Standard Lease Terms (**SLTs**) are part of every lease issued by the BLM. Essentially, these terms establish that the lessee has the right to use as much of the leased lands as is necessary to explore, drill, and extract all the leased resource. They allow for reasonable measures that may be required to minimize adverse impacts to other resource values, land uses, or land users. To the extent consistent with the lease rights granted, these reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. **However, under SLTs such measures, at a minimum, shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for more than 60 days annually (43 CFR 3101.1-2).** The lessee must comply with all laws and regulations regardless of the when the law was enacted and

regardless of the effect it may have on the rights granted. The lessee also must comply with all Oil and Gas Onshore Orders.

### 1.2.2.2 Lease Stipulations

Lease stipulations are conditions placed on a lease that become part of the lease issued by BLM. The purpose of lease stipulations is to minimize potential adverse impacts of exploration and development operations in compliance with applicable management direction. Stipulations may be necessary to protect specific resources, even where such protection is not specifically mandated by existing laws or regulations. Lease stipulations may be modified only through the use of exceptions, modifications, or waivers that are documented in the lease file. Additional information related to lease stipulations and the specific stipulations considered by the Forest Service to meet the standards and guidelines of the WRNF Forest Plan (USFS 2002a) can be found in Section 1.4.6 of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a).

The following brief summary of different types of stipulations and changes to those stipulations is derived from the Uniform Format for Oil and Gas Lease Stipulations (Rocky Mountain Regional Coordinating Committee 1989). A specific stipulation would apply to oil and gas exploration and development if the resource being protected by the stipulation occurs at the proposed well location, based on site-specific field evaluations.

#### No Surface Occupancy

The NSO stipulation is intended for use only when other stipulations are determined to be inadequate to protect surface resources. It is used to provide protection for surface resources when standard lease terms are inadequate, such as where the resource protection cannot be accomplished by relocating proposed operations less than 200 meters. The type of resource to be protected and the rationale for attaching the NSO stipulation must be stated in the lease file along with the location of the stipulation or percentage of the lease affected within the lease boundary.

#### Controlled Surface Use

The Controlled Surface Use stipulation is intended to be used to strictly control lease activities where resource protection cannot be accomplished adequately with mitigation measures provided by standard lease terms, regulations, and other guidance like Onshore Orders. It is less restrictive than NSO or Timing Limitation stipulations and should be applied where use and occupancy is allowed but special operational constraints are needed for specific types of activities that modify the lease rights but do not prohibit all activities. It also may be used to notify the lessee that operations may be moved more than 200 meters to minimize impacts to other resource values.

#### Timing Limitations

The Timing Limitation stipulation prohibits surface use during a specified period to protect identified resources and resource values on a seasonal basis. The specified period must exceed the annual 60-day period under **SLTs**. This stipulation does not apply to operation and maintenance of existing facilities.

#### Exceptions, Modifications and Waivers

Exceptions from stipulations can be issued on a case-by-case basis to temporarily exempt the lessee from lease stipulations because the conditions under which the stipulation was established do not exist at the time of the exception. The acceptable causes for consideration of exceptions are stated in the applicable land use plan for the area.

Modifications are changes to the provisions of the lease stipulation, either temporarily or for the term of the lease. It may be needed if the conditions for which a stipulation was applied to a lease no longer occur. For example, if an NSO stipulation was established to protect a federally listed plant species, but a survey determines that the plant and its habitat do not exist, this may warrant modifying the lease to remove the NSO stipulation in that portion of the lease.

Waivers are permanent exemptions from a lease stipulation because the reason for implementing the stipulation is no longer applicable. Modifications and waivers are defined at 43 CFR 3101.1-4.

### **1.2.2.3 Lease Notice**

A Lease Notice is a written notice from the authorized officer that serves to implement regulations not covered by stipulations or conditions of approval. It provides instructions on how to implement specific actions or items of local, regional, or state importance. Any requirements contained in a Lease Notice must be fully supported by law, regulations, **SLTs**, or Onshore Orders, CFR 3101.3.

## **1.3 Purpose of the Action**

BLM's purpose for this federal leasing action is to:

- Revisit or reaffirm previous BLM decisions to issue 65 leases underlying Forest Service lands. These leases were issued from 1995 to 2012 following the Forest Service's availability decision considered in the 1993 EIS (USFS 1993a);
- Assess conformance with the decisions making these lands available for oil and gas leasing in the 1993 EIS, as reaffirmed in the 2002 WRNF Plan and consider consistency with the Forest Service's recent availability decisions for lands within the WRNF;
- Support the Forest Service in managing oil and gas resources, as required by law and memoranda of understanding between the agencies; and
- Fulfill the federal government's policy to "foster and encourage private enterprise in the development of economically sound and stable industries, and in the orderly and economic development of domestic resources to help assure satisfaction of industrial, security, and environmental needs" (Mining and Minerals Policy Act of 1970) while continuing to sustain the land's productivity for other uses and capability to support biodiversity goals (Forest Service Minerals Program Policy).

## **1.4 Need for the Action**

The BLM's need for this federal leasing action is to:

- Meet domestic energy needs under the requirements of the MLA, as amended, the Mining and Minerals Policy Act of 1970, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987 ("Reform Act"). The BLM's responsibility under these laws is to regulate the development of oil and gas in the public domain, and to ensure that deposits of oil and gas owned by the U.S. shall be subject to disposition through the land use planning process.
- Address the NEPA deficiency identified by the 2007 IBLA ruling on the appeal by the Board of Commissioners of Pitkin County that BLM must formally adopt NEPA analysis completed by the Forest Service or conduct a NEPA analysis of its own for issuance of oil and gas leases underlying WRNF lands;
- Support Forest Service mineral policy that puts responsibility on field units, with the known presence or potential presence of a mineral or energy resource, to foster and encourage the

exploration, development, and production of the mineral or energy resource consistent with Forest Service management direction; and

- Meet BLM's collaborative responsibility under the Reform Act to issue and manage oil and gas leases where the Forest Service has issued a land availability decision.

## 1.5 Decisions to be Made

### 1.5.1 Decisions to be Informed through this Analysis

This EIS considers 65 leases issued since 1993 in the WRNF. The decision to be made by the BLM, based on the analysis in this EIS, is whether the 65 leases should be:

1. Reaffirmed with their current existing stipulations;
2. Modified with additional or different lease stipulations or additional mitigation measures; or
3. Cancelled.

**Note that several leases, as shown in Table 1-1, expired before or during the preparation of the EIS. These leases have been retained in the EIS and its analysis for continuity, and because the circumstances surrounding the expiration of several of those expired leases are either subject to administrative appeal or are under appeal to the IBLA. For purposes of the ultimate decisions on any of the actions analyzed in this EIS, there will be no decision made by the BLM on any leases that are expired and no longer subject to appeal at the time of any final decision.**

### 1.5.2 Decisions Beyond the Scope of this Analysis

The decision of whether NFS lands within the 65 existing leases are available or unavailable for oil and gas leasing remains with the Forest Service and is beyond the scope of this analysis, however, it should be noted that the BLM retains the ultimate discretion whether to issue a lease for any particular parcel (43 CFR 3101.7-2). This EIS will not directly affect decisions on any pending or proposed APDs because the Forest Service has the authority to address the NEPA on the proposed SUPO that accompanies each APD.

The purpose of this EIS is to support a leasing decision with respect to the 65 previously issued leases. It will not authorize any development on these previously issued leases. Any discussion of development in this EIS is only to facilitate an analysis of the indirect effects of leasing through analysis assumptions based on historic oil and gas development in this region and the RFDS prepared for the WRNF that is included as Appendix F of the WRNF Oil and Gas Leasing Draft EIS (USFS 2012).

## 1.6 Relationship to Programs, Policies, and Plans

### 1.6.1 Major Laws and Regulations

The primary laws and regulations that affect fluid mineral leasing decisions on NFS lands are listed in **Table 1-3**. A variety of federal and state permits are required for development of oil and gas leases; however, none are listed because the decision for this EIS would not authorize development or any surface-disturbing activities. Additional details on laws and regulations that apply to leasing on NFS lands can be found in Section 1.4.1 of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a).

**Table 1-3 Major Federal Laws and Regulations Related to Oil and Gas Leasing**

Law or Regulation	Brief Description	Agency
Organic Administration Act of 1897, 16, (U.S. Code [USC]) § 551	Authorizes the Secretary of Agriculture to promulgate rules and regulations for the use and occupancy of the National Forests.	Forest Service
Federal Land Policy and Management Act of 1976, 43 USC §§ 1701 et seq	BLM's organic act that defines the agency's mission as one of multiple use. It requires that BLM management allow for "a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and non-renewable resources" on public lands.	BLM
Multiple Use Sustained Yield Act of 1960, 16 USC § 528	Directed the national forests be managed under the principles of multiple use and to produce a sustained yield of products and services.	Forest Service
MLA, 30 USC §§ 181-287	Authorizes the Secretary of the Interior to issue leases for leasable minerals on public domain lands. Requires Secretary approval for proposed surface-disturbing activities within the lease area prior to issuance of a permit to drill on an oil and gas lease.	BLM
Federal Onshore Oil and Gas Leasing Reform Act of 1987, 30 USC §§181 et seq.	An amendment to the MLA important to federal leasing because it establishes the requirements for competitive leasing and grants the Forest Service the authority to make decisions and implement regulations concerning the leasing of oil and gas on NFS lands.	Forest Service, BLM
Mineral Leasing Act for Acquired Lands of 1947, 30 USC §§ 351 – 359	Extends leasing authority to lands that have been acquired by the federal government. Requires that the BLM obtain the consent of the Secretary of Agriculture prior to lease issuance on acquired NFS lands.	BLM
Mining and Minerals Policy Act of 1970, 30 USC § 21a	Establishes the policy of the federal government to foster and encourage the orderly and economic development of domestic mineral resources in the national interest.	Forest Service, BLM
Energy Security Act of 1980, 42 USC § 8855	Authorizes the Secretary of Agriculture to process applications for leases and permits for resource development on NFS lands, notwithstanding the current status of any Forest Plan.	Forest Service
Energy Policy Act of 2005; <b>Pub. L. No. 108-58 (Aug. 8, 2005)</b>	Directs the Secretaries of the Interior and Agriculture to improve administration of federal oil and gas leasing programs, inspection and enforcement of oil and gas activities, and the development and implementation of Best Management Practices (BMPs). Under this law, the Secretaries of the Interior and Agriculture developed a Memorandum of Understanding to improve coordination and consultation on oil and gas leasing activities and to establish joint policies and procedures for managing oil and gas leasing and subsequent actions.	Forest Service, BLM
National Forest Management Act (NFMA), 16 USC §§1600 et seq.	Requires the Forest Service to prepare a forest plan for each national forest.	Forest Service



**Table 1-3 Major Federal Laws and Regulations Related to Oil and Gas Leasing**

Law or Regulation	Brief Description	Agency
NEPA, 42 USC §§ 4321 et seq. and Council on Environmental Quality – Regulations for Implementing NEPA (40 CFR §§ 1500 – 1508, 43 CFR Part 46)	Requires disclosure of the potential impacts of federal actions on the human environment to the decision makers and the public to ensure that informed decisions are based on science. Mandates public involvement in the process.	All federal agencies
Oil and Gas Resources on National Forests, 36 CFR § 228.100 – 116	Provides regulations for the leasing, permitting, operations, and management of oil and gas resources on NFS lands. Includes requirements for Forest Service analysis and approval of a SUPO, leasing analysis, and compliance.	Forest Service
Onshore Oil and Gas Orders, 43 CFR 3160	Onshore Order No. 1 – Approval of Operations Onshore Order No. 2 – Drilling Operations Onshore Order No. 3 – Site Security Onshore Order No. 4 – Measurement of Oil Onshore Order No. 5 – Measurement of Gas Onshore Order No. 6 – Hydrogen Sulfide Operations Onshore Order No. 7 – Disposal of Produced Waters Onshore Order No. 8 – Well Completions/Workovers/Abandonment (Proposed Rule) Onshore Order No. 9 – Waste Prevention and Beneficial Use of Oil and Gas (Not Published)	BLM

**1.6.2 BLM and Forest Service Land Use Plans**

The most recent approved WRNF management plan is the LRMP 2002 revision (USFS 2002a), which provides objectives and management direction for oil and gas leasing, exploration, and development. The WRNF Oil and Gas Leasing Final EIS (USFS 2014a) analyzes potential amendment of the 2002 LRMP specific to oil and gas leasing availability. When the **Final** ROD **was** signed by the Forest Supervisor **in 2015**, it amended the 2002 WRNF LRMP by making forest-wide decisions on oil and gas leasing land availability and approved lease stipulations to be attached to future leases for the purpose of protecting other resources.

The BLM generally divides the responsibility for leasing Forest Service lands by BLM field office (FO). The 65 leases analyzed in this EIS are located primarily within the jurisdiction of the BLM CRVFO and the BLM Grand Junction FO (GJFO), with one lease to the north within the jurisdiction of the BLM White River FO in Meeker, Colorado, in Rio Blanco County.

The BLM CRVFO document that guides its management decisions is the Resource Management Plan (RMP). The most recent fully approved RMP governing oil and gas development in the CRVFO area is the CRVFO RMP, which was approved in June 2015. Management of oil and gas leasing within the GJFO is guided by the Grand Junction RMP, approved in August 2015. The BLM WRFO recently prepared a RMP Amendment and EIS to address potential oil and gas exploration and development activities within the area it manages and amend the 1997 RMP. The ROD and Approved RMP was signed in August 2015.

## 1.7 Scoping, Public Involvement, and Relevant Issues Identified

### 1.7.1 Public Scoping

The scoping comment period began April 2, 2014, with the publication of the Notice of Intent (NOI) to prepare an EIS in the Federal Register (Vol. 79, No. 63, pages 18576 to 18577). The NOI notified the public of the BLM's intent to prepare an EIS for the Previously Issued Oil and Gas Leases in the WRNF and the beginning of a 30-day scoping period. The BLM also posted the NOI on the project website ([http://www.blm.gov/co/st/en/fo/crvfo/existing\\_leases\\_on.html](http://www.blm.gov/co/st/en/fo/crvfo/existing_leases_on.html)).

The BLM subsequently extended the comment period by 14 days. The scoping comment period ended on May 16, 2014. Additionally, the BLM mailed scoping notification letters to 23 stakeholders on or about April 2, 2014.

The BLM hosted four scoping meetings in April and May 2014 with an attendance (signed-in) totaling 772 people (**Table 1-4**). The meetings provided an opportunity for the BLM to inform those in attendance about the Proposed Action, conceptual alternatives, and the EIS process and to solicit input on the scope of the analysis and potential issues. Each meeting was held from 4:00 p.m. to 7:00 p.m. Attendees were greeted, asked to sign in, given a project fact sheet and comment form, and informed about the meeting agenda, the general flow of information (display boards) in the room, and ways to submit comments to the BLM, including the opportunity for oral comment. A sign-up sheet was provided for attendees wishing to provide oral comments at the meeting.

**Table 1-4 Scoping Meeting Attendance**

Date	Location	Signed-In Attendance
April 15, 2014	Glenwood Springs, CO (Glenwood Springs Community Center)	151
April 16, 2014	Carbondale, CO (Carbondale Town Hall)	286
April 17, 2014	Aspen, CO (Pitkin County Library)	95
May 1, 2014	De Beque, CO (De Beque Community Center)	240

The BLM received 32,318 comment documents, the majority of which were form letters submitted by individuals. Of all the comment documents (letters, emails, form letters, and meeting testimony), 3,275 were from commenters in Colorado, 25,929 were from other U.S. states, 471 were from outside the U.S., and 2,643 were from unknown locations.

All comments were read, categorized, and entered into a database. The detailed comments and a more in-depth discussion of the public scoping process can be found in the External Scoping Summary Report, February, 2015, which is available on the BLM project website at [http://www.blm.gov/co/st/en/fo/crvfo/existing\\_leases\\_on.html](http://www.blm.gov/co/st/en/fo/crvfo/existing_leases_on.html).

### 1.7.2 Scoping Issues

Substantive scoping comments fell into the following four broad categories: Process, Purpose and Need, Alternatives Development, and Impacts Analysis (including resource-specific concerns and cumulative impacts). The primary public scoping issues are summarized in **Table 1-5** with the locations in this EIS where they are addressed.

**Table 1-5 Summary of Primary Scoping Comments**

Resource	Primary Scoping Comments	Resource Issues Analyzed in EIS
Process	What NEPA deficiencies exist and by what process should the BLM address them?	Sections 1.2 through 1.5
	By what authority may the BLM cancel or modify leases?	Sections 1.2 through 1.5
	How can cooperators, agencies with regulatory authority, affected stakeholders, and other interested parties participate during the NEPA process?	Section 1.7
Purpose and Need	Should the Purpose and Need for agency action extend beyond addressing a NEPA deficiency?	Sections 1.2 and 1.3
	How should the BLM balance the requirements of its multiple use mandate under Federal Land Policy and Management Act of 1976 and the need to maintain resource values with the need to respond to the requirements of the MLA?	Sections 1.2, 1.3, and 1.5
	What are BLM's and Forest Service's respective roles and decisions to be made?	Section 1.4
Analysis Approach (General)	What RFDS and other development assumptions should be used for EIS analysis? What level of analysis is appropriate for a lease sale EIS?	Section 4.1
	How should the BLM address changed circumstances and new information in a remedial NEPA process?	Chapter 1.0; Chapter 2.0; Section 4.1
Cumulative Impacts	What reasonably foreseeable future actions are appropriate for inclusion in the cumulative impact analyses?	Section 4.1
Air Quality	How would reasonably foreseeable development activities such as drilling, production, vehicle use, and other sources affect air quality?	Section 4.2
	How will the Proposed Action and alternatives address emissions of greenhouse gasses and potential contributions to climate change?	Section 4.2
	What methods or actions can minimize or mitigate air quality impacts and potential effects on human health and other resources from the Proposed Action and alternatives?	Chapter 2.0; Section 4.2
Geology and Minerals, including Paleontology	What is the potential for seismic activity or other geological instability as a result of reasonably foreseeable development?	Section 4.3
	How would the potential for gas and liquid migration or seismic activity be affected by Mancos shale drilling, hydraulic fracturing, injection of produced water, or other reasonably foreseeable activities? How can those risks be minimized?	Sections 4.3 and 4.5
	What is the potential for impacts to important paleontological resources from reasonably foreseeable development and how can this be minimized?	Section 4.3
Soils	How does area soil type affect the potential for erosion, runoff, and subsequent sediment loading? What is the appropriate level of analysis for a leasing EIS?	Section 4.4
	How will impacts from reasonably foreseeable development to erodible soils, saline soils, or other sensitive soil types be minimized or mitigated?	Chapter 2.0; Section 4.4

**Table 1-5 Summary of Primary Scoping Comments**

Resource	Primary Scoping Comments	Resource Issues Analyzed in EIS
Water Resources	How would the projected water use affect long-term availability of water sources?	Section 4.5
	How would the characteristics of the oil/gas formations, aquifer formations, and their interconnectedness affect water quality during activities such as drilling, hydraulic fracturing, or other reasonably foreseeable activities?	Sections 4.3 and 4.5
	What are appropriate setbacks for protection of public and private wells, lakes and streams, impaired waters, floodplains, or other water resources? What design features, BMPs, mitigation measures, and conditions of approval can be incorporated into the alternatives to reduce risk to water resources?	Chapter 2.0; Section 4.5
	How can the impacts from spills to water quality and other resources be minimized?	Chapter 2.0; Section 4.5
	How should water quantity and quality be monitored?	Section 4.5
Vegetation and Special Status Species	How will vegetation resources, plant diversity, and ecologically intact/undisturbed locations and special status plant species be protected from the impacts of reasonably foreseeable development and maintained?	Chapter 2.0; Section 4.6
	How would surface disturbance or changes in hydrology affect wetlands, riparian areas, and floodplains and how will these areas be protected?	Chapter 2.0; Section 4.7
	How would the potential spread of noxious weeds be mitigated?	Chapter 2.0; Section 4.6
Wildlife and Special Status Species	How would reasonably foreseeable habitat disturbance, vehicle use, and other elements of oil and gas development such as noise affect terrestrial and aquatic wildlife, special status species, and their habitat?	Sections 4.6, 4.7, and 4.8
	How will the Proposed Action and alternatives affect big game, including habitat fragmentation? How would these impacts affect big game hunting?	Section 4.7
	What stipulations or BMP, mitigation measures, or conditions of approval can be incorporated into the Proposed Action and alternatives to reduce risk to wildlife and special status species?	Chapter 2.0; Sections 4.6 and 4.7
Cultural Resources	How can the BLM protect and conserve cultural resources, including Traditional Cultural Properties from reasonably foreseeable development?	Chapter 2.0; Section 4.9
	What cultural importance do local Tribes place on the analysis area, and how might important areas be affected?	Section 4.9
	How can the setting of historic tourism be maintained in consideration of reasonably foreseeable development?	Sections 4.9 and 4.13
Hazardous Materials	What types and amounts of hazardous materials will be used for oil and gas development? What methods will be used for hazardous materials transport, storage, and operations (including drilling and fracturing processes)? How will contaminants be disposed of? How will the BLM enforce compliance with safety requirements?	Section 4.16
	What contingencies exist to handle unexpected contaminations such as natural occurring radioactive materials or accidental spills and releases?	Section 4.16

**Table 1-5 Summary of Primary Scoping Comments**

Resource	Primary Scoping Comments	Resource Issues Analyzed in EIS
Health and Human Safety	How will the BLM protect public health and safety in and around the analysis area?	Chapter 2.0; Section 4.16
	What are the cumulative and combined impacts of multiple exposures to chemicals and toxic substances such as hydraulic fracturing fluids, ozone, and volatile organic compounds on humans? How will exposure to these chemicals and substances be minimized for workers, area residents, and visitors?	Section 4.16
	How can the risk of wildland fire from human activity be reduced?	Section 4.16
	How will reasonably foreseeable development impact emergency and health care services?	Sections 4.16 and 4.17
	How can noise from oil and gas development activities and transportation be mitigated?	Sections 4.10 and 4.11
Land Use	How would the Proposed Action and alternatives comply with federal, county and local policies concerning development? How will county lands identified for protection in Master Plans be protected from reasonably foreseeable development?	Section 4.11
Livestock Grazing	How will the BLM minimize impacts to livestock in and around the analysis area from exposure to hydraulic fracturing fluids, fugitive dust, and as well as impacts from noise or traffic?	Section 4.14
Recreation	How would reasonably foreseeable activities affect access to recreation and the quality of the recreational experience? How would this affect the recreation industry? How will effects be minimized?	Sections 4.13 and 4.17
	What are the hunting and fishing values of lands and waters in the analysis area? How would those activities be affected by potential development?	Sections 4.13 and 4.17
Socioeconomics	Would reasonably foreseeable development be compatible with the varying social and economic conditions across the analysis area, including employment patterns, and preferences for oil and gas development versus other industries?	Section 4.17
	How would lease cancellation affect local and regional social and economic conditions? How would lease cancellation affect operators or recipients of past royalties?	Section 4.17
	How would lease reaffirmation affect social and economic conditions on local and regional levels?	Section 4.17
	How would resource conservation measures and other actions that would restrict or limit oil and gas development (such as modifying leases) affect social and economic conditions?	Section 4.17
	What mitigation strategies can be used to minimize adverse social or economic impacts?	Section 4.17
Special Designations	How would the Proposed Action and alternatives comply with the 2001 and 2012 Roadless Rules? How would the alternatives affect the wilderness qualities of inventoried roadless areas and the values of research natural areas? What measures may be implemented to reduce those impacts?	Chapter 2.0; Section 4.12
	How would the values of other special designations such be protected?	Chapter 2.0; Section 4.12

**Table 1-5 Summary of Primary Scoping Comments**

Resource	Primary Scoping Comments	Resource Issues Analyzed in EIS
Transportation	How will development affect local and regional access and traffic on a daily and annual basis? How will adverse impacts to traffic be minimized?	Chapter 2.0; Section 4.10
	How will reasonably foreseeable development affect the local road system? How will the BLM coordinate with counties on road development? How will adverse impacts to the local transportation network be minimized?	Section 4.10
Scenic Resources	How would the reasonably foreseeable development affect the general landscape and rural character of the area under each of the alternatives? How will adverse impacts to areas with high quality visual resources be minimized?	Chapter 2.0; Section 4.15
	How will the construction and operation activities affect visibility (haze) from Class I and sensitive Class II areas and important recreational facilities?	Sections 4.2 and 4.13

**1.7.3 Internal Scoping**

Following review of the public scoping comments, the BLM CRVFO interdisciplinary team met to discuss the external scoping comments and to formulate alternatives to be analyzed in the EIS. This meeting was held to identify issues of concern to the BLM and to discuss how to address the public and agency issues in the EIS. The meeting also helped to more fully develop the conceptual alternatives that were presented in the NOI.

**1.7.4 Public Meetings and Comments on the Draft EIS**

The publication of the Notice of Availability (NOA) for the Draft EIS in the Federal Register on November 20, 2015, initiated the public comment period that ended on January 8, 2016. A news release announcing the availability of the Draft EIS, the public meetings, and the public comment period was issued on November 17, 2015 to local media outlets.

Advertising of the Draft EIS availability, comment period, and public meetings was accomplished through the following methods:

- BLM News Release (November 17, 2015)
- Publication of Federal Register NOA of the Draft EIS (November 20, 2015)
- Email announcements to those who provided the BLM with a valid email address (November 19, 2015)
- Project website postings of the NOI, news releases, and public meeting dates ([http://www.blm.gov/co/st/en/fo/crvfo/existing\\_leases\\_on.html](http://www.blm.gov/co/st/en/fo/crvfo/existing_leases_on.html))

The BLM held three public meetings to review the Draft EIS findings and receive public comments. The locations, meeting dates, and number of attendees were as follows:

- Glenwood Springs, Colorado—Monday, December 14, 2015 (94 attendees)
- De Beque, Colorado—Tuesday, December 15, 2015 (8 attendees)
- Carbondale, Colorado—Wednesday, December 16, 2015 (240 attendees)

During the formal comment period, the BLM received a total of 60,515 submissions, in the form of letters, emails, faxes, oral testimony recorded at a public meeting, or other methods. Each submittal varied in content, and ranged from one to many comments that contained technical information, suggestions for improving the content of the Draft EIS, as well as personal opinions. The majority of the submissions were “form letters” (i.e., submissions containing identical or nearly identical text submitted by more than one person). All submissions were analyzed for content, and the resulting comments were grouped by resource issue and categorized as substantive or non-substantive. In accordance with NEPA guidelines, the BLM has formally responded to all comments identified as substantive. Appendix E contains additional information regarding public outreach, submissions by type, a description of the content analysis process and comment disposition, a summary of out of scope and non-substantive comments, and all substantive comments with BLM responses.

### **1.7.5 Consultation and Coordination with Federal, State, and Local Governments, and Federally Recognized Indian Tribes**

#### **1.7.5.1 Cooperating Agencies**

The BLM invited 23 federal and state agencies, counties, tribes, and municipalities to become cooperating agencies in letters sent to each organization on July 3, 2014. 13 agencies and local governments accepted the invitation to be a cooperating agency, listed below.

- WRNF
- U.S. Environmental Protection Agency, Region 8
- Colorado Division of Natural Resources
- Garfield County Commissioners
- Mesa County Commissioners
- Pitkin County Commissioners
- Rio Blanco County Commissioners
- Town of Carbondale
- City of Glenwood Springs
- City of Rifle
- Town of Silt
- **Town of Parachute**
- **Town of New Castle**

Cooperating Agency meetings **were** held at the CRVFO every few months or as needed to obtain comments from the cooperating agency representatives. This input includes comments on the types of information and data they can provide to support the NEPA process, comments on the preliminary range of alternatives, and reviews of sections of the EIS related to their special expertise.

#### **1.7.5.2 Tribal Government-to-Government Consultation**

Federal agencies are responsible for compliance with a host of laws, Executive Orders and Memoranda, treaties, departmental policies, and other mandates regarding their legal relationships with and responsibilities to Native Americans. Initially, the BLM CRVFO Field Manager sent scoping letters to the Ute Indian Tribe, the Ute Mountain Ute Tribe, and the Southern Ute Indian Tribe in April 2014, to notify

them about the Previously Issued Oil and Gas Leases in the WRNF EIS, inviting their comments and participation as cooperating agencies. Comments were received from the Southern Ute Indian Tribe.

On July 3, 2014, the BLM Field Manager sent letters to the Ute Indian Tribe, the Ute Mountain Ute Tribe, and the Southern Ute Indian Tribe to invite them to participate as cooperating agencies in the development of the EIS. No responses were received from the tribes.

Formal government-to-government consultation was initiated on June 1, 2015, when the BLM Field Manager sent letters to the tribes requesting that they provide comments or concerns regarding the effects of the alternatives on the known and likely traditional cultural properties, and offering the opportunity for face-to-face meetings with the Forest Service or the BLM. **On April 22, 2016, the BLM sent a letter to the tribes that identified the Preferred Alternative and summarized cultural resource records within the area of potential effect (including potential Traditional Cultural Properties). The letter also offered the opportunity for comments. No responses were received.**

## 1.8 Organization of this EIS

Chapter 1.0 of the EIS provides an introduction and general overview of the proposed federal action. In addition, this chapter describes the purpose of and need for the Proposed Action; the decisions to be made; existing BLM and Forest Service policies, plans, and programs; relevant laws, and regulations; and a summary of outreach activities.

Chapter 2.0 provides a summary of the EIS alternatives; a summary of the alternatives eliminated from detailed analysis and the reasons for elimination; detailed descriptions of the alternatives analyzed in the EIS; a summary of environmental protection measures and agency-required measures; and a comparison of impacts under each alternative.

Chapter 3.0 describes the existing natural and human environment within the proposed project area, focusing on the conditions that may be affected by the alternatives analyzed in detail.

Chapter 4.0 describes the potential direct and indirect impacts to the natural and human environment that would result from the implementation of the EIS alternatives. At the end of each resource section, there is a discussion of the cumulative impacts that would result from the implementation of the alternatives, in combination with the impacts contributed by other past and present actions and reasonably foreseeable future actions. This chapter also discusses the relationship between short-term uses of the human environment and the maintenance and enhancement of long-term productivity, and irreversible and irretrievable commitment of resources.

Chapter 5.0 provides a summary of the public involvement process; a summary of consultation and coordination undertaken to prepare the EIS; a list of federal, state, and local agencies, tribes, and private organizations and companies that were contacted during the preparation of the EIS; agencies, organizations, and persons to whom copies of the EIS were sent; and the lists of BLM and consultant team members that developed the EIS.

Following Chapter 5.0 is the list of references cited in the EIS, a glossary of terms the readers can use to obtain definitions for scientific or technical terms, an index of key terms and information presented in the EIS, and appendices.



## 2.0 Alternatives Including the Proposed Action

### 2.1 Introduction

This chapter describes the alternatives considered in this Environmental Impact Statement (EIS). According to the Regulations for Implementing the Procedural Provisions of National Environmental Policy Act (NEPA) by the Council on Environmental Quality, the alternatives section is the heart of the EIS (40 Code of Federal Regulations [CFR] § 1502.14). Reasonable alternatives to be analyzed in detail must be developed based on the purpose and need for the action, be consistent with federal laws, and not be speculative. Per **Department of the Interior (DOI)** regulations at 43 CFR § 46.420(b), reasonable alternatives are those “that are technically and economically practical or feasible and meet the purpose and need of the proposed action.” All alternatives analyzed in detail in an EIS must be rigorously explored, objectively evaluated, and considered by the decision-maker. The alternatives should be developed to analyze a reasonable range of possibilities that cover the full spectrum of the issues to be evaluated and compared, without requiring every possible combination of options to be considered.

These alternatives were developed by the Bureau of Land Management (BLM) in response to issues and concerns from public comments submitted during the public scoping period, coordination with Cooperating Agencies, and interaction with the BLM management and resource specialists. The BLM also considered alternatives raised during the scoping and alternatives development processes that are not carried forward for detailed analysis. These alternatives, with the rationale for not including each for detailed analysis, are described in Section 2.4.

In addition to the No Action Alternative, there are **five** action alternatives analyzed in detail. This chapter concludes with a summary of the environmental effects of the alternatives that are analyzed in the EIS.

The Council on Environmental Quality regulations at 40 CFR § 1502.14(e) direct that an EIS “...identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.” **In compliance with DOI** regulations at 43 CFR § 46.425, the BLM **identified** a preferred alternative based on the range of alternatives and input from the public during the Draft EIS public comment period. The identification of a preferred alternative does not constitute a commitment or decision in principle, and there is no requirement to select the preferred alternative in the Record of Decision (ROD). Selection in the ROD of an alternative other than the preferred alternative does not require preparation of a supplemental EIS if the selected alternative **is within the range of alternatives** analyzed in the EIS.

### 2.2 Summary of Alternatives Analyzed in Detail

Following is a brief summary of the alternatives analyzed in detail in this EIS.

- **Alternative 1 (No Action Alternative)**—Reaffirms the lease stipulations on the 65 leases as they were issued.
- **Alternative 2**—Modifies leases to address inconsistencies with the 1993 EIS and ROD (U.S. Forest Service [Forest Service or USFS] 1993a). Adds stipulations identified in the 1993 EIS and ROD but not attached to leases as issued.
- **Alternative 3**—Modifies the 65 leases to match the stipulations for future leasing identified in the Proposed Action from the 2014 White River National Forest (WRNF) Final EIS (USFS 2014a).

- **Alternative 4 (Proposed Action)**—Modifies or cancels the 65 leases to match the stipulations and availability decisions identified for future leasing in the 2015 WRNF **Final** ROD (USFS 2015f).
- **Alternative 5**—Cancels all 65 existing leases; plug and abandon producing wells; remove roads, well pads, and ancillary facilities; and reclaim all disturbed areas.
- **Preferred Alternative**—Combines portions of Alternatives 2 and 4; Alternative 2 would be applied to leases that are producing or committed to an exploratory unit agreement or communitization agreement, and Alternative 4, with minor modifications (as noted below), would be applied to non-producing and non-committed (“undeveloped”) leases.

## 2.3 Alternatives Analyzed in Detail

### 2.3.1 Alternative 1 (No Action Alternative): Reaffirm Leases with Current Stipulations

Under Alternative 1, the BLM would continue to administer the leases with their current stipulations. Those leases that are currently under suspension would be reaffirmed and allowed to be developed at the discretion of the lessee, subject to applicable legal requirements. Should a lease be reinstated, the process for management of exploration, development, and reclamation would continue to follow the process described in Section 1.1.3. Throughout this document, the term “development” is used to describe the construction, drilling, and completion processes necessary to produce fluid minerals. Once development is completed, mineral extraction to produce the well is described as “operations.”

As shown in **Table 1-1**, most of the leases not under suspension are within a designated unit or held by production. **Table 2-1** summarizes the stipulations by lease under Alternative 1. The stipulations are displayed in **Figures 2-1** through **2-4**.

**Table 2-1 Lease Stipulations Under Alternative 1**

Zone	Lease No.	Lease Acres	Type of Stipulation <sup>1</sup>	Type of Restriction	Acres <sup>2</sup> or Miles of Stipulation/SLT
1	058677	543	NSO	Roadless Areas	543
1	059630	587	NSO	Bighorn Sheep	309
				Roadless Areas	587
				Slopes Greater than 60%	587
1	066727	640	NSO	Bighorn Sheep	640
1	066728	1,276	NSO	Bighorn Sheep	1,276
			TL	Big Game Winter Range	93
1	066729	654	NSO	Bighorn Sheep	653
				Slopes Greater than 60%	1
1	066730	1,279	NSO	Bighorn Sheep	1,278
			SLT ONLY	Standard Lease Terms	1
1	066731	651	NSO	Slopes Greater than 60%	651
1	066732	1,437	NSO	Slopes Greater than 60%	1435
1	066733	1,416	NSO	Slopes Greater than 60%	1,418
1	066926	1,629	NSO	Slopes Greater than 60%	1,629

**Table 2-1 Lease Stipulations Under Alternative 1**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
2	061121	964	NSO	Slopes Greater than 60%	351
			TL	Big Game Winter Range	208
			SLT ONLY	Standard Lease Terms	405
2	066723	1,280	NSO	Slopes Greater than 60%	68
			TL	Big Game Winter Range	1,198
			SLT ONLY	Standard Lease Terms	82
2	066724	1,973	TL	Big Game Winter Range	1,973
2	066915	2,537	NSO	USFS Administrative Sites	108
			TL	Big Game Winter Range	2,348
				Elk Production Area	80
			SLT ONLY	Standard Lease Terms	1
2	066916	2,562	TL	Elk Production Area	1,901
			SLT ONLY	Standard Lease Terms	660
2	066917	1,920	NSO	High Geologic Hazard—GMUGNF	20
			CSU	Elk Production Area—GMUGNF	439
			TL	Elk Production Area	443
			SLT ONLY	Standard Lease Terms	1,018
2	066918	2,557	NSO	Slopes Greater than 60%	216
			CSU	Level 1 Travel Route	98
			TL	Big Game Winter Range	2,531
2	066920	418	NSO	Slopes Greater than 60%	32
			SLT ONLY	Standard Lease Terms	386
2	067147	783	NSO	Slopes Greater than 60%	771
			TL	Big Game Winter Range	11
			SLT ONLY	Standard Lease Terms	1
2	067150	662	NSO	Slopes Greater than 60%	207
			TL	Big Game Winter Range	385
			SLT ONLY	Standard Lease Terms	70
2	067542	480	NSO	Slopes Greater than 60%	435
			SLT ONLY	Standard Lease Terms	46
2	067543	1,167	NSO	Slopes Greater than 60%	800
			SLT ONLY	Standard Lease Terms	367
2	067544	730	NSO	Slopes Greater than 60%	730
2	070013	1,262	NSO	>60% Slope—GMUGNF	1
				High Geologic Hazard—GMUGNF	52
				Riparian/ Wetland—GMUGNF	3
				Roadless Area—GMUGNF	186

**Table 2-1 Lease Stipulations Under Alternative 1**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
2	070013	1,262	NSO	Slopes Greater than 60%	1,037
			CSU	40-60% Slope—GMUGNF	33
				Moderate Geologic Hazard—GMUGNF	173
2	070014	1,486	NSO	Roadless Areas	1,486
				Slopes Greater than 60%	1,486
2	070015	1,598	NSO	Roadless Areas	1,522
				Slopes Greater than 60%	1,522
			SLT ONLY	Standard Lease Terms	76
2	070016	51	NSO	Slopes Greater than 60%	50
2	070361	638	NSO	Slopes Greater than 60%	556
				CSU	Moderate Geologic Hazard—GMUGNF
			TL		Powerline Corridor
				Big Game Winter Range	35
2	072157	638	NSO	Slopes Greater than 60%	15
				CSU	Moderate Geologic Hazard—GMUGNF
TL	Powerline Corridor	185			
	Big Game Winter Range	201			
2	075070	1,152	NSO	Big Game Winter Range—GMUGNF	341
				Standard Lease Terms	82
2	076123	80	NSO	Roadless Areas	1,147
				Slopes Greater than 60%	248
			TL	Big Game Winter Range	950
				Elk Production Area	249
SLT ONLY	Standard Lease Terms	5			
3	058835	1,475	SLT ONLY	Standard Lease Terms	1,475
3	058836	1,279	SLT ONLY	Standard Lease Terms	1,279
3	058837	1,669	TL	Elk Production Area	1,669
				<b>Snowmobile Corridor</b>	<b>&lt; 0.1 mile</b>
3	058838	1,277	CSU	Areas of Moderate Geologic Hazard—GMUGNF	26
			SLT ONLY	Standard Lease Terms	1,251
3	058839	1,127	TL	Elk Production Area	1,086
				<b>Snowmobile Corridor</b>	<b>2.1 miles</b>
			SLT ONLY	Standard Lease Terms	41

**Table 2-1 Lease Stipulations Under Alternative 1**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
3	058840	639	TL	Snowmobile	8
			SLT ONLY	Standard Lease Terms	631
3	058841	638	TL	Snowmobile	58
			SLT ONLY	Standard Lease Terms	580
3	066687	1,053	NSO	Slopes Greater than 60%	46
			SLT ONLY	Standard Lease Terms	1,007
3	066688	774	NSO	Slopes Greater than 60%	65
			TL	Elk Production Area	174
			SLT ONLY	Standard Lease Terms	535
3	066689	40	NSO	Ski Area	40
3	066690	274	NSO	Ski Area	36
			CSU	Level 1 Travel Route	49
			TL	Elk Production Area	142
				Snowmobile	49
SLT ONLY	Standard Lease Terms	47			
3	066691	198	NSO	Cutthroat Trout	39
				Slopes Greater than 60%	98
			SLT ONLY	Standard Lease Terms	61
3	066692	1,417	NSO	Slopes Greater than 60%	91
			TL	<b>Cutthroat Trout</b>	<b>5.7 miles</b>
			SLT ONLY	Standard Lease Terms	1,327
3	066693	2,167	NSO	Slopes Greater than 60%	365
			TL	Big Game Winter Range	80
				Elk Production Area	1,169
				<b>Cutthroat Trout</b>	<b>0.5 mile</b>
SLT ONLY	Standard Lease Terms	552			
3	066694	119	NSO	Cutthroat Trout	2
				Slopes Greater than 60%	92
			SLT ONLY	Standard Lease Terms	25
3	066695	1,061	NSO	Big Game Winter Range	277
				Slopes Greater than 60%	97
			TL	<b>Cutthroat Trout</b>	<b>0.6 mile</b>
			SLT ONLY	Standard Lease Terms	688
3	066696	1,027	NSO	Cutthroat Trout	206
				<b>Cutthroat Trout</b>	<b>0.4 mile</b>
			TL	<b>Cutthroat Trout</b>	<b>1.3 miles</b>
			SLT ONLY	Standard Lease Terms	821

**Table 2-1 Lease Stipulations Under Alternative 1**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
3	066697	1,872	NSO	Cutthroat Trout	217
			<b>TL</b>	<b>Cutthroat Trout</b>	<b>3.6 miles</b>
			SLT ONLY	Standard Lease Terms	1,655
3	<b>066698</b>	<b>2,460</b>	<b>TL</b>	<b>Cutthroat Trout</b>	<b>3 miles</b>
			SLT ONLY	Standard Lease Terms	2,460
3	<b>066699</b>	<b>114</b>	<b>TL</b>	<b>Cutthroat Trout</b>	<b>2.7 miles</b>
			SLT ONLY	Standard Lease Terms	114
3	066700	841	NSO	Slopes Greater than 60%	370
			<b>TL</b>	<b>Cutthroat Trout</b>	<b>2.4 miles</b>
			SLT ONLY	Standard Lease Terms	471
3	066701	1,885	NSO	Cutthroat Trout	62
				Slopes Greater than 60%	34
			<b>TL</b>	<b>Cutthroat Trout</b>	<b>3.8 miles</b>
			SLT ONLY	Standard Lease Terms	1,789
3	066702	1,254	NSO	Slopes Greater than 60%	822
			<b>TL</b>	<b>Cutthroat Trout</b>	<b>1.4 miles</b>
			SLT ONLY	Standard Lease Terms	432
3	066706	2,548	SLT ONLY	Standard Lease Terms	2,547
3	066707	1,276	NSO	Slopes Greater than 60%	109
			SLT ONLY	Standard Lease Terms	1,167
3	066708	2,554	CSU	Level 1 Travel Route	984
			TL	Elk Production Area	1,239
			SLT ONLY	Standard Lease Terms	1,315
3	066709	638	SLT ONLY	Standard Lease Terms	638
3	066710	2,329	CSU	Level 1 Travel Route	538
			TL	Snowmobile	1,241
			SLT ONLY	Standard Lease Terms	1,088
3	066711	1,751	CSU	Level 1 Travel Route	1,286
			TL	Elk Production Area	1,727
				<b>Cutthroat Trout</b>	<b>0.7 mile</b>
			SLT ONLY	Standard Lease Terms	24
3	066712	875	NSO	Cutthroat Trout	70
			CSU	Level 1 Travel Route	100
			TL	Elk Production Area	617
				<b>Cutthroat Trout</b>	<b>2 miles</b>
			SLT ONLY	Standard Lease Terms	188

**Table 2-1 Lease Stipulations Under Alternative 1**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
3	066908	2,400	TL	Elk Production Area	1,929
				<b>Cutthroat Trout</b>	<b>2.8 miles</b>
			SLT ONLY	Standard Lease Terms	472
3	066909	2,077	NSO	Cutthroat Trout	3
				Slopes Greater than 60%	255
			TL	Big Game Winter Range	206
				Elk Production Area	190
				<b>Cutthroat Trout</b>	<b>4.4 miles</b>
			SLT ONLY	Standard Lease Terms	1,424
3	066913	1,660	NSO	Slopes Greater than 60%	53
			CSU	Level 1 Travel Route	402
			TL	Snowmobile	301
			SLT ONLY	Standard Lease Terms	1,134
4	066948	2,562	NSO	Slopes Greater than 60%	65
			TL	Big Game Winter Range	405
				Snowmobile	1,569
			SLT ONLY	Standard Lease Terms	524

<sup>1</sup> GMUGNF= Grand Mesa, Uncompahgre, and Gunnison National Forest; NSO = No Surface Occupancy; CSU = Controlled Surface Use; TL = Timing Limitation; SLT = Standard Lease Terms.

<sup>2</sup> **Units are in acres unless otherwise noted.**

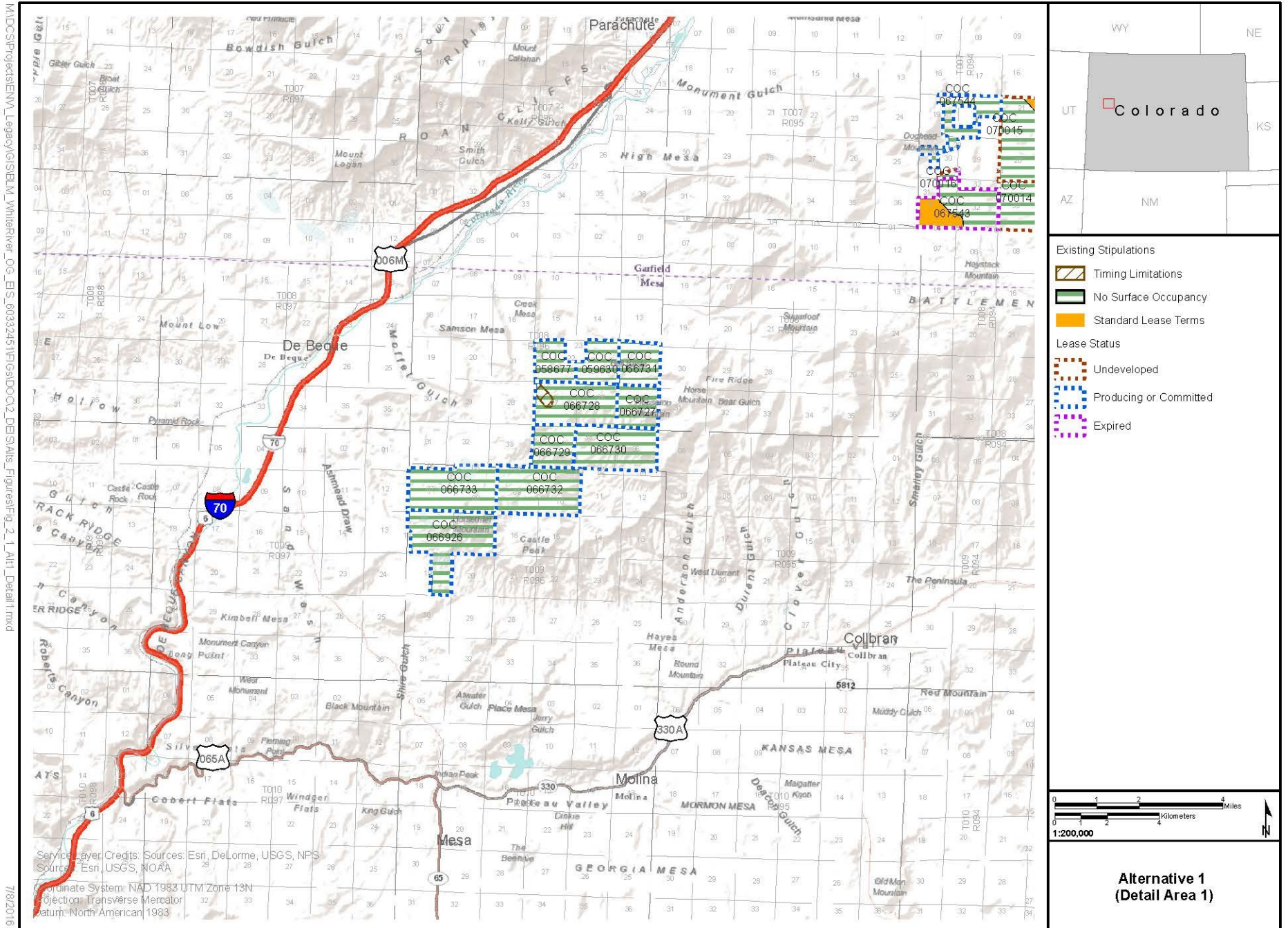


Figure 2-1 Existing Lease Stipulations under Alternative 1, West Side



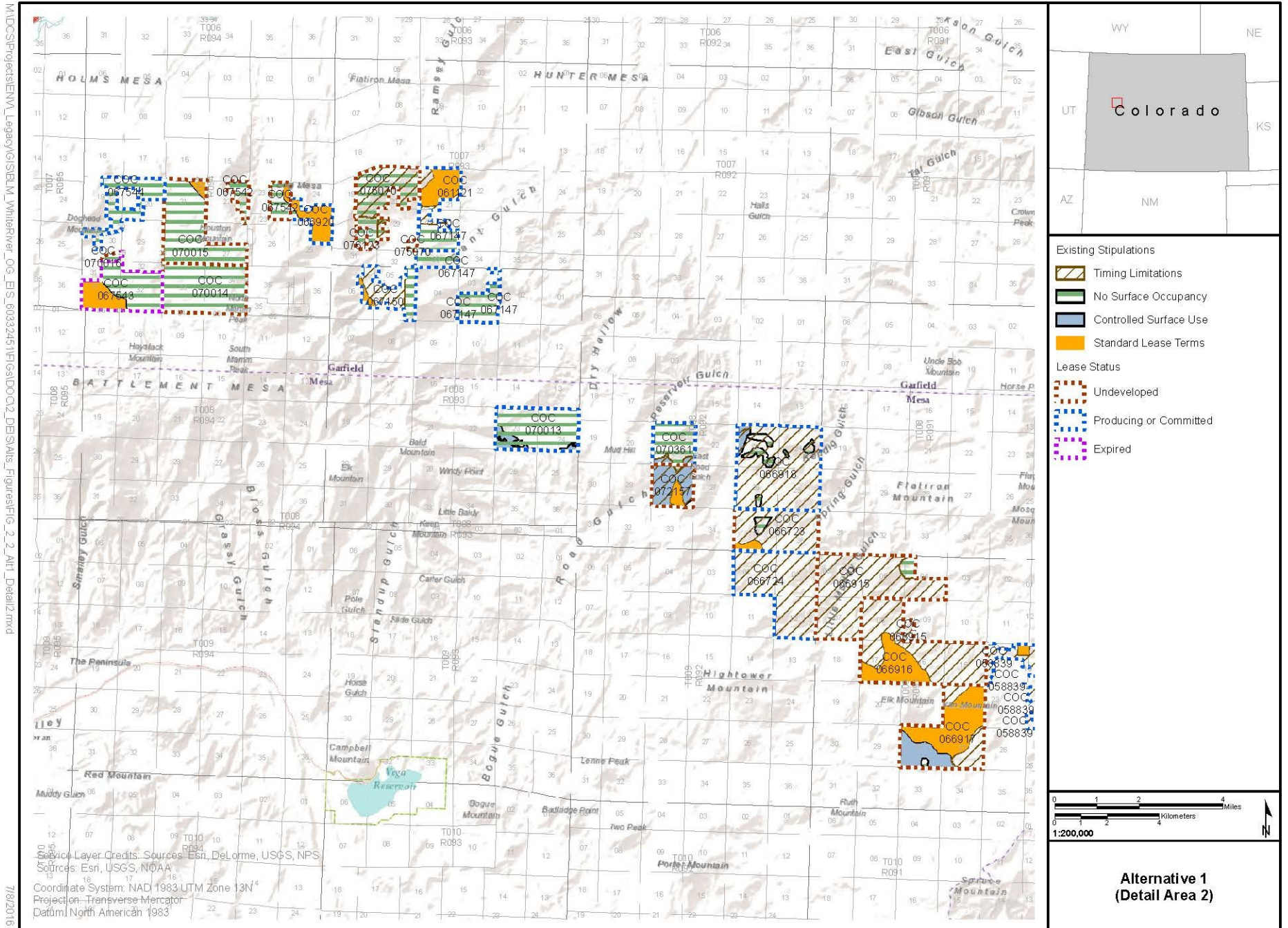
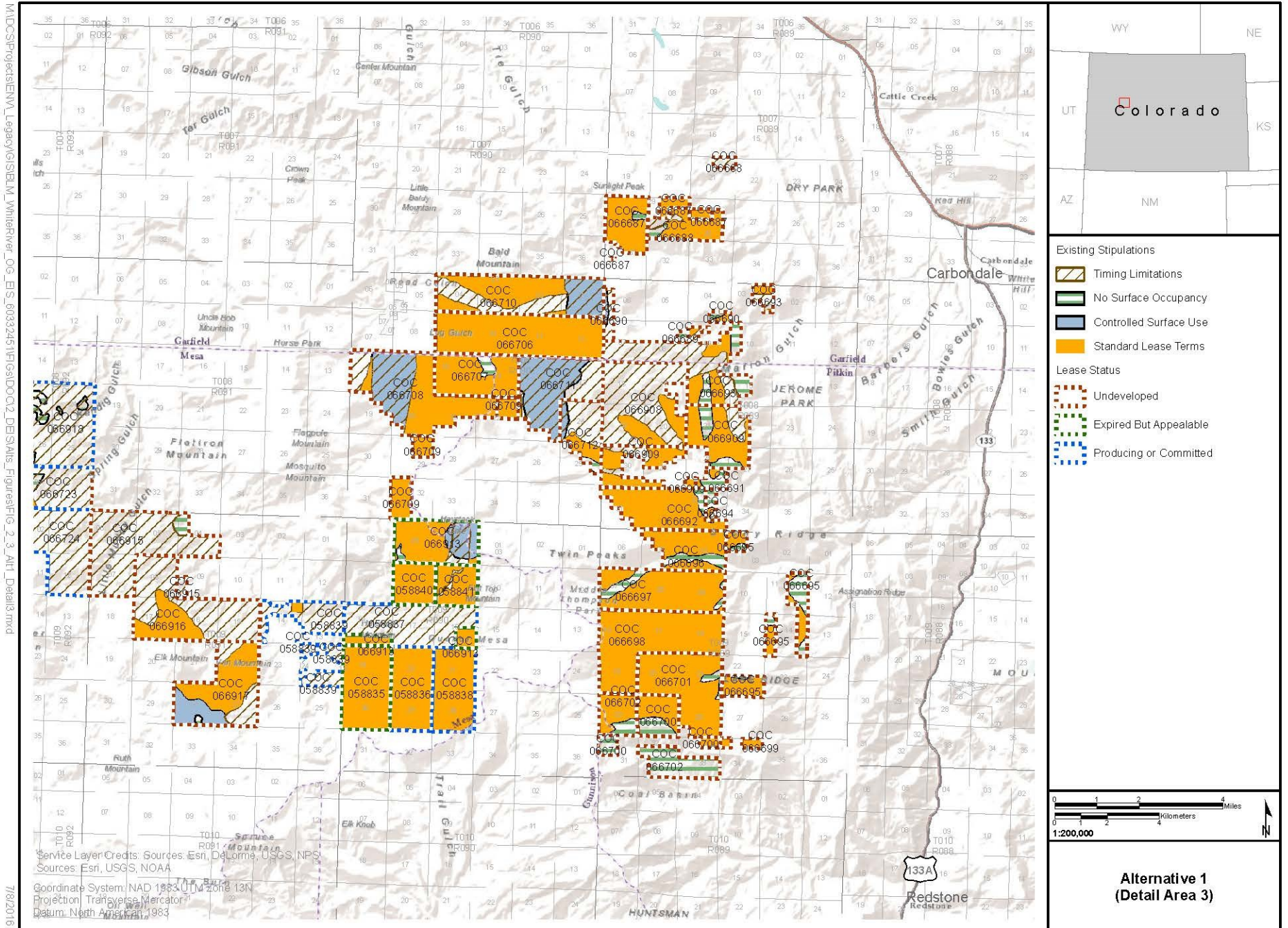


Figure 2-2 Existing Lease Stipulations under Alternative 1, Middle Section



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Figure 2-3 Existing Lease Stipulations under Alternative 1, East Side

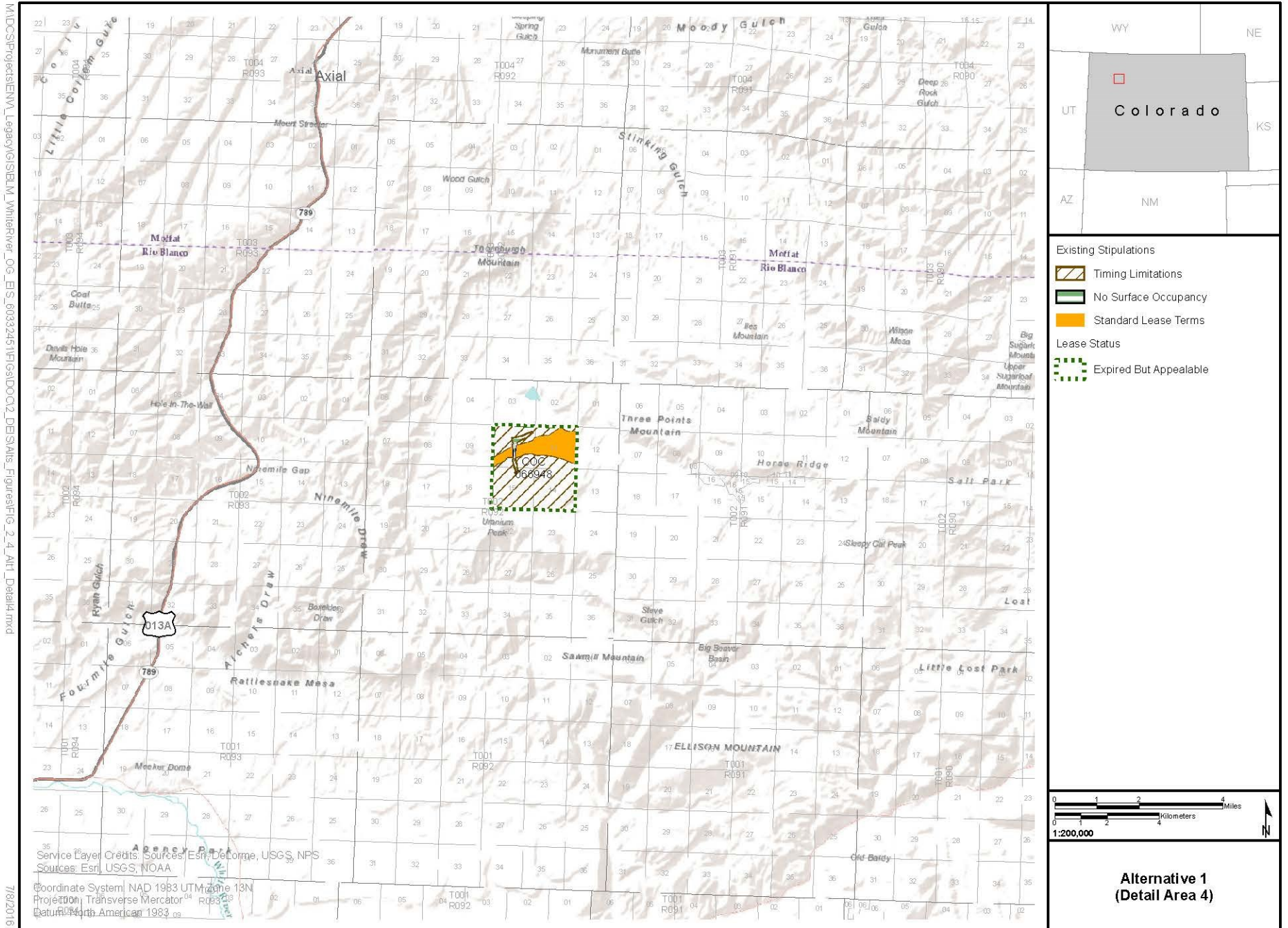


Figure 2-4 Existing Lease Stipulations under Alternative 1, North Lease

**2.3.2 Alternative 2: Update to Include All 1993 Leasing Decisions**

Alternative 2 addresses inconsistencies between the 1993 WRNF ROD and the lease stipulations as they were subsequently issued. In some cases, the leases did not include the stipulations as stated in the Forest Service decision document; these leases would be modified to include those stipulations under this alternative. Under this alternative, the BLM would offer the lessee the option of either accepting the new lease terms or having the lease cancelled. Cancellation would be done through a BLM administrative process and would require that the BLM refund any bonus bids and lease payments.

**Since revenues generated from federal leases are split between the Treasury and the state where the development occurs, should a lease be cancelled by the BLM, the federal government would expect to initially provide the full refund amount to the potentially affected lessees.**

**Subsequently, the State of Colorado’s share of the refund would most likely be deducted from future disbursements to the State, per 30 USC 1721a. Ultimately, approximately 51 percent of the refund would come from the federal government, and 49 percent would be withheld from future federal mineral revenue payments to the State of Colorado Department of Local Affairs (DOLA 2015d) reflecting the statutorily specified distribution of revenues. The state’s formula for allocation of future disbursements to local governments as result of these actions or whether they would be affected at all is unknown.**

This alternative applies only to eight leases and is intended to reconcile differences in the stipulations by adding the stipulations listed in **Table 2-2**. All other lease stipulations are the same as those shown in **Table 2-1**. Only the additional lease stipulations are shown on **Figures 2-5** through **2-8**.

**Table 2-2 Leases with Additional Stipulations to Correct Known Deficiencies**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction	Acres of Stipulation
1	058677	543	TL	Big Game Winter Range	5
3	058840	639	TL	Snowmobile Corridor	80
3	058841	638	TL	Snowmobile Corridor	269
3	066687	1,053	NSO	Slopes Greater than 60%	399
			TL	Elk Production Area	382
3	066688	774	NSO	Slopes Greater than 60%	17
3	066693	2,167	NSO	Ski Area	27
3	066706	2,548	CSU	Level 1 Travel Route	793
			NSO	Slopes Greater than 60%	74
			TL	Unspecified	336
Level 1 Travel Route	793				
3	066707	1,276	TL	Unspecified	133

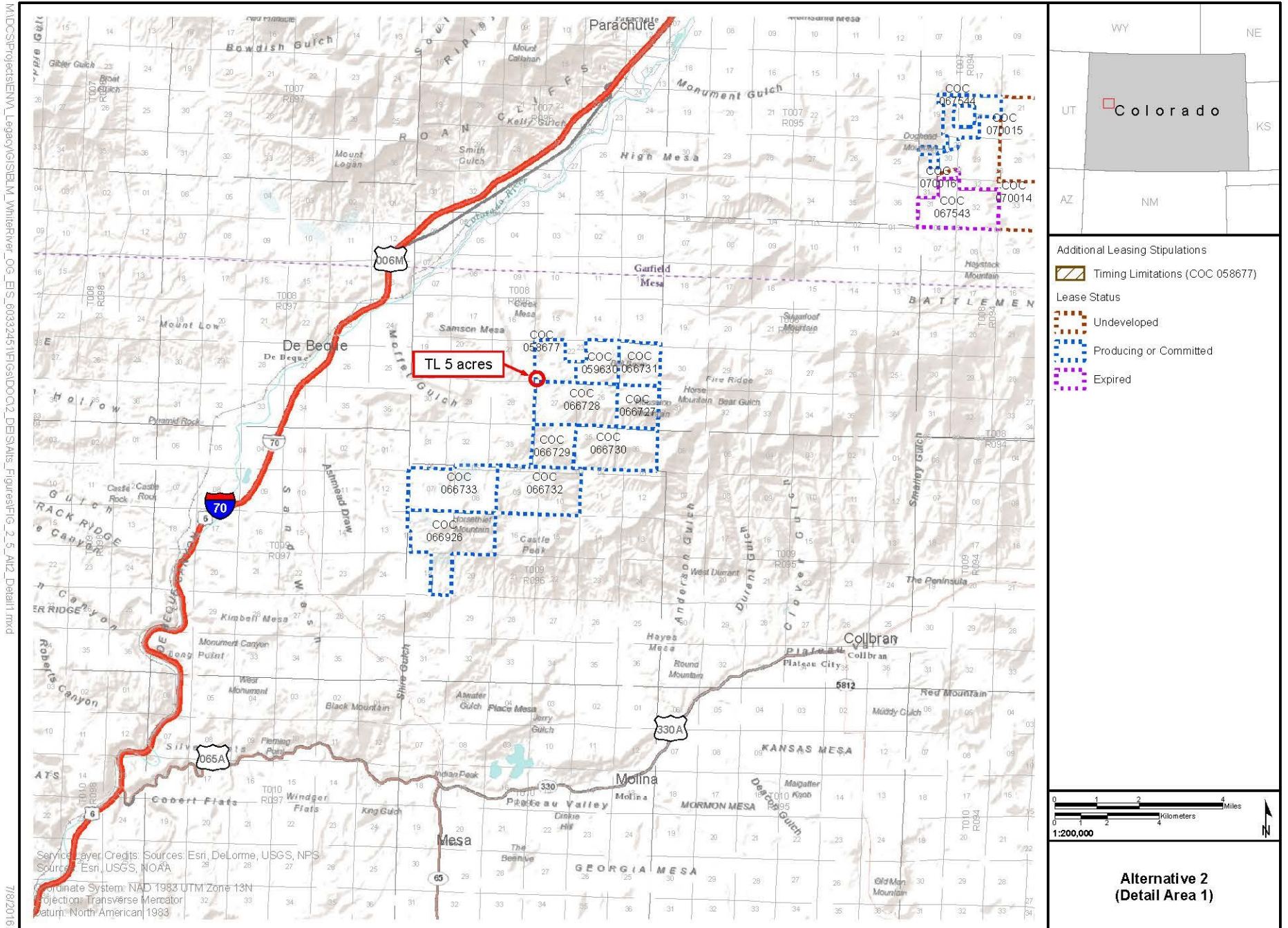


Figure 2-5 Additional Lease Stipulations under Alternative 2, West Side

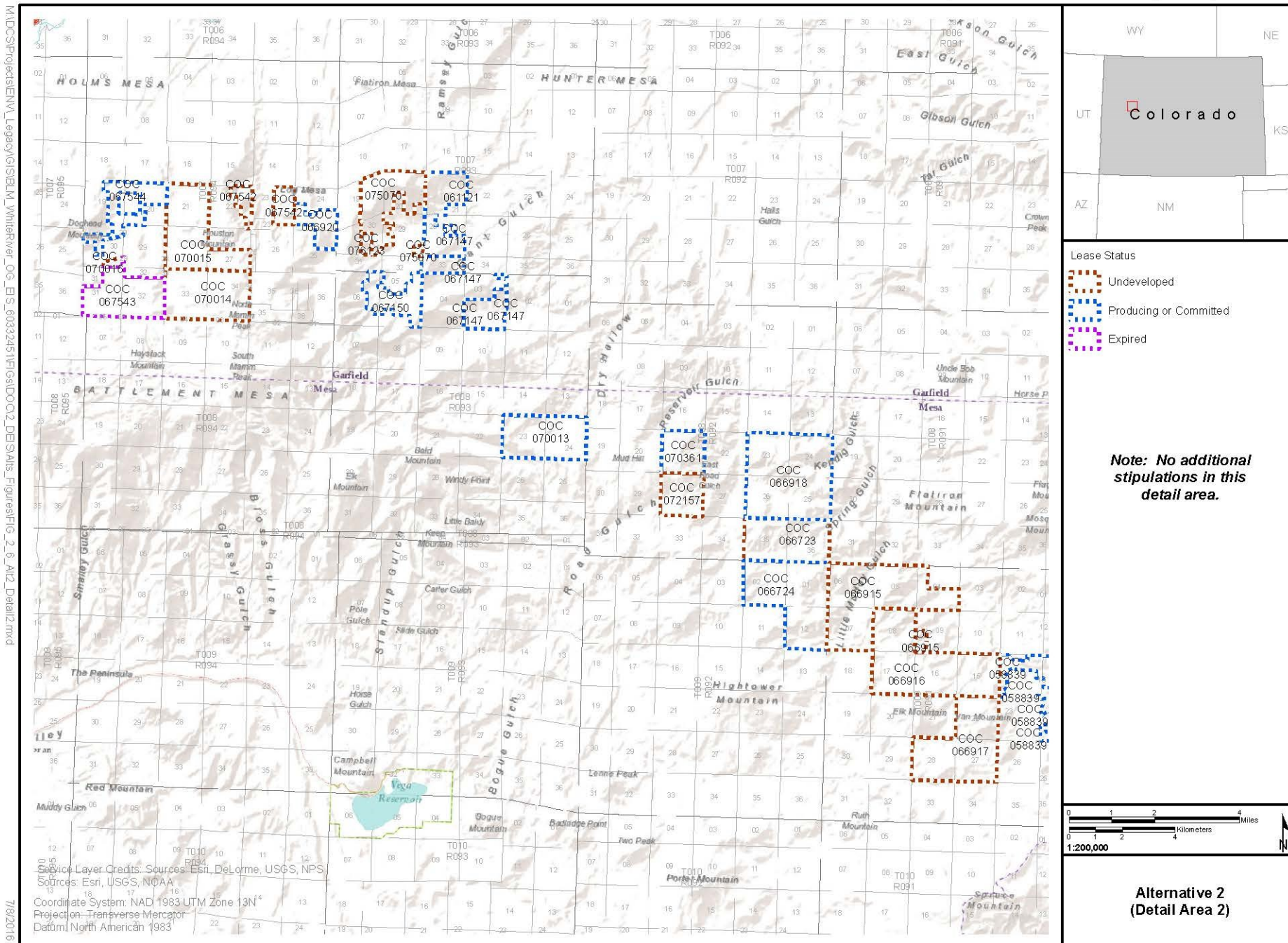
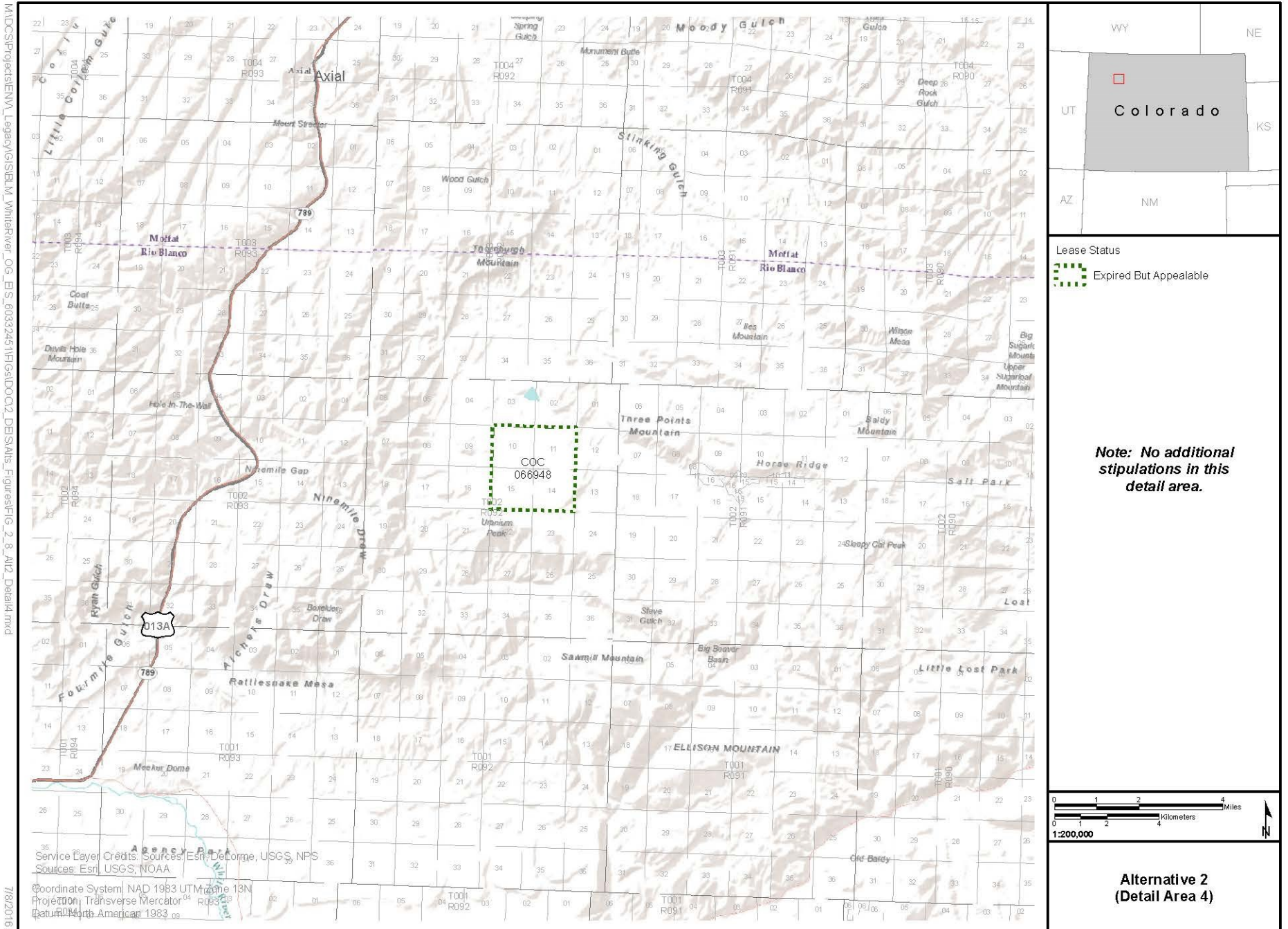


Figure 2-6 Additional Lease Stipulations under Alternative 2, Middle Section





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Figure 2-8 Additional Lease Stipulations under Alternative 2, North Side



### 2.3.3 Alternative 3: Modify Stipulations to Match the 2014 WRNF Final EIS Proposed Action

Although the Forest Service's 2014 Proposed Action and decision do not apply to these 65 leases, Alternative 3 is designed to consider the modification of the 65 leases to match the stipulations for future leasing in the Forest Service's Proposed Action from the WRNF Final EIS (USFS 2014a). Under Alternative 3, the BLM would modify the existing leases to apply stipulations that match those identified by the Forest Service for future leasing in its Proposed Action. Under this alternative, the BLM would offer the lessee the option of either accepting the new lease terms or having the lease cancelled. For **non-producing and non-committed ("undeveloped")** leases, cancellation (if elected by the lessee) would be done through a BLM administrative process and would require that the BLM refund any bonus bids and lease payments. Should the lessee not accept the new lease stipulations on a producing or committed lease, it may be necessary for the BLM to request judicial action to cancel the lease.

**Since revenues generated from federal leases are split between the Treasury and the state where the development occurs, should a lease be cancelled by the BLM, the federal government would expect to initially provide the full refund amount to the potentially affected lessees.**

**Subsequently, the State of Colorado's share of the refund would most likely be deducted from future disbursements to the State, per 30 USC 1721a. Ultimately, approximately 51 percent of the refund would come from the federal government, and 49 percent would be withheld from future federal mineral revenue payments to the State of Colorado Department of Local Affairs (DOLA 2015d) reflecting the statutorily specified distribution of revenues. The state's formula for allocation of future disbursements to local governments as result of these actions or whether they would be affected at all is unknown.**

Changes in lease stipulations would not apply to locations with producing wells because the constraints applied through lease stipulations apply to exploration and development, not operations after the well is producing. However, any new wells to be developed on a lease with modified stipulations would be required to comply with the modified stipulations. Lease Notice CO-56 would apply to new development under Alternative 3. This lease notice states that air quality analysis may be required, including preparation of a comprehensive emissions inventory, air quality modeling, and interagency consultation with affected land managers and air quality regulators to determine potential mitigation options for any predicted significant impacts from proposed development. Compliance with the National Ambient Air Quality Standards and protection of nearby Class I or Sensitive Class II areas would be required.

In the WRNF Final EIS, Alternative C (Scenario 1) presented many new stipulations to protect surface resources that were not considered in the 1993 EIS. For example, there are stipulations to protect such resources as sensitive plant and animal species, migration corridors, scenic integrity, and paleontological resources, none of which are protections provided by the current stipulations. There are many more acres of lease stipulations and very little area with standard lease terms (**SLTs**). The stipulations would be applied to the 65 previously issued leases under this alternative. For leases with producing wells, the new stipulations would only apply to new development. Existing wells would remain in production.

**Table 2-3** lists the proposed stipulations for each lease. Note that the total acreage of stipulations on each lease may be greater than the total lease acreage because many stipulations overlap. **Figures 2-9 through 2-12** display the types of stipulations proposed for each lease.

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
1	058677	543	NSO	Bighorn Sheep Migration Corridors and Water Sources	362
				High Scenic Integrity Objective	541
				Research Natural Areas	540
				Roadless Areas	22
				Severe or High Landscape Stability Hazards	9
				Slope Greater than 50%	11
				Threatened, Endangered, Proposed, and Candidate (TEPC) Aquatic Species	6
				TEPC Plant Species	543
				Water Influence Zones	79
			CSU	Big Game Winter Ranges	543
				Highly Erodible Soils	123
				Paleontological Resources	543
				Plant Species of Local Concern	543
				Sensitive Aquatic Species	16
				Sensitive Plant Species	538
				Sensitive Terrestrial Avian Invertebrate Species	543
			TL	Big Game Winter Range	534
1	059630	587	NSO	Bighorn Sheep Migration Corridors and Water Sources	289
				High Scenic Integrity Objective	574
				Research Natural Areas	572
				Roadless Areas	290
				Severe or High Landscape Stability Hazards	116
				Slope Greater than 50%	109
				TEPC Plant Species	585
				TEPC Wildlife Species	44
				Water Influence Zones	97
			CSU	Authorized Sites and Facilities	45
				Big Game Summer Concentration	126
				Big Game Winter Ranges	587
				Highly Erodible Soils	126
				Paleontological Resources	577
				Plant Species of Local Concern	581
				Sensitive Aquatic Species	1
				Sensitive Plant Species	574

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
1	059630	587	CSU	Sensitive Terrestrial Avian Invertebrate Species	578
				Slopes 30 to 50%	200
			TL	Big Game Summer Concentration	126
				Big Game Winter Range	587
1	066727	640	NSO	Bighorn Sheep Migration Corridors and Water Sources	518
				Bighorn Sheep Winter Habitats	413
				High Scenic Integrity Objective	640
				Research Natural Areas	640
				Roadless Areas	640
				Severe or High Landscape Stability Hazards	343
				Slope Greater than 50%	313
				TEPC Plant Species	158
				TEPC Wildlife Species	194
				Water Influence Zones	57
			CSU	Big Game Summer Concentration	218
				Big Game Winter Ranges	39
				Highly Erodible Soils	41
				Paleontological Resources	640
				Plant Species of Local Concern	102
				Sensitive Aquatic Species	21
				Sensitive Plant Species	640
				Sensitive Terrestrial Avian Invertebrate Species	640
				Slopes 30 to 50%	201
			Spruce Fir Old Growth and Old Growth Recruitment Stands	26	
TL	Big Game Summer Concentration	218			
	Big Game Winter Range	39			
1	066728	1,276	NSO	Bighorn Sheep Migration Corridors and Water Sources	1,275
				Bighorn Sheep Winter Habitats	25
				High Scenic Integrity Objective	1,275
				Research Natural Areas	1,275
				Roadless Areas	835
				Severe or High Landscape Stability Hazards	333
				Slope Greater than 50%	318
				TEPC Plant Species	1,252
				TEPC Wildlife Species	110

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
1	066728	1,276	NSO	Water Influence Zones	237
				CSU	Big Game Winter Ranges
			Highly Erodible Soils		167
			Paleontological Resources		1,275
			Plant Species of Local Concern		1,144
			Sensitive Aquatic Species		205
			Sensitive Plant Species		1,275
			Sensitive Terrestrial Avian Invertebrate Species		1,275
			Slopes 30 to 50%	396	
TL	Big Game Winter Range	728			
1	066729	654	NSO	Bighorn Sheep Migration Corridors and Water Sources	270
				Bighorn Sheep Winter Habitats	488
				High Scenic Integrity Objective	655
				Research Natural Areas	654
				Roadless Areas	492
				Severe or High Landscape Stability Hazards	272
				Slope Greater than 50%	245
				TEPC Plant Species	579
				TEPC Wildlife Species	65
				Water Influence Zones	91
				CSU	Big Game Winter Ranges
			Highly Erodible Soils		13
			Paleontological Resources		655
			Plant Species of Local Concern		416
			Sensitive Aquatic Species		99
			Sensitive Plant Species		654
			Sensitive Terrestrial Avian Invertebrate Species	655	
			Slopes 30 to 50%	209	
			TL	Big Game Winter Range	110
1	066730	1,279	NSO	Bighorn Sheep Migration Corridors and Water Sources	722
				Bighorn Sheep Winter Habitats	341
				High Scenic Integrity Objective	1,279
				Research Natural Areas	1,279
				Roadless Areas	1,228
				Severe or High Landscape Stability Hazards	395
				Slope Greater than 50%	383

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
1	066730	1,279	NSO	TEPC Plant Species	706
				TEPC Wildlife Species	442
				Water Influence Zones	207
			CSU	Big Game Winter Ranges	287
				Paleontological Resources	1,279
				Plant Species of Local Concern	609
				Sensitive Aquatic Species	308
				Sensitive Plant Species	1,279
				Sensitive Terrestrial Avian Invertebrate Species	1,279
				Slopes 30 to 50%	482
Spruce Fir Old Growth and Old Growth Recruitment Stands	20				
1	066731	651	NSO	Authorized Sites and Facilities	126
				Bighorn Sheep Migration Corridors and Water Sources	120
				Bighorn Sheep Winter Habitats	21
				High Scenic Integrity Objective	645
				Research Natural Areas	644
				Roadless Areas	646
				Severe or High Landscape Stability Hazards	75
				Slope Greater than 50%	79
				TEPC Plant Species	339
				TEPC Wildlife Species	139
				Water Influence Zones	108
			CSU	Authorized Sites and Facilities	361
				Big Game Summer Concentration	649
				Big Game Winter Ranges	514
				Highly Erodible Soils	180
				Moderately High Landscape Stability Hazards	13
				Paleontological Resources	646
				Plant Species of Local Concern	325
				Sensitive Aquatic Species	63
				Sensitive Plant Species	651
				Sensitive Terrestrial Avian Invertebrate Species	651
				Slopes 30 to 50%	266
Spruce Fir Old Growth and Old Growth Recruitment Stands	3				

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
1	066731	651	TL	Big Game Summer Concentration	649
				Big Game Winter Range	506
1	066732	1,437	NSO	Bighorn Sheep Migration Corridors and Water Sources	768
				Bighorn Sheep Winter Habitats	663
				High Scenic Integrity Objective	1,435
				Research Natural Areas	1,433
				Roadless Areas	1,267
				Severe or High Landscape Stability Hazards	335
				Slope Greater than 50%	325
				TEPC Plant Species	1,016
				TEPC Wildlife Species	248
				Water Influence Zones	274
			CSU	Big Game Migration Corridors	80
				Big Game Winter Ranges	1,025
				Highly Erodible Soils	154
				Moderately High Landscape Stability Hazards	22
				Paleontological Resources	1,435
				Plant Species of Local Concern	1,375
				Sensitive Aquatic Species	71
				Sensitive Plant Species	1,435
				Sensitive Terrestrial Avian Invertebrate Species	1,435
TL	Big Game Winter Range	594			
1	066733	1,416	NSO	Bighorn Sheep Migration Corridors and Water Sources	688
				Bighorn Sheep Winter Habitats	309
				High Scenic Integrity Objective	1,415
				Raptor Species Breeding Territories	703
				Research Natural Areas	1,377
				Roadless Areas	783
				Severe or High Landscape Stability Hazards	120
				Slope Greater than 50%	120
				TEPC Aquatic Species	713
				TEPC Plant Species	1,200
				TEPC Wildlife Species	106

**Table 2-3 Lease Stipulations Under Alternative 3**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation</b>	<b>Type of Restriction<sup>1</sup></b>	<b>Acres<sup>2</sup> or Miles of Stipulation</b>
1	066733	1,416	NSO	Water Influence Zones	285
				Public Water Supply Source Area Protection	790
			CSU	Big Game Winter Ranges	1,254
				Highly Erodible Soils	666
				Moderately High Landscape Stability Hazards	13
				Paleontological Resources	1,415
				Plant Species of Local Concern	1,418
				Sensitive Plant Species	1,418
				Sensitive Terrestrial Avian Invertebrate Species	1,400
				Slopes 30 to 50%	281
TL	Big Game Winter Range	1,166			
1	066926	1,629	NSO	Bighorn Sheep Migration Corridors and Water Sources	332
				Bighorn Sheep Production	935
				Bighorn Sheep Summer Concentration	404
				Bighorn Sheep Winter Habitats	1,381
				High Scenic Integrity Objective	1,159
				Raptor Species Breeding Territories	1,399
				Research Natural Areas	1,156
				Roadless Areas	1,082
				Severe or High Landscape Stability Hazards	377
				Slope Greater than 50%	313
				TEPC Aquatic Species	1,399
				TEPC Plant Species	1,044
				TEPC Wildlife Species	159
				Water Influence Zones	161
				NSO-Public Water Supply Source Area Protection	10
				CSU	Big Game Migration Corridors
			Big Game Winter Ranges		793
			Highly Erodible Soils		342
			Moderately High Landscape Stability Hazards		11
			Paleontological Resources		1,161
			Plant Species of Local Concern		1,629
			TL	Sensitive Plant Species	1,629
				Sensitive Terrestrial Avian Invertebrate Species	1,629
Slopes 30 to 50%	351				
Big Game Winter Range	773				

**Table 2-3 Lease Stipulations Under Alternative 3**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation</b>	<b>Type of Restriction<sup>1</sup></b>	<b>Acres<sup>2</sup> or Miles of Stipulation</b>
2	061121	964	NSO	Public Water Supply Source Area Protection	416
				Roadless Areas	667
				Severe or High Landscape Stability Hazards	19
				Slope Greater than 50%	20
				TEPC Plant Species	48
				TEPC Wildlife Species	57
				Water Influence Zones	112
			CSU	Big Game Migration Corridors	69
				Big Game Production Areas	184
				Big Game Summer Concentration	441
				Big Game Winter Ranges	964
				Ground Water Resources	8
				Highly Erodible Soils	805
				Moderately High Landscape Stability Hazards	11
				Paleontological Resources	963
				Plant Species of Local Concern	189
				Sensitive Aquatic Species	77
				Sensitive Plant Species	961
				Sensitive Terrestrial Avian Invertebrate Species	769
			TL	Slopes 30 to 50%	302
Big Game Summer Concentration	441				
2	066723	1,280	NSO	Big Game Winter Range	695
				Authorized Sites and Facilities	829
				Raptor Species Breeding Territories	120
				Roadless Areas	71
				Severe or High Landscape Stability Hazards	36
				Slope Greater than 50%	40
				TEPC Aquatic Species	1,077
			Water Influence Zones	174	
			CSU	Authorized Sites and Facilities	1,165
				Big Game Migration Corridors	92
				Big Game Summer Concentration	1,280
				Big Game Winter Ranges	1,280
				Highly Erodible Soils	1,045
				Moderately High Landscape Stability Hazards	2
				Paleontological Resources	1,280
				Sensitive Aquatic Species	122



**Table 2-3 Lease Stipulations Under Alternative 3**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation</b>	<b>Type of Restriction<sup>1</sup></b>	<b>Acres<sup>2</sup> or Miles of Stipulation</b>
2	066723	1,280	CSU	Sensitive Plant Species	1,280
				Sensitive Terrestrial Avian Invertebrate Species	1,031
				Slopes 30 to 50%	422
			TL	Big Game Summer Concentration	1,280
				Big Game Winter Range	1,280
				Raptor Species Breeding Territories	120
2	066724	1,973	NSO	Authorized Sites and Facilities	866
				Raptor Species Breeding Territories	601
				Roadless Areas	1,221
				Severe or High Landscape Stability Hazards	7
				Slope Greater than 50%	29
				TEPC Aquatic Species	724
				Water Influence Zones	240
			CSU	Authorized Sites and Facilities	1,215
				Big Game Migration Corridors	164
				Big Game Production Areas	768
				Big Game Summer Concentration	1,973
				Big Game Winter Ranges	1,900
				Highly Erodible Soils	1,446
				Paleontological Resources	1,973
				Sensitive Aquatic Species	258
				Sensitive Plant Species	1,973
				Sensitive Terrestrial Avian Invertebrate Species	1,143
			TL	Slopes 30 to 50%	524
				Big Game Summer Concentration	1,973
				Big Game Winter Range	1,871
				Raptor Species Breeding Territories	274
2	066915	2,537	NSO	Authorized Sites and Facilities	336
				Native Cutthroat Trout Habitat	41
				Raptor Species Breeding Territories	1,529
				Roadless Areas	1,916
				Severe or High Landscape Stability Hazards	86
				Slope Greater than 50%	176
				TEPC Raptor Species	503
				TEPC Wildlife Species	334
				Water Influence Zones	279

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
2	066915	2,537	CSU	Authorized Sites and Facilities	998
				Big Game Migration Corridors	165
				Big Game Production Areas	1,845
				Big Game Summer Concentration	2,537
				Big Game Winter Ranges	2,456
				High Concern Travel Ways or Use Areas	662
				Highly Erodible Soils	2,082
				Moderately High Landscape Stability Hazards	8
				Paleontological Resources	2,537
				Sensitive Aquatic Species	465
				Sensitive Plant Species	2,537
				Sensitive Terrestrial Avian Invertebrate Species	2,169
				Slopes 30 to 50%	1,349
			<b>Designated Winter Groomed Routes</b>	<b>&lt;0.1 mile</b>	
TL	Big Game Summer Concentration	2,537			
	Big Game Winter Range	2,325			
	Raptor Species Breeding Territories	554			
2	066916	2,562	NSO	Native Cutthroat Trout Habitat	10
				Raptor Species Breeding Territories	292
				Roadless Areas	2,562
				Severe or High Landscape Stability Hazards	115
				Slope Greater than 50%	135
				TEPC Wildlife Species	549
				Water Influence Zones	189
			CSU	Authorized Sites and Facilities	49
				Big Game Migration Corridors	175
				Big Game Production Areas	1,839
				Big Game Summer Concentration	2,376
				Big Game Winter Ranges	244
				High Concern Travel Ways or Use Areas	421
				Highly Erodible Soils	2,193
Moderately High Landscape Stability Hazards	24				
Paleontological Resources	2,562				
Sensitive Aquatic Species	276				
Sensitive Plant Species	2,486				
Sensitive Terrestrial Avian Invertebrate Species	2,048				
Slopes 30 to 50%	943				

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
2	066916	2,562	TL	Big Game Summer Concentration	2,376
				Big Game Winter Range	136
				Raptor Species Breeding Territories	135
2	066917	1,920	NSO	Authorized Sites and Facilities	68
				Fen Wetlands	0
				High Geologic Hazard—GMUGNF	20
				Native Cutthroat Trout Habitat	8
				Roadless Areas	1,324
				Severe or High Landscape Stability Hazards	4
				Slope Greater than 50%	13
				TEPC Aquatic Species	563
				TEPC Plant Species	349
				TEPC Wildlife Species	139
				Water Influence Zones	109
			CSU	Authorized Sites and Facilities	270
				Big Game Production Areas	70
				Big Game Summer Concentration	924
				Big Game Winter Ranges	99
				Elk Production Area—GMUGNF	439
				High Concern Travel Ways or Use Areas	1,201
				Highly Erodible Soils	1,337
				Paleontological Resources	1,452
				Plant Species of Local Concern	915
				Sensitive Aquatic Species	534
				Sensitive Plant Species	1,708
				Sensitive Terrestrial Avian Invertebrate Species	920
TL	Slopes 30 to 50%	277			
	Watersheds with CRCT and GBCT Conservation Populations	206			
<b>Designated Winter Groomed Routes</b>				<b>1.5 miles</b>	
2	066918	2,557	NSO	Severe or High Landscape Stability Hazards	472
				Slope Greater than 50%	367
				TEPC Aquatic Species	236
				TEPC Plant Species	44
				TEPC Wildlife Species	14
				Water Influence Zones	233

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
2	066918	2,557	CSU	Authorized Sites and Facilities	120
				Big Game Migration Corridors	11
				Big Game Summer Concentration	2,123
				Big Game Winter Ranges	2,557
				High Concern Travel Ways or Use Areas	476
				Highly Erodible Soils	2,286
				Moderately High Landscape Stability Hazards	27
				Paleontological Resources	2,553
				Sensitive Aquatic Species	0
				Sensitive Plant Species	2,557
				Sensitive Terrestrial Avian Invertebrate Species	2,493
			Slopes 30 to 50%	1,242	
			TL	Big Game Summer Concentration	2,123
Big Game Winter Range	2,557				
2	066920	418	NSO	Authorized Sites and Facilities	165
				Native Cutthroat Trout Habitat	51
				Severe or High Landscape Stability Hazards	35
				Slope Greater than 50%	50
				TEPC Aquatic Species	7
				TEPC Wildlife Species	29
				Water Influence Zones	44
				NSO-Public Water Supply Source Area Protection	275
			CSU	Authorized Sites and Facilities	304
				Big Game Summer Concentration	51
				Big Game Winter Ranges	406
				High Concern Travel Ways or Use Areas	418
				Highly Erodible Soils	206
				Moderate Scenic Integrity Objective	185
				Moderately High Landscape Stability Hazards	68
				Paleontological Resources	418
				Sensitive Aquatic Species	63
				Sensitive Plant Species	301
				Sensitive Terrestrial Avian Invertebrate Species	123
				Slopes 30 to 50%	233
Spruce Fir Old Growth and Old Growth Recruitment Stands	11				
Watersheds with CRCT and GBCT Conservation Populations	418				

**Table 2-3 Lease Stipulations Under Alternative 3**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation</b>	<b>Type of Restriction<sup>1</sup></b>	<b>Acres<sup>2</sup> or Miles of Stipulation</b>
2	066920	418	TL	Big Game Summer Concentration	51
2	067147	783	NSO	Authorized Sites and Facilities	26
				Raptor Species Breeding Territories	11
				Roadless Areas	779
				Severe or High Landscape Stability Hazards	39
				Slope Greater than 50%	36
				TEPC Wildlife Species	72
				Water Influence Zones	107
			CSU	Authorized Sites and Facilities	119
				Big Game Production Areas	628
				Big Game Summer Concentration	662
				Big Game Winter Ranges	780
				High Concern Travel Ways or Use Areas	497
				Highly Erodible Soils	573
				Moderate Scenic Integrity Objective	372
				Moderately High Landscape Stability Hazards	25
				Paleontological Resources	779
				Sensitive Aquatic Species	210
				Sensitive Plant Species	779
				Sensitive Terrestrial Avian Invertebrate Species	614
			TL	Big Game Summer Concentration	662
Big Game Winter Range	462				
2	067150	662	NSO	Raptor Species Breeding Territories	63
				Roadless Areas	634
				Severe or High Landscape Stability Hazards	86
				Slope Greater than 50%	83
				TEPC Wildlife Species	278
				Water Influence Zones	63
			CSU	Big Game Production Areas	625
				Big Game Summer Concentration	307
				Big Game Winter Ranges	647
				High Concern Travel Ways or Use Areas	2
				Highly Erodible Soils	546
				Moderate Scenic Integrity Objective	52
				Moderately High Landscape Stability Hazards	19
Paleontological Resources	662				

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
2	067150	662	CSU	Sensitive Plant Species	613
				Sensitive Terrestrial Avian Invertebrate Species	310
				Slopes 30 to 50%	248
				Spruce Fir Old Growth and Old Growth Recruitment Stands	27
			TL	Big Game Summer Concentration	307
				Raptor Species Breeding Territories	63
2	067542	480	NSO	Severe or High Landscape Stability Hazards	375
				Slope Greater than 50%	330
				TEPC Wildlife Species	297
				Water Influence Zones	44
			CSU	Big Game Migration Corridors	67
				Big Game Production Areas	145
				Big Game Summer Concentration	343
				Big Game Winter Ranges	467
				High Concern Travel Ways or Use Areas	53
				Highly Erodible Soils	45
				Moderately High Landscape Stability Hazards	0
				Paleontological Resources	480
				Sensitive Plant Species	479
				Sensitive Terrestrial Avian Invertebrate Species	306
				Slopes 30 to 50%	101
				Spruce Fir Old Growth and Old Growth Recruitment Stands	57
			Watersheds with CRCT and GBCT Conservation Populations	480	
			TL	Big Game Summer Concentration	343
				Big Game Winter Range	14
				Raptor Species Breeding Territories	43
2	067543	1,167	NSO	Authorized Sites and Facilities	126
				Raptor Species Breeding Territories	57
				Roadless Areas	994
				Severe or High Landscape Stability Hazards	13
				Slope Greater than 50%	11
				Summer Non-Motorized Recreation	60
				TEPC Aquatic Species	128
				TEPC Wildlife Species	1,024
				Water Influence Zones	112

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
2	067543	1,167	CSU	Authorized Sites and Facilities	560
				Big Game Production Areas	268
				Big Game Summer Concentration	1,167
				Big Game Winter Ranges	579
				Ground Water Resources	479
				High Concern Travel Ways or Use Areas	995
				Highly Erodible Soils	834
				Moderate Scenic Integrity Objective	778
				Moderately High Landscape Stability Hazards	37
				Paleontological Resources	1,166
				Sensitive Aquatic Species	199
				Sensitive Plant Species	1,088
				Sensitive Terrestrial Avian Invertebrate Species	1,143
				Slopes 30 to 50%	202
				Spruce Fir Old Growth and Old Growth Recruitment Stands	405
Watersheds with CRCT and GBCT Conservation Populations	451				
			TL	Big Game Summer Concentration	1,167
2	067544	730	NSO	Native Cutthroat Trout Habitat	46
				Roadless Areas	241
				Severe or High Landscape Stability Hazards	15
				Slope Greater than 50%	20
				TEPC Wildlife Species	35
				Water Influence Zones	108
			CSU	Big Game Migration Corridors	92
				Big Game Production Areas	586
				Big Game Summer Concentration	730
				Big Game Winter Ranges	710
				Ground Water Resources	2
				High Concern Travel Ways or Use Areas	15
				Highly Erodible Soils	580
				Moderate Scenic Integrity Objective	59
				Moderately High Landscape Stability Hazards	80
Paleontological Resources	729				
Sensitive Aquatic Species	93				
Sensitive Plant Species	667				
Sensitive Terrestrial Avian Invertebrate Species	395				

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
2	067544	730	CSU	Slopes 30 to 50%	229
				Watersheds with CRCT and GBCT Conservation Populations	170
			TL	Big Game Summer Concentration	730
				Big Game Winter Range	19
2	070013	1,262	NSO	>60% Slope—GMUGNF	1
				Fen Wetlands	22
				High Geologic Hazard—GMUGNF	52
				Riparian/ Wetland—GMUGNF	3
				Roadless Area—GMUGNF	186
				Roadless Areas	1,200
				Severe or High Landscape Stability Hazards	41
				Slope Greater than 50%	46
				TEPC Aquatic Species	212
				TEPC Wildlife Species	9
				Water Influence Zones	88
			CSU	40-60% Slope—GMUGNF	33
				Big Game Summer Concentration	942
				Big Game Winter Ranges	1,199
				Ground Water Resources	65
				Highly Erodible Soils	1,034
				Moderate Geologic Hazard—GMUGNF	173
				Moderate Scenic Integrity Objective	0
				Paleontological Resources	1,036
				Sensitive Aquatic Species	212
				Sensitive Plant Species	1,255
			TL	Sensitive Terrestrial Avian Invertebrate Species	478
Slopes 30 to 50%	291				
TL	Big Game Summer Concentration	942			
	Big Game Winter Range	796			
2	070014	1,486	NSO	Authorized Sites and Facilities	251
				Fen Wetlands	38
				Native Cutthroat Trout Habitat	107
				Roadless Areas	1,485
				Severe or High Landscape Stability Hazards	24
				Slope Greater than 50%	49
				Summer Non-Motorized Recreation	781



**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
2	070014	1,486	NSO	TEPC Aquatic Species	114
				TEPC Wildlife Species	1,163
				Water Influence Zones	168
			CSU	Authorized Sites and Facilities	722
				Big Game Production Areas	389
				Big Game Summer Concentration	1,486
				Big Game Winter Ranges	704
				Ground Water Resources	346
				Highly Erodible Soils	458
				Moderate Scenic Integrity Objective	1,187
				Moderately High Landscape Stability Hazards	155
				Paleontological Resources	1,486
				Sensitive Aquatic Species	219
				Sensitive Plant Species	1,394
				Sensitive Terrestrial Avian Invertebrate Species	1,277
				Slopes 30 to 50%	450
			Spruce Fir Old Growth and Old Growth Recruitment Stands	933	
Watersheds with CRCT and GBCT Conservation Populations	228				
TL	Big Game Summer Concentration	1,486			
2	070015	1,598	NSO	Authorized Sites and Facilities	118
				Native Cutthroat Trout Habitat	39
				Roadless Areas	1,595
				Severe or High Landscape Stability Hazards	317
				Slope Greater than 50%	324
				Summer Non-Motorized Recreation	31
				TEPC Aquatic Species	45
				TEPC Wildlife Species	824
				Water Influence Zones	136
			CSU	Authorized Sites and Facilities	445
				Big Game Production Areas	683
				Big Game Summer Concentration	1,598
				Big Game Winter Ranges	1,564
				Ground Water Resources	298
				Highly Erodible Soils	700
				Moderate Scenic Integrity Objective	1,004
				Moderately High Landscape Stability Hazards	115

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
2	070015	1,598	CSU	Paleontological Resources	1,598
				Sensitive Aquatic Species	81
				Sensitive Plant Species	1,231
				Sensitive Terrestrial Avian Invertebrate Species	1,124
				Slopes 30 to 50%	671
				Spruce Fir Old Growth and Old Growth Recruitment Stands	420
				Watersheds with CRCT and GBCT Conservation Populations	693
			TL	Big Game Summer Concentration	1,598
2	070016	51	NSO	Roadless Areas	51
				TEPC Wildlife Species	40
				Water Influence Zones	6
			CSU	Big Game Production Areas	46
				Big Game Summer Concentration	51
				Big Game Winter Ranges	50
				Ground Water Resources	21
				High Concern Travel Ways or Use Areas	40
				Highly Erodible Soils	28
				Moderate Scenic Integrity Objective	50
				Moderately High Landscape Stability Hazards	0
				Paleontological Resources	51
				Sensitive Plant Species	1
				Sensitive Terrestrial Avian Invertebrate Species	44
			Slopes 30 to 50%	6	
TL	Big Game Summer Concentration	51			
2	070361	638	NSO	Severe or High Landscape Stability Hazards	23
				Slope Greater than 50%	28
				TEPC Aquatic Species	288
				Water Influence Zones	27
			CSU	Big Game Summer Concentration	33
				Big Game Winter Ranges	638
				High Concern Travel Ways or Use Areas	517
				Highly Erodible Soils	590
				Moderate Geologic Hazard—GMUGNF	47
				Paleontological Resources	591
				Sensitive Aquatic Species	33
Sensitive Plant Species	638				

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
2	070361	638	CSU	Sensitive Terrestrial Avian Invertebrate Species	483
				Slopes 30 to 50%	231
				<b>Designated Winter Groomed Routes</b>	<b>0.2 mile</b>
			TL	Big Game Summer Concentration	33
				Big Game Winter Range	638
				Big Game Winter Range—GMUGNF	47
2	072157	638	NSO	Slope Greater than 50%	0
				TEPC Aquatic Species	419
				TEPC Wildlife Species	2
				Water Influence Zones	23
			CSU	Big Game Summer Concentration	4
				Big Game Winter Ranges	638
				High Concern Travel Ways or Use Areas	627
				Highly Erodible Soils	295
				Moderate Geologic Hazard—GMUGNF	341
				Paleontological Resources	298
				Sensitive Aquatic Species	4
				Sensitive Plant Species	498
				Sensitive Terrestrial Avian Invertebrate Species	249
				Slopes 30 to 50%	75
			<b>Designated Winter Groomed Routes</b>	<b>1.2 miles</b>	
			TL	Big Game Summer Concentration	4
				Big Game Winter Range	638
				Big Game Winter Range—GMUGNF	341
2	075070	1,152	NSO	Authorized Sites and Facilities	40
				Raptor Species Breeding Territories	15
				Roadless Areas	1,113
				Severe or High Landscape Stability Hazards	92
				Slope Greater than 50%	95
				TEPC Wildlife Species	1
				Water Influence Zones	49
				Public Water Supply Source Area Protection	30
			CSU	Authorized Sites and Facilities	163
				Big Game Migration Corridors	116
				Big Game Production Areas	425
				Big Game Summer Concentration	31
				Big Game Winter Ranges	1,150

**Table 2-3 Lease Stipulations Under Alternative 3**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation</b>	<b>Type of Restriction<sup>1</sup></b>	<b>Acres<sup>2</sup> or Miles of Stipulation</b>
2	075070	1,152	CSU	High Concern Travel Ways or Use Areas	114
				Highly Erodible Soils	766
				Moderate Scenic Integrity Objective	3
				Moderately High Landscape Stability Hazards	59
				Paleontological Resources	1,151
				Plant Species of Local Concern	24
				Sensitive Aquatic Species	3
				Sensitive Plant Species	1,094
				Sensitive Terrestrial Avian Invertebrate Species	314
				Slopes 30 to 50%	452
				Watersheds with CRCT and GBCT Conservation Populations	267
			TL	Big Game Summer Concentration	31
				Big Game Winter Range	194
Raptor Species Breeding Territories	15				
2	076123	80	NSO	Raptor Species Breeding Territories	1
				Roadless Areas	80
				Severe or High Landscape Stability Hazards	2
				Slope Greater than 50%	2
				Water Influence Zones	13
			CSU	Authorized Sites and Facilities	28
				Big Game Production Areas	80
				Big Game Winter Ranges	80
				High Concern Travel Ways or Use Areas	79
				Highly Erodible Soils	31
				Moderate Scenic Integrity Objective	15
				Paleontological Resources	80
				Sensitive Plant Species	80
TL	Sensitive Terrestrial Avian Invertebrate Species	31			
	Slopes 30 to 50%	29			
3	058835	1,475	NSO	Raptor Species Breeding Territories	1
				Roadless Areas	1,434
				Slope Greater than 50%	4
				TEPC Aquatic Species	6
				TEPC Wildlife Species	65
Water Influence Zones	203				

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	058835	1,475	CSU	Authorized Sites and Facilities	5
				Big Game Production Areas	1,239
				Big Game Summer Concentration	1,383
				Big Game Winter Ranges	1,471
				High Concern Travel Ways or Use Areas	549
				Highly Erodible Soils	1,179
				Paleontological Resources	1,474
				Sensitive Aquatic Species	189
				Sensitive Plant Species	1,432
				Sensitive Terrestrial Avian Invertebrate Species	829
				Slopes 30 to 50%	186
				Watersheds with CRCT and GBCT Conservation Populations	1,474
			<b>Designated Winter Groomed Routes</b>	<b>0.3 mile</b>	
TL	Big Game Summer Concentration	1,383			
3	058836	1,279	NSO	Roadless Areas	1,222
				Slope Greater than 50%	1
				TEPC Aquatic Species	329
				TEPC Wildlife Species	12
				Water Influence Zones	201
			CSU	Big Game Production Areas	1,026
				Big Game Summer Concentration	1,181
				Big Game Winter Ranges	1,279
				High Concern Travel Ways or Use Areas	412
				Highly Erodible Soils	977
				Paleontological Resources	1,279
				Sensitive Aquatic Species	513
				Sensitive Plant Species	1,239
Sensitive Terrestrial Avian Invertebrate Species	1,135				
Slopes 30 to 50%	39				
Watersheds with CRCT and GBCT Conservation Populations	1,279				
TL	Big Game Summer Concentration	1,181			
3	058837	1,669	NSO	Authorized Sites and Facilities	126
				Fen Wetlands	12
				Native Cutthroat Trout Habitat	229
				Raptor Species Breeding Territories	476
				Roadless Areas	216

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	058837	1,669	NSO	Severe or High Landscape Stability Hazards	14
				Slope Greater than 50%	16
				TEPC Aquatic Species	221
				TEPC Wildlife Species	411
				Water Influence Zones	438
			CSU	Authorized Sites and Facilities	537
				Big Game Production Areas	232
				Big Game Summer Concentration	1,319
				Big Game Winter Ranges	1,402
				High Concern Travel Ways or Use Areas	1,583
				Highly Erodible Soils	713
				Paleontological Resources	1,669
				Sensitive Aquatic Species	812
				Sensitive Plant Species	1,646
				Sensitive Terrestrial Avian Invertebrate Species	1,501
				Slopes 30 to 50%	77
				Watersheds with CRCT and GBCT Conservation Populations	1,669
				<b>Designated Winter Groomed Routes</b>	<b>2 miles</b>
			TL	Big Game Summer Concentration	1,319
				Big Game Winter Range	10
Raptor Species Breeding Territories	476				
<b>Snowmobile Corridor</b>	<b>&lt; 0.1 mile</b>				
3	058838	1,277	NSO	Authorized Sites and Facilities	110
				Roadless Areas	693
				Slope Greater than 50%	12
				TEPC Aquatic Species	226
				TEPC Wildlife Species	105
				Water Influence Zones	196
			CSU	Areas of Moderate Geologic Hazard—GMUGNF	26
				Authorized Sites and Facilities	352
				Big Game Production Areas	304
				Big Game Summer Concentration	1,221
				Big Game Winter Ranges	1,252
				High Concern Travel Ways or Use Areas	28
				Highly Erodible Soils	962
				Moderately High Landscape Stability Hazards	5

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	058838	1,277	CSU	Paleontological Resources	1,252
				Sensitive Aquatic Species	328
				Sensitive Plant Species	649
				Sensitive Terrestrial Avian Invertebrate Species	1,043
				Slopes 30 to 50%	199
				Watersheds with CRCT and GBCT Conservation Populations	1,253
			TL	Big Game Summer Concentration	1,221
3	058839	1,127	NSO	Authorized Sites and Facilities	420
				Fen Wetlands	2
				Native Cutthroat Trout Habitat	183
				Roadless Areas	650
				Slope Greater than 50%	7
				TEPC Wildlife Species	268
				Water Influence Zones	222
			CSU	Authorized Sites and Facilities	908
				Big Game Production Areas	528
				Big Game Summer Concentration	1,127
				Big Game Winter Ranges	1,017
				High Concern Travel Ways or Use Areas	1,035
				Highly Erodible Soils	870
				Paleontological Resources	1,127
				Sensitive Aquatic Species	490
				Sensitive Plant Species	1,115
				Sensitive Terrestrial Avian Invertebrate Species	897
				Slopes 30 to 50%	125
				Spruce Fir Old Growth and Old Growth Recruitment Stands	35
			Watersheds with CRCT and GBCT Conservation Populations	893	
<b>Designated Winter Groomed Routes</b>	<b>2.1 miles</b>				
TL	Big Game Summer Concentration	1,127			
	Big Game Winter Range	184			
	<b>Snowmobile Corridor</b>	<b>2.1 miles</b>			
3	058840	639	NSO	Native Cutthroat Trout Habitat	7
				Raptor Species Breeding Territories	27
				Roadless Areas	630
				TEPC Aquatic Species	75

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	058840	639	NSO	TEPC Wildlife Species	186
				Water Influence Zones	83
			CSU	Authorized Sites and Facilities	58
				Big Game Summer Concentration	213
				Big Game Winter Ranges	2
				High Concern Travel Ways or Use Areas	503
				Highly Erodible Soils	208
				Paleontological Resources	639
				CSU	Sensitive Aquatic Species
			Sensitive Plant Species		638
			Sensitive Terrestrial Avian Invertebrate Species		596
			Slopes 30 to 50%		15
			Watersheds with CRCT and GBCT Conservation Populations		639
			<b>Designated Winter Groomed Routes</b>		<b>0.1 mile</b>
			TL	Big Game Summer Concentration	213
				Raptor Species Breeding Territories	27
			3	058841	638
Raptor Species Breeding Territories	88				
Roadless Areas	134				
TEPC Aquatic Species	95				
TEPC Wildlife Species	125				
Water Influence Zones	124				
CSU	Big Game Summer Concentration	578			
	Big Game Winter Ranges	454			
	High Concern Travel Ways or Use Areas	638			
	Highly Erodible Soils	340			
	Paleontological Resources	638			
	Sensitive Aquatic Species	156			
	Sensitive Plant Species	252			
	Sensitive Terrestrial Avian Invertebrate Species	608			
	Slopes 30 to 50%	10			
	Watersheds with CRCT and GBCT Conservation Populations	638			
<b>Designated Winter Groomed Routes</b>	<b>1.7 miles</b>				
TL	Big Game Summer Concentration	578			



**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066687	1,053	NSO	Authorized Sites and Facilities	3
				Public Water Supply Source Area Protection	279
				Severe or High Landscape Stability Hazards	44
				Slope Greater than 50%	70
				TEPC Aquatic Species	55
				TEPC Wildlife Species	466
				Water Influence Zones	65
			CSU	Authorized Sites and Facilities	64
				Big Game Production Areas	733
				Big Game Winter Ranges	1,041
			CSU	Communication Sites	332
				High Concern Travel Ways or Use Areas	782
				Highly Erodible Soils	59
				Moderate Scenic Integrity Objective	128
				Moderately High Landscape Stability Hazards	7
				Paleontological Resources	1,050
				Sensitive Aquatic Species	89
				Sensitive Plant Species	676
				Sensitive Terrestrial Avian Invertebrate Species	257
				Slopes 30 to 50%	524
Spruce Fir Old Growth and Old Growth Recruitment Stands	105				
<b>Designated Winter Groomed Routes</b>	<b>3.5 miles</b>				
TL	Big Game Winter Range	8			
3	066688	774	NSO	Public Water Supply Source Area Protection	770
				Severe or High Landscape Stability Hazards	94
				Slope Greater than 50%	98
				TEPC Aquatic Species	90
				TEPC Wildlife Species	222
				Water Influence Zones	26
			CSU	Authorized Sites and Facilities	38
				Big Game Production Areas	160
				Big Game Winter Ranges	770
				High Concern Travel Ways or Use Areas	573
				Highly Erodible Soils	162
				Moderate Scenic Integrity Objective	44
				Moderately High Landscape Stability Hazards	19

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066688	774	CSU	Paleontological Resources	774
				Sensitive Plant Species	493
				Sensitive Terrestrial Avian Invertebrate Species	172
				Slopes 30 to 50%	371
			TL	Bald Eagle Winter Roost and Perch Sites	3
				Big Game Summer Concentration	1
				Big Game Winter Range	174
3	066689	40	NSO	Public Water Supply Source Area Protection	40
				TEPC Wildlife Species	11
				Water Influence Zones	1
			CSU	Big Game Production Areas	40
				Big Game Winter Ranges	40
				High Concern Travel Ways or Use Areas	40
				Highly Erodible Soils	40
				Moderate Scenic Integrity Objective	9
				Paleontological Resources	40
				Slopes 30 to 50%	3
				3	066690
Public Water Supply Source Area Protection	80				
Severe or High Landscape Stability Hazards	4				
Slope Greater than 50%	6				
TEPC Aquatic Species	7				
TEPC Wildlife Species	113				
Water Influence Zones	38				
CSU	Authorized Sites and Facilities	94			
	Big Game Production Areas	203			
	Big Game Winter Ranges	78			
	High Concern Travel Ways or Use Areas	274			
	Highly Erodible Soils	174			
	Moderate Scenic Integrity Objective	172			
	Paleontological Resources	274			
	Sensitive Aquatic Species	40			
	Sensitive Plant Species	20			
	Sensitive Terrestrial Avian Invertebrate Species	116			
	Slopes 30 to 50%	97			
<b>Designated Winter Groomed Routes</b>	<b>0.4 mile</b>				
TL	Big Game Winter Range	45			

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066691	198	NSO	Native Cutthroat Trout Habitat	41
				Roadless Areas	50
				Severe or High Landscape Stability Hazards	36
				Slope Greater than 50%	36
				TEPC Aquatic Species	3
				TEPC Wildlife Species	76
				Water Influence Zones	25
			CSU	Highly Erodible Soils	131
				Moderately High Landscape Stability Hazards	3
				Paleontological Resources	198
				Sensitive Aquatic Species	58
				Sensitive Plant Species	198
				Sensitive Terrestrial Avian Invertebrate Species	87
				Slopes 30 to 50%	95
Watersheds with CRCT and GBCT Conservation Populations	198				
<b>Designated Winter Groomed Routes</b>	<b>0.4 mile</b>				
3	066692	1,417	NSO	Fen Wetlands	31
				Raptor Species Breeding Territories	691
				Roadless Areas	1,331
				Severe or High Landscape Stability Hazards	7
				Slope Greater than 50%	19
				TEPC Aquatic Species	35
				TEPC Wildlife Species	737
				Water Influence Zones	187
			CSU	Big Game Summer Concentration	623
				Big Game Winter Ranges	3
				Ground Water Resources	110
				Highly Erodible Soils	1,193
				Moderately High Landscape Stability Hazards	14
				Paleontological Resources	1,417
				Sensitive Aquatic Species	64
				Sensitive Plant Species	534
				Sensitive Terrestrial Avian Invertebrate Species	596
				Slopes 30 to 50%	224
				Spruce Fir Old Growth and Old Growth Recruitment Stands	209

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066692	1,417	CSU	Watersheds with CRCT and GBCT Conservation Populations	1,417
				<b>Designated Winter Groomed Routes</b>	<b>0.2 mile</b>
			TL	Big Game Summer Concentration	623
				Big Game Winter Range	3
				Raptor Species Breeding Territories	15
<b>Cutthroat Trout</b>	<b>5.7 miles</b>				
3	066693	2,167	NSO	Fen Wetlands	51
				Public Water Supply Source Area Protection	1,023
				Severe or High Landscape Stability Hazards	81
				Slope Greater than 50%	98
				TEPC Aquatic Species	128
				TEPC Wildlife Species	1,028
				Water Influence Zones	267
			CSU	Big Game Production Areas	1,070
				Big Game Winter Ranges	2,003
				Ground Water Resources	0
				High Concern Travel Ways or Use Areas	1,973
				Highly Erodible Soils	1,199
				Moderate Scenic Integrity Objective	43
				Paleontological Resources	2,163
				Sensitive Aquatic Species	321
				Sensitive Plant Species	854
				Sensitive Terrestrial Avian Invertebrate Species	503
				Slopes 30 to 50%	688
				Spruce Fir Old Growth and Old Growth Recruitment Stands	30
			TL	Watersheds with CRCT and GBCT Conservation Populations	735
				<b>Designated Winter Groomed Routes</b>	<b>2.5 miles</b>
				Bald Eagle Winter Roost and Perch Sites	0
				Big Game Winter Range	901
<b>Cutthroat Trout</b>	<b>0.5 mile</b>				
3	066694	119	NSO	Native Cutthroat Trout Habitat	5
				Roadless Areas	116
				Severe or High Landscape Stability Hazards	20
				Slope Greater than 50%	26
				TEPC Aquatic Species	0

**Table 2-3 Lease Stipulations Under Alternative 3**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation</b>	<b>Type of Restriction<sup>1</sup></b>	<b>Acres<sup>2</sup> or Miles of Stipulation</b>
3	066694	119	NSO	TEPC Wildlife Species	33
				Water Influence Zones	3
			CSU	Highly Erodible Soils	86
				Paleontological Resources	119
				Sensitive Aquatic Species	10
				Sensitive Plant Species	100
				Sensitive Terrestrial Avian Invertebrate Species	11
				Slopes 30 to 50%	81
				Watersheds with CRCT and GBCT Conservation Populations	119
				<b>Designated Winter Groomed Routes</b>	<b>&lt;0.1 mile</b>
3	066695	1,061	NSO	Fen Wetlands	21
				Roadless Areas	618
				Severe or High Landscape Stability Hazards	78
				Slope Greater than 50%	74
				TEPC Aquatic Species	5
				TEPC Wildlife Species	449
				Water Influence Zones	106
			CSU	Big Game Production Areas	175
				Big Game Summer Concentration	681
				Big Game Winter Ranges	913
				Highly Erodible Soils	486
				Moderate Scenic Integrity Objective	57
				Moderately High Landscape Stability Hazards	22
				Paleontological Resources	1,061
				Sensitive Aquatic Species	10
				Sensitive Plant Species	718
				Sensitive Terrestrial Avian Invertebrate Species	190
				Slopes 30 to 50%	414
				Spruce Fir Old Growth and Old Growth Recruitment Stands	271
			Watersheds with CRCT and GBCT Conservation Populations	1,061	
			TL	Big Game Summer Concentration	681
				Big Game Winter Range	442
				<b>Cutthroat Trout</b>	<b>0.6 mile</b>

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066696	1,027	NSO	Fen Wetlands	36
				Native Cutthroat Trout Habitat	139
				Raptor Species Breeding Territories	49
				Roadless Areas	910
				Severe or High Landscape Stability Hazards	33
				Slope Greater than 50%	47
				TEPC Aquatic Species	129
				<b>Cutthroat Trout</b>	<b>0.4 mile</b>
				TEPC Wildlife Species	446
				Water Influence Zones	131
			CSU	Big Game Production Areas	289
				Big Game Summer Concentration	893
				Big Game Winter Ranges	384
3	066696	1,027	CSU	Ground Water Resources	13
				Highly Erodible Soils	717
				Moderately High Landscape Stability Hazards	2
				Paleontological Resources	1,027
				Sensitive Aquatic Species	214
				Sensitive Plant Species	481
				Sensitive Terrestrial Avian Invertebrate Species	351
				Slopes 30 to 50%	522
				Spruce Fir Old Growth and Old Growth Recruitment Stands	248
				Watersheds with CRCT and GBCT Conservation Populations	1,027
			TL	Big Game Summer Concentration	893
				Big Game Winter Range	81
				<b>Cutthroat Trout</b>	<b>1.3 miles</b>
3	066697	1,872	NSO	Fen Wetlands	32
				Native Cutthroat Trout Habitat	105
				Roadless Areas	1,120
				Severe or High Landscape Stability Hazards	42
				Slope Greater than 50%	43
				TEPC Aquatic Species	116
				TEPC Wildlife Species	1,636
				Water Influence Zones	172

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066697	1,872	CSU	Big Game Production Areas	1,028
				Big Game Summer Concentration	1,863
				Big Game Winter Ranges	1,512
				Ground Water Resources	442
				High Concern Travel Ways or Use Areas	965
				Highly Erodible Soils	742
				Paleontological Resources	1,872
				Sensitive Aquatic Species	181
				Sensitive Plant Species	1,619
				Sensitive Terrestrial Avian Invertebrate Species	1,442
				Slopes 30 to 50%	525
				Spruce Fir Old Growth and Old Growth Recruitment Stands	1,081
				Watersheds with CRCT and GBCT Conservation Populations	1,872
			<b>Designated Winter Groomed Routes</b>	<b>2.8 miles</b>	
TL	Big Game Summer Concentration	1,863			
	<b>Cutthroat Trout</b>	<b>3.6 miles</b>			
3	066698	2,460	NSO	Fen Wetlands	69
				Roadless Areas	1,893
				Slope Greater than 50%	4
				TEPC Aquatic Species	114
				TEPC Wildlife Species	2,247
				Water Influence Zones	212
			CSU	Big Game Production Areas	913
				Big Game Summer Concentration	2,460
				Big Game Winter Ranges	2,460
				Ground Water Resources	723
				High Concern Travel Ways or Use Areas	448
				Highly Erodible Soils	734
				Paleontological Resources	2,460
				Sensitive Aquatic Species	218
	Sensitive Plant Species	2,456			
	Sensitive Terrestrial Avian Invertebrate Species	1,669			
	Slopes 30 to 50%	282			
	Spruce Fir Old Growth and Old Growth Recruitment Stands	1,312			

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066698	2,460	CSU	Watersheds with CRCT and GBCT Conservation Populations	2,460
				<b>Designated Winter Groomed Routes</b>	<b>0.8 mile</b>
			TL	Big Game Summer Concentration	2,460
				<b>Cutthroat Trout</b>	<b>3 miles</b>
3	066699	114	NSO	Roadless Areas	80
				TEPC Wildlife Species	111
				Water Influence Zones	13
			CSU	Big Game Summer Concentration	78
				Big Game Winter Ranges	111
				Highly Erodible Soils	42
				Paleontological Resources	114
				Sensitive Plant Species	114
				Slopes 30 to 50%	48
				Spruce Fir Old Growth and Old Growth Recruitment Stands	114
				Watersheds with CRCT and GBCT Conservation Populations	114
			TL	Big Game Summer Concentration	78
				<b>Cutthroat Trout</b>	<b>2.7 miles</b>
3	066700	841	NSO	Alpine	53
				Fen Wetlands	38
				Roadless Areas	833
				Severe or High Landscape Stability Hazards	73
				Slope Greater than 50%	78
				TEPC Wildlife Species	806
				Water Influence Zones	111
			CSU	Big Game Summer Concentration	682
				Big Game Winter Ranges	539
				Highly Erodible Soils	77
				Moderate Scenic Integrity Objective	615
				Moderately High Landscape Stability Hazards	21
				Paleontological Resources	827
				Sensitive Aquatic Species	0
Sensitive Plant Species	841				
Sensitive Terrestrial Avian Invertebrate Species	133				
Slopes 30 to 50%	359				



**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066700	841	CSU	Spruce Fir Old Growth and Old Growth Recruitment Stands	585
				Watersheds with CRCT and GBCT Conservation Populations	542
			TL	Big Game Summer Concentration	682
				<b>Cutthroat Trout</b>	<b>2.4 miles</b>
3	066701	1,885	NSO	Fen Wetlands	153
				Roadless Areas	1,815
				Severe or High Landscape Stability Hazards	43
				Slope Greater than 50%	48
				TEPC Aquatic Species	327
				TEPC Wildlife Species	1,309
				Water Influence Zones	372
			CSU	Big Game Production Areas	395
				Big Game Summer Concentration	1,885
				Big Game Winter Ranges	1,885
				Highly Erodible Soils	621
				Moderate Scenic Integrity Objective	181
				Paleontological Resources	1,885
				Sensitive Aquatic Species	481
				Sensitive Plant Species	1,709
				Sensitive Terrestrial Avian Invertebrate Species	488
				Slopes 30 to 50%	608
				Spruce Fir Old Growth and Old Growth Recruitment Stands	963
				Watersheds with CRCT and GBCT Conservation Populations	1,884
			<b>Designated Winter Groomed Routes</b>	<b>1.7 miles</b>	
TL	Big Game Summer Concentration	1,885			
	<b>Cutthroat Trout</b>	<b>3.8 miles</b>			
3	066702	1,254	NSO	Alpine	0
				Fen Wetlands	25
				Roadless Areas	570
				Severe or High Landscape Stability Hazards	131
				Slope Greater than 50%	129
				TEPC Aquatic Species	117
				TEPC Wildlife Species	738
				Water Influence Zones	198

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066702	1,254	CSU	Big Game Summer Concentration	557
				Big Game Winter Ranges	415
				Highly Erodible Soils	490
				Moderate Scenic Integrity Objective	331
				Moderately High Landscape Stability Hazards	16
				Paleontological Resources	1,164
				Sensitive Aquatic Species	182
				Sensitive Plant Species	887
				Sensitive Terrestrial Avian Invertebrate Species	508
				Slopes 30 to 50%	381
				Spruce Fir Old Growth and Old Growth Recruitment Stands	282
				Watersheds with CRCT and GBCT Conservation Populations	421
			TL	Big Game Summer Concentration	557
	<b>Cutthroat Trout</b>	<b>1.4 miles</b>			
3	066706	2,548	NSO	Fen Wetlands	3
				Raptor Species Breeding Territories	1,172
				Roadless Areas	1,932
				Severe or High Landscape Stability Hazards	27
				Slope Greater than 50%	27
				TEPC Aquatic Species	43
				TEPC Raptor Species	406
				TEPC Wildlife Species	1,514
				Water Influence Zones	246
				CSU	Authorized Sites and Facilities
			Big Game Production Areas		693
			Big Game Summer Concentration		273
			High Concern Travel Ways or Use Areas		1,226
			Highly Erodible Soils		1,633
			Moderate Scenic Integrity Objective		342
			Paleontological Resources		2,548
			Sensitive Aquatic Species		77
			Sensitive Plant Species		693
			Sensitive Terrestrial Avian Invertebrate Species		2,054
			Slopes 30 to 50%	172	
	Spruce Fir Old Growth and Old Growth Recruitment Stands	6			

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066706	2,548	CSU	Watersheds with CRCT and GBCT Conservation Populations	994
				<b>Designated Winter Groomed Routes</b>	<b>3.7 miles</b>
			TL	Big Game Summer Concentration	273
				Raptor Species Breeding Territories	496
3	066707	1,276	NSO	Fen Wetlands	27
				Native Cutthroat Trout Habitat	4
				Raptor Species Breeding Territories	164
				Roadless Areas	1,168
				Severe or High Landscape Stability Hazards	31
				Slope Greater than 50%	31
				TEPC Aquatic Species	2
				TEPC Wildlife Species	1,030
			Water Influence Zones	94	
			CSU	Big Game Summer Concentration	331
				High Concern Travel Ways or Use Areas	172
				Highly Erodible Soils	1,003
				Moderately High Landscape Stability Hazards	5
				Paleontological Resources	1,276
				Sensitive Aquatic Species	8
				Sensitive Plant Species	750
				Sensitive Terrestrial Avian Invertebrate Species	1,105
				Slopes 30 to 50%	199
				Spruce Fir Old Growth and Old Growth Recruitment Stands	87
			Watersheds with CRCT and GBCT Conservation Populations	1,231	
<b>Designated Winter Groomed Routes</b>	<b>0.8 mile</b>				
TL	Big Game Summer Concentration	331			
	Raptor Species Breeding Territories	0			
3	066708	2,554	NSO	Fen Wetlands	76
				Native Cutthroat Trout Habitat	184
				Raptor Species Breeding Territories	1,518
				Roadless Areas	1,339
				TEPC Aquatic Species	77
				TEPC Wildlife Species	1,693
				Water Influence Zones	277

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066708	2,554	CSU	Big Game Production Areas	297
				Big Game Summer Concentration	898
				Big Game Winter Ranges	8
				High Concern Travel Ways or Use Areas	1,847
				Highly Erodible Soils	2,106
				Paleontological Resources	2,554
				Sensitive Aquatic Species	247
				Sensitive Plant Species	1,669
				Sensitive Terrestrial Avian Invertebrate Species	2,522
				Slopes 30 to 50%	291
				Spruce Fir Old Growth and Old Growth Recruitment Stands	29
				Watersheds with CRCT and GBCT Conservation Populations	2,554
				<b>Designated Winter Groomed Routes</b>	<b>1.6 miles</b>
			TL	Big Game Summer Concentration	898
Raptor Species Breeding Territories	632				
Western Boreal Toad Breeding Sites	6				
3	066709	638	NSO	Fen Wetlands	25
				Native Cutthroat Trout Habitat	0
				Raptor Species Breeding Territories	364
				Roadless Areas	170
				TEPC Wildlife Species	556
				Water Influence Zones	50
			CSU	Big Game Summer Concentration	467
				High Concern Travel Ways or Use Areas	508
				Highly Erodible Soils	440
				Paleontological Resources	638
				Sensitive Aquatic Species	1
				Sensitive Plant Species	199
				Sensitive Terrestrial Avian Invertebrate Species	558
				Slopes 30 to 50%	75
Spruce Fir Old Growth and Old Growth Recruitment Stands	213				
Watersheds with CRCT and GBCT Conservation Populations	638				
<b>Designated Winter Groomed Routes</b>	<b>0.5 mile</b>				

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066709	638	TL	Big Game Summer Concentration	467
				Raptor Species Breeding Territories	137
				Western Boreal Toad Breeding Sites	94
3	066710	2,329	NSO	Authorized Sites and Facilities	303
				Raptor Species Breeding Territories	153
				Roadless Areas	1,896
				Slope Greater than 50%	2
				TEPC Aquatic Species	132
				TEPC Wildlife Species	529
				Water Influence Zones	351
			CSU	Authorized Sites and Facilities	572
				Big Game Production Areas	422
				Big Game Summer Concentration	722
				High Concern Travel Ways or Use Areas	826
				Highly Erodible Soils	1,546
				Moderate Scenic Integrity Objective	460
				Moderately High Landscape Stability Hazards	7
				Paleontological Resources	2,328
				Sensitive Aquatic Species	204
				Sensitive Plant Species	1,205
				Sensitive Terrestrial Avian Invertebrate Species	1,160
				Slopes 30 to 50%	392
			Watersheds with CRCT and GBCT Conservation Populations	895	
	<b>Designated Winter Groomed Routes</b>	<b>5.9 miles</b>			
TL	Big Game Summer Concentration	722			
3	066711	1,751	NSO	Fen Wetlands	48
				Native Cutthroat Trout Habitat	73
				Raptor Species Breeding Territories	560
				Roadless Areas	181
				TEPC Aquatic Species	80
				TEPC Raptor Species	97
				TEPC Wildlife Species	1,275
				Water Influence Zones	163
			CSU	Big Game Production Areas	632
				Big Game Winter Ranges	133
				High Concern Travel Ways or Use Areas	1,701

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation	
3	066711	1,751	CSU	Highly Erodible Soils	491	
				Moderate Scenic Integrity Objective	55	
				Paleontological Resources	1,751	
				Sensitive Aquatic Species	198	
				Sensitive Plant Species	1,323	
				Sensitive Terrestrial Avian Invertebrate Species	815	
				Slopes 30 to 50%	100	
				Spruce Fir Old Growth and Old Growth Recruitment Stands	7	
				Watersheds with CRCT and GBCT Conservation Populations	1,219	
				<b>Designated Winter Groomed Routes</b>	<b>2 miles</b>	
			TL	Raptor Species Breeding Territories	318	
				Western Boreal Toad Breeding Sites	461	
				<b>Cutthroat Trout</b>	<b>0.7 mile</b>	
3	066712	875	NSO	Fen Wetlands	90	
				Native Cutthroat Trout Habitat	36	
				Roadless Areas	481	
				Severe or High Landscape Stability Hazards	2	
				Slope Greater than 50%	2	
				TEPC Aquatic Species	37	
				TEPC Wildlife Species	539	
				Water Influence Zones	154	
				CSU	Big Game Migration Corridors	79
					Big Game Production Areas	488
			Big Game Winter Ranges		343	
			High Concern Travel Ways or Use Areas		345	
			Highly Erodible Soils		617	
			Paleontological Resources		875	
			Sensitive Aquatic Species		80	
			Sensitive Plant Species		211	
			Sensitive Terrestrial Avian Invertebrate Species		465	
			Slopes 30 to 50%		109	
			Spruce Fir Old Growth and Old Growth Recruitment Stands		11	
			Watersheds with CRCT and GBCT Conservation Populations		875	
			<b>Designated Winter Groomed Routes</b>	<b>1.1 miles</b>		

**Table 2-3 Lease Stipulations Under Alternative 3**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation</b>	<b>Type of Restriction<sup>1</sup></b>	<b>Acres<sup>2</sup> or Miles of Stipulation</b>
3	066712	875	TL	Western Boreal Toad Breeding Sites	550
				<b>Cutthroat Trout</b>	<b>2 miles</b>
3	066908	2,400	NSO	Authorized Sites and Facilities	98
				Fen Wetlands	55
				Public Water Supply Source Area Protection	73
				Roadless Areas	1,217
				Slope Greater than 50%	4
				TEPC Aquatic Species	411
				TEPC Wildlife Species	1,101
				Water Influence Zones	382
			CSU	Authorized Sites and Facilities	286
				Big Game Migration Corridors	270
				Big Game Production Areas	1,945
				Big Game Winter Ranges	2,333
				High Concern Travel Ways or Use Areas	975
				Highly Erodible Soils	2,010
				Paleontological Resources	2,400
				Sensitive Aquatic Species	671
				Sensitive Plant Species	1,343
				Sensitive Terrestrial Avian Invertebrate Species	731
				Slopes 30 to 50%	353
				Watersheds with CRCT and GBCT Conservation Populations	2,335
<b>Designated Winter Groomed Routes</b>	<b>2.8 miles</b>				
<b>TL</b>	<b>Cutthroat Trout</b>	<b>2.8 miles</b>			
3	066909	2,077	NSO	Authorized Sites and Facilities	27
				Fen Wetlands	44
				Native Cutthroat Trout Habitat	64
				Raptor Species Breeding Territories	240
				Roadless Areas	826
				Severe or High Landscape Stability Hazards	113
				Slope Greater than 50%	127
				TEPC Aquatic Species	54
				TEPC Wildlife Species	864
				Water Influence Zones	203

**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066909	2,077	CSU	Authorized Sites and Facilities	181
				Big Game Migration Corridors	178
				Big Game Production Areas	543
				Big Game Winter Ranges	1,104
				Ground Water Resources	40
				High Concern Travel Ways or Use Areas	37
				Highly Erodible Soils	1,360
				Paleontological Resources	2,077
				Sensitive Aquatic Species	183
				Sensitive Plant Species	1,303
				Sensitive Terrestrial Avian Invertebrate Species	897
				Slopes 30 to 50%	837
				Spruce Fir Old Growth and Old Growth Recruitment Stands	45
				Watersheds with CRCT and GBCT Conservation Populations	2,067
			TL	Big Game Winter Range	263
	<b>Cutthroat Trout</b>	<b>4.4 miles</b>			
3	066913	1,660	NSO	Raptor Species Breeding Territories	726
				Roadless Areas	507
				Severe or High Landscape Stability Hazards	1
				Slope Greater than 50%	0
				TEPC Aquatic Species	97
				TEPC Raptor Species	292
				TEPC Wildlife Species	688
				Water Influence Zones	177
			CSU	Authorized Sites and Facilities	6
				Big Game Production Areas	168
				Big Game Summer Concentration	1,427
				Big Game Winter Ranges	414
				High Concern Travel Ways or Use Areas	1,501
				Highly Erodible Soils	1,065
				Moderately High Landscape Stability Hazards	5
				Paleontological Resources	1,660
				Sensitive Aquatic Species	176
				Sensitive Plant Species	903
				Sensitive Terrestrial Avian Invertebrate Species	1,218
Slopes 30 to 50%	212				



**Table 2-3 Lease Stipulations Under Alternative 3**

Zone	Lease No.	Lease Acres	Type of Stipulation	Type of Restriction <sup>1</sup>	Acres <sup>2</sup> or Miles of Stipulation
3	066913	1,660	CSU	Spruce Fir Old Growth and Old Growth Recruitment Stands	54
				Watersheds with CRCT and GBCT Conservation Populations	1,660
				<b>Designated Winter Groomed Routes</b>	<b>5.2 miles</b>
			TL	Big Game Summer Concentration	1,427
				Raptor Species Breeding Territories	351
4	066948	2,562	NSO	Fen Wetlands	98
				Raptor Species Breeding Territories	2,085
				Severe or High Landscape Stability Hazards	18
				Slope Greater than 50%	39
				TEPC Aquatic Species	48
				TEPC Raptor Species	503
				TEPC Wildlife Species	1,239
				Water Influence Zones	302
			CSU	Big Game Production Areas	1,709
				Big Game Summer Concentration	2
				Big Game Winter Ranges	469
				Ground Water Resources	89
				High Concern Travel Ways or Use Areas	1,421
				Highly Erodible Soils	1,176
				Moderate Scenic Integrity Objective	789
				Moderately High Landscape Stability Hazards	7
				Paleontological Resources	2,561
				Sensitive Aquatic Species	91
				Sensitive Plant Species	2,282
				Sensitive Terrestrial Avian Invertebrate Species	1,284
Slopes 30 to 50%	156				
Spruce Fir Old Growth and Old Growth Recruitment Stands	132				
Watersheds with CRCT and GBCT Conservation Populations	2,562				
<b>Designated Winter Groomed Routes</b>	<b>4.1 miles</b>				

**Table 2-3 Lease Stipulations Under Alternative 3**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation</b>	<b>Type of Restriction<sup>1</sup></b>	<b>Acres<sup>2</sup> or Miles of Stipulation</b>
4	066948	2,562	TL	Bald Eagle Winter Roost and Perch Sites	2,562
				Big Game Summer Concentration	2
				Big Game Winter Range	317
				Raptor Species Breeding Territories	587

<sup>1</sup> TEPC = Threatened, Endangered, Proposed, or Candidate.  
 CRCT = Colorado River cutthroat trout.  
 GBCT = greenback lineage cutthroat trout.  
 GMUGNF = Grand Mesa, Uncompahgre and Gunnison National Forests.

<sup>2</sup> **Units are in acres unless otherwise noted.**

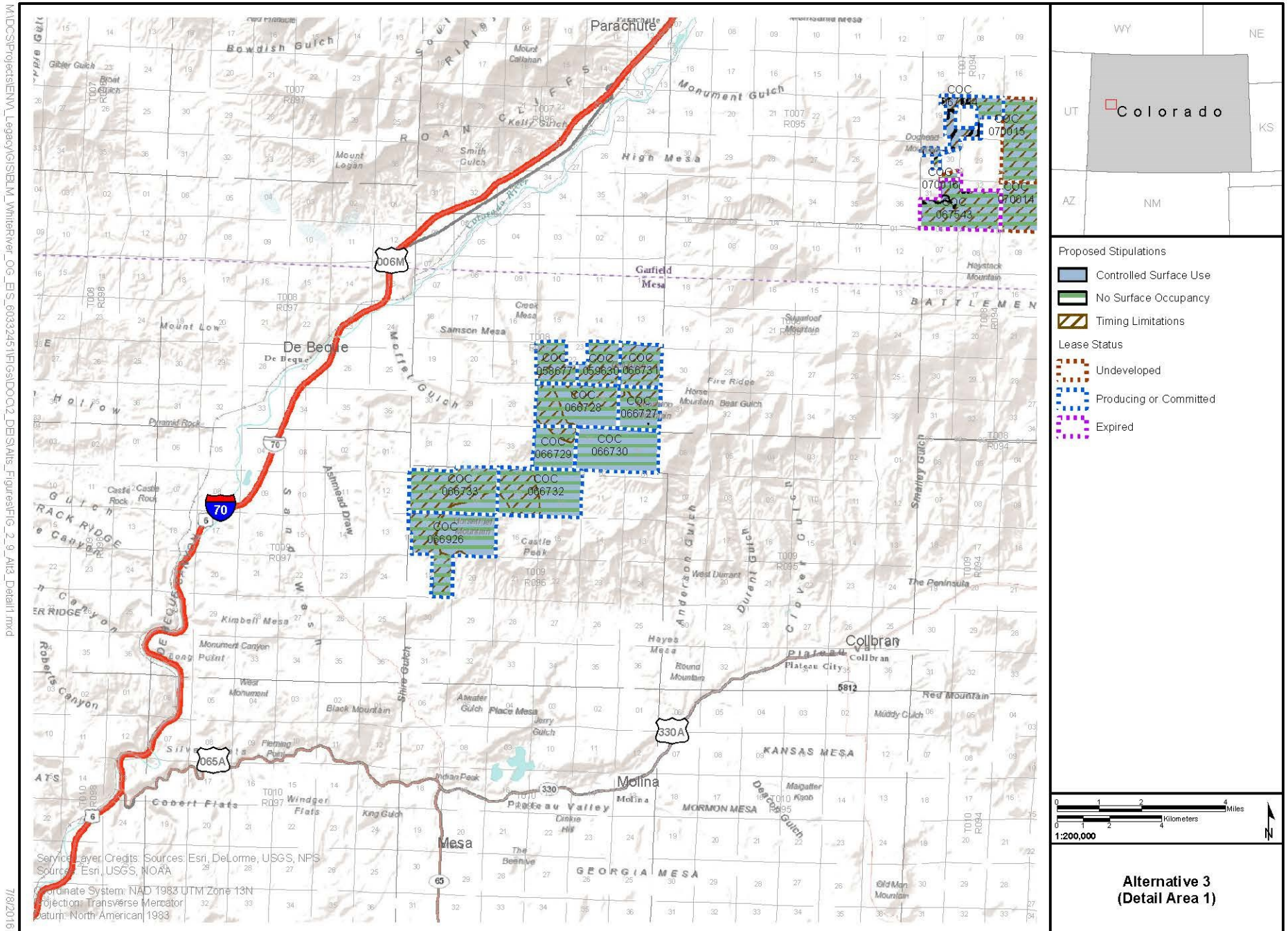


Figure 2-9 Proposed Lease Stipulations under Alternative 3, West Side

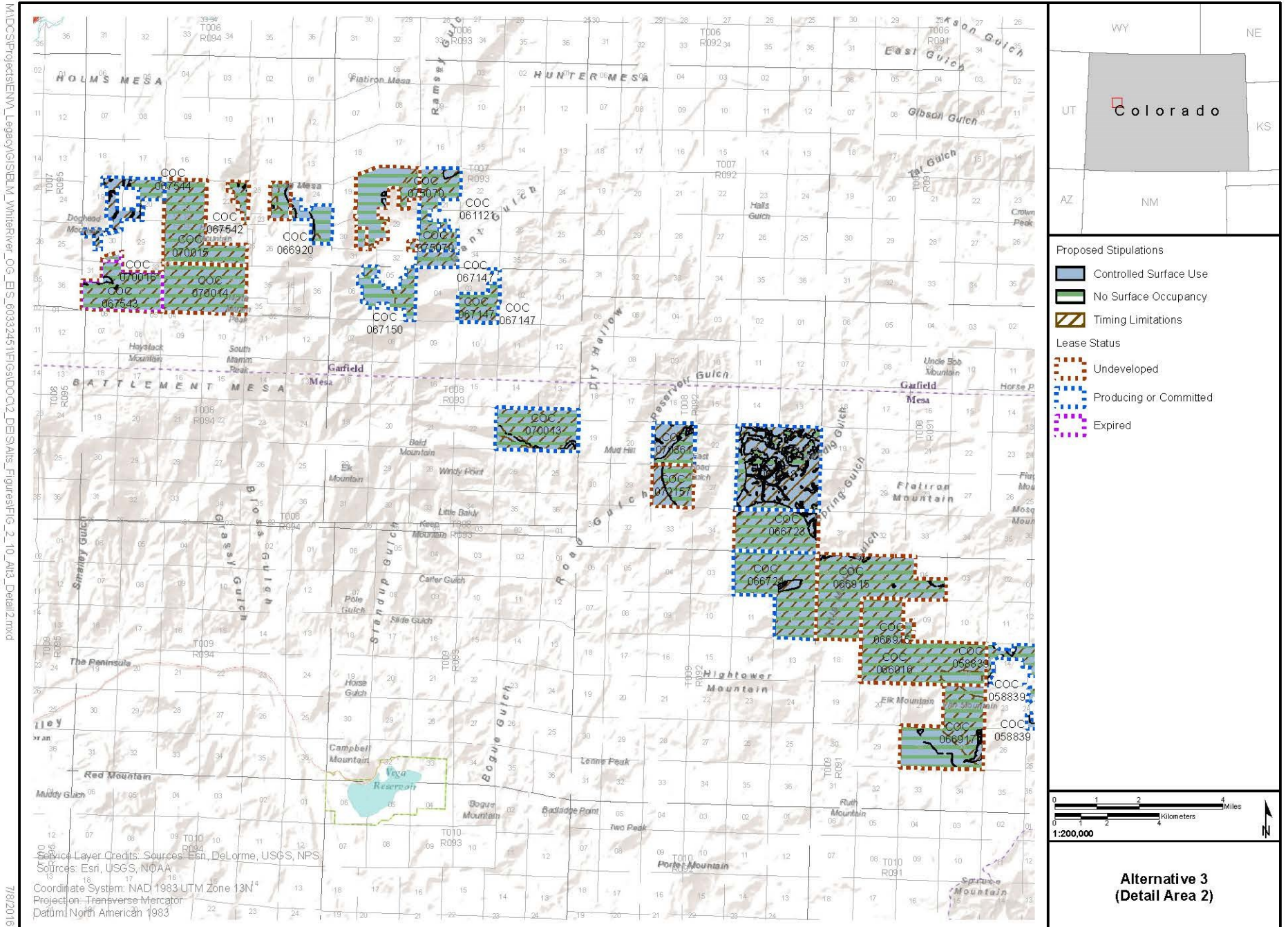


Figure 2-10 Proposed Lease Stipulations under Alternative 3, Middle Section

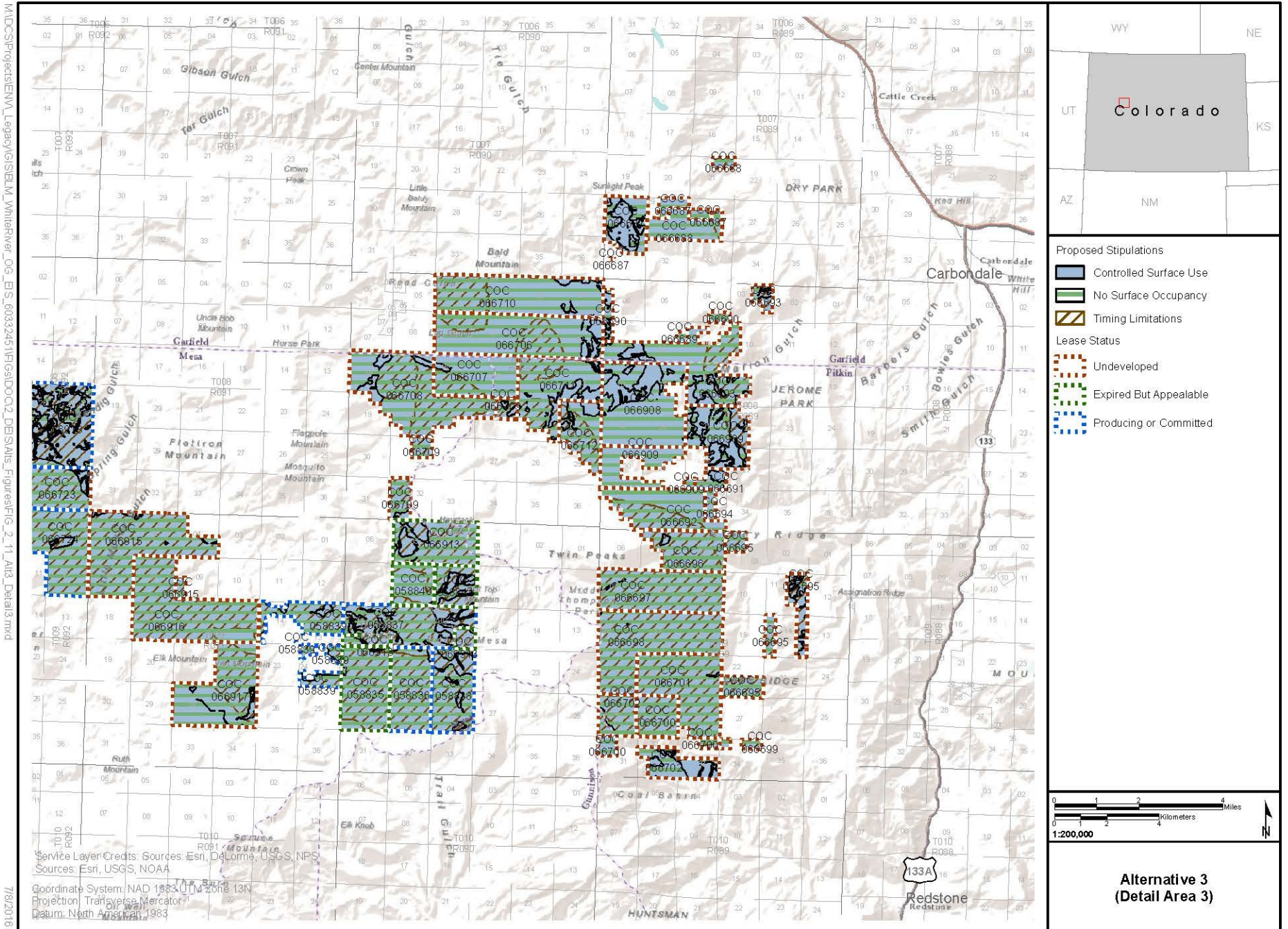


Figure 2-11 Proposed Lease Stipulations under Alternative 3, East Side

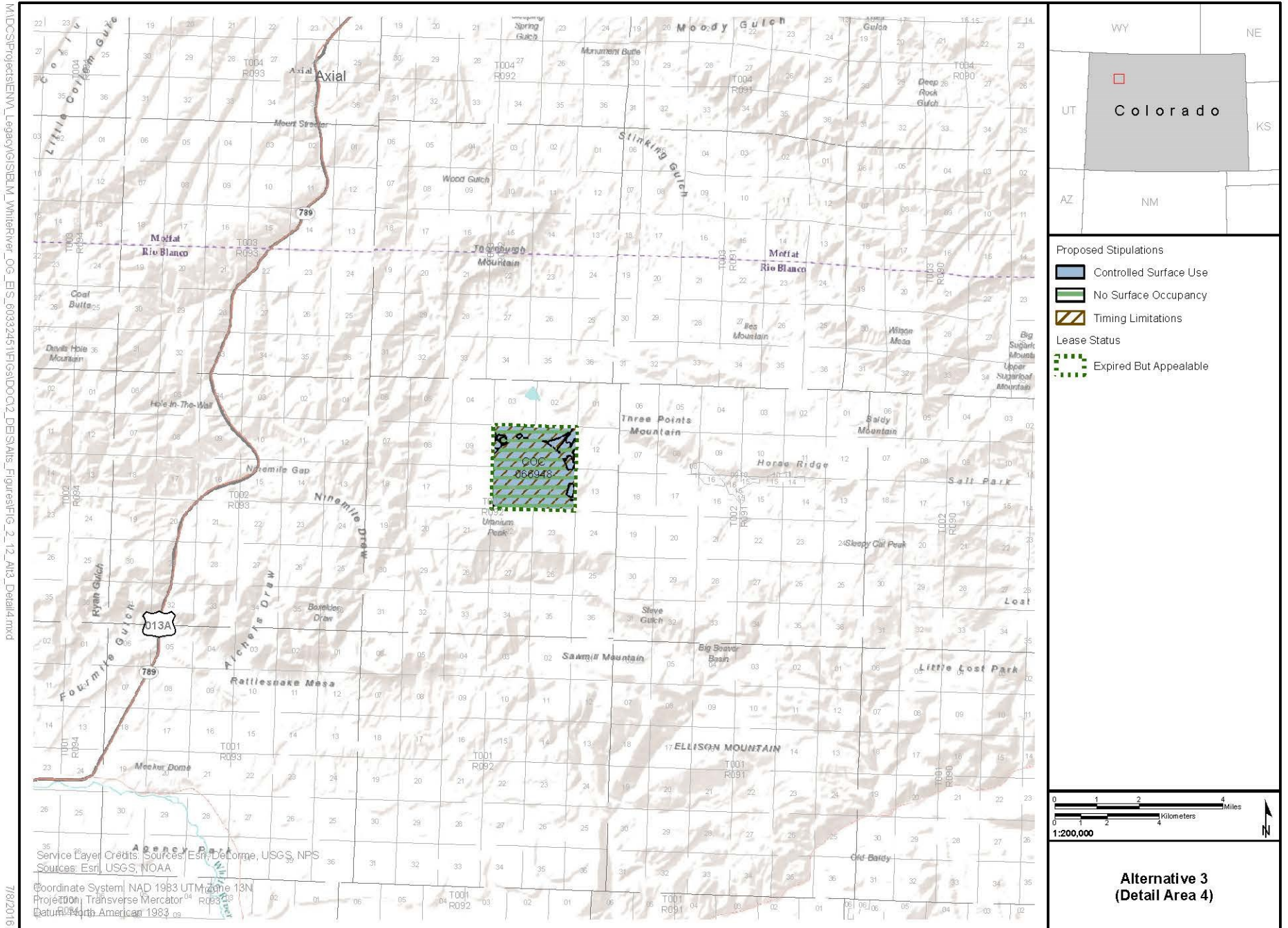


Figure 2-12 Proposed Lease Stipulations under Alternative 3, North Side

**2.3.4 Alternative 4 (Proposed Action): Modify Stipulations and Cancel Leases to Match the WRNF 2015 ROD**

Under Alternative 4, the BLM would modify existing lease stipulations in areas identified as open to future leasing by the Forest Service and cancel existing leases in areas identified as closed to future leasing in the WRNF **Final** ROD (USFS **2015f**). Although the Forest Service’s decision on future leasing in the **2015** ROD does not apply to the 65 previously issued leases, this alternative is designed to reflect the Forest Service’s future management objectives for these lease areas. The primary difference between Alternatives 3 and 4 is that under Alternative 4, some leases or parts of leases would be cancelled to match the Forest Service decision for future leasing availability in the WRNF **Final** ROD (USFS **2015f**). In the existing leases identified as open to future leasing in the WRNF **Final** ROD, the stipulations would be modified to be the same as those listed for Alternative 3 in **Table 2-3**. Lease Notice CO-56 would apply to new development under Alternative 4.

In the areas identified as closed to future leasing in the WRNF **Final** ROD (USFS **2015f**), one of two things would happen—the leases that sit entirely within areas designated as closed to future leasing would be cancelled, or leases that sit partially within and partially outside of areas closed to future leasing would be contracted (reduced in size) to the area of the lease that overlaps the part of the WRNF open to future leasing. With respect to the leases eligible to be contracted, the BLM would offer the lessee the option of either accepting the new lease terms or having the lease cancelled. For undeveloped leases within areas closed to leasing, cancellation would be done through a BLM administrative process and would require that the BLM refund any bonus bids and lease payments.

**Since revenues generated from federal leases are split between the Treasury and the state where the development occurs, should a lease be cancelled by the BLM, the federal government would expect to initially provide the full refund amount to the potentially affected lessees. Subsequently, the State of Colorado’s share of the refund would most likely be deducted from future disbursements to the State, per 30 USC 1721a. Ultimately, approximately 51 percent of the refund would come from the federal government, and 49 percent would be withheld from future federal mineral revenue payments to the State of Colorado Department of Local Affairs (DOLA 2015d) reflecting the statutorily specified distribution of revenues. The state’s formula for allocation of future disbursements to local governments as result of these actions or whether they would be affected at all is unknown.**

For developed leases within areas closed to leasing, the BLM would pursue the plugging and abandonment of all wells and the removal of all associated ancillary facilities located in areas identified as NSO. As with the other alternatives, a decision to implement this alternative would not authorize any on-the-ground activities, including specific reclamation actions. If this alternative is selected, additional site-specific analysis would be required where surface-disturbing activities would be required.

Changes in lease stipulations under this Alternative would not apply to locations with producing wells because lease stipulations apply to exploration and development, not operations; however, any new wells to be developed on a lease with modified stipulations would be required to comply with those changes. The 25 leases that would be cancelled (all or part) are listed in **Table 2-4** and displayed on **Figure 2-13**.

**Table 2-4 Lease Acreage to be Cancelled Under Alternative 4 (all in Zone 3)**

Lease No.	Lease Acres	Acres to be Cancelled	% of Lease to be Cancelled	Acres Retained (for Contracted Leases)
066687	1,053	1,049	100%	0
066688	774	771	100%	0
066689	40	40	100%	0

**Table 2-4 Lease Acreage to be Cancelled Under Alternative 4 (all in Zone 3)**

Lease No.	Lease Acres	Acres to be Cancelled	% of Lease to be Cancelled	Acres Retained (for Contracted Leases)
066690	274	274	100%	0
066691	198	197	100%	0
066692	1,417	1,417	100%	0
066693	2,167	2,153	100%	0
066694	119	119	100%	0
066695	1,061	1,052	100%	0
066696	1,027	1,027	100%	0
066697	1,872	1,872	100%	0
066698	2,460	2,460	100%	0
066699	114	111	100%	0
066700	841	826	98.2%	15
066701	1,885	1,885	100%	0
066702	1,254	1,160	92.5%	94
066706	2,548	2,093	82.1%	455
066707	1,276	380	29.8%	896
066708	2,554	79	3.1%	2,475
066709	638	160	25.1%	478
066710	2,329	2,293	98.5%	36
066711	1,751	1,751	100%	0
066712	875	875	100%	0
066908	2,400	2,397	100%	0
066909	2,077	2,061	100%	0

### 2.3.5 Alternative 5: Cancel All Leases

Under Alternative 5, all of the previously issued 65 leases would be cancelled. For producing leases, this action is not within the BLM’s sole authority to implement so it would be necessary to pursue judicial action. For the purposes of analysis, it is assumed that this judicial action would result in the cancellation of all leases. This alternative is included mainly to facilitate a full range of analysis from continuing the existing leases with their current stipulations to considering a scenario as close to not having issued leases (following the WRNF 1993 ROD) as is feasible today. Under this alternative, all producing wells would have to be plugged and abandoned, infrastructure would be removed, roads, well pads, and other ancillary facilities would be reclaimed, and all disturbed areas would be revegetated. As with the other alternatives, a decision to implement this alternative would not authorize any on-the-ground activities, including specific reclamation actions. If this alternative is selected, additional site-specific analysis would be required. **Figures 2-14** and **2-15** display the locations of the producing wells and well pads to be removed.



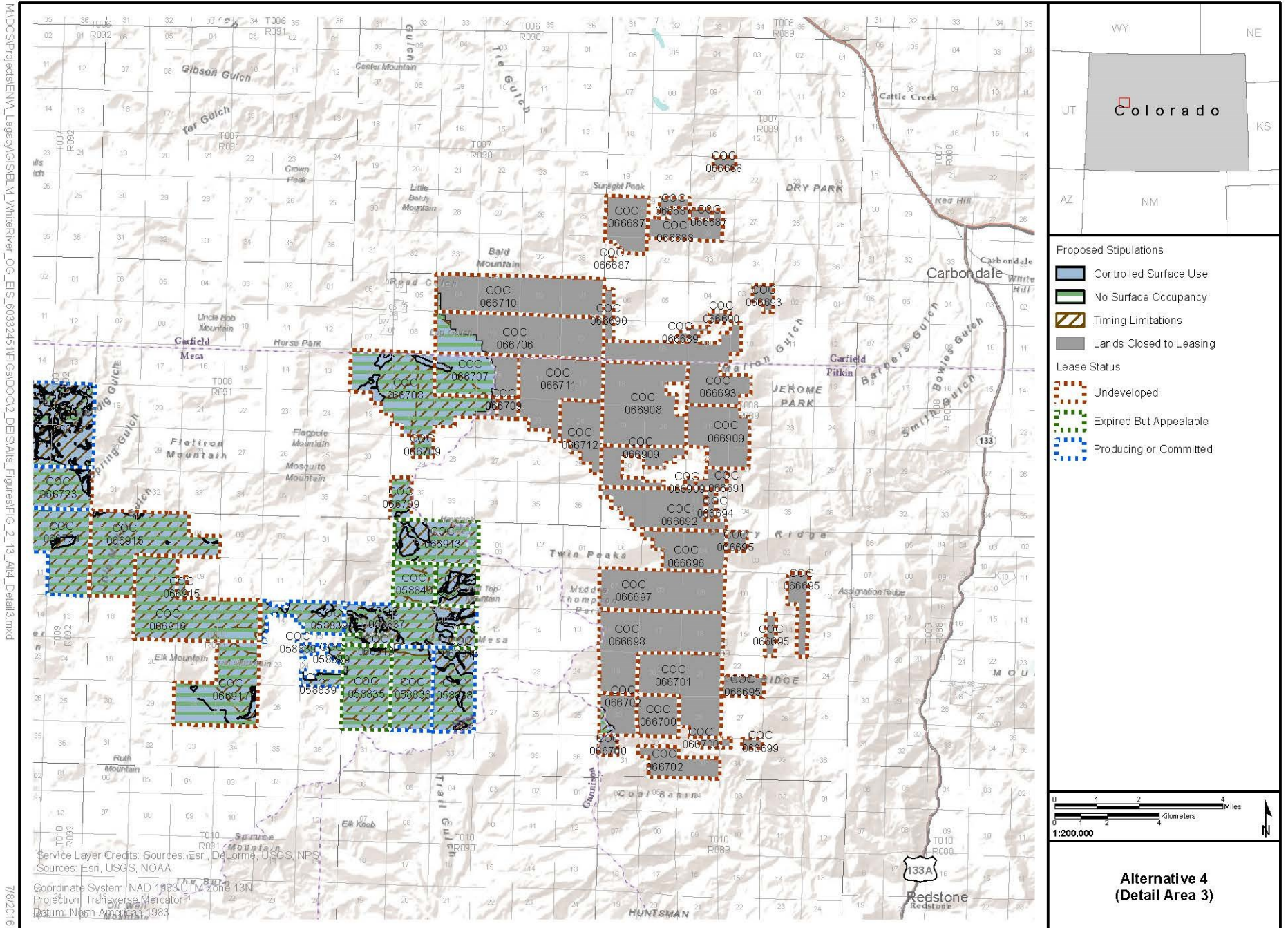
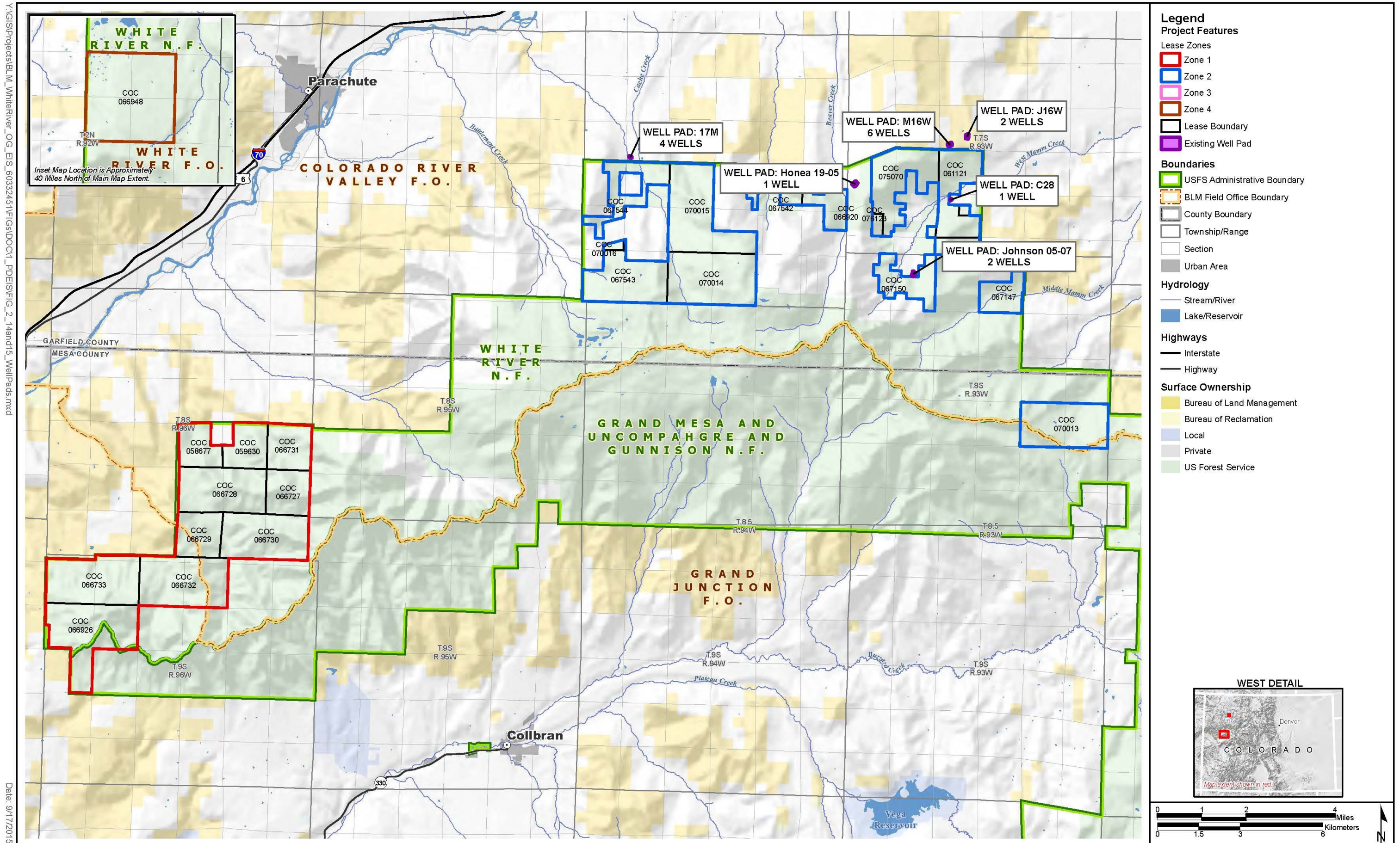


Figure 2-13 Leases to be Cancelled under Alternative 4

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Figure 2-14 Location of Existing Wells and Well Pads to be Removed Under Alternative 5, West Side of Analysis Area

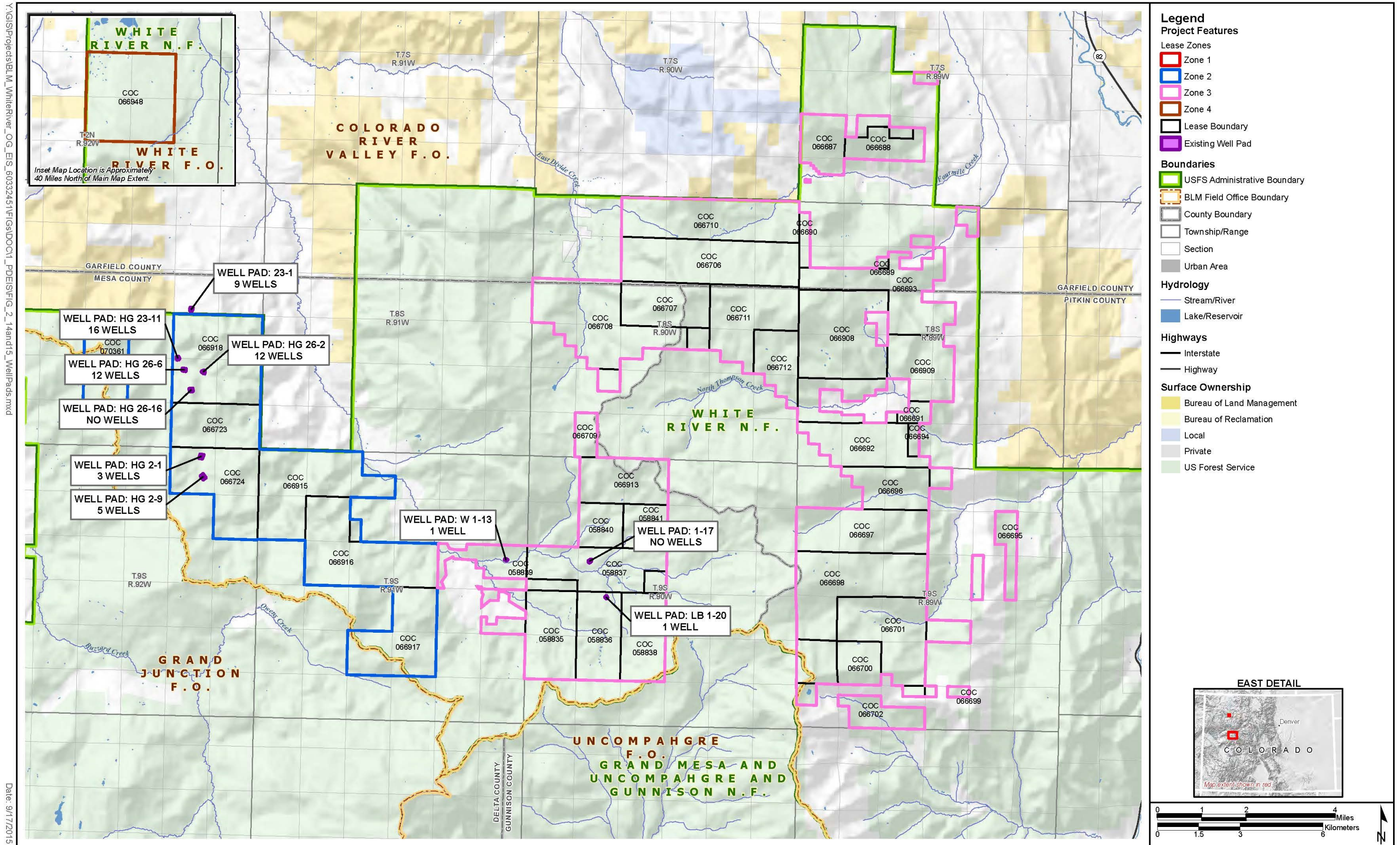


Figure 2-15 Location of Existing Wells and Well Pads to be Removed Under Alternative 5, East Side of Analysis Area

Under this alternative, the following actions would be required:

- Plugging and abandonment of 75 wells; removal of all ancillary equipment (tanks, burners, etc.);
- Reclamation and revegetation of 16 well pads totaling approximately 38 acres; and
- Reclamation and revegetation of approximately 48 acres of access roads.

### **2.3.6 Preferred Alternative**

**Based on public input received and additional internal assessments, the BLM developed its Preferred Alternative by combining aspects of Alternative 2 and 4. The Preferred Alternative addresses public comments and concerns while acknowledging recent decisions by the Forest Service with respect to availability for oil and gas development. The Preferred Alternative also recognizes the adverse economic impacts for the local governments and technical challenges for the BLM associated with any decision to cancel producing or committed leases.**

The Preferred Alternative would cancel in their entirety 25 undeveloped (defined as non-producing and non-committed) leases that overlap the area identified as closed to future leasing by the WRNF Final ROD (USFS 2015f); it would apply Alternative 4 stipulations to the 13 undeveloped leases that are within parts of the WRNF open to future leasing; and would apply Alternative 2 stipulations (including minor updates to reflect the 1993 Forest Service ROD) to 23 leases that are producing or committed to an exploratory unit agreement or communitization agreement and 4 expired leases currently under appeal that had been part of the Willow Creek Unit. The Alternative 2 stipulations would apply only if the Willow Creek Unit contraction under appeal is overturned. As with Alternative 4, the BLM would offer the lessee the option of either accepting the new lease stipulations or having the lease cancelled. For undeveloped leases, cancellation would be done through a BLM administrative process and would require that the BLM refund any bonus bids and lease payments.

Since revenues generated from federal leases are split between the Treasury and the state where the development occurs, should a lease be cancelled by the BLM, the federal government would expect to initially provide the full refund amount to the potentially affected lessees.

Subsequently, the State of Colorado's share of the refund would most likely be deducted from future disbursements to the State, per 30 USC 1721a. Ultimately, approximately 51 percent of the refund would come from the federal government, and 49 percent would be withheld from future federal mineral revenue payments to the State of Colorado Department of Local Affairs (DOLA 2015d) reflecting the statutorily specified distribution of revenues. The state's formula for allocation of future disbursements to local governments as result of these actions or whether they would be affected at all is unknown.

Table 2-5 lists the zones, lease numbers, and how they would be affected by the Preferred Alternative. Figures 2-16, 2-17, 2-18 and 2-19, display the proposed stipulations under the Preferred Alternative and Table 2-6 lists all of the applicable stipulations by zone and lease. Following Table 2-6 is the rationale for why the BLM decided to formulate the Preferred Alternative in this way.

**Table 2-5 Summary of How Stipulations Apply under Preferred Alternative**

Zone	Lease No.	Additional Comments
<b>Alternative 2 Stipulations Apply</b>		
1	058677	Approximately 5 acres TL added to this lease.
1	059630	No change from current lease stipulations.
1	066727	No change from current lease stipulations.
1	066728	No change from current lease stipulations.
1	066729	No change from current lease stipulations.
1	066730	No change from current lease stipulations.
1	066731	No change from current lease stipulations.
1	066732	No change from current lease stipulations.
1	066733	No change from current lease stipulations.
1	066926	No change from current lease stipulations.
2	061121	No change from current lease stipulations.
2	066724	No change from current lease stipulations.
2	066918	No change from current lease stipulations.
2	066920	No change from current lease stipulations.
2	067147	No change from current lease stipulations.
2	067150	No change from current lease stipulations.
2	067544	No change from current lease stipulations.
2	070013	No change from current lease stipulations.
2	070361	No change from current lease stipulations.
3	058836	No change from current lease stipulations.
3	058837	No change from current lease stipulations.
3	058838	No change from current lease stipulations.
3	058839	No change from current lease stipulations.
<b>Alternative 2 Stipulations Apply If Unit Contraction Under Appeal Is Overturned</b>		
3	058835	Contracted from Willow Creek Unit; expired but under appeal
3	058840	Contracted from Willow Creek Unit; expired but under appeal; add TL for snowmobile corridor
3	058841	Contracted from Willow Creek Unit; expired but under appeal; add TL for snowmobile corridor
3	066913	Contracted from Willow Creek Unit; expired but under appeal
<b>Alternative 4 Stipulations and Cancellations Apply</b>		
2	066723	New stipulations apply
2	066915	New stipulations apply
2	066916	New stipulations apply
2	066917	New stipulations apply
2	067542	New stipulations apply
2	067543	New stipulations apply. Expired lease carried forward for analysis.

**Table 2-5 Summary of How Stipulations Apply under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Additional Comments</b>
2	070014	New stipulations apply
2	070015	New stipulations apply
2	070016	New stipulations apply
2	072157	New stipulations apply
2	075070	New stipulations apply
2	076123	New stipulations apply
4	066948	New stipulations apply. Expired lease subject to appeal; carried forward for analysis.
<b>Leases Cancelled In Full</b>		
3	066687	Cancelled in Full
3	066688	Cancelled in Full
3	066689	Cancelled in Full
3	066690	Cancelled in Full
3	066691	Cancelled in Full
3	066692	Cancelled in Full
3	066693	Cancelled in Full
3	066694	Cancelled in Full
3	066695	Cancelled in Full
3	066696	Cancelled in Full
3	066697	Cancelled in Full
3	066698	Cancelled in Full
3	066699	Cancelled in Full
3	066700	Cancelled in Full
3	066701	Cancelled in Full
3	066702	Cancelled in Full
3	066706	Cancelled in Full
3	066707	Cancelled in Full
3	066708	Cancelled in Full
3	066709	Cancelled in Full
3	066710	Cancelled in Full
3	066711	Cancelled in Full
3	066712	Cancelled in Full
3	066908	Cancelled in Full
3	066909	Cancelled in Full

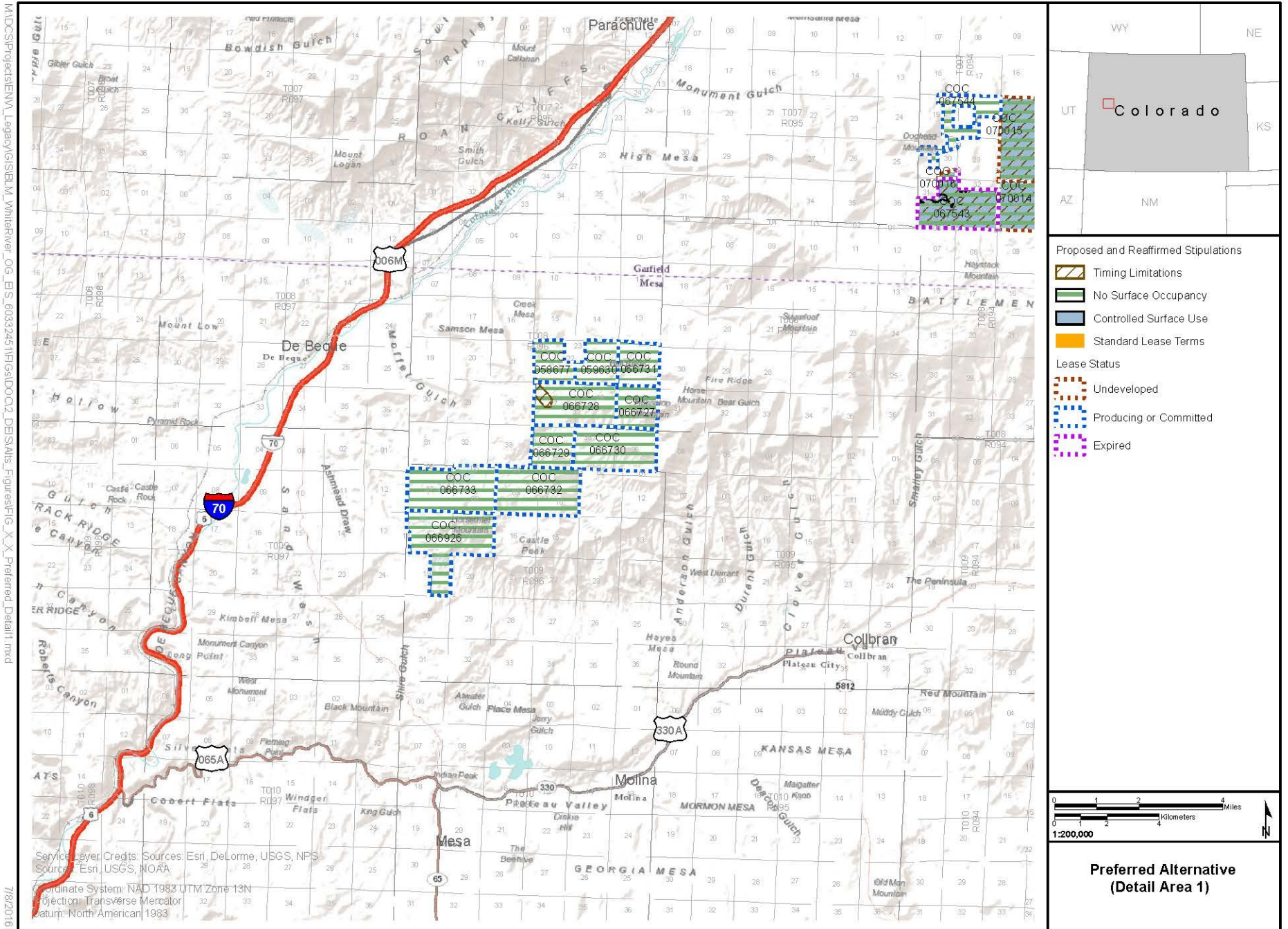


Figure 2-16 Lease Stipulations under Preferred Alternative, West Side



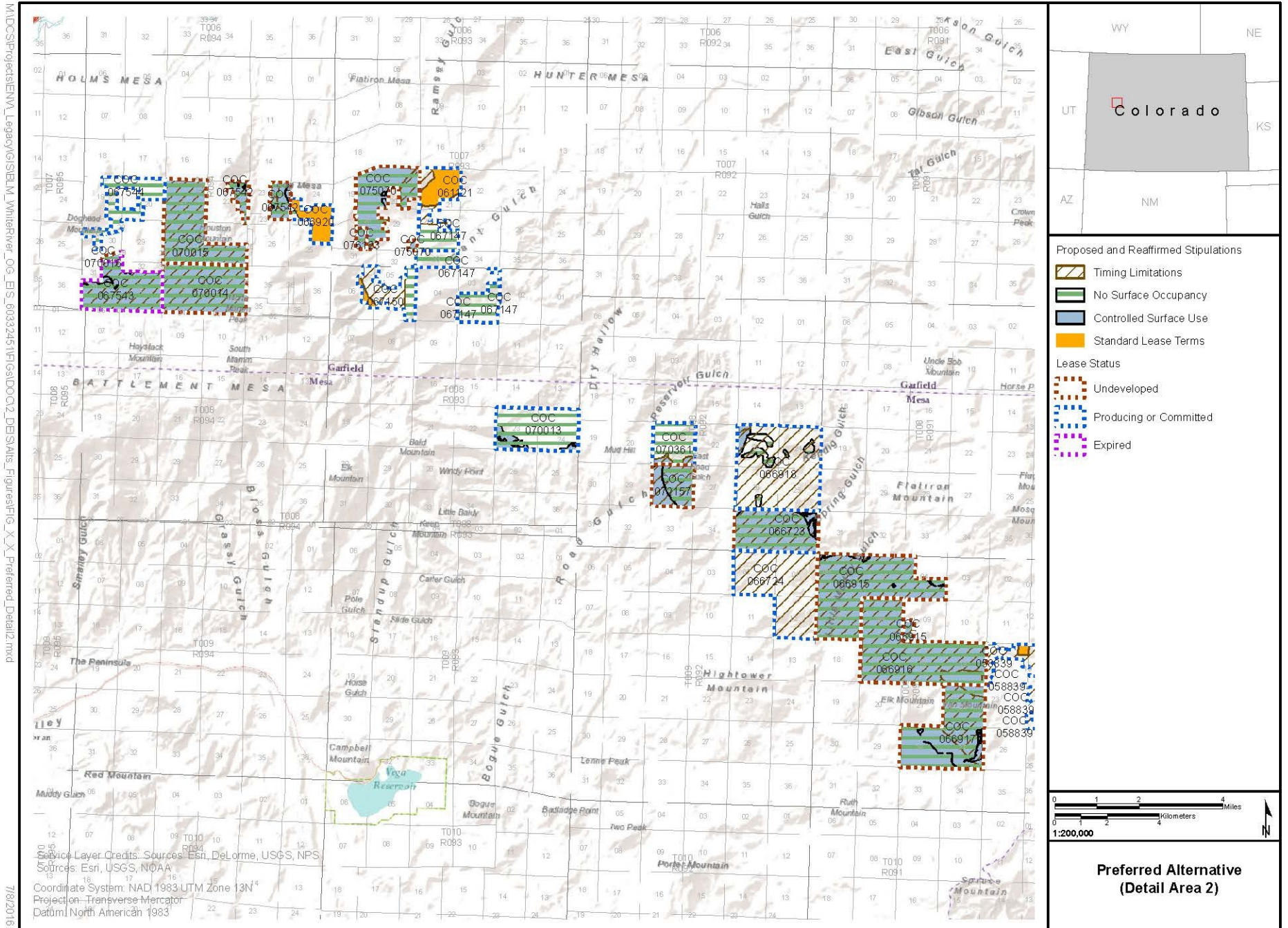


Figure 2-17 Lease Stipulations under Preferred Alternative, Middle Section

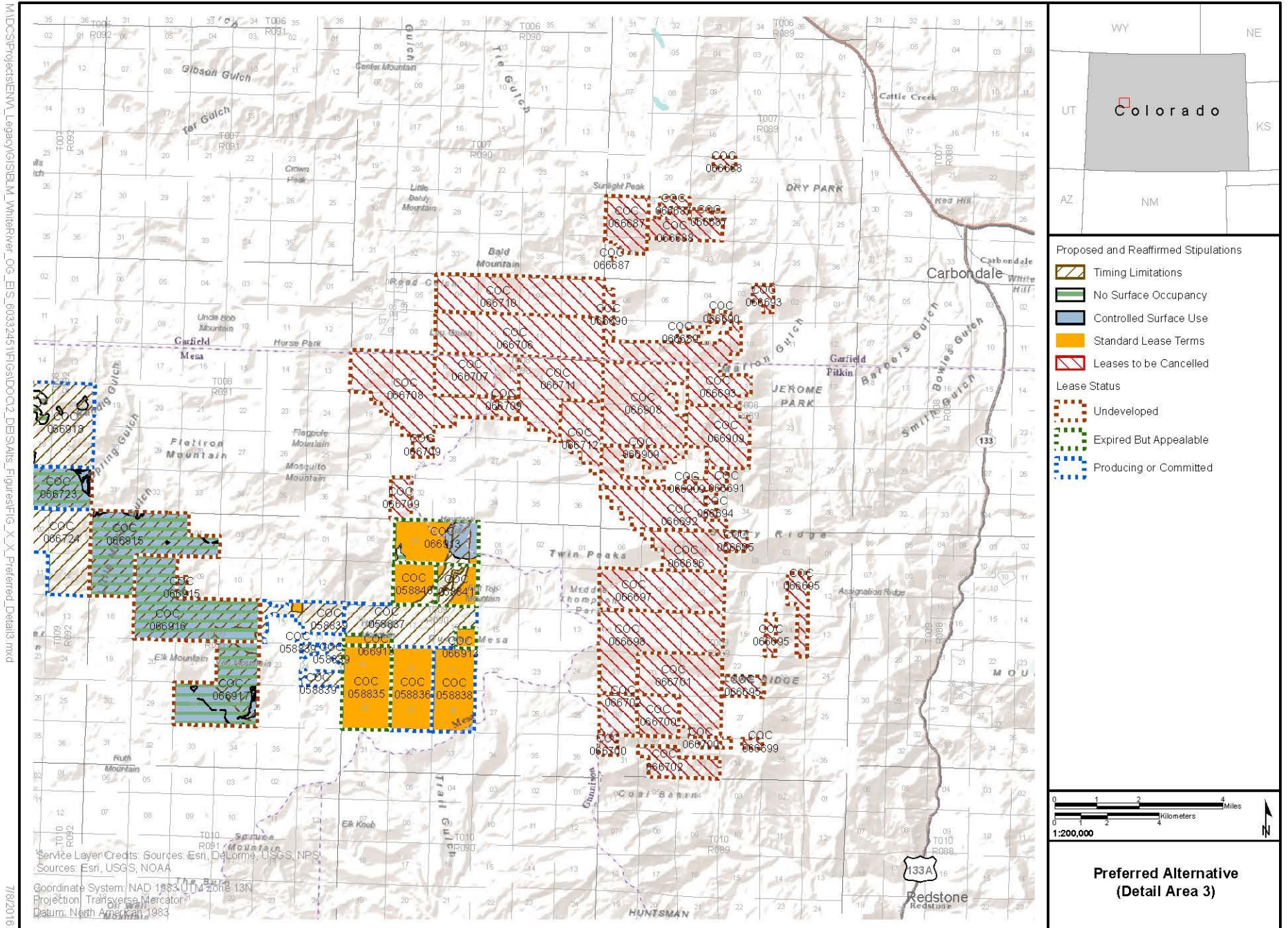


Figure 2-18 Lease Stipulations under Preferred Alternative, East Side

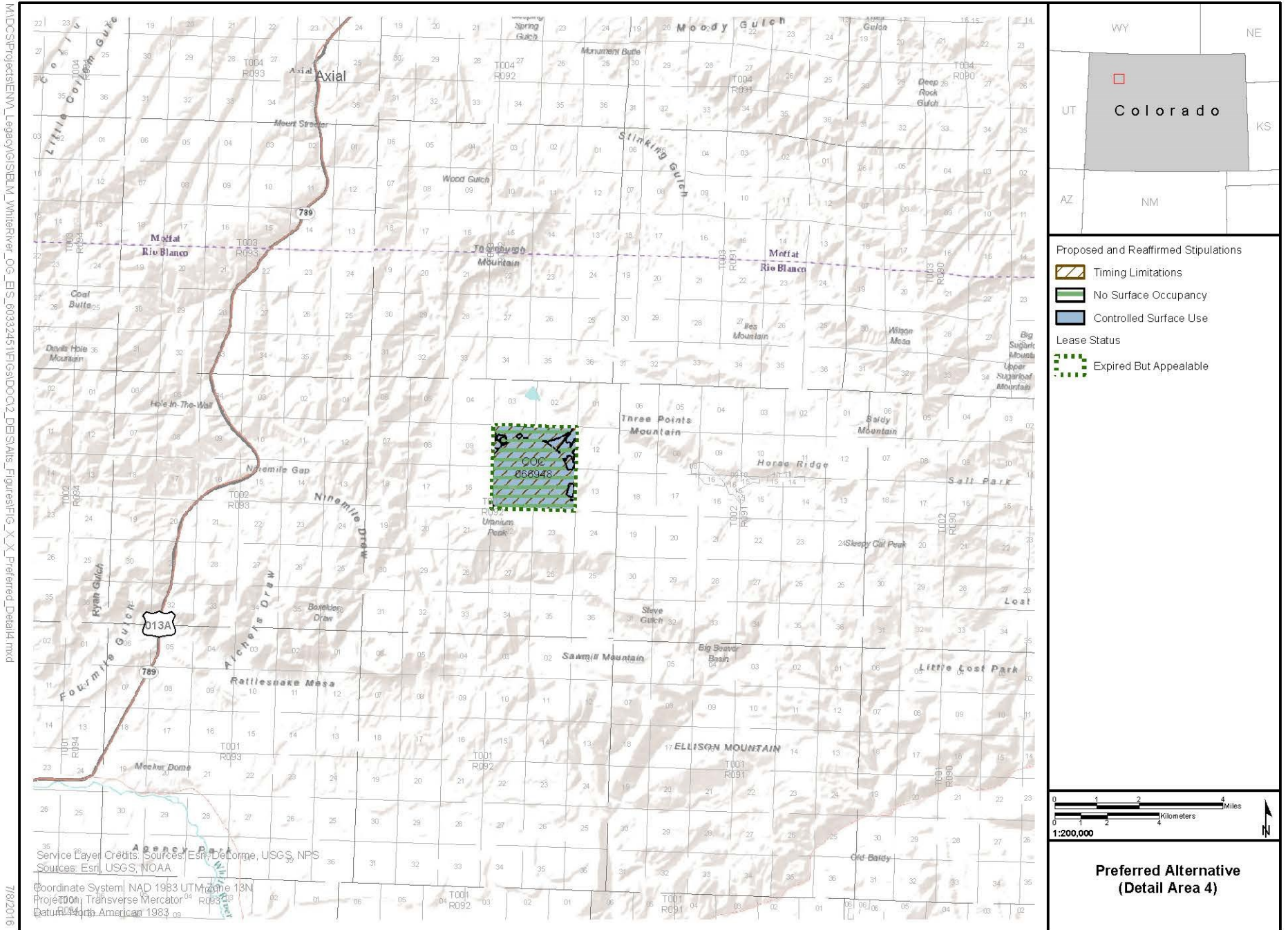


Figure 2-19 Lease Stipulations under Preferred Alternative, North Lease

**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
1	058677	543	NSO	Roadless Areas	543
			TL	Big Game Winter Range	5
1	059630	587	NSO	Bighorn Sheep	309
				Roadless Areas	587
				Slopes Greater than 60%	587
1	066727	640	NSO	Bighorn Sheep	640
1	066728	1,276	NSO	Bighorn Sheep	1,275
			TL	Big Game Winter Range	93
1	066729	654	NSO	Bighorn Sheep	654
1	066730	1,279	NSO	Bighorn Sheep	1,278
			SLT	Standard Lease Terms	1
1	066731	651	NSO	Slopes Greater than 60%	651
1	066732	1,437	NSO	Slopes Greater than 60%	1,435
1	066733	1,416	NSO	Slopes Greater than 60%	1,416
1	066926	1,629	NSO	Slopes Greater than 60%	1,629
2	061121	964	NSO	Slopes Greater than 60%	351
			TL	Big Game Winter Range	208
			SLT	Standard Lease Terms	405
2	066723	1,280	NSO	Authorized Sites and Facilities	829
				Raptor Species Breeding Territories	120
				Roadless Areas	71
				Severe or High Landscape Stability Hazards	36
				Slope Greater Than 50 Percent	40
				TEPC Aquatic Species	1,077
				Water Influence Zones	174
			CSU	Authorized Sites and Facilities	1,165
				Big Game Migration Corridors	92
				Big Game Summer Concentration	1,280
				Big Game Winter Ranges	1,280
				Highly Erodible Soils	1,045
				Moderately High Landscape Stability Hazards	2
				Paleontological Resources	1,280
Sensitive Aquatic Species	122				
Sensitive Plant Species	1,280				

**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
2	066723	1,280	CSU	Sensitive Terrestrial Avian Invertebrate Species	1,031
				Slopes 30 to 50 Percent	422
				Cultural Resources	1,280
			TL	Big Game Summer Concentration	1,280
				Big Game Winter Range	1,280
				Raptor Species Breeding Territories	120
2	066724	1,973	TL	Big Game Winter Range	1,973
2	066915	2,537	NSO	Authorized Sites and Facilities	336
				Native Cutthroat Trout Habitat	41
				Raptor Species Breeding Territories	1,529
				Roadless Areas	1,916
				Severe or High Landscape Stability Hazards	86
				Slope Greater Than 50 Percent	176
				TEPC Raptor Species	503
				TEPC Wildlife Species	334
				Water Influence Zones	279
			CSU	Authorized Sites and Facilities	998
				Big Game Migration Corridors	165
				Big Game Production Areas	1,845
				Big Game Summer Concentration	2,537
				Big Game Winter Ranges	2,456
				High Concern Travel Ways or Use Areas	662
				Highly Erodible Soils	2,082
				Moderately High Landscape Stability Hazards	8
				Paleontological Resources	2,537
				Sensitive Aquatic Species	465
				Sensitive Plant Species	2,537
				Sensitive Terrestrial Avian Invertebrate Species	2,169
				Slopes 30 to 50 Percent	1,349
				Designated Winter Groomed Routes	0.02 mile
			Cultural Resources	2,537	
			TL	Big Game Summer Concentration	2,537
				Big Game Winter Range	2,325
Raptor Species Breeding Territories	554				

**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
2	066916	2,562	NSO	Native Cutthroat Trout Habitat	10
				Raptor Species Breeding Territories	292
				Roadless Areas	2,562
				Severe or High Landscape Stability Hazards	115
				Slope Greater Than 50 Percent	135
				TEPC Wildlife Species	549
				Water Influence Zones	189
			CSU	Authorized Sites and Facilities	49
				Big Game Migration Corridors	175
				Big Game Production Areas	1,839
				Big Game Summer Concentration	2,376
				Big Game Winter Ranges	244
				High Concern Travel Ways or Use Areas	421
				Highly Erodible Soils	2,193
				Moderately High Landscape Stability Hazards	24
				Paleontological Resources	2,562
				Sensitive Aquatic Species	276
				Sensitive Plant Species	2,486
				Sensitive Terrestrial Avian Invertebrate Species	2,048
			TL	Slopes 30 to 50 Percent	943
Cultural Resources	2,562				
Big Game Summer Concentration	2,376				
2	066917	1,920	NSO	Big Game Winter Range	136
				Raptor Species Breeding Territories	135
				Authorized Sites and Facilities	68
				High Geologic Hazard—GMUGNF	20
				Native Cutthroat Trout Habitat	8
				Roadless Areas	1,324
				Severe or High Landscape Stability Hazards	4
				Slope Greater Than 50 Percent	13
				TEPC Aquatic Species	563
				TEPC Plant Species	349
TEPC Wildlife Species	139				
Water Influence Zones	109				

**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
2	066917	1,920	CSU	Authorized Sites and Facilities	270
				Big Game Production Areas	70
				Big Game Summer Concentration	924
				Big Game Winter Ranges	99
				High Concern Travel Ways or Use Areas	1,201
				Highly Erodible Soils	1,337
				Paleontological Resources	1,452
				Plant Species of Local Concern	915
				Sensitive Aquatic Species	534
				Sensitive Plant Species	1,708
				Sensitive Terrestrial Avian Invertebrate Species	920
				Slopes 30 to 50 Percent	277
				Watersheds with CRCT and GBCT Conservation Populations	206
				Designated Winter Groomed Routes	1.5 miles
			Cultural Resources	1,920	
TL	Big Game Summer Concentration	924			
2	066918	2,557	NSO	Slopes Greater than 60%	216
			CSU	Level 1 Travel Route	98
			TL	Big Game Winter Range	2,531
2	066920	418	NSO	Slopes Greater than 60%	32
			SLT	Standard Lease Terms	386
2	067147	783	NSO	Slopes Greater than 60%	771
			TL	Big Game Winter Range	11
			SLT	Standard Lease Terms	1
2	067150	662	NSO	Slopes Greater than 60%	207
			TL	Big Game Winter Range	385
			SLT	Standard Lease Terms	70
2	067542	480	NSO	Severe or High Landscape Stability Hazards	375
				Slope Greater Than 50 Percent	330
				TEPC Wildlife Species	297
				Water Influence Zones	44
			CSU	Big Game Migration Corridors	67
				Big Game Production Areas	145
				Big Game Summer Concentration	343
	Big Game Winter Ranges	467			

**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
2	067542	480	CSU	High Concern Travel Ways or Use Areas	53
				Highly Erodible Soils	45
				Paleontological Resources	480
				Sensitive Plant Species	479
				Sensitive Terrestrial Avian Invertebrate Species	306
				Slopes 30 to 50 Percent	101
				Spruce Fir Old Growth and Old Growth Recruitment Stands	57
				Watersheds with CRCT and GBCT Conservation Populations	480
				Cultural Resources	480
			TL	Big Game Summer Concentration	343
				Big Game Winter Range	14
				Raptor Species Breeding Territories	43
			2	067543	1,167
Raptor Species Breeding Territories	57				
Roadless Areas	994				
Severe or High Landscape Stability Hazards	13				
Slope Greater Than 50 Percent	11				
Summer Non Motorized Recreation	60				
TEPC Aquatic Species	128				
TEPC Wildlife Species	1,024				
Water Influence Zones	112				
CSU	Authorized Sites and Facilities	560			
	Big Game Production Areas	268			
	Big Game Summer Concentration	1,167			
	Big Game Winter Ranges	579			
	Ground Water Resources	479			
	High Concern Travel Ways or Use Areas	995			
	Highly Erodible Soils	834			
	Moderate Scenic Integrity Objective	778			
	Moderately High Landscape Stability Hazards	37			
	Paleontological Resources	1,166			
	Sensitive Aquatic Species	199			
	Sensitive Plant Species	1,088			



**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
2	067543	1,167	CSU	Sensitive Terrestrial Avian Invertebrate Species	1,143
				Slopes 30 to 50 Percent	202
				Spruce Fir Old Growth and Old Growth Recruitment Stands	405
				Watersheds with CRCT and GBCT Conservation Populations	451
				Cultural Resources	1,167
			TL	Big Game Summer Concentration	1,167
2	067544	730	NSO	Slopes Greater than 60%	730
2	070013	1,262		>60% Slope—GMUGNF	1
			High Geologic Hazard—GMUGNF	52	
			Riparian/ Wetland—GMUGNF	3	
			Roadless Area—GMUGNF	186	
			Slopes Greater than 60%	1,037	
			CSU	40-60% Slope—GMUGNF	33
				Moderate Geologic Hazard—GMUGNF	173
2	070014	1,486	NSO	Authorized Sites and Facilities	251
				Fen Wetlands	38
				Native Cutthroat Trout Habitat	107
				Roadless Areas	1,485
				Severe or High Landscape Stability Hazards	24
				Slope Greater Than 50 Percent	49
				Summer Non Motorized Recreation	781
				TEPC Aquatic Species	114
				TEPC Wildlife Species	1,163
				Water Influence Zones	168
				CSU	Authorized Sites and Facilities
			Big Game Production Areas		389
			Big Game Summer Concentration		1,486
			Big Game Winter Ranges		704
			Ground Water Resources		346
			Highly Erodible Soils		458
			Moderate Scenic Integrity Objective		1,187
			Moderately High Landscape Stability Hazards		155
			Paleontological Resources	1,486	
Sensitive Aquatic Species	219				

**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
2	070014	1,486	CSU	Sensitive Plant Species	1,394
				Sensitive Terrestrial Avian Invertebrate Species	1,277
				Slopes 30 to 50 Percent	450
				Spruce Fir Old Growth and Old Growth Recruitment Stands	933
				Watersheds with CRCT and GBCT Conservation Populations	228
				Cultural Resources	1,486
			TL	Big Game Summer Concentration	1,486
2	070015	1,598	NSO	Authorized Sites and Facilities	118
				Native Cutthroat Trout Habitat	39
				Roadless Areas	1,595
				Severe or High Landscape Stability Hazards	317
				Slope Greater Than 50 Percent	324
				Summer Non-Motorized Recreation	31
				TEPC Aquatic Species	45
				TEPC Wildlife Species	824
				Water Influence Zones	136
			CSU	Authorized Sites and Facilities	445
				Big Game Production Areas	683
				Big Game Summer Concentration	1,598
				Big Game Winter Ranges	1,564
				Ground Water Resources	298
				Highly Erodible Soils	700
				Moderate Scenic Integrity Objective	1,004
				Moderately High Landscape Stability Hazards	115
				Paleontological Resources	1,598
				Sensitive Aquatic Species	81
				Sensitive Plant Species	1,231
Sensitive Terrestrial Avian Invertebrate Species	1,124				
Slopes 30 to 50 Percent	671				
Spruce Fir Old Growth and Old Growth Recruitment Stands	420				
Watersheds with CRCT and GBCT Conservation Populations	693				

**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
2	070015	1,598	CSU	Cultural Resources	1,598
			TL	Big Game Summer Concentration	1,598
2	070016	51	NSO	Roadless Areas	51
				TEPC Wildlife Species	40
				Water Influence Zones	6
			CSU	Big Game Production Areas	46
				Big Game Summer Concentration	51
				Big Game Winter Ranges	50
				Ground Water Resources	21
				High Concern Travel Ways or Use Areas	40
				Highly Erodible Soils	28
				Moderate Scenic Integrity Objective	50
				Paleontological Resources	51
				Sensitive Plant Species	1
				Sensitive Terrestrial Avian Invertebrate Species	44
				Slopes 30 to 50 Percent	6
			Cultural Resources	51	
TL	Big Game Summer Concentration	51			
2	070361	638	NSO	Slopes Greater than 60%	556
			CSU	Moderate Geologic Hazard—GMUGNF	47
				Powerline Corridor	35
			TL	Big Game Winter Range	35
				Big Game Winter Range—GMUGNF	47
2	072157	638	NSO	Slope Greater Than 50 Percent	0
				TEPC Aquatic Species	419
				TEPC Wildlife Species	2
				Water Influence Zones	23
			CSU	Big Game Summer Concentration	4
				Big Game Winter Ranges	638
				High Concern Travel Ways or Use Areas	627
				Highly Erodible Soils	295
				Moderate Geologic Hazard—GMUGNF	341
				Paleontological Resources	298
				Sensitive Aquatic Species	4
Sensitive Plant Species	498				
Sensitive Terrestrial Avian Invertebrate Species	249				

**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
2	072157	638	CSU	Slopes 30 to 50 Percent	75
				Cultural Resources	638
			TL	Big Game Summer Concentration	4
				Big Game Winter Range	638
2	075070	1,152	NSO	Authorized Sites and Facilities	40
				Public Water Supply Source Area Protection	30
				Raptor Species Breeding Territories	15
				Roadless Areas	1,113
				Severe or High Landscape Stability Hazards	92
				Slope Greater Than 50 Percent	95
				TEPC Wildlife Species	1
				Water Influence Zones	49
			CSU	Authorized Sites and Facilities	163
				Big Game Migration Corridors	116
				Big Game Production Areas	425
				Big Game Summer Concentration	31
				Big Game Winter Ranges	1,150
				High Concern Travel Ways or Use Areas	114
				Highly Erodible Soils	766
				Moderate Scenic Integrity Objective	3
				Moderately High Landscape Stability Hazards	59
				Paleontological Resources	1,151
				Plant Species of Local Concern	24
				Sensitive Aquatic Species	3
				Sensitive Plant Species	1,094
				Sensitive Terrestrial Avian Invertebrate Species	314
				Slopes 30 to 50 Percent	452
				Watersheds with CRCT and GBCT Conservation Populations	267
				Cultural Resources	1,152
				TL	Big Game Summer Concentration
Big Game Winter Range	194				
Raptor Species Breeding Territories	15				
2	076123	80	NSO	Raptor Species Breeding Territories	1
				Roadless Areas	80

**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
2	076123	80	NSO	Severe or High Landscape Stability Hazards	2
				Slope Greater Than 50 Percent	2
				Water Influence Zones	13
			CSU	Authorized Sites and Facilities	28
				Big Game Production Areas	80
				Big Game Winter Ranges	80
				High Concern Travel Ways or Use Areas	79
				Highly Erodible Soils	31
				Moderate Scenic Integrity Objective	15
				Paleontological Resources	80
				Sensitive Plant Species	80
				Sensitive Terrestrial Avian Invertebrate Species	31
				Slopes 30 to 50 Percent	29
Cultural Resources	80				
TL	Raptor Species Breeding Territories	1			
3	058835	1,475	SLT	Standard Lease Terms	1,475
3	058836	1,279	SLT	Standard Lease Terms	1,279
3	058837	1,669	TL	Elk Production Area	1,669
				Snowmobile Corridor	0.003 mile
3	058838	1,277	CSU	Areas of Moderate Geologic Hazard—GMUGNF	26
			SLT	Standard Lease Terms	1,251
3	058839	1,127	TL	Elk Production Area	1,086
				Snowmobile Corridor	2.1 miles
			SLT	Standard Lease Terms	41
3	058840	639	TL	Snowmobile	88
			SLT	Standard Lease Terms	552
3	058841	638	TL	Snowmobile	327
			SLT	Standard Lease Terms	311
3	066687	1,053	Cancelled		1,053
3	066688	774	Cancelled		774
3	066689	40	Cancelled		40
3	066690	274	Cancelled		274
3	066691	198	Cancelled		198
3	066692	1,417	Cancelled		1,417
3	066693	2,167	Cancelled		2,167

**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

<b>Zone</b>	<b>Lease No.</b>	<b>Lease Acres</b>	<b>Type of Stipulation <sup>1</sup></b>	<b>Type of Restriction</b>	<b>Acres <sup>2</sup> or Miles of Stipulation/SLT</b>
3	066694	119	Cancelled		119
3	066695	1,061	Cancelled		1,061
3	066696	1,027	Cancelled		1,027
3	066697	1,872	Cancelled		1,872
3	066698	2,460	Cancelled		2,460
3	066699	114	Cancelled		114
3	066700	841	Cancelled		841
3	066701	1,885	Cancelled		1,885
3	066702	1,254	Cancelled		1,254
3	066706	2,548	Cancelled		2,548
3	066707	1,276	Cancelled		1,276
3	066708	2,554	Cancelled		2,554
3	066709	638	Cancelled		638
3	066710	2,329	Cancelled		2,329
3	066711	1,751	Cancelled		1,751
3	066712	875	Cancelled		875
3	066908	2,400	Cancelled		2,400
3	066909	2,077	Cancelled		2,077
3	066913	1,660	NSO	Slopes Greater than 60%	53
			CSU	Level 1 Travel Route	402
			TL	Snowmobile	301
			SLT	Standard Lease Terms	1,134
4	066948	2,562	NSO	Fen Wetlands	98
				Raptor Species Breeding Territories	2,085
				Severe or High Landscape Stability Hazards	18
				Slope Greater Than 50 Percent	39
				TEPC Aquatic Species	48
				TEPC Raptor Species	503
				TEPC Wildlife Species	1,239
				Water Influence Zones	302
			CSU	Big Game Production Areas	1,709
				Big Game Summer Concentration	2
				Big Game Winter Ranges	469
	Ground Water Resources	89			
	High Concern Travel Ways or Use Areas	1,421			
	Highly Erodible Soils	1,176			

**Table 2-6 Stipulations on Each Lease under Preferred Alternative**

Zone	Lease No.	Lease Acres	Type of Stipulation <sup>1</sup>	Type of Restriction	Acres <sup>2</sup> or Miles of Stipulation/SLT
4	066948	2,562	CSU	Moderate Scenic Integrity Objective	789
				Moderately High Landscape Stability Hazards	7
				Paleontological Resources	2,561
				Sensitive Aquatic Species	91
				Sensitive Plant Species	2,282
				Sensitive Terrestrial Avian Invertebrate Species	1,284
				Slopes 30 to 50 Percent	156
				Spruce Fir Old Growth and Old Growth Recruitment Stands	132
				Watersheds with CRCT and GBCT Conservation Populations	2,562
				Designated Winter Groomed Routes	4.1 miles
				Cultural Resources	2,562
			TL	Bald Eagle Winter Roost and Perch Sites	2,562
			TL	Big Game Summer Concentration	2
			TL	Big Game Winter Range	317
TL	Raptor Species Breeding Territories	587			

<sup>1</sup> NSO = No Surface Occupancy; CSU = Controlled Surface Use; TL = Timing Limitation; SLT = Standard Lease Terms; GMUGNF = Grand Mesa, Uncompahgre, and Gunnison National Forest; TEPC = Threatened, Endangered, Proposed, and Candidate; CRCT = Colorado River cutthroat trout; GBCT = Greenback Cutthroat Trout.

<sup>2</sup> Units are in acres unless otherwise noted.

**2.3.6.1 Rationale for Development of Preferred Alternative Components**

The BLM’s Preferred Alternative is consistent with the BLM’s stated purpose and need for the EIS (see Sections 1.3 and 1.4) including (1) fulfilling the federal government’s policy of fostering the development of stable industries and orderly development of domestic resources under the Mining and Minerals Policy Act of 1970, (2) meeting domestic energy needs under the requirements of the MLA, as amended, the Mining and Minerals Policy Act of 1970, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987, and (3) supporting the Forest Service mineral policy that places responsibility on field units to foster and encourage the exploration, development, and production of the mineral or energy resource.

**Undeveloped Leases to Be Cancelled**

This proposal would affect 33,004 acres on 25 leases in Zone 3. The Forest Service identified management conflicts with future oil and gas leasing and development in the areas where the 25 undeveloped leases to be cancelled are located. Because the leases proposed to be cancelled are not producing or committed to units or agreements and they are located in an area with little past development, the BLM analysis determined that the economic benefits to industry from developing these leases would be less than in other parts of the WRNF. The Forest Service has determined that an absence of leasing in this area will “maintain the natural character of the

landscape and continue to protect the outstanding wildlife and recreational values” (USFS 2015f).

#### Undeveloped Leases to Be Modified

This proposal would affect 17,513 acres on 13 leases in Zones 2 and 4. These leases would remain available for development with the modification of existing stipulations to resolve identified conflicts with managing surface resources. The BLM and the Forest Service recognize that there are fewer resource conflicts with oil and gas development in this area. Applying the stipulations proposed under Alternative 4 would ensure that the lease stipulations would be the same as newly issued leases in this area by complying with the Forest Service’s decision for future leasing stated in the WRNF ROD (USFS 2015f). If the lessees do not consent to the modified lease terms, the leases would be cancelled administratively. They would be available for future leasing under the same stipulations.

#### Producing Leases

This proposal would affect 25,452 acres on 23 leases in Zones 1, 2, and 3. These leases are either producing or committed to units or agreements that are producing. For that reason, the BLM recognizes that modification or cancellation of these leases would result in considerable adverse economic impacts and technical challenges for the BLM, the Forest Service, and local governments. These adverse effects, in an area that already has developed wells and associated infrastructure, may include loss of future production, the potential for orphan wells requiring BLM oversight, plugging and abandonment of wells, judicial action in the event that cancellation is pursued, and high costs due to abandonment and reclamation. The environmental concerns related to future leasing identified by the Forest Service (USFS 2014a) may be addressed through site-specific mitigation measures, design features, and COAs at the APD stage of development, as they have been in the past on these leases and units. The producing leases and development plans already have had site-specific Forest Service analysis, concurrence, and approval at the time the permit to drill was issued.

Most of the 23 leases would be reaffirmed with their existing stipulations. One lease (058677) would be affected by a change in stipulations, in order to add approximately 5 acres of timing limitation to correct a noted deficiency. If the lessee does not accept the modified stipulations, the BLM would pursue cancellation, requiring judicial action.

#### Expired Leases

This proposal would affect 4,411 acres on 4 leases within Zone 3 (Leases 058835, 058840, 058841 and 066913) that were previously part of the Willow Creek Unit, which is held by production. In 2011, the BLM determined that the Unit had contracted automatically under Section 2(e) of the unit agreement (eliminating all lands not in a participating area on the 5th anniversary of the unit approval if there has not been continuous drilling every 90 days), and the BLM subsequently concluded that the leases had expired. The BLM’s conclusion that these 4 leases are no longer part of the Unit has been appealed to the Interior Board of Land Appeals (IBLA). Due to this pending appeal, the BLM carried these leases forward in this EIS. If the IBLA reverses the BLM’s decision, then those leases would be considered producing leases and the stipulations under Alternative 2 would apply. If the IBLA affirms the BLM’s decision, then the leases would remain expired and would not be addressed by the BLM’s decision. The areas covered by these 4 leases would remain available for oil and gas leasing under the Forest Service’s decision (USFS 2015f).

Additionally, two leases expired during the NEPA process: Lease 066948 (2,562 acres) and Lease 67543 (1,167 acres). These leases have been included for consistency of analysis and because the lifting of suspension leading to expiration of Lease 066948 is subject to appeal. As noted in Table 2 5, Alternative 4 stipulations are applied to both leases because they are undeveloped.



**However, there will be no decision made by the BLM on any leases that are expired and no longer subject to appeal at the time of any final decision.**

## **2.4 Alternatives Considered but Eliminated from Detailed Study**

During alternatives development, the BLM reviewed all alternatives or alternative elements suggested by the public during the scoping period. The range of alternatives to be analyzed in detail described in Section 2.2 addresses most of the scoping comments. Some suggested alternatives or alternative elements were considered during the alternatives development process but were eliminated from detailed analysis.

In general, the following reasons may be considered grounds for eliminating an alternative (BLM Handbook H-1790-1, 6.6.3):

- It is ineffective because it would not respond to the agency's purpose and need.
- It is technically or economically infeasible.
- It is inconsistent with the basic policy objectives for the management of the area.
- Its implementation is remote or speculative.
- It is substantially similar in design to an alternative that is analyzed in detail.
- It would have substantially similar effects to an alternative that is analyzed in detail.

Additionally, there were some suggestions, such as best management practices (BMPs), well design specifications, or other design features that were not incorporated into an action alternative because the BLM has determined they are either regulated by other agencies or are more appropriately considered during the Application for Permit to Drill (APD) process, after operators submit a site-specific plan of operations for evaluation.

Mitigation may be subsequently attached to all leases as Conditions of Approval (COAs). During the APD process, potential resource issues would be identified at the onsite review (see Section 1.2, Federal Leasing Process). The site-specific environmental analysis at the APD stage may identify mitigation measures to be attached to the approved permit as COAs.

The specific alternatives that were eliminated from detailed analysis are discussed below, along with the rationale for their elimination.

### **2.4.1 Designate Access Routes**

Public scoping and some cooperating agency comments stated concerns related to the potential effects of traffic by vehicles and heavy equipment used by the oil and gas industry on community, residential, and relatively narrow forest roads. The comments pointed out that the roads and bridges, especially those that would be needed to access the eastern-most leases, are not adequate to handle heavy and frequent industry traffic without major improvements. Also of concern was that the heavy vehicle traffic would be incompatible with the other activities in Carbondale and Glenwood Springs, due to existing congestion during ski season and the residential nature of some of the feeder roads that would most likely be used to access the leases. Some commenters specifically expressed concern over the use of Four-Mile Road, which is the primary road that would be used to access the leases south of Carbondale and requested that use of this road by oil and gas vehicles and heavy equipment not be allowed.

Specifically, it was suggested that the BLM consider designating specific routes to access certain leases under one or more alternatives. This alternative was not carried forward because BLM guidelines and policy specify that lease stipulations are used to control on-lease activities, not otherwise lawful off-lease

activities over which BLM has no authority. This alternative would not be consistent with the agency's purpose and need to comply with the BLM's and Forest Service's mineral policy and collaborative responsibility for oil and gas development. The construction, use, or improvement of roads on public lands must be addressed through analysis during a separate NEPA process for right-of-way (ROW) or special use permits. In addition, analysis of not using Four-Mile Road to access oil and gas leases would be covered under Alternatives 4 and 5, in which those leases would be cancelled.

#### 2.4.2 Limit Hydraulic Fracturing

There were public concerns related to the effects of hydraulic fracturing expressed during scoping and recommendations that the BLM should consider limiting or excluding hydraulic fracturing through lease stipulations. **The BLM determined that limiting or disallowing hydraulic fracturing through lease stipulations would not meet the purpose and need or is not economically practicable or feasible** for three primary reasons:

1. There are appropriate mitigation measures required during well development operations to minimize potential adverse impacts;
2. Operators cannot feasibly develop many of the target formations in the 65 leases without hydraulic fracturing, which would result in denying access to the leased minerals; and
3. **The method of hydraulic fracturing or other completion technique is speculative until the site-specific stage of permitting and therefore is not able to be analyzed in detail at the leasing stage.**

#### 2.4.3 Requests to Retain or Cancel Certain Leases

There were many requests made during public scoping for the BLM to cancel all leases in the area known locally as the Thompson Divide. The reason stated for an alternative that cancels these leases is to preserve the current nature of the area, protect natural resources for recreational uses, protect surface water and groundwater, and preserve land values and residential communities.

The BLM considered creating an alternative in response to this public request. This was determined not to be necessary as a separate alternative to be analyzed in detail because it is substantively similar to Alternative 4, which reflects the decision made in the WRNF **Final** ROD (USFS 2015f). The approach to analyzing Alternative 5 in which all leases would be cancelled would consider this option without creating and analyzing a separate alternative.

**Comments made on the Draft EIS also included numerous suggestions to cancel or retain certain leases. These included requests to cancel each lease (comments included rational specific to each lease); all Thompson Divide area leases; all leases with little or no fluid mineral production; all leases in Colorado Roadless Rule areas; all leases in Canada lynx and greater sage-grouse or other sensitive habitat; and all leases that are suspended or expired. Other comments suggested that BLM modify Alternative 5 so that all producing leases would be retained. Comments also suggested an alternative that would cancel all non-producing leases and add Alternative 4 stipulations to producing leases. The BLM determined the inclusion of separate alternative to address these comments was not necessary because 1) each of the lease cancellation alternatives are "components" of Alternative 5, which would cancel all 65 leases; and 2) per 40 CFR 1505, the alternatives considered by the decision-maker must be within the range of alternatives discussed in the analysis; however various parts of separate alternatives within that analysis may be "mixed and matched" to develop a complete alternative, as long as the reasons for doing so are explained (see BLM H-1790-2008). Because the range of alternatives analyzed in this EIS includes the cancellation of all leases, the BLM determined that a decision that cancels more leases than those specified in Alternative 4 but fewer leases than outlined in Alternative 5 or which applies Alternative 4 stipulations to producing leases is within the range of alternatives**

**analyzed. Alternative 1, the No Action Alternative, would retain all leases as issued. The BLM determined that a decision to retain certain leases, as recommended by some public comments, is within the range of alternatives analyzed so a new alternative was not added to consider this option.**

#### **2.4.4 Reducing the Size of the Leases**

Scoping comments suggested that the BLM consider reducing the size of the leases as a way to minimize resource impacts. This suggested alternative was eliminated from detailed analysis because it would have substantially similar effects to Alternatives 3 and 5. Alternative 3 adds large areas of new lease stipulations to minimize adverse effects to important resources. Where there are additional acres of NSO stipulations, the size of the lease is effectively reduced for surface disturbance, only allowing fluid mineral extraction from formations accessed from surface locations that are offset from the target location. Alternative 5 considers cancelling all leases, which would eliminate future development and resource impacts.

#### **2.4.5 Cancelling Suspensions/Allowing Leases to Expire**

Scoping comments suggested that the BLM should cancel all lease suspensions and allow leases to expire. This alternative element was dismissed from detailed analysis because it does not meet the agency's purpose and need to regulate the develop of oil and gas in the public domain as defined by the Mineral Leasing Act as amended and would be inconsistent with the requirement to address the NEPA deficiency identified by the Interior Board of Land Appeals (IBLA).

#### **2.4.6 Requirements for Existing Pollution to be Cleaned Up before Leases are Developed**

Scoping comments suggested that the BLM consider a requirement that existing pollution must be cleaned up before operators can develop their leases. This alternative was dismissed from detailed analysis because it does not meet the BLM's or the Forest Service's purpose and need. Specifically, it does not meet BLM's purpose and need to revisit or reaffirm previous leasing decisions, address the NEPA deficiency identified by the IBLA, or meet the BLM's collaborative responsibility under the Federal Onshore Oil and Gas Leasing Reform Act of 1987 to issue and manage oil and gas leases where the Forest Service has issued a land availability decision. Compliance with applicable laws, regulations, and standards for pollutants or hazardous materials and spills is required as part of the BLM and Forest Service regulations, policies, and guidelines for monitoring and enforcement of federal oil and gas leases (e.g., 43 CFR § 3162).

#### **2.4.7 Requirements for Monitoring of Existing Sites**

Scoping comments suggested that the BLM consider a requirement that existing development be randomly monitored to determine their performance with regard to atmospheric, water, and ground contamination. This alternative was dismissed from detailed analysis because it does not meet the agency's purpose and need to address the NEPA deficiency identified by the IBLA associated with the decision to lease. Monitoring of existing oil and gas leasing is addressed under the site-specific Environmental Assessments and permits that authorize development, and as part of the BLM and Forest Service policies and guidelines for monitoring and enforcement of federal leases. It is not within the scope of a leasing-level EIS.

#### **2.4.8 Considering Drilling of Leases with NSO Stipulations from Adjacent Locations without NSO Stipulations**

Scoping comments requested that the BLM and the Forest Service jointly consider and support the application of directional or horizontal drilling of federal leases designated with NSO stipulations from adjacent new or existing locations on federal leases without NSO stipulations or adjacent locations on private leases. This alternative element was dismissed from detailed analysis because BLM regulations

and policy do not require specific drilling techniques such as horizontal drilling, **which is largely** a technical and economic decision to be made by the operator before submitting an APD. However, it should be noted that this scenario is assumed in some cases in the analysis of the alternatives carried forward.

#### 2.4.9 Additional NSO Stipulations

Respondents requested the following NSO stipulations to protect resources that are not currently specified in the range of alternatives:

- NSO for cultural resources
- NSO for sensitive soils
- NSO stipulations to maintain road density guidelines
- NSO buffers around dams and water control structures
- NSO buffers around injection wells
- NSO within Inventoried Roadless Areas

It is important to note that the range of alternatives does offer the option of cancelling all leases. This alternative may be selected for any or all leases, particularly in which unacceptable adverse resource impacts are disclosed through analysis, including impacts to any resources that are not protected by the NSO stipulations outlined in the alternatives.

Additional reasons for the elimination of these alternatives are included below.

- **Cultural Resources:** The existing regulatory framework, including the National Historic Preservation Act, provides the authority to protect cultural resources. Protection of cultural resources is usually addressed at the site-specific APD stage, after cultural surveys have been done. The BLM and the Forest Service are required to consider avoidance or mitigation of sites eligible for the National Register of Historic Places and there is no need to incorporate a stipulation to protect a resource that is already protected by law.
- **Sensitive Soils:** Surface disturbance on erodible soils and landscape stability will be considered in the EIS impact analysis. The range of alternatives includes NSO and CSU stipulations to address conditions that can lead to loss or degradation of soil resources by disallowing surface disturbance (NSO) or moving surface disturbance away from erodible soils (CSU). These stipulations to protect soil resources would be applied under Alternative 3, following site-specific soil surveys once an APD is filed.
- **Road Density:** Because the locations of future oil and gas development (including new access roads) are not known at this level of the leasing availability analysis, it is not practicable to apply NSO stipulations to areas that may potentially have conflicts with Forest Plan road density guidelines. During the site-specific NEPA process, which is done when an APD is submitted, Forest Plan road density guidelines will be a part of the analysis and design of the proposal.

- **Inventoried Roadless Areas:** These areas were designated by the Forest Service in 2001. It was suggested in public scoping and informal discussions that these areas should be limited with a NSO stipulation. This was eliminated from detailed analysis because these designations have been superseded by the 2012 Colorado Roadless Rule. Alternatives 3 and 4 incorporate current Forest Service leasing requirements for compliance with the 2012 Roadless Rule.

#### **2.4.10 NSO Stipulation Buffers**

Respondents suggested specific buffers to protect various resources with NSO stipulations. These suggestions were dismissed from detailed analysis because they fall within the range of alternatives to be analyzed, which includes a full range of resource protections including the buffers contained in the 1993 analysis (Alternatives 1 and 2), the buffers contained in the 2014 WRNF Final EIS (Alternatives 3 and 4). Additionally, the possibility of no leasing is presented and analyzed under Alternative 5 and is available to the BLM as a decision.

#### **2.4.11 Additional Timing Limitations**

Respondents requested a timing limitation that would prohibit in-channel stream disturbance during fish spawning, egg incubation, and fry emerging seasons. This was not incorporated because the current range of alternatives includes NSO stipulations for both native cutthroat trout habitat and water influence zones, which includes perennial streams.

#### **2.4.12 Additional Resource Protections**

Scoping commenters suggested numerous design features and BMPs for various resources including the following. These design features, mitigation measures, and BMPs are more appropriately considered during the APD process, after operators submit a site-specific plan of operations for evaluation. For this reason, they were not added as part of an alternative to be analyzed in detail.

- **Well Design:** design specifications related to well drilling, stimulation, production, and closure phases.
- **Air Quality:** air quality mitigation measures such as methane capture, or other control measures; requirements for air quality monitoring.
- **Human Health and Safety:** use of bear-proof trash containers to reduce wildlife-human conflicts; BMPs to reduce the threat of industry-caused fire, and requirements for emergency response plans.
- **Scenic Resources:** BMPs to protect recreation uses in the area, such as locating disturbance and equipment to minimize visual detection, and painting equipment in neutral tones that match surrounding landscape.
- **Transportation:** BMPs outlining collaboration needs for transportation routes.
- **Water Resources:** requirements to minimize the number of road-stream crossings; BMPs to manage road drainage and erosion to avoid routing sediment to streams; requirements for water resources management plans; and requirements for use of recycling produced water in well drilling and stimulation.

#### **2.4.13 More Expansive Definition of Alternative 2**

BLM considered a preliminary version of Alternative 2 that would have included modifying the geographic application of stipulations currently attached to the 65 leases, or be attached based on the WRNF 1993 ROD, to match more current mapping of those resources. This alternative element was eliminated as redundant with Alternatives 3 and 4, which rely on contemporary mapping of various resources to establish stipulations that are protective of those resources.

The BLM also considered a preliminary version of Alternative 2 that would have included modifying the leases to add stipulations needed to ensure compliance with applicable laws and regulation. This alternative element was eliminated from detailed analysis because: 1) it was somewhat redundant with **SLTs** and supplemental authorities, which require compliance with applicable laws and regulations, and 2) it was not clear whether any stipulations would be needed to ensure compliance. Therefore, Alternative 2 was defined with a more limited scope to allow analysis of a broad range of alternatives to inform the BLM's eventual decision.

#### **2.4.14 Out of Scope Alternatives**

**During the public comment period for the Draft EIS, public comments included requests for an alternative that would cancel additional leases outside of the 65 leases in question (including but not limited to all leases with the WRNF or all leases within Colorado), a negotiated lease exchange, buyout, or legislative removal of the existing leases; consideration of renewable energy projects in place of the federal oil and gas leasing program; and other suggestions unrelated to oil and gas leasing (see Appendix E, Response to Comments).**

**As disclosed in Section 1.5 of the Draft EIS, the decision to be made by the BLM is whether the 65 leases should be: 1) reaffirmed with their current existing stipulations; 2) modified with additional or different lease stipulations or additional mitigation measures; or 3) cancelled. Consideration of negotiated lease exchange, buyout, or legislative removal of leases; renewable energy projects in place of the federal oil and gas leasing program; cancelling other leases outside of the 65 leases; or taking other actions unrelated to mineral leasing would not respond to the agency's purpose and need, would be outside the BLM's authority, and would be inconsistent with the basic policy objectives for the management of the area.**

### **2.5 Land Use Plan Conformance and Consistency**

The Forest Service is responsible for determining what National Forest System (NFS) lands are available for leasing and under what stipulations. It also regulates all surface-disturbing activities conducted during exploration and development of oil and gas leases. The BLM is responsible for issuing oil and gas leases and permits for subsurface development of all federal fluid minerals including those underlying NFS lands. Conformance and consistency with Forest Service and BLM land use plans is discussed below.

#### **2.5.1 Forest Plan Consistency**

The first leasing decision on the WRNF was made with the 1993 Leasing Final EIS, ROD and Amendment to the Forest Plan. The 1993 Oil and Gas Leasing ROD analyzed lands for leasing and made approximately 950,000 acres available for oil and gas leasing with approximately 417,000 acres of the total available actually readily leasable without any additional environmental analysis. The 65 leases under analysis in this EIS were authorized by the WRNF 1993 Oil and Gas Leasing ROD.

In 2002, the WRNF published its Land Resource Management Plan (LRMP) Revision (USFS 2002a) and accompanying Final EIS analysis. The 2002 LRMP adopted the 1993 White River National Forest Oil and Gas Leasing ROD without changes, except that certain areas were made unavailable for leasing due to wild and scenic river designations or were recommended for wilderness.

This EIS evaluates a range of stipulations for oil and gas leasing, all of which are consistent with the WRNF 1993 Oil and Gas Leasing ROD, the 2002 LRMP, or the 2015 WRNF Oil and Gas Leasing **Final** ROD that updates the 2002 LRMP. Forest Plan consistency is compared to the alternatives analyzed in detail in this EIS in the summary below.

- Alternative 1: This alternative would continue managing the existing leases according to the decisions made in the 1993 WRNF Oil and Gas Leasing ROD. This alternative would not apply new lease stipulations, and would therefore be inconsistent with the 2002 LRMP.
- Alternative 2: This alternative would address inconsistencies in leasing stipulations or apply new lease stipulations not contained in the 2002 LRMP. Therefore, this alternative would be consistent with the 2002 LRMP.
- Alternative 3: Under this alternative, new proposed lease stipulations considered under the Proposed Action in the 2014 WRNF Oil and Gas Leasing Final EIS would be applied to the existing leases for the purpose of protecting resources. This alternative would be consistent with the 2002 LRMP and the proposed changes to the Forest Plan per the 2015 WRNF Oil and Gas Leasing Final ROD (USFS 2015f) because it adds stipulations contained in the LRMP **although the 2014 Final EIS and 2015 ROD did not address decisions on existing leasing. The BLM has the authority to add additional lease stipulations beyond those identified and confirmed by the Forest Service.**
- Alternative 4: Under this alternative, new proposed lease stipulations identified in the 2015 WRNF Oil and Gas Leasing Final ROD (USFS 2015f) would be applied to the existing leases for the purpose of protecting resources. Some of the 65 existing federal oil and gas leases on the WRNF would be cancelled within those areas identified as not available for future leasing. This alternative would not be in conformance with the availability decisions in the 2002 LRMP but would be consistent with BLM's authority not to offer the lease. The alternative would be consistent with the decisions in the 2015 WRNF Oil and Gas Leasing Final ROD (USFS 2015f) for future leasing, **which did not address decisions on existing leasing. The BLM has the authority to add additional lease stipulations beyond those identified and confirmed by the Forest Service.**
- Alternative 5: This alternative would cancel all 65 existing federal oil and gas leases on the WRNF. This alternative would not be in conformance with the availability decisions in the 2002 LRMP but would allow for future consistency with the changes identified in the 2015 WRNF Oil and Gas Leasing Final ROD (USFS 2015f) because **the 2015 ROD did not address decisions on existing leasing and this alternative would enable the 65 leases to be reissued according to the Forest Service decision in the future.**
- **Preferred Alternative: This alternative would address inconsistencies in leasing stipulations or apply or apply the lease stipulations contained in the 1993 LRMP and validated in the 2002 LRMP to the 23 producing or committed leases and 4 expired leases. New proposed lease stipulations identified in the 2015 WRNF Oil and Gas Leasing Final ROD (USFS 2015f) would be applied to 13 undeveloped existing leases for the purpose of protecting resources, and 25 undeveloped leases would be cancelled in full within the area identified as closed to future leasing within the WRNF Final ROD (USFS 2015f). Therefore, this alternative would be consistent with either the 2002 LRMP or the 2015 ROD (which did not did not address decisions on existing leasing), depending on the development status and location within the leasing area under evaluation. The BLM has the authority to add additional lease stipulations beyond those identified and confirmed by the Forest Service.**

## 2.5.2 BLM Resource Management Plan Conformance

While responsibility for issuing and managing the 65 leases analyzed in this EIS resides primarily with the BLM Colorado River Valley (CRVFO) (with one lease to the north managed by the BLM White River [WRFO]), the CRVFO and WRFO do not determine what NFS lands are available for leasing nor do they identify the stipulations under which lands will be leased. Therefore, any changes in lease stipulations or availability of lands for leasing on NFS lands would not require changes to the CRVFO or WRFO Resource Management Plans (RMPs).

An evaluation of BLM RMP conformance would be necessary if BLM lands were to be used to provide offsite access to leases. Offsite access, to be determined at the development stage for each lease during processing of APDs, could involve lands managed by the CRVFO, WRFO, as well as the Grand Junction and Uncompahgre FOs. Conformance with the RMPs for these FOs would be evaluated as needed when a site-specific plan of development is submitted to the BLM with details regarding lease access.

## **2.6 Management Requirements, Monitoring, and Environmental Protection Measures Common to All Alternatives**

**Table 1-3** includes a list of major laws and regulations that apply to the leasing and development of federal fluid minerals on the WRNF. There are additional federal laws, regulations, and policies that may apply depending on site-specific resources and conditions. To assist the reader in understanding the oil and gas development phases, regulations, onshore orders, and BMPs, additional information is available on the Forest Service website at <http://www.fs.fed.us/geology/energyOil&Gas.html> and on the BLM Colorado website at [http://www.blm.gov/co/st/en/BLM\\_Programs/oilandgas.html](http://www.blm.gov/co/st/en/BLM_Programs/oilandgas.html). The application of these laws to future development under the Proposed Action and alternatives is assumed in the analysis contained in Chapter 4.0. Because this NEPA process will not result in the approval or authorization of any aspects of development or surface-disturbing activities, identifying design features, BMPs, and COAs to be selected for yet-to-be-identified future development and production projects is best suited for future site-specific environmental analysis when locations are known. See Section 1.4 for a complete description of the decisions to be informed by this EIS.

Future site-specific analysis would occur when there is a review of onsite resources and conditions after the operator submits a Surface Use Plan of Operation (SUPO) and APD for oil and gas exploration or development. The onsite review helps to determine the level of NEPA analysis required, such as a categorical exclusion, environmental assessment, or EIS, before a SUPO can be approved and a permit to drill is issued. The site-specific analysis would evaluate requests by operators to approve waivers, exceptions, or modifications of lease stipulations. Regardless of the level of NEPA analysis, the onsite review is used to determine what site and project specific design features, BMPs, mitigation measures, or COAs would be attached to the SUPO and permit to drill to minimize impacts and protect resources.

## **2.7 Development Assumptions for Use in Impact Analysis**

The 2014 WRNF Oil and Gas Leasing EIS is a programmatic environmental analysis that considers conceptual or planning-level alternatives. For this EIS analyzing potential changes to the 65 previously issued leases, the Reasonably Foreseeable Development Scenario (RFDS) (USFS 2010a), described briefly in Chapter 1.0, Section 1.1.4 and included as Appendix F of the WRNF Oil and Gas Leasing Draft EIS (USFS 2012) was used to determine the amount of conceptual future development in order to compare potential impacts of the proposed leasing stipulations under each alternative.

The following sections provide a simplified description of the typical process by which a federal fluid mineral well on NFS land would be developed in this region following issuance of a lease. This information forms the basis for the development assumptions that are used in the Chapter 4.0 analysis and is followed by summary tables of projected well numbers, associated ancillary facilities, surface disturbance, and water demands by well type and alternative.

### **2.7.1 Typical Well Development Process**

#### **2.7.1.1 Application for Permit to Drill**

Prior to the start of construction activities, the operator submits site-specific applications to the BLM such as Notice of Staking, APD accompanied by a SUPO, and ROW application, as necessary. The operator submits project survey information, including detailed construction plans, and stakes the location on the ground. Although the BLM or Forest Service is responsible for resource surveys, the operator typically



engages an independent third-party contractor to complete the cultural resource, biological, and other surveys, and provides written reports to the BLM or Forest Service as required.

The BLM forwards the SUPO to the Forest Service for review and approval. The BLM completes a geologic and petroleum engineering review of the proposal. The Forest Service and the BLM perform onsite evaluations of surface resources and complete a NEPA analysis as part of the review process. During the APD process, the BLM and Forest Service will determine whether any ROW grants or special use permits are required. The agencies also will identify any BMPs, design features, and mitigation measures that are required to be constructed to protect surface resources and comply with laws and regulations.

Operations by a lessee or operator do not require a special use permit for activities overlying the federal lease being developed, or when the lease is part of a federal unit or communitization agreement. A ROW grant from the BLM or a special use permit from the Forest Service (depending on the surface land manager) is required for well pads, tank batteries, pipelines, powerlines, and access roads that occupy federally owned land outside the lease or unit boundary associated with the proposed oil and gas well.

Once the SUPO is approved and the permit to drill is issued, the operator begins construction of access roads, well pads, pipelines, powerlines, and other ancillary facilities prior to drilling the well. Before surface-disturbing activities start, the operator must obtain a bond to ensure compliance with all lease terms, COAs, and reclamation requirements.

#### **2.7.1.2 Access Road and Well Pad Construction**

Most new access roads would be constructed as laterals from existing roads. Should a new access road be needed, the operator would move construction equipment over existing roads to the point where the access road would begin. Moving equipment to the construction site, such as bulldozers, scrapers, graders, backhoes, and trenchers using trucks) would require transporting several truckloads over public and private roads.

Generally the shortest feasible route would be selected to minimize the distance and construction costs, but environmental factors or the landowner's preference may dictate a longer haul route. The amount of surface area needed for roads depends upon topography and the types of loads they would carry. New roads to be developed for well pads are assumed to require up to a 75-foot disturbance corridor to allow room for construction of both the road and pipeline. Following construction, the disturbed area is stabilized and reclaimed, leaving a 25-foot-wide roadway including side ditches. Roads must comply with the guidance in the Surface Operating Standards for Oil and Gas Exploration and Development (U.S. Department of Interior and U.S. Department of Agriculture 2007), commonly called the "Gold Book."

Well pads are usually constructed from the native sand/soil/rock materials present. Locations are leveled by balancing cut and fill areas. Heavy equipment is used to clear, level, and prepare the site of the well pad. In general, vertical and directional wells require smaller well pads than horizontal wells. The average disturbance footprint for well pads outlined in the RFDS would be 6 acres, assuming that more than one well is drilled from a single pad. The EIS analysis assumes an average of 7 wells would be drilled from each well pad for vertical and directional wells and 2 wells per pad for horizontal wells.

Following well drilling and completion activities (see below), operators would reduce the size of the average 6-acre well pads to the minimum working surface area needed for production facilities and future workovers while allowing for reshaping and stabilization of cut-and-fill slopes. Interim reclamation would be accomplished by grading, leveling, and seeding, as required in the permit to drill. Interim reclamation would reduce the disturbed area at each pad to approximately 3.5 acres.

### **2.7.1.3 Drilling**

Once roads are constructed, the drilling rig and associated equipment would be moved to the location and erected. Moving a drilling rig may require 10 to 25 truckloads of equipment over public highways and private roads. Special transportation permits for oversize loads would need to be obtained from the Colorado Department of Transportation. Derrick heights vary depending on the depth or weight capacity of the rig, but when erected, these heights could range from 160 feet for rigs drilling directional wells to 195 feet for rigs drilling horizontal wells.

Water for drilling would be hauled to storage tanks onsite. Water sources are typically from wells or commercial water sources permitted by the Colorado State Engineer for the use of surface or subsurface water for drilling. When drilling commences, and as long as it progresses, water would be continually transported to the rig location. Roughly 6,000 barrels or 252,000 gallons of fresh water (0.77 acre-foot) would be required to drill a vertical or directional well to the depth of between 3,500 and 7,500 feet. Horizontal wells would require approximately 25,000 barrels or 1,050,000 gallons of fresh water (3.22 acre-feet). More water would be required if circulation is lost.

Once the rig is ready, the hole is drilled to the appropriate depth, at which point surface casing would be set and cemented. Surface casing is set to a depth greater than the deepest fresh water aquifer that could be reasonably developed. After the surface casing is set, a blowout preventer is attached to the top of the surface casing to control the release of subsurface fluids (oil, gas, and water) to the surface. Minimum standards and enforcement provisions for drilling operations are addressed in Onshore Order No. 2.

Drilling is usually accomplished with water or drilling fluids (“mud”) that aid the drilling of the wellbore to depths within about 1,000 feet of the prospective formation. Drilling is usually conducted using a closed-loop drilling system, in which freshwater-based mud is circulated by means of pump pressure from tanks down the drill pipe, through jets in the bit, and up the space between the wellbore and the drill pipe. As mud and cuttings come to the surface, the mud is augmented with fresh mud in the rig’s mud tanks and recirculated and reused continually in the drilling process while drill cuttings are removed from the mud system typically with centrifuges and shaker systems. Drill cuttings are typically stored in a bermed or trenched area on the pad sometimes augmented with drying agents to prevent runoff. Drilling mud may be oil-based (diesel or mineral oil) or synthetic (olefins or paraffins). Synthetic drilling mud is more biodegradable and less toxic than standard oil-based muds.

The duration of drilling operations on a given well can vary greatly depending on depth and conditions encountered while drilling. Drilling operations are continuous, 24 hours a day, 7 days a week, and are estimated to take approximately 10 days for vertical or directionally drilled wells and 60 days for horizontally drilled wells. Pickup trucks or cars are used for workers’ transportation to and from the drilling site.

### **2.7.1.4 Well Testing and Completion**

Upon reaching target depth, a series of geophysical logging tools are run in the well to evaluate the potential resource and make a determination regarding the productive potential of the well. If oil or gas is not discovered in commercial quantities, the well is considered dry. The operator would then be required to follow BLM procedures to properly plug the dry hole and the drill site and access road would be rehabilitated in accordance with the stipulations attached to the APD and the plugging approval.

If the well will be completed as a producer, the drilling rig is moved off the site after the production casing is cemented. A smaller rig, called a completion rig, then is moved in and utilized for running casing identification logs, perforating, running down hole pumps, running production tubing in the wellbore, and setting the wellhead valves and controls. The rest of the fluid treatment and handling system is installed at this time, such as production and storage tanks, dehydrators, separators, measuring systems, sales

meters, and flow lines. A typical cased wellbore consists of conductor pipe, surface casing, and production casing. The surface, intermediate, and production casing/cementing programs are designed to isolate and protect shallower formations and aquifers from the production stream and to minimize the potential for migration of fluids and pressure communication between formations.

After drilling and casing of the well, a completion program is typically initiated to improve resource recovery by increasing the rate and volume of hydrocarbons moving into the wellbore. These processes are known as well-stimulation treatments and include hydraulic fracturing (or “fracking”), acidizing, and other mechanical and chemical treatments, often used in combination. Hydraulic fracturing is a process used to maximize the extraction of underground resources by allowing the fluid minerals to move more freely from the rock pores to the production well. Fluids, commonly made up of water and chemical additives (e.g., recycled or fresh water, liquid carbon dioxide, sand, and chemical additives), are pumped into a geologic formation at high pressure during hydraulic fracturing. When the pressure exceeds the rock strength, the fluids open or enlarge fractures. After the fractures are created, a propping agent is pumped into the fractures to keep them from closing when the pumping pressure is released. After fracturing is completed, up to 80 percent of the injected fracturing fluid returns to the wellbore. The specific type and components of the hydraulic fracturing fluid vary based on geologic formation and company. In Colorado, operators are required by the Colorado Oil and Gas Conservation Commission (COGCC) to maintain a list of the chemicals used in hydraulic fracture of each well and to submit that information to an online data repository ([www.fracfocus.org](http://www.fracfocus.org)).

Groundwater is protected during the hydraulic fracturing process by a combination of the casing and cement that is installed when the well is drilled and by the depth of the rock between the fracture zone and any fresh-water bearing zones or aquifers. Generally, for a typical Mesa Verde well (common to this analysis area), approximately eight hydraulic fracturing stages are performed for each well to free up gas in tight sand lenses.

After completion operations are finished, wellhead equipment, consisting of various valves and pressure regulators, is installed to control the oil or gas flow to the production facilities and to safely shut in the well under any conditions.

Completion activities are continuous, 24 hours a day, 7 days a week, and are estimated to take approximately 20 days for vertical or directionally drilled wells and 30 days for horizontally drilled wells.

#### **2.7.1.5 Well Production**

During production, employees of the operator visit the wells on an as-needed basis, estimated to be about twice per week per pad, to inspect well site facilities and perform other routine maintenance activities on a year-round basis. Field operations also are inspected by the BLM and Forest Service to ensure accountability for royalties, compliance with the lease, and compliance with permits, safety, and environmental requirements.

Produced water and liquid condensate is disposed of by trucking or piping the water to an authorized disposal area and treated. Produced water may be utilized in hydraulic fracturing operations after undergoing a treatment or disposed in an authorized disposal well. The COGCC controls all aspects of disposal wells. The BLM authorizes produced water from federal wells to be disposed of in an approved disposal facility.

It is estimated that when the field is mature each vertical or directionally drilled well would produce approximately 38,000 barrels of fluids (water and condensate) over the life of the well and that each horizontally drilled well would produce approximately 75,000 barrels of fluids (water and condensate) over the life of the well.

### 2.7.1.6 Well Abandonment and Reclamation

It is expected that the typical well would remain economically productive for approximately 20 to 30 years. When the well is depleted and can no longer produce in paying quantities, the operator would submit a plug and abandonment plan. Abandonment of the well pads and facilities would be performed in accordance with all applicable COGCC, Forest Service, and BLM regulations. Subsurface pipelines would be decommissioned from service, plugged at specific intervals, and abandoned in place. The well pad and access road would be closed, graded to natural contours, and reclaimed according to Forest Service specifications from the SUPO and applicable COAs.

The Forest Service would be responsible for establishing and approving the methods for surface rehabilitation, and determining when this rehabilitation has been satisfactorily accomplished. When surface reclamation is completed and desirable vegetation successfully established, the operator would submit a Final Abandonment Notice. When all wells on a lease are satisfactorily reclaimed, the bond would be released.

### 2.7.2 Differences between Vertical or Directionally Drilled and Horizontally Drilled Wells

The RFDS for the analysis area assumes development of the Mesa Verde Formation primarily by the use of conventional vertical or directionally drilled wells. Directionally drilled wells usually begin **and end as** vertical wellbores. At a designated depth the wellbore trajectory bears off on a **non-vertical** angle that is offset from the surface location to **reach a different area of the reservoir, then returns to vertical to intercept the reservoir**. They are often called “s-curve” wellbores to characterize a common configuration. Directional drilling may be used to minimize the wells' environmental impact because multiple wells may be drilled from one well pad, reducing the number of well pads and ancillary facilities and associated surface disturbance.

Horizontal drilling typically starts out with a vertical wellbore until it reaches the target formation, then is turned horizontally **a designated depth (the “kickoff point”), to intercept the reservoir**. Horizontal drilling offers the following differences from a vertical or directional well.

- A horizontal well may produce at rates several times greater than a vertical well, due to the increased wellbore surface area within the producing formation.
- Operators are able to develop a reservoir with a sufficiently smaller number of horizontal wells because each well can drain a larger rock volume about its bore than a vertical well.
- Horizontal wells take longer to drill and complete, **may use** larger well pads for different drilling rigs, require more water for drilling and completion, and often generate more produced water.

### 2.7.3 Development Assumptions

**Table 2-7** displays the assumptions for surface disturbance, water use, and production forecasts by type for a typical well in the analysis area, depending on the drilling technology. The table and the projections for development of the 65 existing leases assume all wells would produce gas with small amounts of oil. For this reason, no production of oil is listed. **Table 2-7** also shows the projected surface disturbance, water usage, and mineral production based on the RFDS, assuming that the leases would be unconstrained by more than **SLTs**.

**Table 2-8 lists other assumptions for typical wells. The assumptions shown in Tables 2-7 and 2-8 are used in the impact analysis contained in Chapter 4.0.** Initial surface disturbance in **Table 2-7** refers to bare soils resulting from earthmoving activities until interim reclamation is achieved. Long-term surface disturbance refers to unvegetated surface that remains in that condition until final reclamation is completed. For example, during well pad construction **and assuming 7 wells per pad as shown in**

**Table 2-8**, up to 6 acres would be disturbed (short-term) and it is assumed that 2.5 acres would be graded and revegetated, leaving 3.5 acres of long-term surface disturbance.

**Table 2-7 Surface Disturbance, Water Use, Production by Typical Well Type**

Facility/Resource	Vertical/Directional				Horizontal			
			RFDS (Unconstrained)				RFDS (Unconstrained)	
Number of wells					427			
Number of pads					61			
Surface Disturbance (acres)	Rate		Total Amount <sup>1</sup>		Rate		Total Amount <sup>1</sup>	
	Initial	Long-term	Initial	Long-term	Initial	Long-term	Initial	Long-term
Pad size (per well)	0.9	0.5	366	214	0.9	0.5	14.6	8.5
Roads/Pipeline (per pad)	9.0	3.0	549	183	9.0	3.0	21.9	7.3
Water Use (acre-feet)	Rate		Total Amount <sup>1</sup>		Rate		Total Amount <sup>1</sup>	
	0.77		330		3.22		55	
Completion <sup>2</sup> (per well)	6.44		2,752		77.3		1,314	
Fluid Production (per well, life of well)	Rate		Total Amount <sup>1</sup>		Rate		Total Amount <sup>1</sup>	
	1.2		512		6.4		109	
Produced Water (acre-feet per well)	4.9		2,1		9.7		164	

<sup>1</sup> Due to rounding of decimal places, the total amounts shown may vary from a calculation using the numbers displayed for the per well rates.

<sup>2</sup> Water used for well completions is assumed to comprise at least 80 percent recycled water and no more than 20 percent fresh water.

Bcf = Billion Cubic Feet

**Table 2-8 Other Development Assumptions for Typical Wells**

Category	Activity	Vertical or Directional Well	Horizontal Well
Surface disturbance	Road and pipeline disturbance ((per pad)	1 mile @ 75 ft. wide (initial); 1 mile @ 25 ft. wide (long-term)	
Drilling practice	Wells per pad (maximum)	7 per pad	2 per pad
	Drilling Duration	10 days	60 days
	Completion Duration	20 days	30 days
	Specific practices	Closed loop, green completions	Closed loop, green completions, synthetic mud
	Directional Reach (depends on total vertical depth)	1,000 to 5,000 ft.	10,560 ft.
Transportation (trips per well pad)	<b>Total for Drilling<sup>1</sup></b>	<b>266</b>	<b>916</b>
	Over-Legal Trucks	7	14
	Heavy Trucks	86	281
	Light Trucks	172	621
	<b>Total for Completion<sup>2</sup></b>	<b>376</b>	<b>497</b>
	Over-Legal Trucks	1	1
	Heavy Trucks	241	294
	Light Trucks	134	202
	<b>Daily for Operations/Maintenance<sup>3</sup></b>	10 trips per day	10 trips per day
	Over-Legal Trucks	0 (workover only) <sup>4</sup>	0 (workover only) <sup>4</sup>
	Heavy Trucks	4	4
	Light Trucks	6	6
	<b>Total for Reclamation<sup>5</sup></b>	<b>54</b>	<b>53</b>
	Over-Legal Trucks	2	2
	Heavy Trucks	10	10
Light Trucks	41	41	
Staffing	Employees Per Day	55	55

<sup>1</sup> Drilling estimates include road, pad and pipeline construction, drilling rig up/rig down, and drilling phases.

<sup>2</sup> Completion estimates include mobilization and completion phases.

<sup>3</sup> Operations include ongoing production and workovers. **This is a conservatively high assumption based on Forest Service estimates.**

<sup>4</sup> Over-legal trucks are estimated to be used during workovers only (which would occur every 4 years, and up to 10 days per well).

<sup>5</sup> Reclamation estimates include plugging and abandoning the well and reclaiming roads and pads.

Source: Mobley 2014.

### 2.7.4 Well Numbers Under Each Alternative

The numbers of wells predicted to be developed under each alternative was determined by starting with the unconstrained development from the RFDS, shown in **Table 2-7**; prorating the well numbers projected for each zone based on past development numbers, production potential, and anticipated drilling technology; and considering the constraints on development, such as NSO stipulations and the maximum distance from the surface location to the target formation. **Table 2-9** displays the estimated number of new wells and pads that are used as the basis for the analysis of effects in Chapter 4.0.

Because the number of wells and pads are prorated based on scaling the RFDS projections but the actual numbers and locations of wells and pads **are** unknown for this leasing analysis, there are fractional numbers for wells and pads only to be used for the analysis of impacts. **Appendix D** describes the process for scaling the RFDS projections for each alternative in more detail.

**Table 2-9 Number of Projected Wells by Alternative**

Zone/Well Type	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5 <sup>1</sup>	Preferred Alternative
<b>Zone 1</b>						
Vertical/ Directional Wells	19.7	19.7	19.7	19.7	0	<b>19.7</b>
Horizontal wells	16	16	16	16		<b>16</b>
Pads	5.1	5.1	5.1	5.1	0	<b>5.1</b>
<b>Zone 2</b>						
Vertical/ Directional Wells	318.1	318.1	318.1	318.1	-73	<b>318.1</b>
Horizontal wells	1	1	1	1		<b>1</b>
Pads	45.6	45.6	45.6	45.6	-13	<b>45.6</b>
<b>Zone 3</b>						
Vertical/ Directional Wells	50.7	50.7	47.6	17.9	-2	<b>10.6</b>
Horizontal wells	1	1	1	0.4		<b>0.2</b>
Pads	7.4	7.4	6.9	2.6	-3	<b>1.5</b>
<b>Zone 4</b>						
Vertical/ Directional Wells	10	10	10	10	0	<b>10</b>
Horizontal wells	0	0	0	0		<b>0</b>
Pads	1.4	1.4	1.4	1.4	0	<b>1.4</b>
<b>Totals</b>						
Vertical/ Directional Wells	398.4	398.4	395.4	365.7	-75	<b>358.4</b>
Horizontal wells	18	18	18	17.4		<b>17.2</b>
Pads	59.5	59.5	59.1	54.7	-16	<b>53.7</b>

<sup>1</sup> Negative numbers in this column account for the numbers of wells and pads to be reclaimed under Alternative 5, which is the only alternative that requires reclamation of existing wells and pads consequent to their cancellation.

**2.7.5 Comparison of Alternatives**

**Table 2-10** displays, by alternative, projected surface disturbance (for well pads, roads, and pipelines), as well as projected water use, transportation needs, staffing requirements, and production forecasts for reasonably foreseeable development. The totals shown in the table account for the combination of vertical/directional wells and the number of horizontal wells projected under each alternative. These results are used in the analysis contained in Chapter 4.0.

**Table 2-10 Development Assumptions by Alternatives**

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5 <sup>1</sup>	Preferred Alternative
<b>Zone 1 (10,114 acres)</b>						
Initial Surface Disturbance (acres)	77	77	77	77	0	<b>77</b>
Long-term Surface Disturbance (acres)	33	33	33	33	0	<b>33</b>
Fresh Water Use <sup>2</sup> (acre-feet)	339	339	339	339	0	<b>339</b>
Recycled Water Use (acre-feet)	1,091	1,091	1,091	1,091	0	<b>1,091</b>
Gas Production (Bcf)	126	126	126	126	0	<b>126</b>
Produced Water (gallons)	81,761,565	81,761,565	81,761,565	81,761,565	0	<b>81,761,565</b>
<b>Zone 2 (24,938 acres)</b>						
Initial Surface Disturbance (acres)	684	684	684	684	76	<b>684</b>
Long-term Surface Disturbance (acres)	296	296	296	296	0	<b>296</b>
Fresh Water Use <sup>2</sup> (acre-feet)	675	675	675	675	0	<b>675</b>
Recycled Water Use (acre-feet)	1,702	1,702	1,702	1,702	0	<b>1,702</b>
Gas Production (Bcf)	388	388	388	388	0	<b>388</b>
Produced Water (gallons)	510,837,600	510,837,600	510,837,600	510,837,600	0	<b>510,837,600</b>
<b>Zone 3 (42,767 acres)</b>						
Initial Surface Disturbance (acres)	111	111	104	39	10	<b>23</b>
Long-term Surface Disturbance (acres)	48	48	45	17	0	<b>10</b>
Fresh Water Use <sup>2</sup> (acre-feet)	123	123	117	44	0	<b>26</b>
Recycled Water Use (acre-feet)	323	323	307	115	0	<b>70</b>
Gas Production (Bcf)	67	67	64	24	0	<b>14</b>
Produced Water (gallons)	84,067,200	84,067,200	79,119,600	29,713,855	0	<b>17,681,236</b>



**Table 2-10 Development Assumptions by Alternatives**

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5 <sup>1</sup>	Preferred Alternative
<b>Zone 4 (2,562 acres)</b>						
Initial Surface Disturbance (acres)	21	21	21	21	0	<b>21</b>
Long-term Surface Disturbance (acres)	9	9	9	9	0	<b>9</b>
Fresh Water Use <sup>2</sup> (acre-feet)	21	21	21	21	0	<b>21</b>
Recycled Water Use (acre-feet)	52	52	52	52	0	<b>52</b>
Gas Production (Bcf)	12	12	12	12	0	<b>12</b>
Produced Water (gallons)	15,960,000	15,960,000	15,960,000	15,960,000	0	<b>15,960,000</b>
<b>Totals (80,381 acres)</b>						
Initial Surface Disturbance (acres)	893	893	886	821	86	<b>805</b>
Long-term Surface Disturbance (acres)	386	386	383	355	0	<b>349</b>
Fresh Water Use <sup>2</sup> (acre-feet)	1,158	1,158	1,152	1,079	0	<b>1,061</b>
Recycled Water Use (acre-feet)	3,168	3,168	3,152	2,960	0	<b>2,914</b>
Gas Production (Bcf)	593	593	590	550	0	<b>540</b>
Produced Water (gallons)	692,626,365	692,626,365	687,678,765	638,273,020	0	<b>626,240,401</b>

<sup>1</sup> Under Alternative 5, all leases would be cancelled; therefore the number of new wells in all zones would be zero. The Alternative 5 column displays the surface disturbance due to reclamation of existing wells, pads, and roads.

<sup>2</sup> Includes 20% of completion water (for hydraulic fracturing) that is not recycled.

Note: Assumptions used to calculate this information are derived from **Tables 2-7, 2-8, and 2-9**.

## 2.8 Summary of Impacts by Alternative

**Table 2-11** provides a summary of the key direct and indirect environmental impacts for each resource analyzed under each alternative. Detailed descriptions of impacts are presented in each resource section in Chapter 4.0. The summarized impacts assume the implementation of laws, regulations, and environmental protection measures required by permits and policy.

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**Table 2-11 Summary of Environmental Impacts and Resource Protections**

Resource Affected	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Preferred Alternative
<b>Air Quality</b>	Based on the Comprehensive Air Resources Protection Protocol implemented by the BLM, the air quality modeling has been completed for this region through the Colorado Air Resources Management Modeling Study (CARMMS). Emissions from projected future development in the 65 leases were previously analyzed in a regional NEPA analysis (CARMMS) and determined not to contribute significantly to adverse effects on air quality. Disclosure of emissions inventories at the project level and monitoring would be required during development and production.				No further analysis or monitoring of air quality would be required under this alternative.	<b>Same as Alternatives 1, 2, 3 and 4.</b>
<b>Geologic Hazards</b>	CSU and NSO stipulations for steep slopes and geological hazards would provide limited coverage to unstable areas.	Coverage of unstable sites from stipulations would be similar to Alternative 1, with slightly more acreage of NSO in Zone 3.	The only stipulations that would minimize impacts to lands with geologic hazards are those designed to protect steep slopes. While this includes slightly more acreage of stipulations intended to cover these unstable areas, the greater limitations on development of lands with geologic hazards would result from NSO stipulations designed to protect other resources, should they be implemented.	Coverage of areas prone to geologic hazards would be similar to that described for Alternative 3. The exception is that those leases that would be cancelled in Zone 3 would not be developed so geologic hazards in the area that would be closed to leasing would not be disturbed by mineral development.	Reclamation of existing wells and other infrastructure would not increase geologic hazards or disturb unstable slopes.	<b>CSU and NSO stipulations for steep slopes and geological hazards would provide limited coverage to unstable areas, but lease cancellation would preclude development in 77 percent of Zone 3.</b>
<b>Minerals</b>	Estimated total production of 593 Bcf, approximately 28 Bcf less than projected for by the unconstrained RFDS.	Same projected gas production as Alternative 1.	Estimated total production of 590 Bcf, slightly less than Alternative 1. <b>Changes in lease stipulations and would have increased effects on oil and gas operations and ultimately impacts to access to the resources and revenues by potentially increasing the costs of development and production. Development impacts may also extend to adjacent leases and larger planned developments.</b>	Estimated total production of 550 Bcf, less than Alternative 1. <b>Impacts to operations and orderly oil and gas development would be similar in type to Alternative 3 but is likely to have a greater impact on Operators due the partial or full cancellation of 25 leases.</b>	There would be an estimated loss of 45 Bcf gas production from the 75 producing wells. <b>The potential for this to occur would be reduced under the Preferred Alternative, which would retain existing stipulations on producing or committed leases. Alternative would have the greatest impact, by cancelling all 65 leases.</b>	<b>Estimated total production of 540 Bcf, which is less than all alternatives proposing development. Impacts to Operators and orderly oil and gas development would less than Alternative 4 due to the retention of existing stipulations on producing or committed leases and the elimination of partial lease cancellations.</b>
<b>Paleontological Resources</b>	There are no stipulations designed to minimize impacts to important paleontological deposits. Protection of Potential Fossil Yield Classification Class 3 and 5 formations would result from implementation of NSO stipulations for other resources, if implemented, and the required management of those classes.	Similar to Alternative 1.	CSU stipulations designed to minimize impacts to paleontological resources would effectively cover almost all of the lease area so important fossil-bearing formations potentially would be protected.	Coverage by stipulations would be similar to that described for Alternative 3, with either NSO stipulations or areas closed to leasing limiting or eliminating surface disturbance in most areas.	Decommissioning and reclamation would take place on previously disturbed ground, so adverse impacts to fossil-bearing formations is unlikely.	<b>For those leases that would have Alternative 2 stipulations applied to them, there would be no stipulations specifically for paleontological resources. Protections as discussed under Alternative 1, For leases where Alternative 4 stipulations would be applied, there are stipulations for the protection of paleontological resources, but only cover 23 percent of the zone. Lease cancellation would preclude development in 77 percent of Zone 3.</b>
<b>Soils</b>	An NSO stipulation for Slopes >60% would preclude surface disturbance in water erodible soils in almost all of Zone 1, in about one-third in Zone 2 and minimally in Zones 3 and 4 (less than 2%). Other NSO stipulations would increase this coverage slightly (mostly in Zone 2).	Same level of coverage by stipulations as described for Alternative 1.	Resource-specific NSO <b>stipulations</b> would preclude surface disturbance in fewer acres of water erodible soils as compared to Alternative 1 (between 1% and 6% of water erodible soils by zone); however, CSU stipulations designed specifically <b>for soils</b> would minimize adverse impacts to erodible soils on between 78% and 100% of water erodible soils, by zone. <b>With consideration of all NSOs, there would be</b> additional coverage of erodible soils compared to Alternative 1, as surface disturbance would be precluded in between 86% and 100% of all water erodible soils, by zone.	The coverage by stipulations for water erodible soils would be similar to that described for Alternative 3, except in Zone 3, where a large area would be closed to leasing. Lease cancellation would result in the elimination of some mineral development within Zone 3 and additional protection for erodible soils.	Surface disturbance would be limited primarily to previously disturbed areas that would be reclaimed. Following reclamation, the potential for surface disturbance would decrease greatly and soil productivity would improve.	<b>An NSO stipulation for Slopes &gt;60% would preclude surface disturbance in water erodible soils in almost all of Zone 1, about 10% of Zone 2 and minimally in Zones 3 and 4 (less than 1%). Other NSO stipulations would increase water erodible soil coverage to almost 70% in Zone 2 and 99% in Zone 4. Lease cancellation in Zone 3 would result in the elimination of some mineral development and would protect about 73% of water erodible soils within this zone.</b>

**Table 2-11 Summary of Environmental Impacts and Resource Protections**

Resource Affected	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Preferred Alternative
<b>Surface Water</b>	There are no stipulations specifically designed to minimize adverse impacts to surface water resources under this alternative. General NSO stipulations for coverage of other resources would, if implemented, <b>would cover</b> 23% of Colorado Source Water Assessment and Protection (CSWAP) areas, 9% of Local Source Water Protection Plans (SWPPs); 11% of Outstanding Waters, 52% of impaired and monitored waters, and 23% of perennial streams. No stipulation coverage would be provided for COGCC Rule 317B areas.	Same as Alternative 1, except that 11% of the SWPP areas would be covered by general NSO stipulations.	There are two NSO stipulations specifically designed to minimize adverse impacts to surface water resources. Resource-specific stipulations that limit surface disturbance would cover 7% of CSWAP areas, 89% of COGCC Rule 317B areas, 9% of SWPP areas, 99% of Outstanding Waters, and 100% of Impaired Waters and perennial streams. General NSO stipulations including those for other resources would cover up to 88% of the CSWAP areas, 92% of COGCC Rule 317B areas, 88% of SWPP areas; 99% of Outstanding Waters, and 100% of perennial streams and impaired and monitored waters.	There are two NSO stipulations specifically designed to minimize adverse impacts to surface water resources. The combination of the resource-specific NSO lease stipulations and areas closed to leasing would cover 45% of CSWAP areas, 89% of COGCC Rule 317B areas, 98% of SWPP areas, 99% of Impaired Waters, and 100% of Outstanding Waters and perennial streams. General NSO stipulations including those for other resources and the areas closed to leasing would cover up to 93% of CSWAP areas; 92% of COGCC Rule 317B areas; 99% of SWPP areas; and 100% of Outstanding Waters, impaired and monitored waters, and perennial streams.	There would be no stipulations needed for protection of surface water resources. Surface disturbance from decommissioning and reclaiming existing wells and infrastructure would be temporary and surface water would be protected by implementation of mitigation measures until reclamation success occurs.	<b>There are two NSO stipulations specifically designed to minimize adverse impacts to surface water resources. Resource-specific stipulations that limit surface disturbance would cover 49% of CSWAP areas, 97% of SWPP areas, 100% of Outstanding Waters, and 51% of perennial streams. No stipulation coverage would be provided to COGCC Rule 317B areas or impaired waters. General NSO stipulations including those for other resources would cover up to 79% of CSWAP areas, 98% of SWPP areas; 100% of Outstanding Waters, 52% of impaired and monitored waters and 57% of perennial streams but would not cover any COGCC Rule 317B areas.</b>
<b>Groundwater</b>	There are no stipulations designed specifically to minimize impacts to groundwater resources under this alternative. Areas of high aquifer sensitivity in Zone 1 would have the most <b>coverage</b> from NSO lease stipulations designed to cover other resources, should they be implemented.	Similar to Alternative 1, with slightly more coverage in Zone 3 due to increased acreage of NSO stipulations.	CSU stipulations designed to minimize adverse impacts to groundwater under Alternative 3 <b>would be applied to 3 to 5% of each zone</b> . These stipulations, combined with the NSO stipulations intended to cover other resources, would provide more coverage of groundwater resources and aquifers compared to Alternative 1.	Similar to Alternative 3, with additional coverage of groundwater resources in the areas that would be closed to leasing.	Once reclamation is completed, this alternative would have the lowest potential to adversely affect groundwater resources because there would be no mineral development.	<b>A CSU stipulation designed to minimize adverse impacts to groundwater would be applied to between 3 and 5% of Zones 2 and 4. NSO stipulations intended to cover other resources would preclude surface disturbance in almost all of Zones 1 and 4 and about 75% of Zone 2. Lease cancellations would remove 77 percent of Zone 3 from development availability.</b>
<b>General Vegetation</b>	NSO stipulation would be applied to riparian/wetland areas (on the GMUGNF), and TEPC Plant Species Populations and Habitats. There would be no resource-specific CSU stipulations. Resource-specific NSOs would cover less than 1% of general vegetation and riparian/wetland habitats (within Zone 3 only). With consideration of all NSO stipulations, stipulation coverage of vegetation by zone would be as follows: Zone 1, 100%; Zone 2, 39%; Zone 3, 8%; Zone 4, 3%.	Same as Alternative 1 except that in Zone 3, lease stipulations would cover an additional 1% of vegetation from surface disturbance.	Resource-specific NSOs (4) would preclude surface disturbance on between 9% (Zone 2) and 73% (Zone 1) of vegetation. Resource-specific CSU stipulations (3) would be applied to between 66% (Zone 3) and 100% (Zone 1) of vegetation. With consideration of all NSO stipulations, stipulation coverage of vegetation by zone would be as follows: Zone 1, 100%; Zone 2, 87%; Zone 3, 86%; Zone 4, 92%.	Similar to Alternative 3 except that 95% of Zone 3 would be precluded from development by a combination of NSO stipulation and lease cancellations.	Minimizes impact to vegetation cover because all surface disturbance would be associated with reclamation of vegetation cover.	<b>Resource-specific NSOs (3) would preclude surface disturbance on between 0% (Zones 1 and 3) and 12% (Zone 4) of vegetation. Resource-specific CSU stipulations (3) would be applied to between 0% (Zones 1 and 3) and 89% (Zone 4) of vegetation. With consideration of all NSO stipulations and cancelled acreages, stipulation coverage of vegetation by zone would be as follows: Zone 1, 100%; Zone 2, 74%; Zone 3, 77% (cancelled); Zone 4, 92%.</b>
<b>Riparian/Wetland Vegetation</b>	<b>Riparian/wetland areas would have the same percentages of stipulation coverage as those described for General Vegetation, except that within Zones 2 and 4, NSO stipulations would cover about 2% less riparian/wetland habitat.</b>	<b>Similar to Alternative 1 (&lt;1% additional stipulation coverage in Zone 3).</b>	<b>Resource-specific NSOs (4) would preclude surface disturbance on between 81% (Zone 3) and 97% (Zone 1) of riparian/wetland habitat. Resource-specific CSU stipulations (3) would be applied to between 79% (Zone 3) and 100% (Zone 1) of riparian/wetland habitat. With consideration of all NSO stipulations, stipulation coverage would be as follows: Zone 1, 100%; Zone 2, 99%; Zone 3, 98%;</b>	<b>Similar to Alternative 3 except that 99% of Zone 3 would be precluded from development by a combination of NSO stipulations and lease cancellations.</b>	Minimal adverse impact to riparian/wetland areas because no new development would occur in these areas.	<b>Resource-specific NSOs (3) would preclude surface disturbance on between 0% (Zones 1 and 3) and 85% (Zone 4) of riparian/wetland habitat. Resource-specific CSU stipulations (3) would be applied to between 0% (Zones 1 and 3) and 95% (Zone 4) of riparian/wetland habitat. With consideration of all NSO stipulations and cancelled acreages, stipulation coverage of riparian/wetland habitat by zone would be as follows:</b>

**Table 2-11 Summary of Environmental Impacts and Resource Protections**

Resource Affected	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Preferred Alternative
			<b>Zone 4, 97%.</b>			<b>Zone 1, 100%; Zone 2, 72%; Zone 3, 48% (cancelled); Zone 4, 97%.</b>
<b>Special Status Plants</b>	<p>Federally listed species would be covered by an NSO stipulation, but this stipulation does not extend to suitable habitat.</p> <p>There is no DeBeque phacelia and Colorado Hookless Cactus suitable habitat outside of Zone 1 so all suitable habitat for these species would be covered. Ute ladies'-tresses suitable habitat would not be covered by stipulations outside of Zone 1.</p> <p>The degree of coverage by stipulations for other special status species in Zones 2, 3, and 4 would vary by suitable habitat type (0% to 100% for fen habitat, 3% to 47% for forested habitat and &lt;1% to 34% for non-forested habitat).</p> <p>Significant plant communities would have very little coverage by stipulations in Zones 2, 3, and 4.</p>	Same as Alternative 1.	<p>CSU stipulations would be applied to Spruce-Fir Old Growth and Old Growth Recruitment Stands, and Plant Species of Local Concern, and Sensitive Plant Species.</p> <p>All federally listed suitable habitats would be fully covered. <b>Zone 1 would be completely precluded from surface disturbance.</b> The degree of stipulation coverage for other special status species in Zones 2, 3, and 4 would vary would be between <b>suitable habitat type (100% for fen habitat, 93% to 94% for forested habitat and 81% to 82% for non-forested habitat)</b>. Significant plant communities would have between <b>60% and 92%</b> coverage.</p>	Similar to Alternative 3 except that surface disturbance in over half of all special status species habitat in Zone 3 would be precluded through lease cancellation.	Alternative 5 would minimize the potential for adverse impacts to special status species habitat to the greatest extent because all surface disturbance would be associated with reclamation.	<p><b>Federally listed species would be covered by an NSO stipulation, but this stipulation does not extend to suitable habitat.</b></p> <p><b>There is no DeBeque phacelia and Colorado Hookless Cactus suitable habitat outside of Zone 1 so all suitable habitats for these species would be covered. Ute ladies'-tresses suitable habitat would not be covered by stipulations outside of Zone 1. The degree of coverage by stipulations (or lease cancellations, in Zone 3) for other special status species in Zones 2, 3, and 4 would vary by suitable habitat type (0% to 100% for fen habitat, 82% to 94% for forested habitat and 81% to 95% for non-forested habitat).</b></p> <p><b>The combination of NSO stipulations in Zone 1 and lease cancellations would preclude surface disturbance in over 97 percent of all significant plant community habitat.</b></p>
<b>Terrestrial Wildlife</b>	<p>NSO stipulations would be applied to bighorn sheep and big game (elk and mule deer) winter ranges. TLs would be applied to big game winter range and elk production areas. A CSU would be applied elk production areas within the GMUGNF.</p> <p>The bighorn sheep NSO would cover most bighorn sheep habitat as currently mapped. The big game winter range NSO would cover mule deer winter range as currently mapped and would cover 8% of elk winter range in Zone 2. The TL stipulation for big game winter range would not always protect deer and elk winter range as it is currently mapped and would not be applied to moose.</p> <p>With regard to all NSO stipulations, the combined coverage of terrestrial wildlife habitat by zone would be as follows: Zone 1—100%, Zone 2—30%, Zone 3—8%, Zone 4—3%</p> <p>Outside of Zone 1, coverage of sensitive wildlife habitat from surface disturbance would be as follows: Mule deer would have no NSO stipulations. Elk production areas would have between 5% and 41% NSO stipulation coverage.</p>	Similar to Alternative 1 with slightly more combined NSO <b>coverage in</b> elk production areas, elk winter range.	<p>The NSO stipulation for bighorn sheep would be expanded to include additional habitat types, resulting in 100% coverage of currently mapped habitat. The NSO stipulation for winter range would be eliminated.</p> <p>The big game winter range TL stipulation would be expanded to include moose and would cover most of deer, elk, and moose winter range as currently mapped.</p> <p>The TL stipulation for elk production areas would be eliminated. Although this stipulation would not be included on any of the leases under Alternatives 3 and 4, there is still an opportunity to apply a 60-day TL as a COA under the BLM <b>SLTs</b> during site-specific NEPA analyses at the implementation level. However, implementing the TL stipulation for big game summer concentration areas (June 16-October 14) and not including the elk production TL under Alternatives 3 and 4, would result in a 45-day window (May 1 to June 15) that would leave approximately 23,813 acres (10% of the total range within the analysis area) of elk production areas on 39 leases in Zones 2, 3, and 4 (see <b>Table 3.7-4</b>) without <b>TL stipulation coverage</b>.</p> <p>CSUs would be applied to Big Game</p>	<p>Coverage by stipulations would be similar to that described for Alternative 3. With regard to all NSO stipulations and areas closed to leasing, the combined coverage to minimize adverse effects on terrestrial wildlife habitat by zone would be the same as Alternative 3 with the exception of in Zone 3 where additional coverage of terrestrial wildlife habitat would be provided by the areas that would be closed to leasing. The leases that would be cancelled due to the closed to leasing requirement would preclude surface in the following wildlife habitat in Zone 3:</p> <ul style="list-style-type: none"> <li>• 3 acres of mule deer habitat</li> <li>• 9,724 acres (72%) of elk production areas</li> <li>• 97 acres (17%) of all elk severe winter range</li> <li>• 1,902 acres (90%) of all elk winter range</li> <li>• 10,296 acres (57%) of all elk summer concentration areas</li> <li>• 241 acres (85%) of black bear fall concentration areas and 1 acre (1%) of all summer concentration areas</li> </ul>	Alternative 5 would provide the maximum amount of reduction in adverse impacts due to oil and gas development for terrestrial wildlife resources.	<p><b>NSO stipulations would be applied to bighorn sheep and big game (elk and mule deer) winter ranges. CSUs and TLs would be applied to big game winter range but not elk production areas (see Alternative 3 discussion).</b></p> <p><b>Impacts to mule deer and associated habitat would be the generally same as those discussed under Alternative 1 with slight additions to coverage in Zone 3 through lease cancellations.</b></p> <p><b>Elk production areas within the analysis area would not be covered by any resource-specific NSO; however, combined NSOs and lease cancellation would cover most habitat areas. Impacts to elk severe winter range and winter concentration areas would be the same as Alternative 2, except in Zone 3 where lease cancellation would cover 100 percent of elk severe winter range. Elk winter range winter range would have coverage ranging from 54 to 91 percent, by zone. Coverage within Zone 2 would increase to 54 percent.</b></p> <p><b>Impacts to bighorn sheep would be the same Alternative 1.</b></p>

**Table 2-11 Summary of Environmental Impacts and Resource Protections**

Resource Affected	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Preferred Alternative
	Elk winter range would have between 1% and 25% NSO coverage and elk severe winter range and elk winter concentration areas would have 0% to 6% NSO coverage. Elk summer concentration areas would have 50% NSO coverage within in Zone 2 but less than 5% in Zone 3. Moose habitats would have 2% to 12% NSO coverage. Black bear fall concentration areas would have 12% to 40% NSO coverage.		Migration Corridors, Big Game Production Areas, Big Game Summer Concentration, Big Game Winter Ranges, Elk Production Area (GMUGNF) and Sensitive Terrestrial/Avian/ Invertebrate Species. With regard to all NSO stipulations, the combined coverage of terrestrial wildlife habitat by zone would be as follows: Zone 1—100%, Zone 2—87%, Zone 3—86%, Zone 4—92%. Mule deer would have 70% to 100% NSO coverage by zone. Elk habitat would have between 63% and 100% NSO coverage, except for severe winter range in Zone 3, which would have no NSO coverage. Moose habitat would have between 80% and 99% NSO coverage in all zones. Black bear habitat concentration areas would have 57% to 100% NSO coverage by zone.			The leases that would be cancelled due to the closed to leasing requirement would preclude surface in the following wildlife habitat in Zone 3: <ul style="list-style-type: none"> <li>• 100% of mule deer habitat</li> <li>• 74% of elk production areas</li> <li>• 100% of all elk severe winter range</li> <li>• 91% of all elk winter range</li> <li>• 67% of all elk summer concentration areas</li> </ul> Moose habitat would have between 60% and 81% combined NSO coverage in all zones. Black bear habitat concentration areas would have 50% to 100% NSO coverage by zone.
<b>Special Status Wildlife Species</b>	All special status species would be covered by an NSO stipulation but this does not necessarily include occupied habitat. Lynx denning habitat would have 89% and 5% NSO coverage in Zones 2 and 3, respectively. Sage grouse habitat (in Zone 1 only) would be fully covered by NSO stipulations.	Similar to Alternative 1 with slightly more combined NSO coverage for Canada lynx denning habitat.	Federally listed/candidate species and associated habitat would be fully covered.	Federally listed/candidate species and associated habitat would be fully covered. The leases that would be cancelled due to the closed to leasing requirement would preclude surface in 105 acres of lynx denning habitat in Zone 3.	Federally listed/candidate species and associated habitat would not be affected by oil and gas development.	<b>NSO stipulation for all known locations of federally listed TEPC species stipulations would extend to occupied and potential habitats Under the Preferred Alternative, 100 percent of lynx denning and denning/winter habitat in Zone 2 would be subject to the NSO coverage. The cancellation of 25 undeveloped leases would provide coverage to 97 percent of lynx habitat of concern within Zone 3. Sage grouse habitat (in Zone 1 only) would be fully covered by NSO stipulations.</b>
<b>Aquatic Resources</b>	There are NSO and TL stipulations designed to minimize adverse impacts to cutthroat trout habitat that would cover up to 7 % of perennial streams, within Zone 3, with no coverage from resource-specific stipulations in Zones 1 and 4 <b>and minimal coverage in Zone 2.</b> Other NSO stipulations would cover some streams and habitat for aquatic species if implemented. This alternative would not fully cover special status aquatic species habitat (cutthroat trout, boreal toad, leopard frog) through stipulations. No new water depletions that have not been analyzed in the previous Biological Assessment and Biological Option are projected.	Same as Alternative 1.	Additional NSO, CSU, and TL stipulations designed for aquatic resources would cover approximately 44% of named perennial streams in Zone 2, 78% in Zone 3, and 100% in Zone 4. There are no perennial streams with game or special status aquatic species in Zone 1. There would be increased coverage for special status aquatic species habitat through resource-specific stipulations and other stipulations. No new water depletions that have not been analyzed in the previous BA and BO are projected.	Similar to Alternative 3, except that more perennial stream miles in Zone 3 outside the leases would be covered by being closed to leasing, eliminating future mineral development in those areas.	Following the short-term disturbance required to removed existing wells and other infrastructure and implement reclamation, there would be no potential impacts to aquatic resources from mineral development or water depletions.	<b>A combination of lease cancellations NSO stipulations designed for aquatic resources would cover approximately 28% of named perennial streams in Zone 2, 54% in Zone 3, and 100% in Zone 4. There are no perennial streams with game or special status aquatic species in Zone 1. There would be increased coverage for special status aquatic species habitat through resource-specific stipulations and other stipulations. No new water depletions that have not been analyzed in the previous BA and BO are projected.</b>

**Table 2-11 Summary of Environmental Impacts and Resource Protections**

Resource Affected	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Preferred Alternative
<b>Cultural Resources</b>	There are no stipulations specifically developed to minimize adverse impacts to cultural resources, although federal law would provide coverage of eligible sites. It is estimated that approximately 276 archaeological sites would be protected from surface disturbance, when considering all NSO stipulations, should they be implemented.	There are no stipulations specifically developed to minimize adverse impacts to cultural resources, although federal law would provide coverage of eligible sites. It is estimated that approximately 281 archaeological sites would be protected from surface disturbance, when considering all NSO stipulations, should they be implemented.	There are no stipulations specifically developed to minimize adverse impacts to cultural resources, although federal law would provide coverage of eligible sites. It is estimated that approximately 670 archaeological sites would be protected from surface disturbance, when considering all NSO stipulations, should they be implemented.	There are no stipulations specifically developed to minimize adverse impacts to cultural resources, although federal law would provide coverage of eligible sites. It is estimated that approximately 707 archaeological sites would be protected from surface disturbance, when considering all NSO stipulations <b>and lease cancellations.</b>	Surface disturbance to remove infrastructure and reclaim areas would occur primarily in previously disturbed areas. It is unlikely that any sites would be affected.	<b>There are no stipulations specifically developed to minimize adverse impacts to cultural resources, although federal law would provide coverage of eligible sites. It is estimated that approximately 618 archaeological sites would be protected from surface disturbance, when considering all NSO stipulations and lease cancellations.</b>
<b>Transportation</b>	<b>An estimated 60 miles of new roads would be constructed, with the heaviest increase in traffic during drilling and completion of wells. Average daily round trips during well development: Zone 1: 4,712; Zone 2: 42,121; Zone 3: 6,824; Zone 4:1,320. The drilling and completion of wells would occur over 20 years, although it is unknown what the actual pace of lease development would be. Average daily round trips during well operations: Zone 1: 357; Zone 2: 3,191; Zone 3: 517; Zone 4:100. Traffic levels on individual roads would vary with proximity to leases. Impacts may include temporary conflicts with normal traffic, travel delays, decreased travel speeds, and increased vehicle collision rates with other vehicles or with wildlife and livestock, fugitive dust and noise. Increased traffic levels would be most noticeable along roads in areas without high levels of existing development. Heavy truck traffic may cause damage to roads and bridges and may also reduce recreational and tourist activities in recreation-intensive areas, such as the Thompson Divide area.</b>	Same as Alternative 1.	<b>Impacts similar to Alternative 1 but slightly fewer wells to be developed in Zone 3, with a corresponding reduction in total new road construction (59 miles) and a lower projected level of traffic in Zone 3 (Average daily round trips during well development: 6,415; Average daily round trips during well operations: 486).</b>	<b>Impacts similar to in type to Alternative 1, but with 60+ percent reduction in the wells projected to be developed in Zone 3, with an associated reduction in miles of new road construction (to 55 miles total) and a lower projected level of traffic in Zone 3 (Average daily round trips during well development: 2,416; Average daily round trips during well operations: 357).</b>	<b>There would be vehicle traffic in Zones 2 and 3 to decommission wells, pads, and roads, and to reclaim the disturbed areas. Once the reclamation is complete, no development-related traffic or construction would occur.</b>	<b>Impacts similar in type to Alternative 1, but additional lease cancellations and associated reductions in projected well development would further reduce road development (to 54 miles) and projected levels of traffic (Average daily round trips during well development: 1,430; Average daily round trips during well operations: 108).</b>
<b>Land Use</b>	Existing land uses would be affected where NSO stipulations do not restrict mineral development. In these areas, it is likely that new ROW authorizations would be necessary. NSO stipulations would be the least under Alternative 1, so changes in land use may be most affected. Communication sites would be covered by stipulations for other resources.	Same as Alternative 1.	Similar to Alternative 1, with more NSO stipulations that would minimize land use changes within the leases, possibly pushing mineral development off-lease to other landowners. The communications sites would be covered by a CSU stipulation.	Similar to Alternative 3, except there would be no land use changes in Zone 3 within the area <b>in which leases are cancelled (which includes the communicate site) which would reduce the potential for conflicts with county land use plans and zoning.</b>	Land uses within the leases would not be modified by mineral development. The 75 wells and associated roads and pipelines would revert to previous land uses after reclamation is completed.	<b>Similar to Alternative 4 except the area in which leases would be cancelled would be greater and the estimated number of potential wells and well pads would be lower, and the potential for conflicts with Mesa and Garfield county land use plans and zoning within Zones 1 and 2 would be greater due to application of Alternative 2 stipulations to producing or committed leases.</b>
<b>Special Designations</b>	The special designations potentially affected include the Lower Battlement Resource Natural Areas (RNA) (Zone 1) and the roadless areas designated under the Colorado Roadless Area (CRA). The majority of the	Same as Alternative 1.	<b>NSO coverage of the RNA would be the same as Alternative 1. All CRA areas within zones 1, 2 and 3 would be fully covered by combined NSO stipulations, with additional constraints</b>	Same as Alternative 3 when considering coverage from both <b>combined</b> NSO stipulations and Zone 3 <b>lease cancellations.</b>	Alternative 5 would result in the fewest development-related impacts to the RNA and CRAs because all leases would be cancelled.	<b>Impacts to the RNA would be the same as under Alternative 1. NSO stipulations or lease cancellation would cover 100% of Zone 1 CRAs, 88% of Zone 2 CRAs and 77% of Zone 3 CRAs; the constraints</b>

**Table 2-11 Summary of Environmental Impacts and Resource Protections**

Resource Affected	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Preferred Alternative
	RNA would be covered by NSO stipulations designed to protect steep slopes and bighorn sheep habitat, should they be implemented. There would be limited coverage of CRAs through NSO stipulations intended to minimize impacts to other resources. There are no CRAs in Zone 4.		<b>provided by CSU stipulations. There are no CRAs within Zone 4.</b>			<b>provided by CSU stipulations would be reduced relative to Alternatives 3 and 4.</b>
<b>Recreation</b>	Should they be implemented, NSO stipulations created to minimize adverse impacts to other resources would limit development-related impacts by covering portions of backcountry motorized and non-motorized management areas in Zone 2. There would be limited acreage of summer and winter recreation opportunity spectrum (ROS) classifications coverage by lease stipulations compared to the acreage available for development.	Similar to Alternative 1 with slightly more coverage of ROS classifications due to slightly increased NSO stipulation acreage.	More coverage of summer and winter ROS classifications would be provided by the greatly increased amount of lease stipulations, especially through NSO constraints. This would provide greater coverage for backcountry motorized recreation in the designated Management Area and the same amount of coverage to non-motorized areas in Zone 2. The dispersed recreation management area in Zone 3 would have some coverage under this alternative.	<b>Impacts to ROS classifications</b> would be similar to Alternative 3.	Protection of recreation resources would be the greatest under Alternative 5 because all leases would be cancelled so there would be no impacts to recreation once existing well pads and roads are reclaimed.	<b>Impacts to management areas with a recreational emphasis would be the same as Alternative 3. Surface disturbance would be fully precluded in Zone 1 and NSO coverage would generally be between 69 and 100 percent in winter and summer SPM and SPNM ROS classes in Zones 2, 3, and 4. Lease cancellations would eliminate conflicts on 14 miles of designated winter grooming routes.</b>
<b>Livestock Grazing</b>	Should they be implemented, NSO and CSU stipulations designed to minimize adverse impacts to other resources would provide some coverage to forage within established grazing allotments that overlap leases. Approximately 25% of all allotments within the leases would be covered. Surface disturbance or the occurrence of structures related to mineral development would only affect an estimated 3 animal unit months on the leases over the long term. Off-lease surface disturbance also could occur.	Similar to Alternative 1, with slightly increased acreage of NSO stipulations that could provide additional coverage to forage.	Because all allotments that overlap the leases would be <b>covered</b> by NSO or CSU stipulations, it is estimated that this alternative would result in the <b>fewer</b> adverse effects to on-lease forage.	Similar to Alternative 3 with possibly greater off-lease coverage of forage within allotments due to the areas in Zone 3 that would be closed to leasing.	Under Alternative 5, areas within allotments would be reclaimed and no new development-related disturbance would occur. This would result in an increase in forage within allotments.	<b>NSO coverage in Zones 1 and 4 would be the same as Alternative 3, but NSO coverage in some Zone 2 allotments would be reduced. Proposed lease cancellations in Zone 3 would eliminate the potential for impacts in 6 allotments in Zone 3; the remaining allotment in Zone 3 would receive less than one percent coverage by a NSO stipulation.</b>
<b>Scenic Resources</b>	There are no specific stipulations to minimize adverse impacts to scenic resources under Alternative 1. Implementation of NSO stipulations designed to cover other resources would provide minor coverage to changes in scenic attractiveness, with the highest percentage of coverage of high and very high Scenic Integrity Objectives by other NSO stipulations in Zone 1.	Similar to Alternative 1.	Alternative 3 includes 3 stipulations designed to minimize adverse impacts to areas with high Scenic Integrity Objectives and travel routes that have high user concern. This coverage, combined with the large area of NSO stipulations designed to minimize adverse impacts to other resources, would result in fewer alterations of scenic resources within the lease boundaries.	Similar to Alternative 3, with additional coverage of scenic resources within the area that would be closed to leasing.	Alternative 5 would have the least adverse impact to scenic resources because, following decommissioning and reclamation of existing wells and other infrastructure, the area would be allowed to return to its natural condition.	<b>Generally the same as Alternative 3 with consideration of all stipulations with the following exceptions:1) within Zone 2, the application of Alternative 2 stipulations would result in greater potential impacts; 2) in Zone 3, full cancellation of 25 leases and lower projected development would more effectively prevent surface-disturbing activities in areas of high scenic importance.</b>
<b>Hazardous Materials</b>	Activities conducted under these alternatives carry risks of spills and releases of hazardous materials and solid waste. In the absence of stipulations, activities would be carried out in accordance with applicable regulatory programs.				The risks would be less under Alternative 5 because the hazardous materials and other chemicals used in gas production would not be present.	<b>Same as Alternatives 1, 2, and 3.</b>



**Table 2-11 Summary of Environmental Impacts and Resource Protections**

Resource Affected	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Preferred Alternative
<b>Human Health and Safety</b>	No water resources-specific stipulations exist but the combined NSO stipulations could cover up to 12% of CSWAP areas, 10% of SWPP areas. Impacts from air emissions are expected to be minimal.  Risk of fire from construction activities or operation of gas wells would be addressed at the site-specific level through best management practices and well design.  Limited employment increases are not expected to affect the level of emergency service. Development of 416 wells would result in county revenues that could benefit public safety.	General NSO stipulations related to other resources could minimize adverse impacts to portions of CSWAP areas; all other impacts and risks would be the same as Alternative 1.	Public Water Supply Source Areas NSO stipulation would minimize adverse impacts to up to 69% of CSWAP areas and 89% of SWPP areas.  Other potential impacts would be similar to Alternative 1 in type but the level of risk would statistically be slightly less due to reduced development, stipulations limiting development near public water supply source areas, and reduced vehicle and equipment use. County revenues that could benefit public safety also may be slightly reduced.	<b>Similar to Alternative 3 but the combination of NSO lease stipulations and cancelled leases would preclude surface disturbance in almost 100% of all CSWAP and SWPP areas, further limiting risk to public water supplies. Proposed development would also be less than Alternative 3. While further reducing risk, this may also reduce county revenues that could benefit public safety.</b>	Long-term risks or potential impacts would be eliminated; some short-term risks would occur when the existing wells are plugged and abandoned and existing facilities reclaimed. County revenues that could benefit Public Safety would be eliminated.	<b>Similar to Alternative 3 but the combination of NSO lease stipulations and cancelled leases would preclude surface disturbance in 79% of CSWAP areas and 98% of SWPP areas. Proposed development would be the lowest of all alternatives proposing lease development. While this would generally result in the lowest risk to human health and safety from potential spills, vehicular accidents, and fire, it may also result in the greatest reductions to county revenues that could benefit public safety (with the exception of Alternative 5).</b>
<b>Socioeconomics</b>	Most new wells are projected to be developed in Mesa County, which is projected to have the greatest increase in employment and revenue from natural gas development. In the Four-county Region, the following increases are projected due to future gas development: <ul style="list-style-type: none"><li>• 259 average(FTEs) (including indirect and induced)</li><li>• \$17.3 million in average annual labor income</li><li>• \$79.0 million in average annual natural gas sales revenues</li><li>• \$4.9 million in average annual revenues to county government</li></ul>	Same as Alternative 1: <ul style="list-style-type: none"><li>• 259 (FTEs) (including indirect and induced)</li><li>• \$17.3 million in average annual labor income</li><li>• \$79.0 million in average annual natural gas sales revenues</li><li>• \$4.9 million in average annual revenues to county government</li></ul>	Slightly less increase in jobs and revenue compared to Alternative 1: <ul style="list-style-type: none"><li>• 258 average FTEs (including indirect and induced)</li><li>• \$17.2 million in average annual labor income</li><li>• \$78.5 million in average annual natural gas sales revenues</li><li>• \$4.9 million in average annual revenues to county government</li></ul>	The average annual employment, labor income, and revenues to the Four-County Region would be less than Alternative 1 due to the decrease in wells projected to be developed and associated gas production. <ul style="list-style-type: none"><li>• 240 average FTEs (including indirect and induced)</li><li>• \$16.0 million in average annual labor income</li><li>• \$73.3 million in average annual natural gas revenues</li><li>• \$4.7 million in average annual revenues to county government. Leaseholders would be paid back for any rental fees and bonus bids for any cancelled leases. Leaseholders had previously paid \$1.0 million for the specific acreage that would be expected to be cancelled, of which 49 percent (\$0.5 million) was distributed to the state of Colorado.</li></ul>	Jobs, labor income, and revenue to counties would be the least of all alternatives because reasonably foreseeable future production would not be developed and producing wells would be eliminated. <ul style="list-style-type: none"><li>• 33 average FTEs (including indirect and induced)</li><li>• \$2.6 million in average annual labor income loss</li><li>• \$18.8 million in average annual natural gas revenues lost</li><li>• \$1.3 million in average annual revenues to local government lost</li></ul> Leaseholders would be refunded all rental fees and bonus bids. Leaseholders had previously paid \$5.3 million, of which 49 percent (\$2.6 million) was distributed to Colorado.	The average annual employment, labor income, and revenues to the Four-County Region would be less than Alternative 1 due to the decrease in wells projected to be developed and associated gas production. <ul style="list-style-type: none"><li>• 236 average FTEs(including indirect and indirect)</li><li>• \$15.7 million in average annual labor income</li><li>• \$72 million in average annual natural gas revenues</li><li>• \$4.6 million in average annual revenues to local government</li></ul> Leaseholders would be paid back for any rental fees and bonus bids for any cancelled leases. Leaseholders had previously paid \$1.3 million for the specific acreage that would be expected to be cancelled, of which 49 percent (\$0.6 million) was distributed to the State of Colorado.
<b>Environmental Justice</b>	There would be no adverse impacts to environmental justice populations under any alternative because they do not exist within the analysis area.					

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## 3.0 Affected Environment

### 3.1 Introduction

This chapter describes the environment that would be affected by the alternatives analyzed in this Environmental Impact Statement (EIS). The baseline information summarized in this chapter was obtained primarily from data, reports, and references provided by the Bureau of Land Management (BLM), the White River National Forest (WNRN), and the Grand Mesa, Uncompahgre, and Gunnison National Forest (GMUGNF), supplemented by information and references submitted by the cooperating agencies. The affected environment for each resource was delineated based on the area where potential environmental impacts are likely to result from the leasing decision and subsequent projected development.

In general, the descriptions of the affected environment focus on the land within the analysis area boundary shown in **Figure 1-1**. For resources such as soils and vegetation, the affected area was determined to be the physical location within the boundaries of the 65 previously issued leases. For other resources such as water, air quality, and socioeconomics, the description of the affected environment is more extensive (e.g., watersheds, airsheds, counties).

The specific aspects of each resource that are described in each section were selected because they have the potential to be affected by the proposed leasing decisions under consideration or the future development that is projected to occur following the leasing decisions. The affected environment descriptions provide a baseline for comparison of potential environmental consequences under each alternative analyzed in Chapter 4.0.

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## 3.2 Air Quality

### 3.2.1 Regional Affected Environment

The USEPA, as directed by the CAA, has established NAAQS for criteria pollutants. Criteria pollutants are air contaminants that are commonly emitted from the majority of emissions sources and include carbon monoxide (CO), lead (Pb), sulfur dioxide (SO<sub>2</sub>), particulate matter with an aerodynamic diameter smaller than 10 and 2.5 microns (PM<sub>10</sub> and PM<sub>2.5</sub>, respectively), ozone (O<sub>3</sub>), and nitrogen dioxide (NO<sub>2</sub>). Ozone is not directly emitted from any sources, but is formed in the atmosphere through chemical interactions of oxides of nitrogen (NO<sub>x</sub>) and volatile organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions (NO<sub>x</sub> and VOCs are known as ozone precursors). Exposure to air pollutant concentrations greater than those established by the NAAQS has been shown to have a detrimental impact on human health and the environment. The USEPA regularly reviews the NAAQS (every 5 years) to ensure that the latest science on health effects, risk assessment, and observable data such as hospital admissions are considered, and can revise any of the NAAQS if the data supports this decision. The current NAAQS levels are shown in **Table 3.2-1**. Ambient air quality standards must not be exceeded in areas where the general public has access.

The CAA has established two types of NAAQS:

**Primary standards:** Primary standards set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly.

**Secondary standards:** Secondary standards set limits to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings.

In addition to the criteria pollutants, regulations also exist to control the release of hazardous air pollutants (HAPs). HAPs are chemicals known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or other adverse environmental effects. USEPA currently lists 187 compounds identified as hazardous air pollutants, some of which can be emitted from oil and gas development operations, such as benzene, toluene, and formaldehyde. There are no ambient air quality standards for HAPs, rather these emissions are regulated by the source type, or specific industrial sector responsible for the emissions.

The USEPA has delegated regulation of air quality to the State of Colorado (for approved State Implementation Plan (SIP) elements). The Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD) administers Colorado’s air quality control programs, and is responsible for enforcing the state’s air pollution laws.

The Federal Land Policy and Management Act of 1976 (FLPMA) requires the BLM to ensure actions taken by the agency provide for compliance with federal, state, tribal, and local air quality standards and regulations. FLPMA further directs the Secretary of the Interior to take any action necessary to prevent unnecessary or undue degradation of the lands [Section 302 (b)], and to manage the public lands “in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values” [Section 102 (a)(8)].

**Table 3.2-1 National Ambient Air Quality Standards**

Pollutant (final rule citation)		Standard Type	Averaging Period	Level	Form
Carbon Monoxide [76 Federal Register (FR) 54294, August 31, 2011]		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, November 12, 2008]		Primary and Secondary	Rolling 3-month average	0.15 µg/m <sup>3</sup>	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, February 9, 2010] [61 FR 52852, October 8, 1996]		Primary	1-hour	100 ppb	98 <sup>th</sup> percentile, averaged over 3 years
		Primary and Secondary	Annual	53 ppb	Annual mean
Ozone [80 FR 65292, October 26, 2015]		Primary and Secondary	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter [73 FR 3086, January 15, 2013]	PM <sub>2.5</sub>	Primary	Annual	12 µg/m <sup>3</sup>	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m <sup>3</sup>	Annual mean, averaged over 3 years
		Primary and Secondary	24-hour	35 µg/m <sup>3</sup>	98 <sup>th</sup> percentile, averaged over 3 years
	PM <sub>10</sub>	Primary and Secondary	24-hour	150 µg/m <sup>3</sup>	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, June 22, 2010]  Colorado (State Only) [38 FR 25678, September 14, 1973]		Primary	1-hour	75 ppb	99 <sup>th</sup> percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and Secondary	3-hour	267 ppb	Not to be exceeded in any 12-month period
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

µg/m<sup>3</sup> = micrograms per cubic meter

ppb = parts per billion

ppm = parts per million

Source: National – 40 CFR 50, Colorado – 5 CCR 1001-14.

**Prevention of Significant Deterioration**

The CAA contains provisions for protection of air quality in areas that are meeting the ambient air quality standards. This is known as the prevention of significant deterioration (PSD) program. Under this program, areas of the country are designated as Class I or Class II. Class I areas are defined as areas of special, national, or regional natural, recreational, or historic value and thus receive special protection under the CAA. Class I areas include wilderness areas more than 5,000 acres in size and national parks more than 6,000 acres in size that were in existence in 1977. Sensitive Class II areas are usually afforded additional protection under state-specific rule making for one or more pollutants. This status distinguishes them from Class II areas which account for every other area of the country that is not explicitly designated as Class I or Sensitive Class II.

An area's class designation determines the maximum amount of additional air pollution, called an increment, which can be added beyond a baseline value emitted from new or modified "major" stationary sources of pollution. Increment consumption analysis falls under the PSD major sources permitting program, which is administered in Colorado by the Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD). Only small amounts of pollutants can be added in Class I areas, while Class II areas permit moderate amounts of pollutants to be added.

The CAA also charges federal land managers with an "affirmative responsibility to protect the air quality related values (including visibility)" of Class I areas that they manage. Air quality related values are resources, as identified by the federal land manager, for one or more federal areas that may be adversely affected by a change in air quality. The resources may include visibility or specific scenic, cultural, physical, biological, ecological, or recreational resources identified by the Federal Land Manager (FLM) for a particular area (FLAG 2010).

### **Visibility**

Visibility is a measure of not only how far one can see but how well one can see important characteristics of the landscape such as form, color, geologic features, and texture. Visibility impairment is caused by the scattering of light by gases and particles in the atmosphere. Some particles in the atmosphere result from man-made pollution, resulting in haze. A monitoring network was established by the Interagency Monitoring of Protected Visual Environments (IMPROVE) program to measure atmospheric particulate concentrations near Class I areas.

The CAA amendments of 1977 set a national goal of preventing future impairment of visibility and remedying any existing impairment of visibility in Class I areas that is caused by man-made pollution. The USEPA promulgated the Regional Haze Rule in order to meet this goal. The Regional Haze Rule requires states to develop air quality protection plans to reduce the pollution that causes visibility impairment in Class I areas, with a goal of achieving "natural" visibility levels within a 60-year period. The USEPA has provided guidance to help states estimate natural visibility for their Class I areas (USEPA 2003).

### **Hazardous Air Pollutants**

Air pollutants that may cause chronic (long-term) or acute (short-term) harmful effects are classified as hazardous air pollutants (HAPs). CAA sections 111 and 112 establish mechanisms for controlling HAPs from stationary sources, and the USEPA is required to control emissions of 187 HAPs. Unlike criteria pollutants, the CAA does not establish ambient concentration standards for HAPs. However, the USEPA has promulgated National Emission Standards for Hazardous Air Pollutants (NESHAP) for 96 different source categories. While NESHAP applicability will depend on the type of source constructed, the following NESHAP regulations are likely to apply to facilities constructed in the CRVFO:

- NESHAP Subpart HH, National Emission Standard for Hazardous Air Pollutants From Oil and Natural Gas Production Facilities; and
- NESHAP Subpart ZZZZ, National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.

A list of NESHAP regulations can be found on the USEPA's web site: (<http://www.epa.gov/ttn/atw/mactfnlalph.html>).

### **New Source Performance Standards (NSPS)**

CAA section 111 establishes mechanisms for controlling emissions of air pollutants from stationary sources. Section 111(b) provides authority for the USEPA to promulgate NSPS that apply only to new and modified sources. These standards are intended to promote use of the best air pollution control

technologies, taking into account the cost of such technology and any other non-air quality, health, and environmental impact and energy requirements. The USEPA has promulgated NSPS for 94 different source categories. While NSPS applicability will depend on the type of source constructed, the following NSPS are likely to apply to facilities constructed in the CRVFO:

- NSPS Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines; and
- NSPS Subpart OOOO, Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution.

### **Non-Road Diesel Engine Standards**

EPA established federal standards for new non-road diesel engines that would include most oil and gas development drilling, completion and fracing engines. The 1998 non-road engine regulations were structured as a 3-tiered progression. Each tier involved a phase-in (by horsepower rating) over several years. Tier 1 standards were phased-in from 1996 to 2000. The more stringent Tier 2 standards took effect from 2001 to 2006, and yet more stringent Tier 3 standards phased-in from 2006 to 2008. The Tier 4 emission standards—phased-in from 2008 through 2015—introduce substantial reductions of NO<sub>x</sub> (for engines above 56 kW) and PM (above 19 kW), as well as more stringent HC limits. For Tier 4 emissions standards, CO emission limits remain unchanged from the Tier 2-3 stage.

#### **3.2.1.1 State**

The USEPA has delegated to the State of Colorado the authority to enforce NAAQS and PSD increments and to issue air quality permits. The CAA requires states to submit State Implementation Plans (SIPs) to the USEPA that provide for the implementation, attainment, maintenance, and enforcement of the NAAQS. The CDPHE, APCD administers Colorado's air quality control programs and is responsible for enforcing the state's air pollution laws.

The Colorado Air Pollution Control Commission oversees the development and adoption of the state's air quality regulation program. The commission can set its own ambient air quality standards that are equal to or more stringent than the federal air quality standards. The state has adopted one additional standard (for SO<sub>2</sub>) in addition to the federal standards, which is noted in **Table 3.2-1**. The APCD implements the air management programs adopted by the commission and enforces compliance with the NAAQS and PSD increments.

In February 2014, the State of Colorado adopted new regulations that will affect emissions from the oil and gas industry. These include Regulation 7, which contains extensive requirements to control emissions of ozone precursors and hydrocarbons from equipment associated with oil and gas development and production. In addition to extensive VOC reductions, Regulation 7 revisions also regulate methane emissions from the oil and gas industry. Colorado also adopted Regulation 6, which incorporates NSPS Subpart OOOO.

Other regulations potentially affecting oil and gas projects include Regulation 8, in which Colorado adopts federal air quality regulations for control of hazardous air pollutants. Reporting of HAPs is required under Regulation 3 if uncontrolled emissions are more than 250 pounds per year.

### **3.2.2 Existing Regional Air Quality**

Air quality for any area is generally influenced by the amount of pollutants that are released within the vicinity and up wind of that area, and can be highly dependent upon the contaminants chemical and physical properties. Additionally, an area's topography or terrain (such as mountains and valleys) and weather (such as wind, temperature, air turbulence, air pressure, rainfall, and cloud cover) will have a direct bearing on how pollutants accumulate or disperse. Ambient air quality in the affected environment



(i.e. compliance with the NAAQS) is demonstrated by monitoring for ground level atmospheric air pollutant concentrations. The APCD monitors ambient air quality at a number of locations throughout the state. Similarly, several Federal Land Managers (FLMs) like the BLM, Forest Service, and National Park Service (NPS), also monitor air quality for NAAQS and Air Quality Related Values (AQRVs) to meet organic act requirements. **Table 3.2-2** presents 4 years of monitoring data for criteria pollutants for each of the CRVFO counties (or adjacent/representative county monitors where no monitoring exists in the CRVFO). The values reported are consistent with the units and the form of the standard in **Table 3.2-1**, but where multiple monitors exist within a single county, the largest value for each pollutant is selected to compute the ozone design value (3-year average of the 4<sup>th</sup> highest 8-hour max), sum 3 consecutive years of data (if available) and divide by three.

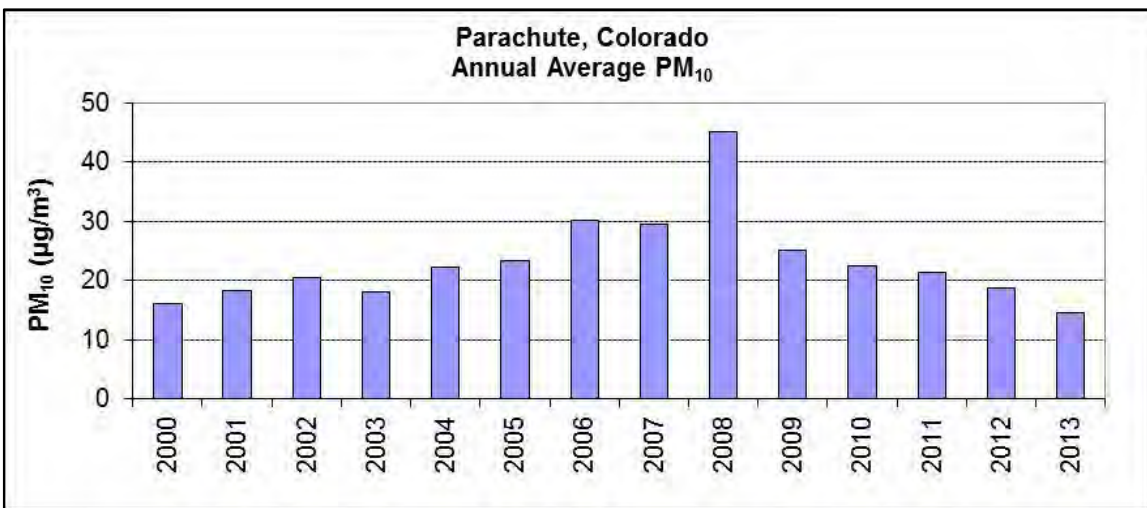
**Table 3.2-2 Ambient Air Quality Monitoring Data<sup>1</sup>**

County	Pollutant	Units	Averaging Time	2011	2012	2013	2014
Garfield	O <sub>3</sub>	ppm	8-hour	0.076	0.073	0.065	0.062
Garfield	PM <sub>10</sub>	µg/m <sup>3</sup>	24-hour	73	46	34	42
Mesa	CO	ppm	1-hour	1.8	2	1.5	1.9
Mesa	CO	ppm	1-hour	1.1	2	1.5	1.9
Mesa	O <sub>3</sub>	ppm	8-hour	0.074	0.071	0.067	0.062
Mesa	PM <sub>10</sub>	µg/m <sup>3</sup>	24-hour	54	64	53	43
Mesa	PM <sub>2.5</sub>	µg/m <sup>3</sup>	24-hour	23.1	24.3	40	27.3
Mesa	PM <sub>2.5</sub>	µg/m <sup>3</sup>	24-hour	7.1	7.3	8.9	7.8
Moffat	O <sub>3</sub>	ppm	8-hour	0.06	0.066	0.065	0.062
Pitkin	O <sub>3</sub>	ppm	8-hour	0.074	0.054	0.067	na
Pitkin	PM <sub>10</sub>	µg/m <sup>3</sup>	24-hour	46	55	35	37
Rio Blanco	NO <sub>2</sub>	ppb	1-hour	23	19	24	14
Rio Blanco	O <sub>3</sub>	ppm	8-hour	0.073	0.069	0.091	0.062
Rio Blanco	PM <sub>2.5</sub>	µg/m <sup>3</sup>	24-hour	21.5	33.4	26.4	15.8
Rio Blanco	PM <sub>2.5</sub>	µg/m <sup>3</sup>	24-hour	9.9	9.9	9.1	7.6
Routt	PM <sub>10</sub>	µg/m <sup>3</sup>	24-hour	79	93	77	81

Source: USEPA 2015a.

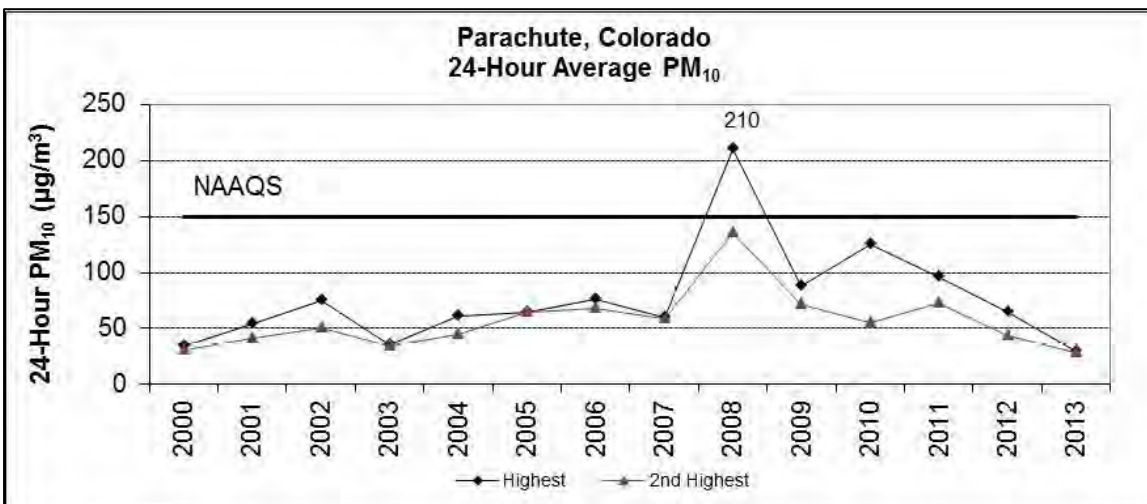
Although the analysis area is currently designated as attaining the NAAQS for all pollutants, several northwest Colorado area monitors have recorded exceedances of the current and new NAAQS for ozone and PM<sub>2.5</sub> (Mesa County) over the past several years (see Table above). Exceedances by themselves do not necessarily mean that the area will be designated as nonattainment (which would be determined by CDPHE and USEPA). The form of the NAAQS must be considered along with the monitored value. The form of the NAAQS for PM<sub>2.5</sub> and ozone require 3-year averages. Other NAAQS pollutants did not have any single-year exceedances for the last few years of monitoring.

**Figure 3.2-1** presents the annual average PM<sub>10</sub> concentrations measured at the Parachute site (since 2000). The highest average recorded PM<sub>10</sub> occurred in 2008, and measurements have decreased since 2009. **Figure 3.2-2** presents the highest and second highest 24-hour average values measured at the Parachute site. Note that the NAAQS for 24 hour PM<sub>10</sub> (150 µg/m<sup>3</sup>) was exceeded for the overall maximum (1<sup>st</sup> high) concentration at the Parachute site in 2008. This exceedance was not a violation of the standard because the average number of annual exceedances over a 3-year consecutive period was not greater than one. **Figure 3.2-3** presents annual 8-hour average ozone values at Rifle, Colorado. Note the exceedance of the former NAAQS (75 ppb) that occurred in 2012. However, this exceedance was not a violation of the standard because that value is the overall maximum 8-hour average ozone concentration for year 2012 and the 4<sup>th</sup> highest values averaged over a 3-year consecutive period was not greater than the former NAAQS 75 ppb (see **Table 3.2-2** for 4<sup>th</sup> high 8-hour average monitored ozone concentration values to compare to new ozone NAAQS [70 ppb]).



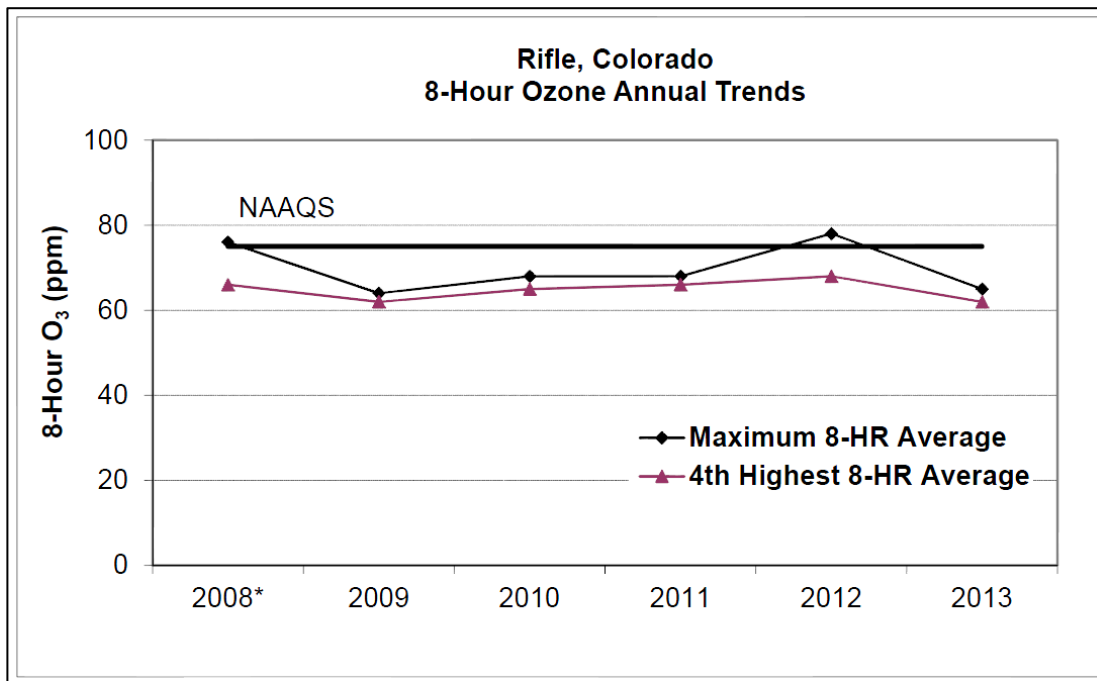
Source: ARS 2014.

**Figure 3.2-1 24-hour Average PM<sub>10</sub> at Parachute, Colorado AQS Site**



Source: ARS 2014.

**Figure 3.2-2 24-hour Average PM<sub>10</sub> at Parachute, Colorado AQS**



Source: ARS 2014.

**Figure 3.2-3 Annual Average PM<sub>10</sub> at Rifle, Colorado AQS Site**

AQRVs are metrics for atmospheric related phenomena like visibility and pollutant deposition impacts that may adversely affect specific scenic, cultural, biological, physical, ecological, or recreational resources. Visibility changes can occur when an excessive amount of pollutants (mostly fine particles) scatter light such that the background scenery becomes hazy. Atmospheric deposition can cause excess nutrient loading in native soils and acidification of the landscape, which can lead to declining buffering capacity changes in sensitive stream and lake water chemistry (commonly referred to as acid neutralization change [ANC]). Air pollutants can be deposited by wet deposition (precipitation) and dry deposition (gravitational settling). The chemical components of wet deposition include sulfate (SO<sub>4</sub>), nitrate (NO<sub>3</sub>), and ammonium (NH<sub>4</sub>) ions; the chemical components of dry deposition can include sulfate, sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), nitrate, ammonium, and nitric acid (HNO<sub>3</sub>). A recent 2014 NPS Study suggests that the critical nitrogen load value for high elevation surface water in all natural areas of Colorado is 2.3 kg/ha-yr. The NPS *Technical Guidance on Assessing Impacts on Air Quality in NEPA and Planning Documents* suggests that critical sulfur load values above 3 kg/ha-yr may result in moderate impacts. AQRVs are important to FLMs (landscape nutrient loading) and congressionally mandated goals (i.e. regional haze). Class I areas are generally pristine landscapes such as national parks, national forests, and wilderness areas that are specifically provided the highest levels of air quality protection under the CAA. Sensitive Class II areas are usually afforded additional protection under state specific rule making for one or more pollutants. This status elevates them above Class II areas which account for every other area of the country that is not explicitly designated as Class I or Sensitive Class II.

The WRNF is surrounded by Class I/sensitive Class II areas on the northern, eastern and southern Field Office boundaries and these areas are within or intersect the analysis area: Flat Tops Wilderness (Class I area-USFS), Eagles Nest Wilderness (Class I area-USFS) and Maroon Bells – Snowmass Wilderness (Class I area-USFS) (**Figure 3.2-4**).

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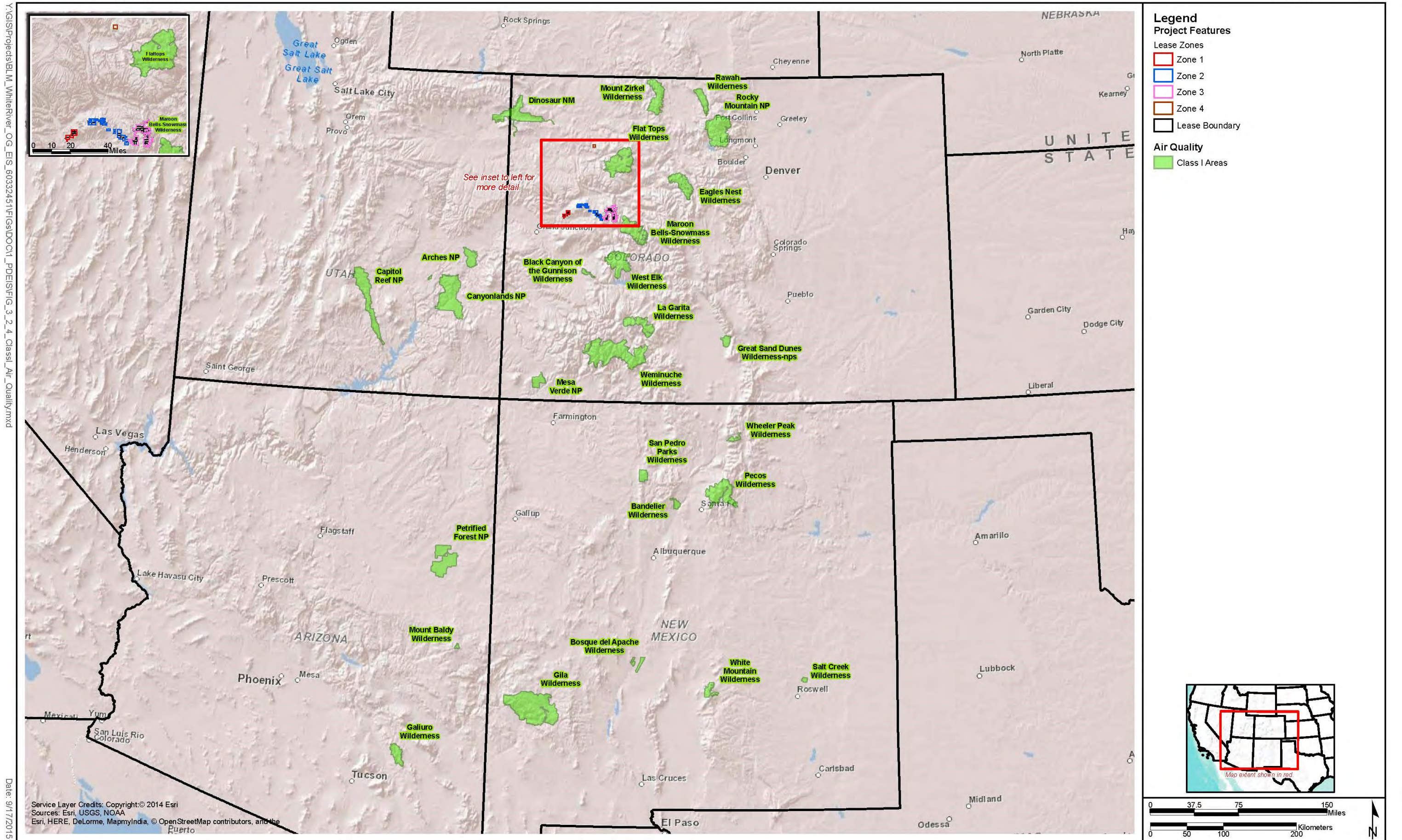
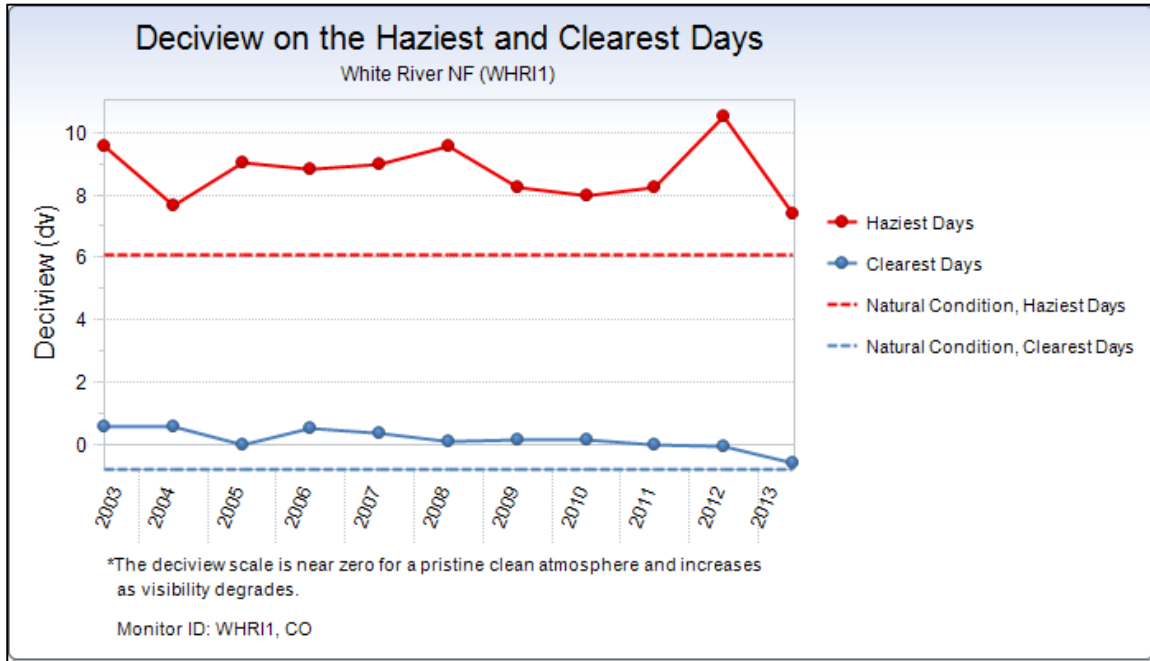


Figure 3.2-4 Class I Areas Surrounding the WRNF

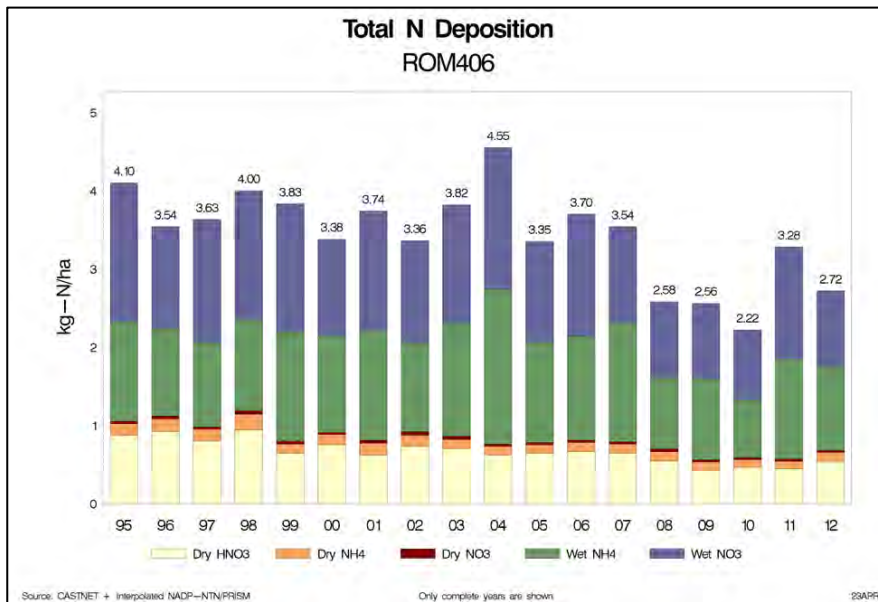
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Figure 3.2-5 provides current trend data for visibility at White River National Forest. Figures 3.2-6 and 3.2-7 provide deposition information at Rocky Mountain National Park. In general, trends with a negative slope indicate better atmospheric conditions for each potentially affected area.



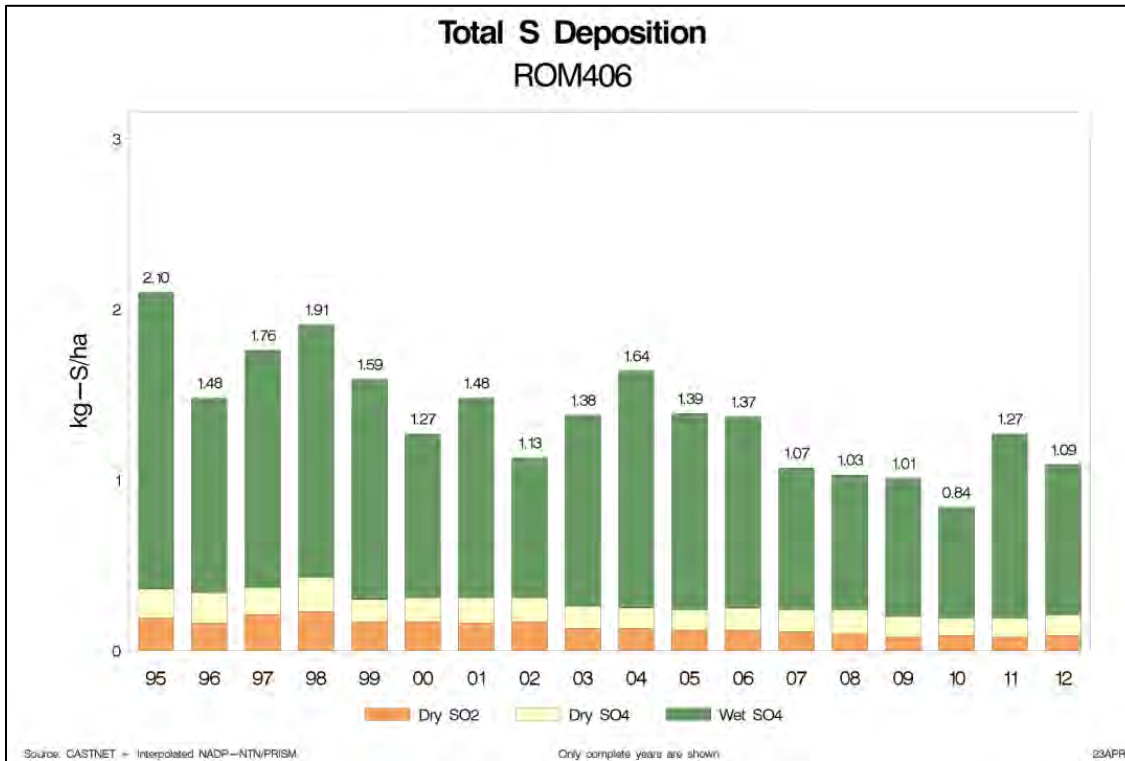
Source: FED 2015.

Figure 3.2-5 AQRV Visibility Data for White River National Forest



Source: USEPA 2015d.

Figure 3.2-6 AQRV Nitrogen Deposition Data for Rocky Mountain National Park



Source: USEPA 2015d.

**Figure 3.2-7 AQRV Sulfur Deposition Data for Rocky Mountain National Park**

HAPs are pollutants of concern since they are suspected or known to cause cancer or other serious health problems. The USEPA has designated approximately 187 compounds as HAPs including benzene, toluene, ethyl-benzene and xylenes (also known as BTEX compounds). Air toxics originate from human-made sources, including mobile sources (cars, trucks, buses, etc.), stationary sources (factories, refineries, power plants), as well as indoor sources (some building materials and cleaning solvents). Some air toxics also are released from natural sources such as volcanic eruptions and forest fires (USEPA 2015b).

Of most relevance for this EIS, HAPs can be emitted by natural gas wells and production equipment. Benzene emissions have been tracked in Garfield County and they were decreasing prior to 2005, but sources related to oil and gas activities have shown increasing trends (Garfield 2015). Colborn et al. (2014) found that for a sampling site located in Garfield County where residences and gas wells co-exist, the highest concentrations of non-methane hydrocarbons (NMHCs) occurred during the initial drilling phase and did not increase during hydraulic fracturing. Many NMHCs have multiple health effects, including 30 compounds that affect the endocrine system, which is susceptible to chemical impacts at very low concentrations. The authors also found that concentrations of selected polycyclic aromatic hydrocarbons (PAHs) were at greater levels than those considered by urban studies that found children prenatally exposed to PAHs had lower developmental and IQ scores. McKenzie et al. (2012) estimated health risks attributable to exposure to air emissions from a natural gas development project in Garfield County, Colorado. McKenzie et al. found that residents living less than 0.5 mile from wells are at greater risk for health effects from natural gas development than are residents living at more than 0.5 mile from wells.



Ambient studies in Garfield County have found that toluene and xylene concentrations measured in grab air samples averaged 105 and 138  $\mu\text{g}/\text{m}^3$ , with maximum concentrations reaching 540 and 1,500  $\mu\text{g}/\text{m}^3$ , respectively. Benzene concentrations averaged 32  $\mu\text{g}/\text{m}^3$ , reaching a maximum of 180  $\mu\text{g}/\text{m}^3$  (UCDenver 2015). **Table 3.2-3** shows measured data for selected HAPs for a monitoring site located in Rifle Colorado. The 1-hour HAP concentrations can be compared to acute Reference Exposure Levels (RELs) for benzene (approximately 1,300  $\mu\text{g}/\text{m}^3$ ) and formaldehyde (approximately 55  $\mu\text{g}/\text{m}^3$ ). RELs are defined as concentrations at or below which no adverse health effects are expected. No REL is available for n-hexane; instead, the available Immediately Dangerous to Life or Health divided by 10 (IDLH/10) values is used which for n-hexane is approximately 390,000  $\mu\text{g}/\text{m}^3$ . These IDLH values were determined by the National Institute for Occupational Safety and Health (NIOSH) and were obtained from USEPA’s Air Toxics Database (USEPA 2011). These values approximate pollutant concentrations likely to produce mild effects during 1-hour exposures.

For long-term maximum potential exposure to HAPs the values in **Table 3.2-3** are compared to Reference Concentrations for Chronic Inhalation (RfCs) for benzene (approximately 30  $\mu\text{g}/\text{m}^3$ ), formaldehyde (approximately 9.8  $\mu\text{g}/\text{m}^3$ ) and n-hexane (approximately 700  $\mu\text{g}/\text{m}^3$ ). An RfC is defined by USEPA as the daily inhalation concentration at which no long-term adverse health effects are expected. RfCs exist for both non-carcinogenic and carcinogenic effects on human health (USEPA 2012).

**Table 3.2-3 Selected HAPs Monitoring Data for 2013**

Monitoring Station Information	Pollutant	Background Monitored Concentrations ( $\mu\text{g}/\text{m}^3$ )		Acute REL <sup>1</sup> ( $\mu\text{g}/\text{m}^3$ )	Non-Carcinogenic Chronic RfC <sup>2</sup> ( $\mu\text{g}/\text{m}^3$ )
		1-Hour	Annual Average		
Garfield County, Colorado (Rifle, Colorado). Monitor ID: 08-045-0007. 1-hour value is maximum for all reported concentrations in year 2013 dataset. Annual average value is average of all values in the year 2013 dataset.	Benzene	28.75	9.11	1,300	30
	Formaldehyde	4.37	1.38	55	9.8
	n-Hexane	80.01	20.46	390,000	700

<sup>1</sup> Air Toxic Acute Reference Exposure Levels.

<sup>2</sup> Air Toxic Non-Carcinogenic Chronic Reference Concentrations.

Source: USEPA 2015a, 2012, 2011.

### 3.2.3 Model-Predicted Existing Regional Air Quality

As part of the Comprehensive Air Resource Protection Protocol (CARPP), the BLM is conducting modeling analyses and developing tools for estimating the air quality and AQRV impacts associated with projected BLM-authorized mineral development activities in Colorado. The BLM has committed to the analysis of air quality and AQRV impacts through a unified regional air quality modeling study known as the Colorado Air Resource Management Modeling Study (CARMMS 2015). As part of the CARMMS modeling, a base case simulation representative of year 2008 conditions was performed in order to estimate predicted air quality changes from a base year (2008) to a future year. This section provides an overview of the base case modeling results.

**Table 3.2-4** provides the ozone design values centered on the 2008 base year for selected monitors within Colorado from the CARMMS study. The values highlighted in yellow are design values that exceed the former ozone NAAQS 75 ppb (former ozone NAAQS used for baseline year 2008 analysis). These design values have been calculated following USEPA’s modeling guidance (USEPA 2007) as implemented in USEPA’s Modeled Attainment Test Software (MATS; Abt 2012). All counties with design values exceeding the ozone NAAQS occur along the Colorado Front Range, which is consistent with the current designation of portions of this area as nonattainment for the former 8-hour ozone standard.

**Table 3.2-4 Base Case Ozone Design Values**

Monitor Name	Latitude	Longitude	State	County	Ozone Design Value
CO_Adams_3001	39.8381	-104.9498	Colorado	Adams	71.5
CO_Boulder_0011	39.9572	-105.2385	Colorado	Boulder	77.3
CO_Denver_0014	39.7518	-105.0307	Colorado	Denver	70.3
CO_Douglas_0004	39.5345	-105.0704	Colorado	Douglas	78.3
CO_El Paso_0013	38.9583	-104.8172	Colorado	El Paso	68.0
CO_El Paso_0016	38.8531	-104.9013	Colorado	El Paso	70.3
CO_Jefferson_0002	39.8003	-105.1000	Colorado	Jefferson	75.0
CO_Jefferson_0005	39.6388	-105.1395	Colorado	Jefferson	74.3
CO_Jefferson_0006	39.9128	-105.1886	Colorado	Jefferson	82.0
CO_Jefferson_0011	39.7437	-105.1780	Colorado	Jefferson	76.3
CO_La Plata_1004	37.3039	-107.4842	Colorado	La Plata	70.0
CO_La Plata_7001	37.1368	-107.6286	Colorado	La Plata	66.0
CO_La Plata_7003	37.1026	-107.8702	Colorado	La Plata	67.0
CO_Larimer_0007	40.2772	-105.5450	Colorado	Larimer	74.3
CO_Larimer_0011	40.5925	-105.1411	Colorado	Larimer	78.0
CO_Larimer_1004	40.5775	-105.0789	Colorado	Larimer	67.3
CO_Montezuma_0101	37.1983	-108.4903	Colorado	Montezuma	69.3
CO_Weld_0009	40.3864	-104.7374	Colorado	Weld	72.7

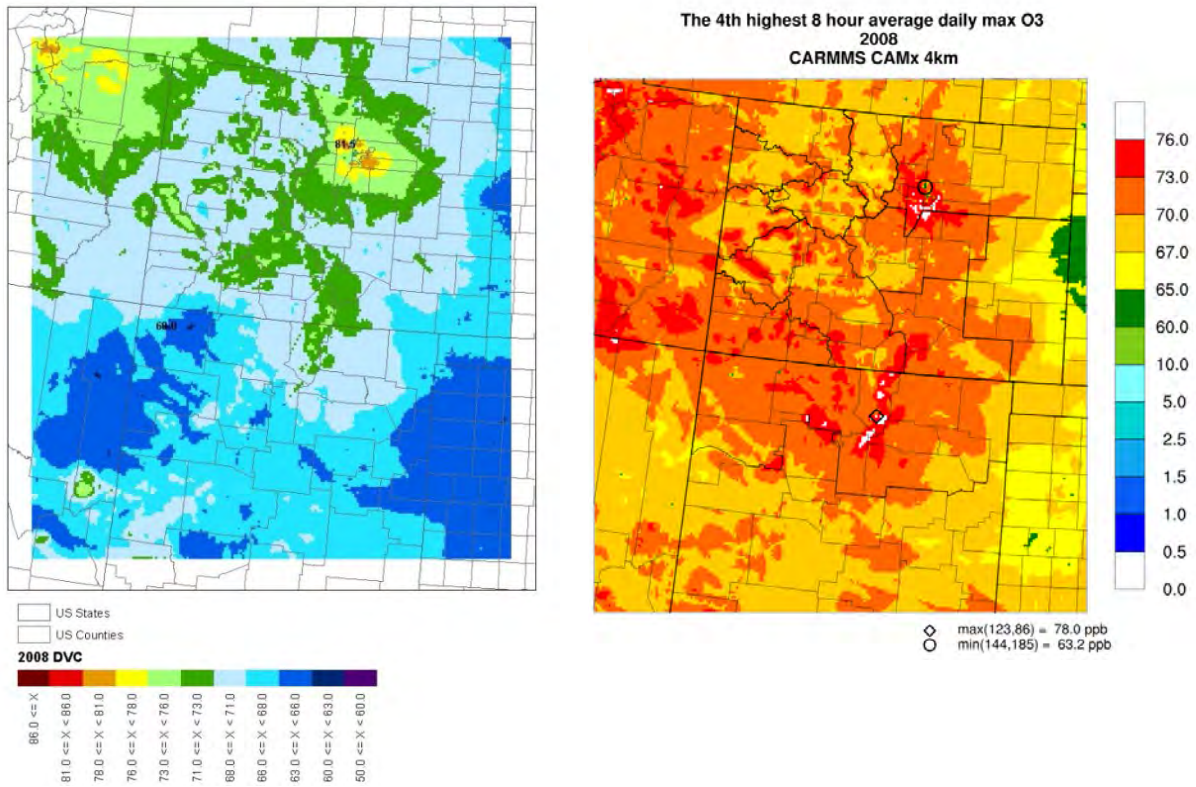
Source: CARMMS 2015.

**Figure 3.2-8** presents the base case ozone concentrations predicted by the CARMMS modeling using two methods of evaluating the results: ozone design values as calculated by MATS (shown on the left) and year 2008 model-predicted concentrations (which is a format most comparable to the NAAQS when evaluating a single year of data). Generally the highest concentrations are observed along the Colorado Front range with maximum concentrations ranging between 78 to 81 ppb.

**Figure 3.2-9** provides model-predicted PM<sub>2.5</sub> concentrations in two forms: the 8<sup>th</sup> highest 24-hour PM<sub>2.5</sub> concentrations and the annual average PM<sub>2.5</sub> concentrations. In general, the largest concentrations in Colorado are observed along the Colorado Front Range with values that can exceed 35 µg/m<sup>3</sup> for the 8<sup>th</sup> highest daily concentrations and 20 µg/m<sup>3</sup> for the annual average concentrations. However, the maximum domain-wide concentrations are located in southern New Mexico.

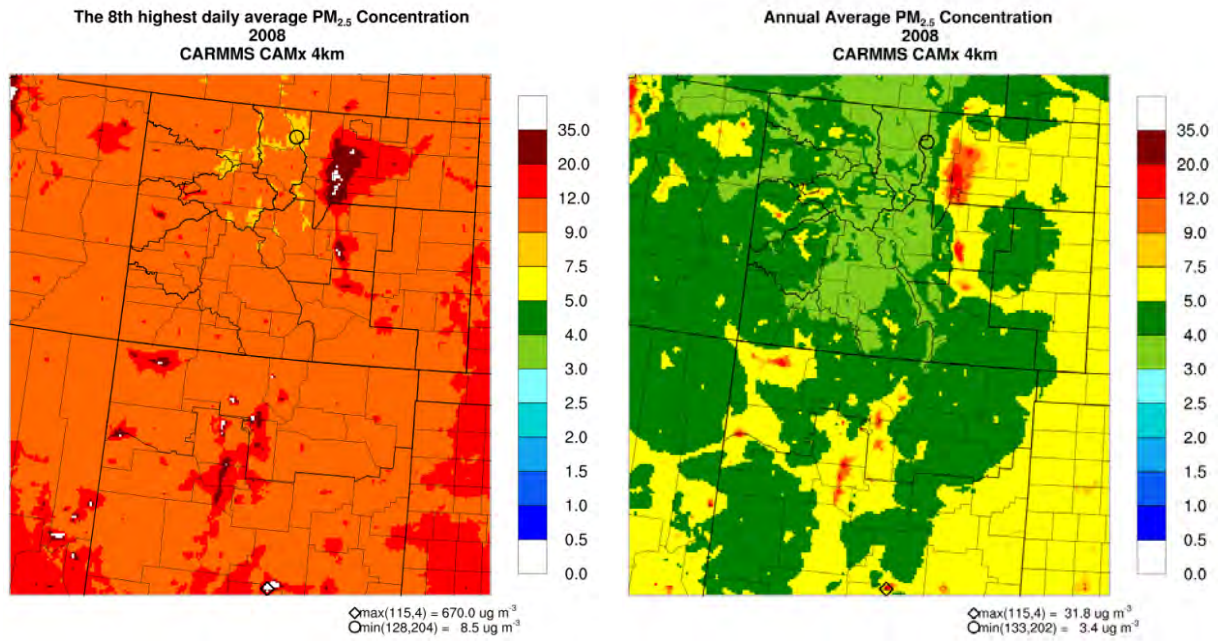
The CARMMS modeling also estimates AQRV impacts, namely visibility and deposition. **Table 3.2-5** provides estimates of the 20 percent worst and 20 percent best cumulative visibility days at Class I areas for the 2008 base case.

**Table 3.2-6** provides model-predicted estimates of the total annual average and maximum nitrogen and sulfur deposition at Class I areas for the 2008 base case. While there are many areas that in 2008 have model-predicted nitrogen deposition that exceeds the NPS recommended critical loads, sulfur deposition in all areas is below the recommended sulfur critical load.



Source: CARMMS 2015.

**Figure 3.2-8 Design Values (left) and 4<sup>th</sup> highest daily maximum 8-hour Ozone Concentrations (right) for the 2008 Base Case**



Source: CARMMS 2015.

**Figure 3.2-9 Eighth highest 24-hour (left) and annual average (right) PM<sub>2.5</sub> concentrations for the 2008 Base Case**

**Table 3.2-5 Cumulative Visibility for Worst 20% and Best 20% Visibility Days at Class I Areas for the 2008 Base Case**

Class I Name	State	IMPROVE Site	Worst 20% Visibility	Best 20% Visibility
Arches National Park	UT	CANY1	11.02	2.86
Mount Baldy Wilderness	AZ	BALD1	11.10	2.86
Bandelier National Monument	NM	BAND1	11.33	4.01
Black Canyon of the Gunnison National Monument	CO	WEMI1	9.95	2.25
Bosque del Apache	NM	BOAP1	12.72	5.50
Canyonlands National Park	UT	CANY1	12.49	4.54
Capitol Reef National Park	UT	CAP11	12.92	3.33
Eagles Nest Wilderness	CO	WHRI1	8.68	0.69
Flat Tops Wilderness	CO	WHRI1	8.68	0.69
Galiuro Wilderness <sup>1</sup>	AZ	CHIR1	11.58	2.58
Gila Wilderness	NM	GICL1	11.58	2.58
Great Sand Dunes National Monument	CO	GRSA1	10.90	3.58
La Garita Wilderness	CO	WEMI1	9.95	2.25
Maroon Bells-Snowmass Wilderness	CO	WHRI1	8.68	0.69
Mesa Verde National Park	CO	MEVE1	11.20	3.12
Mount Zirkel Wilderness	CO	MOZI1	9.36	0.95
Pecos Wilderness <sup>2</sup>	NM	BAND1	11.33	4.54
Petrified Forest National Park	AZ	PEFO1	12.49	4.01
Rawah Wilderness	CO	MOZI1	9.36	0.95
Rocky Mountain National Park	CO	ROMO1	12.04	1.91
Salt Creek	NM	SACR1	16.87	6.81
San Pedro Parks Wilderness	NM	SAPE1	9.43	1.28
West Elk Wilderness	CO	WHRI1	8.68	0.69
Weminuche Wilderness	CO	WEMI1	9.95	2.25
Wheeler Peak Wilderness <sup>2</sup>	NM	BAND1	11.33	4.01
White Mountain Wilderness	NM	WHIT1	12.92	3.33

Source: CARMMS 2015.

**Table 3.2-6 Total Annual Nitrogen and Sulfur Deposition at Class I Areas for the 2008 Base Case**

Class I Area	Nitrogen Deposition Maximum (kg N/ha/yr)	Nitrogen Deposition Average (kg N/ha/yr)	Sulfur Deposition Maximum (kg S/ha/yr)	Sulfur Deposition Average (kg S/ha/yr)
Arches National Park	2.20	1.81	0.36	0.33
Bandelier New Mexico	9.00	2.96	1.12	0.71
Black Canyon National Park	2.99	2.57	0.62	0.53
Bosque del Apache Wilderness Area	5.08	2.46	0.41	0.36
Canyonlands National Park	2.31	1.77	0.60	0.35
Capitol Reef National Park	3.37	1.90	0.55	0.33
Eagles Nest Wilderness Area	3.59	2.94	1.56	1.10
Flat Tops Wilderness Area	3.71	3.09	1.72	1.33
Galiuro Wilderness Area	2.97	2.83	1.12	1.02
Gila Wilderness Area	2.69	1.68	1.61	0.72
Great Sand Dunes National Monument	2.70	1.95	0.94	0.56
La Garita Wilderness Area	2.75	2.11	1.25	0.88
Maroon Bells-Snowmass	3.81	2.94	1.86	1.33
Mesa Verde National Park	3.14	2.76	0.91	0.80
Mount Baldy Wilderness Area	3.24	2.69	2.06	1.52
Mount Zirkel Wilderness Area	5.13	3.95	2.34	1.73
Pecos Wilderness Area	3.95	2.99	1.95	1.30
Petrified Forest National Park	2.66	2.16	0.80	0.68
Rawah Wilderness Area	4.07	3.27	1.77	1.29
Rocky Mountain National Park	4.49	3.50	1.91	1.35
Salt Creek Wilderness Area	8.21	5.39	0.73	0.66
San Pedro Parks Wilderness Area	3.36	2.93	1.61	1.24
Weminuche Wilderness Area	3.80	2.84	2.06	1.36
West Elk Wilderness Area	3.34	2.63	1.48	1.01
Wheeler Peak Wilderness Area	4.11	3.44	2.23	1.66
White Mountain Wilderness Area	3.73	2.85	1.85	1.11

Source: CARMMS 2015.

### 3.2.4 Analysis Area County Oil and Gas Production

**Table 3.2-7** below shows the current oil and gas production statistics on a per county basis (well counts and production numbers are for both federal and fee minerals) for the counties containing the previously issued oil and gas leases and nearby counties: Garfield, Mesa, Moffat, Rio Blanco and Routt. The oil and gas data is from the Colorado Oil and Gas Conservation Commission (COGCC) database and is provided to convey the current level of intensity for oil and gas development within the vicinity of the analysis area.

**Table 3.2-7 Analysis Area County Annual Production Data (2014)**

County	Year	No. Producing wells	Oil Produced (barrels)	Gas Produced (MCF)	Water Produced (barrels)
Garfield	2014	12,693	2,035,678	605,612,719	38,733,797
Mesa	2014	1,849	65,522	36,389,860	1,917,343
Moffat	2014	770	387,714	16,110,261	5,584,878
Rio Blanco	2014	4,164	4,741,767	81,222,356	113,632,434
Routt	2014	46	58,064	149,068	1,580

Source: COGCC 2015.

### 3.2.5 National Emissions Inventory Data (2011)

As previously stated, air quality is generally a function of air pollutants emissions loading within any particular region. The National Emissions Inventory provides a comprehensive estimate of air emissions of both criteria and hazardous air pollutants from multiple air emission sources such as agriculture, biogenics, wild and prescribed fires, fuel combustion, industrial processes and others. With respect to the counties in the area of interest (Eagle, Garfield, Mesa, Pitkin, Rio Blanco and Routt in west and northwest Colorado), the emissions inventories in **Table 3.2-8** are provided to describe the affected environment in terms of current cumulative emissions intensities in tons per year. **Table 3.2-8** also shows the Colorado emission totals to provide some context of the magnitude of emissions for the counties in the area of interest.

### 3.2.6 Oil and Gas Emission Emissions Inventory Data (2011)

The emissions from the Colorado federal oil and gas sector estimated for the CARMMS are presented in **Table 3.2-9**. The table provides the federal oil and gas emissions for the year 2011 for CRVFO (outside of the Roan Plateau Planning Area (RPPA), as well as for those Planning Areas located in Northwestern Colorado, and all of Colorado.

**Table 3.2-8 National Emissions Inventory Data**

County	NO <sub>x</sub>	CO	SO <sub>2</sub>	PM <sub>10</sub> Primary	PM <sub>2.5</sub> Primary	VOC	NH <sub>3</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HAPs (VOC)
Eagle	3,412.4	21,055.6	68.4	3,075.4	1,087.6	18,568.5	386.2	557,774.6	303.7	16.5	2,066.4
Moffat	15,532.5	15,178.7	3,977.7	5,242.6	1,350.6	41,923.3	730.0	107,435.8	58.7	5.2	7,180.2
Garfield	16,412.9	29,787.7	186.8	4,170.1	1,209.8	118,709.0	369.0	569,714.4	133.7	18.8	7,569.7
Mesa	7,412.4	36,911.8	108.8	4,351.9	1,416.1	49,868.0	1,046.9	913,305.4	231.7	43.1	6,298.7
Pitkin	834.3	7,107.2	18.1	573.3	242.4	11,399.6	74.7	159,096.2	56.0	6.6	1,056.3
Rio Blanco	5,027.5	11,556.6	338.7	5,090.8	1,128.2	57,808.8	408.4	71,277.6	19.9	2.7	5,589.6
Routt	7,951.0	20,204.9	2,243.0	7,855.8	2,125.6	29,164.8	609.7	303,702.4	526.2	8.5	2,752.5
<b>Total Colorado</b>	<b>337,092.6</b>	<b>1,575,920.5</b>	<b>55,718.3</b>	<b>329,190.3</b>	<b>101,828.4</b>	<b>1,420,144.6</b>	<b>79,360.6</b>	<b>36,101,024.5</b>	<b>20,317.8</b>	<b>1,377.6</b>	<b>194,894.9</b>

Source: USEPA 2015c.

**Table 3.2-9 CARMMS Federal Oil and Gas Emissions Data (2011)**

Planning Area	NO <sub>x</sub>	VOC	CO	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	Benzene	Toluene	Ethylbenzene	Xylenes	Formaldehyde	n-hexane	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
CRVFO (not including the RPPA)	1,035.98	2,596.16	734.23	200.37	52.53	6.87	66.58	72.59	4.23	75.96	40.94	156.15	332,461.58	9,914.12	4.95
Total Northwest Colorado <sup>1</sup>	6,887.52	11,117.10	5,206.61	875.23	330.44	291.13	293.08	349.68	19.94	312.67	215.26	551.39	2,120,818.26	50,026.24	33.30
Total All Colorado	8,394.53	13,007.28	7,339.87	998.91	378.72	293.27	300.59	358.78	23.51	323.08	224.45	580.38	2,321,470.63	57,648.49	36.13

<sup>1</sup> Northwest Colorado Totals include the following Planning areas: CRVFO, Roan Plateau Planning Area, GJFO, Little Snake Field Office (LSFO), and WRFO. The Northwest emissions include those from the Piceance Basin Area.

Source: CARMMS 2015.



### 3.2.7 Greenhouse Gases and Climate Change

There is broad scientific consensus that humans are changing the chemical composition of Earth's atmosphere. Activities such as fossil fuel combustion, deforestation, and other changes in land use are resulting in the accumulation of trace greenhouse gases (GHGs) such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and several industrial gases in the Earth's atmosphere. An increase in GHG emissions results in an increase in the earth's average surface temperature, primarily by trapping and thus decreasing the amount of heat energy radiated by the Earth back into space. The phenomenon is commonly referred to as global warming. Global warming is expected in turn, to affect weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, which is collectively referred to as climate change.

While GHGs do not have applicable ambient standards or emission limits under the major environmental regulatory programs, several anthropogenic activities contribute to climate change, including emissions of GHGs from fossil fuel development and activities using combustion engines. The Intergovernmental Panel on Climate Change (IPCC) reports that since 1750, the largest contribution to total radiative forcing is caused by the increase in atmospheric concentration of CO<sub>2</sub> (IPCC 2013). In addition, "the atmospheric concentrations of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O have increased to unprecedented levels in at least the last 800,000 years. CO<sub>2</sub> concentrations have increased by 40 percent since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions" (IPCC 2013).

According to the National Climate Assessment (Melillo et al. 2014), U.S. average temperature also have increased by 1.3°F to 1.9°F since record keeping began in 1895, and most of this increase has occurred since 1970.

While the earth has had many episodes of warming and cooling in the past, the IPCC recently concluded that the recent warming of the climate system is very unique when compared to those past episodes. Additionally, most of the observed increase in globally average temperatures since the mid-20<sup>th</sup> century is due to the observed increase in anthropogenic GHG concentrations (IPCC 2013).

**Table 3.2-10** provides a summary of the Colorado GHG emissions in million metric tons of CO<sub>2</sub> equivalents (MMTCO<sub>2</sub>e) as estimated with the USEPA's State Inventory Tool by the Colorado Department of Public Health and Environment (CDPHE). The table provides a comparison of emissions by sector and shows that most GHG emissions in Colorado come from the electric power, transportation, and residential/commercial/industrial fuel use sectors in decreasing order.

**Table 3.2-10 Colorado GHG Emissions by Emissions Sector (2010)**

Sector	GHG Emissions (MMTCO <sub>2</sub> e)
Electric Power	40
Transportation	30
Residential, Commercial & Industrial Fuel Use	27
Natural Gas and Oil Systems	10
Agriculture	9
Coal Mining & Abandoned Mines	8
Industrial Processes	4
Waste Management	3
<b>Total</b>	<b>130</b>

Source: CDPHE 2014.

**Table 3.2-11** provides a summary of the energy-related CO<sub>2</sub> emissions as reported by the U.S. Energy Information Administration (USEIA) in their 2014 Annual Energy Outlook. The table provides a comparison of CO<sub>2</sub> emissions by fuel type for both the entire United States and the Mountain Region. The USEIA defines the Mountain Region as the States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, and Wyoming. The table shows that in the entire U.S., petroleum sources are the largest contributor to CO<sub>2</sub> followed by coal, while in the Mountain Region the largest contributor to CO<sub>2</sub> emissions is coal followed by petroleum.

**Table 3.2-11 Energy Related CO<sub>2</sub> Emissions by Fuel Type (2011)**

<b>Fuel Type</b>	<b>United States (MMTCO<sub>2</sub>)</b>	<b>Mountain Region (MMTCO<sub>2</sub>)</b>
Petroleum <sup>1</sup>	2,304.0	156.8
Natural Gas	1,306.0	96.6
Coal	1,876.0	206.5
Other <sup>2</sup>	12.0	0.0
<b>Total</b>	<b>5,498.0</b>	<b>459.9</b>

<sup>1</sup> This includes carbon dioxide from international bunker fuels, both civilian and military, which are excluded from the accounting of carbon dioxide emissions under the United Nations convention. From 1990 through 2012, international bunker fuels accounted for 90 to 126 million metric tons annually.

<sup>2</sup> Includes emissions from geothermal power and nonbiogenic emissions from municipal waste.

Source: USEIA 2015.

### **3.3 Geological, Mineral, and Paleontological Resources**

#### **3.3.1 Regulatory Framework**

##### **3.3.1.1 Minerals**

Federally owned minerals in the public domain are classified into specific categories that only apply to minerals in the federal mineral estate. Within legal constraints, publicly owned minerals are available for exploration, development, and production, while subject to existing regulations, standard terms and conditions, and stipulations. The classifications listed below are based on Acts passed by the U.S. Congress.

- Leasable minerals (which include fluid minerals such as oil and gas, geothermal resources and associated by-products, oil shale, native asphalt, oil impregnated sands as well as solid minerals such as coal and phosphates) are associated with the following laws; Mineral Leasing Act of 1920, as amended by the Federal Onshore Oil and Gas Leasing Act of 1987; Mineral Leasing Act for Acquired Lands of 1947, as amended; and the Geothermal Steam Act of 1970, as amended. Leasable minerals are acquired by applying to the federal government for a lease to explore and develop the minerals (see Chapter 1.0, **Table 1-3**, Major Federal Laws and Regulations Related to Oil and Gas Leasing).
- Locatable minerals (including precious and base metallic ores and nonmetallic minerals such as bentonite, gypsum, chemical grade limestone, and chemical grade silica sand) are acquired under the General Mining Law of 1872, as amended and the Surface Use and Occupancy Act of July 23, 1955 (American Geological Institute 1997).
- Salable minerals (common mineral materials such as sand, gravel, roadbed, ballast, and common clay that are sold by contract with the federal government) are regulated under the Mineral Material Act of July 23, 1947, as amended, and the Surface Use and Occupancy Act of July 23, 1955 (American Geological Institute 1997).

Other applicable guidance related to oil and gas leasing includes the following:

- WRNF Land and Resource Management Plan (LRMP) identification of areas subject to no surface occupancy, controlled surface use, or timing limitations restrictions and stipulations that could affect geological and mineral resources.
- Forest Service Manual (FSM) 2820 (guidance on mineral leasing operations National Forest System [NFS] lands).
- FSM 2860 (guidance on mineral prospecting and collecting operations on NFS lands, including geophysical activities).
- BLM Colorado Standard Oil and Gas Lease Stipulations.

##### **3.3.1.2 Geological Hazards**

Various federal and state regulations provide design standards for facilities located in areas that may have potentially damaging ground movements due to movement on active or potentially active faults, or landslides.

##### **3.3.1.3 Paleontology**

The Paleontological Resources Preservation Act of 2009 (Public Law [P.L.]111-011) authorizes the BLM and the Forest Service to manage and provide protection to fossil resources using “scientific principles and expertise.” The act defines paleontological resource as “any fossilized remains, traces, or imprints of

organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth.”

Guidance in the protection, assessment, and mitigation of impacts of paleontological resources is contained in BLM Instruction Memorandum 2009-011 (BLM 2013). The Forest Service has issued final rules for the management and protection of paleontological resources (80 FR 21587). Forest Service also regulates fossil resources under Title 36 CFR 228.62(e) and 261.9(l, j) governing petrified wood and special use authorization for removing any paleontological resource for commercial purposes.

### **3.3.2 Analysis Area**

The analysis area for geological, mineral, and paleontological resources consists of the individual lease tracts within the four zones outlined in Chapter 1.0.

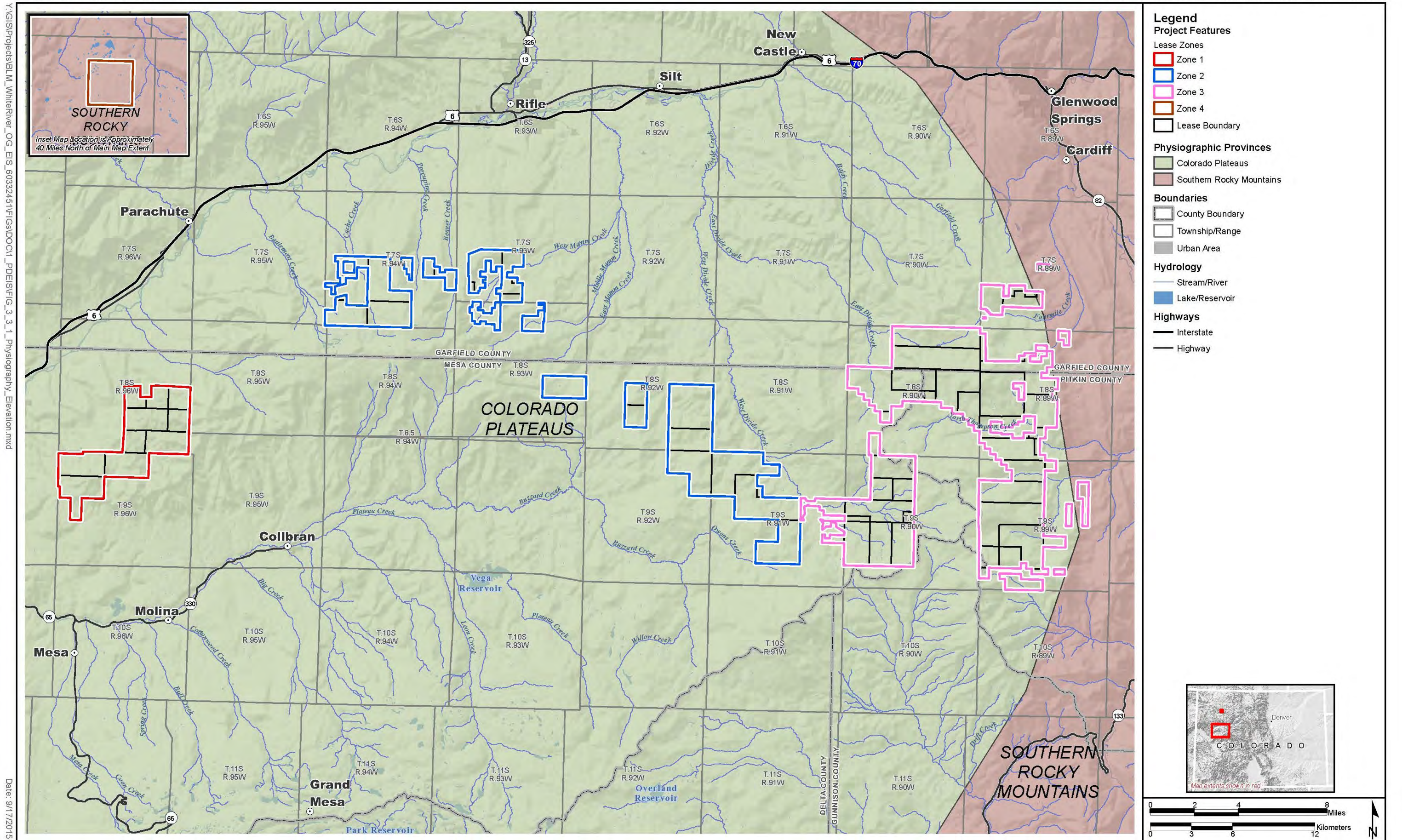
### **3.3.3 Regional Affected Environment**

#### **3.3.3.1 Physiography**

The analysis area, comprised of the boundaries of the 65 existing leases, is located in two physiographic provinces, shown on **Figure 3.3-1**. Zones 1, 2, and 3 are in the Colorado Plateaus physiographic province, which consists of 140,000 square miles and occupies part of the Four Corners area of Arizona, Colorado, New Mexico, and Utah (Howard and Williams 1972). The Colorado Plateaus province is characterized by buttes and mesas and deeply incised drainages. The province is typified by flat-lying or gently folded sedimentary rocks that range in age from Early Paleozoic to late Cenozoic, but in several areas the boundary of the province is defined by steeply dipping rocks that form hogback ridges. Most of the analysis area is located in a physiographic section called the Uinta Basin, which occupies the northernmost portion of the Colorado Plateaus province. The Uinta Basin consists of two subbasins, the Uinta Basin and the Piceance Basin that are separated by the Douglas Creek Arch that runs north-south parallel to the Utah-Colorado state line. The Piceance Basin is a 7,100-square-mile area that trends northwest to southeast and is approximately 100 miles long and 60 miles wide (Colorado Geological Survey [CGS] 2008). The topography is rugged, consisting of deeply incised plateaus with elevations ranging from 5,000 to 6,000 feet above mean sea level (amsl) in the major river valleys to nearly 11,000 feet in the southern part of the basin. A prominent physiographic feature is the Colorado River Valley that trends generally east to west across the basin. Other prominent features include the Roan Plateau, whose southern boundary forms an imposing escarpment on the north side of the Colorado River Valley; the Grand Hogback, a prominent ridge that forms much of the eastern boundary of the Piceance Basin; Battlement Mesa, a strongly dissected mesa opposite from the Roan Plateau on the south side of the Colorado River; and the Grand Mesa to the south of the Battlement Mesa.

Zone 4 is in the Southern Rocky Mountains physiographic province. The province is characterized by high rugged mountains, with many peaks above 14,000 feet in elevation. The mountain ranges generally trend north to south and are separated by valleys. The Zone 4 lease area is located in a sub-section of the Southern Rocky Mountains called the White River Plateau, which trends northwest to southeast that is about 50 miles long and 50 miles wide and is considered a northward extension of the Sawatch Range (Bass and Northrup 1963). Elevations up to 11,000 feet are common with a large area that is capped with flat-lying sedimentary rocks. A portion of the uplift is referred to as the Flat Tops. The edges of the uplift are cut by deeply incised drainages and the southern boundary of the area is the Glenwood Canyon cut by the Colorado River. Several mountain peaks exceed 12,000 feet in elevation (Bass and Northrup 1963).

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Figure 3.3-1 Physiographic Provinces in the Region

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**3.3.3.2 Stratigraphy**

The Piceance Basin contains 20,000 to 25,000 feet of Phanerozoic sedimentary rocks and deposits ranging in age from Lower Cambrian to Holocene (Jensen and Mitchell 1972; Johnson and Roberts 2003). In addition to the sedimentary rocks, there are Tertiary-aged igneous intrusive and volcanic rocks. Unconsolidated surficial deposits consist of alluvium, glacial material, eolian, and landslide deposits. **Table 3.3-1** shows the regional stratigraphy. Cretaceous, Tertiary, and unconsolidated Holocene deposits are the primary units that are exposed in Zones 1, 2, and 3, as shown in **Figure 3.3-2**. The White River Uplift has approximately 20,000 feet of sedimentary rocks that also range in age from Lower Cambrian to Holocene (Bass and Northrup 1963).

**Table 3.3-1 Stratigraphic Chart of the Southeast Piceance Basin and White River Uplift**

Era	System	Series	Formation/Unit	Important Hydrocarbon/ Mineral Production	Potential Fossil Yield Classification (PFYC) Rank <sup>1</sup>	Fossils
Cenozoic	Quaternary	Holocene	Unconsolidated deposits including alluvium, glacial, and wind-blown deposits	Sand and gravel	3 and 4	Mammoth, bison
		Pleistocene				
	Tertiary	Pliocene				
		Miocene	Basalt flows		3 and 4	Mammals
		Oligocene	West Elk volcanics		3 and 4	Mammals
		Eocene	Uinta and Green River Formations	Natural Gas	5	Reptiles, fish, insects, plants
		Paleocene	Wasatch Formation	Natural Gas	5	Mammals, fish, reptiles, insects, plants
Cretaceous	Upper Cretaceous		Mesaverde Group	Natural Gas/ coalbed natural gas (CBNG)/Coal	3 and 4	Not determined
			Mancos Shale	Natural Gas	3 and 4	Fish, reptiles
	Lower Cretaceous		Mowry Shale	Oil	3 and 4	Not determined
			Dakota Group	Natural Gas	3 and 4	Not determined
	Jurassic		Morrison Formation	Oil	5	Dinosaurs
			Entrada Sandstone	Oil	3 and 4	Dinosaurs
	Triassic		Chinle Formation	Oil		
			Moenkopi Formation			
Paleozoic	Permian		State Bridge Formation			
			Phosphoria Formation	Oil		
			Weber Sandstone	Oil		
	Pennsylvanian		Maroon Formation			
			Minturn Formation			
			Eagle Valley Formation			
			Beldon Formation			
			Molas Formation			

**Table 3.3-1 Stratigraphic Chart of the Southeast Piceance Basin and White River Uplift**

Era	System	Series	Formation/Unit	Important Hydrocarbon/ Mineral Production	Potential Fossil Yield Classification (PFYC) Rank <sup>1</sup>	Fossils
Paleozoic	Mississippian		Leadville Limestone			
	Devonian		Gilman Sandstone			
			Dyer Formation			
			Parting Formation			
	Silurian		Not present			
	Ordovician		Manitu Formation			
	Cambrian		Peerless Formation			
			Sawatch Formation			
Precambrian			Igneous and metamorphic rocks			

<sup>1</sup> PFYC rank and fossils shown for those units likely to be affected by ground-disturbing activities, PFYC rank from BLM 2014b. Source: Bass and Northrup 1963; BLM 2014b; CGS 2008; U.S. Geological Survey (USGS) Uinta-Piceance Assessment Team 2003.

**3.3.3.1 Structural Geology**

The Piceance Basin was formed at the end of Cretaceous and early Tertiary during the Laramide mountain building period. The basin is asymmetric with very steeply dipping strata on the east side with the deepest part of the basin in the northeast portion of the basin (**Figure 3.3-3**). The steep dips on the east side of the basin have resulted from basin-bounding faults and the uplift of Cretaceous sedimentary rocks is displayed along the Grand Hogback. There are many internal structures within the basin, with a dominant trend from northwest to southeast. Of interest to this study are the Wolf Creek, Divide Creek, Coal Basin, and the DeBeque Anticlines (USGS Uinta-Piceance Assessment Team 2003).

The structure of the White River uplift is a slightly elongated dome (Bass and Northrup 1963). On the crest of the uplift, structural dips are gentle or flat, but on the boundaries of the uplift the rocks dip steeply having been uplifted along bounding faults. Along the southwest flank of the uplift where it bounds the Piceance Basin at the Grand Hogback, sedimentary rocks have dips from 50 to 90° and in some areas are completely overturned. There are extensive faults trending west to east in the southern part of the uplift. A number of northwest-to southeast-trending folds are present where the Axial Basin, the northeast Piceance Basin, and the Sand Wash Basin bound the northern portion of the White River Uplift. One of these folds is the Yellowjacket Anticline, a north-trending fold that is located in Zone 4 lease area (Reheis 1984).

**3.3.3.2 Geological Hazards**

Landslides

The analysis area (all lease zones) is highly prone to landslides, debris flows, and mass movements of slump-blocks (see **Figure 3.3-4**, Landslides). Much of the underlying instability in the Grand Mesa-Battlement Mesa area has been the result of rapid erosion of Eocene-aged sedimentary rocks and undercutting of overlying volcanic flows (Yeend 1969). Landslides also have been known to occur in upper Cretaceous rocks of the Mesaverde and Mancos Formations (Cole et al. 2014). Numerous landslides have been mapped in the area and movement on many slides can reoccur depending on the



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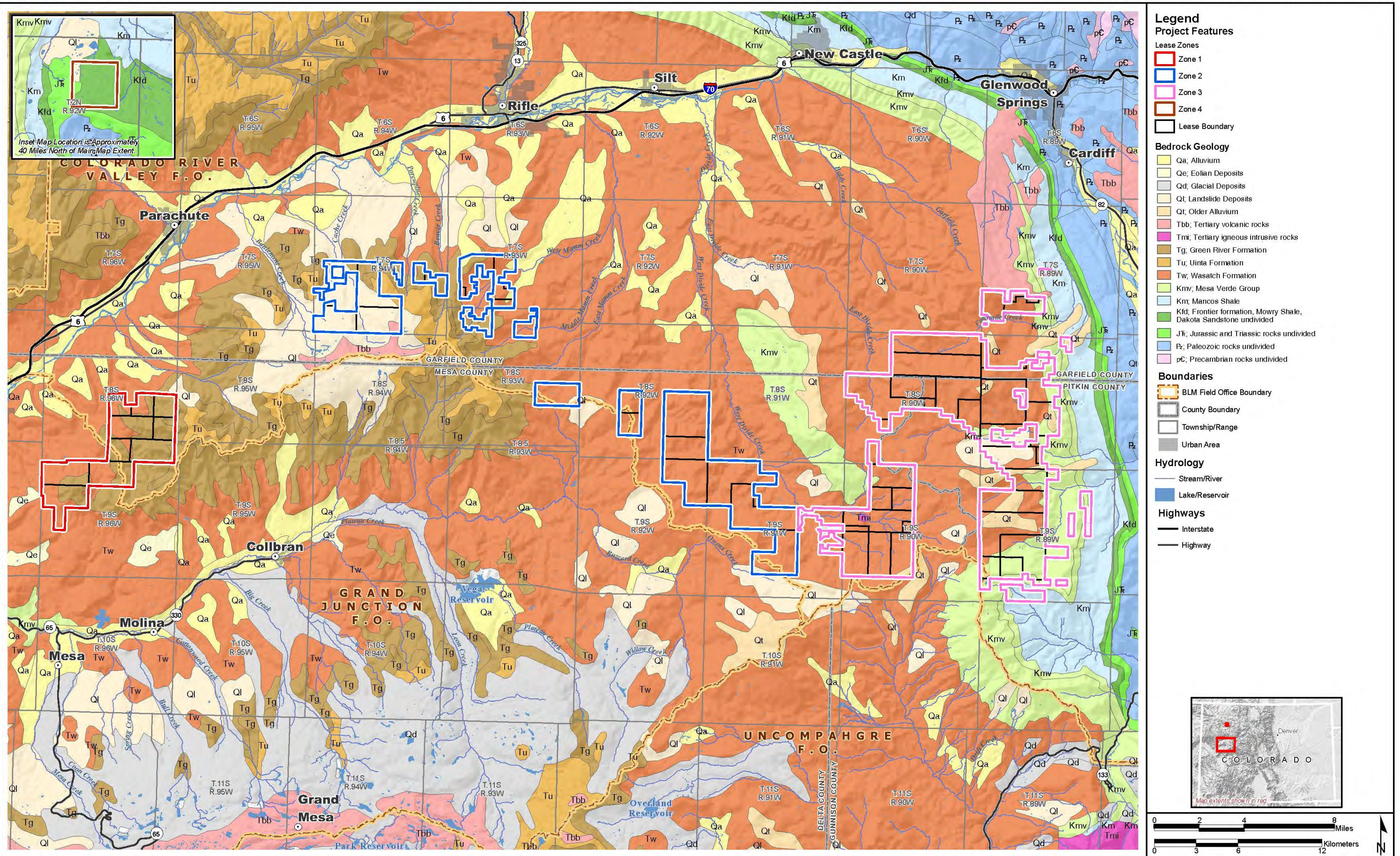
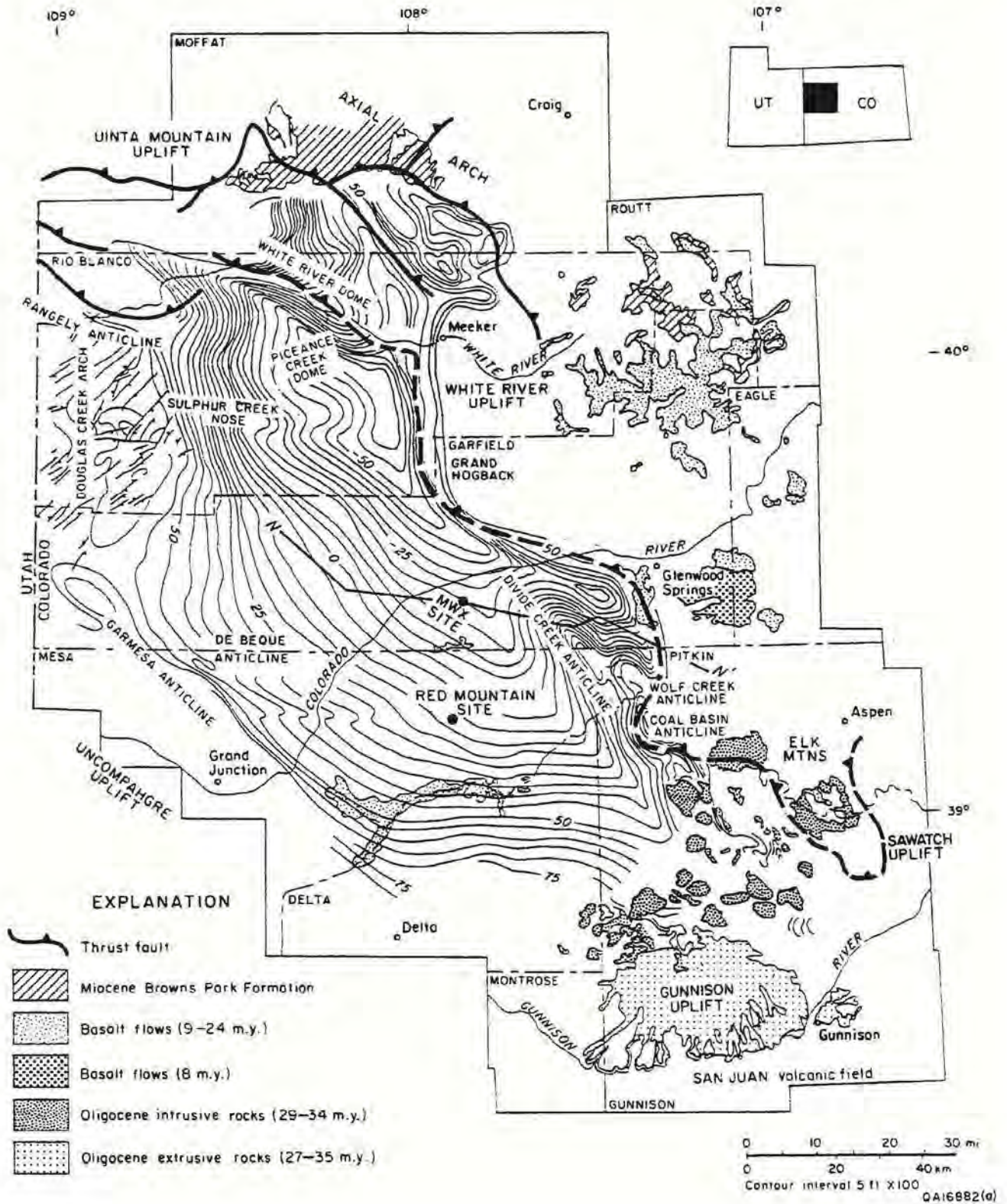


Figure 3.3-2 Regional Bedrock Geology

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Source: Tyler 1996

**Figure 3.3-3 Regional Geologic Structure**

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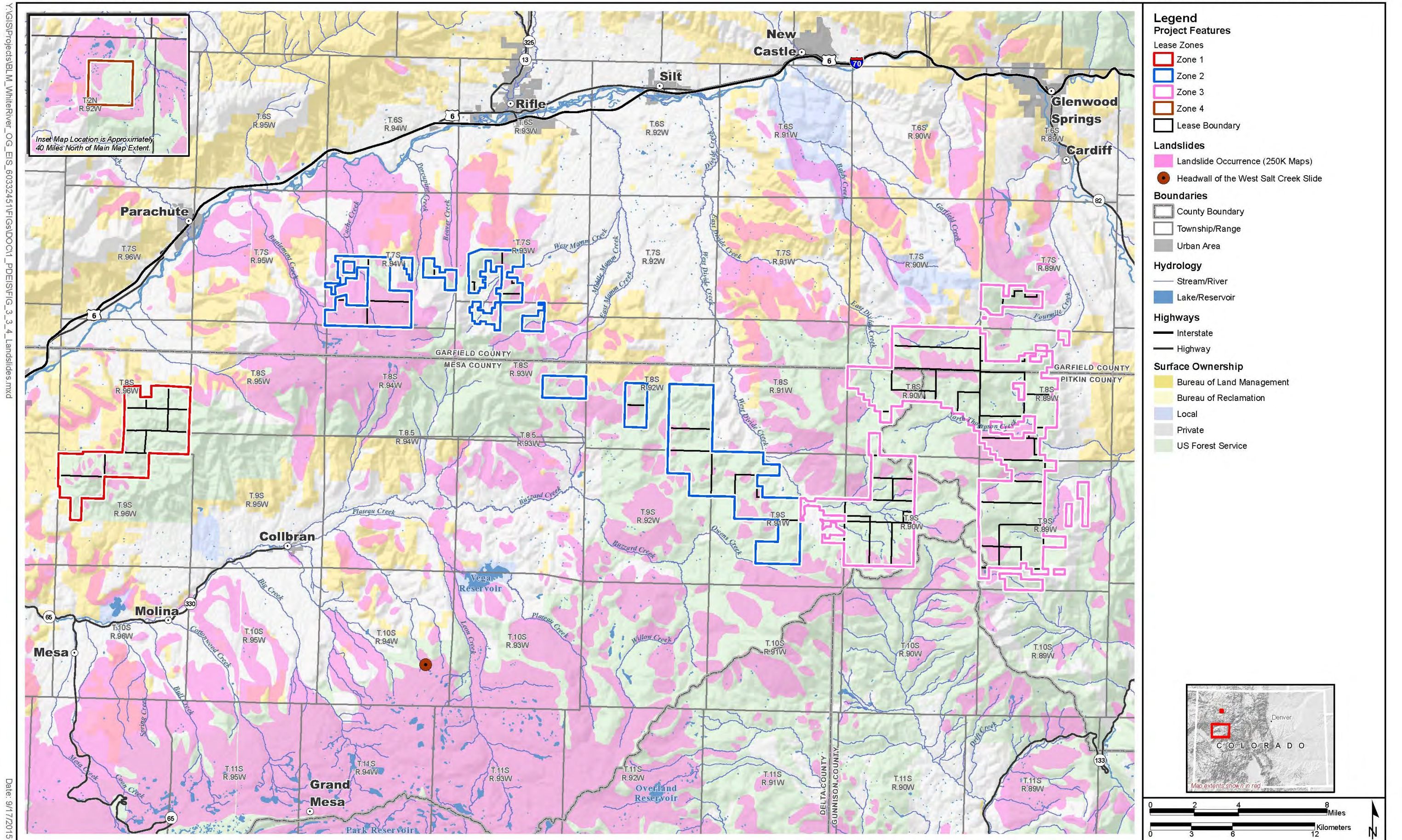


Figure 3.3-4 Landslide Occurrence

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amount of precipitation (Soule 1988). A recent massive landslide occurred on May 27, 2014, that involved three fatalities. The landslide, referred to as the West Salt Creek slide, is located in Township 10 South (T10S), Range 94 West (R94W), about 6 miles southeast of Collbran, Colorado. The slide is approximately 2.8 miles long, 0.5 mile wide, 150 feet thick, and involved 39 million cubic yards of material (Cole et al. 2014). The slide occurred in an area of pre-existing landslide deposits and unconsolidated materials. It is thought that high amounts of precipitation and the steep topographic gradient in the West Salt Creek drainage contributed to a reactivation of an old slump block.

### Seismicity and Faults

A search of the USGS earthquake catalog was conducted to determine level of earthquake activity in the analysis area (USGS 2015). Using search parameters centered on latitude 39.5 degrees north and longitude 108 degrees west and a cutoff of less than magnitude 3.0, it was determined that there were about 60 epicenters (mostly magnitude 3.0 to 4.0), but more than half of the epicenters were rock bursts that appear to be associated with coal mining in the Paonia, Colorado area, approximately 30 miles south of the analysis area. Rock bursts occur during longwall mining when the coal is mined out and roof support is removed and the mined out area collapses.

The estimates of seismic hazards in any given area in the country are based on the mapping of Quaternary (the last 1.6 million years) faults (USGS and CGS 2006). There are Quaternary faults located in T7S and T8S, R88W and R89W along the Grand Hogback (see **Figure 3.3-5**).

### Induced Seismicity

Coal mine rock bursts described above are examples of the phenomena of induced seismicity, in which human activities cause earthquakes to occur. In addition to mining, activities that cause seismicity include subsurface injection and withdrawal of fluids, water reservoirs, and nuclear explosions. Of interest here is induced seismicity caused by the injection of fluids, which may alter the stresses on the rocks, creating a situation where faults can be activated. In the northern Piceance Basin at Rangely oil field, injection during waterflood operations in the 1960s was thought to be the cause of slight tremors (Cypser 1996). In an effort to ascertain whether the tremors were actually caused by injection activities, USGS researchers in 1970 conducted a series of tests and established a strong relationship between increases and decreases in injection pressures and the frequency of earthquakes.

### Caves and Karst

Karst topography occurs in areas that are underlain by carbonate rocks or evaporite minerals (salt, gypsum, or anhydrite) that have undergone dissolution by water. Karst topography is typified by depressions, sinkholes, disappearing streams, and cave openings (Tobin and Weary 2004). Karst topography is common in the White River Plateau and is due primarily to the dissolution of the Leadville Limestone and gypsum and anhydrite beds in the Eagle Valley Evaporite. Over 60 caves have been identified in the in the Leadville Limestone of the White River Plateau (Teller and Welder 1985). The Leadville Limestone also has many features of paleokarst, dissolution features from a late Mississippian period of karst development (De Voto 1988). No caves have been identified in the vicinity of the lease zones, but Spring Cave is located in the White River National Forest near the South Fork Campground, approximately 15 miles southeast of Zone 4.

Evaporite karst is common in the form of sinkholes and depressions which occur where the Eagle Valley Evaporite is relatively shallow and dissolution of the salt and gypsum causes collapse of the overlying unconsolidated materials (Mock 2002). There is some potential for karst in the Carbondale, Colorado, area. **Figure 3.3-6** displays the karst areas. Although potential karst areas are shown to extend into leases in Zone 3, the formations that are susceptible to karst (the Eagle Valley Evaporite and the Leadville Limestone) are too deep to be of concern for the formation of karst hazards.

### 3.3.3.3 Minerals

#### Oil, Gas, and Coalbed Natural Gas

In the Uinta-Piceance petroleum province, the mean undiscovered oil and gas resource including Coalbed Natural Gas (CBNG) is 21 trillion cubic feet of gas and 59 million barrels of oil and 43 million barrels of natural gas liquids (USGS Uinta-Piceance Assessment Team 2003). There are numerous gas fields in the analysis area as shown on **Figure 3.3-7**. Hydrocarbon production comes from a variety of formations as shown on **Figure 3.3-2**. The major commodity produced is natural gas, which includes CBNG. Most CBNG in the Piceance Basin has been produced from the Cameo-Fairfield coal group of the Mesaverde Formation (CGS 2008). It is difficult to summarize CBNG production because coal gas production is often intermingled with natural gas from sandstone reservoirs due to the practice of large-interval staged hydraulic fracturing in vertical or directional wells.

Much of the non-coal gas is found in “tight” (low permeability) sandstones, mainly the Mesaverde and the Wasatch formations. It is expected that most future gas production would come from the Mesaverde Group (BLM 2008a), but there is potential for shale gas production from the Mancos Shale. Although gas has been produced out of conventional sandstone reservoirs in the Mancos “B” zone, the Mancos may have potential as an unconventional shale play. In 2013, WPX reported initial production from a Mancos Shale well to be 16 million cubic feet of gas per day and produced 1.0 billion cubic feet in 100 days (Niobrara News 2013). However, other horizontal attempts at the Mancos Shale have produced mixed results and with low natural gas prices, the foreseeable potential of shale gas in the Mancos is not certain.

The northern edge of the White River Plateau where Zone 4 is located has some oil fields that are associated with the anticlines along the northern boundary of the White River uplift. These oil fields include McHatton, Nine-Mile, Thornburgh, and Scott Hill.

#### Other Minerals

In addition to oil and gas, there are other mineral commodities in the analysis area, including coal, oil shale, uranium, and aggregate. **Figure 3.3-8** displays the permitted mines in the analysis area.

#### Coal

The analysis area is in the Uinta Coal Region, which the USGS divides into several coal resource assessment units. Zones 1, 2, and 3 lie within the South Piceance Basin Assessment Unit, is estimated to have a mineable resource to 3,000 feet deep of 82 billion tons from coals in the upper Cretaceous Mesaverde formation (Brownfield et al. 2000). Only Zone 3 contains potential coal mining areas along the Grand Hogback, but there are no active mines. In 2007, almost 19 million tons of coal was produced from mines in the southern Piceance Basin assessment area (Burnell et al. 2007).

#### Uranium

Uranium deposits in the Piceance Basin are likely to occur in the Morrison, Entrada, and Chinle formations and the Navajo Sandstone (Nelson-Moore et al. 1978). Uranium ore was mined from several occurrences in Garfield County, all located north of the Colorado River. The ore was processed at a mill in Rifle, Colorado. There are numerous uranium occurrences in T2N, R92W, where the Zone 4 is located. No active mining is occurring at the present time.





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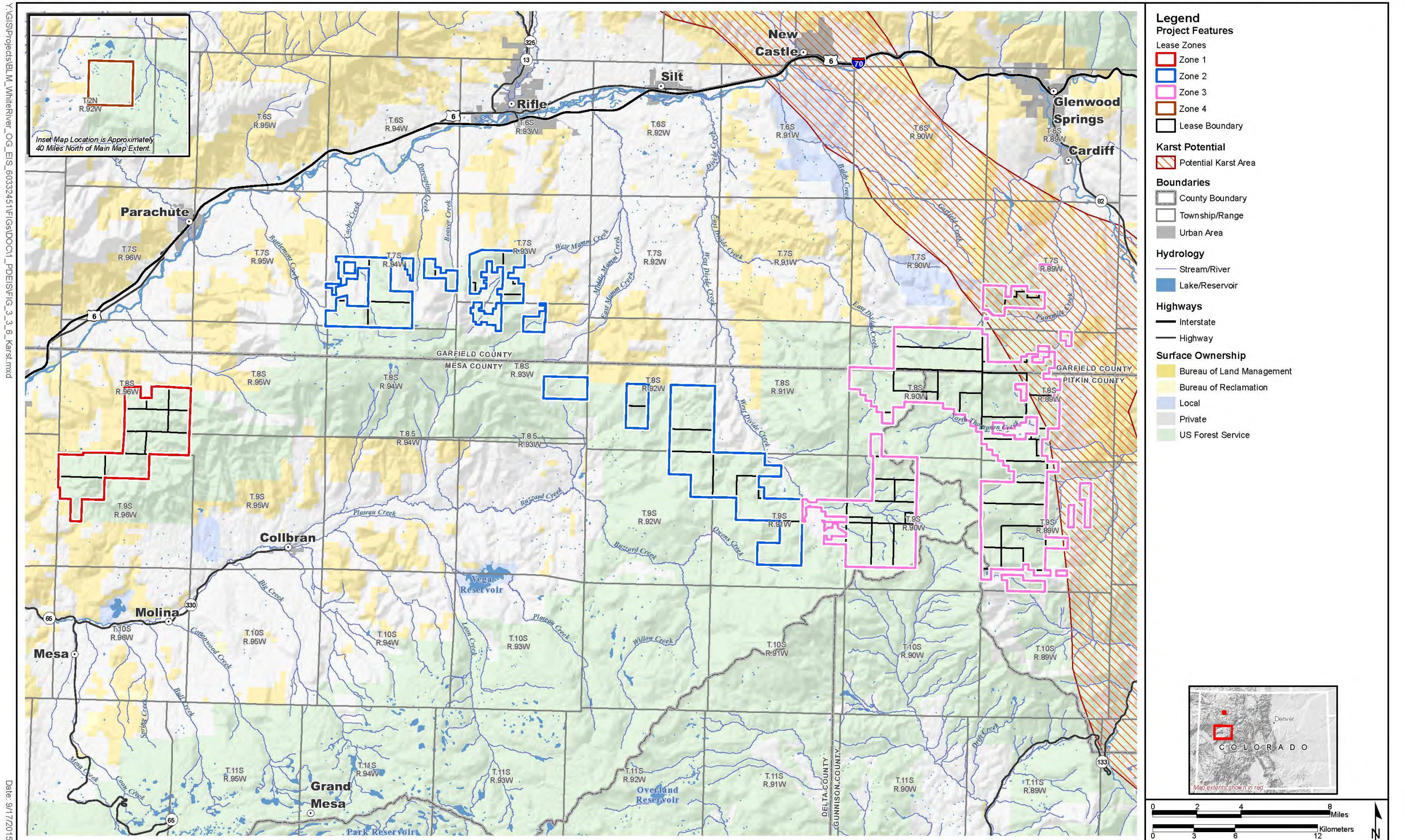


Figure 3.3-6 Karst Areas

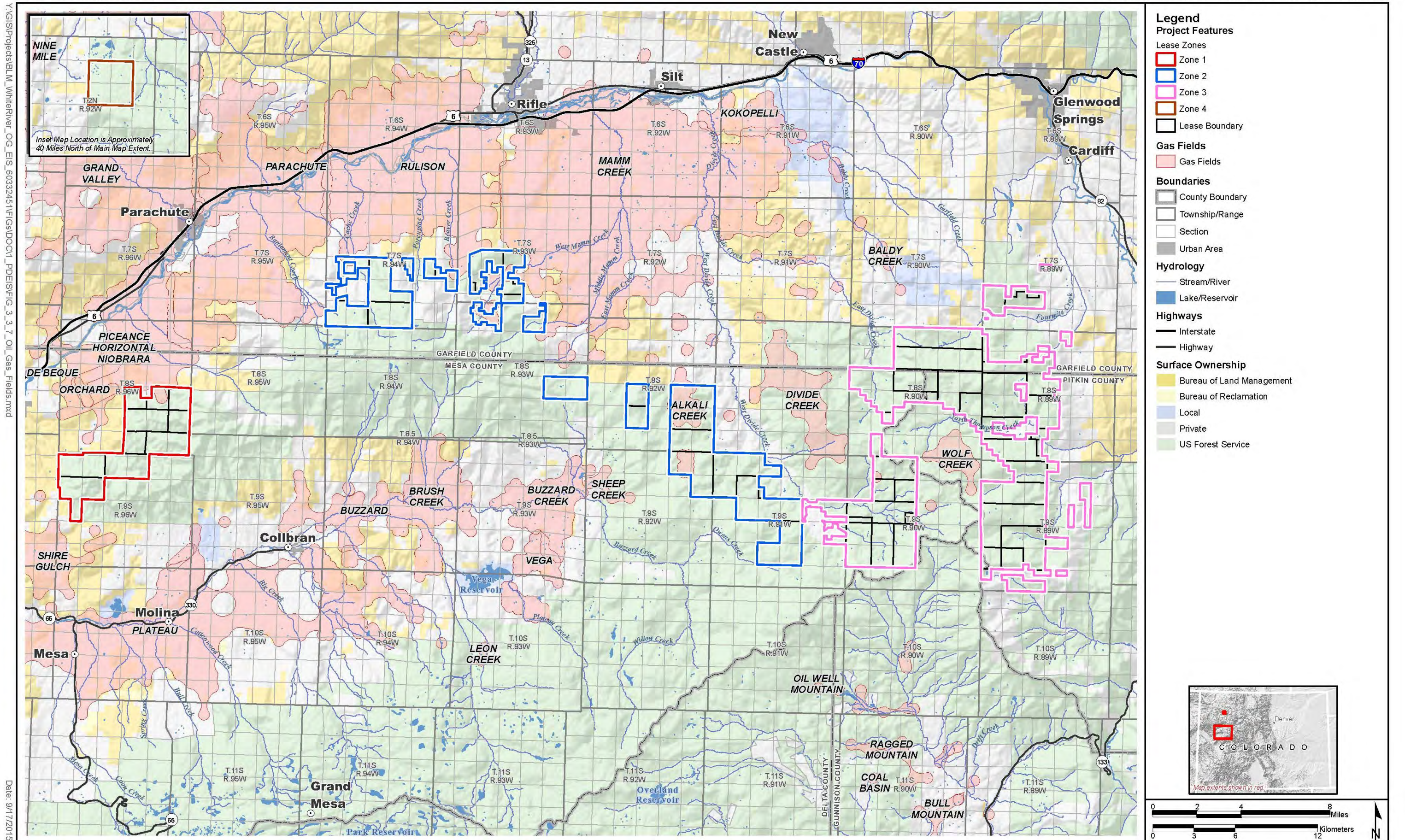


Figure 3.3-7 Oil and Gas Fields in the Analysis Area

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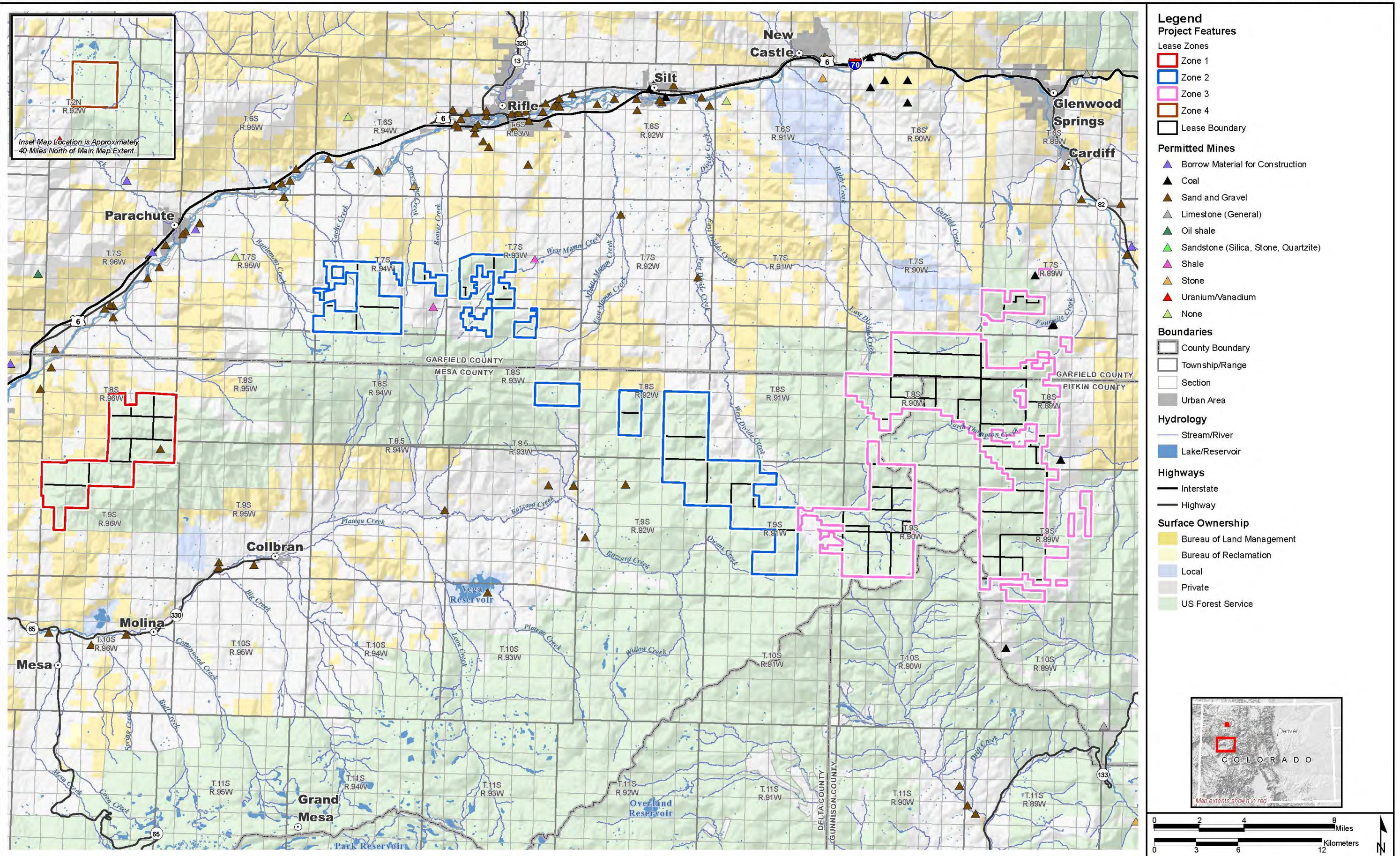


Figure 3.3-8 Permitted Mines in the Analysis Area

### Oil Shale

Oil shale is a marlstone that contains large amounts of kerogen, an organic material that is a precursor to hydrocarbons. Oil shale is an immature hydrocarbon source rock that, when subjected to heat, the kerogen is converted to oil (USGS 2015). Oil shale occurs in abundance in the Green River Formation of the Piceance Basin, but the high grade deposits (oil yield greater than 25 gallons per ton) occur north of the Colorado River.

### Aggregate

Sand and gravel commonly occur in alluvial deposits, but crushed stone also can provide gravel-sized material. In the analysis area, there are numerous sand and gravel pits located adjacent to the Colorado River and along Plateau Creek on Grand Mesa (**Figure 3.3-8**) (Guilinger and Keller 2004).

### Geothermal Energy

The lease zones are located in an area of moderate heat flow and hot springs located in the analysis area are indicative of geothermal potential (Berkman and Carroll 2007). However, there is no power generation by geothermal energy in the area. Hot springs at Glenwood Springs and at Penny Hot Springs in northwest Pitkin County are evidence of geothermal potential in the area.

#### **3.3.3.4 Paleontological Resources**

The BLM adopted the PFYC system to identify and classify fossil resources on federal lands (BLM 2013). Under this system, paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the potential for the occurrence of paleontological resources.

The PFYC system is a way of classifying geologic units based on the relative abundance of scientifically important fossils (plants, vertebrates, and invertebrates) and their sensitivity to adverse impacts. A higher class number indicates higher potential for the occurrence of fossils of scientific importance. The PFYC system is not intended to be applied to specific paleontological localities or small areas within units. Although important localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment. The classification should be used to assist in determining the need for further mitigation, assessment, or other actions. The BLM intends for the PFYC system to be used as a guideline as opposed to rigorous definitions. Descriptions of the potential fossil yield classes are summarized below:

- Class 1—Igneous and metamorphic geologic units (excluding tuffs) that are not likely to contain recognizable fossil remains.
- Class 2—Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically important nonvertebrate fossils.
- Class 3—Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or unknown potential, but could contain fossils based on geologic features or apparent preservation condition.
- Class 4—Geologic units are Class 5 units that have lower risks of human-caused adverse impacts or lower risk of natural degradation. Proposed ground-disturbing activities would require assessment to determine whether significant paleontological resources occur in an area of proposed disturbance.

- Class 5—Highly fossiliferous geologic units that regularly and predictably produce vertebrate fossils or scientifically important nonvertebrate fossils and that are at high risk of natural degradation or human-caused adverse impacts.

The analysis area contains an abundance of high-value paleontological resources. The fossil occurrence in each formation is summarized in **Table 3.3-1**. PFYC ranks are provided for those formations where there is a strong possibility that those formations could be affected by ground-disturbing activities. The PFYC ranks were taken from CRVFO Final Resource Management Plan (RMP) EIS (BLM 2014b). **Figure 3.3-9** shows the distribution of PFYC ranks. **Table 3.3-2** summarizes the extent of the high-value paleontological resources (PFYC 3 and 5) in each lease zone in the analysis area.

**Table 3.3-2 Extent of High-value Fossil Formations by Zone**

Zone No.	Zone Acres	% of PFYC 3 by Zone	% of PFYC 5 by Zone	% of PFYC 3 and 5 by Zone
1	10,114	56	44	100
2	24,938	28	71	99
3	42,767	9	90	99
4	2,562	93	7	100
<b>Total</b>	<b>80,381</b>	<b>24</b>	<b>76</b>	<b>100</b>

### 3.3.4 Analysis Area Affected Environment

#### 3.3.4.1 Zone 1

##### Stratigraphy and Structure

The bedrock in Zone 1 consists of the Tertiary Wasatch, Green River, and Uinta formations (Ellis and Freeman 1989). These formations are composed of sandstone, siltstone, and shale. Surficial deposits are alluvium, older gravel deposits, and landslide material. The sedimentary strata dip gently to the northeast. The De Beque Anticline is a west- to east-trending structure, but is mapped only west of the Colorado River by Ellis and Freeman (1989), so it is not certain if this structure underlies any of the leases in Zone 1.

##### Geologic Hazards

Landslides have been identified in leases in the southern portion of Zone 1 (**Figure 3.3-5**). The slides have involved material from the Wasatch and Green River Formations. No Quaternary faults are present in Zone 1.

##### Mineral Resources

The primary mineral resources in Zone 1 are natural gas and CBNG. The leases in Zone 1 are located between the Parachute and Grand Valley fields to the north and Shire Gulch and Plateau fields to the south. The primary production zones are sandstones of the Mesaverde Group, but other producing horizons include Wasatch, Mancos, Frontier, Dakota, and Morrison Formations (COGCC 2015d). Each of these fields has horizontal Mancos Shale completions located in T8S and T9S, R96W. Coal is present in the Mesaverde Group, but it is too deep to mine. No uranium occurrences have been identified in Zone 1 (Nelson-Moore et al. 1978). Oil shale beds may be present in the Green River Formation, but are likely to be low grade, compared to the higher rank oil shale north of the Colorado River on the Roan Plateau. Zone 1 is in an area of moderate geothermal heat flow, but no hot springs or wells are located within the zone.

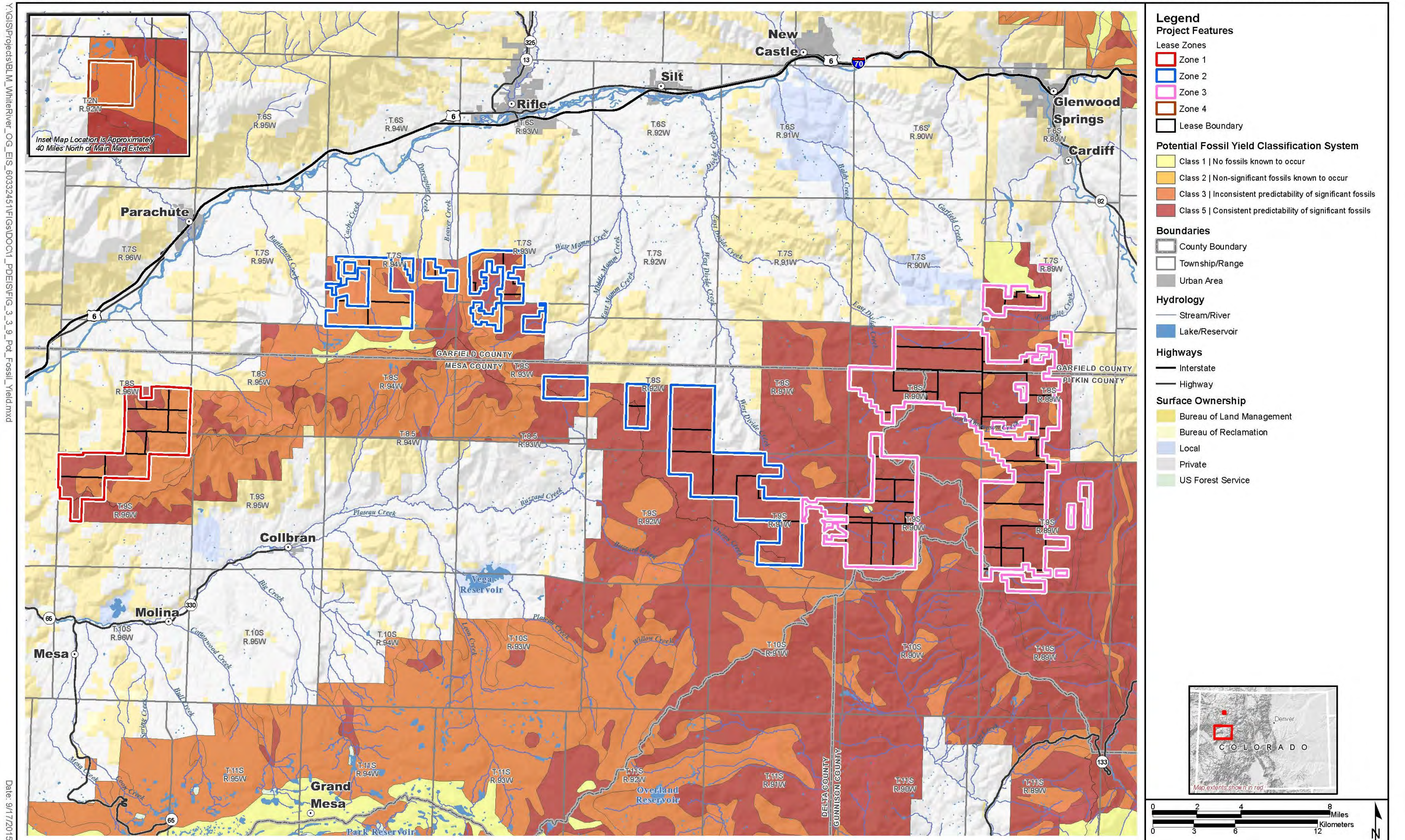


Figure 3.3-9 Potential Fossil Yield Classes in the Analysis Area

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### Paleontological Resources

Because the bedrock units and deposits are considered to have PFYC ranks ranging from 3 to 5, there is a moderate to high probability that scientifically important fossils are present in Zone 1.

#### **3.3.4.2 Zone 2**

##### Stratigraphy and Structure

The bedrock deposits in Zone 2 consist of the Cretaceous upper Mesaverde Group, Tertiary Green River Formation (including the Parachute Creek Member), the Uinta Formation, and Miocene and Pliocene basalts (Tweto 1979; Tweto et al. 1978). The unconsolidated formations are alluvium, terrace deposits, and landslides. The regional structural dip is regionally to the northeast, but the Divide Creek Anticline interrupts the regional dip in the northeast portion of Zone 2. The Divide Creek Anticline is elongate northwest to southeast and the Mesaverde formation is exposed for about 10 miles along the core of the anticline.

##### Geologic Hazards

Landslides have been mapped in Zone 2 leases (**Figure 3.3-5**). The landslides have occurred due to erosion of Green River Formation rocks that underlie volcanic flows that cap Battlement Mesa. There are no Quaternary faults that have been identified in Zone 2.

##### Mineral Resources

Natural gas and CBNG are the main mineral resources in Zone 2 and the subject leases are located adjacent to and within the following fields: Rulison, Mamm Creek, Alkali Creek, and Divide Creek (COGCC 2015d). The producing zones include the Wasatch, Mesaverde Group, and Mancos Shale. As in Zone 1, no uranium occurrences have been identified in Zone 2 (Nelson-Moore et al. 1978). Oil shale beds may be present in the Green River Formation, but are likely to be low grade, compared to the higher rank oil shale north of the Colorado River. Zone 2 is in an area of moderate geothermal heat flow, but no hot springs or wells are located its boundaries.

### Paleontological Resources

Because the bedrock units and deposits are considered to have PFYC ranks ranging from 3 to 5, there is a moderate to high probability that scientifically important fossils are present.

#### **3.3.4.3 Zone 3**

##### Stratigraphy and Structure

The bedrock units in Zone 3 include the Cretaceous Mancos Shale, Mesaverde Group, and Tertiary Wasatch Formation (Ellis and Galbaldo 1984). Surficial deposits consist of alluvium, gravel deposits, and landslides. The Wolf Creek Anticline is the major structural feature in Zone 3 and is more dome-shaped than the Divide Creek Anticline with Cretaceous rocks exposed along the flanks and the core of the structure.

##### Geologic Hazards

Landslides are present in many of the Zone 3 leases. Quaternary faults have been identified within or adjacent to leases in Zone 3. The Grand Hogback Faults/Fourmile Creek-Unnamed fault, located in Section 34, T7S, R89W, is believed to be active. There is evidence that the fault has cut Holocene deposits (less than 15,000 years old) and movement has taken place in the last 15,000 years. This active fault zone has the potential to generate earthquakes that could create ground motions ranging from 20 to 40 percent of the acceleration of gravity (USGS 2014). The fault is just to the north of lease COC 066693, which is located in Section 3, T8S, R89W.

On the east side of Zone 3 there are leases that are within an area that has been identified having potential for the development of karst (**Figure 3.3-7**). The karst potential derives from the presence of Eagle Valley Evaporites in the subsurface.

#### Mineral Resources

The important mineral resources in Zone 3 are natural gas and CBNG. Natural gas in Mesaverde Group sandstones was discovered on the Wolf Creek Anticline in the early 1960s, but was converted to gas storage in 1972 (BLM 2008). Coal is present in the Mesaverde Group that outcrops on the flanks of the Wolf Creek structure and historic coal mining occurred on the Grand Hogback in T7S and T8S, R88W (Wideman et al. 2002). No uranium occurrences have been identified in Zone 3 (Nelson-Moore et al. 1978). The Green River Formation has largely been eroded from this area, so there is no oil shale potential. Penny Hot Springs is located in Section 4, T10S, R88W, in northwest Pitkin County (Barrett and Pearl 2006). The springs are located along the Crystal River in the vicinity of Redstone, Colorado, and temperature of the water varies from 104°F to 115°F (40 to 46 degrees Celsius). These springs are not developed for use.

#### Paleontological Resources

Because the bedrock units and deposits are considered to have PFYC ranks ranging from 3 to 5, there is a moderate to high probability that scientifically important fossils are present in Zone 3.

### **3.3.4.4 Zone 4**

#### Stratigraphy and Structure

Bedrock in Zone 4 consists of the Cretaceous Mesaverde Group, Mancos Shale, and Dakota Formation, Jurassic Morrison Formation, Jurassic-Triassic Entrada-Glen Canyon Sandstones, and the Triassic Chinle Formation (Reheis 1984). Alluvium is present in the drainages, but there are extensive landslide deposits, probably the result of instability in the lower Mancos Shale and the Dakota Formation (Reheis 1984). Zone 4 sits astride a northwest trending structure called the Yellowjacket Anticline.

#### Geologic Hazards

Landslides have been mapped within the Zone 4 lease and resulted from mass-wasting of material from the Mancos, Dakota, and Morrison Formations (Reheis 1984). No Quaternary faults are located within or near the Zone 4 lease (USGS and CGS 2006). No karst potential has been identified in the vicinity of Zone 4 (Tobin and Weary 2004).

#### Mineral Resources

The Yellowjacket Anticline has been the site of various failed attempts to discover oil and gas production (Reheis 1984). The closest oil fields are Ninemile Field, a few miles west of Zone 4, and the Thornburgh Field, approximately 5 miles north of Zone 4 (COGCC 2015d). Mineable coals in Mesaverde Group formations are present in the vicinity (Reheis 1984). The Morrison Formation hosted several uranium occurrences in T2N, R92W where Zone 4 is located. Most of the deposits were mined by stripping or underground methods, but did not yield a large amount of ore, usually less than 500 tons (Nelson-More et al. 1978), although one deposit was mined for 12,000 tons. Zone 4 is in an area of moderate geothermal heat flow, but contains no hot springs or wells.

#### Paleontological Resources

Because the bedrock units and deposits are considered to have PFYC ranks ranging from 3 to 5, there is a moderate to high probability that scientifically important fossils are present in Zone 4.

## **3.4 Soils**

### **3.4.1 Regulatory Background**

Soil resources are managed through a broad set of regulations, guidelines, and formal planning processes. These controls and directions are administered through federal, state, or local units of government. At the federal level, primary land management agencies include the Forest Service and the BLM. The Forest Service addresses soil resource management primarily by cooperating in the Colorado River Salinity Control Program and by implementing policy set forth in the LRMP. The LRMPs set management, protection and use goals and guidelines. The FSM, Soil Management (Chapter 2550) and the Forest Service Handbook, Watershed Conservation Practices Handbook (Chapter 2509.25) specific to each region also provide policy and guidance on managing soil resources. On lands administered by the BLM, the agency addresses soil resources primarily through BLM Handbook H-4810-1, "Rangeland Health Standards," and by participating as a cooperating agency in the Colorado River Salinity Control Program.

### **3.4.2 Analysis Area**

The analysis area for soil resources consists of the 65 leases within the 4 zones. A variety of data sources were used to identify the baseline soil characteristics in the analysis area. Information on Major Land Resource Areas (MLRAs) was obtained from Natural Resources Conservation Service (NRCS) literature or databases, including the Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin, U.S. Department of Agriculture (USDA) Handbook 296 (USDA 2006). The GMUGNF soil survey data has been correlated and is available through the NRCS 2015 Gridded Soil Survey Geographic (gSSURGO) Database (NRCS 2015). Soil resources on the WRNF were characterized by the review of two unpublished draft soil surveys that are pending correlation, the Flat Tops Area Soil Survey and the Holy Cross Area Soil Survey, maintained by the WRNF.

### **3.4.3 Regional Affected Environment**

The lease boundaries lie within the following MLRAs (USDA 2006), shown on **Figure 3.4-1**:

- MLRA 34B – Warm Central Desertic Basins and Plateaus; and
- MLRA 48A – Southern Rocky Mountains

The Warm Central Desertic Basins and Plateaus Major Land Resource Area consists of broad intermountain basins bounded by plateaus and steep escarpments. The elevation ranges from 4,100 feet amsl at the base of the Wasatch Range to 7,500 feet amsl on the Roan Plateau (USDA 2006).

The soils in MLRA 34B primarily formed in slope alluvium and residuum derived from shale or sandstone. The soils that formed in material weathered from Mancos Shale tend to have active or semiactive clay activity classes. Soils that formed in alluvium occur near the major waterways, and soils that formed in colluvium occur generally on slopes of more than 35 percent. Many of the soils are shallow or moderately deep to shale or sandstone bedrock. The majority of the soils are well drained and calcareous. The soils at the lower elevations generally have significant amounts of calcium carbonate, salts, and gypsum. The dominant soil orders in this MLRA are Aridisols and Entisols. Aridisols form in an arid or semi-arid climate and have a low concentration of organic matter. Entisols are considered recent soils that lack soil development because erosion or deposition rates occur faster than the rate of soil development (USDA 2006).

The Southern Rocky Mountains MLRA consists primarily of two belts of strongly sloping to precipitous mountain ranges trending north to south. Several basins, or parks, are between the belts. The elevation ranges from 6,500 to 14,400 feet amsl. Many of the highest mountain ranges were reshaped by glaciation. Alluvial fans at the base of the mountains are recharge zones for aquifers (USDA 2006).

The soils in MLRA 48A primarily formed in slope alluvium and colluvium on mountain slopes or residuum on mountain peaks derived from igneous, metamorphic, and sedimentary parent materials. Younger igneous parent materials, primarily basalt and andesitic lava flows, tuffs, breccias, and conglomerates, are located throughout this area. The dominant soil orders in this MLRA are Mollisols, Alfisols, Inceptisols, and Entisols. Mollisols are fertile soils with high organic matter and a nutrient-enriched, thick surface. Alfisols have at least 35 percent base saturation, meaning calcium, magnesium, and potassium are relatively abundant. In contrast, Inceptisols form in humid and subhumid climates and have altered horizons that have lost bases or iron and aluminum but retain some weatherable minerals (USDA 2006).

#### **3.4.4 Analysis Area Affected Environment**

This section provides the existing conditions and context for the evaluation of potential environmental impacts to soils occurring within the analysis area. For soils, the analysis area includes all land within the boundaries of the 65 leases under consideration. The site-specific use and management of soil types within each area to be disturbed during the development of each lease would be evaluated during the Application for Permit to Drill process. In order to develop a lease on lands administered by the Forest Service, the lessee is required to submit an Application for Permit to Drill to the BLM and Surface Use Plan of Operations to the Forest Service. Site-specific National Environmental Policy Act (NEPA) analyses would be required at this stage and may include detailed soils investigations and analyses. Additionally, the Forest Service may require Conditions of Approval that would mitigate or reduce impacts to soil resources or minimize the effects of soil characteristics that limit soil stability and reclamation.

A variety of soils occur across the analysis area. The soil variability stems primarily from a variety of parent materials and the influence of topography, aspect, elevation, vegetation, and differential rates of mineral weathering. The soils range in depth from very deep (60 inches or more in valley bottoms) to shallow (on ridges and steep slopes). Refer to the WRNF Oil and Gas Leasing Final EIS for additional detail on the soils in the study area (USFS 2014a).

Water erosion is the detachment and movement of soil by water. Natural erosion rates depend on inherent soil properties, slope grade and length, soil cover, and climate. Erosion also may be influenced by the length of time the soils are bare and by alteration of drainage and erosion control structures. Erosion caused by water occurs primarily on loose, non-cohesive soils on moderate to steep slopes, particularly during high intensity storm events. The erodibility factor of the whole soil, including fine particles and stones ( $K_w$ ), is a measure of the potential for bare soil detachment by runoff and raindrop impact. The soil erodibility factor can range from 0.02 to 0.64, and the higher the number, the greater the hazard. For the purposes of this analysis, water erosion prone soils were determined to have a  $K_w$  factor greater than or equal to 0.27. The distribution of soils with high erodibility is shown in **Figure 3.4-2**. **Table 3.4-1** provides the acres (and percentage) of water erodible soils within each zone.

Wind erosion is the physical wearing of the earth's surface by wind. Wind erosion removes and redistributes soil. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture, frozen soil layers, surface fragments (rock, duff, litter), slope and other factors also may influence erosion.

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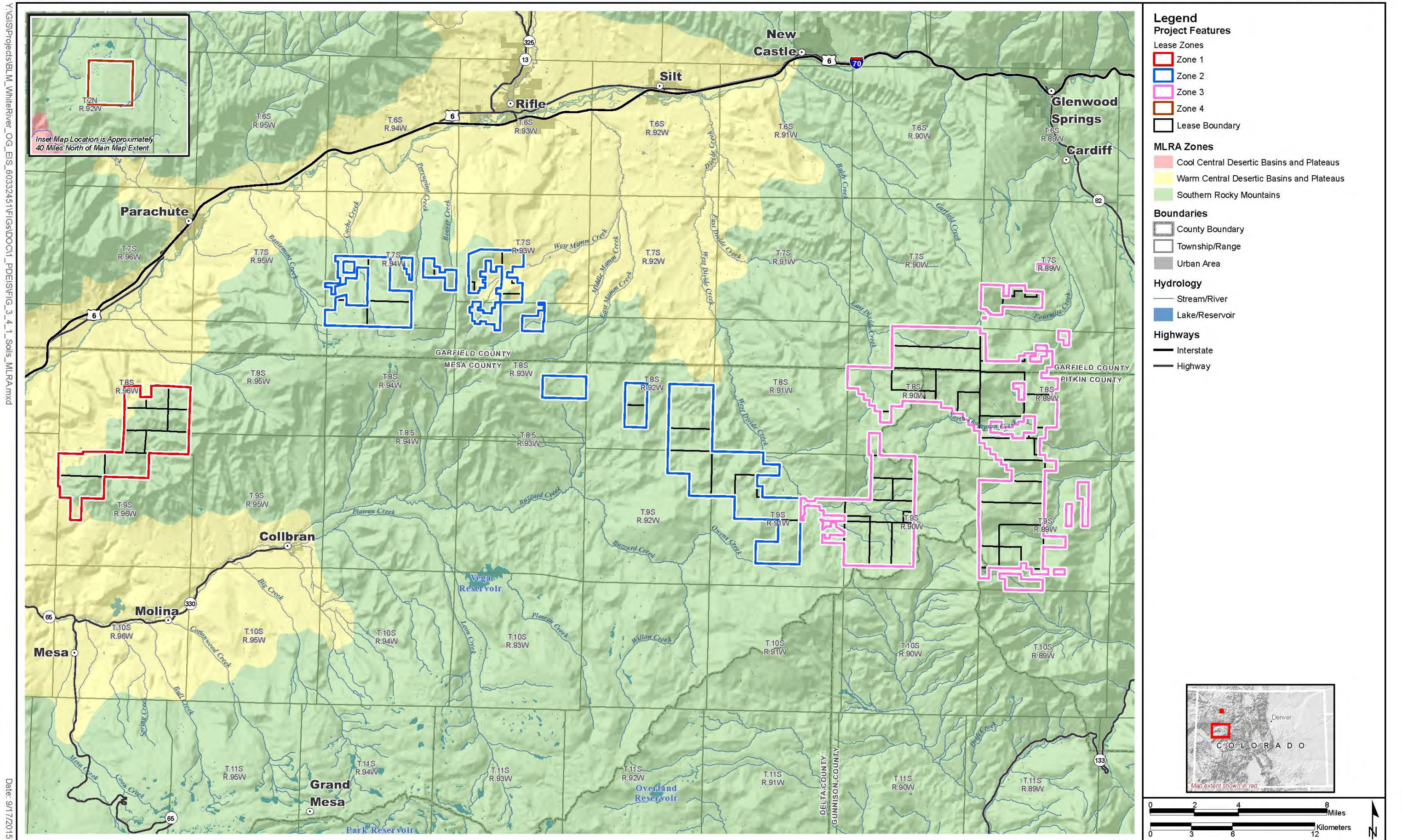


Figure 3.4-1 Major Land Resource Areas

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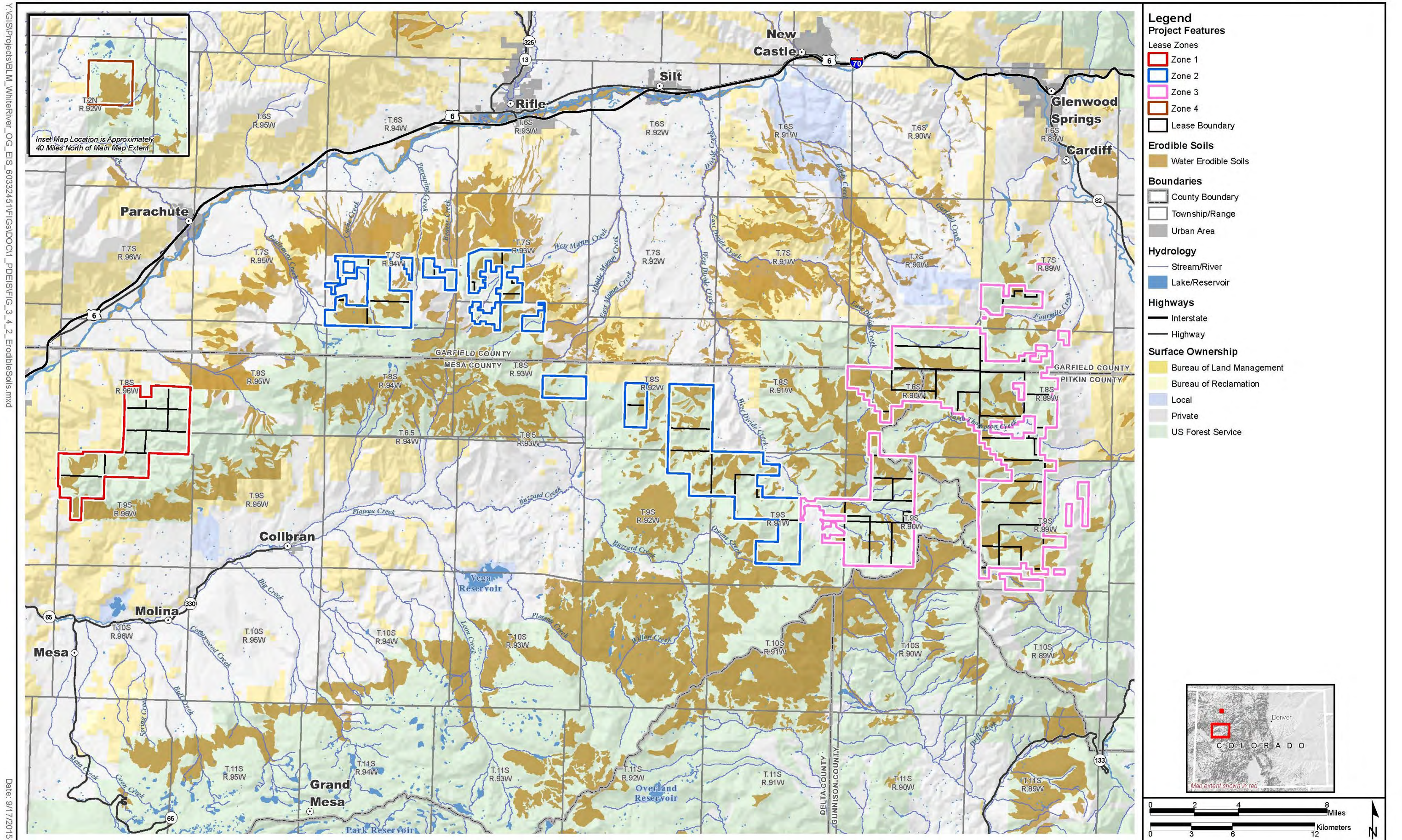


Figure 3.4-2 Soils Susceptible to Water Erosion

Soil characteristics, such as susceptibility to erosion, are important to consider when planning for construction activities, best management practices to minimize erosion, and stabilization of disturbed areas. Such soil characteristics, in combination with the climate and vegetation, may increase the risk of hazards. The extent of water erodible soils are presented in further detail by zone and lease in the following sections.

**Table 3.4-1 Water Erodible Soils by Zone**

Zone	All Soils (acres)	Water Erodible Soils (acres)	Water Erodible Soils (% of Zone)
1	10,114	1,311	13
2	24,938	7,309	29
3	42,767	12,565	29
4	2,562	1,176	46

**3.4.4.1 Zone 1**

Within Zone 1, approximately 1,311 acres of soil map units are identified as being prone to water erosion. **Table 3.4-1** provides the map units and acreages of erodible soils. **Figure 3.4-1** illustrates the distribution of erodible soils within Zone 1.

**3.4.4.2 Zone 2**

Within Zone 2, approximately 7,309 acres of soil map units are identified as being prone to water erosion. **Table 3.4-1** provides the map units and acreages of erodible soils. **Figure 3.4-1** illustrates the distribution of erodible soils within Zone 2.

**3.4.4.3 Zone 3**

Within Zone 3, approximately 12,565 acres of soil map units are identified as being prone to water erosion. **Table 3.4-1** provides the map units and acreages of erodible soils. **Figure 3.4-1** illustrates the distribution of erodible soils within Zone 3.

**3.4.4.4 Zone 4**

Within Zone 4, approximately 1,176 acres, consisting of a single soil map unit, are identified as being prone to water erosion. **Table 3.4-1** provides the map units and acreages of erodible soils. **Figure 3.4-1** illustrates the distribution of erodible soils within Zone 4.

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### **3.5 Water Resources**

#### **3.5.1 Surface Water**

Surface water resources include flowing and standing waters that may be affected by the development of the previously issued leases. Considered are rivers, streams, drainages, reservoirs, lakes, and ponds. The state water quality classifications are included along with specific protection areas for drinking water sources and outstanding water resource values. Consideration also is given to the upslope contributing areas to the water resources in this section. Topography in the analysis area extends from nearly 13,000 feet amsl at the peak of Mount Sopris on the eastern edge to just less than 5,000 feet amsl where the Colorado River leaves the area through DeBeque Canyon.

##### **3.5.1.1 Regulatory Background**

Specific legal and regulatory constraints that are relevant to the previously issued leases and surrounding areas include the following:

- Federal Water Pollution Control Act (“Clean Water Act”) of 1972 and associated Colorado statutes and standards, including:
  - CDPHE Regulation No. 33 Classifications and Numeric Standards for Upper Colorado River Basin and North Platte River (Planning Region 12);
  - CDPHE Regulation No. 35 Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins;
  - CDPHE Regulation No. 37 Classifications and Numeric Standards for Lower Colorado River Basin;
  - CDPHE Regulation No. 61 Colorado Discharge Permit System;
  - CDPHE Regulation No. 93 Section 303(D) List of Impaired Waters, and Monitoring and Evaluation List; and
  - Other CWA section requirements and related findings or designations.
- Rivers and Harbors Act (33 United States Code [USC] 401 et seq.);
- CFR Title 33 Navigation and Navigable Waters;
- Safe Drinking Water Act – Colorado Safe Drinking Water Program;
- Colorado River Basin Salinity Control Act;
- Executive Order (EO) 11988, Floodplain Management;
- EO 11990, Protection of Wetlands, May 24, 1977;
- Colorado State Constitution Article XVI Sections 5 and 6, Water of Streams Public Property and Diverting Unappropriated Water Priority Preferred Uses;
- CCR 5 CCR 1002-31, The Basic Standards and Methodologies for Surface Water;
- COGCC Rule 317B, Public Water System Protection;
- WRNF LRMP 2002 Revision (USFS 2002a); and
- CRVFO Proposed Resource Management Plan and Final EIS (BLM 2014b).

**3.5.1.2 Analysis Area**

The analysis area considered for surface water resources includes the 6th-level subwatersheds, otherwise known as the 12-digit Hydrologic Unit Codes (HUC-12) of the Watershed Boundary Dataset (NRCS et al. 2010), that encompass the leases under consideration for direct, indirect, and cumulative effects to water resources. The subwatersheds comprising the analysis area, including the leases located partially or wholly within each, are listed by the four zones in **Table 3.5-1** and depicted in **Figures 3.5-1** and **3.5-2**.

**Table 3.5-1 Subwatersheds Containing Previously Issued Leases**

Zone	Subwatersheds			Previously Issued Leases	
	Name	HUC-12	Area (acres)	Serial Number	Area (acres)
1	Big Wash-Plateau Creek	140100051310	35,319	COC 066926	465
				COC 066731	161
	Wallace Creek	140100051401	14,469	COC 058677	543
				COC 059630	587
				COC 066727	640
				COC 066728	1,276
				COC 066729	477
				COC 066730	1,279
				COC 066731	490
				COC 066732	387
	Horsethief Creek-Colorado River	140100051404	25,274	COC 066729	177
				COC 066732	1,050
				COC 066733	1,350
				COC 066926	468
Horseshoe Canyon-Colorado River	140100051406	37,963	COC 066733	66	
			COC 066926	697	
			35,319		
2	Headwaters West Divide Creek <sup>1</sup>	140100050301	21,161	COC 066917	202
				COC 066723	22
	Upper West Divide Creek <sup>1</sup>	140100050302	19,897	COC 066724	844
				COC 066915	2,537
				COC 066916	2,562
				COC 066917	1,253
	Alkali Creek	140100050303	15,216	COC 066723	993
				COC 066724	1,129
				COC 066918	1,622
				COC 070361	591
	Middle West Divide Creek	140100050304	18,849	COC 072157	296
				COC 066723	265
	West Mamm Creek	140100050401	9,766	COC 066918	935
				COC 061121	500
				COC 067147	307
				COC 067150	639
				COC 075070	636

**Table 3.5-1 Subwatersheds Containing Previously Issued Leases**

Zone	Subwatersheds			Previously Issued Leases	
	Name	HUC-12	Area (acres)	Serial Number	Area (acres)
				COC 076123	80
	Middle Mamm Creek	140100050402	9,083	COC 067147	476
				COC 067150	23
				COC 070013	1,044
	East Mamm Creek	140100050403	13,356	COC 070013	1,044
	Dry Creek-Colorado River	140100050604	29,562	COC 061121	463
				COC 075070	249
	Beaver Creek-Colorado River	140100050701	38,092	COC 066920	418
				COC 067542	480
				COC 067544	8
				COC 070014	228
				COC 070015	678
				COC 075070	268
	Cache Creek-Colorado River	140100050702	45,715	COC 067543	1,167
				COC 067544	722
				COC 070014	1,259
				COC 070015	920
				COC 070016	51
Owens Creek	140100051101	10,339	COC 066917	465	
Middleton Creek	140100051104	14,265	COC 070013	218	
			COC 070361	47	
			COC 072157	342	
		21,161			
3	Coal Creek	140100040704	17,088	COC 066700	288
				COC 066702	746
	Thompson Creek	140100040708	49,463	COC 066691	198
				COC 066692	1,417
				COC 066693	719
				COC 066694	119
				COC 066695	1,061
				COC 066696	1,027
				COC 066697	1,872
				COC 066698	2,435
				COC 066699	114
				COC 066700	539
				COC 066701	1,885
				COC 066702	415
				COC 066707	300
				COC 066708	78
				COC 066709	165
				COC 066711	1,224
				COC 066712	875

**Table 3.5-1 Subwatersheds Containing Previously Issued Leases**

Zone	Subwatersheds			Previously Issued Leases	
	Name	HUC-12	Area (acres)	Serial Number	Area (acres)
				COC 066908	2,334
				COC 066909	2,066
				COC 066913	199
	Edgerton Creek-Crystal River	140100040709	35,999	COC 066693	876
				COC 066909	11
	Fourmile Creek	140100041001	23,833	COC 066687	1,048
				COC 066688	774
				COC 066689	40
				COC 066690	274
				COC 066693	572
				COC 066706	1,547
				COC 066707	44
				COC 066710	1,435
				COC 066711	527
				COC 066908	66
	Outlet Roaring Fork River	140100041003	25,853	COC 066687	6
	Headwaters West Divide Creek <sup>1</sup>	140100050301	21,161	COC 058835	1,475
				COC 058836	1,279
				COC 058837	1,669
				COC 058838	1,253
				COC 058839	898
				COC 058840	639
				COC 058841	638
				COC 066698	25
				COC 066709	285
				COC 066913	1,461
	Upper West Divide Creek <sup>1</sup>	140100050302	19,897	COC 058839	229
Camp Creek-East Divide Creek	140100050305	13,573	COC 066706	1,000	
			COC 066707	931	
			COC 066708	2,476	
			COC 066709	189	
			COC 066710	894	
Clear Fork East Muddy Creek	140200040202	24,744	COC 058838	24	
			COC 066700	14	
		17,088	COC 066702	93	
4	Headwaters Milk Creek	140500020101	24,900	COC 066948	1,454
	Upper Milk Creek	140500020102	15,638	COC 066948	1,107

<sup>1</sup> These two Subwatersheds have leases from Zones 2 and 3; their acreages are included in the analysis area for both (repeated).

Source: NRCS et al. 2010.

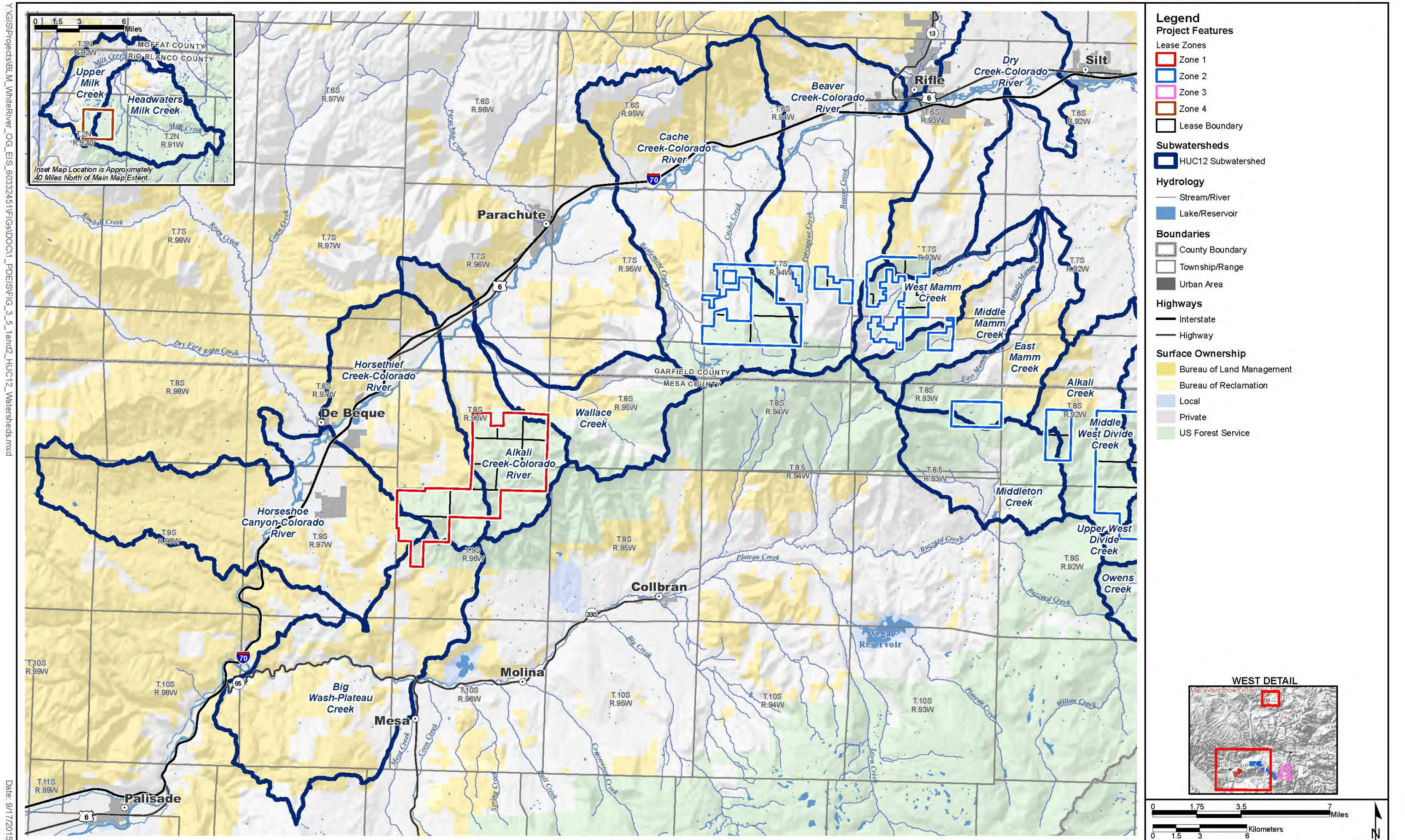


Figure 3.5-1 Hydrologic Units in the Analysis Area (West Side)

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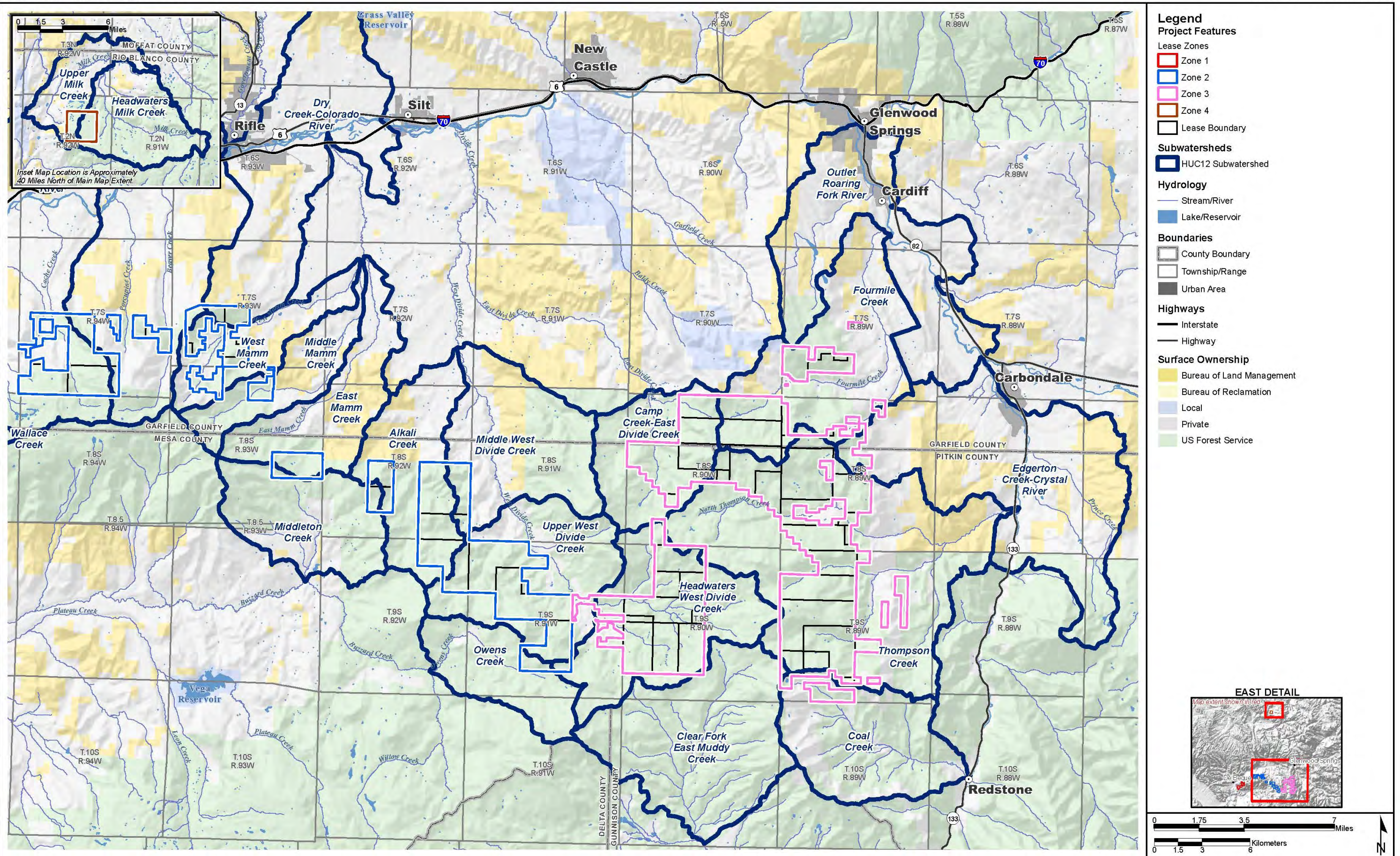


Figure 3.5-2 Hydrologic Units in the Analysis Area (East Side)

### 3.5.1.3 Analysis Area Affected Environment

The surface water analysis area is located entirely within the Colorado River Basin. Major rivers that the analysis area drains toward include the Colorado River (Zones 1, 2, and 3), Roaring Fork River and Crystal River (Zone 3), and the Yampa River (Zone 4). The analysis area of Zones 1, 2, and 3 is generally bounded by the Colorado River corridor on the north and west, the Roaring Fork and Crystal river corridors on the east, and the Plateau Creek corridor to the south. A small area of Zone 3 drains towards the Gunnison River through Muddy Creek. Zone 4 is approximately 40 miles north of the other zones, and has its own analysis area in the Milk Creek drainage (tributary to Yampa River). Additional details on specific waters are included by Zone in the following sections, and a complete listing of surface waters located within the analysis area is included in **Appendix A**, Water Resources.

**Figures 3.5-3** and **3.5-4** display the different types of streams and other waterbodies within the analysis area. The WRNF Oil and Gas Leasing Final EIS (USFS 2014a) and the Watershed Specialist Report, Oil and Gas Leasing on the White River National Forest (Weinhold 2014) analyzed all NFS lands that are considered in this EIS.

#### Water Quality

##### *Water Quality Beneficial Use Classifications*

The Clean Water Act (CWA), Section 303(c), requires each state to review, establish, and revise water quality standards for all surface waters within the state. The State of Colorado Water Quality Control Commission has designated the rivers, streams, and lakes within the analysis area with beneficial use classifications that contain narrative and numeric water quality standards. Surface waters within the analysis area are defined by the classifications listed in **Table 3.5-2**.

**Table 3.5-2 Water Quality Beneficial Use Classifications in the Analysis Area**

Use Classification	Sub-class	Description
Outstanding Waters (OW)	na	Waters with existing quality determined to meet the following three criteria: equal to or better than specified numeric standards for aquatic life - 1, recreation - P and domestic water supply uses; hold an outstanding natural resource (e.g., fishery, special management); and requires protection in addition to the water quality classification and standards and the protection of the antidegradation review process.
Aquatic Life Cold (ALC)	1	These are waters that: (1) currently are capable of sustaining a wide variety of cold water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions.
	2	These are waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.
Aquatic Life Warm (ALW)	1	These are waters that: (1) currently are capable of sustaining a wide variety of warm water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions.
	2	These are waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.

**Table 3.5-2 Water Quality Beneficial Use Classifications in the Analysis Area**

Use Classification	Sub-class	Description
Recreation (R)	e	Existing Primary Contact Use - These surface waters are used for primary contact recreation. Such activities include but are not limited to swimming, rafting, kayaking, tubing, windsurfing, water-skiing, and frequent water play by children.
	p	Potential Primary Contact Use - These surface waters have the potential to be used for primary contact recreation.
	n	Not Primary Contact Use - These surface waters are not suitable or intended to become suitable for primary contact recreation uses.
Water Supply (WS)	na	These surface waters are suitable or intended to become suitable for potable water supplies. After receiving standard treatment (defined as coagulation, flocculation, sedimentation, filtration, and disinfection with chlorine or its equivalent) these waters will meet Colorado drinking water regulations and any revisions, amendments, or supplements thereto.
Agriculture (AG)	na	These surface waters are suitable or intended to become suitable for irrigation of crops usually grown in Colorado and which are not hazardous as drinking water for livestock.

na - Not Applicable.

Source: CDPHE 2013.

Section 303(d) of the CWA requires states to list all streams that do not meet their water use classifications and the associated water quality standards, and are therefore considered impaired streams. Within the analysis area, tributaries to the Colorado River between the Roaring Fork River and Parachute Creek have been identified as impaired streams due to elevated levels of selenium (CDPHE 2012). These streams are discussed in more detail in the Zone 2 subsection below. There are several other waterways that are being monitored and evaluated in the analysis area, including the Colorado River for elevated sediment loads, and Thompson Creek and its tributaries for elevated iron concentrations. **Figure 3.5-5** and **Figure 3.5-6** depicts these streams.



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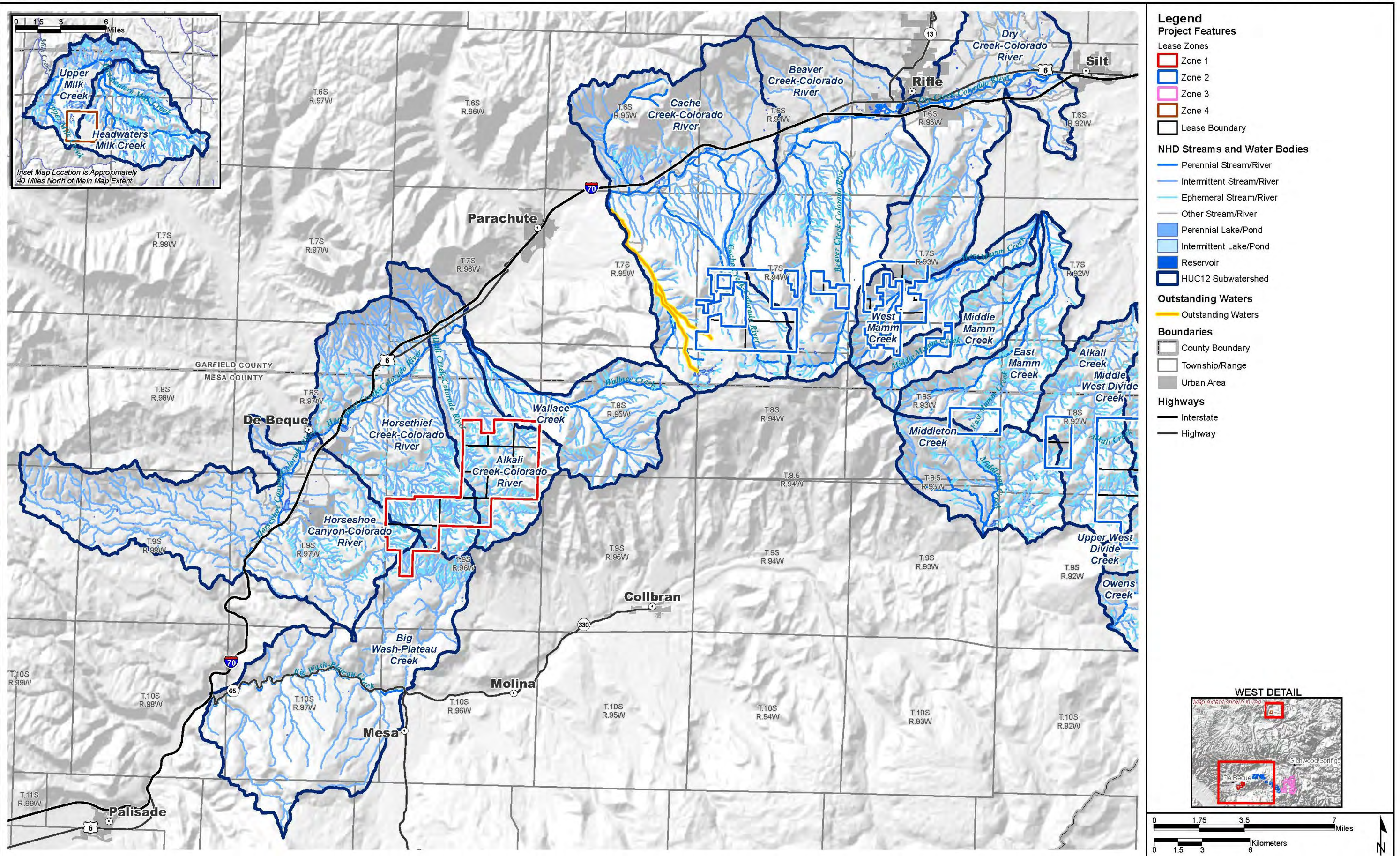
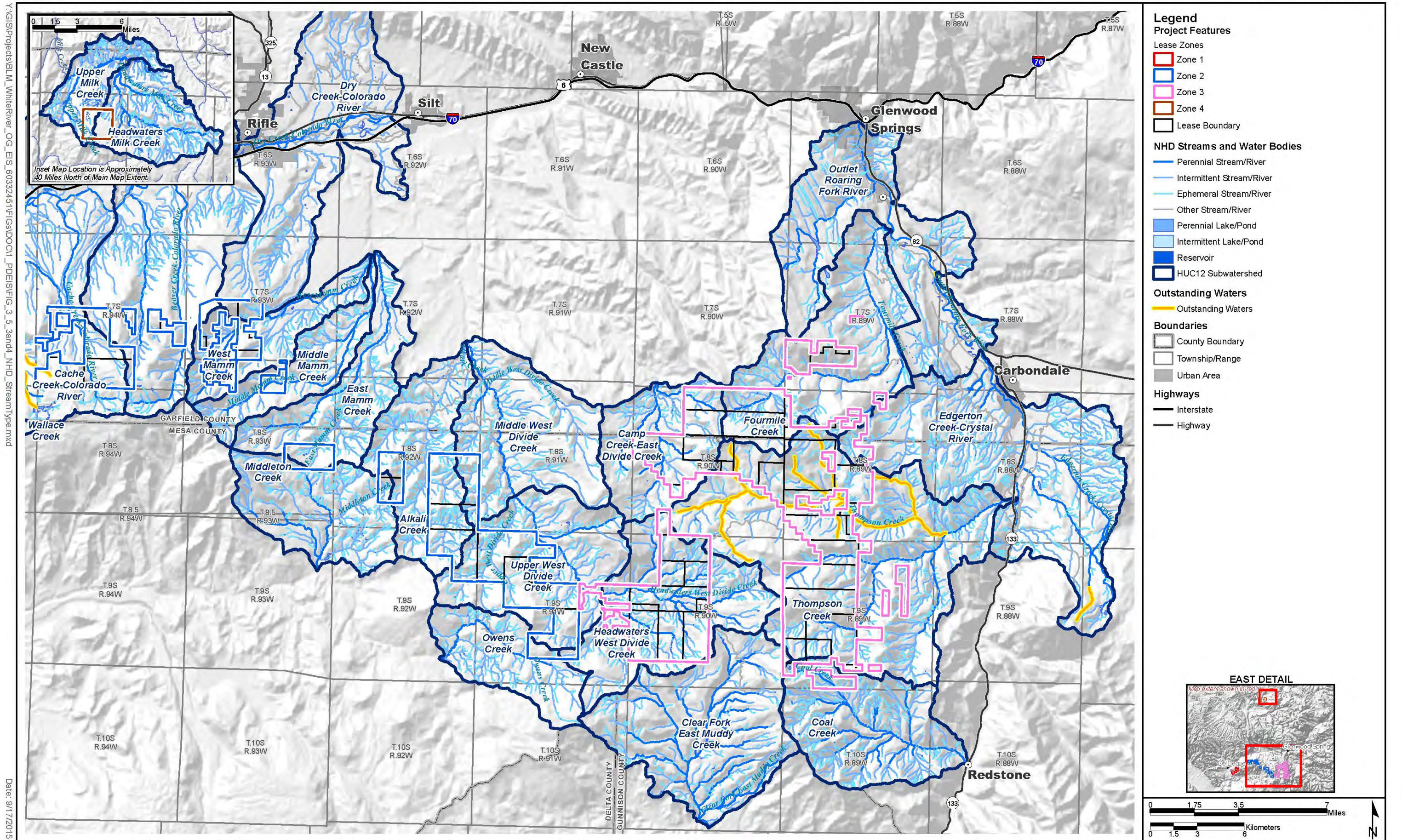


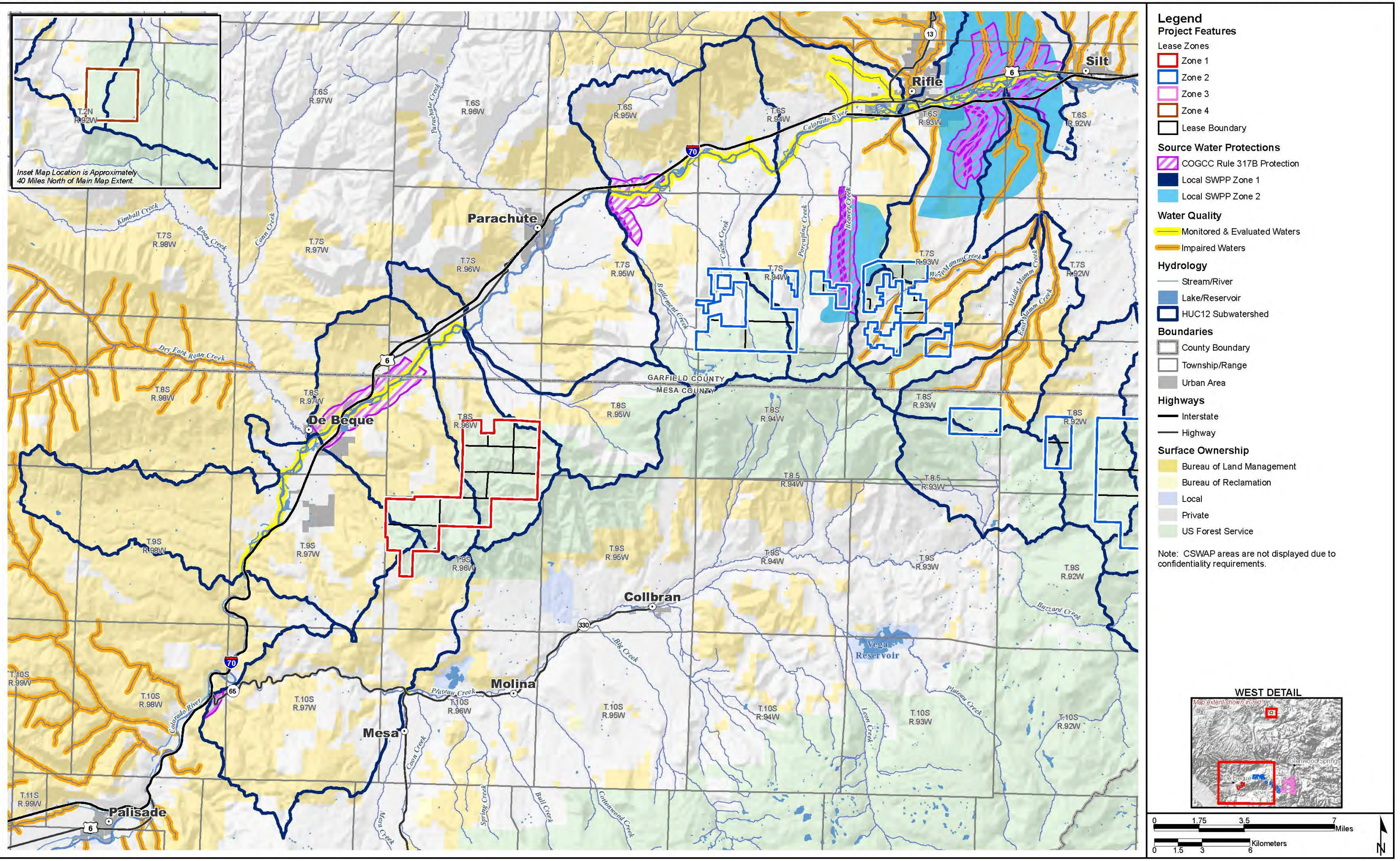
Figure 3.5-3 Surface Water in the Analysis Area (West Side)



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Figure 3.5-4 Surface Water in the Analysis Area (East Side)

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**Legend**

**Project Features**

- Lease Zones
  - Zone 1
  - Zone 2
  - Zone 3
  - Zone 4
- Lease Boundary

**Source Water Protections**

- COGCC Rule 317B Protection
- Local SWPP Zone 1
- Local SWPP Zone 2

**Water Quality**

- Monitored & Evaluated Waters
- Impaired Waters

**Hydrology**

- Stream/River
- Lake/Reservoir
- HUC12 Subwatershed

**Boundaries**

- County Boundary
- Township/Range
- Urban Area

**Highways**

- Interstate
- Highway

**Surface Ownership**

- Bureau of Land Management
- Bureau of Reclamation
- Local
- Private
- US Forest Service

Note: CSWAP areas are not displayed due to confidentiality requirements.

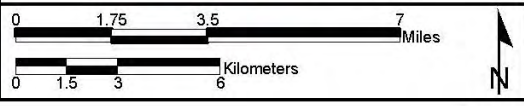
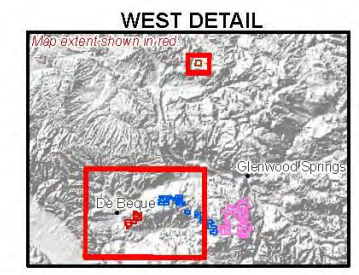
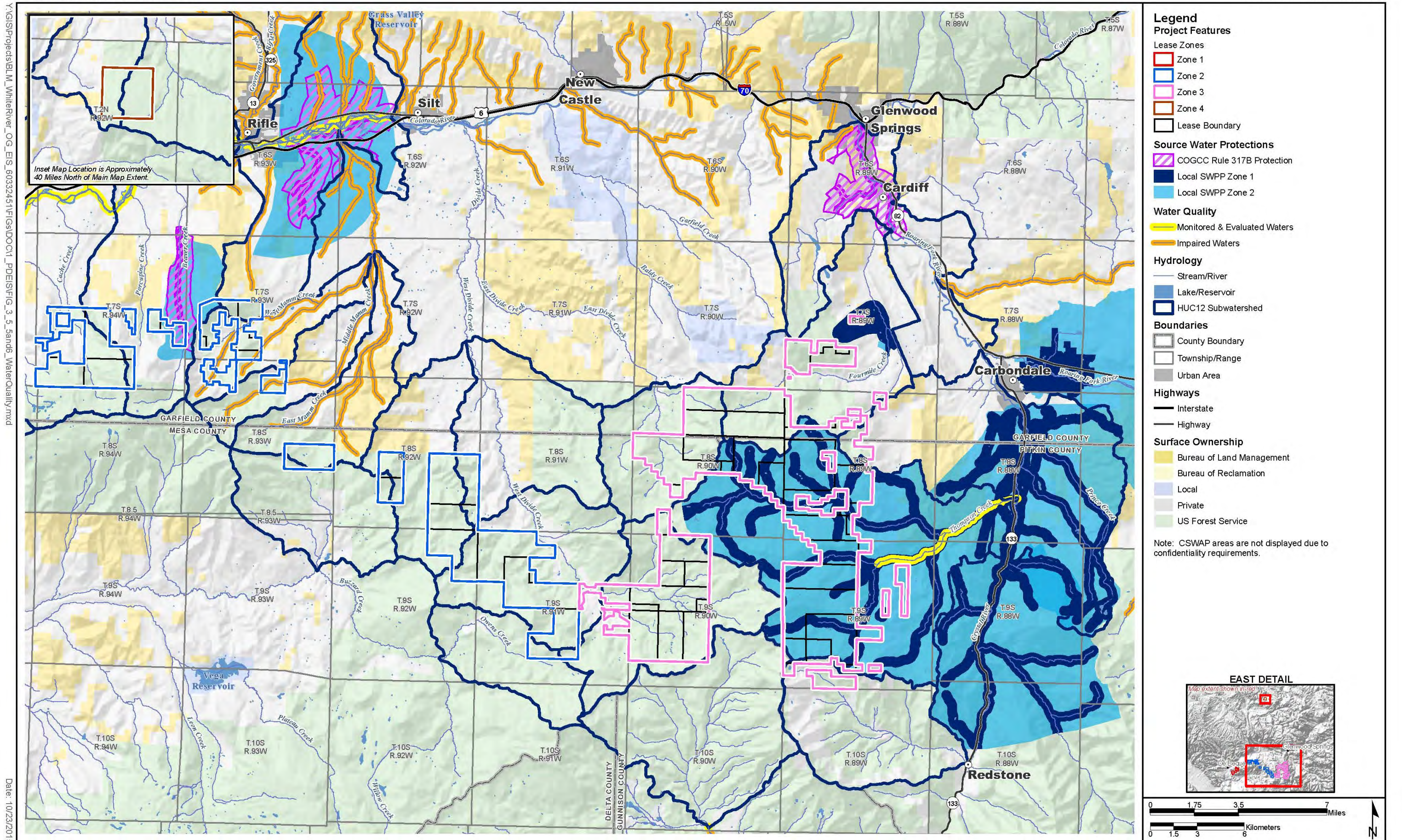


Figure 3.5-5 Impaired Streams and Source Water Protection Areas (West Side)



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Figure 3.5-6 Impaired Streams and Source Water Protection Areas (East Side)

### *State of Colorado's Source Water Assessment and Protection (CSWAP) Program*

The State of Colorado's source water assessment and protection (CSWAP) program is administered by the CDPHE, as required by the Safe Drinking Water Act (as amended). The purpose of the CSWAP program is to identify potential risks to public drinking water sources (CDPHE 2015a). CSWAP zones" for surface water sources (e.g., stream diversions) and groundwater under the influence of surface water (e.g., alluvial wells with direct hydrologic connection to surface waters) are delineated based on drainage networks upstream from water intakes (or alluvial wells). "CSWAP zones" for groundwater sources (e.g., wells not hydrologically connected to surface waters) are delineated based on the concept of area-of-capture around the wells.

The CSWAP program delineates three assessment zones associated with each surface water supply (including groundwater under the influence of surface water):

- CSWAP Zone 1 is based on the stream network, and extends 1,000 feet from streams, creating a 2,000-foot-wide dendritic pattern upstream from the intake.
- CSWAP Zone 2 also is based on the stream network, extending 1,320 feet from streams, creating a 2,640-foot-wide dendritic pattern upstream from the intake.
- CSWAP Zone 3 is based on the catchment area, extending to all locations where a drop of water might run off and eventually make it to the intake.

Because of the large extent of most assessment areas (to the top of the catchment area), each of these CSWAP zones are split into "near zones" (within 15 miles of the intake), and "far zones" (areas beyond 15 miles from the intake). The entire analysis area is covered by some form of surface water CSWAP zone. The CSWAP areas are not displayed due to confidentiality requirements.

The CSWAP program also delineated three assessment zones associated with groundwater sources:

- CSWAP Zone 1: 500-foot radius around wells,
- CSWAP Zone 2: either a 1.5-mile radius or a modelled area of capture for a 2-year period, and
- CSWAP Zone 3: either a 2.5-mile radius or a modelled area of capture for a 5-year period.

There are 63 CSWAP public drinking water sources identified in the analysis area; of these, 20 CSWAPs are within the existing leases considered in this EIS. However, when all CSWAP zones are considered, they cover the entire analysis area. Additional detail on CSWAPs is provided in the Zone 1, 2, 3, and 4 subsections below.

### *COGCC Rule 317B Areas*

The COGCC has established protection to public water system supply areas, as defined in COGCC Rule 317B (Rule 317B). This rule identifies classified water supply segments of streams, which extends five miles upstream from public water systems subject to the rule's protections. It further establishes three zones around the classified water supply segments where oil and gas surface operations must conform to the requirements of Rule 317B:

- Internal Zone: 0 to 300 feet from the ordinary high water mark (OHWM);
- Intermediate Zone: 301 to 500 feet from OHWM; and
- External Zone: 501 to 2,640 feet from OHWM.

New surface operations within the Rule 317B Internal Zone are prohibited without the issuance of a variance from the COGCC. Requirements for new operations within the Intermediate Zone and External

Zone include collection of baseline water quality data, use of pitless drilling systems, storage of drilling fluids in tanks, secondary containment for all oil and produced water storage, notification of surface disturbing activities for potentially impacted public water systems within 15 miles downstream, and development of an emergency spill response program to train employees and notify those systems in the case of a spill or release. There are seven public water system supply areas identified under Rule 317B that fall partially or wholly within the analysis area: Battlement Mesa, Carbondale, De Beque, Glenwood Springs, Parachute, and Rifle. These seven systems are included in the state's CSWAP program and are discussed in additional detail in the Zone 1, 2, and 3 subsections below. One of these systems, the City of Rifle's public water system supply area, falls within the existing leases considered in this EIS.

#### *Local Source Water Protection Plans*

Local public water supply providers also can develop their own source water protection plans (SWPP). These SWPP often utilize the information generated by the CSWAP program, but do not always contain the same geographic delineations or best practices. There are three SWPPs that have been identified with water sources in the analysis area, including the public supplies for Carbondale, Rifle, and the community supply for Oak Meadows subdivision. These are discussed in additional detail in the Zone 2 and 3 subsections below.

#### Water Use

The use of water in the analysis area has been considered on a county-wide and Colorado Division of Water Resources (CDWR) water basis. The analysis area mainly falls within Garfield, Mesa, and Pitkin counties. The Zone 4 leases are located in Rio Blanco County, and there is a small area of existing leases in Gunnison County. The analysis area also extends into Delta and Moffat counties. However, the water use discussion is based on information available for Garfield, Mesa, and Pitkin counties because this is where the majority of the leases are located.

Within the State of Colorado, approximately 80 percent of the available water in the state (16 million acre-feet per year total in the state) originates on the West Slope, with the majority of that water flowing out of the state in the Colorado River (Colorado Water Conservation Board 2011). The CDWR water divisions that encompass the majority of Garfield, Mesa, and Pitkin counties include Divisions 38, 39, 40, 42, 45, 63, 72, and 73. Water use in these water divisions in 2008 totaled approximately 570,000 acre-feet (Colorado Water Conservation Board 2011). The Colorado Division of Water Resources reports approximately 1.2 million acre-feet and 42,000 cubic feet per second in absolute (finalized) and conditional (permitted but not finalized) water rights in the three counties. Of these rights, there are over 560,000 acre-feet and 5,400 cubic feet per second that are assigned the use of "Industrial," which would include oil and gas development (CDWR 2015).

#### Wetlands

Wetland and riparian areas act as water purifiers, supply groundwater recharge, and aid in flood control. This resource's affected environment description is discussed in Section 3.6.4.

#### **3.5.1.4 Zone 1**

Zone 1 leases are within the western side of the analysis area, at the western end of Battlement Mesa (see **Figure 3.5-1**). There are five subwatersheds that contain all of the Zone 1 leases (see **Table 3.5-1**). The Zone 1 analysis area totals 129,465 acres, of which the leases cover 10,103 acres (8 percent). There are only three perennial waterways in Zone 1: the Colorado River, Plateau Creek, and Wallace Creek; the latter two are direct tributaries to the Colorado River (see **Figure 3.5-3**). None of these streams are within the previously issued leases. Several named intermittent streams are within the lease areas, including Alkali, Little Alkali, Horsethief, and Little Horsethief creeks (also all direct tributaries to the Colorado River) (USGS 2011).

Water use classifications (see **Table 3.5-2**) are ALC-2, Rp, AG, and WS in the northern portions of the zone, including the streams within the majority of leases in Zone 1. The use classifications transition into ALW-2, Rp, AG, and WS in the Horseshoe Canyon-Colorado River Subwatershed. The Big Wash-Plateau Creek Subwatershed has ALC-1, Re, WS, and AG uses designated. Each of those subwatersheds contains minimal acreage of the leases (762 acres and 465 acres, respectively). There are no streams with impaired water quality in this zone; however, the Colorado River is being monitored and evaluated for high sediment loads (see **Figure 3.5-5**).

The CSWAPs for Clifton, De Beque, and Ute Water Conservancy District are within Zone 1 leases; the “near zone” CSWAPs are within the leases with the exception of Clifton’s, where only the “far zone” CSWAP reaches the leases. De Beque’s Rule 317B protection area is downstream of the Zone 1 leases in the analysis area. There are no SWPP areas identified within the leases in this zone or downstream within the analysis area (see **Figure 3.5-5**).

### 3.5.2 Zone 2

Zone 2 is in the central portion of the analysis area, extending from the eastern part of Battlement Mesa to the southeast and the Thompson Divide area (see **Figures 3.5-1** and **3.5-2**). There are 12 subwatersheds that contain all of the Zone 2 leases (see **Table 3.5-1**). The Zone 2 analysis area totals 245,137 acres, of which the leases cover 24,923 acres (10 percent). There are two subwatersheds that fall within Zones 2 and 3, and are included in the acreages for both (repeated); Headwaters West Divide Creek and Upper West Divide Creek. Perennial streams within the previously issued leases include West Divide Creek, Middle and West Mamm creeks, Beaver Creek, Cache Creek, and Cottonwood Creek (see **Figures 3.5-3** and **3.5-4**). The Colorado River flows along the northern portion of this zone, outside of the leases, and other perennial streams also are outside the leases such as Mosquito Creek, Salt Creek, East Mamm Creek, and Battlement Creek. All of these streams flow towards the north to the Colorado River. Owens, Middleton, and Cheney creeks flow to the south to Buzzard Creek, which is tributary to Plateau Creek (USGS 2011). Of these, only Owens Creek crosses a small corner of the leases.

Streams have generally been assigned ALC use classifications across this zone (see **Table 3.5-2**), with ALC-1 on National Forest System lands (on all leases) and the higher-elevation streams on the east side of this zone. Battlement Creek has been designated an outstanding water. The lower elevations of the northwestern subwatersheds in this Zone have ALC-2 classifications. All the streams include uses of WS, AG, and some form of recreation (CDPHE 2015b).

Mamm Creek and its tributaries (East, Middle, West Mamm creeks) along with other Colorado River tributaries have water quality impairments because of elevated selenium levels with unknown sources (CDPHE 2012). The Colorado River is being monitored and evaluated for high sediment loads (see **Figures 3.5-5** and **3.5-6**).

There are eight CSWAPs within the Zone 2 lease areas. Battlement Mesa, Collbran, Parachute, Rifle, and Silt each have portions of their “near zone” CSWAPs within the leases; Clifton, De Beque, and Ute Water Conservancy District each have portions of their “far zone” CSWAPs within the leases. Additionally, the CSWAP for Tepee Bible Camp is downstream of the leases in the analysis area. The Rule 317B protection area for Rifle is partially within the Zone 2 lease area; and those for Battlement Mesa, Parachute, and Rifle also are downstream of the Zone 2 leases within the analysis area. Rifle has established a local ordinance protecting the municipal water source that is considered as a SWPP for the purposes of analysis in this EIS. The Rifle SWPP overlaps the CSWAP and Rule 317B areas on the Zone 2 leases in the Beaver Creek-Colorado River Subwatershed and in the analysis area downstream of the leases in the Cache Creek-Colorado River Subwatershed (see **Figures 3.5-5** and **3.5-6**).

### 3.5.3 Zone 3

Zone 3 is in the eastern portion of the analysis area, in the area locally known as Thompson Divide (see **Figure 3.5-2**). There are nine subwatersheds that contain all of the Zone 3 leases (see **Table 3.5-1**). The Zone 3 analysis area totals 231,534 acres, of which the leases cover 42,753 acres (18 percent). There are two subwatersheds that fall within Zones 2 and 3, and are included in the acreages for each (double-counted): Headwaters West Divide Creek and Upper West Divide Creek. Perennial streams in this zone within the previously issued leases that drain towards the north to the Colorado River include East and West Divide creeks, Little Beaver Creek, and Middle and East Willow creeks (see **Figure 3.5-4**). Perennial streams in this zone within the previously issued leases that drain towards the east to the Crystal and Roaring Fork rivers include Porcupine Creek, South Branch Middle, Middle and North Thompson creeks, Yank Creek, Freeman Creek, and Fourmile Creek (USGS 2011).

Water quality uses (see **Table 3.5-2**) in this area are classified as ALC-1, WS, and AG. Streams draining to the east towards the Crystal and Roaring Fork rivers have Re classifications, and streams draining north towards the Colorado River have Rp classifications. North Thompson Creek and its tributaries have been designated as outstanding waters (CDPHE 2015c) (see **Figure 3.5-6**). The Thompson Divide Coalition commissioned water quality sampling in the reaches of Fourmile Creek, North Thompson Creek, Middle Thompson Creek, and South Middle Thompson Creek just below the previously issued leases during the time period between October 2009 and August 2010 (five sampling events). The resulting report indicates that only a few constituents that were submitted for analysis were detectable, and that those detected were within the expected normal ranges for uncontaminated surface waters (Moran 2011).

The Zone 3 existing leases contain portions of 18 CSWAPs: “near zones” for Brettberg Condos, Glenwood Springs, Oak Meadows Subdivision (Phases I & II, and Phase III), Oxbow Mining, Silt, Ski Sunlight, SpringRidge Place Subdivision, Springridge Subdivision, and Sunlight Inn and Restaurant; and “far zones” only for Battlement Mesa, Clifton, De Beque, Grand Junction, Mtn.Coal Co-West Elk Mine, Parachute, Rifle, and Ute Water Conservancy District. The “near zone” CSWAPs are generally found along the northern half of the Zone 3 lease areas. There are no additional surface water CSWAPs within the analysis area downstream from the Zone 3 leases beyond those found within the leases.

There are 31 CSWAPs for groundwater sources located in the analysis area downstream from the Zone 3 leases: Aspen Equestrian - Blue Creek Ranch, Aspen Glen Waste & Sanitation District, Avalanche Campground, Carbondale, Colorado Mountain College, Crystal Valley Mobile Home Park, El Rocko Mobile Home Park, H Lazy F Mobile Home Park, Hideout Cabins & Campground, Lazy Diamond A Subdivision, Mid Valley Metropolitan District, Mountain Meadows, Prince Creek Homeowners Association, Red Canyon Water Company, Redstone Campground-Mechau, Redstone Campground-Osgood, Redstone Waste & Sanitation District, Riverside Cottages, Roaring Fork Waste & Sanitation District, Rock Gardens Mobile Home Park, Sopris Restaurant, Sopris RV Park, Sopris Village Subdivision, Sunlight View Subdivision, Swiss Village Homeowners Association, Teller Springs Homeowners Association, Three Mile Trailer Park, Waldorf School, Westbank Mesa Homeowners Association, Westbank Ranch Homeowners Association, and Wooden Deer Subdivision.

There are no Rule 317B protection areas located in the Zone 3 leases; however Glenwood Springs has a Rule 317B protection area associated with its water supply within the analysis area downstream from the leases (see **Figure 3.5-6**). Both Carbondale and Oak Meadows Subdivision have prepared SWPPs that cover locations within and downstream of the Zone 3 leases to protect their water supplies. These SWPPs cover the majority of the eastern side and central portions of the leases and analysis area surrounding Zone 3 (see **Figure 3.5-6**).



### **3.5.4 Zone 4**

Zone 4 is the northern-most portion of the analysis area that is approximately 50 miles north of the others, in the Yampa River drainage (see **Figure 3.5-2**). There are two subwatersheds that contain all of the Zone 4 leases (see **Table 3.5-1**). The Zone 4 analysis area totals 40,529 acres, of which the leases cover 2,561 acres (6 percent). One perennial stream, Martin Creek, crosses a corner of the previously issued lease in this area (see **Figure 3.5-4**). Other perennial streams in the area include Milk Creek, Clear Creek, and Little Beaver Creek (USGS 2011).

Water quality uses (see **Table 3.5-2**) in this area are classified as ALC-1, Rp, WS, and AG (CDPHE 2015b). There are no impaired streams (CDPHE 2012) in Zone 4 or the associated analysis area. One CSWAP extends into the existing leases, for the Colo-Wyo Coal Company. No Rule 317B areas or SWPPs have been identified in Zone 4 or associated analysis area (see **Figure 3.5-5**).

### **3.5.5 Groundwater**

#### **3.5.5.1 Regulatory Background**

Specific legal and regulatory constraints that are relevant to the previously issued leases and surrounding areas include the following:

- Safe Drinking Water Act (regulations at 40 CFR 144.3, Underground Sources of Drinking Water)
- BLM Onshore Oil and Gas Order Number 2
- COGCC Rules
- Code of Colorado Regulations 1002-8
- Office of the Colorado State Engineer Rules

FSM 2880 requires that geologic components of ecosystems, including groundwater resources, be identified and integrated into the location and design of management activities. Objectives of the policy include protecting and managing groundwater while implementing land management activities. The WRNF LRMP and LRMP Amendment described in Appendix D of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a) do not address management of groundwater.

### **3.5.6 Analysis Area**

The analysis area for direct and indirect effects consists of the individual lease tracts.

#### **3.5.6.1 Regional Affected Environment**

##### Hydrologic Units

The Piceance Basin contains alluvial and bedrock aquifers, but the alluvial aquifers are generally the most productive with wells having good flow rates and good water quality (USEPA 2004). Alluvial aquifers occur in unconsolidated deposits which consist of boulders, cobbles, gravel, sand, silt, and clay (USFS 2014a). In the larger drainages, these deposits can be more than 100 feet thick. As shown in **Figure 3.5-7**, wells are concentrated in the alluvial valleys, especially the Colorado River. Water levels in the alluvial aquifers fluctuate with changes in seasonal precipitation, with the highest levels occurring in spring and summer and the lowest levels occurring in the fall and winter.

The sedimentary bedrock aquifers are used less for water supply because of low permeability, higher total dissolved solids (TDS) concentrations, and association with hydrocarbon-bearing strata. Two major Tertiary aquifer systems in the Piceance Basin are the Upper Piceance Basin Aquifer, composed of members of the Uinta Formation, and the Lower Piceance Basin Aquifer, composed of members of the

Green River Formation (Topper et al. 2003). The geologic strata of the aquifers are shown in **Table 3.5-3**. The tertiary aquifers are separated by the Mahogany oil shale zone, but may be in communication due to natural fracturing in the Mahogany zone. In the lease Zones 1, 2, and 3, the Uinta Formation has been eroded away, but an erosional remnant of the Green River Formation is present at Battlement Mesa. Sandstones of the Wasatch Formation are common aquifers in the Battlement Mesa area (URS 2006).

**Table 3.5-3 Hydrologic Units Piceance Basin**

Era	System	Series	Formation/Unit	Approximate Thickness (feet)	Composition	Hydrologic Unit	Well Yield (gallons per minute [gpm])	
Cenozoic	Quaternary	Holocene	Unconsolidated deposits including alluvium, and glacial till	150	Sand, gravel, clay	Alluvial aquifers	20 to 1,600 gpm	
	Tertiary	Eocene	Uinta Formation	0 to 1,400	Silty sandstone, siltstone, and marlstone	Upper Piceance Basin aquifer	1.0 to 900 gpm	
			Green River Formation	Parachute Creek Member	500 to 1,800	Kerigenous marlstone and shale	Mahogany Confining Unit	
				Anvil Points Member	0 to 1,870	Shale, fine-grained sandstone, and marlstone	Lower Piceance Basin aquifer	1.0 to 1,000 gpm
				Garden Gulch Member	0 to 900 feet	Claystone, siltstone, clay-rich oil shale, and marlstone	Confining Unit	
				Douglas Creek Member	0 to 900	Siltstone, shale, and channel sandstones		
			Paleocene	Wasatch Formation	5,000	Shale and lenticular sandstones	Wasatch aquifer	10 gpm
	Cretaceous	Mesaverde Group	Williams Fork Formation	3,000 to 7,000	Sandstone, shale, and coal	Mesaverde aquifer	Low to 45 gpm	
			Iles Formation		Sandstone, shale, and coal			
			Mancos Shale	Greater than 7,000	Marine shale, isolated sandstones	Mancos Confining Unit		

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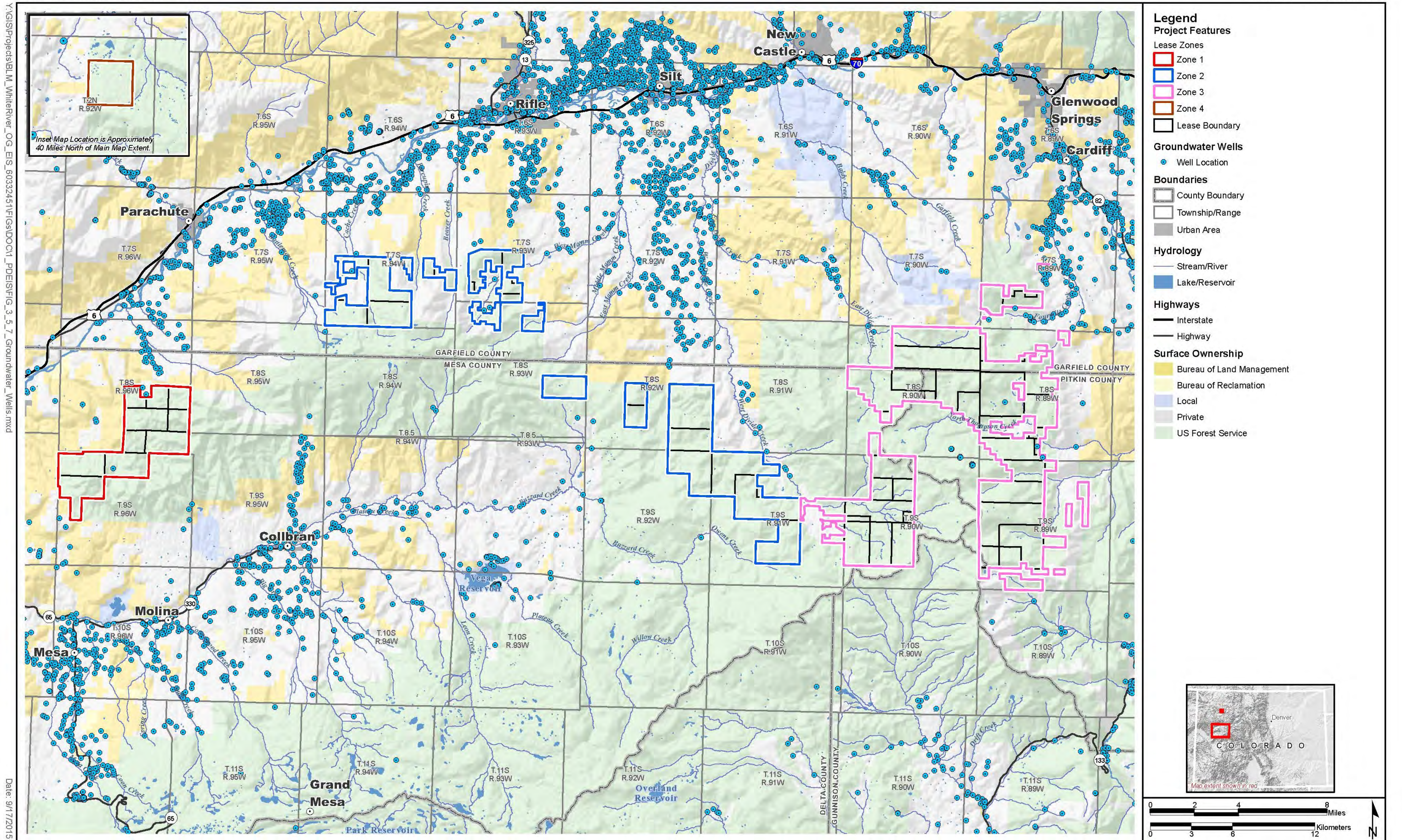


Figure 3.5-7 Locations of Groundwater Wells

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Another bedrock aquifer is the Mesaverde aquifer which is composed of sandstones and coals of the Williams and Iles Formations. Due to overall low permeability, poor water quality, depth, and association with natural gas and CBNG production, the Mesaverde aquifer may not be considered a source of potable water except in isolated areas (Papadopoulos & Associates 2007b). Recharge to the Mesaverde aquifer may occur through precipitation on the outcrop, infiltration from streambeds, vertical inflow from overlying or underlying geologic formations, but overall recharge is limited. Water flow in the Mesaverde aquifer is generally from the outcrop or recharge areas towards the deeper parts of the basin. Flow is complicated by the Divide Creek, Wolf Creek, and Coal Basin structures. Analysis of pressure tests from gas wells indicates that the potentiometric surface of the Mesaverde aquifer is a complex of mounds and ridges (Kaiser and Scott 1996). In lease Zones 1, 2, and 3, the Mesaverde aquifer is mostly in the subsurface at depths of up to several thousand feet, but also outcrops on the east side of Zone 3 and along the axis of the Divide Creek Anticline.

Zone 4 is located on the northwest edge of the Eagle Basin, a 1,500-square-mile area that encompasses Eagle and Pitkin counties and portions of Garfield, Rio Blanco, and Routt counties. The sedimentary rock section may be more than 30,000 feet thick and includes the Maroon Formation, which is the thickest formation of at least 10,000 feet (Topper et al. 2003). Important aquifers are mainly Paleozoic rocks with flow rates up to 3,000 gallons per minute (gpm). Local aquifers have more modest yields averaging 22 gpm.

#### Groundwater Quantity

In 1995, groundwater withdrawals from the Piceance Basin aquifers totaled approximately 46,000 acre-feet, with most of the water being drawn from alluvial aquifers (Topper et al. 2003). In the Eagle Basin, groundwater withdrawals ranged from 993 acre-feet in Pitkin County to almost 15,000 acre-feet in Rio Blanco County.

#### Groundwater Quality

Generally, groundwater quality is better in the alluvial aquifers than the bedrock aquifers; however, the quality of water in alluvial aquifers can vary from valley to valley and is strongly influenced by the bedrock. In the Piceance Basin, analysis of groundwater samples by the USGS from 1946 to 2009 indicated TDS concentrations are commonly less than 1,000 milligrams per liter (mg/L), but range up to over 7,000 mg/L (Thomas and McMahon 2012). Seventy percent of the samples exceeded the USEPA secondary drinking water standard of 500 mg/L. Dissolved solids greater than 7,000 mg/L were generally found in samples from the Green River Formation in Rio Blanco County. In the USGS groundwater sample analysis database for the Piceance Basin (Thomas and McMahon 2012), most of the geologic units for the sample wells are unknown (87 percent or 1,325 sites out of 1,545 sites).

#### Groundwater Use

In the USGS groundwater sample database referenced above for the Piceance Basin, 1,045 were domestic wells, 444 were for monitoring, 39 for irrigation, and 58 were described as not known or “other” (Thomas and McMahon 2012). Most of the samples (62 percent) were from Garfield County in an area that overlaps the analysis area, Zones 1, 2, and 3.

Groundwater accounts for only a small percentage of total water use in the Eagle Basin where most of the water supply is from surface water (Topper et al. 2003). Groundwater uses include domestic, agricultural, and industrial.

### Groundwater Contamination

There are numerous potential sources of groundwater contamination in the analysis area. Alluvial aquifers can be the most susceptible to contamination due to the widespread use of the aquifers, the attributes of the aquifer (unconfined and near surface water tables), and tributary connections with surface waters. In addition, there are concerns that contamination from the drilling and completion of oil and gas wells poses a threat to groundwater resources. **Figure 3.5-8** shows the relative sensitivity of aquifers to potential contamination. The aquifer sensitivity is a measure of how well water flows into an aquifer, and by implication how well contaminants can move into groundwater (Focazio et al. 2002). The risk of contamination to community and public groundwater sources have been assessed through the state CSWAP program and protected through local SWPPs. Section 3.5.1.3 includes a description of these areas within the analysis area.

#### **3.5.6.2 Analysis Area Affected Environment**

##### Zones 1, 2, 3

Zones 1, 2, and 3 are similar enough that they are grouped together for discussion and analysis of groundwater. The aquifers in the area encompassed by the zones include alluvial aquifers, sandstones of the Wasatch Formation, and the Mesaverde aquifer. The alluvial aquifers are found in the major drainages in the vicinity which include the Colorado River, Dry Creek, Mamm Creek, Dry Hollow Creek, West Divide Creek, East Divide Creek, and Divide Creek (URS 2006). Alluvial aquifer potable water wells average 60 feet deep and have an average pumping rate of almost 20 gpm. Groundwater flow in the alluvial aquifers is generally along the topographic gradient of the alluvial deposits.

The aquifers in the Wasatch Formation consist of coarse-grained lenses of sandstone interbedded with fine-grained mudstones (URS 2006). Wasatch aquifer wells average about 200 feet deep, but can be up to 600 feet deep. Overall, the Wasatch aquifer exhibits lower well yields as compared to the alluvial wells with yields averaging around 10 gpm. Where Wasatch wells have higher yields, it is thought that increased density of natural fractures contributes to the increased productivity (URS 2006). Groundwater in the Wasatch aquifer is believed to follow topography and generally flows from south to north, however mounding of water levels coincides with mesas because it is believed that the mesas represent recharge areas.

The Mesaverde aquifer in the Divide Creek area is capable of artesian flow at rates up to 63,000 gallons per day (44 gpm) (Kaiser and Scott 1996). The wells exhibiting artesian flow have generally good water quality with chloride salinity of less than 200 mg/L. Generally, TDS concentrations in the Mesaverde aquifer are greater than 10,000 mg/L (USEPA 2004). Underpressured flows are present in the Divide Creek area and can be attributed to either unconfined conditions in the aquifer where discharge exceeds recharge or to water withdrawals associated with gas and CBNG production. Kaiser and Scott (1996) attribute high flow rates in the Mesaverde aquifer to high permeability due to widespread fractures and faults at the Divide Creek Anticline.

Water quality data obtained from previous sampling and analysis for the Mamm Creek Field Area (Papadopoulos & Associates 2008; URS 2006) were summarized by Thyne (2008). The domestic wells that were sampled exhibited TDS concentrations generally less than 1,000 mg/L. Some of the domestic wells showed elevated levels of nitrate, selenium, and fluoride, but Thyne (2008) concluded that these constituents were not related to oil and gas activities in the area.

Methane was analyzed in a number of water well samples, but it was difficult to determine whether elevated levels of gas result from natural conditions or are the result of drilling gas wells. Contamination of groundwater and surface water occurred in 2004 in West Divide Creek when hydrocarbons were released from an improperly cemented natural gas well (COGCC 2004). Known as the West Divide Creek Seep located in Section 12, T7S, R92W (in Zones 2 and 3), the latest monitoring data indicates

that the groundwater plume has diminished over time, probably due to natural attenuation (Rule Engineering 2013).

Aquifer sensitivity as identified in **Figure 3.5-7** shows, in general, that Zone 1 leases are in an area of high sensitivity, Zone 2 leases are in an area of primarily low sensitivity, and Zone 3 leases are in an area of moderate or medium sensitivity.

#### Zone 4

Groundwater for domestic and stock use is obtained from the Iles and Williams Fork Formations in the Mesaverde Group and from alluvial sources (Reheis 1984). No water quality analyses are available. Springs were reported in the Mancos Shale, but the quality of the water is not known. **Figure 3.5-8** shows, in general, that the Zone 4 leases are in an area of high aquifer sensitivity.

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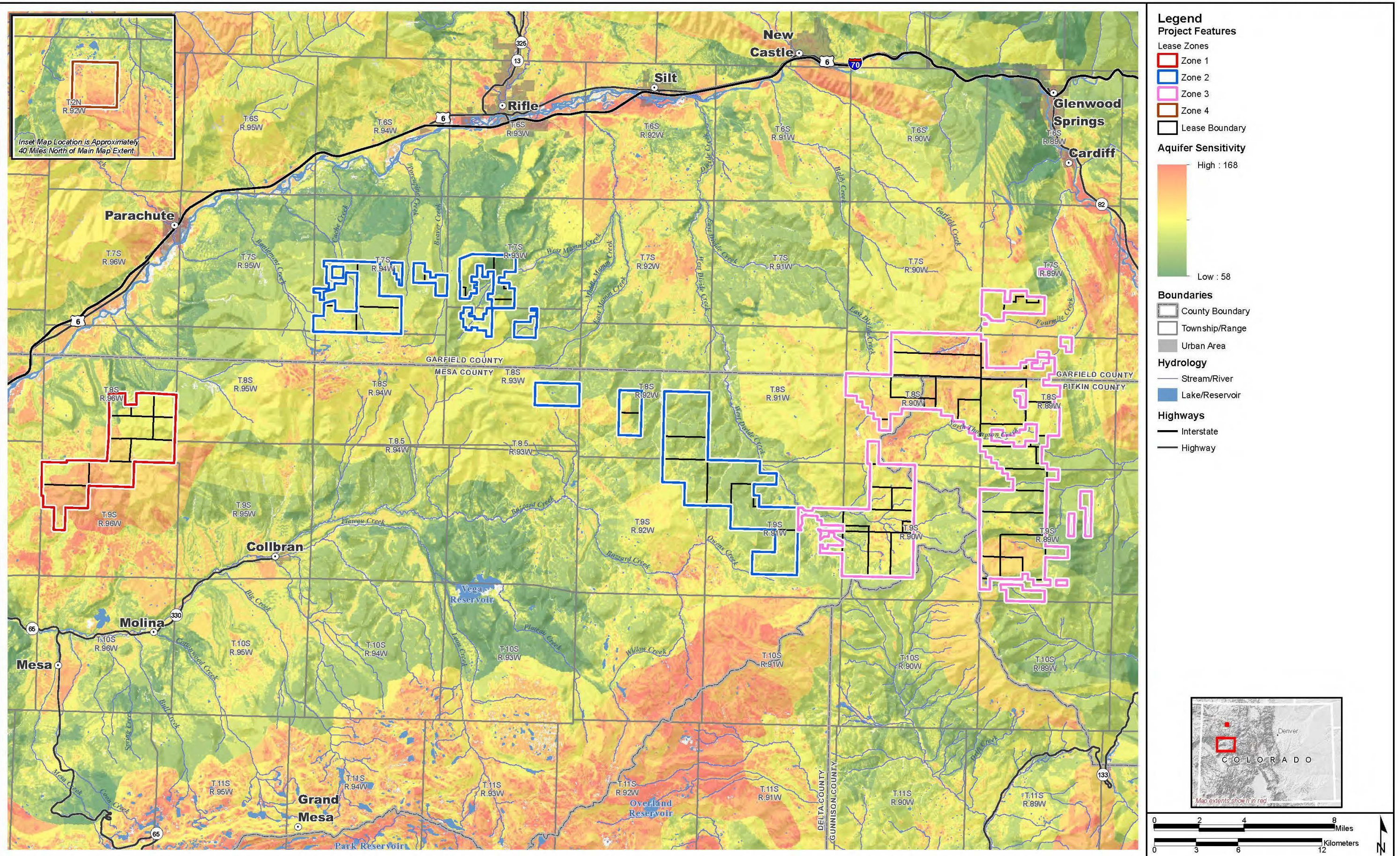


Figure 3.5-8 Aquifer Sensitivity

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### **3.6 Vegetation, Riparian and Wetlands, Special Status Species, and Noxious Weeds**

Vegetative resources presented in this section include general vegetation cover types, wetlands and riparian habitats, noxious weeds/invasive species, and special status plant species and significant plant communities.

#### **3.6.1 Regulatory Background**

Regulations that directly influence vegetation resources within the Project area are primarily implemented by the BLM, Forest Service, Department of Agriculture for Colorado and the U.S. Army Corps of Engineers (USACE), as follows:

- General Vegetation including Timber: FLPMA of 1976; BLM Integrated Vegetation Handbook H-1740-2; National Forest Management Act (NFMA) of 1976; Forest Management Act of 1972; and Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (The Gold Book; USDI and USDA 2007).
- Riparian and Wetland Areas (also see Section 3.6.4): CWA (33 USC 1344); Rivers and Harbors Act (33 USC 401 et seq.); CFR Title 33 Navigation and Navigable Waters; EO 11988, "Floodplain Management," May 24, 1977; EO 11990, "Protection of Wetlands," May 24, 1977; Colorado Code of Regulations 5 CCR 1002-31; and BLM Utah Riparian Policy (Instruction Memorandum -UT-2005-091).
- Noxious and Invasive Weeds (also see Section 3.6.5): Federal Plant Protection Act of 2000 (formerly the Noxious Weed Act of 1974) 7 USC 2801-2814; Colorado Revised Statutes 35-5.5-104.5 to 35-5.5-119; 25-8-205; 25-8-205.5; 35-9-118; Colorado Code of Regulations 8 CCR 1206-2; and FSM 2000 Zero Code 2080.
- Special Status Plant Species (also see Section 3.6.6): Endangered Species Act (ESA) of 1973; BLM Special Status Species Management Policy 6840 (6840 Policy) (Rel. 6-125); and FSM 2670.

#### **3.6.2 Analysis Area**

The analysis area for impacts to general vegetation is comprised of the 65 lease areas (lease area) which are divided into four zones (Zone 1, 2, 3, and 4). The analysis area is located within portions of the WRNF and the GMUGNF boundaries and is comprised of approximately 80,380 acres. The analysis area is located within Mesa, Garfield, Pitkin, and Rio Blanco counties, south of Interstate 70 (I-70), between the towns of DeBeque and Carbondale, except for one lease northeast of Meeker.

The area considered for the Special Status Plant Species and Significant Plant Communities analysis is defined as the lease area plus a 300-meter buffer beyond the edge of the lease boundary. This encompasses the area of potential effects from oil and gas development. The total analysis area is approximately 110,768 acres. Special Status Plant Species and Significant Plant Communities are discussed in Section 3.6.5.

#### **3.6.3 Vegetation Cover Types in the Analysis Area**

Vegetation types and community characterizations are based on vegetation cover types identified through the Forest Service Field Sampled Region 2 Vegetation Data (FSVeg) geospatial database. (USFS 2010b). FSVeg stores data about cover type, dominant vegetative lifeforms, and understory vegetation.

There are 13 primary vegetation cover types found within the analysis area. The vegetation cover types presented below are grouped from cover types identified in the FSVeg dataset and include: aspen, Douglas fir/mixed conifer, gambel oak/mixed mountain shrub, grassland/forbland, lodgepole pine, pinyon-juniper, riparian/wetland, sagebrush/shrub mix, saltbush/greasewood, montane shrubland, snowberry, spruce/fir, and unvegetated. Distribution of vegetation types in these areas is strongly influenced by variations in landscape position, soil type, moisture, elevation, and aspect. **Table 3.6-1** summarizes the acreage of each vegetation type within the analysis area and **Figures 3.6-1** and **3.6-2** display the vegetation cover types throughout the analysis area.

Aspen and Spruce/Fir comprise the dominant cover types in the analysis area. Pinyon-juniper is the dominant cover type for Zone 1. Aspen and Gambel Oak-mixed Mountain Shrub are co-dominant cover types for Zone 2. Aspen is the dominant cover type for Zones 3 and 4. Lodgepole Pine and Saltbush/Greasewood have the least amount of cover in the analysis area and are only observed in Zone 4 and Zone 1, respectively.

#### Aspen

This vegetation cover type is found between 7,100 to 10,300 feet elevation in the analysis area. It consists of open to dense stands of quaking aspen (*Populus tremuloides*) in sometimes isolated pockets in higher elevations. Other tree species known to occur within the aspen cover type include subalpine fir (*Abies lasiocarpa*), lodgepole pine (*Pinus contorta*), Englemann spruce (*Pinus engelmannii*), blue spruce (*Picea pungens*), and Douglas fir (*Pseudotsuga menziesii*). Common shrubs include: Gambel oak (*Quercus gambelii*), Rocky Mountain juniper (*Juniperus scopulorum*), shrubby cinquefoil (*Dasiphora fruticosa*), serviceberry (*Amelanchier* spp.), snowberry (*Symphoricarpos* spp.), sagebrush (*Artemisia* spp.), and willow (*Salix* spp.). The herbaceous layers may be lush and diverse. Common forbs include: Porter's licorice-root (*Ligusticum porteri*), alpine larkspur (*Delphinium barbeyi*), and vetch (*Vicia* spp.). Common graminoids include sedges (*Carex* spp.), Thurber's fescue (*Festuca thurberi*), and needleandthread grass (*Hesperostipa comata*) (Colorado Natural Heritage Program [CNHP] 2005).

#### Douglas Fir/Mixed Conifer

This vegetation cover type is found between 6,000 and 10,000 feet elevation and is dominated by Douglas fir, ponderosa pine (*Pinus ponderosa*), and Englemann spruce. Quaking aspen (aspen) is often present as intermingled individuals in remnant aspen clones, or in adjacent patches. Other less common trees include subalpine fir, and two-needle pinyon pine (*Pinus edulis*). Two-needle pinyon pine also may grow as a shrub within the analysis area. Shrub species that may be present within a sparse- to moderately dense shrub layer include: alderleaf mountain mahogany (*Cercocarpus montanus*), Gambel oak, serviceberry, willow, snowberry, and Rocky Mountain juniper. Perennial graminoids are the most abundant in the sparse to moderately dense herbaceous layer. Characteristic graminoids include: Arizona fescue (*Festuca arizonica*), needleandthread grass, and sedges. The forb layer can be diverse but generally has little cover. Common forbs include: aster (*Aster* spp.), goldenrod (*Solidago* spp.), and beardtongue (*Penstemon* spp.) (CNHP 2005).

#### Gambel Oak/Mixed Mountain Shrub

The Gambel Oak/Mixed Mountain Shrub cover type is found between 6,000 to 9,500 feet elevation along dry foothills and lower mountain slopes. Gambel oak typically dominates this cover type; however, co-dominant shrubs may include serviceberry, big sagebrush (*Artemisia tridentata*), alderleaf mountain mahogany, and snowberry. Scattered trees or other shrubs may occur, including Rocky Mountain juniper, and two-needle pinyon pine. Gambel oak and other dominant shrubs can range from dense thickets with little understory to relatively mesic mixed-shrublands with a rich understory of shrubs, grasses and forbs. Common graminoids include: grama (*Bouteloua* spp.), and *Festuca* spp. Common forbs include western yarrow (*Achillea millefolium*), *Geranium* spp., and vetch (CNHP 2005).

**Table 3.6-1 Vegetation Cover Types within the Analysis Area**

Vegetation Cover Type <sup>1</sup>	Zone 1 Acres (%)	Zone 2 Acres (%)	Zone 3 Acres (%)	Zone 4 Acres (%)	Total Percent Cover in the Analysis Area
Aspen	0 (0)	<i>7,238</i> (29)	<i>23,066</i> (54)	<i>1,288</i> (50)	39
Douglas Fir/Mixed Conifer	1,378 (14)	448 (2)	826 (2)	53 (2)	3
Gambel Oak/Mixed Mountain Shrub	488 (5)	<i>7,313</i> (29)	1,035 (2)	68 (3)	11
Grassland/Forbland	24 (<1)	827 (3)	2,340 (6)	28 (1)	4
Lodgepole Pine	0 (0)	0 (0)	0 (0)	605 (24)	<1
Montane Shrubland	735 (7)	1,040 (4)	160 (<1)	104 (4)	3
Pinyon-Juniper	<i>5,414</i> (54)	335 (1)	7 (<1)	0 (0)	7
Riparian/Wetland <sup>2</sup>	1,718 (17)	2,668 (11)	7,895 (18)	382 (15)	16
Sagebrush/Shrub Mix	740 (7)	3,176 (13)	335 (1)	0 (0)	5
Saltbush/Greasewood	111 (1)	0 (0)	0 (0)	0 (0)	<1
Snowberry	0 (0)	985 (4)	831 (2)	180 (7)	2
Spruce/Fir	181 (2)	3,280 (13)	12,672 (30)	236 (9)	20
Unvegetated	1,041 (10)	271 (1)	177 (<1)	0 (0)	2
<b>Total<sup>3</sup></b>	<b>10,112</b> <b>(13)</b>	<b>24,938</b> <b>(31)</b>	<b>42,766</b> <b>(53)</b>	<b>2,562</b> <b>(3)</b>	<b>100</b>

<sup>1</sup> Dominant cover type by zone is *italicized and highlighted*.

<sup>2</sup> The Riparian/Wetland cover type was determined by analyzing three separate data sources: FSveg, National Wetland Inventory, Forest Service Water Influence Zones data, and Forest Service Fen data.

<sup>3</sup> Approximately 7 acres or 0.01 percent of the total 80,380 acres is not included in the total due to differences in resolution between the FSveg WRNF dataset compared to the FSveg GMUGNF dataset.

Source: USFS 2010b.

### Grassland/Forbland

Grasslands and forblands are very diverse in the WRNF. Their composition is dependent on soil type, land use, aspect, and elevation (between 5,500 to 11,400 feet). Most of these areas are located in valley bottoms, uppermost south-facing slopes, and in scattered patches on windswept ridges. Typical grasses include: Thurber's fescue, Arizona fescue, Idaho fescue (*Festuca idahoensis*), rough fescue (*Festuca campestris*), bluegrass (*Poa* spp.), wildrye (*Leymus* spp.), and brome (*Bromus* spp.). Common forbs include western yarrow, mountain goldenbanner (*Thermopsis montana*), Porter's licorice-root, buckwheat (*Eriogonum* spp.), and beardtongue (*Penstemon* spp.). Sedges also are common within this cover type. Few shrubs and trees are present within this cover type, but may occur on area edges. These include sagebrush, Gambel oak, aspen, snowberry, rabbitbrush (*Chrysothamnus* spp.), willow, Douglas fir, Englemann spruce, blue spruce, and subalpine fir (CNHP 2005).

### Lodgepole Pine

Lodgepole pine forests occur between 8,000 and 9,500 feet elevation on gentle to steep slopes on all aspects inside of the analysis area. This cover type represents an early successional stage and is the result of past stand-replacing fires. In these stands, the community is usually dominated by dense monocultures of trees of similar age, but understory species can be found in more open areas. Sometimes stands are intermingled with mixed conifer/aspen stands. Typical shrubs include snowberry, *Vaccinium* spp., and currant (*Ribes* spp.) (CNHP 2005).

### Montane Shrubland

Shrublands occur between 5,900 and 9,500 feet elevation in the analysis area. This cover type is generally very diverse in plant composition and is usually associated with exposed sites, rocky substrates, and drier conditions, which limit tree growth. Dominant species include Gambel oak, serviceberry, snowberry, alderleaf mountain mahogany, sagebrush, currant, and saltbush (*Atriplex* spp.) (CNHP 2005).

### Pinyon-Juniper

This cover type generally occurs on dry mountains and foothills and is typically found between 5,500 and 8,500 feet elevation within the analysis area. This cover type occurs on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Two-needle pinyon pine, Rocky Mountain juniper (at higher elevations), and Utah juniper (*Juniperus osteosperma*) dominate. Shrubs are common and can co-dominate; these include sagebrush, serviceberry, saltbush, and snowberry (CNHP 2005).

### Riparian/Wetland

Riparian areas, fens, other wetland cover types (including waterbodies) are associated with and depend on the presence of water during some part of the growing season. Riparian areas are generally defined as the vegetated transitional zones that lie between aquatic and terrestrial (upland) environments. Riparian areas usually occur as belts along streams, rivers, lakes, marshes, bogs, and other water bodies. As a transitional zone between aquatic and upland environments, riparian systems often exhibit characteristics of both. Generally, only perennial and intermittent streams can support riparian areas that serve the entire suite of riparian ecological functions. Ephemeral streams rarely possess the hydrologic conditions that allow true riparian vegetation to grow. Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions under normal circumstances. Wetland types include marshes, lakeshores, bogs, fens, wet meadows, willow carrs, springs, seeps, and riparian areas. Fens in Colorado are relict wetlands from the last glaciation, and as a result have very unique characteristics including water-saturated substrates and an accumulation of about 30 centimeters or more of peat (organic soil material). Peatlands, which include fens, are widely distributed across boreal regions. In Colorado, fens may be the most common wetland type in the 8,500 to 10,000 feet elevation range (USFS 2014a, Glossary, page 23).

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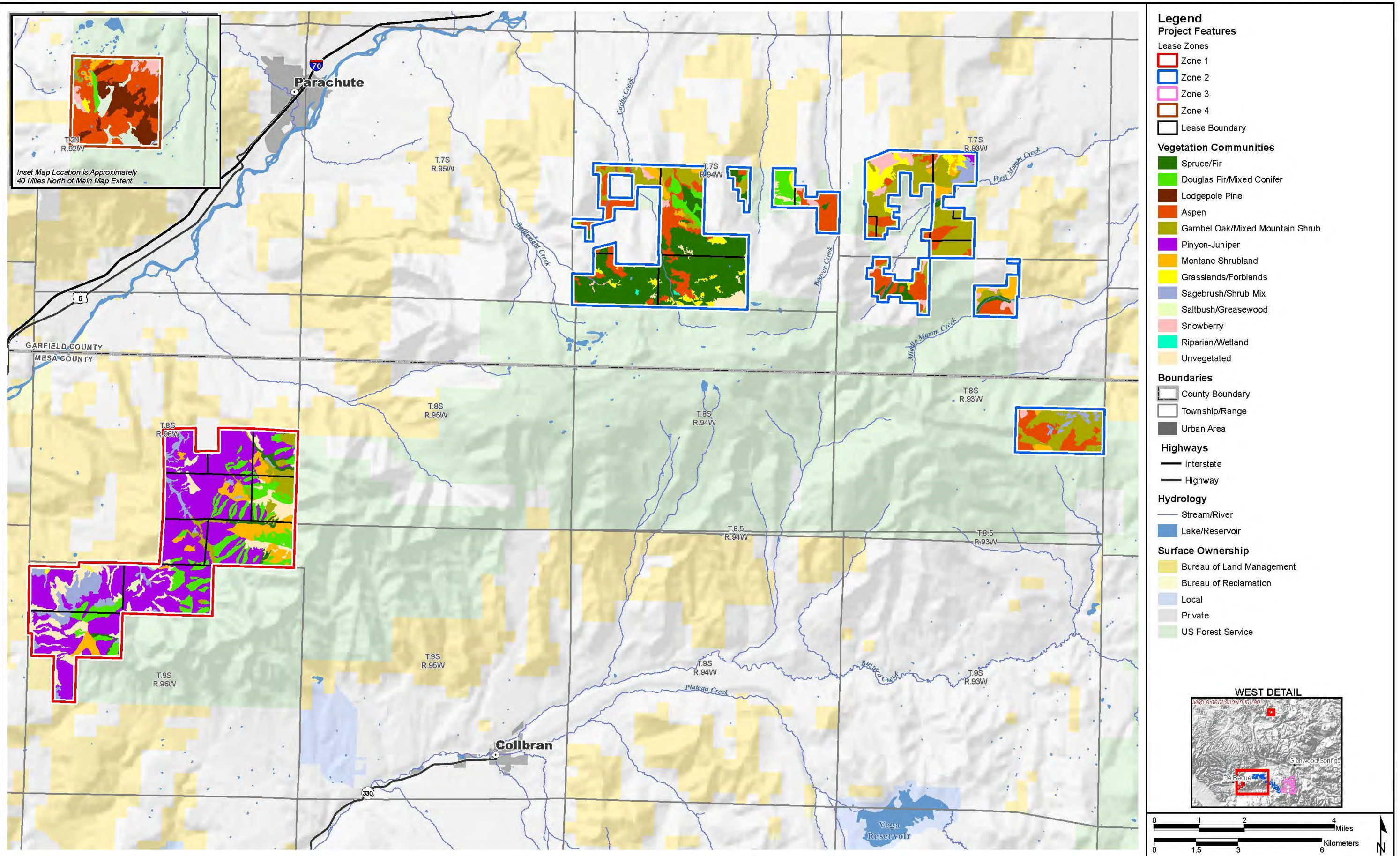


Figure 3.6-1 Vegetation Cover Types in Analysis Area (West)

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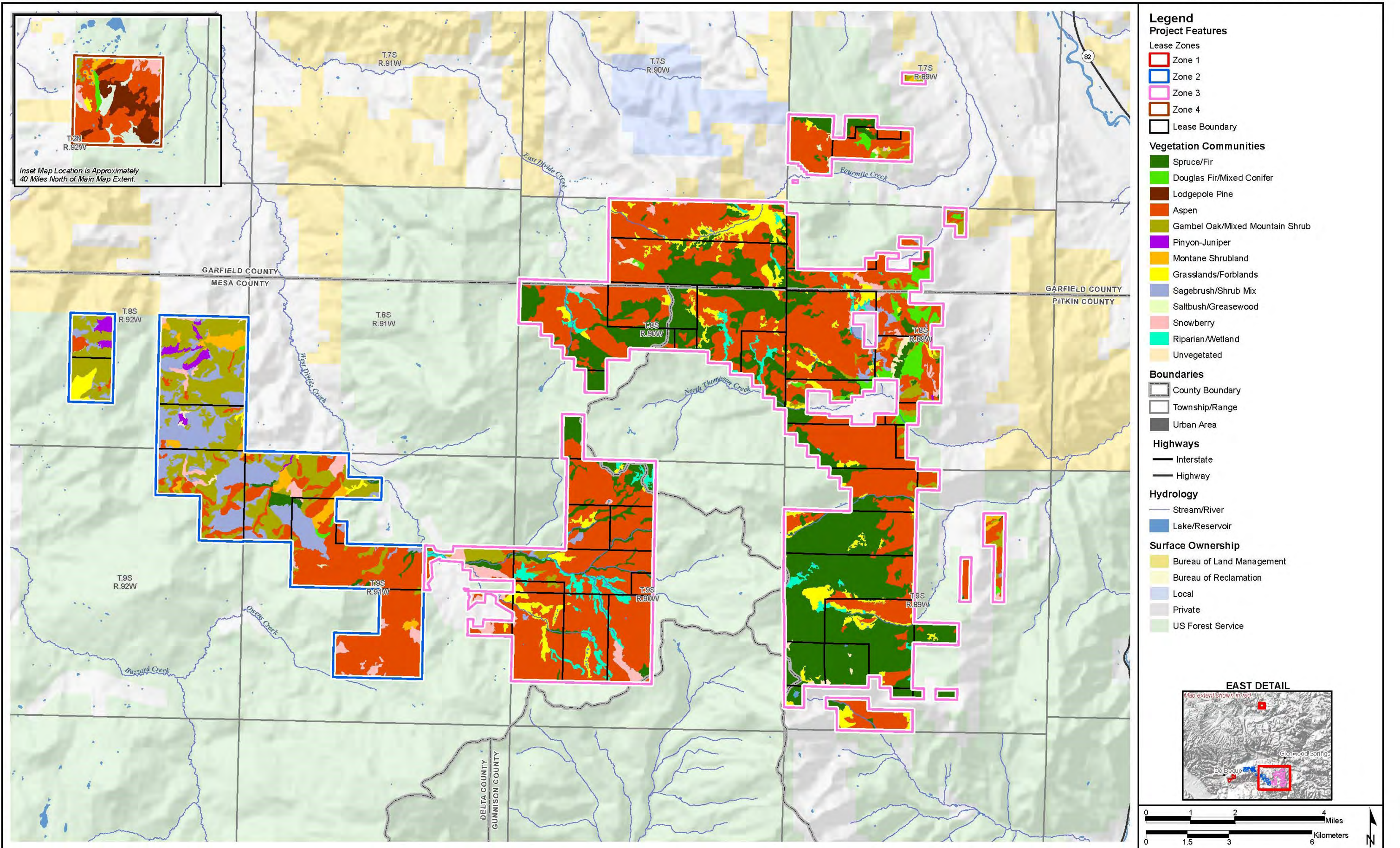


Figure 3.6-2 Vegetation Cover Types in Analysis Area (East)



A variety of vegetation types are found within riparian, fen, and other wetland areas, common graminoids include: rush (*Juncus* spp.), sedge, bluejoint reedgrass (*Calamagrostis canadensis*), and smallflowered woodrush (*Luzula parviflora*). Forbs include: yarrow, wild mint (*Mentha arvensis*), and heartleaf bittercress (*Cardamine cordifolia*). Shrubs are dominated by willow, but other species such as gray alder (*Alnus incana*), redosier dogwood (*Cornus sericea*) and Woods rose (*Rosa woodsii*) may be common. Tree species found within riparian and wetland cover types include subalpine fir, Englemann spruce, aspen, blue spruce, narrowleaf cottonwood, and Douglas fir. One threatened and endangered species is known to grow in riparian environments within the analysis area: Ute Ladies'-tresses (*Spiranthes diluvialis*). Section 3.6.4 describes threatened and endangered species and their habitats in more detail.

#### Sagebrush/Shrub Mix

This cover type is commonly found between 5,500 and 9,500 feet elevation. Several sagebrush species are present within this cover type including Wyoming big sagebrush (*Artemisia tridentata* subs. *wyomingensis*) and mountain big sagebrush (*Artemisia tridentata* subs. *vaseyana*). Other common shrubs include Gambel oak, serviceberry, snowberry, saltbush, greasewood (*Sarcobatus* spp.), alderleaf mountain mahogany, rabbitbrush, and snakeweed (*Gutierrezia* spp.). Two-needle pinyon pine, Rocky Mountain juniper, Utah juniper, and chokecherry (*Prunus virginiana*) also are commonly found within this cover type. Milkvetch (*Astragalus* spp.), buckwheat, and penstemon are common forbs. Graminoids include needleandthread grass and fescue (CNHP 2005).

#### Saltbush/Greasewood

This cover type is generally found in lower elevations of the analysis area (5,700 to 6,700 feet). This cover type is characterized by accumulations of salt on poorly developed deep soils. Soils in this cover type generally have a higher pH, which restricts the uptake of water by all but the most salt-tolerant plants. Saltbush and greasewood species dominate the landscape. Two-needle pinyon pine and milkvetch are other species found within this cover type in the analysis area (CNHP 2005).

#### Snowberry

The Snowberry cover type is typically found at the same elevation as the Montane Shrub cover type. Snowberry is a montane shrub; however, it is the dominant species in this cover type. Other montane shrubs that may be observed in this cover type in the analysis area include serviceberry, Gambel oak, Rocky Mountain juniper, and sagebrush may be present or co-dominate. Tree species that may occur within the cover type include aspen and Englemann spruce (CNHP 2005).

#### Spruce/Fir

Spruce/fir forests are usually found between 7,000 and 11,000 feet. These areas typically have shallow soils and contain dense stands of Englemann spruce, Douglas fir, and subalpine fir with a closed canopy. Openings in the forest support many herbaceous and woody plants often associated with the montane shrublands and grasslands cover types and include snowberry, serviceberry, willow, juniper, cottonwood, aspen, redosier dogwood, Porter's licorice-root, bluntseed sweetroot (*Osmorhiza depauperata*), and fescue (CNHP 2005).

#### Unvegetated

This cover type includes both badlands and sparsely vegetated scree areas found within the analysis area. Badlands generally occur at lower elevations in the analysis area (5,500 to 8,000 feet), while the sparsely vegetated scree areas are at or above 10,000 feet. Vegetation is very sparse and may be naturally absent in some places. If vegetation is present it may be dominated by dwarf shrubs including saltbush in badland areas. Scattered small trees (pinyon or juniper) may be present. Subalpine fir and Englemann spruce may be present at higher elevations (CNHP 2005). Badlands are common on the western portion of the analysis area; alpine areas are not common in the analysis area. Two threatened and endangered species are known to grow in badland environments within the analysis area: DeBeque

phacelia (*Phacelia submutica*) and Colorado hookless cactus (*Sclerocactus glaucus*). Three BLM sensitive species are known to grow in badland environments within the analysis area: DeBeque milkvetch (*Astragalus debequaeus*), Naturita milkvetch (*Astragalus naturitensis*), and Paradox breadroot (*Pediomelum aromaticum*). Section 3.6.4 describes threatened and endangered and BLM sensitive species and their habitats in more detail.

#### **3.6.4 Wetlands and Waters of the U.S.**

Wetlands and other waters of the U.S. (WUS) are protected under Section 404 of the CWA. Section 404 requires that any discharges of dredge or fill material into these water must be permitted. Most oil and gas development, such as well pads and pipelines, is likely to be conducted under Nationwide Permits. However, it should be noted that the USACE has revoked the use of Nationwide Permits in fen wetlands in Colorado in order to protect the unique wetland type.

WUS are defined in 33 CFR 328.3 as all non-tidal waters that are currently, or were used in the past, or may be susceptible to use in interstate commerce; all interstate waters including wetlands; all other waters such as interstate lakes, rivers, streams (including intermittent streams), mud flats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, of which the use, degradation or destruction could affect interstate commerce; and all impoundments of WUS. In addition, tributaries of the above listed waters, including intermittent drainages, and wetlands adjacent to the above waters also are considered to be WUS.

Wetlands are a WUS and are considered to be a special aquatic site. According to the USACE's 1987 Wetland Delineation Manual, a "three-parameter" approach is required for delineating USACE-defined wetlands (USACE 1987), where areas are identified as wetlands if they exhibit hydrophytic vegetation, hydric soils, and wetland hydrology.

Common wetland types found in the analysis area include marshes, lakeshores, bogs, fens, wet meadows, willow carrs, springs, and seeps. A brief description of dominant vegetation species found in wetlands and riparian areas is described in Section 3.6.2. **Figures 3.6-3** and **3.6-4** display riparian areas, fens, and other wetlands in the analysis area.

#### **3.6.5 Noxious Weeds and Invasive Species**

Noxious weeds include those listed by the State of Colorado Department of Agriculture. Noxious weeds are defined by the Colorado Noxious Weed Act in 8 CCR 1203-19 as plants that aggressively invade or are detrimental to economic crops or native plant communities; are poisonous to livestock; are carriers of detrimental insects, diseases, or parasites; or are detrimental to the environmentally sound management of natural or agricultural ecosystems. Noxious weeds are officially designated as non-native plant species that are invasive, can become monocultures, and pose a serious threat to the continued productivity and biological diversity of the ecosystem. These non-native species can cause harm to land value, native ecology, agricultural interests, wildlife habitat, livestock forage, riparian resources, and aesthetic and visual values of land (USFS 2014a, page 379).

Colorado has published a list of 72 noxious weeds that may be found in the state. The species on the list have been assigned a rating of "A," "B," or "C," depending on the severity of the threat. Of these, 18 have been put on the "A" list, meaning that they are currently rare in Colorado and are subject to eradication wherever detected. The other 54 species are either on the "B" or "C" list. List B species are those that have discrete statewide distributions. The goal for List B species is to stop the spread; List B species are subject to eradication, containment, or suppression. List C species have existing statewide populations; the goal for these species is to control the growth and spread (Colorado Department of Agriculture 2015).

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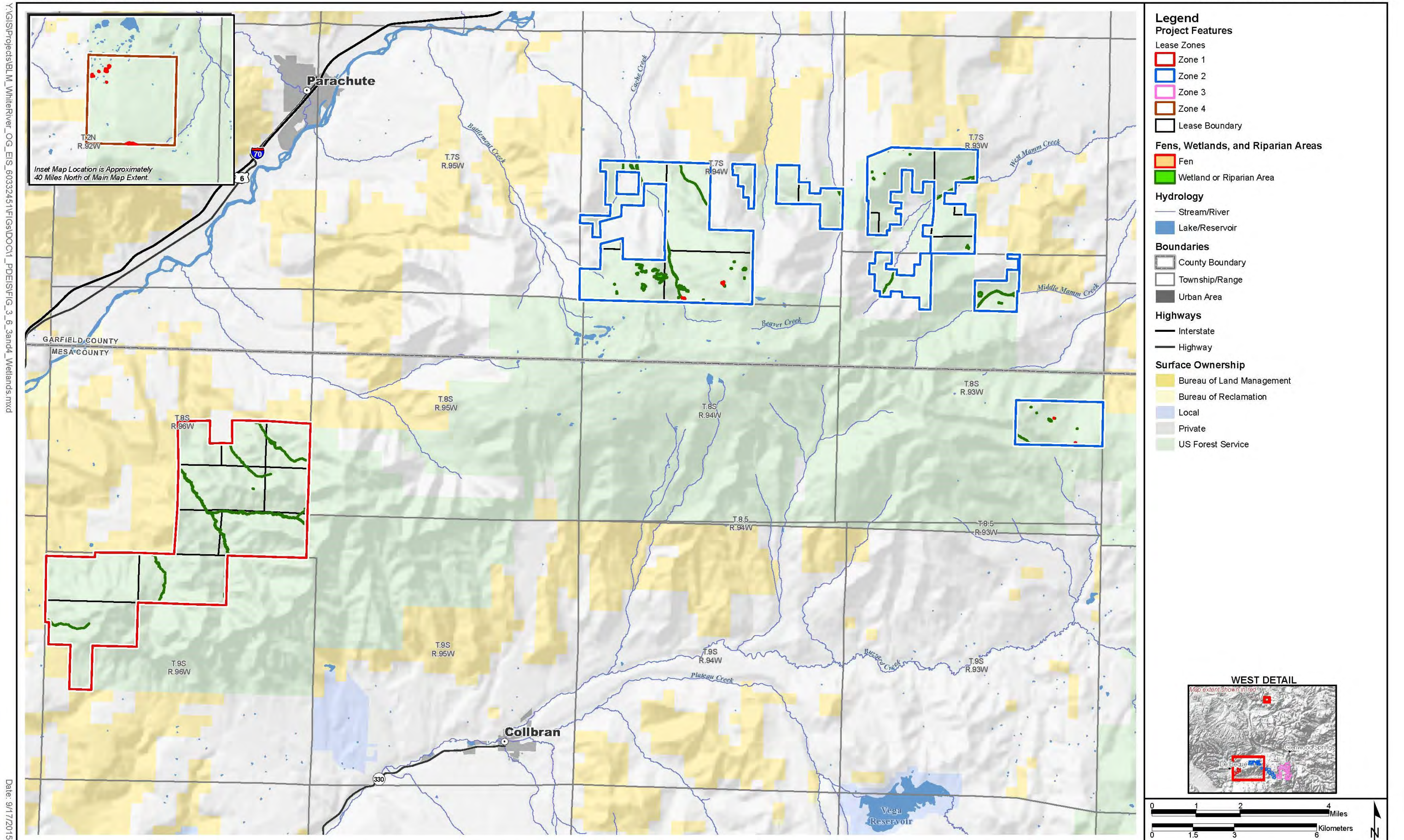


Figure 3.6-3 Riparian Area, Fens, and Other Wetlands in the Analysis Area (West)

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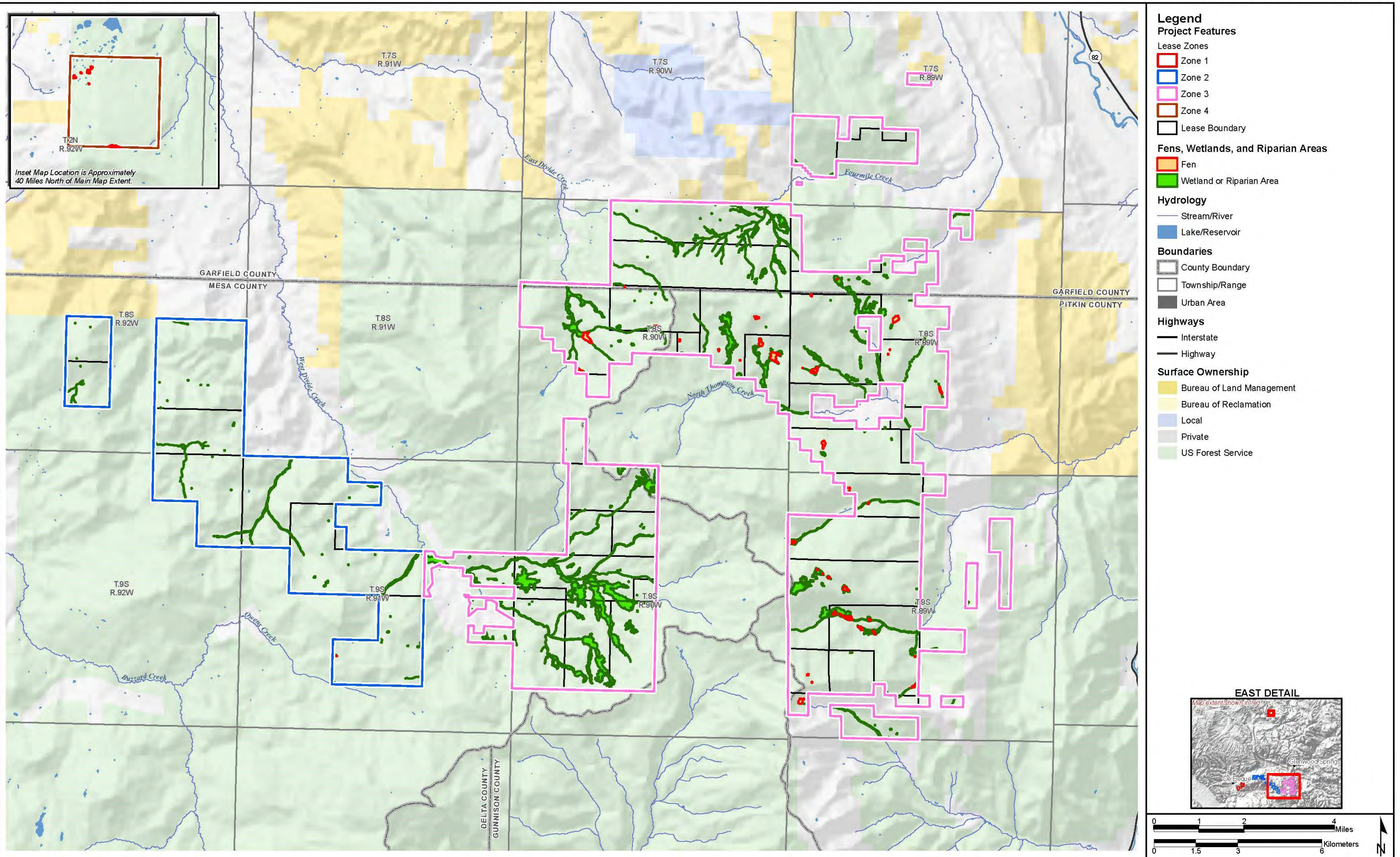


Figure 3.6-4 Riparian Area, Fens, and Other Wetlands in the Analysis Area (West)

Noxious weed populations have slowly but continually increased throughout the WRNF in the past few decades. Non-native noxious weeds are very opportunistic and tend to invade where soil disturbance activities take place. Oil and gas development activities such as access roads, pipelines, facilities, and well pad construction all create optimum environments for noxious weed establishment and spread (USFS 2014a, page 379). Noxious weeds are distributed across the WRNF and GMUGNF. Surface-disturbing activities along with other vectors have led to the continued spread and establishment of noxious weeds in these forests.

Of the 72 weeds listed by the state, the Forest Service has identified 17 noxious weed species that are present in the analysis area. **Table 3.6-2** lists known populations of noxious weeds and their occurrence in each zone.

**Table 3.6-2 Noxious Weed Populations in the Analysis Area**

Noxious Weed (Scientific Name)	State Noxious Weed Category <sup>1</sup>	Zone 1 Acres (%)	Zone 2 Acres (%)	Zone 3 Acres (%)	Zone 4 Acres (%)
Bull thistle ( <i>Cirsium vulgare</i> )	B		82 (<1)	12 (<1)	
Canada thistle ( <i>Cirsium arvense</i> )	B		14 (<1)	135 (<1)	<1 (<1)
Cheatgrass/Downy brome ( <i>Bromus tectorum</i> )	C	1 (<1)	3 (<1)	10 (<1)	
Common mullein ( <i>Verbascum thapsus</i> )	C		<1 (<1)		
Common tansy ( <i>Tanacetum vulgare</i> )	B			10 (<1)	
Corn chamomile ( <i>Anthemis arvensis</i> )	B		8 (<1)		
Dalmation toadflax ( <i>Linaria dalmatica</i> )	B			<1 (<1)	
Field bindweed ( <i>Convolvulus arvensis</i> )	C		1 (<1)		
Gypsyflower/Houndstongue ( <i>Cynoglossum officinale</i> )	B		277 (1)	170 (<1)	
Hardheads/Russian knapweed ( <i>Acroptilon repens</i> )	B		<1(<1)		
Nodding plumeless thistle/Musk thistle ( <i>Carduus nutans</i> )	B		668 (3)	54 (<1)	
Oxeye daisy ( <i>Chrysanthemum leucanthemum</i> )	B		<1 (<1)	10 (<1)	
Saltcedar ( <i>Tamarix chinensis</i> , <i>T. parviflora</i> , <i>T. ramosissima</i> )	B	1 (<1)	6 (<1)		
Spiny plumeless thistle ( <i>Carduus acanthoides</i> )	B		94 (<1)	10 (<1)	

**Table 3.6-2 Noxious Weed Populations in the Analysis Area**

Noxious Weed (Scientific Name)	State Noxious Weed Category <sup>1</sup>	Zone 1 Acres (%)	Zone 2 Acres (%)	Zone 3 Acres (%)	Zone 4 Acres (%)
Spotted knapweed ( <i>Centaurea maculosa</i> )	B		1 (<1)	<1 (<1)	
Stinking chamomile/ Mayweed chamomile ( <i>Anthemis cotula</i> )	B		25 (<1)		
Whitetop/Hoary cress ( <i>Cardaria draba</i> )	B		2 (<1)		
<b>Total Noxious Weed Occurrences</b>		<b>2 (&lt;1)</b>	<b>1,182 (5)</b>	<b>414 (1)</b>	<b>&lt;1 (&lt;1)</b>

<sup>1</sup> A – Subject to eradication wherever detected; B – stop the spread by eradication, containment, or suppression; C – management controls are recommended.

Source: USFS 2015a,b.

The WRNF produced the 2011 Invasive Species Management Environmental Assessment (USFS 2011). This report describes invasive plant species and their impacts to native plant communities across the WRNF. Current invasive species treatment on the WRNF combines biological, mechanical, and cultural control for eradication, with use of herbicides in limited areas (USFS 2011).

### 3.6.6 Special Status Plant Species and Significant Plant Communities

This section discusses four categories of special status plants: 1) threatened and endangered species and their critical habitat, 2) BLM sensitive species, 3) Forest Service Regional Forester’s sensitive species, and 4) Forest Service local concern species. Significant plant communities also are discussed in this section. The Forest Service prepared a Biological Assessment (BA) (USFS 2014e) and Biological Evaluation (BE) (USFS 2014f) as part of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a) for all potentially affected special status plant species that could occur within the WRNF.

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over species listed as threatened or endangered under Section 7 of the federal ESA (16 USC 1536 et seq.). Under Section 7 of the ESA federal agencies are required to consult with USFWS on any action they authorize, fund, or conduct that may affect a listed species or result in adverse modification of critical habitat. Additionally, BLM must confer with USFWS on any activity that may jeopardize a proposed species or if it is “likely to result” in adverse modifications or destruction of proposed critical habitat. Section 7(a)(1) requires Federal agencies to use their authorities to further conservation of federally listed species. This involves BLM’s cooperation with USFWS in species recovery and conservation as provided in species recovery plans for federally listed species.

Federal candidate species and their habitats and species designated as sensitive by the BLM State Director are managed as BLM sensitive species with a greater emphasis on conservation. On BLM-administered public lands, BLM sensitive species would be managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under the ESA (i.e., maintain viable populations, thereby preventing federal listing from occurring). The BLM may coordinate with the CNHP to develop conservation strategies and to mitigate threats to rare plants that are not designated as BLM special status species.

The FSM 2600 (USFS 2005) provides policies pertaining to the management of sensitive plants on NFS land. This manual stipulates that the Forest Service provide special management importance for sensitive species to ensure their sustainability and preclude trends toward federal listing. The Forest Service accomplishes this by maintaining a list of sensitive plant species specific to the region (the Regional Forester’s sensitive species list). Section 2672.2 of the manual states that the Forest Service should manage habitat at levels that aid in the recovery of federally listed species as documented in USDA recovery plans (USFS 2005).

To facilitate management of native and desirable non-native plant species, the Forest Service developed a list of species of local concern separate from the Regional Forester’s sensitive plant species list. The Region 2 Planning Desk Guide (USFS 2003a) defines species of local concern as “species that are documented or suspected to be at risk at a local scale within Region 2, but do not meet the criteria for regional Sensitive Species designation.”

Significant plant communities (potential conservation areas) have been delineated by CNHP to identify the land area that provides habitat and ecological processes upon which a particular species, suite of species, or natural community depends for its continued existence (NatureServe 2015).

While the specific habitat requirements vary for each of the Forest Service Regional Forester’s Sensitive Species and Forest Service Local Concern Species evaluated in this report, they were broadly divided into the following spatially identifiable and quantifiable categories for analysis comparison purposes: Alpine, Non-Forested, Forested, Riparian/Wetland – Non-Fen, and Fen. **Table 3.6-3** provides brief descriptions of these habitat categories within the 110,768-acre analysis area.

**Table 3.6-3 Regional Forester’s Sensitive Species and Local Concern Species Habitat Categories for Analysis**

Habitat Category <sup>1</sup>	Description	Total Analysis Area Acres (%) <sup>2,3</sup>
Alpine <sup>4</sup>	Occurs above 11,500 feet or treelimit. Treelimit occurs at around 11,500 to 12,000 feet in the analysis area. Alpine habitat is sometimes referred to as alpine tundra.	1 (<1)
Non-Forested	The most abundant non-forested cover type in the analysis area is Gambel Oak/Mixed Mountain Shrub followed by Sagebrush/Shrub Mix.	27,315 (25)
Forested	The most abundant cover type in the analysis area. is Aspen, followed by Spruce/Fir.	67,276 (61)
Riparian/Wetland – Non-Fen	All riparian and wetland habitats other than fens.	12,327 (11)
Fen	Wetlands with water-saturated substrates and an accumulation of about 30 centimeters or more of peat (organic soil material). Common in the 8,500 to 10,000 feet elevation range.	276 (<1)

<sup>1</sup> The WRNF 2014 EIS describes the process in which these habitat categories were identified.

<sup>2</sup> Percentage calculated based on the total analysis area (including the 300-meter buffer); 110,768 acres.

<sup>3</sup> Only data specific to the WRNF portion of the lease specific analysis area has been obtained. Information for the GMUGNF is unavailable.

<sup>4</sup> Alpine habitat does not occur within the lease area; however, it occurs within the 300-meter buffer.

Source: USFS 2014a.

### 3.6.6.1 Federally Threatened and Endangered Plant Species

The Grand Junction office of the USFWS identified four federally listed plant species as occurring, potentially occurring, or potentially being affected by its management activities in the analysis area (USFS 2014a, page 232). **Table 3.6-4** identifies those species along with their status, a brief habitat description, and their suitable habitat acreage (and critical habitat acreage) in the analysis area. **Figures 3.6-5** and **3.6-6** show the suitable habitat and critical habitat for the federally listed species.

**Table 3.6-4 Federally Listed Plant Species Considered in this Analysis**

Species (Scientific Name)	Status	Habitat Description	Total Suitable Habitat Acreage in Analysis Area <sup>1</sup> (%)
Penland alpine fen mustard ( <i>Eutrema edwardsii</i> spp. <i>penlandii</i> )	Threatened	Alpine tundra above 11,800 feet. Rooted in mosses on stream banks and wetlands. Endemic to the Mosquito Range in central Colorado	0 (0)
DeBeque phacelia <sup>2</sup> ( <i>Phacelia submutica</i> )	Threatened	Below 6,700 feet within the South Rifle Ranger District near DeBeque, Colorado. Found on sparsely vegetated slopes in chocolate brown or gray clay soils (Atwell Gulch and Shire Members of Wasatch Formation).	Suitable Habitat: 3,850 (3) Critical Habitat: 1,903 (2)
Colorado hookless cactus ( <i>Sclerocactus glaucus</i> )	Threatened	Below 6,700 feet on the South Rifle Ranger District near DeBeque, Colorado. Found on alluvium derived from seleniferous shales (Mancos shale, or members of the Wasatch Formation).	3,850 (3)
Ute ladies'-tresses ( <i>Spiranthes diluvialis</i> )	Threatened	Seasonally moist soils and wet meadows of drainages below 7,200 feet in Eagle, Garfield, and Pitkin counties. Sub-irrigated meadows along margins of ditches.	5,277 (5)

<sup>1</sup> Percentage calculated based on the analysis area (including the 300-meter buffer); 110,768 acres.

<sup>2</sup> Only DeBeque phacelia critical habitat is found within the lease specific analysis area and the analysis area.

Source: USFWS 2015a; USFS 2014a.

A pre-field review done in support of the 2014 WRNF Oil and Gas Leasing Final EIS concluded that three threatened, endangered, and proposed plant species have occurrences or suitable habitat within the analysis area (USFS 2014a, page 233). Based on this analysis, DeBeque phacelia, Colorado hookless cactus, and Ute ladies'-tresses are carried forward for analysis. Because there are no plants, or suitable alpine habitat within or connectivity to the analysis area for Penland alpine fen mustard (*Eutrema edwardsii* spp. *penlandii*), it will not be discussed further in this document.

### 3.6.6.2 BLM Sensitive Species

The BLM CRVFO identifies three sensitive plant species as occurring, potentially occurring, or potentially being affected by its management activities in the analysis area (BLM 2015d). **Table 3.6-5** identifies those species along with a brief habitat description. The general suitable habitat and their cover area within the analysis area is the same as that of DeBeque phacelia and Colorado hookless cactus and described in more detail above in Section 3.6.2 and in **Table 3.6-4**.



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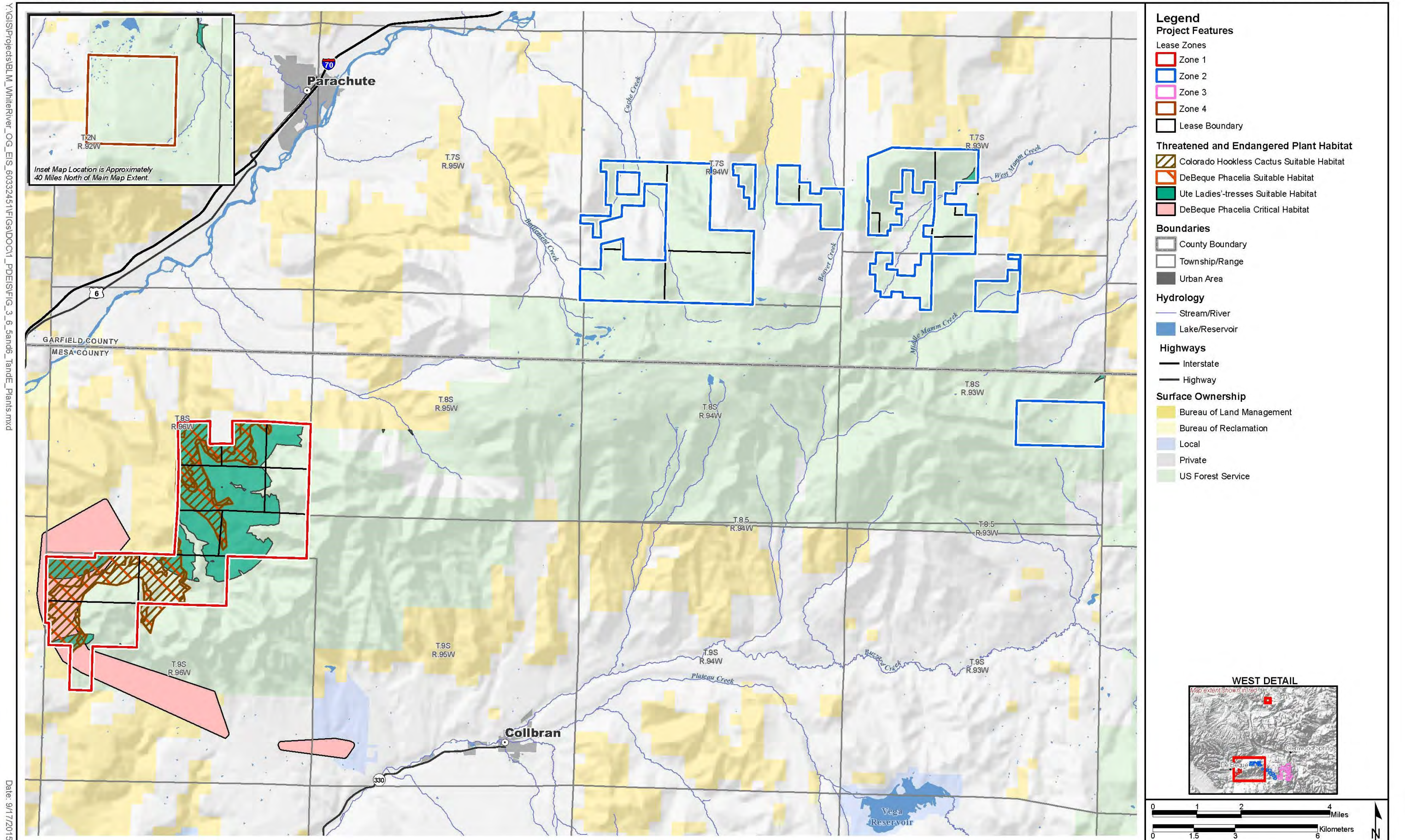


Figure 3.6-5 Threatened and Endangered Plan Species Habitat (West)

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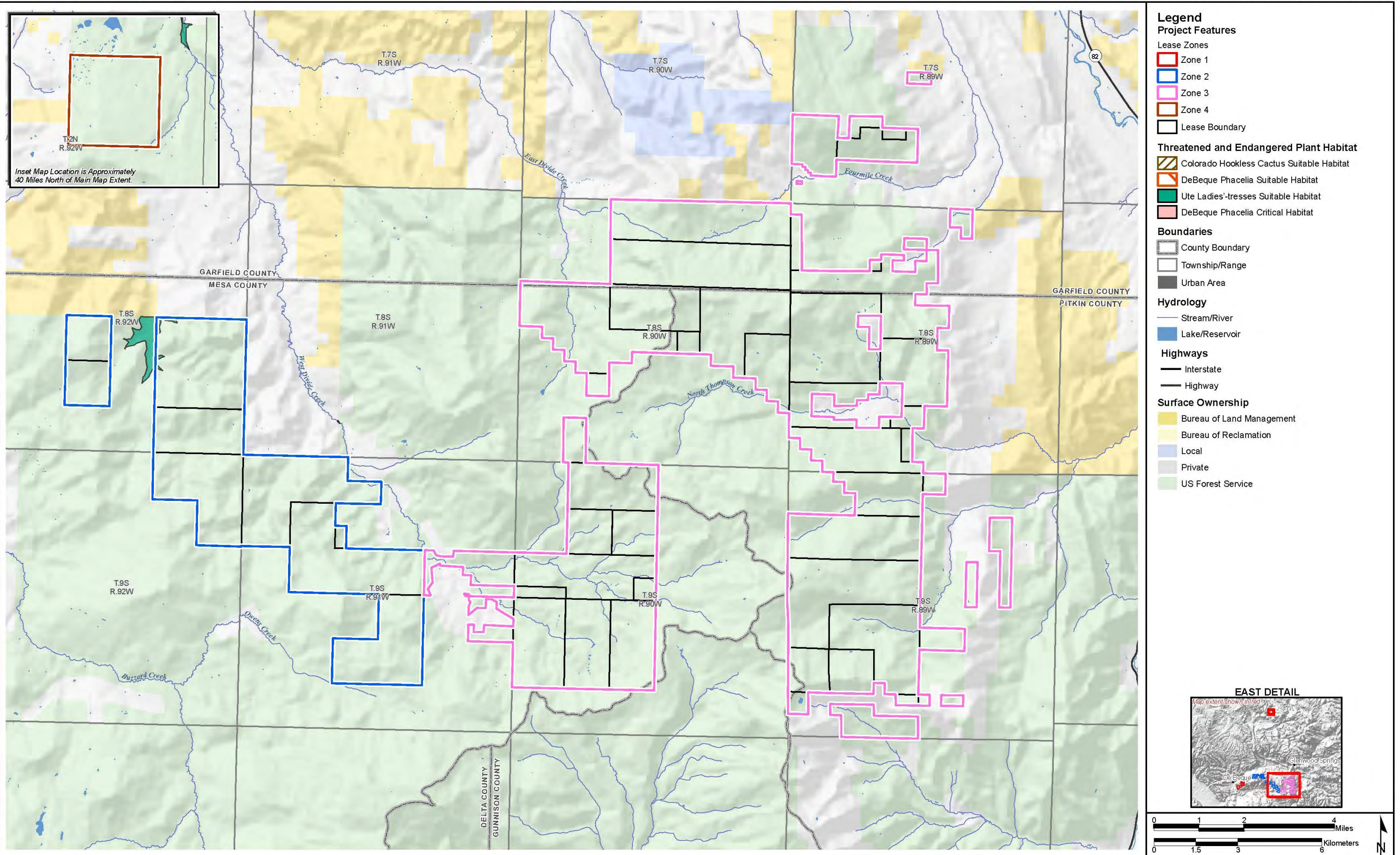


Figure 3.6-6 Threatened and Endangered Plant Species Habitat (East)

**Table 3.6-5 BLM Sensitive Plant Species Considered in this Analysis**

<b>Species (Scientific Name)</b>	<b>Habitat Description</b>
DeBeque milkvetch ( <i>Astragalus debequaeus</i> )	Varicolored, fine-textured, seleniferous, saline soils of the Atwell Gulch Member of the Wasatch Formation, in areas surrounded by pinyon-juniper woodlands and desert shrub (4,900 to 6,700 feet elevation). Plants are mostly clustered on toe slopes and along drainages, but many occur on steep sideslopes. Soils are clayey but littered with sandstone fragments. Suitable habitat exists near the southwest portion of the analysis area.
Naturita milkvetch ( <i>Astragalus naturitensis</i> )	Sandstone mesas, ledges, crevices and slopes in pinyon-juniper woodlands. Between 5,000 and 7,000 feet elevation. Suitable habitat exists near the southwest portion of the analysis area.
Paradox breadroot ( <i>Pediomelum aromaticum</i> )	Open pinyon-juniper woodlands, in sandy soils or adobe hills. Between 4,600 and 6,700 feet elevation. Suitable habitat exists near the southwest portion of the analysis area.

Source: BLM 2015d; CNHP 1997.

### 3.6.6.3 Forest Service Regional Forester’s Sensitive Plant Species

Based on analysis conducted for the WRNF Oil and Gas Leasing Final EIS, there are 33 sensitive plant species documented or suspected to occur in the WRNF. Five species do not have occurrences or suitable habitat within the analysis area and have been dropped from further consideration in this analysis. The remaining 28 species are known to occur, suspected to occur, or have potential, suitable habitat within the analysis area (USFS 2014a, page 234). These species were carried forward into the effects portion of this analysis. **Table 3.6-6** lists the Forest Service Regional Forester’s sensitive plant species and their category type. Potential habitat coverage in the analysis area is described above in **Table 3.6-3**.

A BE was prepared as part of the WRNF Oil and Gas Leasing Final EIS for all potentially affected Regional Forester’s sensitive plant species that could occur within the analysis area (USFS 2014f).

**Table 3.6-6 Forest Service Regional Forester’s Sensitive Plant Species Considered in this Analysis**

Habitat <sup>1</sup>	Species (Scientific Name)
Alpine Habitat <sup>2</sup>	Smooth northern-rockcress ( <i>Braya glabella</i> ) Gray’s draba ( <i>Draba grayana</i> ) Colorado tansyaster ( <i>Machaeranthera coloradoensis</i> )
Non – Forested	Narrowleaf grapefern ( <i>Botrychium lineare</i> ) Peculiar moonwort ( <i>Botrychium paradoxum</i> ) Plains rough fescue ( <i>Festuca halli</i> ) Harrington beardtongue ( <i>Penstemon harringtonii</i> ) Cathedral bluff meadow-rue ( <i>Thalictrum heliophilum</i> )
Forested	Harrington beardtongue
Riparian/Wetland – Non-Fen	Park milkvetch ( <i>Astragalus leptaleus</i> ) Triangle lobe moonwort ( <i>Botrychium ascendens</i> ) Lesser panicle sedge ( <i>Carex diandra</i> ) Yellow lady’s slipper ( <i>Cypripedium parviflorum</i> ) Stream orchid ( <i>Epipactis gigantea</i> ) Kotzebue’s grass of Parnassus ( <i>Parnassia kotzebueii</i> ) Dwarf raspberry ( <i>Rubus arcticus</i> ssp. <i>acaulis</i> ) American cranberrybush ( <i>Viburnum opulus</i> var. <i>americanum</i> )
Fen	Livid sedge ( <i>Carex livida</i> ) Roundleaf sundew ( <i>Drosera rotundifolia</i> ) Whitebristle cottongrass ( <i>Eriophorum altaicum</i> var. <i>neogaeum</i> ) Chamisso’s cottongrass ( <i>Eriophorum chamissonis</i> ) Slender cottongrass ( <i>Eriophorum gracile</i> ) Simple bog sedge ( <i>Kobresia simpliciuscula</i> ) Porter’s false needlegrass ( <i>Ptilagrostis porterii</i> ) Sageleaf willow ( <i>Salix candida</i> ) Autumn willow ( <i>Salix serissima</i> ) Fine bog-moss ( <i>Sphagnum angustifolium</i> ) Baltic bog moss ( <i>Sphagnum balticum</i> ) Lesser bladderwort ( <i>Utricularia minor</i> )

<sup>1</sup> Habitats descriptions are provided in **Table 3.6-3**.

<sup>2</sup> Alpine habitat does not occur within the lease area; however, it occurs within the 300-meter buffer.

Source: USFS 2014a.

### 3.6.6.4 Significant Plant Communities

Significant plant communities, or potential conservation areas, are known to occur, suspected to occur, or have potential, suitable habitat within the analysis area. Significant plant communities cover approximately 20,022 acres (18 percent) within the 110,768-acre analysis area. Based on data from CNHP, there are four significant plant communities in the analysis area. A brief description of the biodiversity significance for each community is provided below.

Beaver Creek at Battlement Mesa – contains two plant communities that are vulnerable on a global scale: blue spruce/thinleaf alder (*Alnus incana*) montane riparian forest and aspen/thinleaf alder montane riparian forest (CNHP 2014).

Fourmile Creek at Sunlight – contains Booth’s willow (*Salix boothii*)/ mesic graminoid willow carr. Also includes three more common plant communities: Booth’s willow/beaked sedge (*Carex utriculata*) willow carr, subalpine fir/thimbleberry forest and oak-serviceberry shrubland (CNHP 2014).

Middle Thompson Creek – Includes one of the largest good-condition riparian areas observed in the lower Crystal River/Roaring Fork Watershed. It supports an excellent ranked riparian plant community as well as subalpine riparian woodland carr habitats (CNHP 2014).

Rare Plants of the Wasatch – This site is a botanical hotspot and contains almost the entire known population of the globally imperiled DeBeque milkvetch and the globally imperiled DeBeque phacelia. There also are excellent and good occurrences of the globally imperiled adobe thistle (*Cirsium perplexans*), good occurrences of the globally imperiled Naturita milkvetch and several good occurrences of the globally imperiled Colorado hookless cactus (CNHP 2014).

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### 3.7 Terrestrial Wildlife Including Special Status Species

#### 3.7.1 Regulatory Background

Laws, regulations, and policies that directly influence wildlife management decisions made as part of the EIS for Previously Issued Leases in the White River National Forest are primarily implemented by the BLM, USFWS, and the Colorado Parks and Wildlife (CPW). Prominent laws, regulations, directives, and agreements relevant to the proposed include:

- Colorado Revised Statutes 33-1-101, 33-2-104;
- ESA of 1973;
- Migratory Bird Treaty Act (MBTA) (16 USC 703 et seq.);
- Forest Service Agreement #08-MU-1113-2400-264;
- EO 13186 (66 FR 3853);
- FSM 2670;
- BLM Special Status Species Management Policy 6840 (6840 Policy) (Rel. 6-125);
- Colorado Revised Statutes 33-2-105; and
- Bald and Golden Eagle Protection Act (BGEPA) (16 USC § 668 et seq.).

Information regarding wildlife species and their habitats within the wildlife analysis area was obtained from a review of existing published sources, BLM RMPs, Forest Service land and resource management plans (forest plans), file information from BLM, Forest Service, CPW, and USFWS, as well as CNHP database information and Colorado's Comprehensive Wildlife Conservation Strategy and Wildlife Action Plans (2006).

#### 3.7.2 Analysis Areas

Analysis areas for terrestrial and wildlife species were chosen to represent the combination of geographic areas containing contiguous habitat that would be impacted by the proposed leasing decisions, as well as the management regimes to which this habitat is subject. The analysis areas for terrestrial wildlife species are defined as follows:

- *Nongame and Small Game Terrestrial Wildlife Analysis Area:* The terrestrial wildlife analysis area for small game species and nongame species, including raptors and other migratory birds, includes suitable habitat (as determined through use of the Forest Service Region 2 vegetation data) within the lease boundaries.
- *Special Status Species Wildlife Analysis Area:* The analysis area for special status species, including Federally Listed, Proposed, or Candidate Wildlife Species, Forest Service and BLM Sensitive Wildlife Species, and Forest Service Management Indicator Species (MIS) comprises of suitable, historic, or occupied, habitat within the lease boundary based on Region 2 vegetation data. The exception is elk, which is an MIS but is analyzed under the big game analysis area described above.
- *Big Game Analysis Area:* The big game analysis area consists of the Game Management Units (GMUs) that are crossed by the lease boundaries. Sensitive habitat is typically considered the limiting factor for big game populations, therefore additional focus will be given on these areas (e.g., winter range, transition range, migratory corridors, fawning and calving areas and summer range) within the GMUs. GMUs included in the analysis area are 12, 23, 42, 43, 421, and 521.

- *Canada Lynx Analysis Area*: The Canada lynx analysis area comprises Lynx Analysis Units (LAUs) crossed by the lease boundaries.
- *Greater Sage-grouse Analysis Area*: The greater sage-grouse analysis area includes Priority Habitat Management Areas (PHMA) and General Habitat Management Areas (GHMA) as classified by CPW, crossed by the lease boundaries.

### 3.7.3 Regional Affected Environment

The terrestrial wildlife analysis areas provide a variety of habitats for wildlife species that are broadly described based on the Forest Service Region 2 vegetative cover. The terrestrial wildlife analysis area is comprised of the 65 lease areas (lease area), which are divided into four zones (Zone 1, 2, 3, and 4). The analysis area is located within portions of the WRNF and the GMUGNF boundaries and is comprised of approximately 80,380 acres. **Table 3.7-1** lists the types and amount of vegetation communities within the terrestrial wildlife analysis area. Wildlife species may utilize several different habitat types or vegetation communities in different seasons or throughout their life cycles. Detailed descriptions of these vegetation community types are discussed in Section 3.6, Vegetation. For more detailed discussions of habitats on the WRNF, please see the Forest Plan (USFS 2002a; Final EIS, pp 3-289-335 and Appendices, pp D-14-50) and the Forest Service WRNF EIS (USFS 2014a; Final EIS pp 182-191).

**Table 3.7-1 Vegetation Communities within the Analysis Area**

Vegetation Cover Type <sup>1</sup>	Zone 1 Acres (%)	Zone 2 Acres (%)	Zone 3 Acres (%)	Zone 4 Acres (%)	Total Percent Cover in the Analysis Area
Aspen	0 (0)	7,238 (29)	23,066 (54)	1,288 (50)	39
Douglas Fir/Mixed Conifer	1,378 (14)	448 (2)	826 (2)	53 (2)	3
Gambel Oak/Mixed Mountain Shrub	488 (5)	7,313 (29)	1,035 (2)	68 (3)	11
Grassland/Forbland	24 (<1)	827 (3)	2,340 (6)	28 (1)	4
Lodgepole Pine	0 (0)	0 (0)	0 (0)	605 (24)	<1
Montane Shrubland	735 (7)	1,040 (4)	160 (<1)	104 (4)	3
Pinyon-juniper	5,414 (54)	335 (1)	7 (<1)	0 (0)	7
Riparian/Wetland <sup>2</sup>	0 (0)	21 (<1)	1,255 (3)	0 (0)	2
Sagebrush/Shrub Mix	740 (7)	3,176 (13)	335 (1)	0 (0)	5
Saltbush/Greasewood	111 (1)	0 (0)	0 (0)	0 (0)	<1
Snowberry	0 (0)	985 (4)	831 (2)	180 (7)	2
Spruce/Fir	181 (2)	3,280 (13)	12,672 (30)	236 (9)	20



**Table 3.7-1 Vegetation Communities within the Analysis Area**

<b>Vegetation Cover Type<sup>1</sup></b>	<b>Zone 1 Acres (%)</b>	<b>Zone 2 Acres (%)</b>	<b>Zone 3 Acres (%)</b>	<b>Zone 4 Acres (%)</b>	<b>Total Percent Cover in the Analysis Area</b>
Unvegetated	1,041 (10)	271 (1)	177 (<1)	0 (0)	2
<b>Total<sup>3</sup></b>	<b>10,112 (13)</b>	<b>24,938 (31)</b>	<b>42,766 (53)</b>	<b>2,562 (3)</b>	<b>100</b>

<sup>1</sup> Dominant cover type by zone is *italicized and highlighted*.

<sup>2</sup> The Riparian/Wetland cover types includes fens and WUS. The area was determined by analyzing three separate data sources: FSVeg, National Wetland Inventory, and USFS Fen data (used to determine fen locations for the 2014 WRNF EIS).

<sup>3</sup> Approximately 7 acres or 0.01 percent of the total 80,380 acres is not included in the total due to differences in resolution between the FSVeg WRNF dataset compared to the FSVeg GMUGNF dataset.

Source: USFS 2010b.

The terrestrial wildlife analysis areas support a diverse terrestrial wildlife community of large and small mammals, migratory birds, and reptiles. Occurrence and density of wildlife species within this analysis area are dependent upon a variety of factors including the size and mobility of the animal, food habits, water, existing and ongoing development, and overall habitat carrying capacities (Prior Magee 2007). All wildlife species present in the analysis areas are important members of a functioning ecosystem and wildlife community, but most are common and have wide distributions in the region. Consequently, the relationships of most of these species to this analysis area are not discussed in the same depth as species that are threatened, endangered, sensitive, of special concern, of special economic interest, or otherwise of high public interest or unique value.

### 3.7.4 Nongame Species

The analysis area supports many types of nongame species (e.g., small mammals, raptors, passerines, and reptiles) occupying the habitat types within the wildlife analysis area. Nongame species serve as predators, prey, and scavengers in ecosystems.

#### 3.7.4.1 Small Mammals

##### Bats

Bats are insectivores that utilize trees, caves, buildings, and rock crevices as day and maternal roost sites, as well as hibernacula. Bat species are most vulnerable to disturbance at birth and during hibernation. Representative bat species most likely to occur in the region include the little brown bat (*Myotis lucifugus*), Yuma myotis (*M. yumanensis*), long-eared myotis (*M. evotis*), fringed myotis (*M. thysanodes*), long-legged myotis (*M. volans*), California myotis (*M. californicus*), small footed myotis (*M. ciliolabrum*), silver-haired bat (*Lasionycteris noctivagans*), western pipistrelle (*Pipistrellus hesperus*), big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), Townsend's big-eared bat (*Corynorhinus townsendii*), spotted bat (*Euderma maculatum*), pallid bat (*Antozous pallidus*), and Brazilian free-tailed bat (*Tadarida brasiliensis*) (BLM 2014b). Within the terrestrial wildlife analysis area, emphasis is placed on the protection of cave habitat utilized as both maternity and winter hibernaculum by some species of bats. The fringed myotis and Townsend's big-eared bat are considered MIS cave species and are addressed in Section 3.7.7, Special Status Species.

##### Other Mammals

Other common small mammals occurring within the terrestrial wildlife analysis area include voles, chipmunks, gophers, woodrats, ground squirrels, and mice that provide a substantial prey base for

predators within the wildlife analysis area including larger mammals and raptors. The CRVFO RMP (BLM 2014b) provides the following information on the composition of small mammals present within the region:

Common predators occupying the region include the long-tailed weasel (*Mustela frenata*), mink (*M. vison*), and American badger (*Taxidea taxus*), raccoon (*Procyon lotor*), ringtail (*Bassariscus astutus*), striped skunk (*Mephitis mephitis*), and spotted skunk (*Spilogale gracilis*). Small herbivores include larger rodents, such as the beaver (*Castor canadensis*), muskrat (*Ondatra zibethica*), yellow-bellied marmot (*Marmota flaviventris*), pine squirrel (*Tamiasciurus hudsonicus*), rock squirrel (*Otospermophilus variegatus*), thirteen-lined ground squirrel (*Ictidomys tridecimlineatus*) golden-mantled ground squirrel (*Callospermophilus lateralis*), and chipmunks (*Neotamias* spp.). Common lagomorphs include the black-tailed jackrabbit (*L. californicus*), mountain cottontail (*Sylvilagus nuttalli*), and desert cottontail (*S. audubonii*). Another lagomorph, limited to higher elevations, is the snowshoe hare (*Lepus americanus*), the primary prey species for the Canada lynx. Common nocturnal small mammals include the northern pocket gopher (*Thomomys talpoides*) bushy-tailed woodrat (packrat) (*Neotoma cinerea*), deer mouse (*Peromyscus maniculatus*), western harvest mouse (*Reithrodontomys megalotis*), and long-tailed vole (*Microtus longicaudus*) in addition to a variety of shrews.

#### 3.7.4.2 Reptiles

As described for in the 2014 CRVFO RMP (BLM 2014b), reptiles in this region occur mostly in dryer habitats at lower elevations, such as semidesert shrub, sagebrush, and pinyon-juniper. The 2002 White River LRMP (USFS 2002a) indicates 14 species of reptiles on the Forest. Representative reptile species include lizards, such as the collared lizard (*Crotaphytus collaris*), short-horned lizard (*Phrynosoma hernandesii*), sagebrush lizard (*Sceloporus graciosus*), plateau lizard (*S. tristichus*), tree lizard (*Urosaurus ornatus*), plateau striped whiptail (*Aspidocelis velox*); and snakes, such as the racer (*Coluber constrictor*), gopher snake or bull snake (*Pituophis catenifer*), midget faded rattlesnake (*Crotalus oreganus concolor*) (a subspecies of the western rattlesnake), milk snake (*Lampropeltis triangulum*), smooth green snake (*Liochlorophis vernalis*), and western terrestrial garter snake (*Thamnophis elegans*) (BLM 2014b).

#### 3.7.4.3 Birds

A number of songbird, raptor, and other bird species occur within the terrestrial wildlife analysis area and utilize all habitats presented in **Table 3.7-1**. The majority of these avian species are migratory and occur only as summer residents within the project vicinity. Many of the summer residents are neotropical migrants that winter in Central and South America. In addition, a number of upland game birds and waterfowls species occur within the terrestrial wildlife analysis area. These species are discussed further under small game species below.

It is generally thought that many bird species are more vulnerable to disturbance during the breeding season. Although most bird species have relatively well-defined breeding seasons, information for some species-specific breeding periods remains unavailable. The timing and duration of the breeding season is species-specific and may vary according to latitude, elevation, and climatic conditions. Since weather is a major determinant of nesting season, breeding generally occurs later in higher latitudes of a species' range (Baicich and Harrison 1997). This trend also applies to higher elevations, where snow and cold temperatures remain longer than at lower elevations. In areas with significant elevation gradients, the breeding season for a given species may be prolonged. In addition, many species have extended breeding periods because they may produce two or even three clutches each year.

In general, large avian species (e.g., owls and eagles) have prolonged periods of development when the young remain in the nest and are dependent upon the parents. Other species, such as quail and grouse,

may leave the nest within hours of hatching and forage with their parents long before they can fly. Small songbirds remain in the nest until they can fly; however, their development is often so rapid that the adults may complete the entire nesting cycle in 1 month or less. The duration of incubation and nestling periods is well established and may be predicted within a few days for most avian species.

### Migratory Birds

The MBTA provides federal legal protection for bird species listed at 50 CFR 10.13. In accordance with EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (January 10, 2001) the Forest Service has agreed to a Memorandum of Understanding with the USFWS to promote migratory bird conservation (Forest Service Agreement #08-MU-1113-2400-264). Under this Memorandum of Understanding, the Forest Service has committed to focus its evaluation of the effects of agency actions on those species of management concern along with their priority habitats.

In addition to the MBTA, bald and golden eagles are protected under the BGEPA (16 USC 668 et seq.). This statute prohibits anyone without a permit from committing “take” of bald and golden eagles, including their parts, nests, and eggs. “Take” is defined as the actions to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest and disturb. In 2009, the USFWS implemented two rules authorizing new permits under BGEPA.

- 50 CFR 22.26 would authorize limited “take” of bald and golden eagles where the “take” is associated with, but is not the purpose of an activity and cannot practicably be avoided.
- 50 CFR 22.27 would authorize the intentional take of eagle nests where necessary to alleviate safety hazards to people or eagles; to ensure public health and safety; where a nest prevents the use of a human-engineered structure; and when an activity, or mitigation for the activity, will provide a net benefit to eagles. Only inactive nests are allowed to be taken, except in the case of safety emergencies.

BGEPA provides the Secretary of Interior with the authority to issue eagle-take permits only if he/she is able to determine that the take is compatible with the preservation of the eagle. This take must be “...consistent with the goal of increasing or stabilizing breeding populations.” For golden eagles, current data indicate a negative population trend in the lower latitudes, such as the southwestern U.S., while data indicate a positive population trend in the northern Bird Conservation Regions. These trends may simply indicate movement patterns; however, evidence may demonstrate a lack of resiliency in golden eagle populations.

### Raptors

Raptors are protected under state and federal laws including the MBTA and the BGEPA. A variety of raptor habitats are within the lease area, from lower elevation grassland and shrublands to montane shrublands and forests. As a result, there are a variety of raptor species likely to hunt and breed in the area. A number of songbird and other bird species also may occur within the lease area, which include open-country species associated with grassland and shrubland habitats and woodland species associated with coniferous forests. The majority of these avian species are migratory and occur only as summer residents. Many of the summer residents are neotropical migrants that winter in Central and South America.

Open-country raptors likely to occur near the leases include golden eagle (*Aquila chrysaetos*), turkey vulture (*Cathartes aura*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and prairie falcon (*Falco mexicanus*). Species closely associated with open water and riparian habitats are osprey (*Pandion haliaetus*), bald eagle, and peregrine falcon. Common montane forest or forest edge dwelling species include Cooper’s hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), northern goshawk (*Accipiter gentilis*), great horned owl

(*Bubo virginianus*), long-eared owl (*Asio otus*), flammulated owl (*Otus flammeolus*), northern pygmy-owl (*Glaucidium gnoma*), and northern saw-whet owl (*Aegolius acadicus*).

In the lease area, osprey, golden eagle, red-tailed hawk, northern goshawk, and great horned owl typically nest in relatively large trees with open crowns. Ospreys require trees along major rivers, lakes, and reservoirs. Osprey also will nest on power poles, artificial platforms, and other man-made structures. All but northern goshawk and osprey also may nest on rock ledges on cliffs and rock outcrops. Northern goshawks typically nest in mature to old-growth stands of aspen, ponderosa pine, and lodgepole pine. Prairie and peregrine falcons nest on ledges and in rock cavities on cliff faces. The American kestrel is a cavity nester, and abandoned woodpecker holes are used as nest sites. American kestrel inhabits a variety of open and wooded habitats and avoids densely forested habitats. Northern harriers nest on the ground in low shrubs or in pockets of dense shrub and grass cover, often near wetlands. Other preferred habitats include native and non-native grasslands, agricultural areas, and marshes (Carter 1998).

Cooper's hawk nests in aspen or in deciduous trees in riparian situations but also is known to nest in mature conifers (Ehrlich et al. 1988; Terres 1980). Nests are typically constructed in an upper crotch of a tree near the trunk and below the canopy top. Sharp-shinned hawks, unlike the Cooper's hawk, nest in a wide variety of wooded habitats ranging from mountain mahogany stands to conifers.

A variety of owl species may occur throughout the leases. Long-eared owls, like great horned owl, do not build their own nest and usually occupy abandoned magpie, hawk, crow, or squirrel nests in tall shrubs or trees (Ehrlich et al. 1998). Although primarily an open-country hunter, long-eared owls typically nest in juniper thickets, woodland perimeters, edges of riparian woodlands and at forest edges near water or moist meadow habitats (Terres 1980). Flammulated owl, northern pygmy-owl, and northern saw-whet owl are all cavity-nesting, coniferous forest dwelling species. The flammulated owl is considered a common summer resident in Colorado and occupy stands of aspen within the analysis area. Northern pygmy-owls are year-round residents in Colorado, but probably exhibit some elevation movements over the seasons (Kingery 1998). Preferred breeding habitat in Colorado appears to be areas that include a mixture of pine, spruce, fir, and aspen with nearby meadows and a water source such as a creek or pond (Rashid 2009). Northern saw-whet owls also are year-round residents in Colorado that also exhibit some elevation movement in response to the seasons (Rashid 2009). The species is relatively widespread in Colorado and prefers old-growth pinyon-juniper and ponderosa pine habitats (Boyle 1998). They can be found nesting in the same higher elevation habitats and areas used by northern pygmy-owls (Rashid 2009). Areas with larger and more mature trees are more likely to provide cavities for nesting for these species.

#### Birds of Conservation Concern

The USFWS places the highest management priority on the Birds of Conservation Concern (BCC) list (USFWS 2008b). The BCC list was developed as a 1988 amendment to the Fish and Wildlife Conservation Act. This Act mandated that the USFWS “identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA of 1973.” The goal of the BCC list is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions. The habitats and ranges of the BCC for the Southern Rockies/Colorado Plateau (Bird Conservation Region 16) (USFWS 2008) were reviewed to identify BCC potentially occurring in the terrestrial wildlife analysis area (**Table 3.7-2**).

**Table 3.7-2 BCC Potentially Occurring within the Special Status Species Wildlife Analysis Area**

Common Name	Scientific Name	Associated Habitat
Bald eagle	<i>Haliaeetus leucocephalus</i>	Open water, woody riparian and wetlands
Ferruginous hawk	<i>Buteo regalis</i>	Cliff and canyon, desert shrubland, grassland, montane grassland, montane shrubland, pinyon-juniper, sagebrush shrubland, saltbush shrubland
Golden eagle	<i>Aquila chrysaetos</i>	Agricultural land, cliff and canyon, desert shrubland, grassland, montane grassland, montane shrubland, pinyon-juniper, sagebrush shrubland, saltbush shrubland, tundra
Peregrine falcon	<i>Falco peregrinus</i>	Aspen forest and woodland, cliff and canyon, conifer forest, deciduous forest, desert shrubland, grassland, herbaceous wetland, montane grassland, montane shrubland, pinyon-juniper, sagebrush shrubland, saltbush shrubland, riparian, woody riparian and wetlands
Prairie falcon	<i>Falco mexicanus</i>	Cliff and canyon, desert shrubland, grassland, montane grassland, montane shrubland, sagebrush shrubland, saltbush shrubland
Long-billed curlew	<i>Numenius americanus</i>	Agricultural land, grassland, herbaceous wetland, open water, riparian, woody riparian and wetlands
Yellow-billed cuckoo (western)	<i>Coccyzus americanus</i>	Riparian, woody riparian and wetlands
Flammulated owl	<i>Otus flammeolus</i>	Aspen forest and woodland, conifer forest
Lewis's woodpecker	<i>Melanerpes lewis</i>	Aspen forest and woodland, conifer forest, deciduous forest, pinyon-juniper, riparian
Willow flycatcher	<i>Empidonax traillii</i>	Deciduous forest, montane shrubland, riparian, woody riparian and wetlands
Gray vireo	<i>Vireo vicinior</i>	Cliff and canyon, desert shrubland, montane shrubland, pinyon-juniper, sagebrush shrubland, saltbush shrubland
Pinyon jay	<i>Gymnorhinus cyanocephalus</i>	Conifer forest, montane shrubland, pinyon-juniper
Juniper titmouse	<i>Baeolophus ridgwayi</i>	Pinyon-juniper
Brewer's sparrow	<i>Spizella breweri</i>	Sagebrush shrubland
Brown-capped rosy-finch	<i>Leucosticte australis</i>	Cliff and canyon, tundra
Cassin's finch	<i>Carpodacus cassinii</i>	Agricultural land, aspen forest and woodland, conifer forest, pinyon-juniper, riparian, woody riparian and wetlands

Sources: Kingery 1998; USFWS 2008b.

### 3.7.5 Game Species

#### 3.7.5.1 Ungulates

All ungulates within the region are considered big game species. As described above, the analysis area for big game species includes sensitive habitat (e.g., severe winter range, production range, etc.) within the GMUs that are crossed by the lease boundaries. In Colorado, big game is managed by the CPW within specific geographic areas within herd areas, or GMUs, based on objectives set within a herd management plan, also known as a Data Analysis Unit (DAU). Herds are capable of using multiple or single GMUs (CPW 2014-2015) The DAU represents the year-round range of a big game herd and

includes all of the seasonal ranges of a specific herd. The purpose of a DAU plan is to integrate the plans and intentions of CPW with the concerns and ideas of land management agencies and interested publics to determine how a big game herd in a DAU should be managed (CPW 2015b). GMUs are used to delineate the big game DAUs. GMUs included in the analysis area for big game are units 12, 23, 42, 43, 421, and 521 (**Figure 3.7-1**). This analysis area, which comprises 2,121,890 acres, provides the context for project and cumulative impacts on habitat specifically managed by state agencies for big game populations and is further referred to as the big game analysis area through the remainder of the document.

The big game ungulate species that are known to occur in the big game analysis area include mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), moose (*Alces alces*), pronghorn (*Antilocapra americana*), and Rocky Mountain bighorn sheep (*Ovis canadensis*). Herd size and viability of big game populations are dependent on the combination, availability, and quality of seasonal ranges. Seasonal ranges are not mutually exclusive and fulfill different requirements for resident and migratory big game populations. CPW has identified several types of seasonal ranges (i.e., summer, winter, production, etc.) ranked according to their relative biological value.

### Mule Deer

A variety of vegetation communities provide suitable habitat for mule deer. These vegetation communities include aspen forests and woodlands, conifer forests, shrublands, and pinyon-juniper woodlands. Although their diet varies somewhat by season, mule deer are primarily browsers, feeding on a wide variety of woody vegetation including shoots, leaves, and twigs of shrubs and trees. Winter habitat for mule deer occurs in areas of relatively high sagebrush densities and overall low snow accumulation, on south- and west-facing slopes.

The leases are within the range of the White River, North Grand Mesa, Maroon Bells, and Grand Mesa deer herds (DAUs 7, 12, 13, and 51, respectively). DAU plans provide specific information including herd dynamics and population trends, habitat utilized by the herd, and current land use within the DAU. Currently, DAU plans are available from CPW for D-12 and D-13, but not D-7 and D-51. However, the CPW 2014 Big Game Regional Hunt Guides for the Northwest and Southwest Regions of the state provide additional information on the White River and Grand Mesa herds (CPW 2014-2015). Based on the information provided in D-12 and D-13, the main issues include the quality and quantity of winter range, land development, and the expansion of energy development (CPW 2011, 2010).

Sensitive mule deer ranges within the lease areas are detailed in **Table 3.7-3** and include winter range, winter concentration areas, and severe winter range. CPW (2010) defines these ranges as follows:

- *Winter Range*: that part of the range where 90 percent of the animals are located during average winters.
- *Winter Concentration Area*: the part of the range where densities are at least 200 percent greater than the surrounding winter range in average winters.
- *Severe Winter Range*: that part of the range where 90 percent of the animals are located during the two worst winters in 10 years as determined by the maximum annual snow pack and minimum temperatures.

The big game analysis area contains approximately 622,042 acres of mule deer winter range, 278,292 acres of winter concentration areas, and 184,360 acres of severe winter range. As shown below in **Table 3.7-3**, no severe winter range is found within the lease boundaries, the leases contain very little winter concentration areas, and contain over 6,000 acres of winter range (1 percent of available winter range within the big game analysis area), most of which is located in Zone 1. **Figure 3.7-2** identifies sensitive mule deer range in and near the leases.



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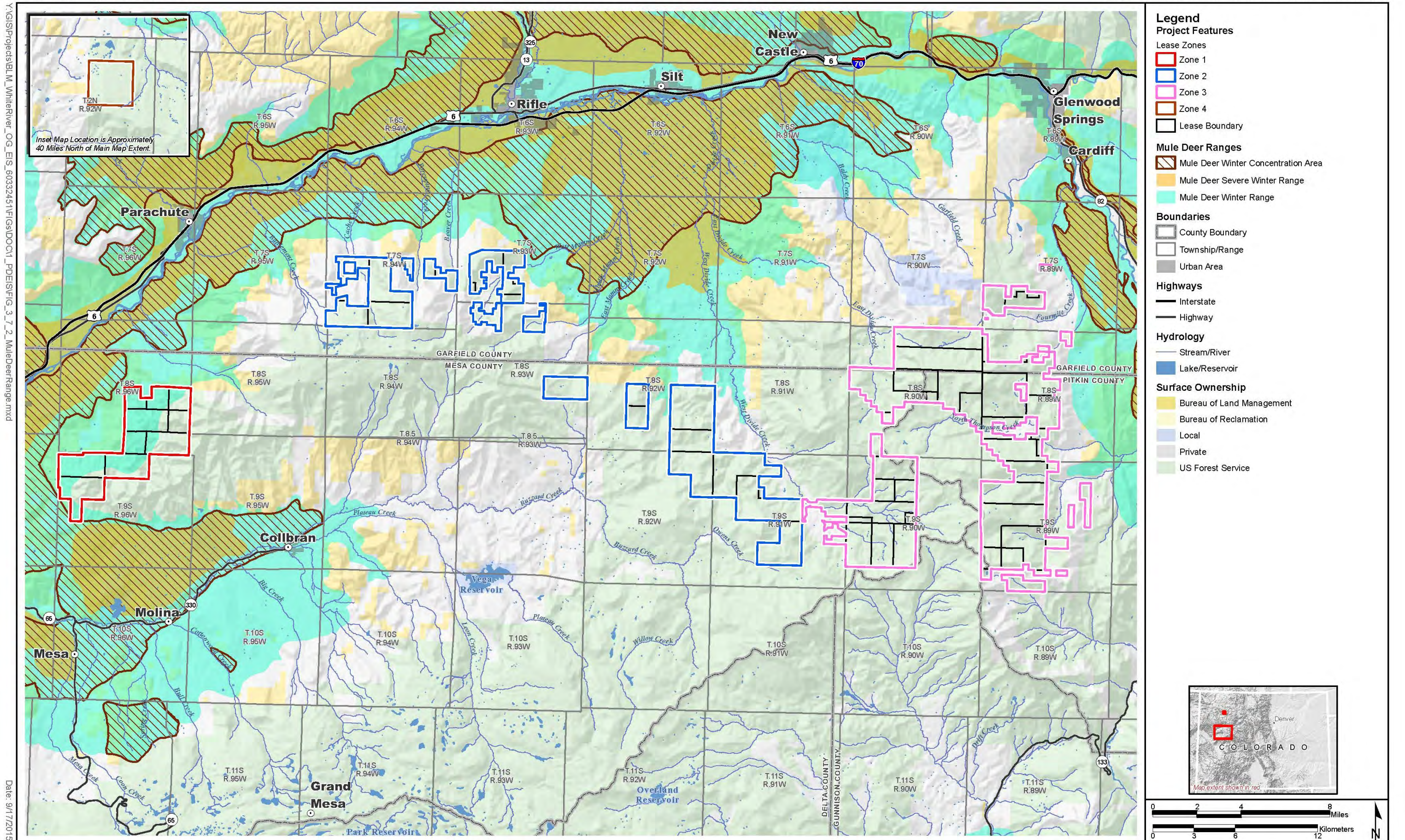


Figure 3.7-2 Mule Deer Ranges within the Big Game Analysis Area



**Table 3.7-3 Sensitive Mule Deer Ranges by Zone and Lease**

Zone	GMU	DAU	Lease No.	Sensitive Range (acres)	
				Winter Concentration Areas	Winter Range
1	42	D-12	COC 058677		543
			COC 059630		572
			COC 066728		1,028
			COC 066729		655
			COC 066730		287
			COC 066731		272
			COC 066732		861
			COC 066733		1,254
		421	D-12	COC 066926	19
<b>Zone 1 Total</b>				<b>19</b>	<b>6,160</b>
2	42	D-12	COC 061121		2
			COC 066918		60
<b>Zone 2 Total</b>					<b>62</b>
3	43	D-13	COC 066688		3
<b>Zone 3 Total</b>					<b>3</b>
<b>Total Acres within the Lease Boundaries</b>				<b>19</b>	<b>6,225</b>
<b>Total Acres within the Big Game Analysis Area</b>				<b>278,292</b>	<b>622,042</b>
<b>Percent of the Designated Range Impacted by the Lease Boundaries</b>				<b>&lt;1%</b>	<b>1%</b>

Source: USFS 2013c.

Elk

In Colorado, elk range covers the western two-thirds of the state, generally at elevations above 6,000 feet (Armstrong et al. 2011). Elk are typically found in forested habitats, although in northwestern Colorado elk are found in large herds during the winter months in open sagebrush shrublands and grasslands (Colorado Division of Wildlife [CDOW] 2012b). Winter habitat for elk typically consists of low elevation rolling hills, meadows, and agricultural fields. However, unlike mule deer, elk are not as susceptible to harsh winter conditions due to their nutritional requirements and large body size and will often remain at higher elevations until snow depths reach approximately 16 inches (Armstrong et al. 2011).

Considered generalist feeders, elk are both grazers and browsers. In the northern and central Rocky Mountains, grasses and shrubs compose most of the winter diet, with grasses becoming of primary importance in the spring months. Forbs become increasingly important in late spring and summer, and grasses again dominate in the fall. Forbs tend to be favored on drier sites, but browse is preferred in most mesic areas including aspen stands, willow communities, and moist meadows. Upland meadow

and mountain shrub habitats provide the highest-quality forage areas for elk within the big game analysis area. Elk breed in the fall with the peak of the rut in Colorado occurring during the last week of September and first week of October. Breeding typically is over by late October. Most calves are born in late May to early June. Calving grounds generally are in areas where forage, cover, and water are in juxtaposition. Elk tend to inhabit higher elevations during spring and summer and migrate to lower elevations for winter range. Spring and fall migrations are tied to weather and forage availability.

The leases are within the range of the White River, Grand Mesa, and Avalanche Creek elk herds (DAUs E-6, E-14, and E-15, respectively). Sensitive elk range includes production areas, winter range, severe winter range, summer concentration areas, winter concentration areas, and winter range. The CPW defines these areas as follows:

- Production areas are that part of the overall range of elk occupied by the females from May 15 to June 15 for calving.
- Severe winter range represents that part of the overall range of elk where 90 percent of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the 2 worst winters out of 10.
- Summer concentration areas are those areas where elk concentrate from mid-June through mid-August. High quality forage, security, and lack of disturbance are characteristics of these areas to meet the high energy demands of lactation, calf rearing, antler growth, and general preparation for the rigors of fall and winter.
- Winter concentration areas include that part of the winter range where densities are at least 200 percent greater than the surrounding winter range density during the average 5 winters out of 6 from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each DAU.
- Winter range is that part of the overall range of elk where 90 percent of the individuals are located during the average 5 winters out of 10 from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each DAU.

Within the big game analysis area, there are 230,971 acres of production areas, 249,501 acres of summer concentration areas, 302,898 acres of severe winter range, 303,275 acres of winter concentration areas, and 1,086,391 acres of winter range. Sensitive elk ranges within the lease area are detailed in **Table 3.7-4**. As shown in the table, the leases contain very little severe winter range or winter concentration areas (less than 1 percent), but contain over 23,000 acres of production areas and over 25,000 acres of summer concentration areas (10 percent of all available range production areas and summer concentration areas within the big game analysis, area). **Figure 3.7-3** identifies sensitive elk range in and near the leases.

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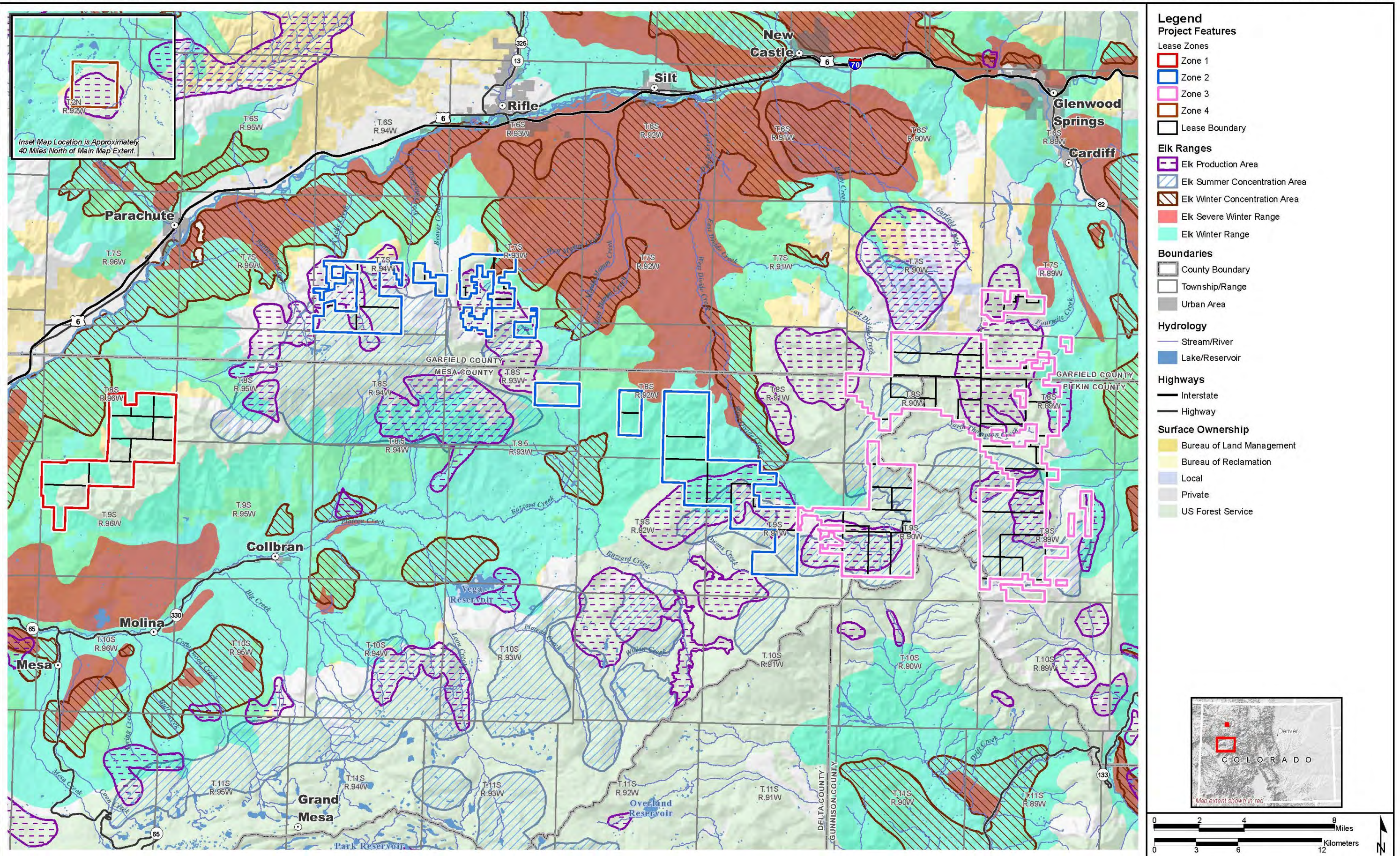


Figure 3.7-3 Elk Ranges within the Big Game Analysis Area

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**Table 3.7-4 Sensitive Elk Ranges by Zone and Lease**

Zone	GMU	DAU	Lease No.	Sensitive Elk Ranges Designated within the Big Game Analysis Area (acres)				
				Production Area	Summer Concentration Area	Severe Winter Range	Winter Concentration Area	Winter Range
1	42	E-14	COC 058677					534
			COC 059630					587
			COC 066727					39
			COC 066728					728
			COC 066729					110
			COC 066731					506
			COC 066732					594
			COC 066733					1,166
	COC 066926					447		
	421	E-14	COC 066926					327
<b>Zone 1 Total</b>								<b>5,038</b>
2	42	E-14	COC 061121	184		425	429	695
			COC 066723					1,280
			COC 066724	768	10			1,871
			COC 066915	1,845	518		0	2,325
			COC 066916	1,839	1,886			136
			COC 066917	70	924			
			COC 066918			19		2,557
			COC 066920		45			
			COC 067147	628	212			462
			COC 067150	625	1			
			COC 067542	145	32			14
			COC 067543	268	1,167			
			COC 067544	586	95			19
			COC 070013					634
			COC 070014	389	1,486			
			COC 070015	683	1,287			
			COC 070016	46	51			
COC 070361			0		591			
COC 072157					298			
COC 075070	425		12	25	194			
COC 076123	80							

**Table 3.7-4 Sensitive Elk Ranges by Zone and Lease**

Zone	GMU	DAU	Lease No.	Sensitive Elk Ranges Designated within the Big Game Analysis Area (acres)				
				Production Area	Summer Concentration Area	Severe Winter Range	Winter Concentration Area	Winter Range
2	421	E-14	COC 070013					162
			COC 070361					47
			COC 072157					340
<b>Zone 2 Total</b>				<b>8,581</b>	<b>7,714</b>	<b>455</b>	<b>454</b>	<b>11,625</b>
3	42	E-14	COC 058835	1,239	1,233			
			COC 058836	1,026	1,176			
			COC 058837	232	187			10
			COC 058838	304	1,197			
			COC 058839	528	222			184
			COC 058840		149			
			COC 058841		578			
			COC 066698		27			
			COC 066706		273			
			COC 066707		331			
			COC 066708	297	898			
			COC 066709		467			
			COC 066710	6	722			
			COC 066913	168	1,241			
	43	E-15	COC 066687	733				8
			COC 066688	160		100		174
			COC 066689	40				
			COC 066690	203				45
			COC 066692		623			3
			COC 066693	1,070				901
			COC 066695	175	440			442
			COC 066696	289	893			81
			COC 066697	1,028	1,863			
			COC 066698	913	2,433			
			COC 066699		78			
			COC 066700		668			
COC 066701	395	1,885						
COC 066702		467						
COC 066706	693							
COC 066708		1						

**Table 3.7-4 Sensitive Elk Ranges by Zone and Lease**

Zone	GMU	DAU	Lease No.	Sensitive Elk Ranges Designated within the Big Game Analysis Area (acres)				
				Production Area	Summer Concentration Area	Severe Winter Range	Winter Concentration Area	Winter Range
3	521	E-14	COC 066710	416				
			COC 066711	632				
			COC 066712	488				
			COC 066908	1,945				
			COC 066909	543				263
			COC 066913		3			
			COC 066702		9			
<b>Zone 3 Total</b>				<b>13,523</b>	<b>18,063</b>	<b>100</b>	<b>454</b>	<b>2,112</b>
4	12	E-6	COC 066948	1,485				317
	23	E-6	COC 066948	223				
<b>Zone 4 Total</b>				<b>1,709</b>				<b>317</b>
<b>Total Acres within the Lease Boundaries</b>				<b>23,813</b>	<b>25,778</b>	<b>555</b>	<b>454</b>	<b>19,091</b>
<b>Total Acres within the Big Game Analysis Area</b>				<b>230,971</b>	<b>249,501</b>	<b>302,898</b>	<b>303,275</b>	<b>1,086,391</b>
<b>Percent of the Designated Elk Range Impacted by the Lease Boundaries</b>				<b>10</b>	<b>10</b>	<b>&lt;1</b>	<b>&lt;1</b>	<b>2</b>

Source: USFS 2013c.

Moose

Moose are not common within the big game analysis area but occur in DAUs M-5 and M-6 as part of the White River and Grand Mesa herds (CPW 2014-2015). Until 1978 when moose were reintroduced to North Park from Utah and Wyoming, moose were not breeding in Colorado and only considered migrants into the state (CPW 2014a). From 2005 to 2007, moose were reintroduced to the Grand Mesa, near the lease area (CPW 2014b). Typically, this species is found in forested areas, primarily along riparian areas with abundant willow habitat. Moose feed on a wide variety of plants including trees, shrubs, grasses, forbs, algae, and other aquatic plants (Armstrong et al. 2011). On the Grand Mesa, moose are found most frequently Gambel oak-dominated woodlands, followed by aspen, then conifer forests, and mixed aspen-conifer stands. Only 3 percent of locations since 2005 have been in willow or riparian areas (CPW 2014b). Generally, moose are not as susceptible to severe winter conditions as other big game animals due to their large body size that allows them to forage in deep snow.

Within the big game analysis area, there are 124,086 acres of concentration areas and 334,837 acres of summer range. **Table 3.7-5** identifies moose range by zone and by lease. The leases contain about 9 percent (11,445 acres) of all available concentration areas within the big game analysis area. The majority of these areas are in Zone 2. There is a small amount of moose summer range in Zone 3 (<1 percent of all available summer range within the big game analysis area). Moose range in and near the leases is displayed on **Figure 3.7-4**.

**Table 3.7-5 Sensitive Moose Ranges by Zone and Lease**

Zone	GMU	DAU	Lease No.	Sensitive Range (acres)	
				Concentration Areas	Summer Range
2	42	M-5	COC 066723	1,206	
			COC 066724	1,973	
			COC 066915	2,537	
			COC 066916	2,224	
			COC 066917	0	
			COC 066918	916	
			COC 072157	4	
<b>Zone 2 Total</b>				<b>8,861</b>	
3	42	M-5	COC 058835	276	
			COC 058836	6	
			COC 058837	1,132	
			COC 058838		0
			COC 058839	924	
			COC 058840	64	
			COC 066913	183	
	43	M-5	COC 066700		0
			COC 066702		0
	521	M-5	COC 058838		24
			COC 066700		14
			COC 066702		90
	<b>Zone 3 Total</b>				<b>2,584</b>
<b>Total Acres within the Lease Boundaries</b>				<b>11,445</b>	<b>128</b>
<b>Total Acres within the Big Game Analysis Area</b>				<b>124,086</b>	<b>334,837</b>
<b>Percent of the Designated Range Impacted by the Lease Boundaries</b>				<b>9%</b>	<b>&lt;1%</b>

Source: USFS 2013c.

Pronghorn

Pronghorn, like moose, are not common within the big game analysis area but occur in DAU A-34 as part of the Axial Basin herd (CPW 2014-2015). No sensitive ranges for pronghorn overlap with the lease boundaries. Within Colorado, pronghorn are found on the eastern plains, in the larger mountain parks and valleys, and on shrublands west of the mountains. Pronghorn generally live in grasslands and semidesert shrublands on rolling topography that affords good visibility (CPW 2015a). Pronghorns are largely browsers, subsisting on sagebrush, supplemented by leafy forage in summer (CPW 2015a). Breeding occurs in the fall from mid-September to mid-October, and give birth in late May to mid-June (CPW 2015a).



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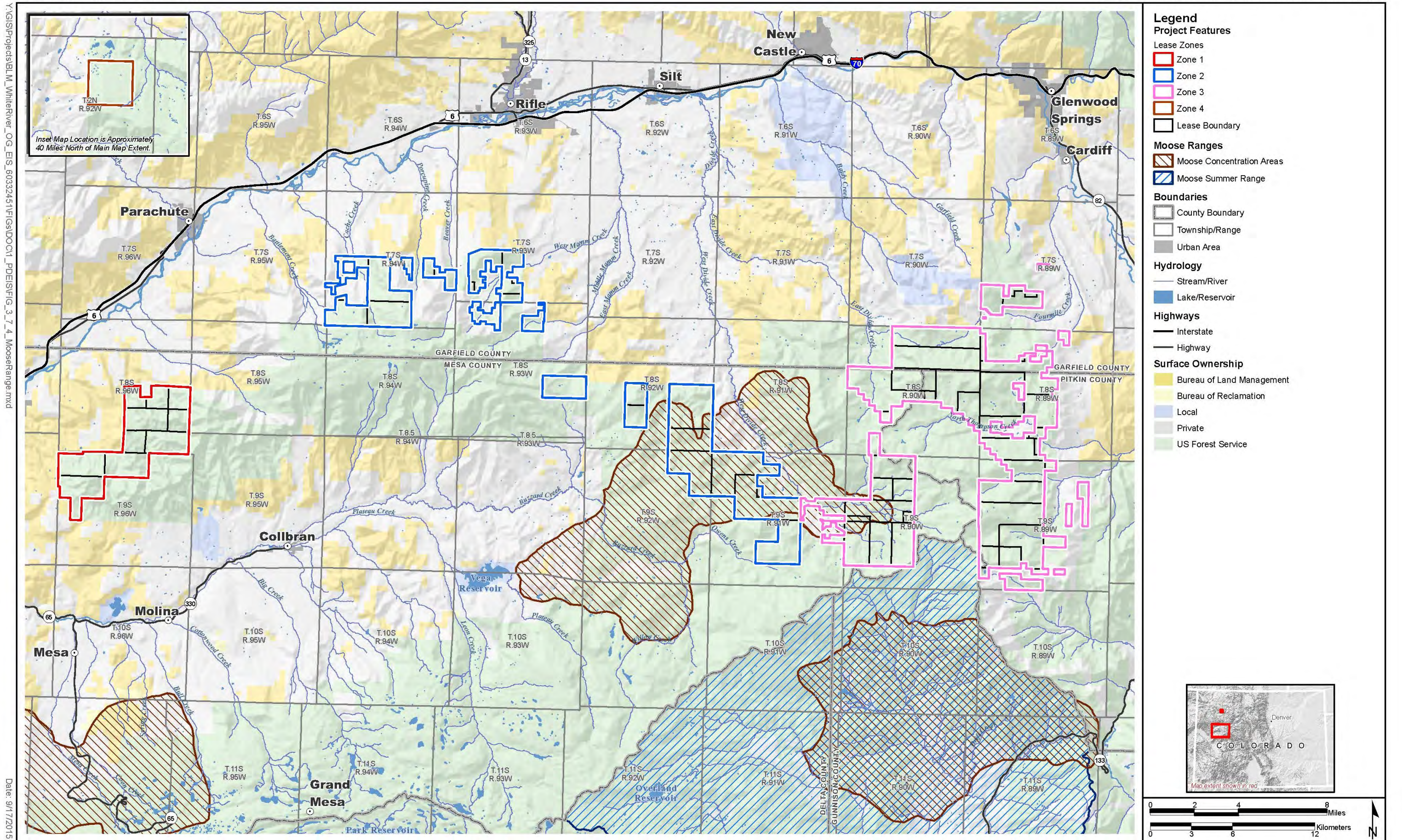


Figure 3.7-4 Moose Ranges within the Big Game Analysis Area

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### Rocky Mountain Bighorn Sheep

Rocky Mountain bighorn sheep occur in portions of the big game analysis area and are listed as Forest Service sensitive in the WRNF (USFS 2013a). Rocky Mountain bighorn sheep can be found in a variety of habitats from alpine to lower elevation foothills but typically occupy steep, inaccessible habitat that provides them vantage points for predator detection and escape cover (Armstrong et al. 2011; CDOW 2009). This species feeds primarily on grasses, shrubs, and some forbs depending on the elevation of occupied habitat. Winter range for Rocky Mountain bighorn sheep typically consists of low elevation south-facing slopes that are blown free of snow cover. Rocky Mountain bighorn sheep are gregarious and exhibit high site fidelity. In many areas of their range, this species spends the winter months in the same localized winter habitat each year (Armstrong et al. 2011; CDOW 2009).

The Battlement and Avalanche Creek herd ranges overlaps with the leasing area within the DAUs S-24 (GMUs 42 and 421) and S-25 (GMU 43), respectively (CPW 2014c). The Battlement herd is one of only four low elevation indigenous bighorn herds remaining in Colorado (USFS 2014a). According to the Forest Service BE (USFS 2014e) for the WRNF, the range for this herd is primarily the Rifle District of the WRNF, the GMUGNF, Grand Mesa and Uncompahgre National Forests, and a small amount of BLM land. The herd historically occupied the Battlement Range between Horsethief Mountain and Mamm Peaks, with the higher-elevation eastern end of the Battlements providing summer range habitat and the lower-elevation end providing winter range habitat (USFS 2014a). The current population is estimated at approximately 50 individuals (USFS 2014a).

The Avalanche Herd primarily resides outside the big game analysis area on the east side of the Crystal River with the majority of their range existing in the Maroon Bells-Snowmass Wilderness, but the boundary of DAU 2-25 overlaps with Zone 3. According to the BE (USFS 2014e, pg. 27) for the WRNF, this herd is primarily a native herd with only one record of augmentation, including five rams that were added from the Basalt Herd. The current population is approximately 60 animals, and this herd has been declining since the late 1990s.

**Table 3.7-6** details the amount of Rocky Mountain Bighorn Sensitive ranges within the lease areas. As shown in the table, only Zone 1 contains sensitive bighorn sheep ranges. Leases within this zone contain 3 to 7 percent of all the sensitive ranges within the big game analysis area. The exception is water sources, where 43 percent lie within lease boundaries found in Zone 1. In addition to the designated ranges overlapping the lease boundaries, 1,401 acres of severe winter range exists within the big game analysis area, but outside the lease boundaries. Rocky Mountain bighorn sheep range in and near the leases is displayed as **Figure 3.7-5**.

**Table 3.7-6 Bighorn Sheep Ranges by Zone and by Lease**

Zone	GMU	Lease No.	Range (acres)					
			Overall Range	Production Areas	Summer Concentration Areas	Summer Range	Winter Concentration Areas	Water Source
1	42	COC 058677	362			362		362
		COC 059630	365			365		289
		COC 066727	640			640		518
		COC 066728	1,275			1,275		1,275
		COC 066729	655			655		270
		COC 066730	1,279			1,279		605
		COC 066731	625			625		120
		COC 066732	1,435			1,435		768
		COC 066733	1,096			1,096		688
			COC 066926	1,161	561	245	1,161	245
	421	COC 066926	468	374	158	468	158	
<b>Zone 1 Total</b>			<b>9,361</b>	<b>935</b>	<b>404</b>	<b>9,361</b>	<b>404</b>	<b>5,227</b>
<b>Total Acres within the Lease Boundaries</b>			<b>9,361</b>	<b>935</b>	<b>404</b>	<b>9,361</b>	<b>404</b>	<b>5,227</b>
<b>Total Acres within the Big Game Analysis Area</b>			<b>164,545</b>	<b>30,034</b>	<b>8,744</b>	<b>149,229</b>	<b>5,484</b>	<b>12,224</b>
<b>Percent of the Designated Range Impacted by the Lease Boundaries</b>			<b>6%</b>	<b>3%</b>	<b>5%</b>	<b>6%</b>	<b>7%</b>	<b>43%</b>

Source: USFS 2013c.

### 3.7.5.2 Carnivores

#### Big Game

The big game carnivore species that are known to occur in the big game analysis area include black bear (*Ursus americanus*), and mountain lion (*Puma concolor*). Similar to the big game ungulate species, viability of these big game populations are dependent on the combination, availability, and quality of seasonal ranges. Seasonal ranges are not mutually exclusive and fulfill different requirements for resident and migratory big game populations. CPW has identified several types of seasonal ranges (i.e., summer, winter, production, etc.) ranked according to their relative biological value.

#### *Black Bear*

Black bear are classified as a big game species in Colorado. The species is fairly common within the big game analysis area (DAUs B-10 and B-1), especially in forested, woody riparian, and wetland areas along perennial waterbodies (Armstrong et al. 2011). Black bears generally occur at low densities in habitats found within the big game analysis area and their distribution is dependent on existing and ongoing disturbance and available food sources. The big game analysis areas include 498,538 acres of fall concentration areas and 435,815 acres of summer concentration areas. The CPW defines fall and summer concentration areas as:

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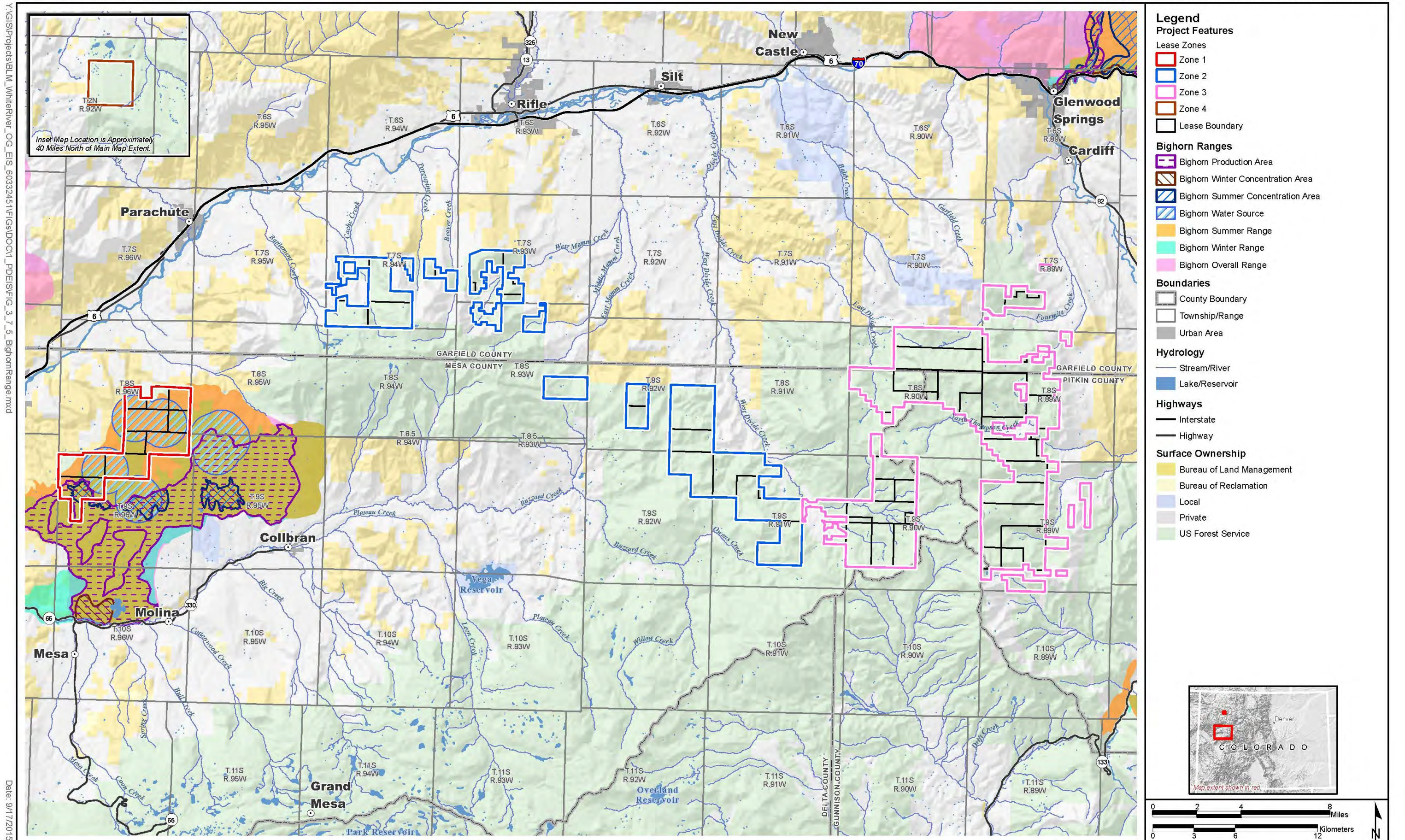


Figure 3.7-5 Bighorn Sheep Range Locations Within and Near Leases

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- Fall Concentration: That portion of the overall range occupied from August 15 until September 30 for the purpose of ingesting large quantities of mast and berries to establish fat reserves for the winter hibernation period.
- Summer Concentration: That portion of the overall range of the species where activity is greater than the surrounding overall range during that period from June 15 to August 15.

As shown below in **Table 3.7-7**, the leases contain a small percentage of concentration areas (3 percent of available fall concentration areas and less than 1 percent of available summer concentration areas within the big game analysis area), most of which are located in Zones 2 and 3. **Figure 3.7-6** identifies black bear habitat in and near the leases.

**Table 3.7-7 Black Bear Concentration Areas Zone and by Lease**

Zone	GMU	Lease No.	Fall Concentration Areas (acres)	Summer Concentration Areas (acres)
1	42	COC 059630	126	
		COC 066727	218	
		COC 066731	649	
<b>1 Total 993</b>				
2	42	COC 061121	441	
		COC 066723	1,104	
		COC 066724	1,224	
		COC 066915	2,503	
		COC 066916	1,176	
		COC 066918	2,084	
		COC 066920	6	
2	42	COC 067147	662	
		COC 067150	307	
		COC 067542	343	
		COC 067543	1,057	
		COC 067544	730	
		COC 070013	942	
		COC 070014	566	
		COC 070015	1,598	
	421	COC 070016	51	
		COC 070361	33	
		COC 075070	31	
		COC 070013	0	
		<b>2 Total 14,857</b>		
3	42	COC 058838		0
		COC 058839	44	
	43	COC 066695	241	
		COC 066700		0
		COC 066702		0

**Table 3.7-7 Black Bear Concentration Areas Zone and by Lease**

Zone	GMU	Lease No.	Fall Concentration Areas (acres)	Summer Concentration Areas (acres)
	521	COC 058838		24
		COC 066700		14
		COC 066702		90
<b>3 Total 285</b>				<b>128</b>
4	12	COC 066948		2
<b>4 Total</b>				<b>2</b>
<b>Total Acres within the Lease Boundaries</b>			<b>16,135</b>	<b>130</b>
<b>Total Acres within the Big Game Analysis Area</b>			<b>498,538</b>	<b>435,815</b>
<b>Percent of the Designated Range Impacted by the Lease Boundaries</b>			<b>3%</b>	<b>&lt;1%</b>

Source: USFS 2013c.

*Mountain Lion*

Mountain lions are classified as a big game species in Colorado. The species is fairly common within the big game analysis area, especially in forested, woody riparian and wetland areas along perennial waterbodies (Armstrong et al. 2011). Mountain lions generally occur at low densities in habitats found within the mule deer big game analysis area (DAUs 7 and 12) and their distribution is dependent on available food sources, primarily mule deer.



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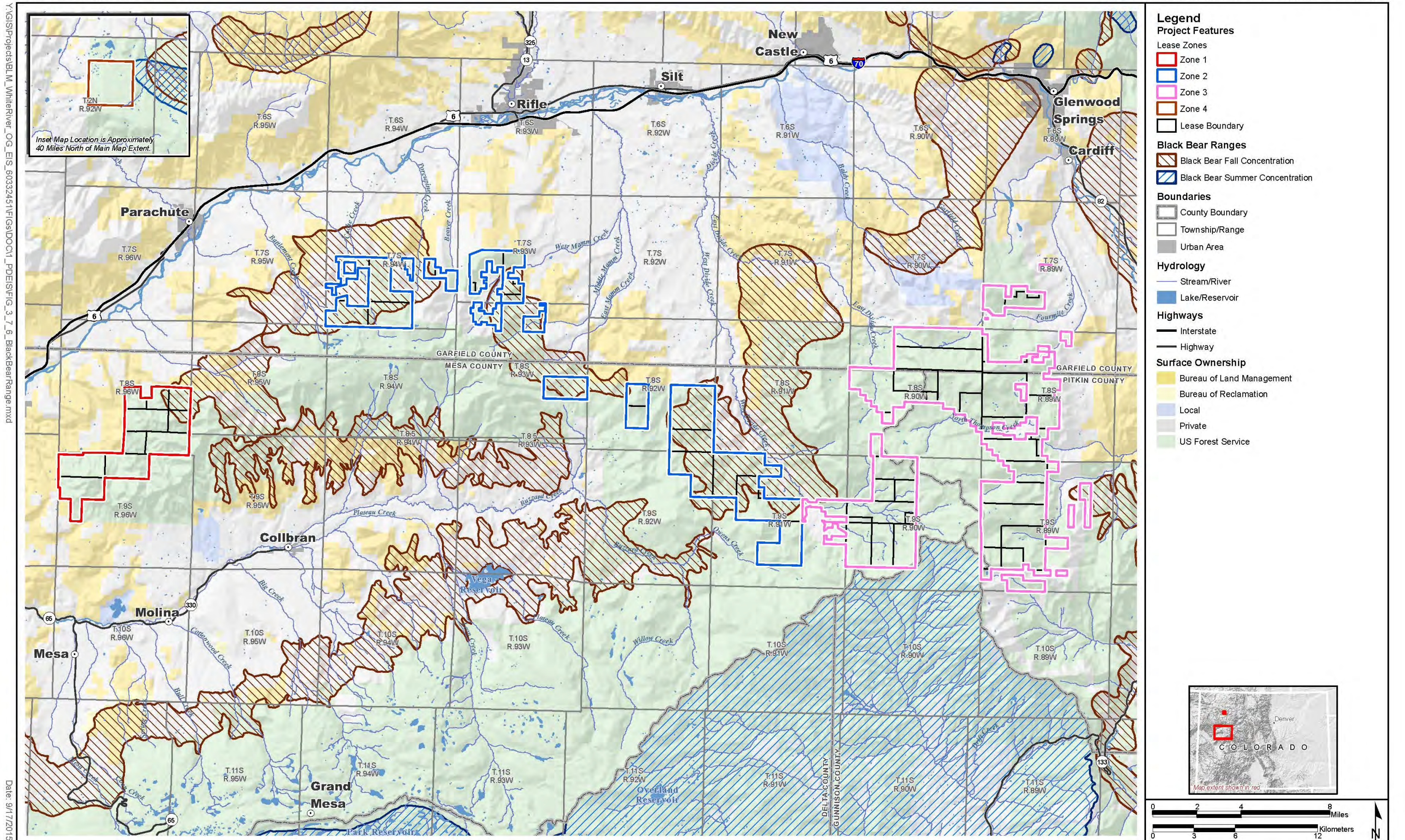


Figure 3.7-6 Black Bear Range Locations Within and Near Leases

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### 3.7.5.3 Furbearers

Furbearers likely to occur within the wildlife analysis area include beaver, muskrat, raccoon, striped skunk, long tailed weasel, short-tailed weasel, American badger, bobcat, coyote, mink, gray fox, kit fox, and red fox (CDOW 2012a). These species have wide distributions within the wildlife analysis area and are found within a variety of habitat types (e.g., sagebrush shrubland, desert shrub, pinyon-juniper, montane shrubland, grassland, etc.). The distribution of furbearers within the wildlife analysis area is typically determined by available food sources (e.g., small rodents, fish, insects, waste grain, human food waste). The Canada lynx also is a furbearer but is listed as threatened by the USFWS and is discussed under Section 3.7.7, Special Status Species.

### 3.7.5.4 Small Game Species

Small game species that occur within the wildlife analysis area include upland game birds, small mammals, furbearers, and waterfowl. Potential habitat for small game species (except waterfowl) within the wildlife analysis area includes all of the vegetative communities present. Potential habitat for waterfowl within the wildlife analysis area includes herbaceous wetland, open water, riparian, and woody riparian and wetlands vegetation communities.

#### Upland Game Birds

Upland game bird species that occur within the wildlife analysis area include greater sage-grouse (*Centrocercus urophasianus*), dusky grouse (*Dendragapus obscurus*), wild turkey (*Meleagris gallopavo*), Gambel's quail (*Callipepla gambelii*), band-tailed pigeon (*Patagioenas fasciata*), and mourning dove (*Zenaida macroura*). The greater sage-grouse is a Forest Service Sensitive species, BCC, and state species of concern for Colorado and is discussed under Special Status Species. Dusky grouse are found in forested areas of Colorado that contain aspen, chokecherry, serviceberry, Douglas fir, lodgepole pine, and spruce/fir vegetation types (Kingery 1998; Stokes and Stokes 1996). Wild turkeys are found in Colorado and are typically associated with ponderosa pine and oakbrush habitats but also may be found in riparian and agricultural areas with suitable trees for roosting (Boyle 1998). Gambel's quail are found in Colorado (Stokes and Stokes 1996). This species of quail occupies brushy habitats near riparian areas (Stokes and Stokes 1996). Band-tailed pigeons occur in Colorado in forests and mountain shrub habitats, primarily ponderosa pine and oakbrush (Dexter 1998). Mourning doves occur in habitats ranging from deciduous forests to shrubland and grassland communities, often nesting in trees or shrubs near riparian areas or water sources (Stokes and Stokes 1996). Most upland game bird species feed on a wide variety of plant and insect species depending on the time of year (i.e., insects during the spring and summer and leaves and seeds during the fall and winter). Many of the species described above exhibit annual population fluctuations depending on habitat conditions and weather patterns.

#### Waterfowl

The lease area is located within the Central and Pacific Flyways. Common waterfowl species that may occur within the wildlife analysis area include Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), green winged teal (*A. crecca*), northern pintail (*A. acuta*), gadwall (*A. strepera*), American wigeon (*A. americana*), and common goldeneye (*Bucephala clangula*). Other common summer residents include blue-winged teal (*A. discors*), northern shoveler (*A. clypeata*), redhead (*Aythya americana*), and greater and lesser scaup (*A. marila* and *A. affinis*) (Cerovski et al. 2004; Floyd et al. 2007; Kingery 1998; Stokes and Stokes 1996).

These species distributions are limited to the rivers, streams, lakes, reservoirs, ponds, and wetlands found within the wildlife analysis area. For the purposes of this analysis, these habitats are classified as open water and wetland/riparian vegetation communities. Population numbers for these species vary annually based on available habitat and weather patterns. While waterfowl species are considered game birds, they also are protected under the MBTA.

### 3.7.6 Special Status Species

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed species that are protected under the ESA and species designated as sensitive by the Forest Service.

In accordance with the ESA, the BLM, in coordination with the USFWS, must ensure that any action that they authorize, fund, or carry out is not likely to jeopardize a federally listed species or result in the destruction or adverse modification of critical habitat. In addition, as stated in the BLM's Special Status Species Management Policy 6840 (6840 Policy) (Rel. 6-125), it is BLM policy "to conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA provisions are no longer needed for these species, and to initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing of these species under the ESA." The FSM 2670 states "Sensitive species of native plant and animal species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing."

#### 3.7.6.1 Federally Listed and Candidate Wildlife Species

A total of three federally listed wildlife species (two birds and one mammal) have potential to occur within the special status wildlife analysis area. A summary of the listing status, habitat, and general distribution for each federally listed, candidate, and proposed wildlife species is provided in **Table 3.7-8**.

**Table 3.7-8 Federally Listed, Candidate, and Proposed Wildlife Species with the Potential to Occur within the Analysis Area**

Species Scientific Name	Species Common Name	Status	Associated Habitat	Included in Detailed Analysis
<b>Mammals</b>				
<i>Lynx canadensis</i>	Canada lynx	FT	Boreal forests.	Yes, see suitable habitat table below.
<i>Mustela nigripes</i>	Black-footed ferret	FE	Large prairie dog colonies found within short-grass prairie.	No. The lease boundaries are currently located outside the Northwestern Colorado/Northeastern Utah Black-footed Ferret Experimental Population Area and no wild ferrets are documented outside reintroduced populations.
<b>Birds</b>				
<i>Coccyzus americanus</i>	Western yellow-billed cuckoo	FT	Large contiguous blocks of cottonwoods/riparian.	Yes
<i>Strix occidentalis lucida</i>	Mexican spotted owl	FT	Mixed coniferous forests and hardwood forests in rocky steep-walled canyons.	Yes

Status Key: FT – Federally Threatened; FE – Federally Endangered.

Source: USFWS 2015b; USFS 2015e

A BA (USFS 2015e) and BE (USFS 2014e) were completed for the WRNF as part of the 2014 Oil and Gas Leasing Final EIS (USFS 2014a). The BA provides natural history, habitat condition and

requirements, and background information on the federally listed and candidate wildlife species to be analyzed in this EIS and is hereby incorporated by reference. The following sections contain information on habitat within the analysis areas and the leases.

Federally Threatened

*Canada Lynx*

Lynx habitat can generally be described as moist boreal forests dominated by conifer trees, primarily species of spruce (*Picea* spp.) and fir (*Abies* spp.), that have cold, snowy winters and a high-density snowshoe hare prey base (USFWS 2014c). For more detailed information on the occurrence and existing conditions of suitable habitat within the WRNF, see the BA (USFS 2015e, pp 33-35) for the 2014 WRNF EIS (USFS 2014a; Final EIS, pp 33-35).

For this EIS, the analysis area for Canada lynx consists of LAUs that overlap with the lease boundaries. LAUs are management areas that contain suitable lynx habitat and approximate the size of a female home range. The analysis area is approximately 510,804 acres and the LAUs included in the analysis area include:

- Aldrich Lakes
- Battlement
- Crystal West
- Divide Creek
- Huntsman Mountain
- Ruth Mountain
- South Mamm Peak

Within the analysis area, there is approximately 34,162 acres of suitable lynx habitat. Lynx habitat within the analysis area is found in **Table 3.7-9**. Of the lynx habitat that exists within the analysis area, only denning and non-lynx habitat exists within the lease boundaries. **Table 3.7-10** details the amount of suitable habitat for lynx by zone within the lease area. As shown in the table, the leases contain a total of 7,878 acres of denning habitat (31 percentage of all available denning habitat within the analysis area). Overall, 30 percent of the lynx habitat within the analysis area is located within lease boundaries within Zones 2 and 3. **Figure 3.7-7** identifies the LAUs that comprise the Canada lynx analysis area and lynx habitat in and near the leases.

**Table 3.7-9 Habitat Conditions within the Canada Lynx Analysis Area**

LAU	Lynx Habitat (acres)					
	Denning	Denning/ Winter	Non-lynx Habitat	Other	Winter	Winter Forage
Aldrich Lakes	3525		721	18		732
Battlement	5,737	219	5,274		115	
Crystal West	9,365					
Divide Creek	7,174	125			1,157	
<b>Grand Total</b>	<b>25,801</b>	<b>344</b>	<b>5,995</b>	<b>18</b>	<b>1,272</b>	<b>732</b>

Source: USFS 2013c.

**Table 3.7-10 Habitat Conditions by Zones and Leases**

Zone	LAU	Lease No.	Habitat (acres)		
			Denning	Non-Lynx Habitat	Grand Total
2	Battlement	COC 067543	764		764
		COC 070014	1,017		1,017
		COC 070015	507		507
		COC 070016	19		19
		COC 066724		550	550
		COC 070013		716	716
		COC 070361		194	194
		COC 072157		292	292
<b>Battlement Total</b>			<b>2,306</b>	<b>1,751</b>	<b>4,057</b>
3	Crystal West	COC 066692	209		209
		COC 066696	203		203
		COC 066697	1,224		1,224
		COC 066698	1,197		1,197
		COC 066701	15		15
		COC 066702	123		123
		COC 066707	28		28
		COC 066708	25		25
		COC 066709	76		76
		COC 066711	32		32
		COC 066712	11		11
		COC 066909	45		45
		COC 066913	137		137
<b>Crystal West Total</b>			<b>3,327</b>		<b>3,327</b>
3	Divide Creek	COC 066687	129		129
		COC 066698	25		25
		COC 066706	583		583
		COC 066707	129		129
		COC 066708	910		910
		COC 066709	351		351
		COC 066711	104		104
		COC 066913	15		15
<b>Divide Creek Total</b>			<b>2,245</b>		<b>2,245</b>
Total Acres within the Lease Boundaries			7,878	1,751	9,629
Total Acres within the Canada Lynx Analysis Area			25,801	5,995	31,796
Percent of the Designated Habitat Impacted by the Lease Boundaries			31%	29%	30%

Source: USFS 2013c.

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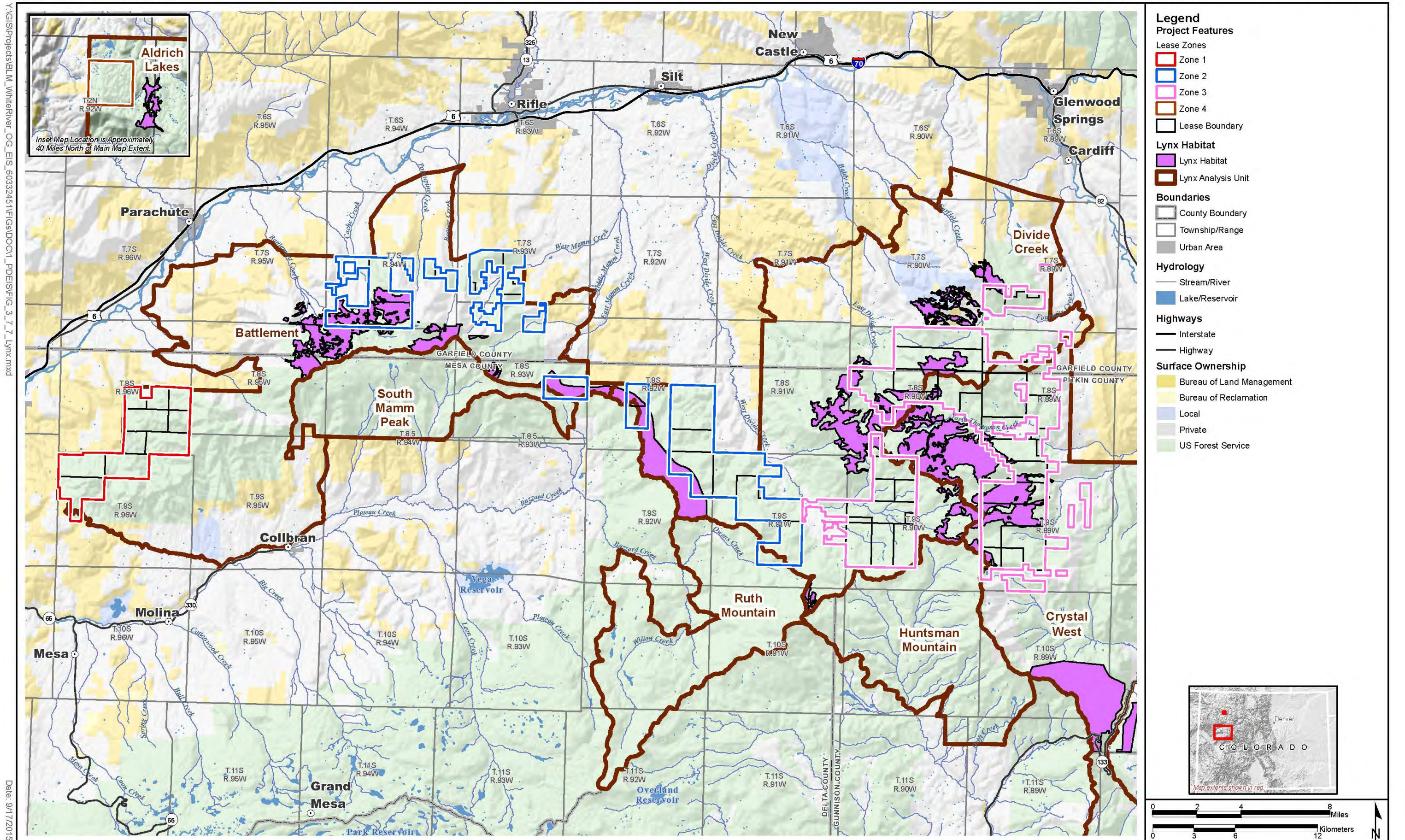


Figure 3.7-7 Canada Lynx Analysis Area and Lynx Habitat In and Near The Leases

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*Western Yellow-Billed Cuckoo*

The Western U.S. Distinct Population Segment of the yellow-billed cuckoo became a candidate species for listing as threatened or endangered on October 30, 2001 (66 FR 54807–54832). On October 3, 2013, the yellow-billed cuckoo western Distinct Population Segment was proposed for listing under the ESA (78 FR 61621 61666). On October 3, 2014, the species was then listed as threatened (79 FR 59991 60038). Critical habitat was designated on November 12, 2014 (79 FR 67154 67155).

Western populations of yellow-billed cuckoos breed in dense riparian woodlands along riparian corridors in otherwise arid areas (Hughes 1999). Dense undergrowth may be an important factor in selection of nest sites (Ehrlich et al. 1988). Western yellow-billed cuckoos appear to require relatively large tracts of riparian woodland. Several studies have reported the species to only nest in tracts greater than 25 acres in size.

The range of the western population of yellow-billed cuckoo has been determined as the portion of yellow-billed cuckoo range west of the crest of the Rocky Mountains (USFWS 2001). Currently, the western yellow-billed cuckoo is very rare in scattered drainages in western Colorado (NatureServe 2012). No documented occurrence exists for this species within the analysis area for nongame species. As detailed in **Table 3.7-1**, approximately 2 percent of the leases are within the riparian area vegetation community.

*Mexican Spotted Owl*

Mexican spotted owls typically inhabit steep canyons with mature or old growth forest but they also may occur in canyons with steep cliffs and relatively little forest habitat. Mexican spotted owl habitat typically has a structured canopy, a perennial water source, and a rodent-dominated prey base of adequate size (Gutierrez et al. 1995). According to the BA (USFS 2015e, pg.32) for the WRNF (USFS 2014a), there is a limited amount of potential habitat for the Mexican spotted owl within the special status species wildlife analysis area.

**3.7.6.2 Forest Service Sensitive and Management Indicator Species**

A variety of special status wildlife species are associated with habitats found within the special status wildlife analysis area. **Table 3.7-11** lists the special status (Forest Service Sensitive and Forest Service MIS) mammal, bird, and insect wildlife species and their associated habitat groups. Special status amphibian species are covered in Section 3.8, Aquatic Systems.

**Table 3.7-11 Forest Service Sensitive Species with the Potential to Occur in the Analysis Area**

Species Scientific Name	Species Common Name	Status	Habitat(s)	Eliminate from Further Consideration
<b>Mammals</b>				
<i>Cervus elaphus</i>	Elk	USFS - MIS	All	No, see big game section.
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	USFS – S, MIS	B,*E,F	No
<i>Euderma maculatum</i>	Spotted bat	USFS - S	B,*E,F, G	No
<i>Gulo gulo</i>	American wolverine	USFS – S	A,D	No
<i>Lasiurus cinereus</i>	Hoary bat	USFS - S	A,C,D,F	No
<i>Lontra canadensis</i>	River otter	USFS – S	C	Yes, suitable habitat is not found within the lease boundaries.
<i>Martes americana</i>	Marten	USFS - S	D	No
<i>Myotis thysanodes</i>	Fringed myotis	USFS – S, MIS	B,*D,G	No

**Table 3.7-11 Forest Service Sensitive Species with the Potential to Occur in the Analysis Area**

Species Scientific Name	Species Common Name	Status	Habitat(s)	Eliminate from Further Consideration
<i>Ovis canadensis canadensis</i>	Rocky Mountain bighorn sheep	USFS - S	B,E	No, see big game section.
<i>Sorex hoyi</i>	Pygmy shrew	USFS - S	C,D	No
<b>Birds</b>				
<i>Accipiter gentilis</i>	Northern goshawk	USFS - S	A,D	No
<i>Aegolius funereus</i>	Boreal owl	USFS - S	D	No
<i>Amphispiza belli</i>	Sage sparrow	USFS - S	E	No
<i>Buteo regalis</i>	Ferruginous hawk	USFS - S	E, *E	No
<i>Centrocercus urophasianus</i>	Greater sage-grouse	USFS - S	E	No
<i>Circus cyaneus</i>	Northern harrier	USFS - S	C,E	No
<i>Contopus cooperi</i>	Olive-sided flycatcher	USFS - S	A,C,D	No
<i>Cypseloides niger</i>	Black swift	USFS - S	B	Yes – Suitable habitat is not found within the lease area.
<i>Falco peregrinus anatum</i>	American peregrine falcon	USFS – S	B	Yes – This species may forage or occur as a migrant only through the lease area.
<i>Haliaeetus leucocephalus</i>	Bald eagle	USFS - S	C	Yes – No nest or winter roost sites occur within or adjacent to the lease boundaries. This species may forage or occur as a migrant through the lease area.
<i>Lagopus leucurus</i>	White-tailed ptarmigan	USFS - S	H,I	No
<i>Lanius ludovicianus</i>	Loggerhead shrike	USFS - S	E	No
<i>Melanerpes lewis</i>	Lewis' woodpecker	USFS - S	C,D	No
<i>Otus flammeolus</i>	Flammulated owl	USFS - S	A,D	No
<i>Progne subis</i>	Purple martin	USFS - S	A,C	No
<i>Spizella breweri</i>	Brewer's sparrow	USFS – S, MIS	E	No
<i>Tympanachus phasianellus columbianus</i>	Columbian sharp-tailed grouse	USFS – S	E	Yes, the overall range for this species does not overlap with any lease boundaries.
<i>Oreothlypis virginiae</i>	Virginia's Warbler	MIS	F, G	No
<b>Insects</b>				
<i>Speyeria nokomis nokomis</i>	Great Basin silverspot	USFS - S	C	Yes, this species is not known to occur on the WRNF.

Status Key: USFS – S: USFS Sensitive Species; USFS – MIS: USFS Management Indicator Species

Habitat Key: A=Aspen B=Caves/Cliffs/Waterfalls C=Wetland/Riparian/Stream & River Systems D=Conifer Forest \*D low elevation conifer; E=Sagebrush/Grassland; \*E semi-desert shrubland; F=Pinyon Juniper; G=Mountain Shrub; H=Alpine; I=Willow Carr

Source: USFS 2014a,e; 2013a,c; 2009; USFWS 2015b.

A terrestrial biological evaluation (BE; see USFS 2014e) for Forest Service Sensitive Species was prepared to support the 2014 Final EIS for Leasing on the WRNF (USFS 2014a). The BE provides natural history, habitat requirements, background information on the Forest Service terrestrial sensitive species to be analyzed in this EIS. Groups of similar species may be discussed together in some cases, if habitat requirements and behavior are similar.

According to the BE for the 2014 WRNF EIS (USFS 2014a), the WRNF has never had the wide expanses of sagebrush necessary to support large, viable populations of sage-grouse. For more detailed information on the occurrence and existing conditions of suitable habitat within the White River National Forest, see the BE for the 2014 WRNF EIS (USFS 2014a; Final EIS, pg 52). Similarly, the analysis area for greater sage-grouse for this EIS lies within the Colorado Plateau Management Zone (MZ VII) as designated within the Greater Sage-grouse Comprehensive Conservation Strategy (Stiver et al. 2006), which does not contain core populations of greater sage-grouse or have the highest reported densities. However, the recent release of the 2015 Northwest Colorado Greater Sage-grouse Proposed Land Use Plan Amendment and Final EIS (BLM and USFS 2015) designates management areas critical to the conservation and improvement of greater sage-grouse habitat that were not addressed in the BE for the 2014 WRNF EIS (USFS 2014a). As defined above, the analysis area for the greater sage-grouse includes any PHMA and GHMA crossed by the lease boundaries as classified by CPW. CPW uses a combination of mapped grouse occupied range, production areas, and modeled habitat (summer, winter, and breeding) to delineate these areas. Per the 2015 Northwest Colorado Greater Sage-grouse Proposed Land Use Plan Amendment and Final EIS (BLM and USFS 2015), PHMA is defined as areas that have been identified as having the highest conservation value to maintaining sustainable Greater Sage-grouse populations; these areas include breeding, late brood-rearing, and winter concentration areas.” GHMA is defined as “Areas of seasonal or year-round habitat outside of priority habitat.” According to range data provided by CPW, 255 acres of GHMA habitat for the greater sage-grouse overlaps with leases located in Zone 1 (**Table 3.7-12**). No PHMA is located within the analysis area. Further, no known lek sites exist within the analysis area or within four miles of the lease boundaries in all zones. **Figure 3.7-8** identifies overall habitat in and near the lease area.

**Table 3.7-12 Acres of Overall Habitat (GHMA) by Lease and Zone**

<b>Zone</b>	<b>Lease No.</b>	<b>Acres</b>
<b>1</b>	COC 066733	62
	COC 066926	193
<b>Grand Total</b>		<b>255</b>

Source: USFS 2013c.

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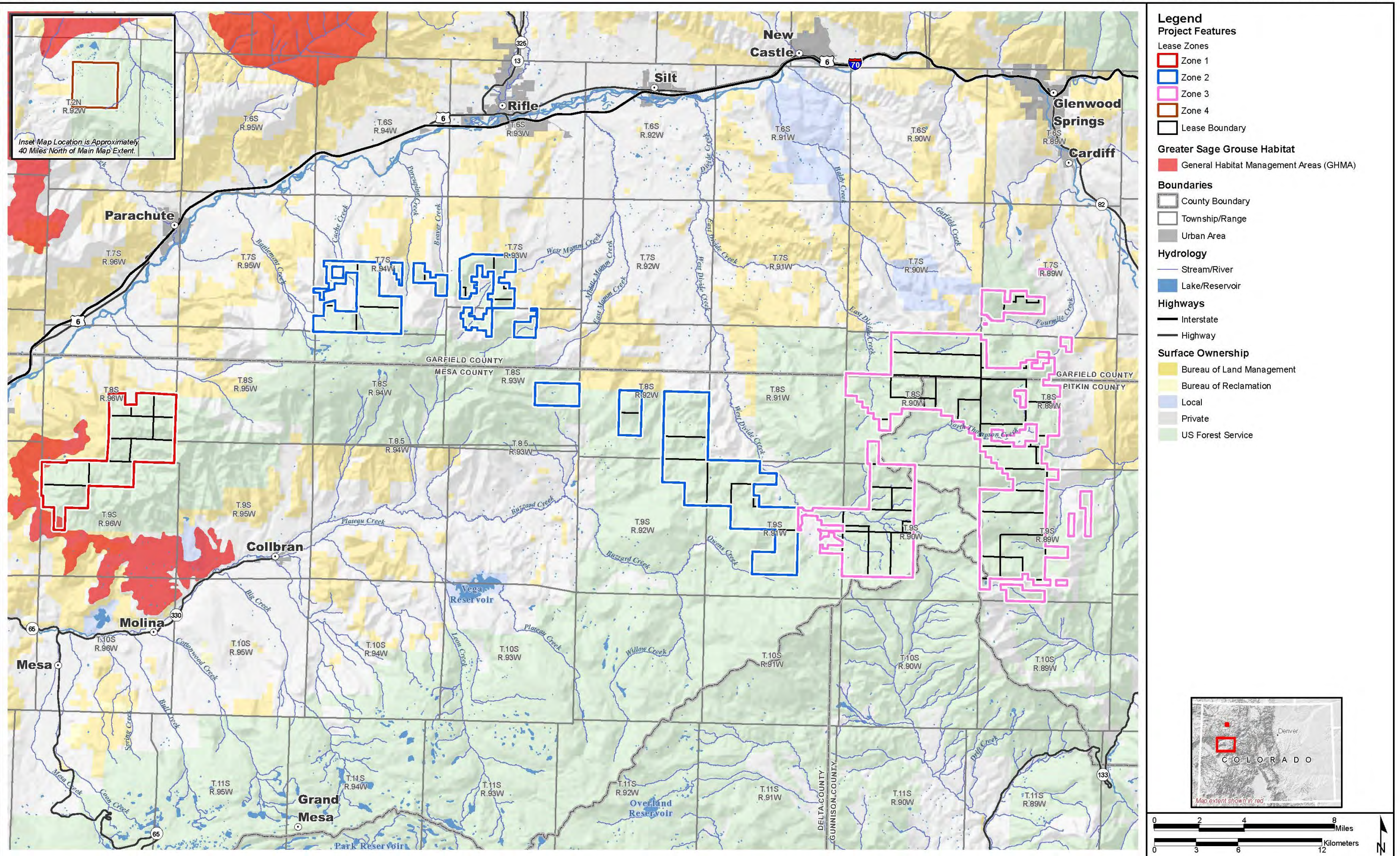


Figure 3.7-8 Sage-Grouse Overall Habitat In and Near The Leases

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### 3.8 Aquatic Resources

#### 3.8.1 Regulatory Background

Regulations that involve the management and protection of aquatic species and habitat within the analysis area are implemented by CPW, USFWS, BLM, and the Forest Service. Regulations and legal requirements related to aquatic species and their habitat are listed in **Table 3.8-1**.

**Table 3.8-1 Regulations for Protection of Aquatic Species**

Topic	Regulation
Aquatic Species Jurisdiction	Colorado Revised Statutes 33-1-101
Aquatic Species Protection	Colorado Revised Statutes 33-1-101
Prevent Invasive Species Infestation	Colorado Revised Statutes 33-1-101, 33-2-104
Protection of Federally Listed Species	ESA of 1973
Protection of BLM Sensitive Species	BLM Special Status Species Management Policy 6840 (6840 Policy) (Rel. 6-125)
Protection of Forest Service Sensitive Species	FSM 2670
Protection of Colorado Listed Species	Colorado Revised Statutes 33-2-105

Sources: BLM 2014b; WRNF 2014a.

#### 3.8.2 Analysis Area

The analysis area for aquatic resources coincides with the surface water resources analysis area. As shown in **Figure 3.5-1**, the geographical extent of the analysis area for aquatic species and their habitats includes the subwatersheds (HUC-12) and perennial waterbodies located within the oil and gas lease boundaries. Additional downstream reaches are included to evaluate potential offsite indirect effects from upstream leased lands, as well as the effects from water depletions. The downstream analysis area is defined as the perimeter of the subwatersheds that extend downstream of the lease boundaries. For federally listed fish species in the Colorado River, the downstream analysis area relates to the closest occurrence of the fish species including their critical habitat.

#### 3.8.3 Regional Affected Environment

The geographical extent of the analysis area for aquatic species and their habitats includes the subwatersheds (HUC-12) (see **Figure 3.5-1**) and perennial waterbodies located within the oil and gas lease boundaries. Additional downstream reaches are included to evaluate potential offsite/indirect effects from upstream leased lands, as well as effects from water depletions. The downstream analysis area is defined as the perimeter of the subwatersheds that extend downstream of the lease boundaries. For federally listed fish species in the Colorado River, the downstream analysis area relates to the closest occurrence of the fish species including their critical habitat.

Information regarding aquatic species and their habitats within the analysis area was obtained from a review of existing published sources, BLM RMPs, Forest Service land and RMPs (forest plans), file information from BLM, Forest Service, CPW, and USFWS. Species occurrence information was obtained from CPW (2015c) and the BLM (2015h).

Overall, aquatic habitat in the region includes a mixture of rivers, streams, reservoirs, lakes, ponds wetlands, and springs. In total, approximately 40 miles of perennial streams occur within the areas associated with all leases. River and stream habitats consist of perennial, intermittent, and ephemeral waterbodies. Perennial streams contain water and habitat wetted continuously during a normal or

average year, while intermittent (sporadic or periodic flows) and ephemeral (short-lived or transitory) provide temporary habitat for aquatic species. Approximately 108 lakes or reservoirs occur within all 65 leases combined. All of these waterbodies are less than 10 acres in surface area.

Due to their recreational values, game fish species are an important focus in the management of aquatic species within the analysis area. Recreational game fish species include coldwater (trout) species in higher elevation streams and lakes (**Table 3.8-2**). Some waterbodies below approximately 6,500 feet in elevation also support cool water (northern pike, walleye, and smallmouth bass) and warmwater species (sunfish, crappies, largemouth bass, and catfish) (BLM 2014b). The cool and warmwater fish species mainly occur in some lakes, reservoirs, or ponds, and large streams such as the Colorado River and several of its tributaries. The cool and warmwater game fish species are uncommon in the analysis area, and therefore, they are not discussed further in this section. All of the game fish species are nonnative except for two lineages of Colorado River cutthroat trout (CRCT). General spawning periods and habitat for the more common game fish species (i.e., trout) within the analysis area are provided in **Table 3.8-3**. Important fish habitat in the analysis area consists of perennial waterbodies. Other native nongame fish include the mottled sculpin (*Cottus bairdi*), Paiute sculpin (*C. beldingii*), and speckled dace (*Rhinichthys osculus*).

**Table 3.8-2 Game Fish Species in Analysis Area**

Common Name	Scientific Name	General Habitat
Trout	Salmonidae	
Brook trout	<i>Salvelinus fontinalis</i>	Streams, lakes/reservoirs
Brown trout	<i>Salmo trutta</i>	Streams, lakes/reservoirs
CRCT	<i>Oncorhynchus clarkii pleuriticus</i>	Streams, lakes
Cutthroat trout	<i>Oncorhynchus clarkii</i>	Streams
Mountain whitefish	<i>Prosopium williamsoni</i>	Streams
Rainbow trout	<i>Oncorhynchus mykiss</i>	Streams, lakes/reservoirs

**Table 3.8-3 Game Fish Spawning Periods and Habitat**

Species or Group	Months												Spawning Habitat	
	J	F	M	A	M	J	J	A	S	O	N	D		
Brook trout														Stream spawners that use gravel substrates and spring upwelling areas.
Brown trout														Stream spawners that use tributary streams with gravel substrates in riffle-run areas.
Cutthroat trout														Stream spawners that use tributary streams with gravel substrates in riffle areas.
Mountain whitefish														Stream spawners that move from pools to riffles for spawning.
Rainbow trout														Stream spawners that use gravel substrates at head of riffle or downstream portion of pool.

Sources: CDOW 2008; Sigler and Sigler 1996.



The analysis area includes special status aquatic species, which consist of federally listed and candidate species, Forest Service sensitive, and Colorado listed species (**Table 3.8-4**). Species with BLM sensitive species status also are shown in **Table 3.8-4** because water use effects include downstream areas within BLM lands. Four federally listed fish species (bonytail, Colorado pikeminnow, humpback chub, and razorback sucker) occur in river segments in the Colorado, White, and Yampa rivers, which are located downstream of the analysis area. However, they are included for the purpose of Project water use in the Upper Colorado River basin. Recent genetic and meristic studies have provided evidence of six historical lineages of cutthroat trout in the Colorado River basin and the Front Range of Colorado (AMEC 2014; Bestgen et al. 2013). Two lineages of CRCT occur within the Project analysis area. The blue lineage is native to the Green and Yampa watersheds, while the green lineage is native to the Colorado River watershed. The green lineage may require taxonomic revision and a new subspecies name. Until the taxonomy of these cutthroat trout subspecies are resolved, the USFWS has recommended that federal agencies treat the CRCT (green lineage) as if it is the federally threatened greenback cutthroat trout (*Oncorhynchus clarkia stomias*) (Rogers 2012). Other special status fish and amphibian species in the analysis area are listed in **Table 3.8-4**.

**Table 3.8-4 Special Status Aquatic Species in the Analysis Area**

Common Name	Scientific Name	Status <sup>1</sup>
<b>Amphibians</b>		
Boreal toad	<i>Bufo boreas boreas</i>	FS; SE; CAS
Northern leopard frog	<i>Rana pipiens</i>	BLM; FS
<b>Fish</b>		
Bluehead sucker	<i>Catostomus discobolus</i>	BLM; FS
Bonytail (CH) <sup>2</sup>	<i>Gila elegans</i>	FE; SE; BLM
Colorado pikeminnow (CH) <sup>2</sup>	<i>Ptychocheilus lucius</i>	FE; ST; BLM
CRCT (blue lineage)	<i>Oncorhynchus clarkii pleuriticus</i>	BLM; FS; SSC
CRCT (green lineage) <sup>3</sup>	<i>Oncorhynchus clarkii</i> subspecies	FT, BLM, FS, SSC
Flannelmouth sucker	<i>Catostomus latipinnis</i>	BLM; FS
Humpback chub (CH) <sup>2</sup>	<i>Gila cypha</i>	FE, SE; BLM
Razorback sucker (CH) <sup>2</sup>	<i>Xyrauchen texanus</i>	FE; SE; BLM
Roundtail chub	<i>Gila robusta robusta</i>	BLM; SSC; FS

<sup>1</sup> Status: FE = Federally Endangered; BLM = BLM Sensitive; CAS = Conservation Agreement Species; FS = Forest Service Sensitive; SE = Colorado Endangered; ST – Colorado Threatened; SSC = Colorado Special Concern.

<sup>2</sup> Critical habitat is located downstream of the analysis area.

<sup>3</sup> Considered threatened by the Forest Service until such time as a status review of cutthroat trout in Colorado is completed

Aquatic habitat in the analysis area used by special status aquatic species includes streams, springs, stock ponds, reservoirs and wetlands. Specific habitat conditions for waterbodies with special status aquatic species that are located within the analysis area are not described in this section, since information is not available for all species. Instead, reference is made to habitat preferences, which are provided in **Table 3.8-5** along with spawning or breeding periods.

**Table 3.8-5 Habitat Preferences and Spawning Periods for Special Status Aquatic Species**

Species	Habitat	Spawning/Breeding Periods
Boreal toad	Habitat used during the nonbreeding consists of forested areas and upland vegetation such as sagebrush and grassland. Boreal toads migrate from terrestrial habitats to aquatic habitats during the breeding period. Burrows are used by boreal toads and other amphibians during the summer and winter to maintain stable body temperatures and prevent water loss. (Keinath and McGee 2005).	May through August (Keinath and McGee 2005)
Northern leopard frog	Habitat consists of marshes, beaver ponds, stock ponds, streams, rivers, lakes, reservoirs, and wet meadows at elevations up to approximately 9,000 feet amsl (Smith and Keinath 2007). Northern leopard frog uses underwater areas as overwinter habitat.	March through June (Smith and Keinath 2007)
Bluehead sucker	Species inhabits various stream habitats ranging from small tributaries to large mainstem rivers. Habitat typically consists of runs or riffles with rock or gravel substrates. Juveniles utilize riffles, eddies and backwaters (Ptacek et al. 2005).	Early May through mid-August (CDOW 2008)
Bonytail	The general types of habitat include mainstem riverine areas and impoundments in the Colorado River system. Deep pools and eddies with slow to fast currents are characteristic of the riverine habitat (Kaeding et al. 1986).	June or July (Maddux et al. 1993)
Colorado pikeminnow	Habitat requirements of Colorado pikeminnow vary depending on the life stage and time of year. Young-of-the-year and juveniles prefer shallow backwaters, while adults use pools, eddies, and deep runs (Miller et al. 1982). During peak runoff in the spring and early summer, fish usually move into backwater areas of flooded riparian zones to avoid swift velocities, feed, and prepare for the upcoming spawning period.	Mid-June to mid-August (Miller et al. 1982)
CRCT (blue lineage)	This subspecies occurs in higher elevation streams and lakes in cold, clear water (Behnke 1981).	Early June through end of August (CDOW 2008)
CRCT (green lineage)	Same as CRCT (blue lineage).	Early June through end of August (CDOW 2008)
Flannelmouth sucker	Species is typically found in slower, warmer rivers where they prefer pools and deep runs but also use mouths of tributaries, riffles, and backwaters. Juveniles utilize backwaters and shoreline areas (Rees 2005a).	Early April through early July (CDOW 2008)
Humpback chub	Species mainly occur in river canyons where they utilize a variety of habitats including deep pools, eddies, upwells near boulders, and areas near steep cliff faces. Young and spawning adults are generally found in sandy runs and backwaters (USFWS 1990).	May through July (USFWS 1990)
Razorback sucker	General habitats used by adults include eddies, pools, and backwaters during the non-breeding period (July through March) (Maddux et al. 1993). Seasonal habitat use includes pools and eddies from November through April, runs and pools from July through October, runs and backwaters in May, and backwaters and flooded gravel pits during June. Juveniles prefer shallow water with minimal flow in backwaters, tributary mouths, off-channel impoundments, and lateral canals (Maddux et al. 1993).	April through mid-June (Maddux et al. 1993)
Roundtail chub	Species occurs in stream reaches with a mixture of pool and riffle habitats. Adults and juveniles typically are found in relatively deep, slow-velocity habitats that contain woody debris or other types of cover (Rees 2005b).	Mid-May through mid-July (CDOW 2008)

The population status of the two native CRCT lineages is considered to be stable or increasing due to efforts to reestablish this cutthroat subspecies in historical habitat (BLM 2014b). In 2006, a conservation agreement was signed by Colorado, Utah, and Wyoming to reverse declining population trends and maintain or increase fish numbers and miles of habitat for conservation populations (CRCT Conservation Team 2006).

Amphibian species that occur within the analysis area include the special status species, boreal toad and northern leopard frog. Other amphibians in the area include the wood frog (*Lithbates sylvaticus*), Great Basin spadefoot toad (*Spea intermontana*), Woodhouse’s toad (*Anaxyrus woodhousii*), northern chorus frog (*Pseudacris triseriata*), and tiger salamander (*Ambystoma tigrinum*), and barred salamander (*Ambystoma mavortium*) (BLM 2014b; CPW 2015c). Amphibians utilize a mixture of perennial and temporary aquatic habitats such as ponds, streams, wetlands, and seasonal pools.

**3.8.4 Analysis Area Affected Environment**

The following information describes aquatic habitat and game fish and special status aquatic species that occur within each of the lease zones. Details on subwatersheds, perennial streams, and species occurrence are provided in **Appendix A, Tables A-2 through A-5**. A summary of the parameters used to characterize the four lease zones is provided in **Table 3.8-6**.

**Table 3.8-6 Parameters Used to Characterize Aquatic Habitat and Species within the Lease Zones**

Parameter	Zone 1	Zone 2	Zone 3	Zone 4
Number of Subwatersheds with Perennial Streams within Zone Lease Boundary	0	7	6	1
Miles of Perennial Stream Habitat within Zone Lease Boundary	0	8	36	<1
Number of Lake/Reservoir Habitat (<10 acres in Area) within Zone Lease Boundary	0	10	74	24
Number of Perennial Streams with Game Fish Species Within Zone Lease Boundary	0	4	8	0
Number of Perennial Streams with Special Status Fish Species within Zone Lease Boundary	0	4	7	0
Number of Cutthroat Trout Conservation Populations within Zone Lease Boundary	0	3	5	0
Acres of Current Boreal Toad Habitat within Zone Lease Boundary	0	715	0	0
Acres of Potential Boreal Toad Habitat within Zone Lease Boundary	0	43	530	6
Acres of Potential Northern Leopard Frog Habitat within Lease Zone Boundary	906	2,512	8,095	111
Miles of Perennial Stream Habitat in Area Outside of the Zone Lease Boundary	39	144	195	38
Number of Perennial Streams with Game Fish Species Outside of the Zone Lease Boundary	3	6	18	1
Number of Perennial Streams with Special Status Fish Species Outside of the Zone Lease Boundary	3	6	16	1
Number of Cutthroat Trout Conservation Populations Outside of the Zone Lease Boundary	0	4	3	1

### 3.8.4.1 Zone 1

Of the four zones, the lowest amount of perennial habitat is present in Zone 1 because no perennial streams are located within the lease boundaries. Likewise, no game fish or special status aquatic species occur within Zone 1 and there are no lakes or reservoirs. However, there are approximately 39 miles of perennial stream habitat in the subwatersheds that extend beyond the lease boundaries. Three streams occur within these subwatersheds including North Wallace and Wallace creeks and the Colorado River (**Appendix A, Table A-2**). North Fork Wallace and Wallace creeks contain game fish species, as well as the special status species, CRCT (**Figure 3.8-1**). The lineage of the cutthroat trout populations in both streams are mixed blue and green so they are not pure Colorado River or greenback cutthroat trout populations. Special status fish species that occur in the Colorado River and Plateau Creek include bluehead sucker, flannelmouth sucker, and roundtail chub.

Special status amphibian habitat in Zone 1 consists of approximately 906 acres of potential habitat for northern leopard frog potential habitat (**Figure 3.8-2**). Potential habitat is defined by a 500-foot buffer along riparian areas. No boreal toad habitat is present in Zone 1. No critical habitat for federally listed fish species occurs within Zone 1. Critical habitat for four fish species is located downstream of the Zone 1 boundary in the Colorado River. The approximate distance to critical habitat is approximately 4 miles for Colorado pikeminnow and razorback sucker and 76 miles for bonytail and humpback chub (species name).

### 3.8.4.2 Zone 2

The boundary for Zone 2 overlaps with approximately 8 miles of perennial stream habitat within seven subwatersheds (**Appendix A, Table A-3**). The named perennial streams include West Divide, West Mamm, Middle Mamm, Beaver, Cache, Cottonwood, and Owens creeks. The largest amount of perennial stream habitat is provided by Cache Creek (2.2 miles) and West Mamm Creek (1.8 miles). Approximately 10 lakes and reservoirs occur in Zone 2. Game fish occur in four streams (upper portion of West Divide, Beaver, Cache, and Owens creeks). Cutthroat trout are present in all four streams (**Figure 3.8-1**); brook trout also occurs in West Divide Creek. The lineage of the CRCT populations vary by stream, with a green lineage in the upper portion of West Divide Creek and in Beaver, and Cache creeks, and an unknown lineage in Owens Creek. The cutthroat occurrences in Beaver and Cache creeks and the upper portion of West Divide Creek are considered conservation populations. The two cutthroat trout lineages are considered special status species. West Divide Creek also contains three additional special status fish species (bluehead sucker, flannelmouth sucker, and roundtail chub) in downstream areas.

The analysis area includes subwatersheds that extend beyond the Zone 2 leases. Approximately 144 miles of perennial stream habitat occurs in the area outside of the lease boundaries, with the largest amount of habitat provided by Beaver (11.9 miles), Middle Mamm (10.3 miles), and West Mamm (9.3 miles) creeks (**Appendix A, Table A-3**). Six streams contain game fish species, which include Beaver, Battlement, Cache, Owens, and West Divide creeks and the Colorado River. CRCT are present in all of the streams. The CRCT (green lineage) is present in the upper portion of West Divide Creek and Beaver and Cache creeks, while the CRCT (blue lineage) occurs in Battlement Creek (**Figure 3.8-1**). The CRCT lineage in Owens Creek is unknown. Other special status species consist of bluehead sucker, flannelmouth sucker, and roundtail chub in the lower portion of West Divide Creek and the Colorado River.

Northern leopard frog and boreal toad habitat is present in Zone 2 (**Figures 3.8-2 and 3.8-3**). Although no known northern leopard frog occurrences have been reported in Zone 2, approximately 2,512 acres of potential habitat is identified for this species. The current range of boreal toad includes approximately 714 acres in Zone 2 (**Figure 3.8-3**). Boreal toad occurrence has been reported in Owens Creek. In addition, approximately 43 acres of potential boreal toad habitat are located within Zone 2 (**Figure 3.8-3**).

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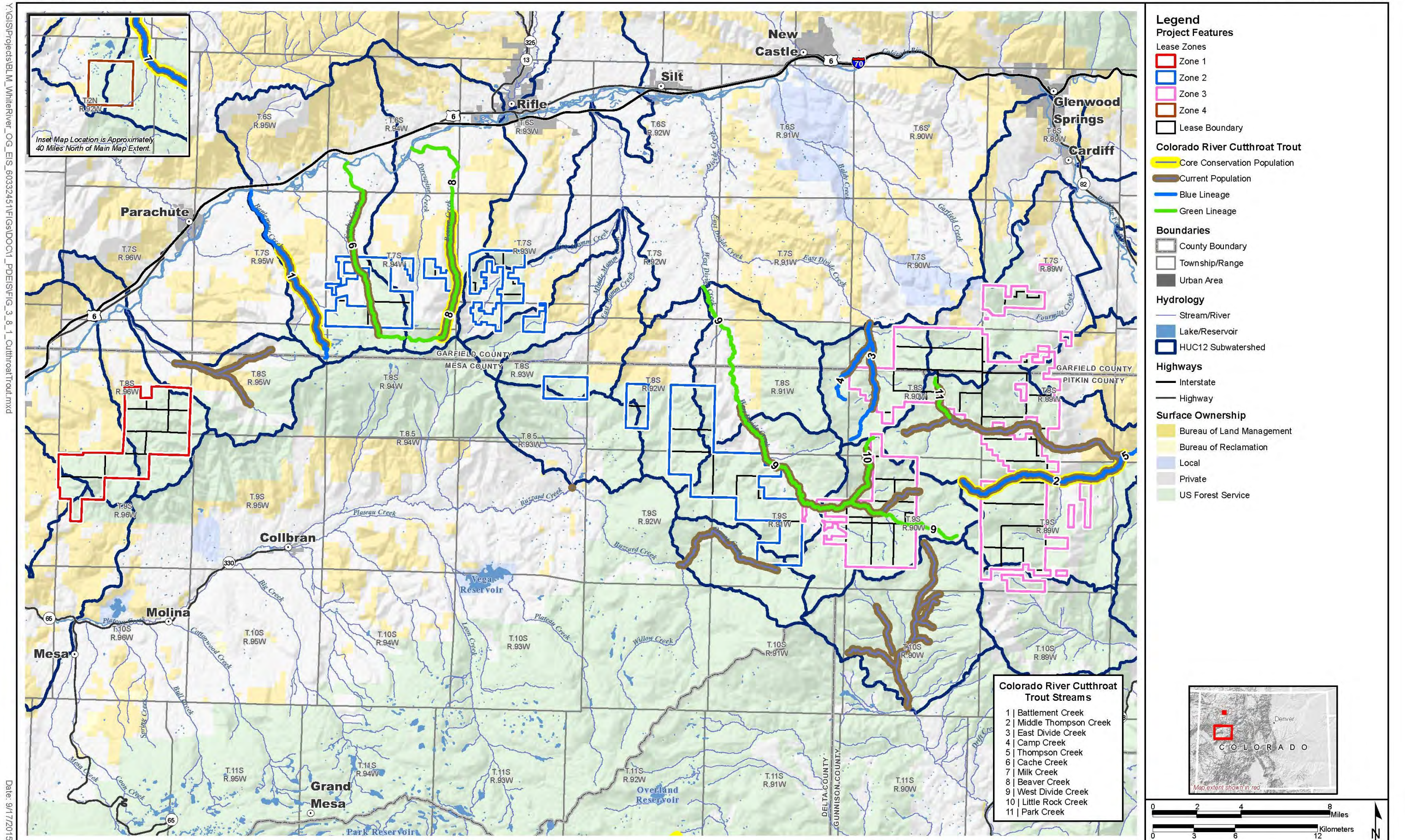


Figure 3.8-1 Colorado River Cutthroat Trout - Current and Core Conservation Populations

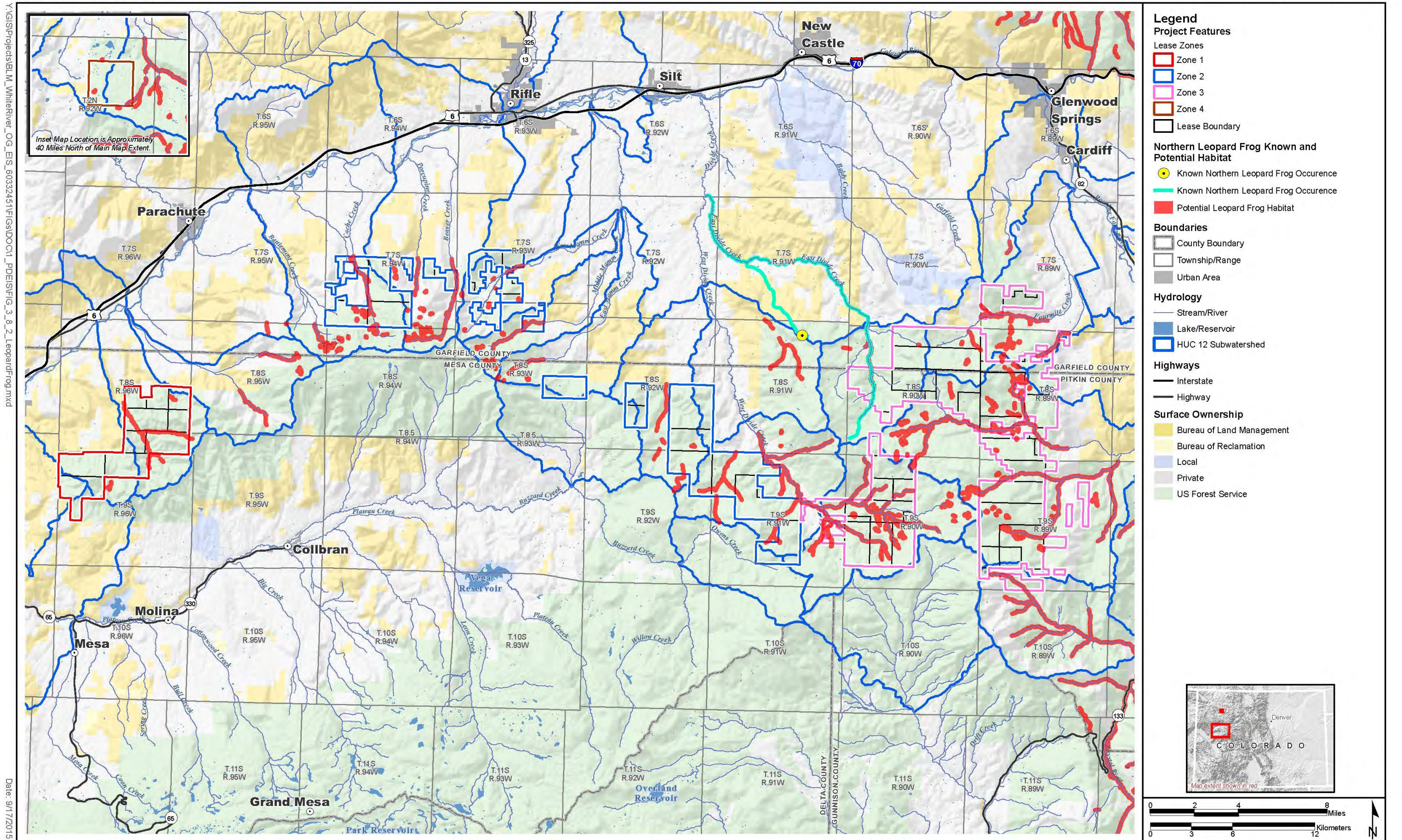


Figure 3.8-2 Known and Potential Northern Leopard Frog Habitat

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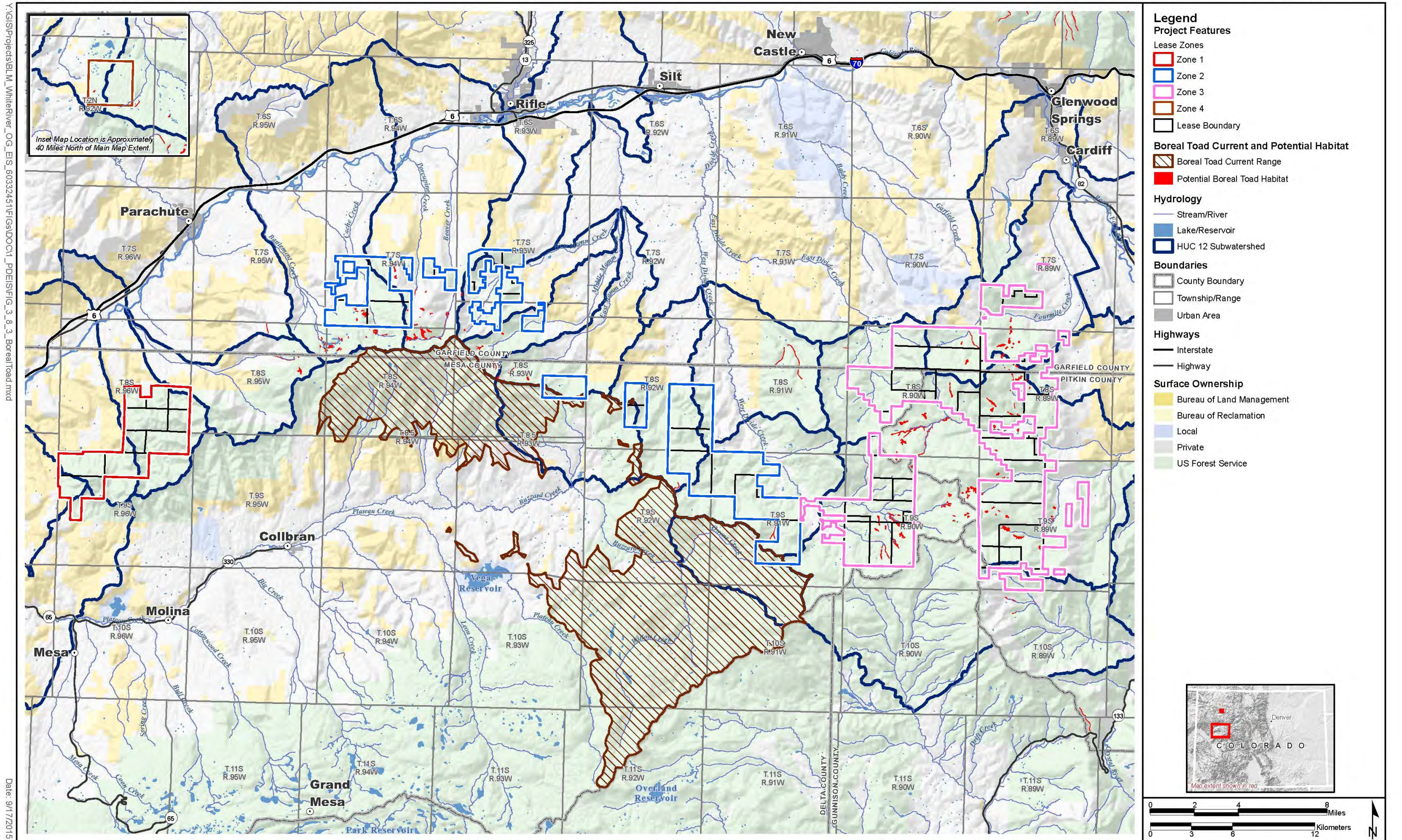


Figure 3.8-3 Boreal Toad - Current and Potential Habitat

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No critical habitat for federally listed fish species occurs within Zone 2. Critical habitat for four fish species are located downstream of Zone 2 in the Colorado River. The approximate distance to critical habitat is approximately 4 miles for Colorado pikeminnow and razorback sucker and 90 miles for bonytail and humpback chub.

#### 3.8.4.3 Zone 3

The largest amount of perennial habitat is located within Zone 3, which overlaps with approximately 36 miles of perennial streams in 6 subwatersheds (**Appendix A, Table A-4**). Of the named perennial streams in this zone, the largest amount of habitat is provided by West Divide Creek (5.1 miles), East Willow Creek (3.0 miles), Middle Thompson Creek (2.9 miles), and Fourmile Creek (2.1 miles). Approximately 74 lakes and reservoirs occur in Zone 3. Game fish species are present in eight streams, which include Camp East Divide, Fourmile, Little Rock, Middle Thompson, North Thompson, Park, and West Divide creeks. Cutthroat trout comprise the game fisheries in all of these streams except Fourmile Creek. Additional game species consist of brown and rainbow trout in North Thompson Park and Fourmile creeks. Special status species are present in seven streams including Camp, Middle Thompson, North Thompson, Park, Little Rock Park, East Divide, and West Divide creeks. CRCT (green lineage) occur in Little Rock and West Divide creeks, while blue lineage exists in Camp, East Divide, and Middle Thompson Creek. All three of these CRCT occurrences are conservation populations (**Figure 3.8-1**). Other special status species consist of bluehead sucker, flannelmouth sucker, and roundtail chub in West Divide Creek and northern leopard frog in East Divide Creek.

The analysis area includes subwatersheds that extend beyond Zone 3. Approximately 195 miles of perennial stream habitat occurs in the area outside of the lease boundaries, with the largest amount of habitat provided by Fourmile (12.1 miles), North Thompson (10.6 miles), Prince (9.3 miles), and Clear Fork (8.8 miles) creeks. The area outside of Zone 3 includes 18 streams with game fish species (**Appendix A, Table A-4**). Cutthroat trout are present in 16 of these streams (Camp, East Divide, Fourmile, Little Rock, Middle Thompson, North Thompson, North Twin, Park, Rock, Second, South Twin, South Branch Middle Thompson, Thompson, and West Divide creeks and the Crystal and Roaring Fork rivers (**Figure 3.8-1**). Cutthroat trout conservation populations have been designated Camp, Middle Thompson, and Park creeks. The cutthroat lineages in Zone 3 are listed in **Appendix A, Table A-4**. Other special status fish species consist of bluehead sucker, flannelmouth sucker, and roundtail chub in West Divide and East Divide creeks and the Crystal and Roaring Fork rivers.

Northern leopard frog and boreal toad potential habitat is located in Zone 3. Northern leopard frog habitat is present in East Divide and June creeks. In addition, approximately 8,095 acres of potential habitat for this species are located within Zone 3 (**Figure 3.8-2**). Approximately 530 acres of potential boreal toad habitat also are located within Zone 3 (**Figure 3.8-3**).

No critical habitat for federally listed fish species occurs within Zone 3. Critical habitat for four fish species are located downstream of the Zone 3 Lease boundary in the Colorado River. The approximate distance to critical habitat is approximately 26 miles for Colorado pikeminnow and razorback sucker and 124 miles for bonytail and humpback chub.

#### 3.8.4.4 Zone 4

Aquatic habitat is limited in Zone 4, with less than 1 mile for one stream, Martin Creek (**Appendix A, Table A-5**). No game fish or special status species occur in Martin Creek. Approximately 24 lakes and reservoirs occur in Zone 4. Approximately 38 miles of perennial stream habitat are located in the two subwatersheds that extend beyond the lease boundaries. One stream, Milk Creek, occurs within the subwatersheds that are adjacent to and outside of Zone 4. Milk Creek contains the game fish and special status species, CRCT (blue lineage), which is considered a conservation population (**Figure 3.8-1**). Milk Creek also contains other special status fish species including bluehead sucker, flannelmouth sucker, and roundtail chub.

Special status amphibian habitat in the Zone 4 Lease area consists of approximately 111 acres of potential habitat for northern leopard frog potential habitat (**Figure 3.8-2**). No Known boreal toad occurrence has been reported in Zone 4, but there are 6 acres of potential habitat (**Figure 3.8-3**).

No critical habitat for federally listed fish species occurs within Zone 4. Critical habitat for four fish species are located downstream of Zone 4 in the White River. The approximate distance to critical habitat is approximately 20 miles for Colorado pikeminnow and razorback sucker and 90 miles for bonytail and humpback chub.

## **3.9 Cultural Resources**

### **3.9.1 Regulatory Background**

Section 3.6.1 of the WRNF Final EIS (USFS 2014a) provides an extensive list of the laws, executive orders, regulations, and policies that comprise the regulatory framework for the protection and management of cultural resources on NFS and other federal lands. In addition to compliance with the NEPA, a brief list of the major laws governing cultural resource management includes the following:

- Antiquities Act of 1906;
- Historic Sites Act of 1935;
- National Historic Preservation Act of 1966 (NHPA) (P.L. 89-665, as amended);
- Archaeological Resources Protection Act of 1979 (P.L. 96-95, as amended);
- Native American Grave Protection and Repatriation Act (P.L. 101-601);
- American Indian Religious Freedom Act of 1978 (P.L. 96-341); and
- Religious Freedom Restoration Act of 1993 (P.L. 103-141).

#### **3.9.1.1 Implementation of Section 106 of the National Historic Preservation Act**

To describe cultural resources that may be affected by oil and gas leasing and development, Section 106 of the NHPA provides the basis for documenting and identifying what cultural resources are of primary concern to the impact analysis. The NHPA mandates that federal agencies consider the effect of an undertaking on cultural resources that are listed or are eligible for listing on the National Register of Historic Places (NRHP). Section 106 of the NHPA establishes a four-step review process by which such resources are considered. The four steps are as follows:

1. Initiate the Section 106 process by establishing the undertaking, defining the Area of Potential Effect, and consulting with the appropriate agencies;
2. Identify NRHP-eligible sites through inventory and evaluation;
3. Assess adverse effects by applying specific criteria of adverse effects; and
4. If adverse effects will occur, take appropriate steps to avoid or mitigate those effects.

Cultural resources that are listed or eligible for listing on the NRHP are referred to as “historic properties.”

The WRNF has a forest-wide goal to work in close coordination with the Southern Ute Indian Tribe, Ute Mountain Ute Tribe and Ute Indian Tribe of the Uintah and Ouray Reservation (sometimes also referred to as the Northern Ute Tribe, known as the Confederated Ute Tribes. Regulations in 36 CFR 800 (revised 2004) outline the process through which historic preservation legislation under the NHPA is administered. The 2012 National Programmatic Agreement among the BLM, Advisory Council on Historic Preservation, and National Conference of State Historic Preservation Officers regarding the manner in which the BLM meets its responsibilities under the NHPA is the basis of the BLM authority for meeting requirements of the NHPA. Day-to-day operations are based on the Colorado State Protocol Agreement (2014). Additionally, BLM Manual 8140 provides direction for protecting cultural resources from natural or human-caused deterioration and for recovering significant cultural resource data to mitigate adverse effects of proposed undertakings in accordance with the state protocol.

### 3.9.1.2 Eligibility Criteria for Listing Cultural Resources on the NRHP

The NRHP is a national list of cultural resources that are considered important in local, state, or national prehistory or history. Federal laws and regulations require that sites listed on or eligible for listing on the NRHP be taken into account in the planning and implementation of federal actions. Resources that have not been evaluated for the NRHP (unknown or needing data) are generally treated as potentially eligible resources until eligibility is determined. The NRHP, maintained by the NPS on behalf of the Secretary of the Interior, is the nation's inventory of historic properties. There are three main standards that a property must meet to qualify for listing on the NRHP: age, integrity, and significance. To meet the age criteria, a property generally must be at least 50 years old. To meet the integrity criteria, a property must "possess integrity of location, design, setting, materials, workmanship, feeling, and association" (36 CFR 60.4). Finally, a property must be significant according to one or more of the following criteria:

- Criterion A—Be associated with events that have made a significant contribution to the broad patterns of U.S. history; or
- Criterion B—Be associated with the lives of persons significant in U.S. history; or
- Criterion C—Embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D—Have yielded, or may be likely to yield, information important in prehistory or history.

### 3.9.2 Analysis Area

The analysis area encompasses the maximum extent of the lease boundaries.

### 3.9.3 Regional Affected Environment

Cultural resources are locations of human activity, occupation, or use, and include archaeological, historic, or architectural sites, structures, or places with important public and scientific uses. They may include locations (sites or places) of traditional, cultural, or religious importance to specified social or cultural groups. Cultural resources are concrete, material places and things that are located, classified, ranked, and managed through the system of identifying, protecting, and utilizing for public benefit. Cultural resources are identified through cultural resource inventories, architectural inventories, historic sources, and consultation with concerned ethnic groups or communities.

As noted WRNF Oil and Gas Leasing Final EIS (USFS 2014a, page 368-369), the area is mostly lacking confirmed Ute sites, but contains other heritage resources (archaeological sites) and landscapes indicative of Ute site presence. The Ute tribes that have historic affiliation with the project area include: 1) Southern Ute Indian Tribe; 2) Ute Mountain Ute Tribe; and 3) Ute Indian Tribe of the Uintah and Ouray Reservation (sometimes also referred to as the Northern Ute Tribe).

### 3.9.4 Analysis Area Affected Environment

The summaries of the number of cultural resource inventories, site eligibility, and site density presented in this section are based on data included in the Heritage Resources Specialist Report prepared for the WRNF Final EIS (Brogan 2014) and cultural resources spatial data provided by the WRNF.

There have been 458 cultural resource projects conducted in the analysis area covering 11,524 acres (14 percent of the analysis area), and 117 cultural resources that have been previously recorded, of which 19 are listed, or eligible for listing, on the NRHP. A breakdown in inventory coverage by lease zone is presented in **Table 3.9-1**.

**Table 3.9-1 Existing Inventory Coverage Within the Analysis Area**

Zone	Acres of Analysis Area	Percent of Analysis Area
1	564	6
2	2,712	11
3	7,819	18
4	429	17

The majority (40 percent) of the cultural resources projects were inventory projects. A field inventory may be of different intensities (reconnaissance, sampling, or intensive) depending on variables such as existing knowledge of the area and type and scope of land use planning or undertaking (USFS 2012). According to Forest Service guidelines (USFS 2012), a field inventory typically includes the following:

- Characterize the range of cultural resources in a geographic area.
- Locate and document cultural resources.
- Develop recommendations for further identification or survey needs.
- Address specific management issues or needs.
- Aid in developing and testing inventory plans and predictive models.
- Answer pertinent research questions.

Of the 117 recorded cultural resources in the analysis area, 99 are prehistoric, 16 are historic, 1 is multi-component containing both prehistoric and historic components, and 6 are or are potentially Traditional Cultural Properties (TCPs). According to the National Register Bulletin, Guidelines for Evaluating And Documenting Traditional Cultural Properties (Parker and King 1998), a TCP is “eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community’s history, and (b) are important in maintaining the continuing cultural identity of the community.” It should be noted that Ute Tribal concerns expressed to Forest Service Heritage Resource Specialists often go beyond culturally modified locations or cultural material occurrences on these landscapes. Tribal concerns are often more broadly applicable to the wider spectrum of environmental resources encompassed in EISs and not simply to those concerns typically included in the cultural and historical resource sections of an EIS. The Forest Service has identified a subset of the prehistoric sites that are resource types to which the Confederated Utes Tribes often ascribe cultural and/or religious significance (but may not have been identified through consultation as TCPs). The Forest Service will conduct further consultation with the Confederated Ute Tribes to officially determine the status of these sites. A total of 18 cultural resources are recommended as eligible for listing on the NRHP, 90 have been recommended as not eligible, 8 are unevaluated, and 1 is listed on the NRHP. The overall density of cultural resources to area surveyed is approximately 0.01 site per acre, which is relatively low, with a high proportion of prehistoric sites (85 percent). **Table 3.9-2** presents a summary of the previously recorded resources for the entire analysis area.

As most intensive cultural inventories are project-driven, only a small portion of the analysis area has been systematically inventoried for cultural resources so unknown resources may be identified in previously unsurveyed areas prior to or during construction and operations. Not all archaeological sites are easily identified on the surface because some may be obscured by vegetation and others may be buried by sedimentation or geological processes.

**Table 3.9-2 Summary of Previously Recorded Cultural Resources within Analysis Area**

Site Types	Site Eligibility					Percent of Total Sites
	Number of Sites	Listed	Eligible	Not Eligible	Unevaluated	
Prehistoric Sites	99	--	17	75	7	85
Historic Sites	16	1	--	15	--	14
Multi-component Sites (contains both historic and prehistoric)	1	--	--	--	1	0.5
<b>Total Resources</b>	<b>116</b>	<b>1</b>	<b>17</b>	<b>90</b>	<b>8</b>	<b>100</b>

**3.9.4.1 Zone 1**

Approximately 6 percent of the Zone 1 leases have been previously inventoried for cultural resources. There are 11 previously recorded resources within Zone 1, including 2 prehistoric archaeological sites that have been determined eligible for listing on the NRHP. There are three TCPs within Zone 1. There are nine resources that have been determined not eligible for listing on the NRHP. The overall density of cultural resources to area surveyed within Zone 1 is approximately 0.02 site per acre. This is a relatively low site density with a high proportion of prehistoric sites (82 percent). **Table 3.9-3** presents a summary of the previously recorded resources for Zone 1.

**Table 3.9-3 Previously Recorded Cultural Resources within Zone 1**

Site Types	Site Eligibility					Percent of Total Sites
	Number of Sites	Listed	Eligible	Not Eligible	Unevaluated	
Prehistoric Sites	9	--	2	7	--	82
Historic Sites	2	--	--	2	--	18
Multi-component Sites (contains both historic and prehistoric)	--	--	--	--	--	--
<b>Total Resources</b>	<b>11</b>	<b>--</b>	<b>2</b>	<b>9</b>	<b>--</b>	<b>100</b>

**3.9.4.2 Zone 2**

Approximately 11 percent of the Zone 2 leases have been previously inventoried for cultural resources. There are 12 previously recorded resources within Zone 2, including 1 historic site that is listed on the NRHP. There are 10 resources that have been determined not eligible for listing on the NRHP, and 1 that remains unevaluated. The overall density of cultural resources to area surveyed within Zone 2 is approximately 0.004 site per acre. This is a relatively low site density with a high proportion of prehistoric sites (67 percent). **Table 3.9-4** presents a summary of the previously recorded resources for Zone 2.

**Table 3.9-4 Previously Recorded Cultural Resources within Zone 2**

Site Types	Site Eligibility					Percent of Total Sites
	Number of Sites	Listed	Eligible	Not Eligible	Unevaluated	
Prehistoric Sites	8	--	--	7	1	67
Historic Sites	4	1	--	3	--	33
Multi-component Sites (contains both historic and prehistoric)	--	--	--	--	--	--
<b>Total Resources</b>	<b>12</b>	<b>1</b>	<b>--</b>	<b>10</b>	<b>1</b>	<b>100</b>

**3.9.4.3 Zone 3**

Over 18 percent of the Zone 3 leases have been previously inventoried for cultural resources. There are 92 previously recorded resources within Zone 3, including 15 prehistoric archaeological sites that are eligible for listing on the NRHP. There are three TCPs within Zone 3. There are 69 cultural resources that have been determined not eligible for listing on the NRHP and 7 that remain unevaluated. The overall density of cultural resources to area surveyed within Zone 3 is approximately 0.01 site per acre. This is a relatively low site density with a high proportion of prehistoric sites (88 percent). **Table 3.9-5** presents a summary of the previously recorded cultural resources for Zone 3.

**Table 3.9-5 Previously Recorded Cultural Resources within Zone 3**

Site Types	Site Eligibility					Percent of Total Sites
	Number of Sites	Listed	Eligible	Not Eligible	Unevaluated	
Prehistoric Sites	81	--	15	60	6	88
Historic Sites	9	--	--	9	--	10
Multi-component Sites (contains both historic and prehistoric)	1	--	--	--	1	<1
<b>Total Resources</b>	<b>91</b>	<b>--</b>	<b>15</b>	<b>69</b>	<b>7</b>	<b>100</b>

**3.9.4.4 Zone 4**

Over 17 percent of the Zone 4 leases have been previously inventoried for cultural resources. There are two previously recorded resources within Zone 4 and both have been determined not eligible for listing on the NRHP. The overall density of cultural resources to area surveyed within Zone 4 is approximately 0.005 site per acre, a very low site density. **Table 3.9-6** presents a summary of the previously recorded cultural resources for Zone 4.

**Table 3.9-6 Previously Recorded Cultural Resources within Zone 4**

Site Types	Site Eligibility					Percent of Total Sites
	Number of Sites	Listed	Eligible	Not Eligible	Unevaluated	
Prehistoric Sites	1	--	--	1	--	50
Historic Sites	1	--	--	1	--	50
Multi-component Sites (contains both historic and prehistoric)	--	--	--	--	--	--
<b>Total Resources</b>	<b>2</b>	<b>--</b>	<b>--</b>	<b>2</b>	<b>--</b>	<b>100</b>



### **3.10 Transportation**

A variety of federal, state, and local agencies administer and regulate roadways. The American Association of State Highway and Transportation Officials and the Federal Highway Administration are responsible for interstate and U.S. highways. The Colorado Department of Transportation (CDOT) is responsible for state highways and routes. County and local roads are controlled by the presiding jurisdiction (cities, counties).

The WRNF LRMP 2002 Revision, as amended (Forest Plan) provides the overall direction for managing transportation on the WRNF, including meeting national strategic goals and objectives. National strategic goals and objectives for transportation systems are guided by the CFR and the Forest Service Handbooks and Manuals. The WRNF Roads Analysis Forest Scale Report (WRNF 2003), the WRNF 2011 Travel Management Plan (WRNF 2011), and the WRNF Oil and Gas Leasing Final EIS (USFS 2014a) provide further description and guidance for use of the existing and future transportation system on Forest Service lands.

#### **3.10.1 Analysis Area**

The analysis area for direct, indirect, and cumulative impacts consists of the affected oil and gas leases and any off-lease area that might be used to access development areas within the leases, plus the regional road network spanning multiple counties.

#### **3.10.2 Regional Affected Environment**

The region is transected by or adjacent to two federal highways, three state highways, and numerous county, BLM, and Forest Service roads. I-70 bisects the region east-west and is a four-lane federal highway. U.S. Highway 6 (US-6) generally parallels I-70 on varying sides of the interstate from Canyon Creek exit west to De Beque. Colorado State Highway 13 (SH-13) runs north from the City of Rifle to Baggs, Wyoming. Colorado SH-133 begins in Carbondale and traverses south over McClure Pass to Delta, Colorado. Colorado SH-82 runs north through Carbondale before terminating at Glenwood Springs. These roads are displayed on **Figures 3.10-1** and **Figure 3.10-2**. Also detailed on the figure are the anticipated haul roads used to access the lease zones.

There are many NFS roads within the analysis area that are designed to handle different modes of travel. Passenger car roads, characterized by USFS road maintenance Levels 3, 4, and 5, require a higher degree of user comfort therefore requiring higher levels of design and maintenance (Mobley 2014). Driving surfaces of these roads range from asphalt to aggregate to native surface with the majority being aggregate surfaced (Mobley 2014). Most NFS access roads used by gas operators are maintained at maintenance Level 3 or higher, and are aggregate surfaced.

#### **3.10.3 Analysis Area Affected Environment**

The analysis area for transportation consists of the affected oil and gas leases, plus the regional road network which spans multiple counties. The primary transportation impact would involve Garfield, Mesa, Pitkin, and Rio Blanco county roads (CRs).

##### **3.10.3.1 Transportation**

There are many types of roads that transect the transportation analysis area. I-70 is a four-lane federal highway, maintained by the Federal Highway Administration and CDOT. As shown in **Table 3.10-1**, 2013 average annual daily traffic levels ranged from 14,000 to 26,000 vehicles a day, with the higher amounts occurring near Glenwood Springs. Typically, 13 percent of this traffic was truck traffic (CDOT 2014). US-6 generally parallels I-70 on varying sides of the interstate from Canyon Creek exit west to De Beque Canyon where it is an undivided two-lane road. Nearly 7 percent of the traffic occurring on US-6 at

Milepost (MP) 93 near Rifle in 2013 was truck traffic (CDOT 2014). Colorado SH-82 is a four-lane divided road maintained by CDOT. Traffic levels increase on the highway near Glenwood Springs. Approximately 4 percent of the 2013 vehicle traffic was truck traffic (CDOT 2014). Colorado SH-82 is the second most utilized road in the analysis area. Colorado SH-133 is a two-lane undivided road maintained by CDOT. Traffic levels increase on the highway near Carbondale. A small percentage of vehicle traffic (3 percent) is truck traffic (CDOT 2014). Colorado SH-330 is a two-lane undivided road, which experiences higher traffic levels west towards Collbran. Colorado SH-13 is a two-lane undivided road maintained by CDOT. At 18 percent, Colorado SH-13 contained the highest level of truck traffic, as a percentage, within the analysis area (CDOT 2014). As detailed in **Table 3.10-1**, it is estimated that I-70 and US-6 will experience the largest regional increases in traffic by 2025. Colorado SH-82 and SH-133 will experience the least increases.

**Table 3.10-1 Current and Projected Traffic Volume Near the Analysis Area**

Route	2013 All Vehicles AADT <sup>1</sup>	2025 All Vehicles AADT (projected)	2013-2025 % Change (All Vehicles)
I-70 (MP 109, West of Glenwood Springs)	26,000	34,112	31.2
I-70 (MP 97, West Silt)	18,000	23,832	32.4
I-70 (MP 76, East of Parachute)	17,000	25,058	47.4
I-70 (MP 62, De Beque)	14,000	18,704	33.6
US-6 (MP 93, Rifle)	5,000	6,770	35.4
SH-82 (MP 2, South of Glenwood Springs)	22,000	26,884	22.2
SH-82 (MP 11, North of Carbondale)	18,000	20,700	15.0
SH-133 (MP 68, Carbondale)	11,000	12,914	17.4
SH-133 (MP 52, North of Redstone )	1,600	1,744	9.0
SH-330 (MP 5, West of Collbran)	2,700 <sup>2</sup>	3,443	27.5
SH-13 (MP 44, Meeker)	1,700	2,230	31.2

<sup>1</sup> AADT = average annual daily traffic.

<sup>2</sup> Year 2014.

Source: CDOT 2014.

Numerous roads have been identified as potential haul roads within the analysis area to access the leases. A number of the potential haul roads to serve oil and gas operations are already being used to access existing oil and gas operations. These roads are displayed on **Figures 3.10-1** and **3.10-2**. Areas of heightened interest are detailed below. Further information on analysis area roads by zone are detailed in **Tables 3.10-2** through **3.10-5**.

- Coal Creek Road (USFS Road-307), on the eastern edge of the analysis area, is not currently used as a haul road to access oil and gas activities. Coal Creek road terminates at Colorado SH-133, and is a chip-sealed, asphalt paved on gravel bedding two-lane roadway, generally 20 feet wide. Typical traffic levels over the past 15 years have averaged 62 vehicles per day (SGM 2012).

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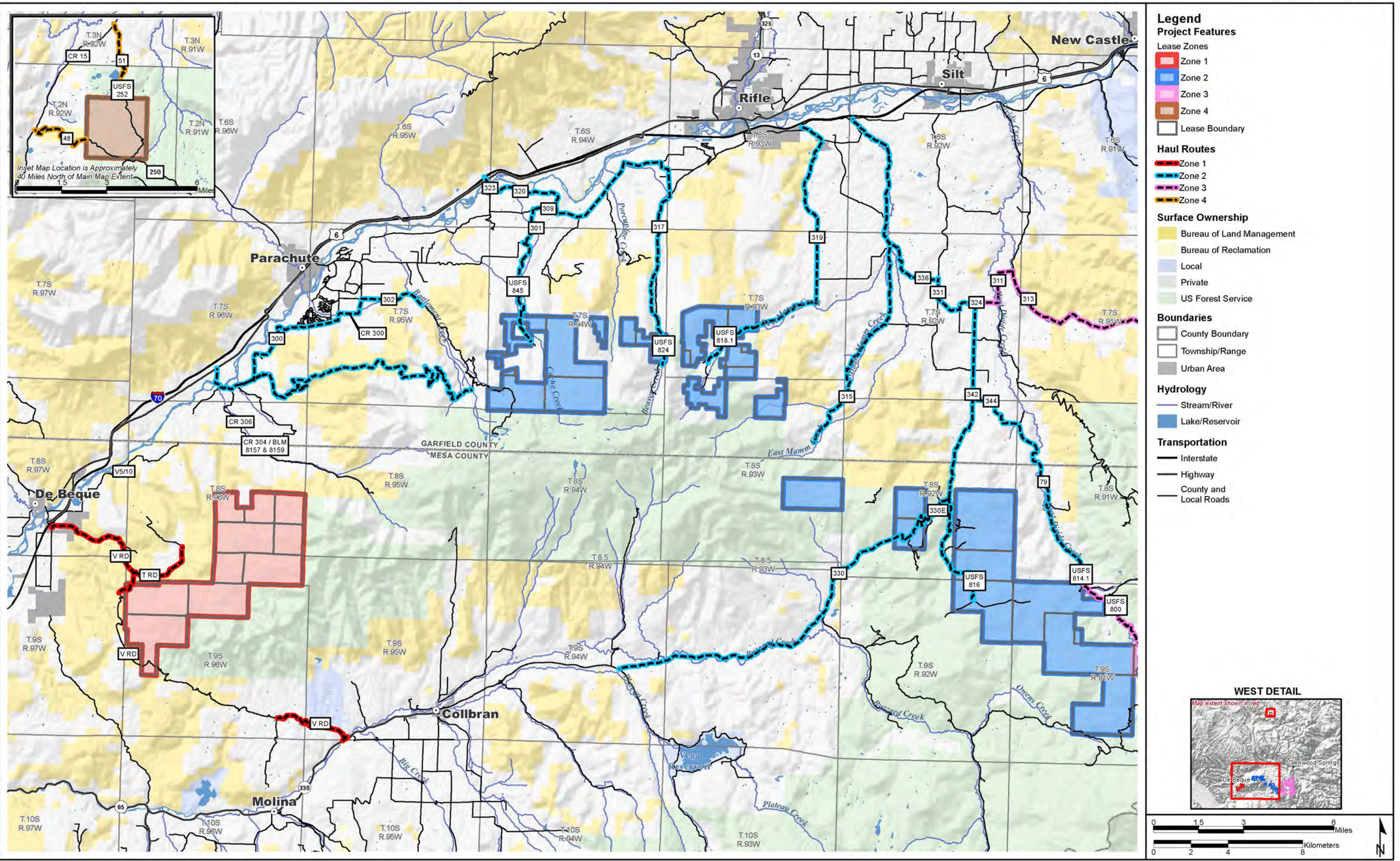


Figure 3.10-1 Transportation Routes in the Analysis Area (West)

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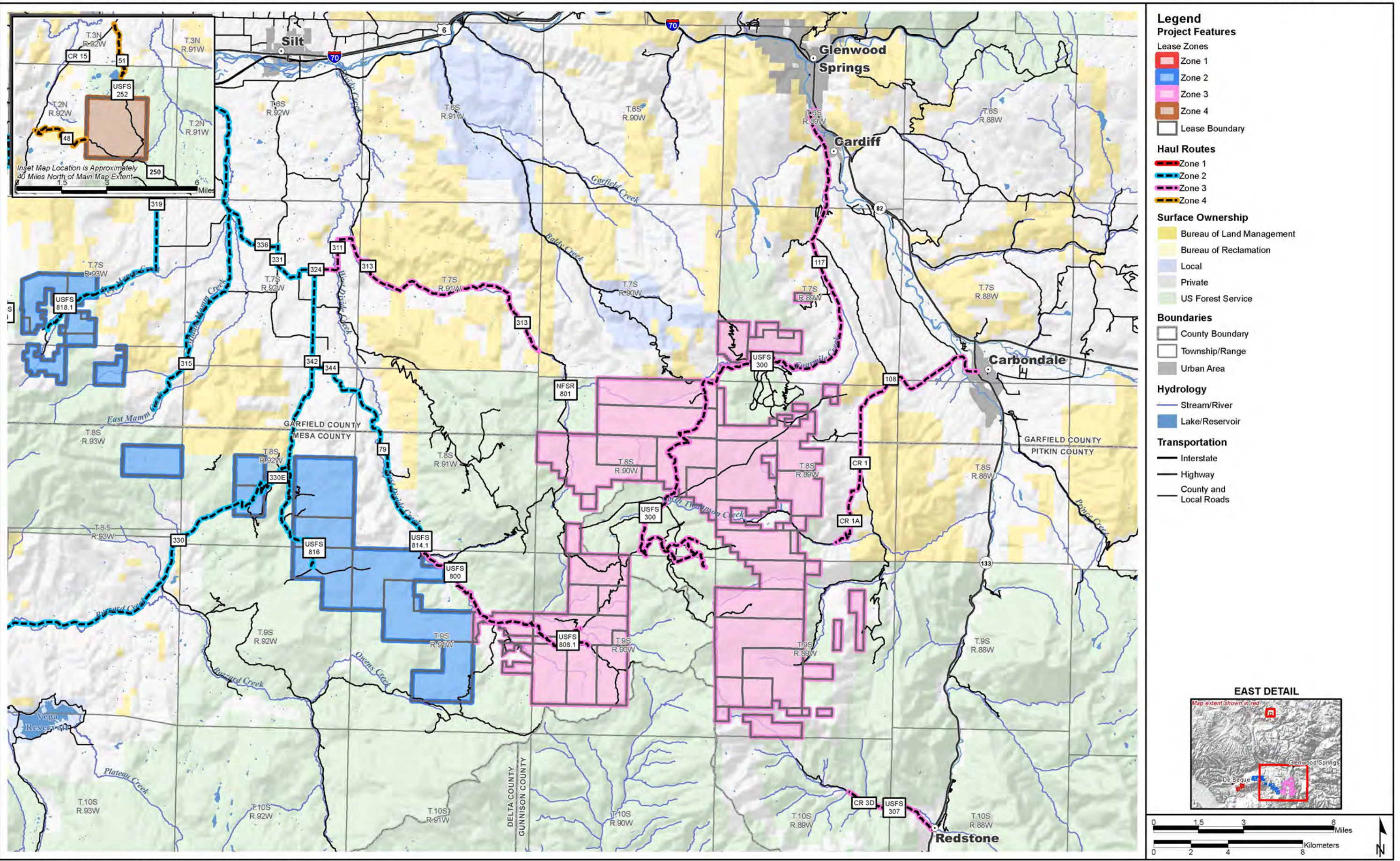


Figure 3.10-2 Transportation Routes in the Analysis Area (East)

- Thompson Creek Road (managed by Garfield County (CR-108) and Pitkin (CR-1), on the eastern edge of the analysis area, is not currently used as a haul road to access oil and gas activities. Thompson Creek Road terminates at Colorado SH-133, and is a chip-sealed, gravel and dirt two-lane roadway, generally 20 feet wide that currently serves as rural and recreational access. Typical traffic levels over the past 10 years have averaged 97 vehicles per day (SGM 2012).
- Four-Mile Road (Garfield CR-117) is located on the eastern edge of the analysis area and ends at Colorado SH-82 on the southern fringe of Glenwood Springs. Four-Mile Road is a chip-sealed two-lane county road that provides industrial, residential, rural, and recreational access to surrounding areas. Four-Mile Road also is used to access oil and gas operations on NFS lands. These operations include natural gas injection/withdrawal wells for the Wolf Creek natural gas storage field, natural gas storage field monitoring wells, and a natural gas pipeline control facility. Historically, oil and gas traffic comprises 25 percent of traffic on the WRNF portion of the road (Mobley 2015). Access to Sunlight Mountain Resort is via Four-Mile Road as well.
- Multiple roads located in the western portion of the analysis area are already used as haul roads to access existing oil and gas operations. Further information is located in **Tables 3.10-2** through **3.10-5** and portrayed in **Figures 3.10-1** and **3.10-2**.

Further details are available in the Transportation Specialist Report prepared for the WRNF Oil and Gas Leasing Final EIS (USFS 2014a). The Transportation Specialist Report provides an enhanced overview of the nationwide and forest wide strategic goals and objectives, as well as an in-depth analysis of regional and NFS roads.

### 3.10.3.2 Zone 1

There are three potential haul routes within Zone 1. All of these roads are currently used as haul roads to access existing oil and gas operations. They are detailed below in **Table 3.10-2** and portrayed in **Figure 3-10-1**.

**Table 3.10-2 Potential Haul Routes in Zone 1** <sup>1</sup>

Potential Haul Routes	Current Route Utilization <sup>2</sup>	Length (miles)
Mesa County Road (CR)-V	Heavily utilized south from De Beque to the junction with CR T. Use is very light or nonexistent south of this junction until several miles north of Hwy 330 where oil and gas traffic increases.	4.9
Mesa CR-T	Heavily utilized.	2.4
Garfield CR-306	Heavily utilized.	2.8

<sup>1</sup> Roads are detailed from west to east.

<sup>2</sup> Heavily utilized is characterized by daily heavy truck traffic. Light utilization is anything less than daily heavy truck traffic. Non-existent is no commercial use.

Source: BLM 2015e.

### 3.10.3.3 Zone 2

There are 18 potential haul routes within Zone 2, the most of any leasing zone. Many of these roads are currently used as haul roads to access existing oil and gas operations. They are detailed below in **Table 3.10-3** and portrayed in **Figures 3-10-1** and **3.10-2**.

**Table 3.10-3 Potential Haul Routes in Zone 2 <sup>1</sup>**

Potential Haul Routes	Current Route Utilization <sup>2</sup>	Length (miles)
Garfield CR- 300	Heavily utilized.	7.1
Garfield CR-302	Heavily utilized to Battlement Creek.	3.0
Garfield CR-304/BLM 8157 and 8159	Heavily utilized to the USFS boundary.	8.3
Garfield CR-320	Heavily utilized.	2.8
Garfield CR- 301 and CR-309/USFS-845	Heavily utilized. Use on CR 309 becomes very light to nonexistent at the USFS boundary.	1.4/4.1
Garfield CR-317	Heavily utilized	10.5
USFS-824	Heavily utilized.	1.9
USFS-818	Heavily utilized.	2.3
Garfield CR-319	Heavily utilized.	8.9
Garfield CR-315	Heavily utilized.	12.9
Garfield CR-331	Heavily utilized.	0.7
Garfield CR-342	Heavily utilized.	6.5
Mesa CR-330E	Heavily utilized.	3.6
USFS-816	Heavily utilized.	4.6
Mesa CR-330	Heavily utilized.	12.3
Garfield CR-344	Heavily utilized.	3.1
Mesa CR-79	Heavily utilized to SGI compressor station. Use is then light.	4.5
USFS-814.1	Non-existent. Restricted bridge.	0.5

<sup>1</sup> Roads are detailed from west to east.

<sup>2</sup> Heavily utilized is characterized by daily heavy truck traffic. Light utilization is anything less than daily heavy truck traffic. Non-existent is no commercial use.

Source: BLM 2015e; Mobley 2015.

### 3.10.3.4 Zone 3

There are six potential haul routes within Zone 3. They are detailed below in **Table 3.10-4** and portrayed in **Figure 3-10-2**. The majority of potential haul routes are currently used for residential and recreational access. Four-Mile Road is currently the only road used to access oil and gas operations.

### 3.10.3.5 Zone 4

There are three potential haul routes within Zone 4. They are detailed below in **Table 3.10-5** and portrayed in **Figure 3.10-1**. None of these routes are currently use to access existing oil and gas operations. The northern half of CR-51 is used to facilitate agricultural operations.

**Table 3.10-4 Potential Haul Routes in Zone 3<sup>1</sup>**

Potential Haul Routes	Current Route Utilization <sup>2</sup>	Length (miles)
USFS-800	Lightly utilized.	8.7
Garfield CR-313 <sup>3</sup>	Lightly utilized. After the Spruce Crossing Gulch drainage, utilization is very light to nonexistent.	9.2
USFS-808.1	Lightly utilized.	0.8
Garfield CR-117 (Four-Mile Road)/USFS-300 (USFS-300.4K, USFS-300.4M and USFS-321 <sup>8</sup> )	Heavily utilized in summer. – 14.1 Miles shown on figure and in use as access to well pads, 3.2 miles more to closure gate – non- existent use beyond gate with potential to access leased lands being analyzed in this document.	10.3/14.1 plus 6.8 miles for USFS spur routes
Garfield CR-108/Pitkin CR-1 and 1A (Jerome Park/Thompson Creek/ N Thompson Creek Road)	Lightly utilized.	10.4
Pitkin County CR-3D/USFS-307 (Coal Creek/Coal Basin Road)/	Lightly utilized.	3.4

<sup>1</sup> Roads are detailed from west to east.

<sup>2</sup> Heavily utilized is characterized by daily heavy truck traffic. Light utilization is anything less than daily.

<sup>3</sup> This route as shown on **Figure 3.10-2** would be considered an alternative haul route. The route on USFS lands is currently unsuitable for use by heavy truck traffic and is not considered a viable access route by the Forest Service.

Source: BLM 2015e; Mobley 2015.

**Table 3.10-5 Potential Haul Routes in Zone 4<sup>1</sup>**

Potential Haul Routes	Current Route Utilization <sup>2</sup>	Length (miles)
Rio Blanco CR-15/Moffat County CR 45	Lightly utilized.	17.8/8.8
Rio Blanco CR-48	Nonexistent.	2.7
Rio Blanco CR-51/USFS-252	Lightly utilized.	1.8/3.6

<sup>1</sup> Roads are detailed from west to east.

<sup>2</sup> Heavily utilized is characterized by daily heavy truck traffic. Light utilization is anything less than daily heavy truck traffic. Non-existent is no commercial use.

Source: BLM 2015e; Mobley 2015.

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### **3.11 Lands and Special Uses**

#### **3.11.1 Regulatory Background**

Land use within the WRNF is guided by the WRNF LRMP 2002 Revision. Additional applicable authority and regulations related to rights-of way (ROWs) include the Mineral Leasing Act of 1920 (MLA 1920), as amended, Title V of the FLPMA of October 21, 1976, and 43 CFR 2800/2880 and 36 CFR 251.

#### **3.11.2 Analysis Area**

The analysis area encompasses the 4 lease zones (see **Figure 1-1**).

#### **3.11.3 Regional Affected Environment**

The goal of the BLM lands and realty program is to manage public lands to support resource program goals and objectives, provide for public land uses in accordance with applicable laws and regulations while protecting sensitive resources and improving public land management through land tenure adjustments. As such, the program responds to requests for ROWs, permits, leases, withdrawals, and land tenure adjustments from outside entities.

Forest Service standards regarding realty include but are not limited to retaining existing access rights where needed to meet Forest Plan goals and objectives and pursue access rights where needed to meet forest plan goals and objectives. Additionally, land adjustment activities would need to evaluate and balance the overall combination of all resource values and factors including wildlife habitat, fisheries habitat, riparian areas, wetlands, cultural resources, recreation opportunities, scenic value, watershed protection, timber resources, rangelands, public access, better federal land management, and other factors (USFS 2002a). Further information on standards and guidelines are detailed in the WRNF LRMP, 2002 Revision (USFS 2002a).

#### Mineral Reservations and Outstanding Mineral Rights

Surface land management within the leases is under the authority of the Forest Service. All mineral estate within the leases is owned by the federal government, which is administered by the BLM. There is no private surface landownership or mineral ownership within the leases.

#### Rights-of-Way

ROW corridors are typically used for major oil and gas pipelines; water transmission systems; slurry pipelines, aerial and underground utility facilities for transmission of electricity, major communication facilities, railroads, and major highway and road routes. These areas are managed for construction, operation, and maintenance of facilities associated with public utilities and transportation systems. ROW corridors are typically linear management areas that transect other management areas. Physical disturbance to existing conditions frequently are high within the ROW corridor and low outside the corridor (USFS 2002b).

The MLA (MLA 1920), as amended, (Sec. 28[a]) authorizes a federal agency to grant ROWs for pipeline purposes for the transportation of oil, natural gas, synthetic liquid or gaseous fuels, or any refined product produced. Pipeline projects that traverse several federal land management jurisdictional boundaries fall under the provisions listed in Sec. 28(c)(2) of the MLA, which authorizes the Secretary of the Interior (delegated to the BLM) to grant or renew ROWs or permits. The MLA also directs agencies to require the applicant to submit a plan of construction, operation, and rehabilitation for ROWs.

The Forest Service does not grant ROWs, but does grant special use permits. Granting ROWs is under the jurisdiction of the BLM. Further information regarding ROWs, specifically regarding stipulations, design requirements, and special use permits, including those for water pipeline ROWs, is detailed in the WRNF Oil and Gas Leasing Final EIS (USFS 2014a, pages 375 – 376). There is currently no consistent dataset for the entire analysis area that provides the locations and types of ROWs or easements. However, these types of land use authorizations are common on public lands and may occur within the analysis area.

#### Valid Existing Rights

The BLM understands that individuals and entities may have established valid rights to occupy and use NFS lands under laws and authorities established by Congress. Such valid outstanding rights may exist and will be honored when it is subsequently determined that the claim to such rights meet the criteria set forth in a respective statute granting such occupancy and use (USFS 2002b). Further information regarding honoring valid existing rights and applicable legal precedent is detailed in the WRNF Oil and Gas Leasing Final EIS (USFS 2014a, page 376).

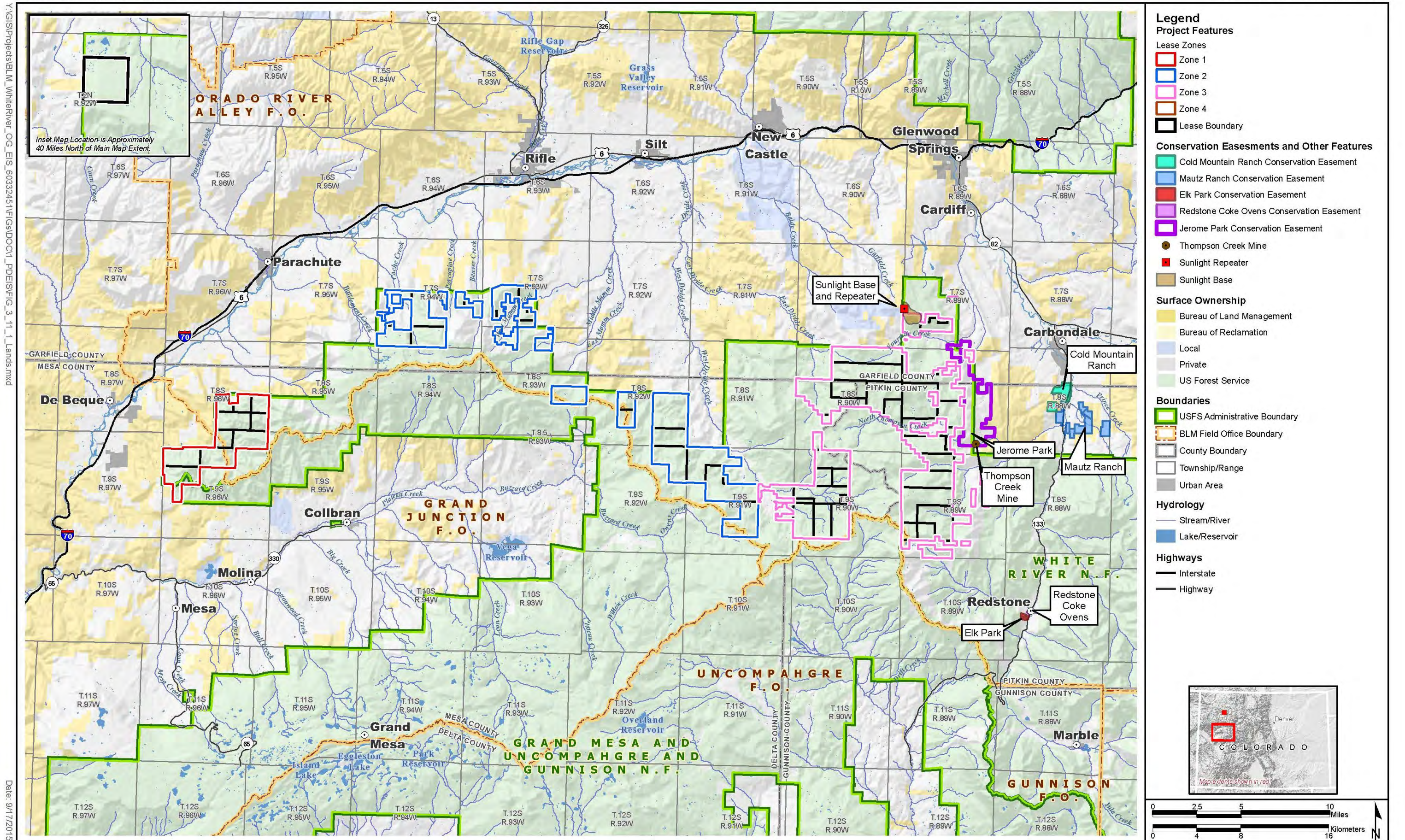
#### Communication Sites

Communication sites are a special use authorization. Special use authorizations apply to all occupancy, use, or improvements on USFS lands that are not directly related to timber harvest, grazing of livestock, mining activities, or recreation. Specific laws and CFR requirements govern decisions regarding these authorizations. The FLPMA provides authority for majority of non-recreation special use authorizations on USFS lands. There is one communication site, the Sunlight Base and Repeater, in Zone 3 (**Figure 3.11-1**).

#### County Land Use Plans and Zoning

The entirety of Zone 1 and a portion of Zone 2 lies within the Mesa County Agricultural, Forestry, Transitional District, which is a Rural Zoning District. The AF-35, Agricultural and Forestry District is primarily intended to provide for the protection and continuation of agriculture and forestry operations, and the preservation of environmentally sensitive lands. Site-specific conditions may limit development in areas considered environmentally sensitive.

Mesa County has produced a Mineral and Energy Resources Master Plan (Mesa County 2011). Goals of the plan include balancing new and traditional technologies related to exploration, development, conservation, and the use of resources in a way that will strengthen economic growth and mitigate environmental impacts (Mesa County 2011). The plan also identifies recommended and mandatory mitigation for sensitive resources, such as visual, transportation, surface water, groundwater, odor, noise, wildfire, air, and biological resources. The Mesa County Energy Atlas, cited within the county's Mineral and Energy Resources Master Plan, shows potential regulatory constraints from roadless areas and natural moderate constraints from natural hazards/geology (Mesa County 2009).



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Figure 3.11.1 Special Uses in the Analysis Area

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Garfield County encompasses portions of Zones 2 and 3, which are zoned as “public.” “Public” zoning is comprised of all land owned by the U.S. Government or the State of Colorado, located in the unincorporated area of the County and not included in any other zone district. Zone District dimensions, such as lot size, setbacks, and height do not apply to public lands within the county; additionally, oil and gas drilling within areas zoned ‘public’ would be exempt from county review and standards (Garfield County 2015b). Additional adjacent lands are zoned Commercial/Limited. These lands are associated with Sunlight Mountain Resort. None of the leases transect lands zoned Commercial/Limited; however, Four-Mile Road, which is a potential haul route, runs adjacent to this designation. Two Planned Unit Developments (PUDs), Oak Meadows and Springridge Reserve, also are adjacent to Four-Mile Road. The Oak Meadows PUD has been in existence since 1977, while the preliminary plan for the Springridge Reserve PUD was approved in 2005. The Garfield County Comprehensive Plan 2030 details county mineral extraction goals, which include ensuring that mineral extraction is regulated appropriately, ensuring that mineral extraction activities mitigate their effects on the natural environment, and working with mineral extraction projects to protect the public health, safety and welfare of its citizens (Garfield County 2013a).

The majority of Zone 3 is in Pitkin County and is within zoning district Resource 30. The general intent of this zoning district is to permit low density, single family residential development, discourage sprawl, preservation of open space, preserve agricultural operations and environmental resources; and preserve the rural visual quality and character while permitting carefully sited low-density development (Pitkin County 2006). The Pitkin County Code does not detail oil and gas development limitations specific to the Thompson Divide. Within Pitkin County, the Board of County Commissioners has authority to approve, conditionally approve, or deny an application for an oil or gas facility and operation in the county; however, in cases where the county does not have the legal right to establish and enforce standards, primarily where those standards are duplicative of state or federal regulations, the Board does not enforce state or federal regulations, or county regulations which duplicate those of the federal or state government (Pitkin County 2006).

All of Zone 4 is within Rio Blanco County and zoned Agricultural. As stated in the Rio Blanco County Master Plan (Rio Blanco 2011), land use policies should keep rural open spaces intact and minimize adverse agricultural impacts. The same plan also states as a goal that the county should make certain that large-scale oil shale and/or mineral development expands operations and ultimately phases down in a manner that protects the quality of life and environmental conditions of Rio Blanco County (Rio Blanco 2011).

#### Other Uses

Other uses in the analysis area, including the Jerome Park Conservation Easement, Cold Mountain Ranch, Mautz Ranch, Elk Park, Redstone Coke Ovens, and Thompson Creek Mine are portrayed on **Figure 3.11-1**. These easements were designated to protect a range of resources, including recreation, agriculture, and cultural preservation. These special use areas are outside of the lease zones, but may be affected by potential haul routes and state highways, (Coal Creek Road, Thompson Creek Road, and State Route-133) or leasing development activity in adjacent lease zones.

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## **3.12 Special Designations**

### **3.12.1 Regulatory Background**

The following regulations guide the management of special designations within the analysis area:

- Wild and Scenic Rivers Act of 1968;
- 2012 State of Colorado Roadless Rule and the 2001 Roadless Area Conservation Rule (36 Colorado Public Rule § 294.13(b)(2));
- The National Scenic Byways Program (established under the Intermodal Surface Transportation Efficiency Act of 1991 and reauthorized in 1998 under the Transportation Equity Act for the 21<sup>st</sup> Century);
- FSM 4063; and
- USFS 2002a.

### **3.12.2 Analysis Area**

The analysis area for special designations consists of the any special designation area intersecting the oil and gas leases or which are close enough to the leases that there is potential for them to be impacted by reasonably foreseeable development of the leases.

### **3.12.3 Analysis Area Affected Environment**

The analysis area contains a number of special and unique resources. Planning procedures and regulations allow for these resources to be recognized and protected. Some special designations emphasize recreation use and interpretation of the environment, while others minimize uses in order to protect special values. The size of individual areas varies depending on the site-specific resource values and management emphasis (USFS 2002b).

Special designations within the region are discussed below and are identified on **Figure 3.12-1**.

#### **3.12.3.1 Research Natural Areas**

Research Natural Areas (RNAs) are located within the analysis area. RNAs serve three important functions: reference areas, biological diversity, and research (USFS 2002b). These functions are detailed below:

- Reference areas – RNAs serve as benchmarks for monitoring and evaluating the sustainability and impacts of land management practices on lands with similar ecosystems.
- Biological diversity – RNAs provide protection for biological diversity.
- Research – RNAs provide sites for research into how ecosystems function, particularly in areas in which ecological and evolutionary processes are functioning in a relatively natural state.

Forest Service Manual FSM 4063 provides specific direction regarding RNA management. Domestic livestock grazing, motorized vehicle use, new road and trail construction, timber management, ski areas, ground-disturbing mineral development, and other intensive management activities generally are restricted or prohibited (USFS 2002b). More detailed information regarding RNAs can be found in the WRNF Oil and Gas Leasing Final EIS (USFS 2014a). There is one RNA within the analysis area, the Lower Battlement Mesa RNA (see **Figure 3.12-1**). The RNA contains a lower elevation system unique within the WRNF and GMUGNF, and contains significant populations of several rare plant species as well as bighorn sheep and other wildlife species.

### 3.12.3.2 Special Interest Areas

Also found near the analysis area are Special Interest Areas (SIAs), designated to recognize a broader range of values than research natural areas, including botanical, geological, historical, paleontological, scenic, or zoological resources. RNAs are considered SIAs although they typically require a higher degree of pristine character to qualify for designation because they serve as ecological baseline references (USFS 2002b). Management implementation guidelines are developed for each SIA to ensure protection of the values for which they were designated (USFS 2002a). The nearest SIA to the leasing areas is Coal Basin SIA, located less than 1,000 feet from the southern portion of Zone 3. More detailed information regarding SIAs can be found in the WRNF Oil and Gas Leasing Final EIS (USFS 2014a).

### 3.12.3.3 Roadless Areas

There are approximately 47,250 acres of Colorado Roadless Areas (CRAs) as defined by the 2012 Roadless Rule within the analysis area (see **Figure 3.12-1**). These areas were evaluated for potential wilderness recommendation, based on capability, availability, and need. No acreage within the lease zones have been designated as wilderness, and roadless areas not recommended for wilderness are generally available for oil and gas leasing depending on the applicable management area guidelines (USFS 2014a). Colorado issued the Colorado Roadless Rule (CRR), which was published in 2012 (FR Vol. 77, No. 128). This rule amends the 2002 Forest Plan, provides the current inventory and direction for roadless areas in the State of Colorado, and provides the final designations for CRAs for each forest. The CRR influences oil and gas exploration and development but does not affect the terms or validity of leases existing prior to the promulgation date of the final rule. This rule preserves surface development rights and limitations on surface development rights existing at the time of adoption of this rule on all oil and gas leases. The CRR applicability is still legally unresolved. Compliance is the responsibility of the Forest Service.

The Roadless Specialist Report (Haskins 2014) prepared in support of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a) provides further history, regulatory detail, and management guidelines for the CRR as it pertains to oil and gas exploration.

### 3.12.3.4 Scenic Byways

Scenic byways promote scenic and historic cultural values along their routes. In 1988, the Forest Service established a National Forest Scenic Byways program to better serve the needs of people visiting the national forests for the purpose of enjoying scenic drives (USFS 2002b). There are two scenic byways adjacent the analysis area, the West Elk Loop Byway and the Flat Tops Byway. The West Elk Loop Byway incorporates a portion of SH-133 between Coal Creek Road and the Town of Carbondale. Total length of the byway is 205 miles. The Flat Tops Byway initiates at SH-13 in the Town of Meeker and extends east for 82 miles via CR-8. The two scenic byways are shown on **Figure 3.12-1**.

### 3.12.3.5 Wilderness and Wild and Scenic Rivers

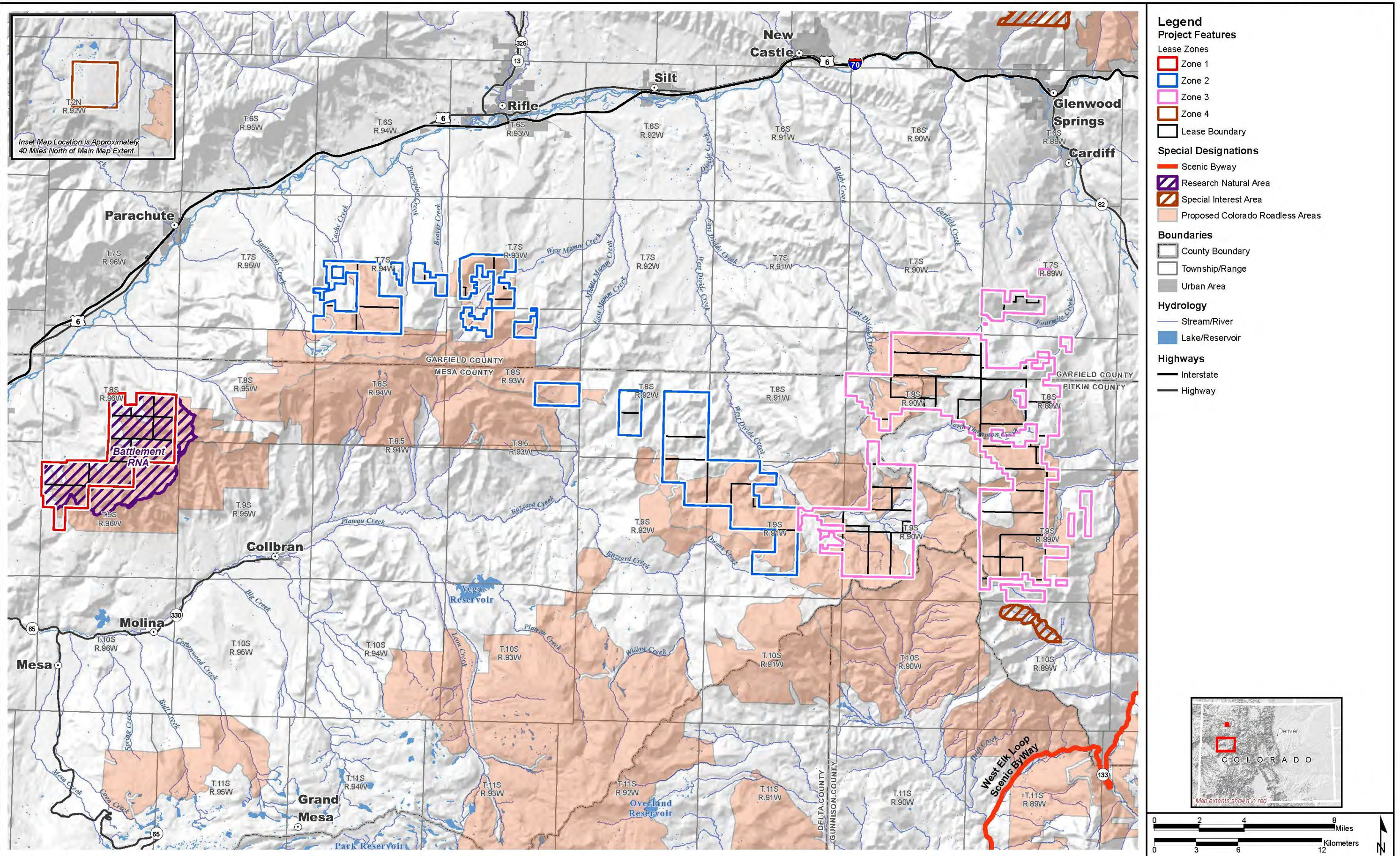
All federal lands within designated wilderness areas, lands recommended for wilderness, and waters eligible under the Wild and Scenic Rivers act were made administratively unavailable for oil and gas leasing in the 2002 Forest Plan (USFS 2002a). There are no designated wilderness areas, lands recommended for wilderness, or designated wild and scenic river areas within the leases.

### 3.12.4 Special Designations within the Leases

The four lease zones encompass portions of two special designations: RNAs and CRAs as defined by the 2012 Roadless Rule. There are no SIAs within the leasing zones, although an SIA is adjacent to Lease Zone 3.



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**Legend**

**Project Features**

Lease Zones

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Lease Boundary

**Special Designations**

- Scenic Byway
- Research Natural Area
- Special Interest Area
- Proposed Colorado Roadless Areas

**Boundaries**

- County Boundary
- Township/Range
- Urban Area

**Hydrology**

- Stream/River
- Lake/Reservoir

**Highways**

- Interstate
- Highway

Figure 3.12-1 Special Designations

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**Table 3.12-1** shows the acreage of each of these areas within the leasing zones, as well as the total percentage that they comprise within the zones. They also are portrayed in **Figure 3.12-1**.

**Table 3.12-1 Special Designations Within the Lease Areas**

Resource Issue	Lease Area (acres)	Percent of Lease Area
Research Natural Areas	9,572	12
Special Interest Areas	0	0
Colorado Roadless Areas	33,130	41

**3.12.4.1 Zone 1**

There are approximately 9,572 acres of one RNA (the Lower Battlement Mesa RNA) within Zone 1 as shown in **Table 3.12-2**. The Lower Battlement Mesa RNA provides a representation of low-elevation ecosystem types. Large populations of several rare plant species and the lack of roads add to enhance the ecological value of the RNA (USFS 2014a). This RNA intersects 10 leases.

Approximately 97 percent of Zone 1 is comprised of CRAs, which intersect 10 leases.

**Table 3.12-2 Land Uses and Designations in Zone 1**

Land Uses and Designations	Acres	Percent of Zone
Lower Battlement Mesa Research Natural Area	9,572	95
Colorado Roadless Areas	7,285	72

**3.12.4.2 Zone 2**

There are no RNAs within Zone 2. Approximately 72 percent of Zone 2 is comprised of CRAs, which intersect 18 leases. CRA acreage is shown in **Table 3.12-3**.

**Table 3.12-3 Land Uses and Designations in Zone 2**

Land Uses and Designations	Acres	Percent of Zone
Research Natural Areas	0	0
Colorado Roadless Areas	15,934	64

**3.12.4.3 Zone 3**

There are no RNAs within Zone 3. Approximately 64 percent of Zone 2 is comprised of CRAs, which intersect 26 leases. CRA acreage is shown in **Table 3.12-4**.

**Table 3.12-4 Land Uses and Designations in Zone 3**

Land Uses and Designations	Acres	Percent of Zone
Research Natural Areas	0	0
Colorado Roadless Areas	24,031	56

**3.12.4.4 Zone 4**

There are no RNAs within Zone 4. Approximately 8 percent of Zone 4 is comprised of CRAs, which intersect 1 lease. CRA acreage is shown in **Table 3.12-5**.

**Table 3.12-5 Land Uses and Designations in Zone 4**

<b>Land Uses and Designations</b>	<b>Acres</b>	<b>Percent of Zone</b>
Research Natural Areas	0	0
Colorado Roadless Areas	0	0

### **3.13 Recreation**

#### **3.13.1 Regulatory Background**

The 2002 USFS WRNF LRMP guides direct recreation activities on NFS lands within the analysis area. EO 13443 directs federal agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

#### **3.13.2 Analysis Area**

The analysis area encompasses those portions of the WRNF and a small portion of the GMUGNF within the 4 lease zones (see **Figure 1-1**).

#### **3.13.3 Regional Affected Environment**

The WRNF, established in 1891 and consisting of 2.3 million acres, is the most visited national forest in the nation, generating approximately 12 million visitors per year (USFS 2014a; Statewide Comprehensive Outdoor Recreation Plan [SCORP] 2014). The WRNF provides more than 2,500 miles of trails, 1,900 miles of NFS roads, 66 campgrounds, 12 ski areas, and eight wilderness areas (USFS 2013b). Recreational activities are primarily skiing, hiking, hunting, biking, horseback riding, all-terrain vehicle and motorcycle riding, four-wheel driving, fishing, camping, and driving for pleasure.

A large portion of the Upper Colorado River's water originates in the headwater regions of the WRNF. These headwaters also provide recreational pursuits, which include fishing, boating, and camping (USFS 2002b). Approximately 400,000 annual recreational fishing visits to the forest occur annually. The forest provides a wide variety of recreational fishing experiences from lakes that experience high visitor density to small secluded streams (USFS 2002b). Rafting opportunities also are found within the forest, through either permitted outfitters or on one's own. These water recreation activities are found along numerous streams and rivers within the analysis area, such as the Colorado and Frying Pan rivers. Additionally, numerous hiking trails cross throughout the analysis area, including trails to the summits of 10 peaks over the elevation of 14,000 feet.

There are eight counties within the WRNF. Of these eight counties, Garfield, Rio Blanco, Pitkin, and Mesa counties contain the previously issued leases. Towns within these counties, such as Parachute, Meeker, Craig, Rifle, Silt, New Castle, Glenwood Springs, Basalt, Aspen, Carbondale, and Redstone provide easy local access to recreational opportunities. These local recreational opportunities are some of the reasons that many residents live in these communities. A more detailed description of the local communities can be found in the Recreation Specialist Report prepared for the WRNF Oil and Gas Leasing Final EIS (Hopkins 2014). According to the 2014 SCORP, Colorado's population is expected to increase substantially in the coming decades, with state forecasters predicting the population exceeding 7.7 million by 2040. The majority of growth is expected to take place in the metropolitan Front Range counties, as well as Boulder, Jefferson, Summit, and Lake counties, and western slope counties, such as Eagle, Garfield, and Mesa counties. This population growth will ensure an increasing demand for recreational activities within the analysis area.

#### **3.13.4 Analysis Area Affected Environment**

The WRNF is broken into management areas that include specific direction on how to manage different land uses based on the LRMP (USFS 2002a). Each management area is defined by primary emphases and a set of elements that guides the activities taking place within it. The management areas with a recreational emphasis that transect the lease zones are depicted on **Figure 3.13-1** and described below and in **Table 3.13-1**.

**Table 3.13-1 Management Areas with a Recreational Emphasis Within the Analysis Area**

Zones	Management Area	Management Area Acreage	Percent of Zone
1	NA	0	0
2	3.31, Backcountry Recreation, Year-round Motorized	515	1
	3.32, Backcountry Recreation, Non-motorized with Winter Motorized	872	14
3	4.3, Dispersed Recreation	464	7
4	NA	0	0

Management Area 3.31, Backcountry Recreation, Year-round Motorized

These areas are managed to provide summer motorized recreation on roads and trails and winter motorized recreation throughout the area in a natural-appearing landscape.

Management Area 3.32, Backcountry Recreation, Non-motorized with Winter Motorized

These areas are managed to provide recreation opportunities in a natural-appearing landscape.

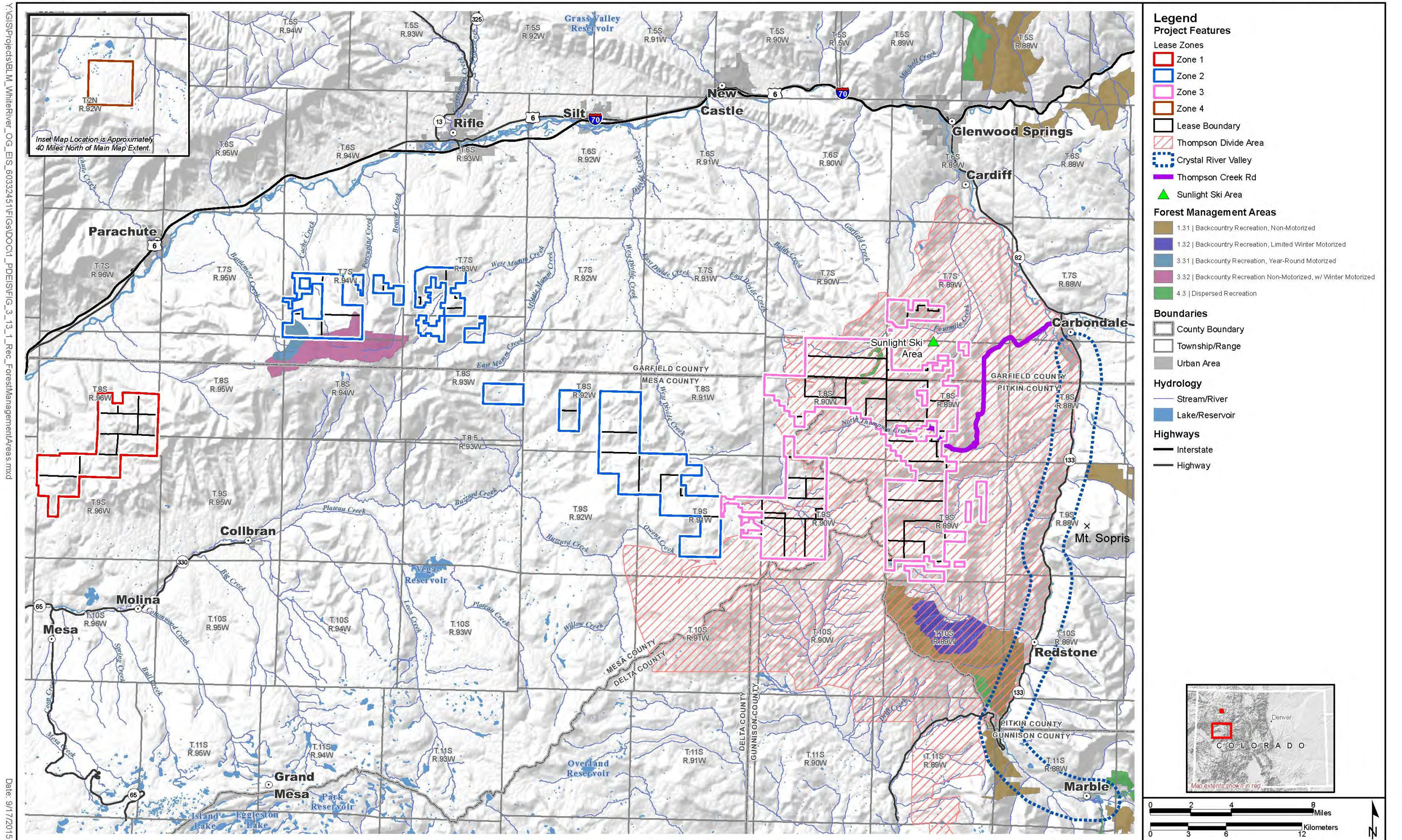
Management Area 4.3, Dispersed Recreation

These areas are managed to provide undeveloped recreation opportunities in natural or natural-appearing landscapes.

If a management area does not have a recreational emphasis, recreation still may take place essentially anywhere. Further description of each management area is located in the Recreation Specialist Report (Hopkins 2014) and the 2002 Final EIS for the LRMP (USFS 2002a). Sensitive areas which see elevated levels of recreational use, such as the Thompson Divide, Crystal River Valley, Sunlight Ski Area, and Thompson Creek Road area also portrayed on **Figure 3.13-1**.

For each management area, one or more recreation opportunity spectrum (ROS) objectives may apply. The ROS is a classification tool that groups NFS lands into six management class categories defined by setting and the recreational experiences and activities. These classes are urban, rural, roaded natural, semi-primitive motorized, semi-primitive non-motorized, and primitive. A limited description of each class category (USFS 1982) is listed below:

- Urban – Settings are dominated by human-made features and evidence of management. Sights and sounds of humans on-site are predominant. Large numbers of users can be expected. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.
- Rural – Settings are dominated by human-made features and evidence of management. Sights and sounds of humans are readily evident and interaction between users is often moderate to high. Facilities for intensified motorized use and parking are available.
- Roaded Natural – Settings are within 0.5 mile of better than primitive roads. Interaction between users may be low to moderate, but with evidence of other users prevalent. Conventional motorized use is provided for in construction standards and design of facilities.
- Semi-primitive Motorized – Settings are within 0.5 mile of primitive roads and the area is characterized by a predominantly natural or natural-appearing environment. Concentration of users is low, but there is often evidence of other users. Motorized use is permitted.



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Figure 3.13-1 Recreation and Management Areas

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- Semi-primitive Non-motorized – Settings are 0.5 to 3 miles from roads and the area is characterized by a predominantly natural or natural-appearing environment. Interaction between users is low, but there is often evidence of other users. Motorized use is not permitted.
- Primitive – Settings are at least 3 miles from roads and have no or extremely little evidence of management or human alteration. Interaction between users is very low and evidence of other users is minimal. Motorized use is not permitted.

Summer and winter ROS classifications are detailed in **Figure 3.13-2** and **3.13-3**. A more detailed explanation of ROS classifications is found in the WRNF 2014 Recreation Specialist Report (Hopkins 2014).

The 2014 SCORP provides strategies for sustaining Colorado’s outdoor recreation heritage. WRNF is within the SCORP Northwest Regional Analysis area. Skiing and snowboarding make up 10 million activity days. The nearest, Sunlight Mountain Resort, is adjacent to Zone 3. There are no ski resorts within the leasing zones. As detailed earlier, Colorado’s population is expected to increase substantially in the coming decades. This population growth will ensure an increasing demand for recreational activities within the analysis area and the need for subsequent recreational planning (SCORP 2014).

Both summer and winter activities are popular within the analysis area. **Table 3.13-2** details the three most popular activity types, by percent of the Colorado population that participated, for summer and winter recreation within the SCORP Northwest Regional Analysis area (Region 1). As is detailed in the table, hiking and backpacking, as a percent of population involvement, were the most common types of summer activity, followed by walking, and tent camping. Skiing or snowboarding at a ski resort was by far the most popular winter activity, followed by snowshoeing or cross-country skiing, and backcountry skiing. There are several designated winter groomed trail systems under special use. The Spring Gulch Nordic Ski Area, with 13 miles of trails, is just adjacent to Zone 3. Downhill skiing or snowboarding does not take place within the lease zones.

**Table 3.13-2 Common Recreation Activity Types Within the Analysis Area**

Type of Activity	Most Common Activity/Percent of CO Population	2 <sup>nd</sup> Most Common Activity/Percent of CO Population	3 <sup>rd</sup> Most Common Activity/Percent of CO Population
Trail/Road Activities	Hiking/Backpacking 27.6 percent	Walking 22.8 percent	Mountain Biking 7.8 percent
Water-based Activities	Fishing 10.6 percent	Swimming 6.9 percent	Power Boating 4.2 percent
Wildlife Related Activities	Wildlife viewing 5.7 percent	Big Game hunting 5.3 percent	Upland bird and small game hunting 2.3 percent
Other Outdoor Activities	Tent Camping 15.6 percent	Picnicking 9.7 percent	Developed/RV camping 7.1 percent
Winter Activities	Skiing or snowboarding at a ski area 27.3 percent	Snowshoeing or cross-country skiing 10.1 percent	Backcountry skiing 5.8 percent

Source: SCORP 2014.

#### 3.13.4.1 Developed Recreation

Developed recreation includes a variety of activities generally dependent on developed facilities such as campgrounds and trailheads. At developed recreation sites, facilities have been constructed to provide recreation experiences, protect resources, or otherwise manage activities. These infrastructure developments range from a complete campground with a water system, toilets, and showers, to a simple bulletin board or parking barriers at a parking lot. Trailhead and family campgrounds comprise the majority of publicly developed sites followed by boating and fishing sites. Privately developed sites are mostly comprised of recreation residences and huts. There are a total of two developed recreation areas within the leasing zones, the Beaver Creek and Cayton trailheads. These developed recreation areas are located within lease Zone 2. Further descriptions of developed recreation are located in the WRNF 2014 Recreation Specialist Report (Hopkins 2014).

#### 3.13.4.2 Dispersed Recreation

Dispersed recreation occurs where there are no developed facilities present and is generally defined as activities more unstructured or dispersed in nature and not facility dependent. Dispersed recreation requires few if any improvements and typically occurs in conjunction with roads or trails and is often day-use oriented. There are many dispersed recreation opportunities on the forest. Dispersed recreation consists of a wide variety of recreation activities, such as pleasure driving, hunting, wildlife and nature viewing, participating in guided or unguided tours or walks, biking, hiking, picnicking, and rafting. Winter activities include backcountry/cross-country skiing, snowshoeing, and snowmobiling. Approximately 50 percent of the total recreation use on the forest is dispersed (USFS 2002a).

Big game hunting is a common dispersed recreation activity that takes place within the analysis area. Big game hunting season is typically from mid-August through early November. The zones are located within or adjacent to GMUs 12, 23, 42, and 43. The GMUs are managed by CPW. GMUs 42 and 43 are generally located south of I-70 from De Beque to Glenwood Springs. GMUs 12 and 23 are located east and northeast of the town of Meeker. Some of the most common species hunted are elk and deer. Reportedly, the largest elk herd is located east of the town of Meeker. Bear, moose, mountain goat, and Rocky Mountain bighorn sheep hunting take place within the analysis area as well, but to a lesser extent, as does waterfowl and small game hunting.

**Table 3.13-3** shows deer hunting statistics from 2009 through 2013. **Table 3.13-4** details elk hunting statistics for the same timeframe. The number of deer hunters across the GMUs has generally declined during the 2009 to 2013 timeframe, with the exception of GMU 23, which stayed fairly static. Total deer harvests across the GMUs either declined or rose and fell within a relatively narrow range. The opposite is the case for elk hunting, with the number of elk hunters rising in all the GMUs with the exception of GMU 12. In spite of the rise in the number of hunters, the total elk harvest declined in most of the GMUs over the 2009 to 2013 timeframe.

As detailed in **Table 3.13-2**, fishing is the most prolific water based activity within the region. CPW has primary responsibility for managing fish populations on the forest, and has actively stocked catchable and smaller fish throughout the forest, enhancing recreational fishing opportunities. Fishing piers, boardwalks, trails, parking areas, and informational signs have been constructed to enhance the recreational fishing experience in the region (USFS 2002a). There are 155 outfitter and guide permits throughout the forest, offering numerous services ranging from fishing to cross-country skiing and hunting (USFS 2013b; 2002a). Furthermore, as of 2013, 291 recreation special use permits were administered (USFS 2013b). More detailed information regarding outfitters, recreation special uses, and other dispersed recreation activities can be found in the WRNF 2014 Recreation Specialist Report (Hopkins 2014).

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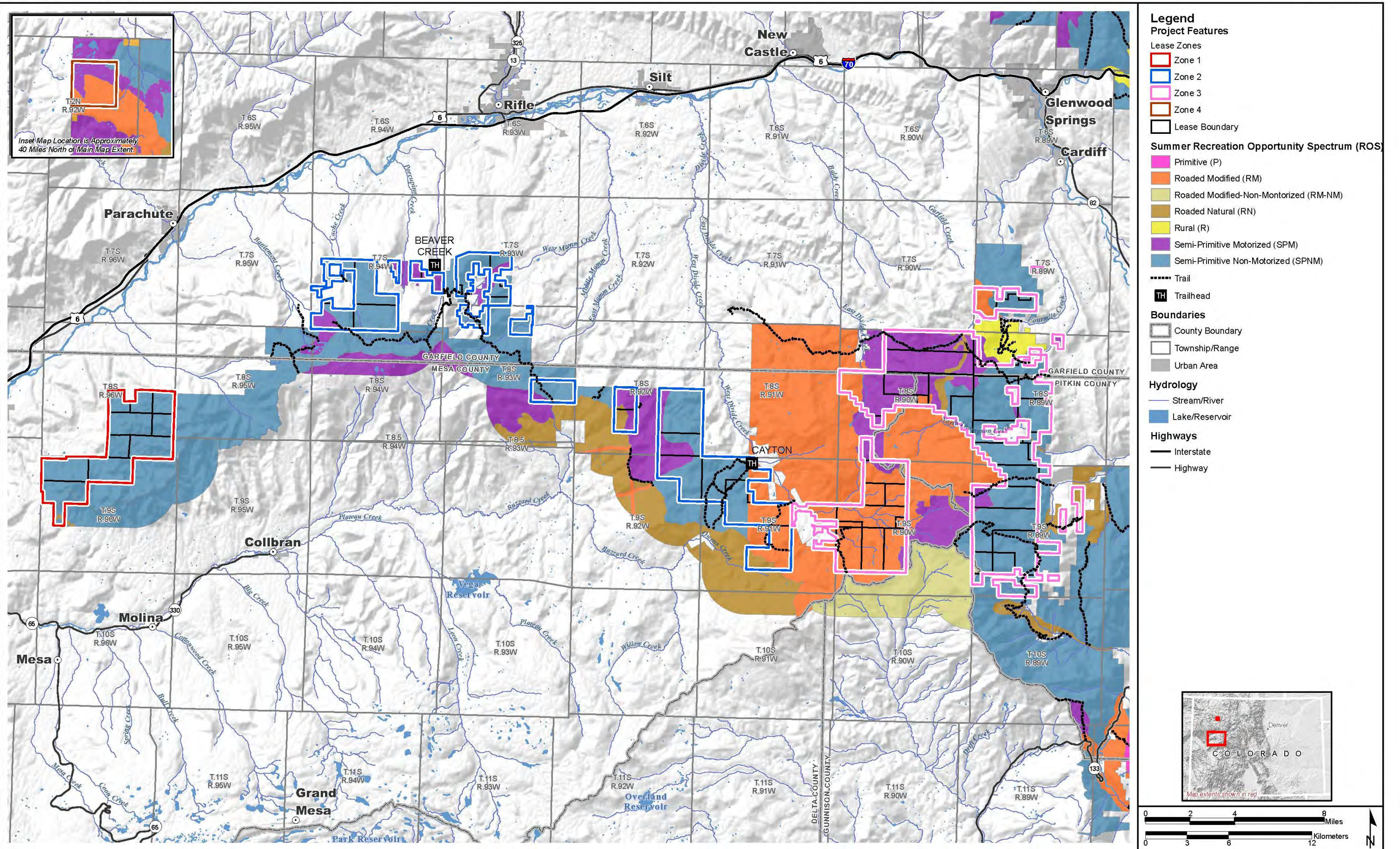


Figure 3.13-2 Summer Recreation Opportunity Spectrum Classifications in the Analysis Area

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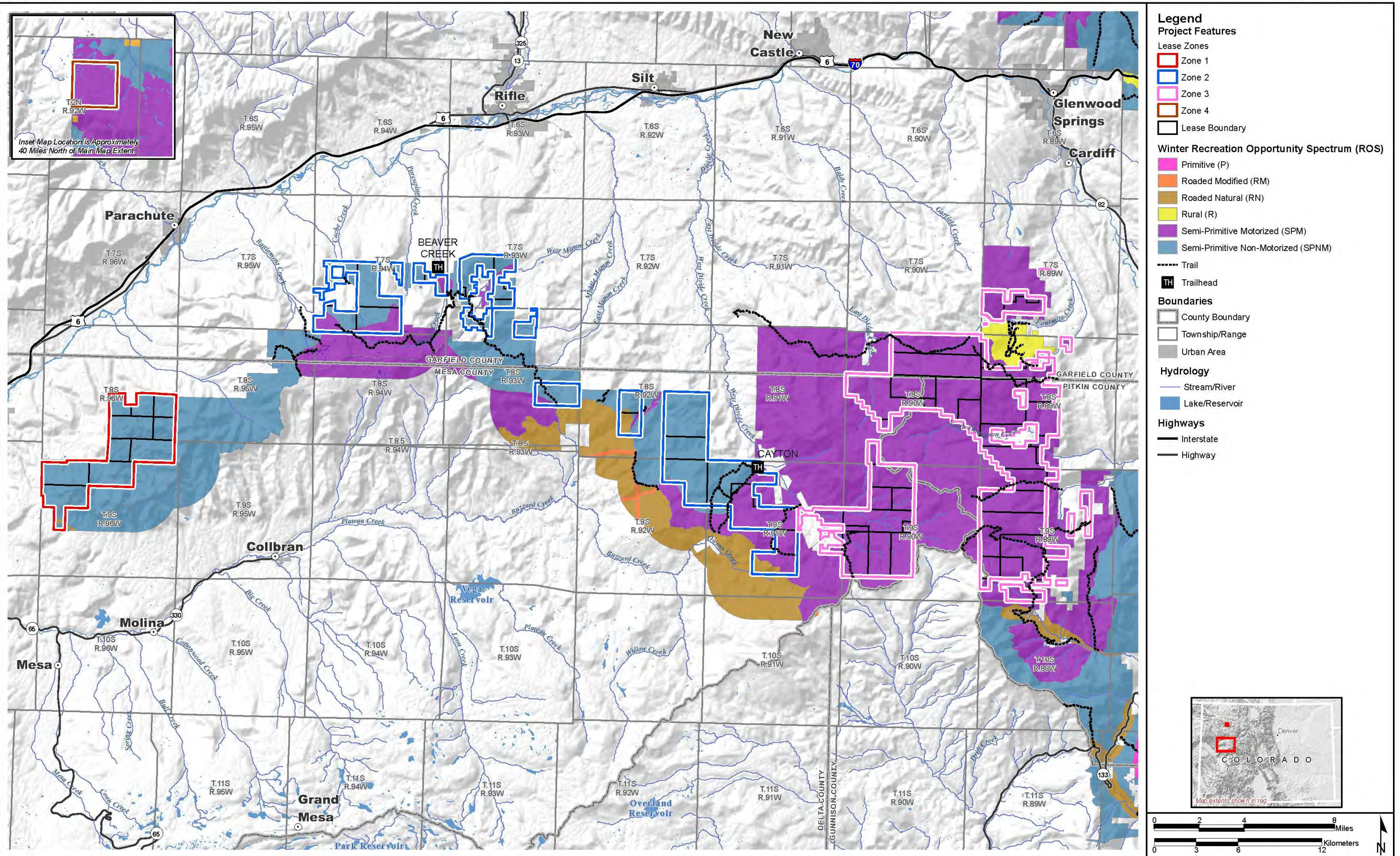


Figure 3.13-3 Winter Recreation Opportunity Spectrum Classifications in the Analysis Area

**Table 3.13-3 Deer Hunting Statistics**

<b>Game Management Unit/Year</b>	<b>Total Deer Harvest</b>	<b>Total Hunters</b>	<b>Total Rec. Days</b>
<b>GMU 42</b>			
2013	550	1,255	5,313
2012	582	1,249	5,792
2011	728	1,620	7,192
2010	798	1,546	6,671
2009	680	1,525	6,843
<b>GMU 43</b>			
2013	286	739	3,763
2012	241	788	4,443
2011	279	786	3,644
2010	287	861	4,594
2009	285	862	4,391
<b>GMU 12</b>			
2013	318	644	2,816
2012	307	657	2,849
2011	318	726	3,647
2010	388	804	3,941
2009	386	918	4,691
<b>GMU 23</b>			
2013	223	680	3,384
2012	303	684	3,186
2011	282	864	4,230
2010	294	879	3,827
2009	200	708	3,649

Source: CPW 2014e.

**Table 3.13-4 Elk Hunting Statistics**

Game Management Unit/Year	Total Elk Harvest	Total Hunters	Total Rec. Days
<b>GMU 42</b>			
2013	815	3,971	19,882
2012	805	3,501	17,166
2011	667	3,038	15,169
2010	504	2,950	15,603
2009	562	2,407	12,094
<b>GMU 43</b>			
2013	633	3,275	16,927
2012	719	3,683	19,025
2011	797	3,582	17,539
2010	726	3,396	17,009
2009	642	3,194	15,263
<b>GMU 12</b>			
2013	1,776	5,583	23,010
2012	1,949	5,637	24,409
2011	1,796	5,513	23,655
2010	2,161	5,499	23,485
2009	2,134	5,889	24,980
<b>GMU 23</b>			
2013	773	4,228	18,673
2012	951	4,267	19,685
2011	921	4,713	21,232
2010	1,163	3,903	16,517
2009	1,024	3,854	17,498

Source: CPW 2014e.

**3.13.4.3 Zone 1**

**Table 3.13-5** details summer and winter ROS classifications within Zone 1. The zone is dominated by the semi-primitive non-motorized classification indicating that the area is predominantly natural or natural-appearing with a low concentration of users. There are no developed recreation sites within this zone, and as is detailed in **Table 3.13-1**, there is no management acreage with a recreational emphasis within Zone 1.

**Table 3.13-5 ROS Classifications Zone 1**

ROS Classifications	Urban (percent/ acres)	Rural (percent/ acres)	Roaded Natural (percent/acres)	Semi-primitive Motorized (percent/acres)	Semi-primitive Non-motorized (percent/acres)	Primitive (percent/ acres)
<b>Zone 1</b>						
Acres of Summer ROS classifications	0/0	0/0	<1/44	0/0	99/10,037	<1/33
Acres of Winter ROS classifications	0/0	0/0	<1/44	0/0	99/10,037	<1/33

**3.13.4.4 Zone 2**

**Table 3.13-6** details summer and winter ROS classifications within Zone 2. The zone is dominated by the summer and winter semi-primitive non-motorized classification indicating that the area is predominantly natural or natural-appearing with a low concentration of users. This is followed by summer and winter semi-primitive motorized and roaded natural classifications. Motorized travel is allowed within these two classifications. There are two developed recreation sites within this zone, and as is detailed in **Table 3.13-1**, 14 percent of the lease zone transects management areas that have a recreational emphasis. The two developed recreation sites are the Beaver Creek and Cayton trailheads. There are approximately 16 miles of recreational trails within this zone. The Sunlight to Powder Horn snowmobile trail from Sunlight Ski Resort to Powderhorn Ski Resort which includes approximately 120 miles of groomed and ungroomed trails transects a portion of Zone 2.

**Table 3.13-6 ROS Classifications Zone 2**

ROS Classifications	Urban (percent/ acres)	Rural (percent/ acres)	Roaded Natural (percent/acres)	Semi-primitive Motorized (percent/acres)	Semi-primitive Non-motorized (percent/acres)	Primitive (percent/ acres)
<b>Zone 2</b>						
Acres of Summer ROS classifications	0/0	0/0	16/4,107	18/4,400	65/16,322	<1/110
Acres of Winter ROS classifications	0/0	0/0	4/888	26/6,610	69/17,331	<1/110

**3.13.4.5 Zone 3**

**Table 3.13-7** details summer and winter ROS classifications within Zone 3. The zone is dominated by the summer and winter semi-primitive non-motorized classification indicating that the area is predominantly natural or natural-appearing with a low concentration of users. This is followed by summer roaded natural and semi-primitive motorized classifications. Motorized travel is allowed within these two classifications. There are no developed recreation sites within this lease zone, and as is detailed in **Table 3.13-1**, 7 percent of the zone transects management areas that have a recreational emphasis. There are approximately 22 miles of recreational trails within this zone. Although there are no developed recreation sites within the lease zone, there are five trailheads (Babbish Gulch, Four Mile Complex, South Branch of Thompson Creek, Dexter Park, and Braderich Creek), and four winter trailheads (2-Fourmile Complex, Marion Gulch, and Spring Gulch Ski Area) which are adjacent to the leasing zone. Additionally, the Sunlight to Powder Horn snowmobile trail from Sunlight Ski Resort to Powderhorn Ski Resort which includes approximately 120 miles of groomed and ungroomed trails transects a portion of Zone 3.

**Table 3.13-7 ROS Classifications Zone 3**

ROS Classifications	Urban (percent/ acres)	Rural (percent/ acres)	Roaded Natural (percent/acres)	Semi-primitive Motorized (percent/acres)	Semi-primitive Non-motorized (percent/acres)	Primitive (percent/ acres)
<b>Zone 3</b>						
Acres of Summer ROS classifications	0/0	<1/10	29/12,537	25/10,544	46/19,600	<1/76
Acres of Winter ROS classifications	0/0	<1/10	0/0	99/42,556	<1/125	<1/76

**3.13.4.6 Zone 4**

**Table 3.13-8** details summer and winter ROS classifications within Zone 4. The majority of the zone is comprised by the summer roaded natural classification indicating that interaction between users may be low to moderate in this area. This is followed by summer semi-primitive motorized classifications. Motorized travel is allowed within these two classifications. The summer semi-primitive non-motorized classification makes up the remainder of the zone. The zone is dominated by the winter semi-primitive motorized classification indicating that the area is predominantly natural or natural-appearing environment. There are no developed recreation sites within this zone, and as is detailed in **Table 3.13-1**, there is no management acreage with a recreational emphasis within Zone 1. There is approximately 1 mile of recreational trails within this zone.

**Table 3.13-8 ROS Classifications Zone 4**

ROS Classifications	Urban (percent/ acres)	Rural (percent/ acres)	Roaded Natural (percent/acres)	Semi-primitive Motorized (percent/acres)	Semi-primitive Non-motorized (percent/acres)	Primitive (percent/ acres)
<b>Zone 4</b>						
Acres of Summer ROS classifications	0/0	0/0	52/1,347	44/1,119	4/96	0/0
Acres of Winter ROS classifications	0/0	0/0	0/0	96/2,466	4/96	0/0



### **3.14 Livestock Grazing**

#### **3.14.1 Regulatory Background**

The following regulations authorize and guide livestock grazing on NFS lands:

- Taylor Grazing Act of 1934
- Organic Administration Act of 1897
- Federal Land Policy and Management Act
- Public Rangelands Improvement Act of 1978
- NFMA of 1976
- Granger Thye Act of 1950
- FSM 2201

#### **3.14.2 Analysis Area**

The analysis area for livestock consists of the portion of the 19 grazing allotments overlapped by the 65 existing leases under evaluation within the four zones identified in Chapter 1.0 (**Figure 3.14-1**).

#### **3.14.3 Regional Affected Environment**

Livestock grazing operations have been active within the WRNF for almost 100 years and is regulated under a system of Forest Service grazing permits that allows for a set number of livestock to graze within an allotment for a defined period of time. The grazing permits are issued at a level that considers the overall condition and health of the rangeland.

The WRNF supports approximately 65 livestock grazing operations on 88 active allotments (USFS 2014a). As stated in the Final EIS for the WRNF 2002 LRMP (USFS 2002b), approximately 45 percent of the total forage is available for livestock grazing (USFS 2002b). USFS grazing allotments are managed in accordance with the standards and guidelines in the 2002 LRMP (USFS 2002b).

#### **3.14.4 Analysis Area Affected Environment**

Analysis area overlaps a total of 16 allotments ranging in size from approximately 4,400 acres to 95,390 acres and producing approximately 1 Animal Unit Month (AUM) per 12 acres. The allotment boundaries that overlap the analysis area and the zones are displayed on **Figure 3.14-1**.

Various rangeland improvements and infrastructure have been constructed within the analysis area. According to Forest Service GIS data, these consist mainly of fences, handling facilities (livestock trails and stock driveways), cattle guards, and out buildings.

##### **3.14.4.1 Zone 1**

One grazing allotment is overlapped by the leases in Zone 1 as shown in **Table 3.14-1**. The Wallace Creek Cattle and Horse (C&H) allotment contains some fencing and a few facilities; however, they are to the east of the allotment lease overlap.

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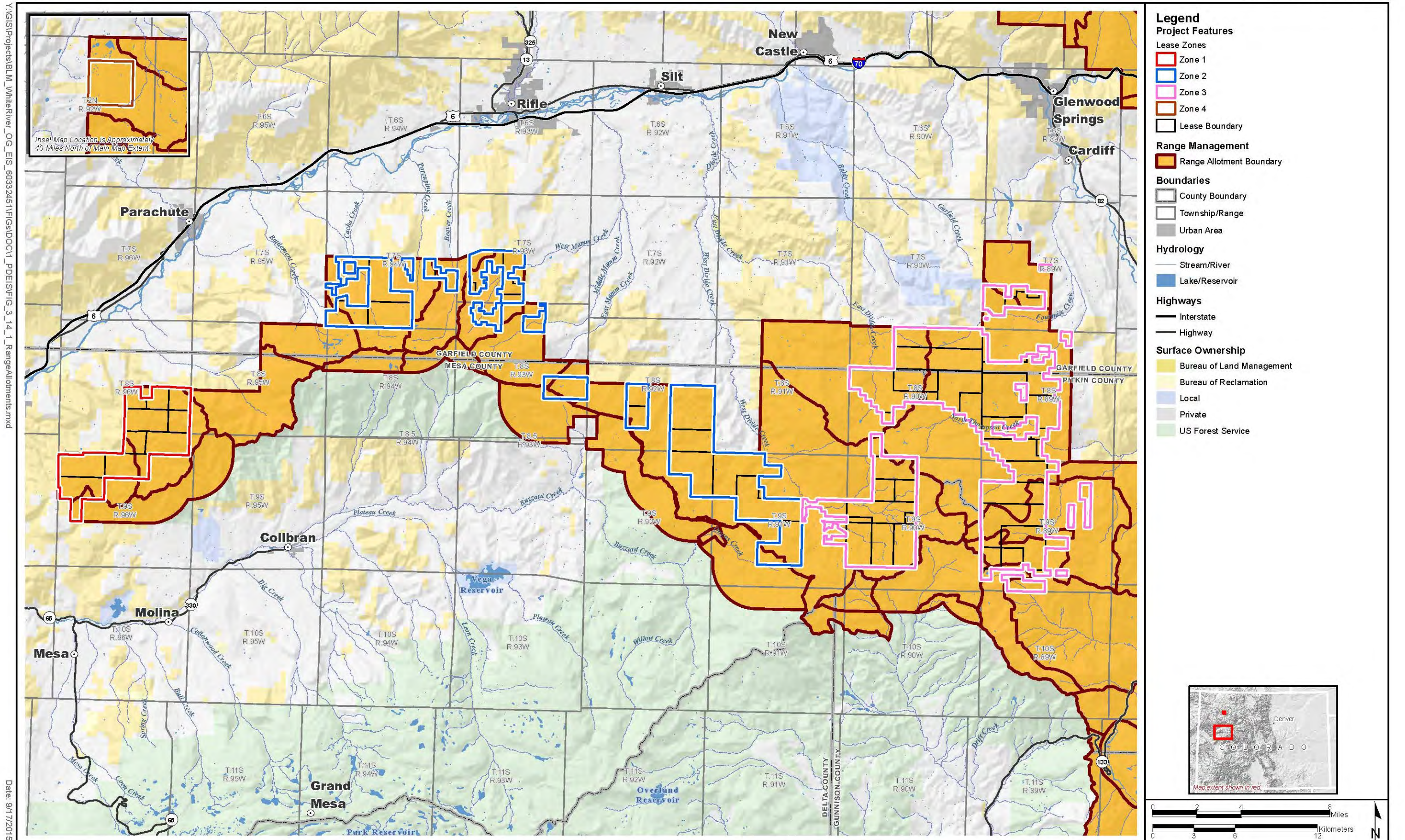


Figure 3.14-1 Livestock Grazing Allotments

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**Table 3.14-1 Grazing Allotments Overlapped by Zone 1 Leases**

Allotments within the Zone 1	Allotment Total Acreage	Intersected Leases (No.)
Wallace Creek C&H	7,546	COC 066731

**3.14.4.2 Zone 2**

Eight grazing allotments are overlapped by the leases in Zone 2 as shown in **Table 3.14-2**. Zone 2 overlaps with portions of allotments that contain rangeland fences, handling facilities, and an outbuilding.

**Table 3.14-2 Grazing Allotments Overlapped by Zone 2 Leases**

Allotments within the Zone 2	Allotment Total Acreage	Intersected Leases (No.)
Battlement Creek	4,830	COC 067543
Beaver Creek C&H	4,795	COC 066920
		COC 067542
		COC 070014
		COC 075070
Buzzard	13,616	COC 066917
		COC 072157
Cache Creek C&H	10,336	COC 066920
		COC 067542
		COC 067543
		COC 067544
		COC 070014
		COC 070015
		COC 070016
Cheney Creek	4,840	COC 070013
Hunter C&H	5,994	COC 061121
		COC 067147
		COC 067150
		COC 075070
		COC 076123
Mamm Creek C&H	6,059	COC 067147
		COC 067150
		COC 070013

**Table 3.14-2 Grazing Allotments Overlapped by Zone 2 Leases**

Allotments within the Zone 2	Allotment Total Acreage	Intersected Leases (No.)
West Divide C&H	56,574	COC 066723
		COC 066724
		COC 066915
		COC 066916
		COC 066917
		COC 066918
		COC 070013
		COC 070361
		COC 072157

**3.14.4.3 Zone 3**

Seven grazing allotments are overlapped by the leases in Zone 3 as shown in **Table 3.14-3**. Zone 3 overlaps with portions of allotments that contain rangeland fences, handling facilities, and an outbuilding.

**Table 3.14-3 Grazing Allotments Overlapped by Zone 3 Leases**

Allotments within the Zone 3	Allotment Total Acreage	Intersected Leases (No.)
Coal Basin C&H	19,852	COC 066695
		COC 066698
		COC 066699
		COC 066700
		COC 066701
		COC 066702
East Divide C&H	19,108	COC 066706
		COC 066707
		COC 066708
		COC 066709
		COC 066710
Lake Ridge C&H	11,995	COC 066695
		COC 066696
		COC 066697
		COC 066698
		COC 066699
		COC 066701
Muddy Sheep and Goat	6,976	COC 058838
		COC 066700
		COC 066702

**Table 3.14-3 Grazing Allotments Overlapped by Zone 3 Leases**

Allotments within the Zone 3	Allotment Total Acreage	Intersected Leases (No.)
North Thompson/ Fourmile C&H	37,663	COC 066687
		COC 066688
		COC 066689
		COC 066690
		COC 066691
		COC 066692
		COC 066693
		COC 066694
		COC 066695
		COC 066696
		COC 066697
		COC 066698
		COC 066706
		COC 066707
		COC 066708
		COC 066709
		COC 066710
		COC 066711
		COC 066712
		COC 066908
COC 066909		
COC 066913		
Threemile C&H	4,433	COC 066687
		COC 066688
West Divide C&H	56,574	COC 058835
		COC 058836
		COC 058837
		COC 058838
		COC 058839
		COC 058840
		COC 058841
		COC 066709
		COC 066913

**3.14.4.4 Zone 4**

One grazing allotment is overlapped by the lease in Zone 4 as shown in **Table 3.14-4**. There are no rangeland improvements overlapped by Zone 4.

**Table 3.14-4 Grazing Allotments Overlapped by Zone 4 Leases**

<b>Allotments within the Zone 4</b>	<b>Allotment Total Acreage</b>	<b>Intersected Leases (No.)</b>
Lantern Ridge Sheep and Goat	8,858	COC 066948



### 3.15 Scenic Resources

This section describes the affected environment based on the potential construction, operation, and maintenance of oil and gas facilities within the existing leases in the analysis area. Scenic resources are defined as “Attributes, characteristics, and features of landscapes that provide varying responses from, and varying degrees of benefits to, humans” (USFS 1996).

#### 3.15.1 Regulatory Background

The NEPA and NFMA, described briefly in Chapter 1.0, all establish federal policies that require consideration of impacts of federal actions on the human environment, aesthetics, and the quality of the surroundings, including scenic values.

The NFMA Part 219.21(f) requires: “The visual resource shall be inventoried and evaluated as an integrated part of evaluating alternatives in the forest planning process, addressing both the landscape’s visual attractiveness and the public’s visual expectation. Management prescriptions for definitive land areas of the forest shall include visual quality objectives.”

FSM 2300, Recreation, Wilderness, and Related Resource Management, Chapter 2380 – Landscape Management, requires the inventory, evaluation, management, and, where necessary, restoration of scenery as a fully integrated part of the ecosystems of NFS lands and of the land and resource management and planning process. This manual specifies a requirement to “conduct and document a scenery assessment for all activities that may affect scenic resources and that require analysis under NEPA.” It also requires the “application of the principles of landscape aesthetics, scenery management, and environmental design in project-level planning.”

The Forest Service Scenery Management System (SMS) integrates scenery components into overall ecosystem management. The components include landscape character, scenic attractiveness, user concern, visibility, distance zones, and existing scenic integrity (intactness). They are considered by management in land use planning (in the LRMP) through the designation of scenic integrity objectives (SIOs) for all Forest Service land areas. This management approach includes consideration of the effects of changes in the landscape and incorporation of people’s values in decision-making about those changes (USFS 1996). The term scenic integrity indicates the degree of intactness of the landscape character or, conversely, the degree of visible disruption of the landscape character. A landscape with very minimal visual disruption is considered to have high scenic integrity (USFS 1996). In general, the LRMP prepared for a national forest guides all natural resource management activities and establishes management standards and guidelines for scenery. The LRMP outlines SIOs that prescribe the level of visible change allowable within forest boundaries. SIOs are determined based on scenic attractiveness, visibility, distance zones, concern level, and existing scenic integrity, and are managed to ensure that changes and development fit with existing type, form, line, color, and texture (USFS 1996). The five potential SIOs are Very High (unaltered), High (appears unaltered), Moderate (appears slightly altered), Low (moderately altered), and Very Low (highly altered). Consistency with SIOs is determined by comparison of the objective or integrity level of the applicable SIO with the effects or alteration caused by prospective changes in the landscape. The leases are contained within jurisdictions of the WRNF and, to a small extent, the GMUGNF (approximately 2 percent of the lease area). The GMUGNF and WRNF LRMPs establish SIOs for NFS lands within the analysis area.

#### 3.15.2 Analysis Area

The analysis area is contained within the lease boundaries, shown in **Figure 3.15-1**. The map shows the lease boundaries, terrain, rivers and streams, and county and local roads as the context for the SIO consistency analyses.

Landscape character is identified and described by the combination of the scenic attributes that make each landscape unique. The landscape characteristics of a region often add significantly to an individual's and community's "sense of place" by providing a memorable and identifiable image. The characteristic landscape of the analysis area is contained within a wide variety of topographic, vegetative, geologic, hydrologic, and land use characteristics of two physiographic provinces: Colorado Plateaus Physiographic Province and Southern Rocky Mountains Physiographic Province (Fenneman 1931), described in Section 3.3.1.1. Vegetation cover types are described in Section 3.6.2.

Major river and topographic features in the area include the Colorado River, Crystal River, and Roaring Fork River and their drainages, Battlement Mesa on the west to Grass Mesa, Holms Mesa, Hunter Mesa, Thompson Divide, and Mount Sopris on the east. Please refer to Section 3.6, Vegetation, for detailed information on vegetation types and characteristics in the analysis area. The forms, lines, colors, and textures are mostly consistent with the natural scenery of the landscape, but are contrasted with ranches, residences, and existing oil and gas development. Other existing activity affecting the characteristic landscape in the analysis area includes sparsely distributed range improvements and unimproved roads associated with livestock grazing and range management.

Recreational activities, including driving, biking, hiking, skiing, golf, fishing, hunting, photography, and picnicking, depend on the settings and scenic views that the Forest Service is required to manage. The main public access roads in the analysis area include I-70, US-6, SH-13/789, SH-82, and SH-133.

The northern lease area is located northeast of Meeker. The northern lease area is intersected by a single road, Yellow Jacket Pass/CR-42. There is surface water in the northern area that includes Aldrich Lakes, DD and E Wise Reservoir, Konopik Reservoir, Lunney Reservoir, and Wyman Reservoir.

Communities in vicinity of the southern area include De Beque on the west to Sunlight Ski Area and Carbondale on the east. Major lakes and reservoirs in the vicinity of the southern area include Island Lake and Mosquito Lake, and Battlement Reservoirs, Baugh Reservoir, Curtin Reservoir, Debeque Reservoir, Hawkhurst Reservoir, Hughes Reservoir, McCurry Reservoir, Piute Reservoir, Sunnyside Reservoir, and Watson Reservoir. The southern areas are intersected by multiple year-round and summer travel routes.

SMS inventories were conducted by the Forest Service to determine the scenic values of the GMUGNF and WRNF. The components of Forest Service SMS inventories include Scenic Attractiveness, Landscape Visibility, Existing Scenic Integrity (ESI) levels, and SIOs.

Although the GMUGNF and WRNF utilize the same approach for determining the inventory of scenic resources, the SMS inventory for the GMUGNF was never completed; within the GMUGNF, the only data available are SIO classifications. The scenic inventories remain incomplete for Scenic Attractiveness and Landscape Visibility classifications (USFS 2006b). The total area of GMUGNF lands covers approximately 1,680 acres, or 2 percent, of the lease area.

**Tables 3.15-1 through 3.15-4** in the following sections summarize the acreages and percent of the analysis area categorized by SMS.

### **3.15.3 Scenic Attractiveness**

Based on Forest Service guidance (USFS 1996), Scenic Attractiveness classes are developed on NFS lands to determine the relative scenic value of lands within a particular Landscape Character. The three Scenic Attractiveness classes are Class A, Distinctive; Class B, Typical; Class C, Indistinctive. The landscape elements of landform, vegetation, rocks, cultural features, and water features are described in terms of their line, form, color, texture, and composition for each of these classes. The classes and their

breakdown are generally displayed in a chart format and a map delineating the Scenic Attractiveness classes is prepared for the area of interest.

**Figure 3.15-2** and **Table 3.15-1** illustrate and quantify the Scenic Attractiveness classifications in the analysis area.

**Table 3.15-1 Forest Service Scenic Inventory: Scenic Attractiveness**

	Class A		Class B		Class C	
	Acres	%	Acres	%	Acres	%
Scenic Attractiveness	4,817	6	73,843	92	0	0
<b>Total Acres</b>	<b>80,380</b>					

Note: The lease area also includes portions of the GMUGNF (approximately 2% of the lease area) that was not inventoried for Scenic Attractiveness. Acreage totals for the Scenic Attractiveness classes do not equal the total lease area of 80,380 acres due to inconsistencies with dataset edge matching and the additional GMUGNF land with no available data.

### 3.15.4 Landscape Visibility

The Landscape Visibility Analysis (see **Table 3.15-2** and **Figure 3.15-3**) serves as the Forest Service guide to perceptions of attractiveness, helps identify special places, and helps to define the meaning people give to the subject landscape (USFS 1996). This constituent analysis leads to a determination of the relative importance of aesthetics to the public; this importance is expressed as a Concern Level. Sites, travelways, special places, and other areas are assigned a Concern Level value of 1, 2, or 3 to reflect the relative High, Medium, or Low importance of aesthetics. Seen Areas and Distance Zones are integrated with Concern Levels 1, 2, or 3 areas to determine the relative sensitivity of scenes based on their distance from an observer. These zones are identified as:

- Foreground (up to 0.5 mile from the viewer);
- Middleground (up to 4 miles from the foreground); and
- Background (4 miles from the viewer to the horizon).

**Table 3.15-2 Forest Service Scenic Inventory: Landscape Visibility**

WRNF Concern Level 1					
Foreground		Middleground		Background	
Acres	%	Acres	%	Acres	%
8,821	11	26,714	33	22,530	28
WRNF Concern Level 2					
Foreground		Middleground		Background	
Acres	%	Acres	%	Acres	%
9,336	12	6,025	8	1,046	1
WRNF Concern Level 3					
Foreground		Middleground		Background	
Acres	%	Acres	%	Acres	%
238	<1	154	<1	2	<1
<b>Total Acres</b>	<b>80,380</b>				

Note: The lease area also includes portions of the GMUGNF (approximately 2% of the lease area) that was not inventoried for Landscape Visibility. Acreage totals for the Landscape Visibility classes do not equal the total lease area of 80,380 acres due to inconsistencies with dataset edge matching, seldom seen (not assigned) areas (approximately 5% of the lease area), and the additional GMUGNF land with no available data.

There are Level 1 (High importance) user concerns in the headwaters of (west to east) Battlement Creek, Beaver Creek/Log Mesa, Middle Mamin Creek, East Road Gulch, East Divide Creek, Van Mountain, Haystack Mountain, Flat Top Mountain, Park Creek, Middle Thompson Park, Four Mile Creek, Freeman Creek, and Marion Gulch.

### 3.15.5 Existing Scenic Integrity

ESI is evaluated and mapped based on the degree of intactness and wholeness of the landscape character; conversely, Scenic Integrity is a measure of the degree of visible disruption of the landscape character. A landscape with very minimal visual disruption is considered to have High Scenic Integrity. Those landscapes having increasingly discordant relationships among scenic attributes are viewed as having diminished Scenic Integrity. Scenic Integrity is expressed and mapped in terms of Very High, High, Moderate, Low, Very Low, and Unacceptably Low. The analysis area has Very High Scenic Integrity in the areas of Alkali Creek, Housetop Mountain, Porcupine Creek, and Stony Ridge. There is High Scenic Integrity in the areas surrounding Aldrich Lakes, Castle Peak, Horsethief Mountain, and Three Points Mountain. The remaining portions of the analysis area are mapped as Moderate Scenic Integrity. There are 6,314 acres of Very High ESI, 4,943 acres of High ESI, 67,347 acres of Moderate ESI, 6 acres of Low ESI, and 56 acres of Very Low ESI inside the analysis area leases. ESI analysis data for the lease areas is unavailable from GMUGNF. **Table 3.15-3** and **Figure 3.15-4** quantify and illustrate the ESI in the analysis area.

**Table 3.15-3 Forest Service Scenic Inventory: Existing Scenic Integrity**

	Very High		High		Moderate		Low		Very Low	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Existing Scenic Integrity	6,314	8	4,943	6	67,347	84	6	<1	56	<1
<b>Total Acres</b>	<b>80,380</b>									

Note: The lease area also includes portions of the GMUGNF (approximately 2% of the lease area) that was not inventoried for ESI. Acreage totals for the ESI classes do not equal the total lease area of 80,380 acres due to inconsistencies with dataset edge matching and the additional GMUGNF land with no available data.

### 3.15.6 Scenic Integrity Objectives (Forest Service)

Forest Service resource allocation decisions have resulted in assignment of SIOs for all land areas within the leases (**Figure 3. 15-5**). **Table 3.15-4** quantifies the SIOs in the analysis area. The assignment of SIOs is based on the management decisions made in the Forest Service planning processes, which must take into consideration the value of visual resources and management priorities for land uses. During the Forest Service LRMP process, inventory class boundaries can be adjusted as necessary to reflect resource allocation decisions made in the LRMP. Management objectives established for each Forest Service SIO (USFS 1996) is summarized in **Table 3.15-5**. There are Very High SIOs on the southern slopes (GMUGNF area only) of Horsethief Mountain. There are High SIO parcels in the Alkali Creek, Bull Basin, Castle Peak, Horsethief Mountain, Housetop Mountain, and Little Alkali Creek areas. There are Moderate SIO parcels are assigned in the Aldrich Lakes/Wise Reservoir, Battlement Creek, Doghead Mountain, Glade Creek, Houston Mountain, Log Mesa, Middle Mamm Creek, North Mamm Peak, Porcupine Creek, Stony Ridge, Uranium Peak and West Mamm Creek areas. All remaining lease areas are assigned Low and Very Low SIOs. There are 330 acres of Very High SIO, 9,804 acres of High SIO, 7,845 acres of Moderate SIO, 62,047 acres of Low SIO, and 10 acres of Very Low SIO within the leases.

**Table 3.15-4 LRMP Scenic Integrity Objectives**

	Very High		High		Moderate		Low		Very Low	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Scenic Integrity Objectives <sup>1</sup>	330	<1	9,804	12	7,845	10	62,047	77	10	<1

<sup>1</sup> Although not a part of the SMS, the data provided by the GMUGNF has 125 acres (less 1 percent of the analysis area) within the GMUGNF classified as High/Moderate SIO. The High/Moderate SIO classification is assigned in the Owens Creek, Basin Creek, and Clear Fork areas.

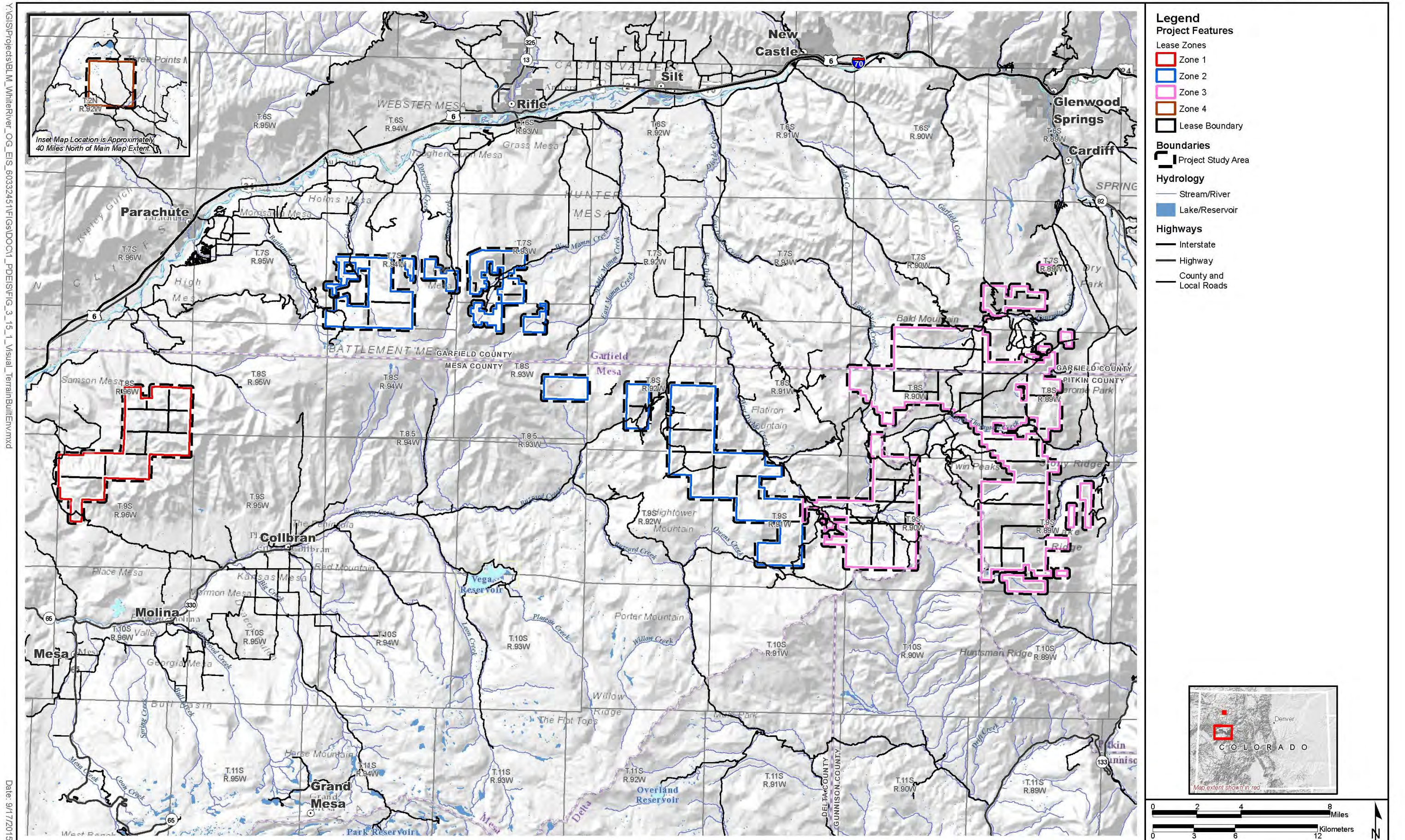
Note: Acreage totals for the scenic integrity objective classes do not equal the total lease area of 80,380 acres due to inconsistencies with dataset edge matching and the additional GMUGNF acreage classified as High/Moderate.

**Table 3.15-5 LRMP Forest Service Scenic Integrity Objectives**

<b>Very High</b>	Very High scenic integrity refers to landscapes where the valued landscape character “is” intact with only minute if any deviations. The existing landscape character and sense of place is expressed at the highest possible level.
<b>High</b>	High scenic integrity refers to landscapes where the valued landscape character “appears” intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident.
<b>Moderate</b>	Moderate scenic integrity refers to landscapes where the valued landscape character “appears slightly altered.” Noticeable deviations must remain visually subordinate to the landscape character being viewed.
<b>Low</b>	Low scenic integrity refers to landscapes where the valued landscape character “appears moderately altered.” Deviations begin to dominate the valued landscape character being viewed but they borrow valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed, but also compatible or complimentary to the character within.
<b>Very Low</b>	Very low scenic integrity refers to landscapes where the valued land “appears heavily altered.” Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles within or outside landscape being viewed. However deviations must be shaped and blended with the natural terrain (landforms) so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition.

Source: USFS 1996.

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Figure 3.15-1 Lease Analysis Areas

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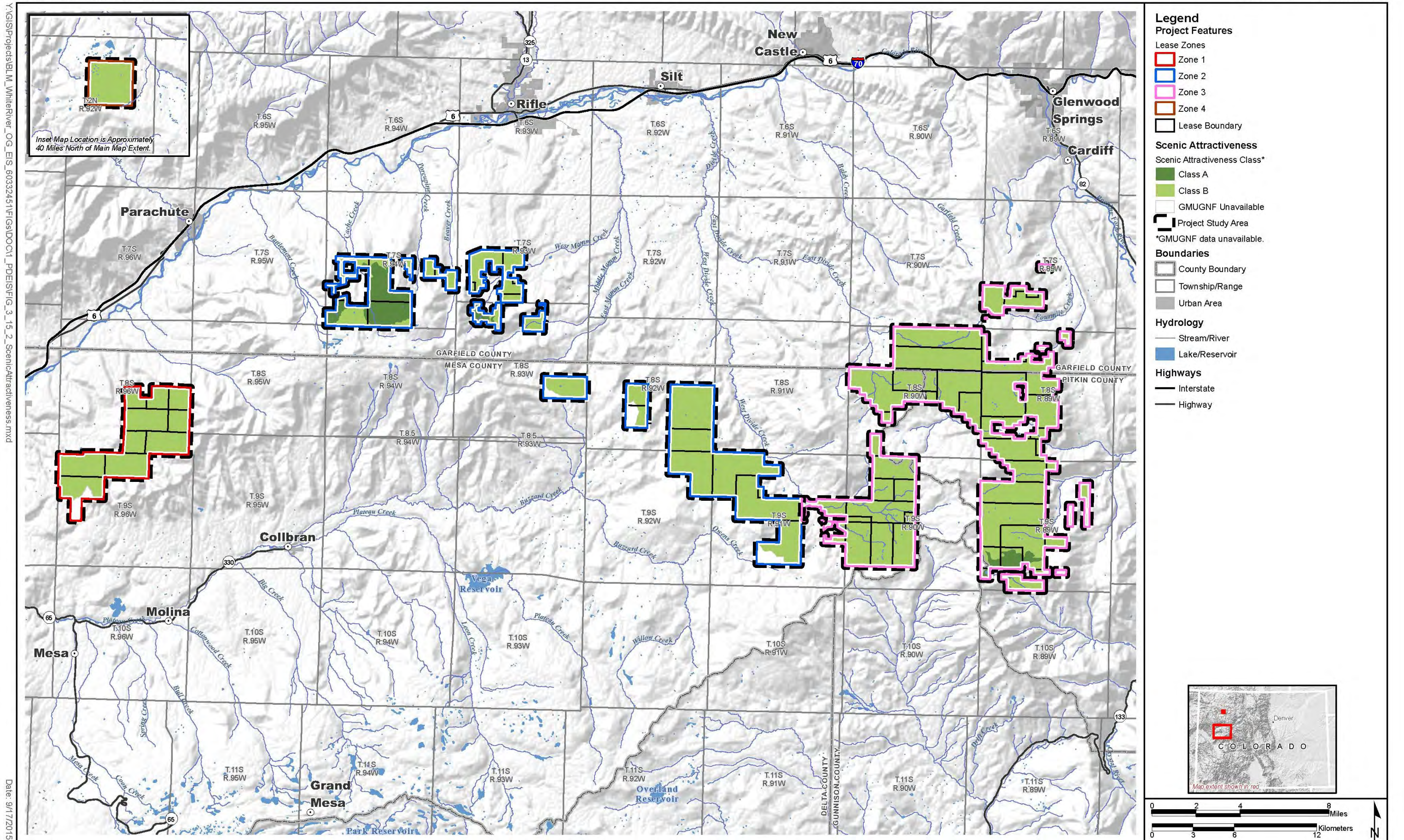
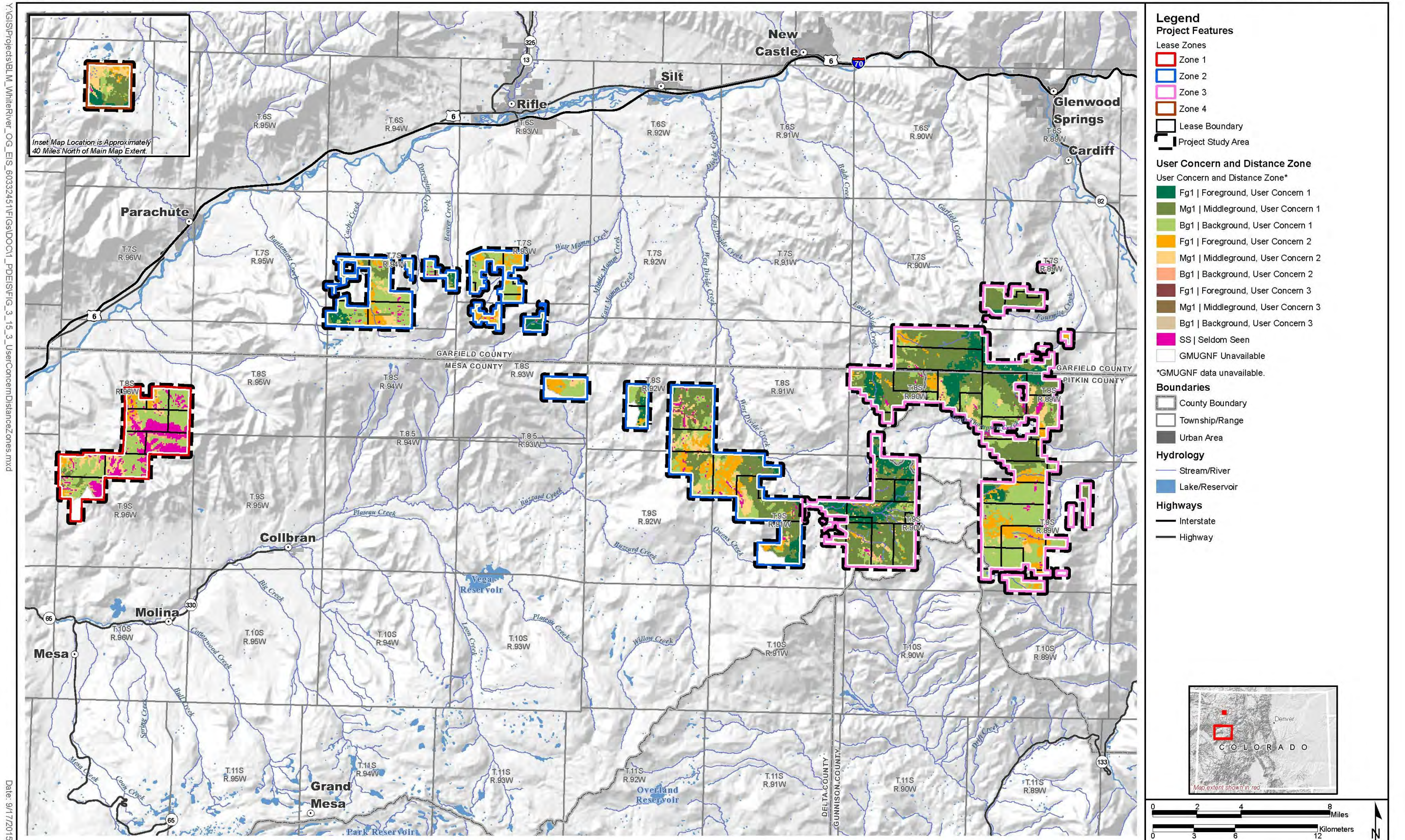


Figure 3.15-2 Scenic Attractiveness





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Figure 3.15-3 User Concern, Seen Areas, and Distance Zones

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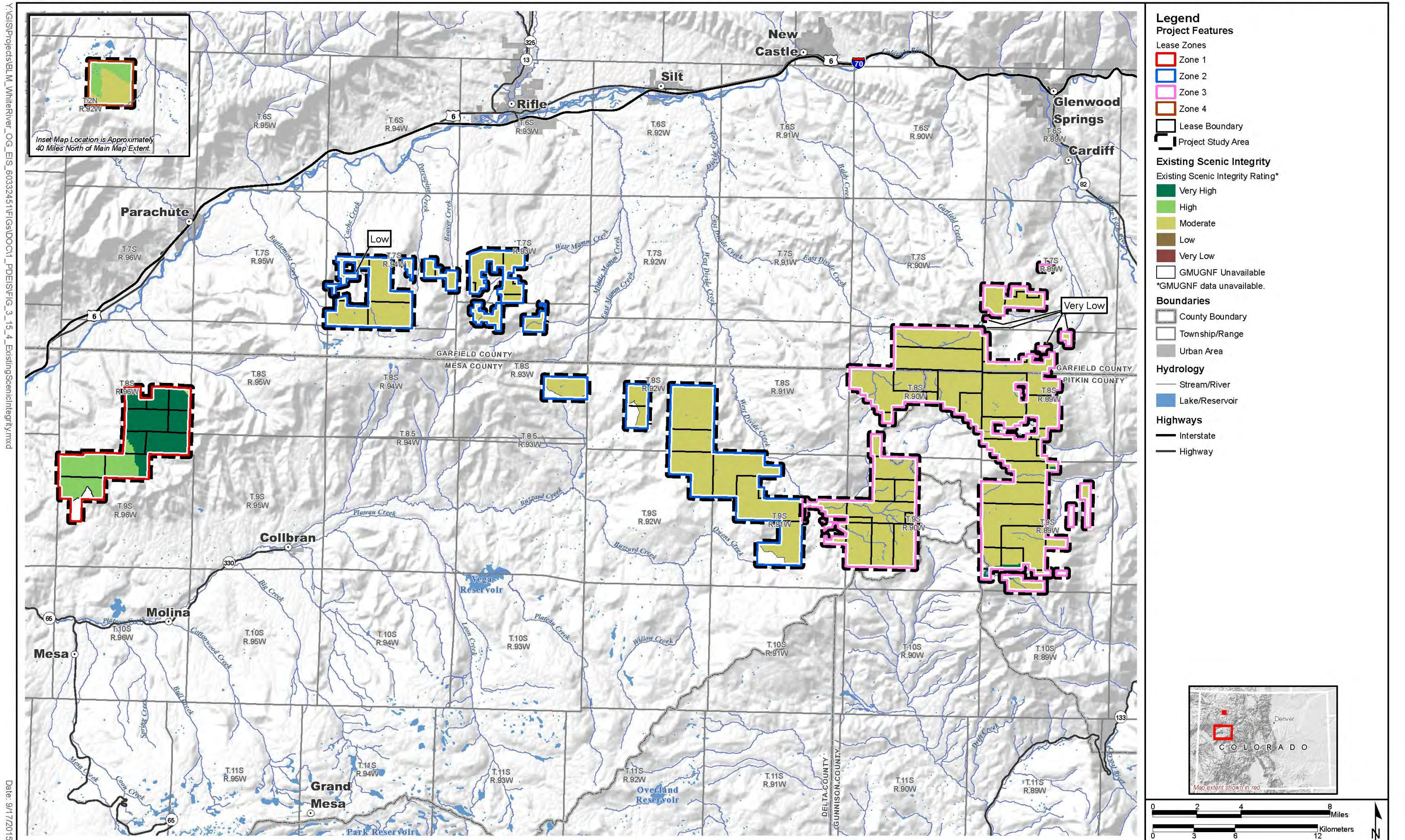


Figure 3.15-4 Existing Scenic Integrity

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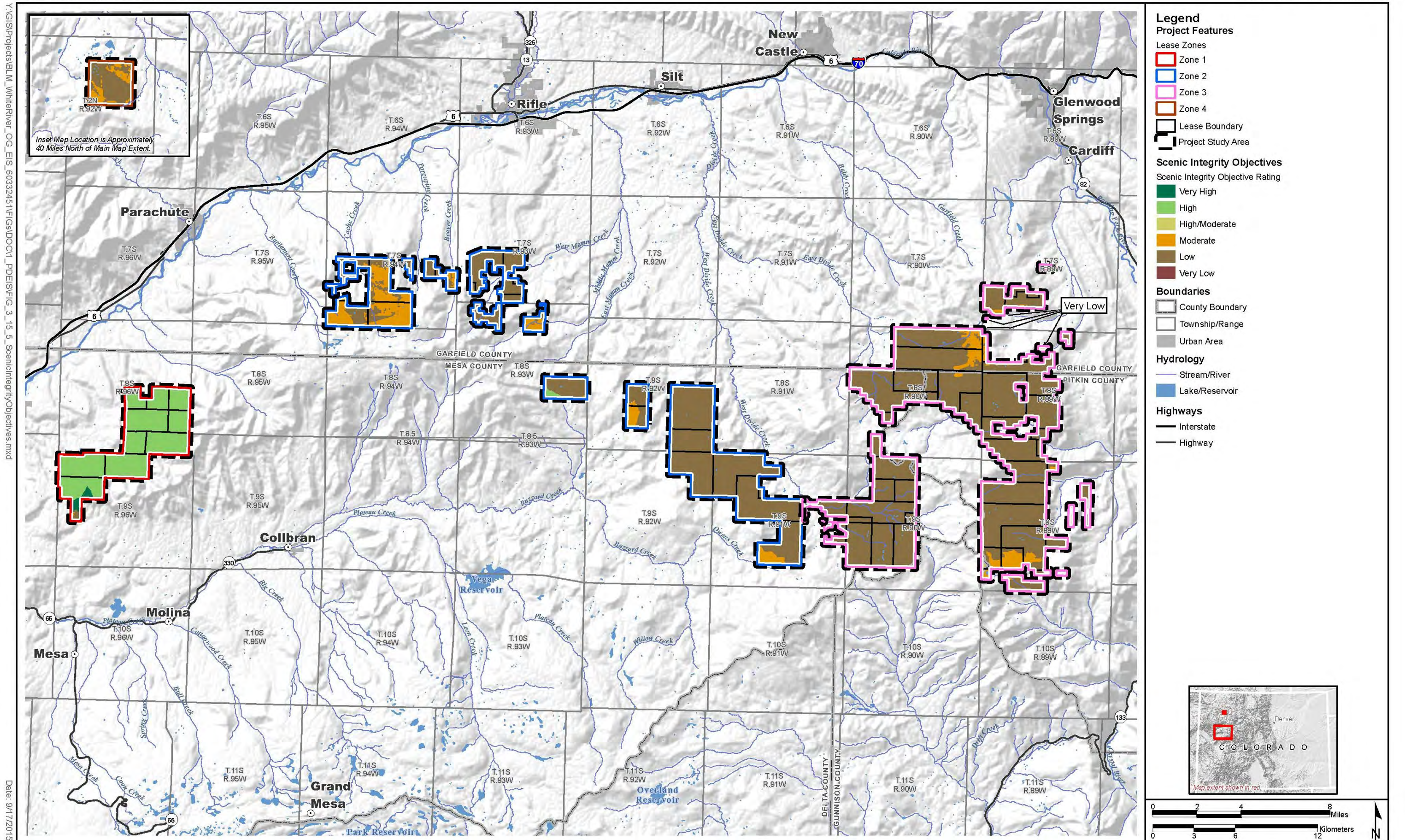


Figure 3.15-5 Scenic Integrity Objectives

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### **3.16 Hazardous Materials and Human Health and Safety**

The affected environment considers the presence of hazardous materials and solid waste that may affect air, water, soil, biological resources, and human health. Hazardous materials can represent potential risks to both human health and to the environment when not managed properly. Other considerations for human health and safety are hazards that not only present risks to oil field workers, but to the public at large. The analysis area for human health and safety is shown in **Figure 1-1**.

#### **3.16.1 Hazardous Materials and Solid Waste**

##### **3.16.1.1 Regulatory Background**

Hazardous materials are defined in various ways under a number of regulatory programs. The term *hazardous materials* include the following materials that may be utilized or disposed of in conjunction with fluid minerals drilling and completion operations.

- Substances covered under the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200). The types of materials that may be used in drilling and completion activities and that would be subject to these regulations would include almost all of the materials covered by the regulations identified below.
- Hazardous materials as defined under the U.S. Department of Transportation (USDOT) regulations in 49 CFR Parts 171.8 and 172.101.
- Hazardous substances as defined by the Comprehensive Environmental Response, Compensation, and Liability Act as listed in 40 CFR Table 302.4.
- Hazardous wastes as defined in the Resource Conservation and Recovery Act (RCRA) Subtitle C regulations (40 CFR Parts 260-299).
- Hazardous substances and extremely hazardous substances subject to reporting requirements (Threshold Planning Quantities) under Sections 311 and 312 of the Superfund Amendments and Reauthorization Act (SARA), which include petroleum or products derived from petroleum including crude oil, condensate, methane, gasoline, diesel, propane and a wide variety of chemicals and materials that are used in drilling and production.
- Petroleum products defined as “oil” in the Oil Pollution Act of 1990. The types of materials used in drilling and completions activities that would be subject to these requirements include fuels, lubricants, hydraulic oil, and transmission fluids.

Hazardous materials as defined by USDOT would include fuels and other chemical products. These materials are often transported to work sites in accordance with applicable USDOT rules and regulations. In conjunction with the definitions noted above, the following lists provide information regarding management requirements during transportation, storage, and use of particular hazardous chemicals, substances, or materials.

- SARA Title III List of Lists (USEPA 2012b) also known as the Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the CAA.
- USDOT listing of hazardous materials in 49 CFR 172.101.

Non-hazardous solid waste is regulated under Subtitle D of RCRA and hazardous waste is regulated under Subtitle C. In Colorado, solid waste is regulated by the CDPHE under a USEPA-delegated RCRA program.

### 3.16.2 Analysis Area

The analysis area for hazardous materials and solid waste consists of the individual lease tracts and routes that would be used for the transportation of hazardous materials.

#### 3.16.2.1 Oil and Gas-related Hazardous Materials

A large variety of hazardous materials are used or stored in oil and gas drilling and production. Chemicals and materials that may be used for this project are listed in **Table 3.16-1**. Potentially hazardous substances used in the development or operation of wells are kept in limited quantities on drill pads and at production facilities for short periods of time. Some of the chemicals or materials listed in **Table 3.16-1** are found on the EPCRA List of Lists or defined as hazardous materials by USDOT.

**Table 3.16-1 Potentially Hazardous Materials Used or Stored in Typical Oil and Gas Well Drilling, Completion, and Production Operations**

<b>Drilling and Completion Operations</b>	
<b>Material</b>	
Diesel	Engine lubricants
Gasoline	Biocides
Drilling fluid additives	Solvents
Caustics	Paint and thinners
Well completion and treatment fluid and additives (to include hydraulic fracturing chemicals)	Pipe thread sealer
Silica sand	Explosives (for perforating)
Corrosion inhibitors	Compressed gases
Cement	Lead-acid batteries
Cement additives	Ethylene glycol
Hydraulic fluids	Weight materials (e.g., barite)
<b>Production Operations<sup>1</sup></b>	
<b>Material</b>	
Crude oil, condensate, natural gas liquids, natural gas, CO <sub>2</sub> , hydrogen sulfide (H <sub>2</sub> S)	Methanol (line freezing prevention, gas wells)
Well workover treatment chemicals	Water treatment chemicals
Emulsion breakers (oil wells)	Catalysts (natural gas processing, sulfur recovery)
Corrosion inhibitors	Caustics (gas treatment)
Triethylene glycol (natural gas dehydration)	Paint and thinners
Biocides	Lead-acid batteries
Diesel and gasoline	Herbicides
Amines (natural gas processing)	Defoamers

<sup>1</sup> Includes field gas processing and gathering pipelines.

Sources: AECOM 2012; Government Accountability Office 2012; Interstate Oil and Gas Compact Commission 1999; USFS and BLM 2003.

The federal National Response System is the federal government's mechanism for tracking discharges of hazardous substances and wastes into the environment. The National Response System functions through a network of interagency and inter-government relationships formally established and described in the National Oil and Hazardous Substances Pollution Contingency Plan.

Under EPCRA, operators are required to report the presence of chemicals or substances on-site if those materials are considered hazardous by OSHA and exceed threshold planning quantities (TPQs). Chemicals subject to reporting under Title III of the SARA in quantities more than 10,000 pounds may be used or stored at well pads or facilities. There are substances that are defined as Extremely Hazardous Substances that may have TPQs that are much lower than 10,000 pounds. Types of chemicals or materials that may be trigger reporting requirements include the following (Government Accountability Office 2012; Interstate Oil and Gas Compact Commission 1999):

- Cement and associated additives;
- Silica;
- Shale control additives;
- Drilling mud and associated additives;
- Deflocculants;
- Lubricants;
- Alkalinity and pH control material;
- Produced hydrocarbons; and
- Fuels.

The above list contains just a few examples of the thousands of chemicals subject to EPCRA reporting requirements (USEPA 2014). It is important to note that produced hydrocarbons are considered hazardous materials subject to EPCRA reporting and that in seemingly small amounts would exceed the TPQ for those materials. For instance, the threshold amount for crude oil or condensate is about 33 barrels (Elliott 2013), a quantity that could be easily exceeded at many typical oil and gas field sites. A release of a reportable quantity of a hazardous substance must be reported to the COGGC, CDPHE and possibly to the USEPA depending on the circumstances and the substance involved. Operators would develop and maintain Spill Prevention, Control, and Countermeasure plans as part of overall emergency response plans for well pad and production facilities in the project area, as required by regulation, to prevent and contain accidental releases.

### **3.16.2.2 Solid Waste**

Solid waste comprises a broad range of materials that include garbage, refuse, sludge, non-hazardous industrial waste, municipal wastes, and hazardous waste (USEPA 2011a). Solid waste as defined includes solids, liquids, and contained gaseous materials. Hazardous waste are those materials that either exhibit certain characteristics (as defined by laboratory analysis), are generated from specific industrial processes, or are chemical compounds that if abandoned or discarded, could pose a threat to human health and the environment.

The USEPA has specifically exempted certain waste materials generated in oil and natural gas exploration and production (E&P) from regulation as hazardous waste (USEPA 1993, 1988). To classify as exempt E&P waste, these materials must be intrinsic or uniquely associated with the production of oil and natural gas. Examples of exempt E&P waste include, but are not limited to, produced water, drilling mud, hydraulic fracturing flow back fluids, and treatment chemicals (e.g., acids) that have been used in the well. Although specifically exempted from regulation as hazardous waste, these materials are solid

waste and must be disposed in a ways that are protective of human health and the environment. Although specific E&P waste are exempted from RCRA Subpart C, it does not mean that the waste can be discarded in a haphazard manner or disposed onsite. Disposition of exempt waste is regulated by the COGCC, the BLM, or the CDPHE depending upon the particular waste and the manner of disposition.

RCRA non-exempt waste would include materials such as spent solvents, discarded lubricants, and paints. These and other non-exempt wastes would be classified according to the process that generated the waste and are handled and disposed or recycled in accordance with applicable rules and regulations. Proposed project activities may generate non-exempt waste that may be hazardous, but would be generated in limited quantities and would have to be disposed of according to hazardous waste rules.

### **3.16.3 Human Health and Safety**

The individuals most likely to be affected by health and safety concerns are workers associated with oil and gas operations as well as rural residents and recreational enthusiasts. Public uses in the analysis area include stock raising, recreational activities, and motorists traveling on local roads and highways.

#### **3.16.3.1 Regulatory Background**

Depending on the specific location, a number of public health and safety regulations may be applicable to various portions of the Project. OSHA (U.S. Department of Labor) has jurisdiction over most occupational health and safety issues within each state the Project crosses. Industrial construction and routine workplace operations are governed by the OSHA of 1970, particularly 29 CFR 1910 (general industry standards) and 29 CFR 1926 (construction industry standards). While there are no federal noise regulations, federal agencies, states, municipalities and local governments may adopt laws and regulations that impose a maximum noise limit or mitigation requirement within their jurisdiction. These ordinances are often enforced by police or an agency.

#### **3.16.3.2 Local Human Health and Safety Concerns**

Numerous additional areas have been identified by government agencies and the public as health and safety concerns related to the potential of oil and gas development. These concerns include exposure to chemical pollutants from air and water transport, as well as the potential pollution of surface waters (including potable water sources), as well as air and soil pollution.

The potential for accidental releases of hazardous fluids and contamination of drinking water and soils from drilling and hydraulic fracturing operations are a major public concern. Effects to soils and surface water would depend on the volume and toxicity of the spilled materials or fluids. Spills with low levels of hydrocarbons would have minimal long-term impacts to soils and water, whereas spills of higher levels of hydrocarbons would have more serious impacts (BLM 2014b). A number of local communities have identified oil and gas development as a potential risk to drinking water sources, and have contributed to cooperative management approaches with oil and gas operators (BLM 2014b). Sections 3.4 and 3.5, Soils and Water, respectively, further detail the affected environment of soils and water resources.

Another area of health and safety concern is the potential for air pollution and the subsequent potential for health problems from oil and gas development. Chemicals, some hazardous, are used and produced by oil and gas exploration and production. Hazardous air pollutants from wells and associated sources, can potentially pose health hazards (BLM 2014b). Local governments, in response to air quality concerns, have enacted ongoing ambient air monitoring, local emissions inventories, health risk assessments, and special collaborative projects (BLM 2014b; Garfield County 2013b). Section 3.2 Air Quality, further details the affected environment of air quality.



### **3.16.3.3 Oil and Gas Exploration, Development, and Production Operations**

Health and safety concerns within the analysis area are associated primarily with occupational hazards from oil and gas exploration, development, and operations and potential hazards related to vehicle accidents, contact with objects and equipment, fires and explosions, falls, and overexertion. Natural gas gathering, compression, stabilization, and transmission operations also currently take place in the analysis area. Operators working within the analysis area are governed by the Colorado OSHA program, which has adopted the general construction rules and regulations of the federal OSHA program. These include special rules for oil and gas development and operations. Most natural gas transmission and gathering operations are regulated by the USDOT Office of Pipeline Safety. The Office of Pipeline Safety regulations require stringent system maintenance programs, emergency response planning, risk management planning, and individual personnel operations and maintenance training for regulated pipeline systems.

Of particular concern for worker and public safety is H<sub>2</sub>S gas that can occur naturally with oil and gas or occurs as a result of bacterial contamination of oil and gas production wells. H<sub>2</sub>S may be produced in sufficient quantities that can pose health and safety concerns beyond drill sites and production and processing facilities. Currently, no wells within the CRVFO qualify under federal regulations as hydrogen sulfide wells under Onshore Oil and Gas Order #6, Hydrogen Sulfide Operation, 43 CFR 3160 (BLM 2014b).

#### Naturally Occurring Radioactive Materials

Radioactive materials can be classified under two broad headings: man-made and naturally occurring radioactive materials (NORM). The geologic formations that contain oil and gas deposits also contain naturally occurring radionuclides including uranium (and its decay products), thorium (and decay products), radium (and decay products), and lead-210. Each year, hundreds of millions of metric tons of NORM waste are generated from a wide variety of processes, including oil and gas production. During oil and gas development, radionuclides, along with other minerals, precipitate (separate and settle) out forming various wastes at the surface including mineral scales inside pipes, sludges, contaminated equipment or components or produced waters. Because the extraction process concentrates the naturally occurring radionuclides and exposes them to the surface environment and human contact, these wastes are classified as Technologically Enhanced naturally occurring radioactive materials (TENORM) and may have radionuclide concentrations that are orders of magnitude higher than in the parent materials. (USEPA 2015g). Because TENORM-contaminated wastes in oil and gas production operations were not properly recognized in the past, disposal of these wastes may have resulted in environmental contamination in and around production and disposal facilities. Surface disposal of radioactive sludge/scale, and produced water (as practiced in the past) may lead to groundwater and surface water contamination.

An estimated 30 percent of domestic oil and gas wells produce some TENORM. In surveys of production wells in 13 states, the percent reporting high concentrations of radionuclides in the wells ranged from 90 percent in Mississippi to none or only a few in Colorado, South Dakota, and Wyoming (USEPA 2015g). Earlier studies noted that TENORMs resulting from produced water and oil-field equipment within the analysis area is at background or marginally detectable (USGS 1999). As a result, TENORM from oil and gas production is thought to be low in the analysis area. However, as noted in Section 3.3, Geology and Minerals, uranium ore has been mined in portions of Garfield County north of the Colorado River and outside of the existing leases and there are numerous uranium occurrences in T2N, R92W, where the Zone 4 lease is located.

### **3.16.3.4 Vehicle Safety Issues**

Existing health and safety concerns within the analysis area include occupational hazards associated with the operation of vehicles on improved and unimproved roads, winter driving conditions, and

potential collisions with livestock and big game. **Table 3.16-2** conveys the accident rates by specific highway segments where data was available. The segment selected for SH-82 had the lowest injury accident rates for any of the other selected highway segments. Conversely, some of the highest injury accident rates occurred along the selected segment of SH-13 near Meeker. The single highest fatality rate was documented along the selected segment US-6 in 2010. The data did not detail livestock or wildlife collision statistics.

**Table 3.16-2 Accident Rates By Highway**

Year	Road MP	Section Length	MVMT <sup>2</sup>	Accident Rates <sup>1</sup>			
				PDO <sup>3</sup>	Injury	Fatal	Total
<b>US-6</b>							
2012	98.7	3.6	6.6	0.91	0.15	0.0	1.1
2011	98.7	2.7	5.0	1.82	0.0	0.0	1.82
2010	98.7	2.7	5.0	2.02	0.20	20.20	2.42
2009	98.7	2.7	5.0	0.4	0.4	0.0	0.81
<b>SH-13</b>							
2012	53.9	9.5	5.89	0.85	0.17	0.0	1.02
2011	53.9	9.5	5.87	1.70	0.34	0.0	2.05
2010	53.9	9.5	6.22	1.45	0.0	0.0	1.45
2009	53.9	9.5	6.22	3.68	0.33	0.0	4.01
<b>I-70</b>							
2012	65.4	3.7	19.2	0.52	0.05	0.0	0.57
2011	65.4	3.7	19.1	0.78	0.05	5.23	0.89
2010	65.4	3.7	19.1	0.68	0.32	5.25	1.05
2009	65.4	3.7	26.1	0.50	0.19	0.00	0.69
<b>I-70</b>							
2012	113.5	8.3	54.4	0.92	0.17	0.0	1.09
2011	113.5	4.5	42.8	0.65	0.05	0.0	0.70
2010	113.5	4.5	50.9	0.41	0.02	1.96	0.45
2009	113.5	4.5	50.5	0.95	0.10	0.0	1.05
<b>SH-82</b>							
2012	6.5	1.5	11.45	0.61	0.0	0.0	0.61
2011	6.5	1.5	11.42	1.22	0.09	0.0	1.31
2010	6.5	1.5	11.96	0.67	0.0	0.0	0.67
2009	7.9	3.8	31.76	0.95	0.09	0.0	1.04
<b>SH-133</b>							
2012	65.9	9.0	10.5	1.43	0.38	0.0	1.81
2011	65.9	9.0	10.6	0.47	0.19	0.0	0.66
2010	65.9	9.1	12.3	0.73	0.08	0.0	0.82
2009	65.9	9.1	12.3	1.06	0.33	8.16	1.47

<sup>1</sup> PDO and Injury rates in Million Vehicle Miles Traveled. Fatal Rate in 100 Million Vehicle Miles Traveled.

<sup>2</sup> MVMT – Million Vehicle Miles Traveled.

<sup>3</sup> PDO = Property Damage Only.

Source: CDOT 2013.

### 3.16.3.5 Noise

Noise is defined as any sound that is undesired, extraneous or interferes with one's hearing. Noise is considered a human health concern as it can interfere with speech communication and hearing or is otherwise considered annoying. The term "unwanted" can be subjective in nature and can vary greatly among individuals. An individual's response to noise is influenced by the type of noise, perceived importance of the noise, appropriateness in the setting, time of day, type of activity during which the noise occurs, and the sensitivity of the individual.

Sound is measured in decibels on the A-weighted scale (dBA) and is based on a logarithmic scale to account for the wide range of audible sound intensities. Under the logarithmic scale for sound (and noise), a 10-dBA increase would increase sound intensity by 10 times; a 20-dBA increase would increase sound intensity by 100 times. As a result, methods have been developed for weighting the sound frequency spectrum to approximate the response of the human ear. The dBA scale is widely used for environmental noise assessments because of its relative convenience and accuracy in correlating with people's judgments of what constitutes noise. Typical A-weighted sound and noise levels associated with common activities or situations are shown in **Figure 3.16-1**.

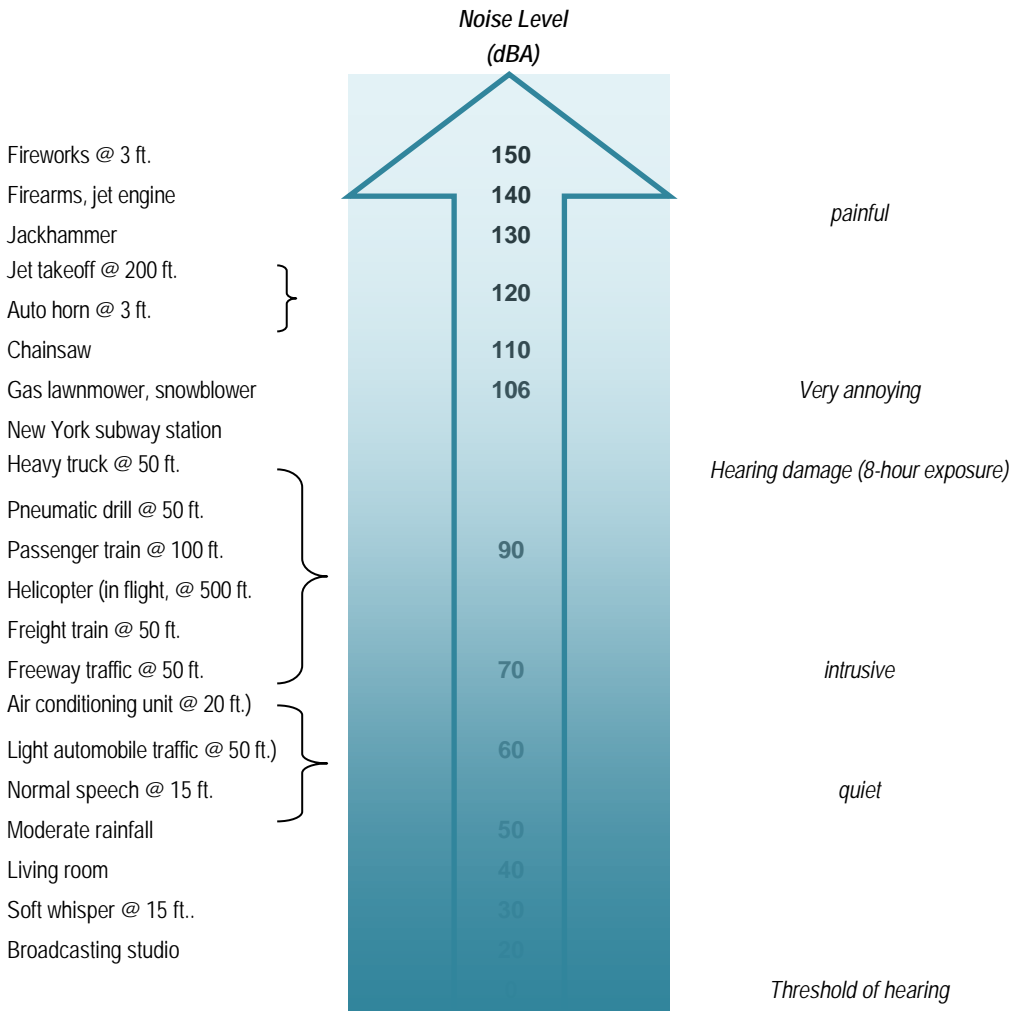
Noise level from a point source such as concentrated construction activity will decrease by 6 dBA for every doubling of the distance away from the source, assuming there are no reflections or reverberations (Truax 1999). This concept is known as geometric spreading. When comparing similar sounds (e.g., changes in traffic noise levels) a 3-dBA change in sound-pressure level is considered detectable by the human ear in most situations. A 5-dBA change is readily noticeable by most people and a 10-dBA change is perceived to be a doubling (or halving) of sound or noise.

Ambient noise, or background noise, is defined as the total noise from nearby and distant sources, that is relatively steady and homogeneous, with no particular source identifiable within it (GE Energy 2005; National Wind Coordinating Committee 2002). Ambient noise levels within the lease area have not been measured; however, as rural background noise in wilderness and rural areas typically is 40 dBA (USEPA 1978), noise levels are likely to be low in portions of leases that are within inventoried roadless areas and the research natural area (see Section 3.12, Special Designations), if they also are not near existing oil and gas development (described in Chapter 1.0), mining operations (see **Figure 3.3-8**) or haul routes (see **Figures 3.10-1** and **3.10-2**). Noise levels near existing oil and gas development, mining operations or haul routes are likely to be higher due to machinery, human activities, or vehicle movement. While some proposed transportation routes go through communities (such as Glenwood Springs), in general, sensitive receptors within the leasing area are limited to residents in scattered rural locations near haul routes.

### 3.16.3.6 Emergency Services

#### Zone 1

Law enforcement and emergency response near Zone 1 are provided by the Mesa County Sheriff's Department. Emergency response activities are coordinated through Mesa County's Sheriff's Office of Emergency Management (Mesa County 2015). Local fire protection and emergency medical service is provided through the De Beque Fire District, where emergency medical services accounts for the majority of call responses. The De Beque Fire District also provides structural firefighting, hazardous materials operations level response, and wildland fire fighting (De Beque Fire Protection District 2015). Law enforcement in De Beque is provided by the De Beque Marshall Department (Town of De Beque 2015).



Source: Council on Environmental Quality 1970.

**Figure 3.16-1 Typical A-weighted Sound Levels**

### Zones 2 and 3

Law enforcement and emergency response near Zones 2 and 3 are provided by the Garfield County Sheriff's Department. Additionally, there are six fire protection districts serving the county. Locations near Zone 2 include Rifle, Silt, and Parachute. Ambulance service also is available out of Basalt, Parachute, Rifle, Silt, and New Castle (Garfield County 2015b). The municipalities of Rifle and Parachute also provide their own law enforcement departments (The City of Rifle 2015; Town of Parachute 2015). Garfield County fire districts located near Zone 3 include Glenwood Springs and Carbondale. Ambulance service near Zone 3 is located in the towns of Glenwood Springs and Carbondale (Garfield County 2015b). The municipalities of Carbondale and Glenwood Springs near Zone 3 also provide their own law enforcement departments (Carbondale 2015; Glenwood Springs 2015).

### Zone 4

Law enforcement and emergency response near Zone 4 are provided by the Rio Blanco County Sheriff's Department, based in the Town of Meeker (Rio Blanco County 2015). The Meeker Volunteer Fire and Rescue provides local fire protection and ambulance service (Meeker Volunteer Fire and Rescue 2015). The municipality of Meeker also provides law enforcement services (Meeker Colorado 2015).

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### **3.17 Socioeconomics**

#### **3.17.1 Regulatory Background**

Social and economic conditions are not subject to direct regulation or management, although NEPA requires they be addressed. Social and economic conditions also are commonly recognized and addressed as a concern in a wide variety of federal, state, and local planning and management processes.

The consideration of social and economic conditions in land use management planning processes conducted by the BLM and the Forest Service for the public lands under their respective management are guided by the following:

- BLM, Land Use Planning Handbook, H-1601-1
- Forest Service, Land Management Handbook, FSH 1909.12

The following county land use plans provide guidance related to transportation, housing, land use and land development issues on non-federal lands, as well as goals and objectives related to area character and sources of income:

- Garfield County Comprehensive Plan (2013a)
- Mesa County Land Use Plan (2013)
- Mesa County Mineral and Energy Resources Master Plan (2011)
- Grand Valley 2040 Regional Transportation Plan Update (2014)
- Pitkin County Comprehensive Plan (2003) and 11 Rural Area plans
- Rio Blanco Master Plan (2011)

Regulations related to Environmental Justice are discussed in Section 3.18.

#### **3.17.2 Analysis Area**

The analysis area for the socioeconomic analysis consists of Garfield, Mesa, Pitkin, and Rio Blanco counties. The analysis focuses on the four counties as important governing jurisdictions and the main representative units of sub-regional economies. The counties also are important governmental entities responsible for planning and providing public facilities and services.

#### **3.17.3 Regional Affected Environment**

The analysis also evaluates the socioeconomic impacts for the local communities surrounding the leases that would be expected to have the strongest socioeconomic relationships with the project activities and project area resources. The local analysis area for the socioeconomic analysis consists of the cities and communities of Parachute, Rifle, Silt, New Castle, Glenwood Springs, and Carbondale located in Garfield County. In addition, the small community of De Beque in Mesa County also is included in the local impact analysis. While other cities also could be affected by the project they either have only limited potential relationship with the project (e.g., Meeker in Rio Blanco County) or are larger and more economically diversified cities (e.g., Grand Junction and Aspen) whose economic impacts are considered within the county-level analysis. Due to the nature of some impacts and data limitations, not all socioeconomic impacts can be identified and evaluated at a local level.

### 3.17.3.1 Population

**Table 3.17-1** shows the regional and county population growth since 2000. Between 2000 and 2013, the region’s total population increased by approximately 45,600 residents, at a growth rate of 1.9 percent per year that was higher than Colorado’s statewide average 1.6 percent rate of annual growth. The majority of the regional population growth was the result of in-migration (Economic Profile System–Human Dimension Toolkit [EPS-HDT] 2015). The in-migration was largely due to the Western Colorado River Valley’s residential and commercial construction boom from the region’s recreation industry growth, increased oil and gas activity, and development of the I-70 corridor. Together, these also have spurred increasingly inter-dependent economic relationships between the four counties, with substantial inter-county commuting by workers residing in the analysis area (BBC Research and Consulting [BBC] 2007).

**Table 3.17-1 Population in Four-County Region (2000-2013)**

Area	2000	2013	2000-2013 Growth	Annual Growth Rate (Est.)
Colorado	4,338,801	5,264,890	926,089	1.6%
Four-County Region	183,624	229,263	45,639	1.9%
Garfield County	44,240	57,298	13,058	2.3%
Mesa County	117,651	147,811	30,160	2.0%
Pitkin County	15,764	17,376	1,612	0.8%
Rio Blanco County	5,969	6,778	809	1.0%

Source: Colorado Department of Local Affairs, State Demography Office 2015a.

Between 2000 and 2013, Garfield County had the region’s highest population growth rate as its population grew annually by an average of 2.3 percent and added over 13,000 new residents. Garfield County’s growth exceeded Colorado’s annual 1.6 percent growth rate by nearly 44 percent. The County experienced rapid growth in recent years due to the growth in resort and recreation development in the Roaring Fork Valley; and the relatively abundant supply of affordable housing, which made the County a popular alternative for Pitkin and Eagle Counties’ work force and the new oil and gas workers drawn to the Colorado River Valley (BBC 2007). During that same period Mesa County had the largest total population increase as it added over 30,100 new residents at a rate of 2.0 percent annually.

**Table 3.17-2** shows the population growth for the communities near the lease area between 2000 and 2013. Altogether, at least 9,360 new residents were added to the local communities’ population—representing more than 37.5 percent increase from its 2000 population levels. The growth within these communities accounted for nearly 72 percent of Garfield County’s total population growth. The spread of recreation development “down valley” pushed growth from Carbondale and Glenwood Springs, to New Castle, Silt, and Rifle, and as such the major share of the growth occurred in these three towns (BBC 2007).

**Table 3.17-3** shows the counties projected future population growth over the next 25 years. All the counties’ populations are projected to continue increasing at rates equal to or greater than Colorado’s statewide population growth rate.



**Table 3.17-2 Population in Local Communities (2000-2013)**

Area	2000	2013	2000-2013 Growth	Annual Growth Rate (Est.)
<b>Garfield County</b>				
Carbondale	5,277	6,514	1,237	1.8%
Glenwood Springs	7,884	9,849	1,965	1.9%
New Castle	2,073	4,563	2,490	9.2%
Parachute	1,007	1,095	88	0.7%
Rifle	6,907	9,279	2,372	2.6%
Silt	1,780	2,988	1,208	5.2%
<b>Mesa County</b>				
De Beque	473	492	19	0.3%
<b>Total Local Communities</b>				
	<b>25,401</b>	<b>34,780</b>	<b>9,379</b>	<b>2.8%</b>

Source: Colorado Department of Local Affairs, State Demography Office 2015b.

**Table 3.17-3 Population Projections for the Four-County Region (2015-2040)**

Area	Population Projections				2015-2040 Growth	Annual Growth Rate (Est.)
	2015	2020	2030	2040		
Colorado	5,439,290	5,924,692	6,915,379	7,752,887	2,313,597	1.7%
Four-County Region	234,432	258,843	317,277	372,196	137,764	2.4%
Garfield County	58,961	66,558	87,300	108,000	49,039	3.3%
Mesa County	150,987	165,695	197,574	226,773	75,786	2.0%
Rio Blanco County	6,826	7,400	8,925	9,767	2,941	1.7%
Pitkin County	17,658	19,190	23,478	27,656	9,998	2.3%

Source: Colorado Department of Local Affairs, State Demography Office 2014a.

### 3.17.3.2 Housing

In recent years, housing availability and affordability has become an important issue in the four-county region. Although there has been some increase in housing availability following the recent economic downturn, it remains an issue of public concern (USFS 2014a).

**Table 3.17-4** provides household and housing data for the four-county region. Vacancy rates in the region are generally highest in communities with the least quantity of affordable housing. In 2013, Pitkin County's had a 37 percent housing vacancy rate and is one of the least affordable housing markets in the four-county region. Pitkin also has the highest median mortgage costs and gross rents (EPS-HDT 2015). A large percent of Pitkin's vacant housing units are from seasonal or recreational use of homes. Adjusting for Pitkin County's recreational housing market, the adjusted vacancy rate for the County would be closer to 25 percent, which is still relatively high when compared to the vacancy rates in neighboring counties (Loughery et al. 2014).

**Table 3.17-4 Housing Characteristics and Vacancy Rates for the Four-County Region (2013)**

Area	Households		Housing		
	Total	Persons per Household	Total	Vacant	Vacancy Rate
Colorado	2,066,166	2.5	2,254,905	188,739	8%
Four-County Region	89,892	2.5	104,007	14,115	14%
Garfield County	20,709	2.7	23,489	2,780	12%
Mesa County	58,241	2.5	64,111	5,870	9%
Pitkin County	8,258	2.1	13,054	4,796	37%
Rio Blanco County	2,684	2.4	3,353	669	20%

Source: Colorado Department of Local Affairs, State Demography Office 2015c.

As previously discussed, rapid residential development occurred in Garfield and Mesa counties between 2000 and 2013, and these Counties' housing inventories increased by 34 percent and 31 percent, respectively (Colorado Department of Local Affairs, State Demography Office 2015c). Concurrently, these counties also had a large influx of new residents within the past decade, and consequently they continue to have low vacancy rates. **Table 3.17-5** provides the household and housing data for the individual key communities. Of these, Parachute and De Beque have the highest vacancy rates (31 and 18 percent, respectively).

**Table 3.17-5 Housing Characteristics and Vacancy Rates for Key Communities (2013)**

Area	Households		Housing		
	Total	Persons per Household	Total	Vacant	Vacancy Rate
<b>Garfield County</b>					
Carbondale	2,282	2.8	2,479	197	8%
Glenwood Springs	3,872	2.5	4,176	304	7%
New Castle	1,587	2.9	1,719	132	8%
Parachute	374	2.9	539	165	31%
Rifle	3,259	2.8	3,635	376	10%
Silt	1,006	3.0	1,088	82	8%
<b>Mesa County</b>					
De Beque	185	2.7	225	40	18%

Source: Colorado Department of Local Affairs, State Demography Office 2015c.

### 3.17.3.3 Commuting Patterns

Many residents of the four-county region commute to work in another county which is an indication of the counties' economic interdependence. Countywide commuting patterns are shown in **Table 3.17-6**. Approximately 24 percent of Garfield County's employed residents work outside the county, the majority (67 percent) of which commute to work in Pitkin County or Eagle County (21 percent). Mesa County has the lowest rate of out-of-county commuting as approximately only 6 percent of its employed residents travel outside of Mesa for work. Most of these commuters (63 percent) travel to jobs in Garfield County (American Association of State Highway and Transportation [AASHTO] 2010).

**Table 3.17-6 Commuting Patterns in Four-County Region (2010)**

Area	Place of Work	
	In County of Residence	Outside County of Residence
Four-County Region	89%	11%
Garfield County	77%	24%
Mesa County	94%	6%
Pitkin County	91%	9%
Rio Blanco County	87%	13%

Note: Due to rounding, sum of percentages do not always add up to 100 percent.  
Source: AASHTO 2010.

Most of Garfield County’s local communities have commuting rates comparable to or less than the County average except for Carbondale which has a 49 percent out-of-county commuting rate. The small community of De Beque in Mesa County also has a higher commuting rate, as 38 percent of its work force travel daily out of the County to work (AASHTO 2010).

**3.17.3.4 Employment**

Labor force and employment data for the region is provided in **Table 3.17-7**. In 2014, the four-county region’s unemployment rate was 5.8 percent and slightly higher than the statewide unemployment rate of 5.0 percent. While labor force and employment growth rates for both Garfield and Mesa counties were substantially higher than the statewide average between 2000 and 2014, Pitkin County had slower growth rates and Rio Blanco County’s rates were negative.

**Table 3.17-7 Labor Force and Unemployment Rates for the Four-County Region (2000-2014)**

Area	Labor Force			Employed			Unemployment Rate	
	2000	2014	% Change (2000-14)	2000	2014	% Change (2000-14)	2000	2014
Colorado	2,359,515	2,817,334	19%	2,294,408	2,675,947	17%	2.8%	5.0%
Four-County Region	96,801	119,097	23%	93,802	112,212	20%	3.1%	5.8%
Garfield County	24,755	31,505	27%	24,087	29,871	24%	2.7%	5.2%
Mesa County	58,884	73,608	25%	56,921	69,068	21%	3.3%	6.2%
Pitkin County	9,925	11,030	11%	9,651	10,491	9%	2.8%	4.9%
Rio Blanco County	3,237	2,954	-9%	3,143	2,782	-12%	2.9%	5.8%

Source: Colorado Department of Labor and Employment 2015a; 2000.

Pitkin County’s low job growth was largely due to the relocation of certain industries, such as construction, to other more affordable down valley areas such as Garfield County (Aspen Community Vision 2008). In addition, many Pitkin County workers reside in neighboring counties with more affordable housing and lower living costs. As a result, the spending by local residents has increasingly moved “down valley” over the past decade.

**Tables 3.17-8 and 3.17-9** show industry sector employment by county and for the local communities. The largest employing industry sectors in the seven key towns and cities are construction, retail trade, and services (accommodation and food, education, healthcare and social assistance). The retail trade and the services sectors also are the largest employing industry sectors in the four-county region as a whole. Between 1970 and 2000, there has been a regional shift from the retail sector to the services sector as the region's recreation sector has becoming increasingly important (BLM 2011).

#### Mineral Extraction

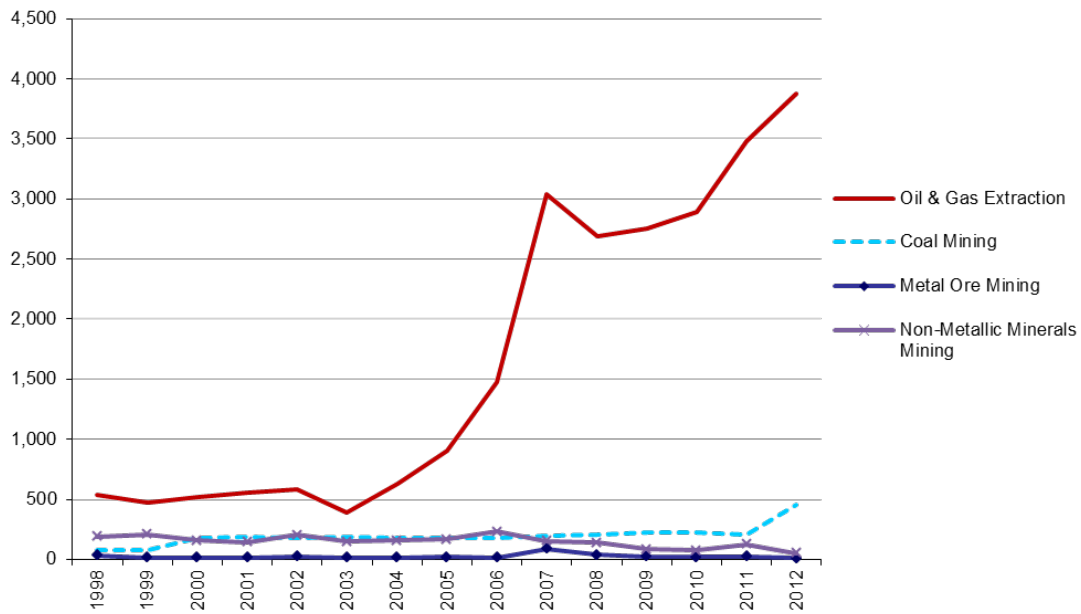
**Table 3.17-10** shows mineral extraction sector employment by industry. In 2013, the mineral extraction sector employed an estimated total of 7,235 people that accounted for 4.8 percent of the four-county region's total employment. The sector constitutes a similar proportion of Garfield and Mesa counties' total employment. However, while extraction industries provided over 18 percent of Rio Blanco County's jobs, they provided a negligible proportion (less than 0.2 percent) of Pitkin County's employment. The oil and gas extraction industry and its support activities constitute nearly all (95 percent) of the mineral extraction sector's employment in the four-county region.

Over the last decade, the mineral extraction sector's proportion of regional employment has increased substantially. As recently as 2004, the mineral extraction sector provided only 1 percent of region's total employment. However by 2012, mineral extraction sector employment grew to more than 5 percent of the region's jobs (**Table 3.17-8**). As shown in **Figure 3.17-1**, the oil and gas extraction business sector accounted for the majority of the mineral extraction sector's job growth as employment within the other business sectors was relatively unchanged.

#### Recreation and Tourism

The recreation and tourism sector (also commonly referred to as the travel and tourism sector) is predominately a subset of the service industry sector. Travel and tourism employment includes the business sectors retail trade, transit, entertainment and recreation, and food and lodging sectors. Together these business sectors employ more than 40,000 workers in the region. However about one-third of these jobs serve local residents. The sales to visitors (i.e., non-local individuals) comprise the remaining two-thirds and are known as the recreation and tourism sector. There are inherent challenges in determining the proportion of economic activity and employment properly attributed to visitor spending versus that spent by local residents.

**Table 3.17-11** shows the estimated travel and tourism sector employment by major business type. In 2013, the region's tourism sector is estimated to have provided nearly 26,000 jobs—equivalent to more than 17 percent of the region's total employment. The tourism industry sector is Pitkin County's largest employer, accounting for 30 percent of Pitkin County's jobs. Moreover, Pitkin County's tourism sector accounts for almost half of all the region's travel and tourism jobs. This is due to the popularity of its extensive developed recreation resources and opportunities in particular its successful winter sports and the resorts in Aspen. However, Pitkin County also faces high seasonal unemployment in the off-season months of May and June (EPS-HDT 2015).



Source: EPS-HDT 2015.

**Figure 3.17-1 Job Growth in Mining sectors in Four-County Region (1998-2012)**

**Table 3.17-8 Employment by Industry Sector for the Four-County Region (2013)**

Industry Sector	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
	Employment	% of Total	Employment	% of Total	Employment	% of Total	Employment	% of Total	Employment	% of Total
<b>Total Employment</b>	<b>38,766</b>		<b>84,033</b>		<b>22,176</b>		<b>4,835</b>		<b>149,810</b>	
Agriculture	872	2	2,167	3	113	1	338	7	3,489	2
Mineral Extraction	2,633	7	3,682	4	44	0	876	18	7,235	5
Construction	4,173	11	5,207	6	947	4	426	9	10,753	7
Manufacturing	394	1	3,098	4	119	1	40	1	3,651	2
Trade	4,452	12	12,154	15	1,976	9	353	7	18,934	13
TIPU <sup>1</sup>	3,161	8	3,521	4	349	2	151	3	7,182	5
Service	18,113	47	45,064	54	16,737	76	1,600	33	81,514	54
Government	4,970	13	9,139	11	1,891	9	1,052	22	17,052	11

<sup>1</sup> Transportation, Information, Power and Utilities sector.

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

**Table 3.17-9 Employment by Industry Sector for the Local Communities (2013)**

Industry Sector	Garfield County						Mesa County
	Carbondale	Glenwood Springs	New Castle	Parachute	Rifle	Silt	De Beque
<b>Total Employment</b>	<b>3,443</b>	<b>5,604</b>	<b>2,274</b>	<b>487</b>	<b>4,779</b>	<b>1,308</b>	<b>144</b>
Agriculture and Mineral Extraction	82	76	28	23	214	81	17
Construction	586	795	372	77	797	158	22
Manufacturing	78	73	44	17	270	25	6
Trade	356	1,001	443	61	797	292	27
TIPU <sup>1</sup>	154	306	102	31	376	135	11
Service	2,038	3,152	1,208	255	2,120	514	56
Government	149	201	77	23	205	103	5

<sup>1</sup> Transportation, Information, Power and Utilities sector.

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: EPS-HDT 2015.

**Table 3.17-10 Mineral Extraction Employment (2013)**

Industry	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
Total Employment	38,766		84,033		22,176		4,835		149,810	
<b>Mineral Extraction</b>	<b>2,633</b>		<b>3,682</b>		<b>44</b>		<b>876</b>		<b>7,235</b>	
Oil & Gas Extraction	971	37%	791	22%	33	75%	245	28%	2,040	28%
Drilling Oil & Gas Wells	862	33%	492	13%	4	9%	105	12%	1,463	20%
Support Activities - Oil and Gas	742	28%	2,281	62%	1	2%	319	36%	3,343	46%
Mining (Except Oil & Gas)	57	2%	95	3%	0	0%	204	23%	356	5%
Support Activities - Mining	1	0%	23	1%	7	16%	2	0%	33	1%

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

**Table 3.17-11 Travel and Tourism Employment in Four-County Region**

Industry	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
Total Employment	38,766		84,033		22,176		4,835		149,810	
<b>Travel &amp; Tourism Related</b>	<b>6,622</b>		<b>11,831</b>		<b>7,070</b>		<b>433</b>		<b>25,956</b>	
Retail Trade	714	7%	2,126	18%	618	9%	73	17%	3,531	14%
Entertainment & Recreation	850	13%	1,789	15%	2,338	39%	73	17%	5,100	20%
Food & Lodging	2,997	35%	7,178	61%	3,914	48%	287	66%	14,376	55%
Transport & Related <sup>1</sup>	2,060	45%	738	6%	200	4%	0	0%	2,998	12%

<sup>1</sup> Includes scenic and sightseeing transportation and support activities for transportation, and travel arrangement and reservation services.

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

Recreational opportunities in the WRNF are wide-ranging. Skiing, snowmobiling and snowshoeing are the primary recreation uses during the winter season. During the rest of the year recreation uses within WRNF includes backpacking, hiking, camping, boating, biking, stand-up paddle boarding and hunting (USFS 2013b).

In 2012, there were an estimated 12,287,000 total visits to the WRNF. Downhill and cross-country skiing and hiking/walking are the most popular recreational activities in the WRNF as reported by the National Visitor Use Monitoring results (USFS 2008). Over half the visitors reported skiing as their primary activity during their National Forest visit, which was followed by hiking/walking (23.5 percent). In comparison, only 0.8 percent and 0.4 percent of visitors reported hunting and fishing respectively as their primary recreational activity during their National Forest visit (USFS 2015f).

As discussed in Section 3.13 (Recreation), developed recreation is very limited within the lease area. There are only two developed recreation sites identified within the lease zones (Beaver Creek and Cayton trailheads) and a total of 39 miles of recreational trails within all four zones with majority located in Zones 2 and 3. An estimated 14 percent of Lease Zone 2 and 7 percent of Zone 3 transect

management areas accessed by dispersed recreation users. Overall, the zones are in predominantly natural or natural appearing conditions with a relatively low-concentration of recreational users.

Big game hunting is an important dispersed recreation activity in the WRNF. Most hunting occurs primarily south of the I-70 from De Beque to Glenwood Springs and east and northeast of Meeker. Big game hunting season also is typically from mid-August through early November. Within the analysis area, the GMUs 12, 23, 42, and 43 are where a majority of the existing leasing zones are located or adjacent to. On average, 20,000 big game hunting licenses are issued annually for GMUs 12, 23, 42, and 43. Hunters typically spend on average 4.6 days per season hunting, and consequently there are approximately 92,000 recreational days per year within the four GMU units for hunting. The majority (75 percent) of hunting use is estimated to be by non-locals that contribute positively to the region’s tourism sector by bringing new spending and income (USFS 2010d). Recreational hunting by local resident may be expected to have a more limited economic impact to the regional economy since most of their hunting-related spending may predominantly result in reallocation of spending with little if any net new income added to the region’s economy.

Over the last decade, several location or activity specific analyses have estimated the economic contribution of specific recreational activities to the regional economies, some of which are presented in **Table 3.17-12**. Hunting and fishing jobs are a subset of values in **Table 3.17-11**. As hunting and fishing only represent a small percent of total recreational activity that occurs on the WRNF, the employment contribution of these activities also would be expected to similarly represent a limited proportion of the region’s tourism and service sectors.

**Table 3.17-12 Recreation Sector’s Contribution to Employment**

Report	Year	Analysis Area	Recreation Activity	Jobs Created
BBC (2008). <i>Economic Impacts of Hunting, Fishing and Wildlife Watching in Colorado</i> .	2008	Colorado (by county)	Hunting and fishing	Garfield County: 579 Mesa County: 813 Pitkin County: 327 Rio Blanco County: 305 <b>Four-County Region: 2,024</b>
Southwick Associates. (2013). <i>Economic Contribution of Outdoor Recreation in Colorado</i> .	2013	Colorado (by county)	Hunting	Garfield County: 322 Mesa County: 484 Pitkin County: 70 Rio Blanco County: 191 <b>Four-County Region: 1,067</b>
BBC (2013). <i>Economic Contribution of Thompson Divide to Western Colorado</i> .	2013	Thompson Divide Area	Hunting, fishing and other recreation (camping, trails etc.)	Hunting, recreation and fishing generate 72, 138 and 20 jobs respectively.
USFS. (2014a). <i>WRNF Oil and Gas Leasing Final EIS</i> and Hopkin, K. (2014). <i>Recreation Specialist Report. White River National Forest Oil and Gas Leasing EIS</i> .	2014	WRNF	Hunting and fishing	For every 1,000 non-local hunting and fishing visits, 1.4 jobs are created. For every 1,000 local hunting and fishing visits, 0.2 jobs are created.



Analysis by BBC Research in 2008 estimated that within entire the four-county region recreational fishing generates twice the economic impacts<sup>1</sup> as hunting. It also estimated that recreational fishing supported approximately 1,300 jobs and hunting another 700 jobs (BBC 2008). More recent analysis by Southwick Associates estimated that hunting created 1,067 jobs in the region (Southwick Associates 2013). It also indicated that the region’s recreational fishing use likely generated similar economic impacts, which would suggest an estimated total of approximately 2,100 recreational hunting- and fishing-related jobs in the region. This value is similar to BBC Research’s 2008 employment estimate of approximately 2,000 (BBC 2008).

Hunting, fishing, and other dispersed recreation activities (including hiking and camping) solely within the Thompson Divide area have been estimated to generate a total of 230 jobs in the region (BBC 2013), of which 72 are estimated to be hunting-related. All of the Zone 3 leases are located within the Thompson Divide area.

The Forest Service 2014 Final EIS for Future Leasing on the WRNF estimated that for every 1,000 local hunting and fishing visits, 0.2 jobs are created and for every 1,000 non-local visits, 1.4 jobs are created (USFS 2014a). The National Visitor Use Monitoring data estimated approximately 150,000 hunting and fishing visits to the WRNF in 2012 and of these approximately 94,000 were elk and deer hunting use. Of the total visits, 25 percent of visitors were from the area within 25 miles of the forest (USFS 2008). As such, based on the Forest Service estimates, hunting and fishing generated approximately 160 jobs in the WRNF.

Agriculture

The agriculture sector includes typical crop production and livestock operations as well as forestry, fishing and hunting businesses. **Table 3.17-13** shows the employment by major agricultural industry for the region and each of the four counties. The agricultural sector accounts for nearly 5 percent of four-county region employment (**Table 3.17-8**) and in 2013 it provided approximately 3,500 jobs. However, the sector’s importance varies significantly between counties. In Rio Blanco County, the agriculture sector provides 7 percent of the county’s jobs with beef cattle ranching being the county’s largest agricultural employer. By contrast, agricultural jobs represent only about 0.5 percent of the Pitkin’s employment.

**Table 3.17-13 Agriculture Sector Employment in the Four-County Region (2013)**

Industry	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
	Jobs	%	Jobs	%	Jobs	%	Jobs	%	Jobs	%
Total Employment	38,766		84,033		22,176		4,835		149,810	
<b>Agriculture Sector</b>	<b>872</b>		<b>2,167</b>		<b>113</b>		<b>338</b>		<b>3,489</b>	
Crop Farming	300	34%	996	46%	27	24%	126	37%	1,449	42%
Beef Cattle Ranching/Farming	258	30%	394	18%	15	13%	147	44%	815	23%
Other Animal Production <sup>1</sup>	126	14%	449	21%	37	33%	42	12%	654	19%
Support Activities - Agriculture	177	20%	307	14%	31	27%	23	7%	538	15%
Other <sup>2</sup>	10	1%	20	1%	2	2%	0	0%	33	1%

<sup>1</sup> Includes dairy operations, poultry and egg production and all other animal production (e.g., pig and sheep).

<sup>2</sup> Includes Forestry and timber production, commercial logging and fishing. Also includes commercial hunting/trapping (it also may be considered to be a recreational activity).

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

<sup>1</sup> Economic impacts refer to quantifiable benefits to the economy, measured in jobs, labor income and economic output.

Crop farming is the region's largest agricultural employer and provides the most agricultural jobs in all the counties except Rio Blanco. The beef cattle ranching industry is the second largest agricultural employer in the region with many ranching operations grazing their herds on public lands leased from the Federal government.

Grazing is an important economic activity within the WRNF and Thompson Divide areas. Active grazing allotments provide over 19,000 AUMs annually within the Thompson Divide. Based on this, it was estimated that grazing on Thompson Divide supports 64 jobs (BBC 2013).

Livestock grazing within the WRNF is regulated under a system of federal grazing permits or allotments. As discussed in Section 3.14 (Livestock Grazing), the entire WRNF provides grazing for approximately 65 livestock operations on 88 active allotments. It also is estimated that approximately 45 percent of the WRNF total forage is available for livestock grazing use (USFS 2014a). A total of 19 grazing allotments overlap the leasing zones, and cover 26 percent of the analysis area.

The WRNF's current permitted level of grazing is 64,863 cattle head months<sup>2</sup> (HMs) and 118,514 sheep HMs. This is the maximum number of HMs that could be accommodated under ideal forage conditions. Actual grazing use varies due to factors such as drought, financial limitations on operators, market conditions and implementation of grazing practices to improve range conditions. Between 2004 and 2008, grazing use in the WRNF averaged 60,043 Cattle HMs and 102,339 Sheep HMs (USFS 2014a). The analysis area contains only a portion of total permitted allotments in the WRNF and consequently only a comparable fraction of the 160,000 HMs are located in the analysis area. As discussed in Section 3.14 (Livestock Grazing), the four leasing zones overlap a total of 17 allotments with an average carrying capacity of 12 AUMs per acre. The analysis area's total grazing capacity is estimated to be 23,300 AUMs, which represents approximately 30 percent of WRNF's estimated total 80,000 AUMs grazing capacity. However, the analysis area's AUM estimates represent its grazing use potential. Specific grazing use of these allotments is unknown and consequently, it is difficult to estimate the specific economic contribution of their grazing use.

### 3.17.3.5 Income

Labor earnings are the largest source of income for residents, with labor earnings accounting for 59.6 percent of total personal income in 2012 in the four-county region (**Table 3.17-14**). Garfield, Mesa, and Rio Blanco counties had similar compositions of personal income (average of less than \$28,000/year), with labor earnings being the largest source of personal income accounting for approximately 60 percent of more of its residents' personal income. Pitkin County's total personal income is more equally divided between labor and non-labor income<sup>3</sup>.

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<sup>2</sup> A cattle HM or AUM is the amount of forage required by an animal unit for 1 month, and is defined as a mature (1,000-pound) cow or the equivalent (e.g., a cow-calf pair), based on an average consumption rate of 26 pounds of forage dry matter per day.

<sup>3</sup> Non-Labor Income includes: income from investments, payments associated with aging, and payments associated with economic hardship.

**Table 3.17-14 Total Personal Income in the Four-County Region (2012)**

Income	Garfield County	Mesa County	Pitkin County	Rio Blanco County	Four-County Region
Total Personal Income (in Millions)	\$2,396.9	\$5,580.1	\$1,473.0	\$296.9	\$9,747.0
Labor Earnings	65%	59%	52%	68%	60%
Non-Labor Income	35%	41%	48%	32%	40%
Average Per Capita Income	\$27,034	\$27,133	\$52,654	\$28,033	\$42,515

Note: Labor and non-labor income may not add up exactly to 100% due to social security, cross-county commutes, and other factors.

Source: EPS-HDT 2015.

As shown in **Table 3.17-15**, the service industry is the largest contributor to total labor earnings in the four-county region, and is similarly the largest contributor in Garfield, Mesa, and Pitkin counties. In Pitkin County, the service industry is particularly important, due to its significant tourism and recreation sector, and the industry contributes 76 percent of total labor income in the county. In Garfield and Mesa counties, the service sector accounts for 36 percent and 44 percent, respectively, of the total labor income. Mineral extraction, construction, trade and government sectors are the other important contributors for both Garfield and Mesa counties. Mineral extraction industries in Rio Blanco County provides almost a third of Rio Blanco County’s labor income, with government, construction and service sectors providing more than 10 percent each.

In all the counties, oil and gas extraction average wages have consistently remained higher than those in other sectors. In 2013 the mineral extraction sector’s average wage was nearly twice the region’s average wage rate. In comparison, the travel and tourism sector’s average wage was nearly half the region’s average wage rate (EPS-HDT 2015). The oil and gas sector’s comparatively high wage rates results in its larger proportional contribution to the region’s labor income.

### 3.17.3.6 Output

Economic output provides a measure comparable to the county level gross domestic product for each industry sector. Output is measured differently for each industry sector to determine its appropriate contribution to the economy. For manufacturers, gross sales are adjusted for the change in inventory (to account for inputs used in production). Similarly, retail and wholesale trade businesses’ output is determined by gross margin (i.e., adjusted for their inventory costs) and not gross sales. However, the service sector’s output is represented by gross sales, as its value is predominantly based on labor.

**Table 3.17-16** presents the total output in the region by sector. The service sector accounts for the majority of total output in the four-county region. While more than 75 percent of Pitkin County’s total output comes from its service sector, it contributes less than 30 percent to Rio Blanco County’s total output.

**Table 3.17-15 Total Labor Income in the Four-County Region by Industry (2013)**

Sector / Industry	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
	Labor Income	%	Labor Income	%	Labor Income	%	Labor Income	%	Labor Income	%
<b>Total (\$ millions)</b>	\$1,750	100	\$3,068	100	\$2,817	100	\$205.4	100	\$5,713	100
Agriculture	\$16	1	\$16	1	\$12	0	\$3	1	\$28	1
Mineral Extraction	\$224	13	\$242	8	\$13	1	\$66	32	\$516	9
Construction	\$255	15	\$222	7	\$193	7	\$32	16	\$490	9
Manufacturing	\$21	1	\$149	5	\$27	1	\$1	1	\$179	3
TIPU <sup>1</sup>	\$162	9	\$169	6	\$65	2	\$10	5	\$347	6
Trade	\$176	10	\$384	13	\$212	8	\$9	4	\$627	11
Service	\$633	36	\$1,339	44	\$2,130	76	\$31	15	\$2,534	44
Government	\$263	15	\$546	18	\$166	6	\$53	26	\$990	17

<sup>1</sup> Transportation, Information, Power, and Utilities sector.

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

**Table 3.17-16 Sector Output in Four-County Region (2013)**

Sector	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
	Output	%	Output	%	Output	%	Output	%	Output	%
<b>Total (in \$millions)</b>	<b>\$5,352</b>		<b>\$11,235</b>		<b>\$2,818</b>		<b>\$860</b>		<b>\$20,264</b>	
Agriculture	\$49	1	\$178	2	\$12	0	\$51	6	\$290	1
Mineral Extraction	\$643	12	\$834	7	\$13	1	\$285	33	\$1,775	9
Construction	\$733	14	\$878	8	\$193	7	\$85	10	\$1,889	9
Manufacturing	\$142	3	\$934	8	\$27	1	\$9	1	\$1,115	6
TIPU <sup>1</sup>	\$593	11	\$643	6	\$65	2	\$69	8	\$1,369	7
Trade	\$481	9	\$1,215	11	\$212	8	\$38	4	\$1,946	10
Service	\$2,376	44	\$5,789	52	\$2,130	76	\$257	30	\$10,553	52
Government	\$334	6	\$761	7	\$166	6	\$65	8	\$1,326	7

<sup>1</sup> Transportation, Information, Power, and Utilities sector.

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

Oil and Gas Extraction

**Table 3.17-17** presents total output from the mineral extraction sector in the four-county region. In Rio Blanco, the mineral extraction sector accounts for 33 percent of County’s total output (**Table 3.17-16**), by far the highest percentage of all the counties in the region. Mineral extraction makes a negligible contribution to Pitkin County’s economy, which has been traditionally more dependent on tourism and recreation businesses as represented by its large service industry sector.

**Table 3.17-17 Mineral Extraction Sector Output by Industry (2013)**

Sector / Industries	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
Total Output (in \$millions)	\$5,352		\$11,235		\$2,818		\$860		\$20,264	
<b>Mineral Extraction</b>	<b>\$643</b>		<b>\$834</b>		<b>\$12.9</b>		<b>\$285</b>		<b>\$1,775</b>	
Oil & Gas Extraction	\$273	42%	\$216	26%	\$10.8	84%	\$69.9	25%	\$570	32%
Drilling Oil & Gas Wells	\$224	35%	\$132	16%	\$1.2	9%	\$26.3	9%	\$383	22%
Support Activities - Oil and Gas	\$129	20%	\$415	50%	\$0.1	1%	\$54.5	19%	\$599	34%
Mining (Except Oil & Gas)	\$16.6	3%	\$66	8%	\$0	0%	\$134	47%	\$217	12%
Support Activities - Mining	\$0.1	0%	\$3	1%	\$0.7	5%	\$0.4	0%	\$4.2	0%

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

Recreation and Tourism

**Table 3.17-18** presents the total output in the four-county region related to the travel and tourism sector. As discussed above, this is primarily a subset of the service industry sector. The recreation and tourism sector in Pitkin County generates approximately 25 percent of the County’s total output, with entertainment and recreation, and food and lodging as the two largest contributing business sectors. For all counties, food and lodging constitutes the largest share of their respective outputs.

**Table 3.17-18 Travel and Tourism Sector Output by Industry (2013)**

Sector / Industries	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
Total Output (in \$millions)	\$5,352		\$11,235		\$2,818		\$860		\$20,264	
<b>Travel &amp; Tourism</b>	<b>\$548</b>		<b>\$716</b>		<b>\$667</b>		<b>\$36.6</b>		<b>\$1,967</b>	
Retail Trade	\$39.5	7%	\$118	17%	\$59.1	9%	\$9.6	26%	\$226	12%
Entertainment & Recreation	\$70.4	13%	\$104	15%	\$260	39%	\$6.8	19%	\$441	22%
Food & Lodging	\$192	35%	\$404	57%	\$320	48%	\$20.2	55%	\$936	48%
Transport and related services	\$246	45%	\$89.5	13%	\$28.1	4%	\$0	0%	\$364	19%

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

According to the National Visitor Use Monitoring data, 79 percent of the WRNF’s 12.3 million visitors primarily engage in downhill skiing and hiking/walking. Correspondingly, these recreational activities also would have the largest contributions to the travel and tourism sector output in the four-county region. Annual total spending<sup>4</sup> associated with all WRNF visits was \$1,947 million (in 2014 dollars), with downhill skiing visits accounting for \$1,388 million (in 2014 dollars<sup>5</sup>) (USFS 2008). As such, downhill skiing alone accounts for 70 percent of total spending from WRNF recreational use.

In comparison, WRNF hunting- and fishing-related recreational use is estimated to generate annual regional travel-related expenditures<sup>6</sup> of approximately \$1.8 million and \$5.4 million (in 2014 dollars<sup>7</sup>), respectively (USFS 2010d). Wildlife viewing recreation within WRNF is estimated to contribute \$4.0 million in travel spending (in 2014 dollars) (USFS 2010d). The analysis area is only a portion of the WRNF, and thus its recreation use will contribute only a portion of total forest-wide travel-related expenditures.

Over the last decade, several studies have estimated the economic contribution of recreational activities to the regional economies, some of which are presented in the **Table 3.17-19**. The total economic impact from recreation is the sum of direct and indirect expenditures related to the recreational activities.

<sup>4</sup> Spending includes spending on forest and within 50 miles of the forest boundary. Spending categories include lodging, restaurant, groceries, gas and oil, other transportation, admissions and fees etc.

<sup>5</sup> Dollar values from the report were converted to current (2014) dollar values for easier comparison across years, different reports and sections.

<sup>6</sup> These estimates are only for travel-related expenditures, and exclude expenditures on non-travel items such as equipment (e.g., hunting supplies) and entertainment (USFS 2010d).

<sup>7</sup> Dollar values from the report were converted to current (2014) dollar values for easier comparison across years, different reports and sections.

**Table 3.17-19 Total Economic Impact from Recreation**

Report	Year	Analysis area	Recreation Activity	Total Economic Impact
BBC (2008). <i>Economic Impacts of Hunting, Fishing and Wildlife Watching in Colorado.</i>	2008	Colorado (by county)	Hunting and fishing	Garfield County: \$54.4 mil. Mesa County: \$76.1 mil. Pitkin County: \$24.8 mil. Rio Blanco County: \$30 mil. <b>Four-County Region: \$185.3 mil</b>
Southwick Associates (2013). <i>Economic Contribution of Outdoor Recreation in Colorado.</i>	2013	Colorado (by county)	Hunting	Garfield County: \$22.6 mil. Mesa: \$33.7 mil. Pitkin: \$6.0 mil. Rio Blanco: \$13.7 mil. <b>Four-County Region: \$76.0 mil.</b>
BBC (2013). <i>Economic Contribution of Thompson Divide to Western Colorado.</i>	2013	Thompson Divide Area	Hunting, fishing and other recreation (camping, trails etc.)	Hunting, recreation, and fishing generate \$6.8 mil., \$12.6 mil., and \$1.5 mil., respectively.

Agriculture

**Table 3.17-20** presents the total output in the four-county region related to the agriculture sector. For all counties, beef cattle ranching is the most significant agriculture related business sector, constituting the largest share to their respective local outputs. In particular, it accounts for more than half of total agricultural output in Garfield and Rio Blanco counties.

**Table 3.17-20 Agriculture Sector Output by Industry (2013)**

Sector/Industries	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
Total Output (in \$millions)	\$5,352		\$11,235		\$2,818		\$860		\$20,264	
<b>Agriculture Sector</b>	<b>\$49.0</b>		<b>\$178</b>		<b>\$12.0</b>		<b>\$51.4</b>		<b>\$290</b>	
Crop Farming	\$12.1	25%	\$61.1	34%	\$2.9	24%	\$11.3	22%	\$87.4	30%
Beef Cattle Ranching/Farming	\$26.5	54%	\$62.7	35%	\$4.1	34%	\$35.3	67%	\$128.6	44%
Other Animal Production <sup>1</sup>	\$4.8	10%	\$40.5	23%	\$3.7	31%	\$3.7	7%	\$52.7	18%
Support Activities - Agriculture	\$5.1	10%	\$12.6	7%	\$1.2	10%	\$1.1	2%	\$20.0	7%
Other <sup>2</sup>	\$0.4	1%	\$1.2	1%	\$0.1	1%	\$0.9	2%	\$2.6	1%

<sup>1</sup> Includes dairy operations, poultry and egg production and all other animal production (e.g., pig and sheep).

<sup>2</sup> Includes forestry and timber production as well as commercial logging, fishing and hunting (which also may be considered a recreational activity).

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

### 3.17.3.7 Oil and Gas Production

#### Statewide and Regional Production

Colorado has substantial mineral deposits and considerable ongoing mineral extraction activity. The State’s average oil and natural gas production between 2008 and 2012 was \$10 billion per year. Colorado’s natural gas production is ranked seventh in the U.S. State natural gas sales averaged almost 1.6 Mcf per year between 2009 and 2014 (COGCC 2015e; USEIA 2015a).

**Table 3.17-21** shows the region’s oil and gas production values. These values are based on the assessed property tax values (Leeds 2014a). Natural gas accounted for 78 percent of oil and gas revenues for the four-county region in 2012, and region accounted for 50 percent of total natural gas sold in Colorado (COGCC 2015f). As shown in **Figure 3.17-2**, most production occurs in the western portion of the region, with only limited oil and gas drilling in the eastern section and no active wells currently operating in Pitkin County.

**Table 3.17-21 Regional Oil and Natural Gas Production Values (2012) (in \$ millions)**

Area	Oil	Natural Gas	Total <sup>1</sup>
Colorado	\$3,697.7	\$4,754.0	\$8,451.3
Four County Region	\$638.1	\$2,367.5	\$3,005.6
Garfield County	\$186.3	\$1,963.4	\$2,149.7
Mesa County	\$8.5	\$133.7	\$142.1
Pitkin County	\$0	\$0	\$0
Rio Blanco County	\$443.3	\$270.5	\$713.8

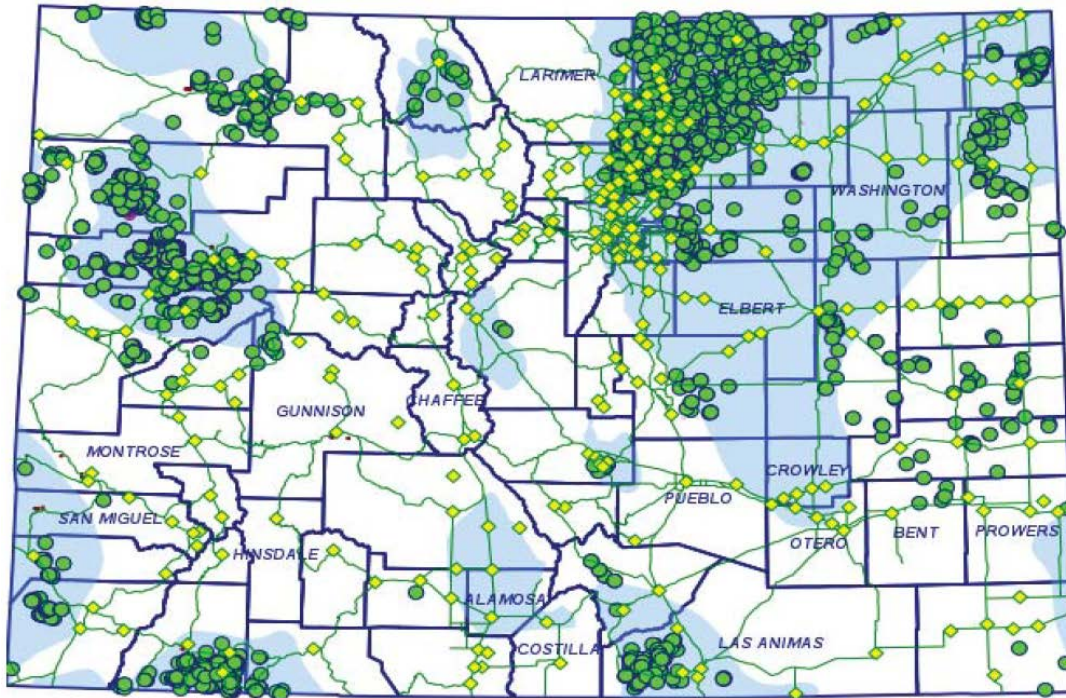
<sup>1</sup> Total does not include additional CO<sub>2</sub> sales revenue of \$353 million. No CO<sub>2</sub> production expected in the four-county region.  
Source: Leeds 2014a.

The socioeconomic analysis assesses the total oil and gas tax impacts to the four-county region. However, the lease area’s wells are expected to produce almost exclusively natural gas. The analysis also assumes that the proportion of natural gas production wells to total active wells is equal to their relative taxable production values (79 percent). It is consequently estimated that there are approximately 11,785 natural gas wells in the four-county region.

**Table 3.17-22** shows the estimated annual oil and gas production for the four-county region. In 2014 the average natural gas well in the four-county region produced an estimated 60 million cubic feet per year. Applied over an expected 20-year average operational lifespan with a constant production curve, a typical directional well would be expected to produce a total of 1.2 billion cubic feet of natural gas (assuming a constant production rate). Horizontal wells in the region are similarly expected to produce 6.4 billion cubic feet of natural gas based on a 20-year lifespan and constant production levels.

Other analysts have questioned the economic feasibility of future natural gas production in the Thompson Divide (Wright 2014). The socioeconomic impact analysis for this EIS is not focused on the evaluation of the economic feasibility of specific wells or oil and gas production in the analysis area. Instead it evaluates the future socioeconomic impacts that would be expected under different future lease alternatives assuming future full development of the approved leases.





Source: COGCC 2015d.

**Figure 3.17-2 Recent Colorado Oil and Gas Well Permits (April 2015)**

**Table 3.17-22 Annual Oil and Gas Production and Active Wells**

Area	Natural Gas Sales (2014) (Mcf)	Natural Gas Sales (2012) (Mcf)	Oil Sales (2012) (barrels)	Active Oil and Gas Wells (March 2015)
Colorado	1,572,439,283	1,657,526,831	48,694,918	53,400
Four-County Region	709,442,729	829,578,021	7,715,082	14,961
Garfield County	596,115,652	691,491,442	2,805,406	10,975
Mesa County	33,466,673	45,011,451	64,372	1,065
Pitkin County	0	0	0	0
Rio Blanco County	79,860,404	93,075,128	4,845,304	2,921

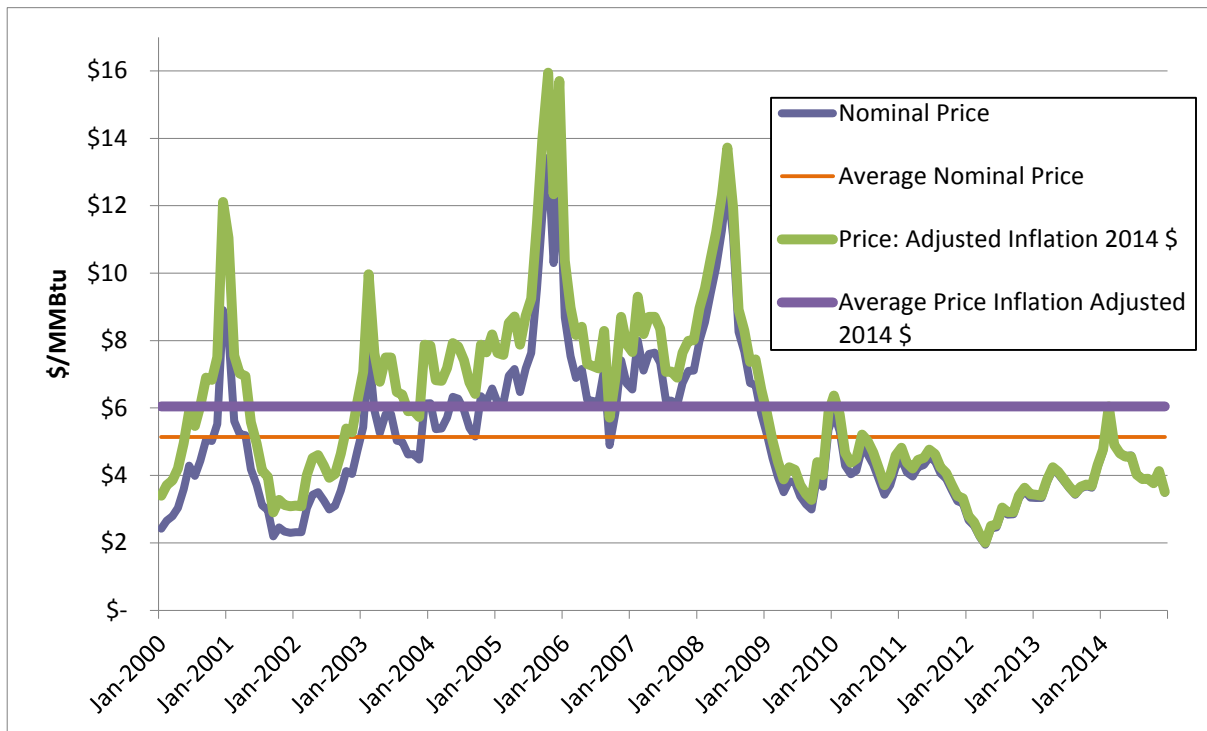
Source: COGCC 2015a-c.

Current Oil and Gas Production within the Analysis Area

There are currently 75 producing wells within the lease boundaries. Another 914 producing wells are located within a 2-mile vicinity of the lease boundaries. The current leased wells support a total of 15 full-time equivalent employees and generate approximately \$1.3 million in annual public revenues for the four-county governments. The lease area is projected to support future development of up to 444 new producing wells (see Section 1.1.4). The Forest Service Reasonably Foreseeable Development Scenario also projects the likely future development of up to 1,014 new wells in the area (USFS 2014a).

Estimated Value of Oil and Gas Production

Colorado’s oil and gas industry had an average total value of \$10 billion per year between 2008 and 2012 of which about \$7 billion was obtain from natural gas production (Leeds 2014a). As shown in **Figure 3.17-3**, there has been significant volatility in natural gas prices nationally since 2000. As a result of nationwide production increases and other factors, natural gas prices peaked in 2008 at nearly \$13/MMBtu; and have since decreased dramatically (USEIA 2015a). Between 2000 and 2014, the Henry Hub average nominal natural gas price was \$5.14/MMBtu. Adjusted for inflation using the Consumer Price Index (CPI), natural gas prices averaged approximately \$6.05 in 2014 dollars between 2000 and 2014 (BLS 2015).



Source: USEIA 2015a.

**Figure 3.17-3 Henry Hub Natural Gas Prices**

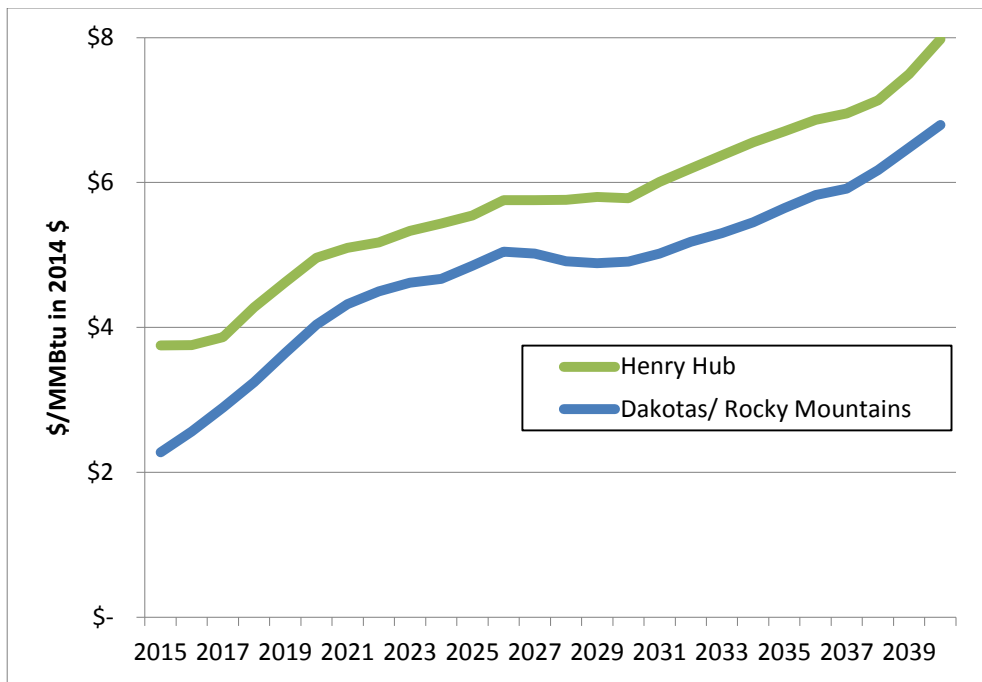
Past Colorado wellhead prices have not always correlated with Henry Hub prices primarily due to variations in natural gas transportation costs and supply conditions. The Leeds 2013 report (citing Colorado Geological Survey) provided an average of \$2.87 per Mcf in Colorado in 2012, with oil priced at \$87.33 per barrel. These values were used to estimate the total sales values shown in **Table 3.17-23**.

Recent expansion of the Colorado natural gas pipeline system has resulted in greater consistency with Henry Hub prices. Nonetheless, future variability in Colorado natural gas prices can continue to be expected (USEIA 2014a). As shown in **Figure 3.17-4**, natural gas prices in the Dakotas/Rocky Mountains are forecasted to increase in real terms through 2040 with a projected average price between 2017 and 2036 of \$4.70/MMBtu in 2014 dollars (USEIA 2014a).

**Table 3.17-23 Oil and Gas Sales for 2012 (\$ Millions)**

Area	Natural Gas Sales (2012)	Oil Sales (2012)	Total Sales (2012)	Natural Gas Percent Total Sales
Colorado	\$4,764.5	\$4,252.3	\$9,016.8	51
Four-County Region	\$2,384.6	\$673.7	\$3,058.3	78
Garfield County	\$1,987.7	\$245.0	\$2,232.6	89
Mesa County	\$129.4	\$5.6	\$135.0	96
Pitkin County	\$0.0	\$0.0	\$0.0	0
Rio Blanco County	\$267.5	\$423.1	\$690.7	39

Source: Leeds 2014.



Source: USEIA 2014a.

**Figure 3.17-4 EIA Forecasted Henry Hub vs. Dakotas/ Rocky Mountains Natural Gas Prices**

### 3.17.3.8 Public Revenue

Government revenues from oil and gas activities within its jurisdiction will depend primarily on well production quantities. **Table 3.17-24** shows the state and county oil- and gas-related tax revenues for the region in 2012. Sales and use taxes typically account for a significant proportion of county and local government revenues. For counties with significant oil and gas extraction activity, oil- and gas-related tax and fee payments can represent a major percentage of their general fund revenues. In 2012, Rio Blanco and Garfield counties received oil and gas revenues equivalent to 56 and 45 percent, respectively, of their general fund expenses.

**Table 3.17-24 General Fund Expenses and Oil and Gas Revenues for the Four-County Region (2012) (\$ Millions)**

Area	General Fund Expenses	County Oil and Gas Revenues
Colorado	\$7,163.2	\$1,600.0
Four-County Region	\$272.0	\$66.4
Garfield County	\$98.3	\$44.7
Mesa County	\$106.4	\$10.3
Pitkin County	\$47.2	\$0.0
Rio Blanco County	\$20.1	\$11.3

Source: Garfield County 2012, Leeds County 2014a; Mesa County 2012, Pitkin County 2012, Rio Blanco County 2012.

Several different government agencies collect fees and taxes from oil and gas operations in Colorado and distribute the collected revenues according to different formulas. Detailed discussion, as well as how oil and gas revenues fund other public entities such as school districts, towns and the COGCC is provided below. The Federal Government also pays “Payments in Lieu of Taxes” (PILT) to local governments to help offset their losses in property tax revenues for non-taxable Federal lands. Sales and income taxes related to oil and gas activities also may generate indirect revenues for the state, county and local governments. However, the magnitude of these public revenues will be limited to a small proportion of the workers’ added labor income and spending on taxable goods.

Federal Mineral Lease Revenues

The Office of Natural Resource Revenue collects federal mineral lease (FML) revenues from oil and gas leases of Federal Government lands. These revenues include rental of the mineral rights, bonus bids, and royalties once a site begins to produce oil and gas. The revenue is then redistributed to the state from where the mineral leases production occurred with the Federal Government keeping 51 percent and the States getting 49 percent. The state then distributes a portion of their revenue to local government agencies within the county from where the resource was produced. **Table 3.17-25** shows a summary of the FML revenues received by the region’s county governments in 2012.

**Table 3.17-25 Federal Mineral Lease Revenues for the Four-County Region (2012) (\$ Millions)**

Area	FML Revenues
Colorado	\$72.4
Four-County Region (ex. Local agencies) <sup>1</sup>	\$8.8
Garfield	\$3.8
Mesa	\$1.9
Pitkin	\$0.0
Rio Blanco	\$3.1
Local Communities <sup>2</sup>	\$3.5

<sup>1</sup> Regional Total only includes county governments.

<sup>2</sup> Includes nearby school and special districts as well as the communities of Parachute, Rifle, Silt, New Castle, Glenwood Springs, Carbondale, and De Beque.

Source: Leeds 2014a.

An entity interested in producing oil and gas from federal land must first lease the mineral rights. While annual rent is \$1.50/acre (increasing to \$2/acre after the first 5 years); many parcels are bid for competitively in a federal auction. Interested parties can then offer bonus bids of at least \$2/acre to compete for specific mineral lease rights. In some case, bonus bids for specific parcels have been more than \$10,000/acre. In an August 14, 2008 auction, the average bonus was \$2,084/acre (BLM 2008c).

The federal lease then gives its lessee 10 years to begin production although a lease can be generally extended if the lessee can prove its well will be capable of future oil and gas production. Once a well begins to produce, the lessee will begin making royalty payments to the Federal Government. The magnitude of its royalty payments are based on its production quantities. The current Onshore Federal Royalty Rate for oil and gas production is typically equivalent to 12.5 percent of its total mineral production value (BLM 2014a).

States distribute their lease revenues based on broad Federal guidelines. Generally priority is given to areas socially or economically impacted by mineral development. FML revenues are typically used for planning, construction or maintenance of public facilities. FML revenues also can be used to fund public service operations. FML revenues also are often retained in reserve funds for later use as future emergency budget funding during economic shortfalls.

Colorado's Department of Land Affairs (DOLA) administers the distribution of both its FML and State severance tax receipts (described below). Forty percent of the State's FML revenues are transferred to the county and municipal governments either by direct distribution (50 percent) or through DOLA grants and loans. The allocations are based on statewide share of where the FML was generated, population, road miles and location of employees.

The other 60 percent not distributed to county and municipal governments is paid out to the school districts, the Colorado public school fund, Colorado Water Conservation Board, or other State Reserve funds. School districts receive funding partly based on their enrollment. As a rough estimate, 2.45 percent of the total mineral production value is transferred to the county and the municipal governments in its jurisdiction, with another 3.7 percent benefiting Colorado State Government and Schools.

### Property Taxes

The local counties, cities, and school districts can directly tax oil and gas production within their jurisdiction through mill levy property taxes. Mill levy property tax rates vary between jurisdictions. Property tax payments are credited against severance taxes (discussed in section below) at a rate of up to 87.5 percent.

Colorado's total oil and gas related property tax revenues in 2012 were \$372.8 million and increased to \$383.3 million in 2013 (Leeds 2014b). The tax revenue totals include both an annual assessment as well as time of sale "ad valorem" property taxes. **Table 3.17-26** summarizes the 2012 property taxes revenues for the four-county region.

Federal lands do not pay County property taxes. However, the Federal Government pays PILT to local governments to help offset losses in property taxes from non-taxable Federal lands. PILT helps pay for firefighting, police protection, construction of public schools and roads, and search-and-rescue operations. PILT allocations are calculated based the Federal land acreage, population, Congressional funding levels for the program, and consideration of other Federal Government contributions. For example, PILT payments are generally reduced in jurisdictions with increased FML revenues. 2012 PILT values for the four-county region are shown in **Table 3.17-27**.

**Table 3.17-26 Property Tax Revenues from Oil and Gas for the Four-County Region (2012)  
(\$ Millions)**

County	Estimated Mill Levies <sup>1</sup>	Oil and Gas Property Taxes
Four-County Region (ex. Local agencies) <sup>2</sup>	47	\$53.0
Garfield	46	\$38.8
Mesa	61	\$6.6
Pitkin <sup>3</sup>	38	\$0
Rio Blanco	42	\$7.6
Local Communities <sup>4</sup>	-	\$64.0

<sup>1</sup> Includes city, school and special districts.

<sup>2</sup> Regional total only includes county governments.

<sup>3</sup> Pitkin County currently has no natural gas production. Pitkin's future property tax rate is assumed to be the same as Rio Blanco County.

<sup>4</sup> Includes nearby school and special districts as well as all cities and towns in the Four-County Region. However, cities and towns accounted for only \$105,000 combined

Source: Leeds 2014a,b.

**Table 3.17-27 PILT Revenues for the Four-County Region (2012)**

Area	PILT Receipts (\$ millions)	Total Acres (millions)
Colorado	\$27.7	23.7
Four-County Area	\$3.9	3.8
Garfield County	\$0.4	1.2
Mesa County	\$1.6	1.6
Pitkin County	\$1.2	0.7
Rio Blanco County	\$0.7	0.3
Local Communities <sup>1</sup>	\$0.0	0.0

<sup>1</sup> Includes nearby school and special districts as well as all cities and towns in the Four-County Region.

Source: USDI 2013.

### Severance Tax

Colorado levies severance taxes on natural gas operations producing more than 90 Mcf/day. Smaller natural gas wells are exempted from paying severance tax (DOLA 2014b; Leeds 2014b). The severance taxes for larger wells are assessed on a sliding scale: from a minimum of 2 percent for wells with a gross income (after royalties) less than \$25,000 to a maximum rate of 5 percent severance for wells with annual gross incomes over \$300,000. Due to the exemptions, severance taxes are generally only obtained from wells with an annual gross income greater than \$300,000 (DOLA 2014b).

In 2013 Colorado derived 1.3 percent of its total State revenues from severance tax payments although in other years severance taxes have accounted for up to 3.2 percent of State revenues (DOLA 2013). However, these taxes are only obtained from jurisdictions that have a mill levy property tax of 58 or less (Colorado's tax code allows operators to deduct up to 87.5 percent of their property tax).

These severance tax revenues are distributed by DOLA with 50 percent paid out to local governments through direct transfer (30 percent) and grants (70 percent). Each jurisdiction’s allocation depends on several considerations: employee residence, mineral permits, mineral production, population, and road miles. **Table 3.17-28** summarizes direct transfer county severance tax revenues within the analysis area.

**Table 3.17-28 Severance Tax Revenues from Oil and Gas for the Four-County Region (2012) (\$ millions)**

Area	2012 Severance
Colorado	\$75.2
Four-County Region	\$4.6
Garfield	\$2.1
Mesa	\$1.8
Pitkin	\$0.0
Rio Blanco	\$0.6
Local Communities <sup>1</sup>	\$1.6

<sup>1</sup> Includes nearby school and special districts as well as the communities of Parachute, Rifle, Silt, New Castle, Glenwood Springs, Carbondale, and De Beque.

Source: Colorado Department of Local Affairs 2012b.

Many natural gas operations in Garfield and Rio Blanco Counties pay both county property and State severance taxes. Natural gas production in Mesa County pays little to no severance tax revenues to the State as its mill levy rates are greater than 58 mills (Leeds 2014b). However, Mesa County does receive a percentage of State’s total severance tax revenues. In fact, Mesa receives almost as much severance tax revenues as Garfield due to the allocation process described above.

Colorado Oil and Gas Conservation Commission Taxes

Oil and gas companies are required to pay a conservation levy (currently 0.07 percent of sales value less exemptions) to the COGCC for its oversight expenses and environmental response fund. In 2012, statewide COGCC tax revenues were \$4.7 million, down from \$7.1 million in 2011 (Leeds 2014a).

**3.17.3.9 Community Character and Social Values**

Western Colorado offers its residents a rural and remote character, outdoor recreation opportunities, natural beauty, and scenic quality of its public lands. Many area residents value these characteristics as important factors contributing to their quality of life and sense of place. These characteristics also are often primary factors that attract and retain many residents to live in these communities. According to the Colorado Statewide Comprehensive Outdoor Recreation Plan, 90 percent of Coloradans participated in some form of outdoor recreation over the past year, and more than 65 percent of residents participate in outdoor recreation activities on a weekly basis (CPW 2014d). This is an indication of the extent to which local residents’ use and value public land (Hopkins 2014). Furthermore, community assessments conducted for North Central Colorado (Hopkins 2014) and Mesa County (BLM 2009) also reported its residents consider the area’s recreation opportunities, wildlife resources and scenic landscape as the most valuable community characteristics.

The rural and remote landscape characteristics of the region with its diversity in topography and vegetation, presence of cultural and traditional uses (such as open rangelands), and the historical landscape contribute greatly to the “sense of place” for communities in Western Colorado, particularly those south of I-70. “Sense of place” can be described as an unquantifiable value that attracts people to

specific landscapes, generates a community identity, and ultimately contributes to the overall quality of life of its residents (Hopkins 2014).

Surveys and studies of reported preferences of the local community with respect to their quality of life have identified a wide range of different perspectives and concerns. Comments received from community groups and individuals during the public scoping period included those favoring the economic and lifestyle benefits from oil and gas development within the area as well as those placing more value on the economic and lifestyle benefits WRNF's recreational and wilderness resources.

Overall feedback gathered from interviews with officials from Mesa, Garfield, and Rio Blanco counties identified the following common themes in their constituents' attitudes and perceived quality of life changes from the ongoing growth in oil and natural gas development within the region.

- Urbanization and higher land values have reduced agriculture's viability, changing the area's culture (Redifer et al. 2007);
- Long-term residents miss the "small town atmosphere" of the past (Redifer et al. 2007);
- Many residents find it less satisfying to hunt and fish in their favorite places as development encroaches into wildlife areas (Redifer et al. 2007);
- The natural beauty of the area is disrupted as views are marred by drilling rigs and networks of access roads (Redifer et al. 2007); and
- Growth in the temporary and transient work force has caused housing shortages (BLM 2015i; Redifer et al. 2007).

In early 2014, the BLM held a public scoping period for the project. Members of the public could comment on the project through email, regular mail, fax as well as during public meetings in Glenwood Springs, Carbondale, Aspen, and DeBeque. The BLM received over 32,000 comment submissions, of which about 31,000 were form letters. Of the 866 form letter submittals originating within the four-county region, 553 (64 percent) were from self-identified Garfield County residents and 279 (32 percent) were from Pitkin County residents. Only 34 (4 percent) were by Mesa County residents. No form letters were submitted by Rio Blanco County residents.

Scoping submissions resulted in a total of 4,158 scoping comments. Of this total, 10 percent were primarily concerned with socioeconomic issues and another 5 percent raised recreation-related issues. Other major topics potentially related to the area's quality of life included water (10 percent), air quality (6 percent) and wildlife (7 percent), and human health and safety (5 percent). Grazing-related issues comprised 1 percent of comments, as did visual concerns. Three percent of the comments related to roadless areas.

Public comments from the 2,318 form letters submitted by self-identified Colorado residents included the following sentiments:

- Concerns about legally deficient oil and gas leases in WRNF and/or in the Thompson Divide and request to void the leases.
- Concerns about impacts to wildlife/wildlife habitat; inventoried roadless lands and values; threatened, endangered, and sensitive species; plant species and plant communities; scenery; and recreation opportunities.
- Request to expedite the NEPA process and to address the economic and community uncertainties of the oil and gas leases.



The following section contains a summary of non-form letter submissions provided by self-reported residents of the four-county area. The summary was derived through a review of individual scoping submissions as well as the scoping report (BLM 2015i).

The majority of local community respondents supported voiding or cancelling the leases. These concerns were predominantly related to the potential adverse impact of oil and gas development on the region's physical and natural resources and thus its "sense of place" and overall quality of life. Particular emphasis and concerns were expressed on the potential for adverse impacts on recreation and grazing due to the important contribution these activities are considered to make to the local economies. The most commonly stated concerns relating to potential oil and gas development in the analysis area are listed below. Respondents express concerns that:

- Air quality would decrease, or that there could be a higher risk of adverse health effects from increased emissions by oil and gas development activities.
- Water quality impacts could affect recreation, wildlife, fisheries and livestock grazing.
- Oil and gas activities could potentially limit or affect existing and proposed land use.
- Oil and gas activities could potentially affect the future of grazing use of the Thompson Divide area, which has been ranched for a century.
- Recreation and tourism would be adversely affected particularly in terms of big-game hunting in Thompson Divide, fishing in Roaring Fork River and skiing and resort areas around Aspen. Respondents stated that adverse impact of oil and gas activity on physical resources (e.g., air and water quality as well as traffic impacts) could compromise the region's attractiveness as a tourism and recreational destination.
- GMUs 42, 43, and 542, which are located near the leasing zones and reportedly generate more than 20,000 annual big game hunting licenses, could be adversely affected.
- Future oil and gas activity would adversely affect the economic impacts to the local economy from recreation. Commenters cited the Thompson Divide area as an example of the economic significance of recreation for their communities, generating 300 jobs and \$30 million in economic activity, of which 72 jobs and \$6.8 million in annual economic output were generated by hunting.

Concerns and support for the lease renewal was broadly associated with the respondent place of residents. Generally individual from the eastern part of the region (e.g., Pitkin County) mostly opposed future renewals of the leases while those in the west (particularly in Mesa County) were more likely to express support for lease continuation. Pitkin County respondents generally expressed views emphasizing the importance of the region's recreation resources, both in terms of their personal use and for the region's resort and tourism industries. These respondents also expressed an appreciation of the region's undeveloped natural resources especially in the Thompson Divide.

While a substantial portion of Garfield County respondents reported similar opinions and also expressed the importance of local agriculture and grazing to the area's economy and character, some individuals raised concerns that any lease cancellations would result in negative economic effects.

Support for retaining the leases also was expressed by other respondents and the majority of Mesa County respondents asserted the importance of oil and gas development for the region's economy. The statements of support for retaining the leases were associated with the socioeconomic impacts of the oil and gas activity in the region. Respondents expressed concerns that reduced oil and gas development and possible future departure of energy companies could result in negative economic impacts such as loss of jobs, local revenue, grant funding, affordable healthcare, and emergency facilities. Respondents stated that the oil and gas development provide the community with well-paying jobs that cannot be found in other industries and that lease cancellations would affect both workers directly employed in the

extraction industry and support services. Other respondents also noted that the oil and gas industry contributes to the local communities not only through oil and gas revenues, but also through fundraisers, scholarships and other charitable ventures.

Local municipalities and service providers included the following information about the contribution of oil and gas development:

- The Town of Parachute indicated that the oil and gas industries provide a considerable amount of tax revenue from oil and gas development, and the provision of public services may be affected without this source of revenue.
- The Grand River Hospital District in Garfield County indicated that majority of the funds with which they operate are directly attributable to oil and gas development, and cited specific medical facilities that were funded with oil and gas revenues.
- The Grand Valley Fire Protection District stated that 93 percent of its budget is comprised of property taxes derived from oil and gas activities.

Overall, a common sentiment among supporters and opponents of renewing the leases was that measures should be taken to avoid oil and gas activity-related deterioration on the surrounding environment and natural resources. These sentiments expressed by self-reported residents of the Four-County area also are reflected in the Master Plans developed to guide future development within each of the four counties.

- Garfield County recognizes energy development as a dominant industry with the potential for strong job growth and considerable benefit to the economic health of the county (Garfield County 2013a).
- Mesa County recognizes and seeks to protect its rural character and notes that that continued ranching may require the use of public lands to remain viable (Mesa County 2013). Furthermore, the stated overall goal of its 2011 Mesa County Mineral and Energy Resources Master Plan is to “(c)reate and maintain a balance between present and future resource development and use” by “minimizing negative impacts from Resource exploration, development and use and protecting Resources from incompatible land uses.”
- Pitkin County is guided by several plans, all of which emphasize the protection of the natural environment, agriculture, and the rural character. Snowmass-Capitol Creek Valleys Master Plan (which guides development in and near Aspen) specifically seeks to prevent mineral development, including oil and gas drilling on private lands, to the extent possible, discourages such activities on public lands (Snowmass Capitol Creek Caucus 2003).
- Rio Blanco promotes the preservation of rural and agricultural areas, while at the same time acknowledging the importance of resource extraction. The Master Plan suggests the county should promote agriculture, outdoor recreation, tourism a pristine environment, and new economic opportunities to decrease negative effects of an unpredictable energy market (Rio Blanco County 2011).

### 3.18 Environmental Justice

EO 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” (59 FR 7629), is “intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority communities and low-income communities access to public information on, and an opportunity for participation in, matters relating to human health and the environment.” It requires each federal agency to achieve environmental justice as part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including social and economic effects, of its programs, policies, and activities on minority and low-income populations.

The BLM relies on the CEQ Environmental Justice Guidance under NEPA (CEQ 1997) in implementing EO 12898 for NEPA documents. The guidance for evaluating potential adverse environmental effects of projects requires specific identification of potential environmental justice communities of concern when either: 1) a low-income population is meaningfully greater than the surrounding area; 2) a minority population exceeds 50 percent of the population of the affected area; or 3) a minority population is meaningfully greater than the surrounding area. The guidance considers the following groups to be minorities: American Indian or Alaskan Native; Asian or Pacific Islander; Black or African American; and Hispanic or Latino.

#### 3.18.1 Analysis Area

The study area for direct and indirect impacts to environmental justice includes U.S. Census Bureau tracts in Garfield, Mesa, Pitkin, and Rio Blanco counties that contain existing oil and gas leases. This includes tract 9511 in Rio Blanco County, tracts 9516, 9517.01, 9517.02, 9518.02, 9518.03, 9518.04, 9519.01, 9519.02, 9520.01, 9520.02, and 9521 in Garfield County, tract 18 in Mesa County, and tract 1 in Pitkin County. These tracts were selected by overlaying the analysis area with the 2010 Census Tracts to see which tracts were either completely within or partially within the analysis area.

#### 3.18.2 Affected Environment

The data presented below is based on the U.S. Census Bureau’s 2009-2013 American Community Survey 5-year estimates (U.S. Census 2013a,b) for the affected Census tracts. Information on poverty, race, and ethnicity are used to determine if any of the communities near the oil and gas leases are environmental justice communities of concern. In 2013, the poverty threshold was \$11,888 per person or \$23,624 for a family of four (U.S. Census 2013c).

#### 3.18.3 Minority Populations

**Table 3.18-1** summarizes the minority populations in the each of the counties by Census tracts. The four-county region’s total population is 229,263 and predominantly consists of non-Hispanic whites (approximately 80 percent). Less than 4 percent of the population consists of African American, American Indian, Asian, or Native Hawaiian residents. The region’s total minority population (excluding Hispanic or Latinos) is 8,283. Hispanic or Latinos residents account for 38,461 persons or approximately 17 percent of the total population in the four-county area.

In accordance with the CEQ guidance, minority populations should be identified when either:

- The minority population of the affected area exceeds 50 percent; or
- The minority population of the affected area is meaningfully greater (i.e., 10 percentage points greater) than the surrounding area (i.e., the county that contains the tract).

**Table 3.18-1 Minority Populations 2009 – 2013 American Community Survey 5-Year Estimates**

Geography	Non-Hispanic White alone <sup>1</sup>	Total Minority <sup>1</sup>	Hispanic or Latino <sup>1</sup>	Minority Populations by Race					
				Black or African American alone <sup>1</sup>	American Indian and Alaska Native alone <sup>1</sup>	Asian alone <sup>1</sup>	Native Hawaiian and Other Pacific Islander <sup>1</sup>	Some Other Race alone <sup>1</sup>	Two or More Races <sup>1</sup>
Rio Blanco County	85.2	14.8	10.8	0.5	1.5	0.4	0.0	0.0	1.6
Tract 9511	82.8	17.2	12.3	0.4	1.7	0.6	0.0	0.0	2.2
Garfield County	69.0	31.0	28.2	0.4	0.4	0.6	0.2	0.0	1.2
Tract 9516	69.7	30.3	28.0	0.1	0.2	0.0	0.0	0.0	2.0
Tract 9517.01	64.7	35.3	33.2	0.4	0.5	0.0	0.0	0.0	1.2
Tract 9517.02	70.8	29.2	25.9	0.5	0.0	1.8	0.0	0.0	1.1
Tract 9518.02	74.0	26.0	24.5	0.0	0.0	1.1	0.0	0.0	0.4
Tract 9518.03	62.5	37.5	36.6	0.5	0.0	0.0	0.0	0.2	0.1
Tract 9518.04	70.8	29.2	24.1	0.0	2.6	1.4	0.0	0.0	1.1
Tract 9519.01	68.4	31.6	25.7	0.3	0.0	1.9	2.6	0.0	1.0
Tract 9519.02	66.6	33.4	30.4	0.1	1.3	0.2	0.0	0.0	1.3
Tract 9520.01	59.7	40.3	38.2	0.2	0.0	0.0	0.0	0.0	2.0
Tract 9520.02	75.6	24.4	21.4	1.6	0.0	0.2	0.0	0.0	1.1
Tract 9521	74.0	26.0	23.1	0.2	0.3	0.8	0.0	0.0	1.6
Mesa County	82.7	17.3	13.5	0.6	0.4	0.7	0.1	0.2	1.9
Tract 18	90.7	9.3	5.8	0.6	2.3	0.0	0.0	0.0	0.6
Pitkin County	87.0	13.0	9.3	0.3	0.6	1.6	0.0	0.3	0.9
Tract 1	87.5	12.5	8.7	0.0	1.0	1.2	0.0	0.3	1.2

<sup>1</sup> Units in percent.

Note: Total minority is the sum of Minority Populations by Race and Hispanic or Latino.

Source: U.S. Census 2013a.

None of the affected tracts contain more than 50 percent of any minority population. In addition, none of the tracts contain a minority population that is 10 percentage points higher than the county as a whole.

Prehistoric sites with cultural and/or religious significance also may be in the study area. Further consultation with native tribes on the importance and locations of these sites will take place. For more details, see Section 3.9, Cultural Resources.

### 3.18.4 Low-income Populations

**Table 3.16-2** summarizes the low-income populations in the each of the counties by Census tracts. In 2013, the range of median household incomes for the four-county area was between \$49,471 for Mesa County and \$72,745 for Pitkin County (U.S. Census 2013a). Of the four counties, Rio Blanco County had the highest percent of individuals with below poverty level incomes (i.e., low-income).

**Table 3.18-2 Low-income Populations**

<b>Geography</b>	<b>Percent of Population Below the Poverty Line</b>
Rio Blanco County	14.9
Tract 9511	16.8
Garfield County	11.9
Tract 9516	7.7
Tract 9517.01	19.5
Tract 9517.02	21.3
Tract 9518.02	6.3
Tract 9518.03	17.9
Tract 9518.04	9.5
Tract 9519.01	10.3
Tract 9519.02	5.1
Tract 9520.01	20.7
Tract 9520.02	6.1
Tract 9521	11.6
Mesa County	14.7
Tract 18	13.8
Pitkin County	10.1
Tract 1	12.1

Source: U.S. Census 2013a.

In accordance with the CEQ guidance, low-income populations should be identified when the low-income population of the affected area is meaningfully greater (i.e., 10 percentage points) than the surrounding area (i.e., the county that contains the tract).

Six of the affected tracts contain higher proportions of low-income individuals than the counties that contained them. However, none of the affected tracts had low-income proportions that were more than 10 percentage points higher than the counties that contained them.

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