Environmental Assessment

Trapper Mine
Moffat County, Colorado

Federal Coal Leases C-07519 and C-079641
Mining Plan Modification
January 2016

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Acronyms and Abbreviations

°F	degrees Fahrenheit
µg/g	microgram per gram
µg/L	microgram per liter
$\mu g/m^2$	microgram per square meter
$\mu g/m^3$	microgram per cubic meter
AADT	Annual Average Daily Traffic
AAI	Agapito Associates, Inc.
AMPD	Air Markets Program Data
amsl	above mean sea level
ANFO	ammonium nitrate and fuel oil
AP-42	Compilation of Air Pollutant Emission Factors
APCD	Air Pollution Control Division
APE	area of potential effect
APEN	Air Pollutant Emission Notice
AQCR	Air Quality Control Regions
ASLM	Assistant Secretary for Land and Minerals Management
AUM	animal unit month
AVF	alluvial valley floor
BA	Biological Assessment
BART	Best Available Retrofit Technology
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management (U.S.)
BMP	Best Management Practice
BO	Biological Opinion
CAA	Clean Air Act of 1970
CARMMS	Colorado Air Resource Management Modeling Study
CCR	Code of Colorado Regulations
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CDPS	Colorado Discharge Permit System
CDRMS	Colorado Division of Reclamation, Mining and Safety
CEQ	Council on Environmental Quality
CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CHIA	Cumulative Hydrologic Impact Assessment
CIAA	cumulative impacts analysis area
CNHP	Colorado Natural Heritage Program
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent

COGCC	Colorado Oil and Gas Conservation Commission
Court	U.S. District Court in the State of Colorado
CPW	Colorado Parks and Wildlife
Craig Station	Craig Generating Station
CRS	Colorado Revised Statutes
CSLB	Colorado State Land Board
CWA	Clean Water Act
DAU	Data Analysis Unit
dB	decibel
dB(A)	decibel on an A-weighted scale
DNR	Department of Natural Resources (Colorado)
DOI	Department of the Interior (U.S.)
DOLA	Department of Local Affairs
DRMS	Division of Reclamation Mining and Safety (Colorado)
dv	deciview
EA	Environmental Assessment
EDCC	Economic Development Council of Colorado
EGU	electric generating unit
EIS	Environmental Impact Statement
EO	Executive Order
EP	extraction procedure
EP	Extraction Procedure
ESA	Endangered Species Act of 1973
FCLAA	Federal Coal Leasing Amendments Act of 1976
FCPP & NMEP	Four Corners Power Plant and Navajo Mine Energy Project
FLPMA	Federal Land Policy and Management Act of 1976
FMU	Fish Management Unit
FR	Federal Register
GHG	greenhouse gas
GMU	Game Management Unit
gpm	gallons per minute
GW-hour	gigawatts per hour
GWP	global warming potential
H:V	Horizontal to Vertical
HAP	hazardous air pollutant
HCFC	hydrochloroflourocarbons
Hg_2	oxidized mercury
IF	Isolated Find
IME	IME Consulting
km	kilometer
kV	kilovolt
lb/GWh	pounds of pollutant per gigawatt – electric output
LSFO	Little Snake Field Office (BLM)
MATS	Mercury and Air Toxics Standards

MBTA	Migratory Bird Treaty Act
MDN	Mercury Deposition Network
MeHg	methylmercury
MFP	Management Framework Plan
mg/L	milligrams per liter
MLA	Mineral Leasing Act of 1920
MLRA	Major Land Resource Area
MMBtu	Million British thermal unit
MMPA	Mining and Minerals Policy Act of 1970
MMT	million metric tons
MMtpy	million tons per year
MPDD	Mining Plan Decision Document
MT	metric tons
mtph	Million tons per year
MW	megawatt
N_2O	nitrous oxide
N2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NO_X	nitrogen oxide
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
O_3	ozone
OSMRE	Office of Surface Mining Reclamation and Enforcement
P.M.	Prime Meridian
PAP	Permit Application Package
Pb	lead
PFYC	Potential Fossil Yield Classification
PM_{10}	particulate matter 10 microns or less in diameter
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
ppb	parts per billion
ppm	parts per million
PPV	peak particle velocity
PR	
PSD	Prevention of Significant Deterioration
R2P2	Resource Recovery and Protection Plan
RCRA	Resource Conservation Recovery Act
RIPRAP	Recovery Implementation Program Recovery Action Plan
RMP	Resource Management Plan
RN	
ROD	Record of Decision

SCC	social cost of carbon
SCR	Selective Catalytic Reduction
SHPO	State Historic Preservation Office(r)
SIP	State Implementation Plan
SMCRA	Surface Mining Control and Reclamation Act of 1977
SNCR	Selective Non-Catalytic Reduction
SO_2	sulfur dioxide
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
TDS	total dissolved solids
the Act	Colorado Surface Coal Mining Reclamation Act
TMI	Trapper Mining Inc.
tpy	tons per year
TSS	total suspended sediment
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VER	Valid Existing Rights
VOC	volatile organic compound
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WOTUS	Waters of the U.S.

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1.0 Purpose and Need

1.1 Introduction

The Trapper Mine Federal Coal Leases, C-07519 and C-079641 Mining Plan Modification, Environmental Assessment (EA) has been prepared by the Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region, with assistance from cooperating agencies including: the Bureau of Land Management (BLM), Little Snake Field Office (LSFO); the State of Colorado, Department of Natural Resources (DNR) (including the Executive Director's Office, Colorado Division of Reclamation, Mining and Safety [CDRMS], Colorado State Land Board [CSLB], and Colorado Parks and Wildlife [CPW]); Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD); Moffat County Commissioners and Rio Blanco County Natural Resources Department.

The EA describes the environmental impacts that are anticipated to result from the current and future mining operations at the Trapper Mine from July 1, 2015, through the life of the mine within the portions of Federal Coal Leases C-07519 and C-079641 that lie within the approved Surface Mining Control and Reclamation Act of 1977 (SMCRA) permit area (the Project) (**Figure 1-1**).

The EA review has been conducted in accordance with the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508); the Department of the Interior's (DOI's) regulations for implementation of NEPA (43 CFR Part 46); the DOI's Departmental Manual Part 516; and OSMRE's Directive REG-1, Handbook on Procedures for Implementing the National Environmental Policy Act of 1969 (OSMRE 1989). Information gathered from federal, state, and local agencies, Trapper Mining Inc. (TMI), and publicly available literature, as well as in-house OSMRE sources, such as the Trapper Mine Permit Application Package (PAP), were used in the preparation of this EA.

NEPA requires federal agencies to disclose to the public the potential environmental impacts of projects they authorize and to make a determination as to whether the analyzed actions would "significantly" impact the environment. The term "significantly" is defined in 40 CFR 1508.27. If OSMRE determines that the Project would have significant impacts following the analysis in the EA, then an Environmental Impact Statement (EIS) would be prepared for the Project. If OSMRE determines that the potential impacts would not be "significant," OSMRE would prepare a "Finding of No Significant Impact" to document this finding, and, accordingly, would not prepare an EIS.

1.2 Background

1.2.1 Site History

The Trapper Mine is located approximately 6 miles (9.66 kilometers [km]) south of the City of Craig in Moffat County, Colorado, east of Colorado State Highway 13 (**Figure 1-1**).

Utah International, Inc., a subsidiary of General Electric Company, began coal exploration in the Trapper Mine area in 1954. Once coal reserves were identified, Utah International, Inc. signed coal delivery contracts with four utility companies that owned the Craig Generating Station (Craig Station). At that time, Craig Station was owned by Colorado-Ute Electric Association, Inc., Salt River Project Agricultural Improvement and Power District, Tri-State Generation and Transmission Association, Inc., and Platte River Power Authority. Craig Station is a coal-powered, electricity generating facility capable of producing up to 1,264 megawatts (MW) of electricity. Construction began on the mine facilities in 1975. Mining operations began in 1977, with the first coal delivery occurring in 1978.

In 1982, Utah International, Inc. formed a Colorado Corporation, called Trapper Mining Inc., to consolidate and hold the properties and rights to the Trapper Mine. In 1983, the four electric utility

companies, mentioned above, purchased TMI from Utah International, Inc. In 1990, Colorado-Ute Electric Association, Inc. filed for bankruptcy, and, when the reorganization plan was finalized in 1992, Colorado-Ute Electric Association, Inc.'s interest in TMI was transferred to Tri-State Generation and Transmission Association, Inc. and PacifiCorp.

Following the transfer of interests in TMI, the new owners formed a cooperative and incorporated the company as a Delaware Corporation on December 29, 1997. TMI is jointly owned by the cooperative members who include Salt River Project Agricultural Improvement and Power District, Platte River Power Authority, Tri-State Generation and Transmission Association, Inc., and PacifiCorp.

TMI and its predecessors obtained rights to five tracts of federal coal from 1958 to 1980. Two of these tracts are covered by this EA. Federal Coal Lease C-07519 was issued by the BLM in June of 1958, and Federal Coal Lease C-079641 was issued by the BLM in October of 1962. Both leases were originally issued to General Electric Holdings, Inc. and subsequently assigned to TMI in 1990.

In 1979, BLM completed the Final EIS for the Federal Coal Management Program and the Secretary of the Interior adopted a new program for the management of coal resources on federal lands. The potential environmental impacts of leasing federal coal resources in Colorado and Wyoming were analyzed in the Final Green River - Hams Fork Regional Coal EIS (BLM 1980). The federal coal leases covered by this EA were evaluated through NEPA as part of coal lease readjustments. A NEPA evaluation was released for readjustment of C-07519 on February 12, 1979, and for readjustment of C-079641 on September 28, 1982 (BLM 1979 and BLM 1982, respectively).

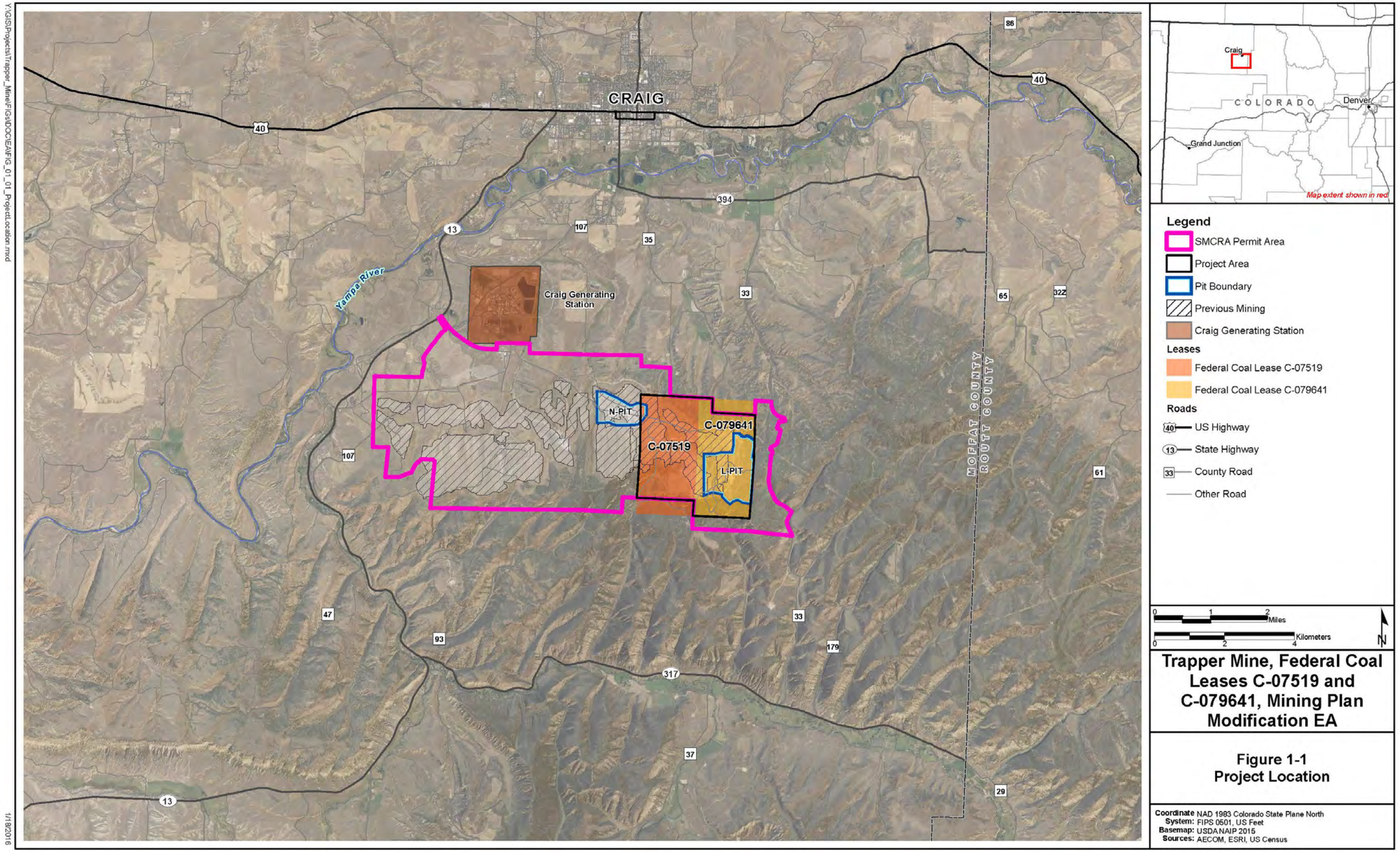
The Trapper Mine produces approximately 2.3 million tons per year (mtpy) and can produce a maximum of 2.6 mtpy based on permit limitations currently in place by the Clean Air Act of 1970 (CAA) permit issued by the CDPHE APCD. The Trapper Mine produces coal from the L Pit located on Federal Coal Lease C-079641. Future mining also is proposed in the N Pit located partially within Federal Coal Lease C-07519. Coal is mined using dragline, truck and shovel, and highwall mining methods. Mining operations are described in detail in Chapter 2.0. The coal is transported by haul truck to the Craig Station located to the north of the mine. TMI currently has no provisions to transport coal to other locations.

TMI operates the Trapper Mine under SMCRA Permit Number C-1981-010 issued by CDRMS in accordance with the approved Colorado State Coal Regulatory Program (30 CFR Part 906). Although SMCRA permits are issued based on the life-of-mine plans for the mining operation, under the Colorado Surface Coal Mining Reclamation Act of 1979 (CSCMRA) permits must be renewed every 5 years (34 33-101 *et seq.* Colorado Revised Statutes [CRS] 1973 as amended).

1.2.2 Project Background

On May 8, 2015, the United States District Court for the District of Colorado (the District Court) issued an Order related to NEPA compliance regarding the mining plan approval document signed by the ASLM for the Trapper Mine in 2009 (2009 Approval). The Order in *WildEarth Guardians v. U.S. Office of Surface Mining Reclamation and Enforcement et al.*, Case 1:13-cv-00518-RBJ concluded:

> "[OSMRE] violated NEPA by failing to notify the public of and involve the public in the preparation of the Colowyo and Trapper EAs and by failing to notify the public once the EAs had been completed and the [findings of no significant impacts] had been issued. [OSMRE] also violated NEPA by failing to take a hard look at the direct and indirect effects of the increased mining operations before determining that there would be no significant impact on the environment. The Secretary of the Interior violated NEPA by approving both of these mining plan modifications in spite of these defects."


CRAIG
Craig Generating Station
Yampa River
N-PIT
C-07519
C-079641
L-PIT
MOFFAT COUNTY
ROUTT COUNTY
Craig
COLORADO
Denver
Grand Junction
Map extent shown in red
Legend
SMCRA Permit Area
Project Area
Pit Boundary
Previous Mining
Craig Generating Station
Leases
Federal Coal Lease C-07519
Federal Coal Lease C-079641
Roads
US Highway
State Highway
County Road
Other Road
Miles
Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 1-1
Project Location
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: USDA NAIP 2015
Sources: AECOM, ESRI, US Census
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(*WildEarth Guardians v. U.S. Office of Surface Mining Reclamation and Enforcement* 104 F. Supp. 3d 1208, [D. Colo Court 2015]).

In order to address the deficiencies identified by the Court, this EA was completed pursuant to the Joint Proposed Remedy, proposed by OSMRE, TMI and WildEarth Guardians and approved by the Court on September 14, 2015. As part of the Court-approved remedy, OSMRE agreed to conduct a new, prospective NEPA analysis for the Project. The EA discloses the potential for direct, indirect, and cumulative impacts to the environment from the Project.

Pursuant to the District Court-approved remedy, OSMRE agreed to complete this EA, including all public participation components, on or before April 30, 2016. As part of the Joint Proposed Remedy, TMI agreed to the following on-the-ground restrictions for mining activities on Federal Coal Leases C-07519 and C-079641 during the preparation of this EA, including: 1) limiting mining activities to lands permitted by CDRMS as of July 1, 2015; 2) limiting disturbance to lands already classified as disturbed based on the current disturbance limit; and 3) limiting coal removal to areas west of a line designated as the Coal Removal Limit as shown on **Figure 1-2.** Mining up to the Coal Removal Limit allows TMI to mine an additional approximately 4 million tons after July 1, 2015. The District Court-approved remedy does not affect TMI's mining or reclamation activities on state, county, or private lands or minerals, or other federal coal leases. The District Court Order is on appeal to the U.S. Court of Appeals for the 10th Circuit (Case Nos. 15-1186 and 1236).

1.2.3 Statutory and Regulatory Background

For new mining plans, OSMRE prepares a mining plan decision document (MPDD) in support of its recommendation to the ASLM (30 CFR Chapter VII, Subchapter D). For existing approved mining plans that are proposed to be modified, as is the case with this Project, OSMRE prepares a MPDD for a mining plan modification. The ASLM reviews the MPDD and decides whether or not to approve the mining plan modification, and, if approved, what, if any, conditions may be needed. Pursuant to 30 CFR 746.13, OSMRE's recommendation is based, at a minimum, upon:

- The PAP;
- Information prepared in compliance with NEPA, including this EA;
- Documentation illustrating compliance with the applicable requirements of federal laws, regulations and Executive Orders (EOs) other than NEPA;
- Comments and recommendations or concurrence from other federal agencies and the public;
- Findings and recommendations of the BLM with respect to the Resource Recovery and Protection Plan (R2P2), federal lease requirements, and the Mineral Leasing Act of 1920 (MLA);
- Findings and recommendations of the CDRMS with respect to the mine permit application C-1981-010 and the Colorado State program; and
- The findings and recommendations of the OSMRE with respect to the additional requirements of 30 CFR Chapter VII, Subchapter D.

In compliance with other federal laws, regulations and EOs, OSMRE also conducts consultation with other agencies before it makes its recommendation to the ASLM. This consultation includes the U.S. Fish and Wildlife Service (USFWS) Section 7 consultation for threatened and endangered species potentially affected by the proposed mining plan under the Endangered Species Act of 1973 (ESA), and the Colorado State Historic Preservation Office (SHPO) under the National Historic Preservation Act of 1966 (NHPA) Section 106 consultation for the affected area.

1.3 Purpose and Need

1.3.1 Purpose

The purpose of this EA is to re-evaluate the environmental effects of coal mining on the portions of Federal Coal Leases C-07519 and C-079641 that lie within the approved SMCRA permit boundary to assist OSMRE in developing a new recommendation for the ASLM to make a new decision on a mining plan modification for the Project.

1.3.2 Need

Coal mining operators must have a mining plan approved by the ASLM to mine federal coal (30 CFR 746.11). Mining of the coal within the two federal coal lease areas is required under the terms and conditions of the Federal Coal Leases C-07519 and C-079641, and under the terms and conditions of the TMI Logical Mining Unit Application and R2P2. TMI has contractual obligations to deliver approximately 2.3 mtpy plus/minus 200,000 tons to the Craig Station through the year 2020.

OSMRE is the agency responsible for making a recommendation to the ASLM regarding a decision on proposed mining plan modifications (30 CFR 746.13). TMI is presently operating under the 2009 Approval that allows it to mine federal coal from Federal Coal Leases C-07519 and C-079641 in accordance with the SMCRA permit issued by CDRMS.

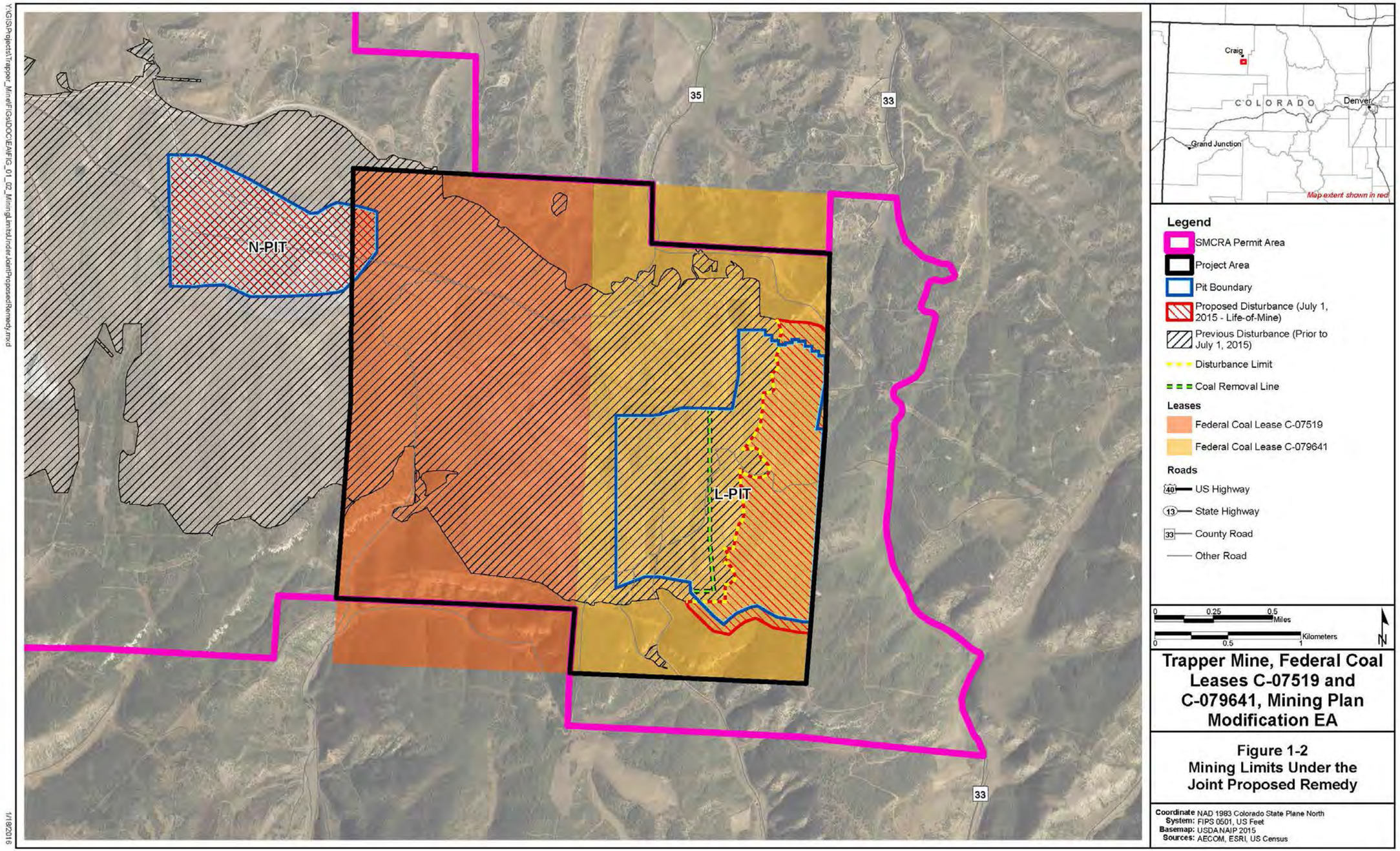
As a result of the District Court's decision in *WildEarth Guardians v. U.S. Office of Surface Mining Reclamation and Enforcement* 104 F. Supp. 3d 1208, (D. Colo. 2015), which determined there were deficiencies in the EA underlying the 2009 Approval, and, pursuant to the Court-approved remedy, OSMRE has agreed to re-evaluate the environmental impacts of current and future mining activities on these federal leases, beginning July 1, 2015, and continuing through the life of mine within the SMCRA permit boundary.

1.4 Relationship to Statutes, Regulations, and Other Agency Plans

1.4.1 Statutes and Regulations

The following key laws, as amended, relate to the primary authorities, responsibilities, and requirements for developing federal coal resources:

- MLA
- NHPA
- NEPA
- Mining and Minerals Policy Act of 1970 (MMPA)
- CAA
- Clean Water Act of 1972 (CWA)
- ESA
- CSCMRA
- Federal Land Policy and Management Act of 1976 (FLPMA)
- Federal Coal Leasing Amendments Act of 1976 (FCLAA)
- SMCRA


N-PIT
L-PIT
35
33
33
Craig
COLORADO
Denver
Grand Junction
Map extent shown in red
Legend
SMCRA Permit Area
Project Area
Pit Boundary
Proposed Disturbance (July 1, 2015 - Life-of-Mine)
Previous Disturbance (Prior to July 1, 2015)
Disturbance Limit
Coal Removal Line
Leases
Federal Coal Lease C-07519
Federal Coal Lease C-079641
Roads
US Highway
State Highway
County Road
Other Road
0 0.25 0.5 Miles
0 0.5 1 Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 1-2
Mining Limits Under the Joint Proposed Remedy
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: USDA NAIP 2015
Sources: AECOM, ESRI, US Census
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The MLA and FCLAA provide the legal foundation for the leasing and development of federal coal resources. BLM is the federal agency delegated the authority to offer federal coal resources for leasing and to issue leases. The MMPA declares that it is the continuing policy of the federal government to foster and encourage the orderly and economic development of domestic mineral resources. In that context, BLM complies with FLPMA to plan for multiple uses of public lands and determine those lands suitable and available for coal leasing and development. Through preparation of land use plans and/or in response to coal industry proposals to lease federal coal, BLM complies with NEPA to disclose to the public the potential impacts from coal leasing and development, and also complies with the NHPA, CAA, CWA, ESA, and other applicable environmental laws to ensure appropriate protection of other resources. BLM then makes the federal coal that is determined suitable for coal development available for leasing. BLM also is responsible for ensuring that the public receives fair market value for the leasing of federal coal. Once a lease is issued, BLM ensures that the maximum economic recovery of coal is achieved during the mining of those federal leases and ensures that waste of federal coal resources is minimized through review and approval of a mine's R2P2 as required under the MLA. BLM implements its responsibilities for leasing and oversight of coal exploration and development under its regulations at Public Lands, Subtitle B, Chapter II, BLM, DOI, Subchapter C – Minerals Management (43 CFR Parts 3400-3480).

SMCRA provides the legal framework for the federal government to regulate coal mining by balancing the need for continued domestic coal production with protection of the environment and ensuring the mined land is returned to beneficial use when mining is finished. OSMRE was created in 1977 under SMCRA to carry out and oversee those federal responsibilities. OSMRE implements its MLA and SMCRA responsibilities under regulations at Mineral Resources, Chapter VII – OSMRE, DOI (30 CFR Parts 700-End).

As provided for under SMCRA, OSMRE works with coal producing states and tribes to develop their own regulatory programs to permit coal mining. Once a regulatory program is approved for a state or tribe, OSMRE steps into an oversight role. OSMRE approved the State of Colorado's coal regulatory program on December 15, 1980 (30 CFR 906.10). As a result, CDRMS manages its own program under the CSCMRA (34 33-101 et seq. CRS 1973, as amended). CDRMS has the authority and responsibility to make decisions to approve surface coal mining permits and regulate coal mining in Colorado under Regulations of the Colorado Mined Land Reclamation Board for Coal Mining with oversight from OSMRE. The Cooperative Agreement between OSMRE and CDRMS allows the CDRMS to regulate surface coal mining on federal lands or leases while OSMRE continues to carry out its obligations under the MLA, NEPA and other public laws (30 CFR 906.30) which includes the approval of mining plans and mining plan modifications.

1.4.2 Other Agency Plans

The BLM LSFO in Craig, Colorado, manages approximately 1.3 million surface acres and 1.1 million acres of mineral estate in northwest Colorado, including BLM-managed mineral estate in the Project area. As required by FLPMA, BLM periodically prepares and revises land use plans to determine those uses that are suitable and compatible on specific portions of public lands, and under what conditions those uses would be authorized to mitigate potential impacts on other resource values and protect human health and safety.

In the late 1950s and early 1960s, when the TMI leases were issued, there were no existing BLM management plans. In the late 1960s and early 1970s, the BLM prepared Management Framework Plans (MFPs) as its land use plans. In 1989 the BLM approved the 1989 Resource Management Plan (RMP) for public lands administered by the BLM LSFO and associated Record of Decision (ROD) (1989 LSFO RMP-ROD) (BLM 1989). In 2011, BLM issued the *Little Snake Record of Decision and Approved Resource Management Plan* (2011 LSFO RMP-ROD) (BLM 2011), which replaced the 1989 LSFO RMP-ROD. In September 2015 the BLM issued the ROD and Northwest Colorado Approved Greater Sage-Grouse Amendment (BLM 2015).

TMI's leases were issued by the BLM prior to the existence of a RMP or MFP and, therefore, were established as valid existing rights (VER) prior to approval of the RMPs/MFPs. As is recognized and stated in the 2011 LSFO RMP-ROD, a valid existing lease conveys certain rights of development to the leaseholder and a stipulation cannot be added after the lease is issued without the consent of both the lessee and lessor. Conditions of Approval and/or Best Management Practices (BMPs) required by the BLM in accordance with the newer RMPs would need to be consistent with the VER granted in existing leases. In this context, BLM made subsequent and periodic decisions regarding readjustment of the lease terms for each lease as required under the MLA and FCLAA. For each readjustment decision, BLM determined whether the lease terms were in conformance with the land use plan in effect at the time. In several cases the BLM, with the concurrence of TMI, added stipulations to the lease adjustments to align the leases with the RMP in place at the time. Further, OSMRE consulted with the BLM LSFO as part of the 2009 Approval process. At that time, in a letter dated July 8, 2009, the BLM LSFO determined and documented that the R2P2, which BLM approved, was in conformance with the MLA; the regulations at 43 CFR 3480; the lease terms and conditions; and maximum economic recovery. In the context of this EA, BLM has again reviewed the Project and determined that it conforms to the MLA, 43 CFR 3480 lease terms and conditions, and, considering VER, conforms with the 2011 LSFO RMP and the 2015 amendments to the RMP.

1.5 Authorizing Actions

Two separate approvals are needed for a coal mine operator to conduct mining operations on lands containing leased federal coal: 1) a SMCRA permit approved by the state regulatory authority, in this case, CDRMS; and 2) a mining plan or mining plan modification approved by the ASLM in accordance with the MLA.

1.6 Outreach and Issues

Public comments in advance of preparation of this EA were solicited through several methods. OSMRE published legal notices in the *Craig Daily Press* on October 14 and 21, 2015, and the *Rio Blanco Herald Times* on October 22, 2015 (**Appendix A**). The legal notice described the Project in summary form, informed the public that a public outreach meeting for the EA was scheduled for October 29, 2015, at the Moffat County Fairgrounds, Pavilion Building, 640 Victory Way, Craig, Colorado 81625, and informed the public that public comments would be accepted until November 12, 2015. The legal notice was posted at various public locations in Craig and Meeker, Colorado. An outreach letter describing the Project, announcing the public outreach meeting, and soliciting comments was mailed on October 16, 2015, to a total of 15 recipients, including city governments, adjacent landowners, and other interested parties. On October 20, 2015, a total of 6 letters were sent to American Indian tribes. A total of 21 parties received the outreach letter.

OSMRE developed a Project website, which provided additional Project notice, Project information, and comment opportunities: http://www.wrcc.osmre.gov/initiatives/trappermine.shtm. The website was activated on October 16, 2015, and continues to be updated periodically as additional information on the Project becomes available.

The public outreach meeting was held on October 29, 2015, from 4:00 PM until 8:00 PM. Five hundred one individuals signed in at the public meeting, and 195 comment forms were submitted during the meeting. A total of 3,855 individuals or organizations submitted comments by the end of the comment period. Ninety- two comments were received after the comment period closed on November 12, 2015. Comments received during and after the comment period were evaluated for relevance in preparing this EA.

Table 1-1 summarizes the comment topics by resource category.

Table 1-1 Public Outreach Comments Categorized by Resource Category

Comment Category	Number of Comments	% of Total Comments
Air Quality/Climate Change	3,548	89.9
Community Works	72	1.8
Environmental Stewardship	53	1.3
General Support without specific topic	26	0.7
Mineral Resources	22	0.6
Socioeconomic	226	5.7
Total	**3,947**	**100**

The majority of the comments received during the public outreach period were provided as a combined form letter prepared by WildEarth Guardians regarding the Trapper Mine, Spring Creek Mine, and Skyline Mine from the Wild Earth Guardians website. The Spring Creek Mine is located in Montana and operated by Cloud Peak Energy, while the Skyline Mine is located in Utah and operated by Bowie Resource partners, LLC. These mines have no affiliation with TMI or the Trapper Mine. The WildEarth Guardians form letter was signed by 3,452 individuals before the public comment period ended and another 91 individuals after the comment period ended, comprising 90 percent of the total comments. The primary focus of the WildEarth Guardians form letter concerned air quality and climate change impacts associated with burning coal to create energy. The form letter also mentioned the potential for impacts to wildlife and water from mining activities but did not provide any details on these impacts. Of the remaining 404 comments, one of which was received after the public comment period ended, five expressed concern for air quality and climate. The environmental concerns related to air quality and climate discussed alternative, clean energy sources in place of coal combustion. In addition, it was asserted that the Craig Station can be supplied with coal by other mines in the area. Concern also was expressed for overseas exportation of coal.

Three hundred ninety- nine were individual comments made in support of Trapper Mine focusing mainly on the economic ramifications of discontinuing the mining operations within the Project area. Job and tax revenue loss were the largest concerns. Most individual commenters praised TMI for its involvement in the local community and its exemplary reclamation efforts in most individual comments. Many commenters in support focused on the awards TMI has received including the Gold Level Good Neighbor award given in 2004 and the Bronze Award in 2002 by OSMRE for having one of the top three mining reclamation practices. Socioeconomic impacts were discussed in nearly every comment of support for TMI. Individuals who work directly for TMI and businesses in the area that rely on mining to sustain their enterprises expressed concerns for their jobs and family welfare. Other socioeconomic comments outlined that TMI is a major contributor to Moffatt County tax revenue as the fourth largest tax payer. Many comments also incorporated the role TMI plays in community involvement. TMI employees donate time to charitable organizations. TMI donates time, equipment, and materials to provide Craig and the surrounding community with parks, golf courses, and fitness facilities. Mineral resource comments consisted of observations of the proximity of Trapper Mine to the Craig Station, the high quality of the coal mined at the Trapper Mine, and the high percent used directly at the Craig Station. Additional comments were submitted supporting TMI without specific focus on any one subject.

Mineral resource comments were the smallest group and addressed coal quality and proximity to the Craig Station. One commenter provided a range of alternatives that they would like to see evaluated in the EA.

All substantive comments received have been considered and included as appropriate in the preparation of this document.

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2.0 Proposed Action and Alternatives

This chapter provides background information on TMI's existing operations at the Trapper Mine, and describes Alternative A, the Proposed Action Alternative, Alternative B, disapproval of continued mining within the Project Area, and Alternative C, the No Action Alternative. Alternatives that were considered, but eliminated from detailed analysis are also discussed. A more complete description of TMI's existing mining and reclamation methods can be found in the PAP. The PAP, including Permit Renewal (RN) 06 (RN06) which was submitted by TMI to the CDRMS on June 20, 2012, and approved by the CDRMS on August 28, 2013, and Permit Revision (PR) 07 (PR07), which was submitted to the CDRMS May 21, 2013, and approved by CDRMS on October 6, 2015, provides detailed information on the current 5-year mining term from 2013 through 2017 (TMI 1981 et seq.). Readers desiring greater detail can review the additional descriptions, maps, and drawings contained in the PAP, which is available at the Trapper Mine Administration Office at 25910 State Highway 13, Craig, Colorado, 81625; the CDRMS available at 1313 Sherman Street, Room 215, Denver, Colorado, 80203; and the OSMRE available at 1999 Broadway, Suite 3320, Denver, Colorado, 80202. The PAP is also available online on the CDRMS website at http://mining.state.co.us.

2.1 Trapper Mine SMCRA Permit

TMI operates the Trapper Mine within the SMCRA permit boundary of CDRMS-issued Permit C-1981-010. The SMCRA permit area includes a total of approximately 11,157 acres as shown in **Figure 2-1**. TMI owns or controls the surface and coal resources within the SMCRA permit boundary. The surface ownership includes private entities and the State of Colorado. Coal resources within the SMCRA permit boundary are owned by private entities, the State of Colorado, and the federal government.

Environmental studies for the Trapper Mine began in 1972, with the construction of facilities commencing in 1975. The Colorado Mined Land Reclamation Board approved Permit No. 76-11 for the Trapper Mine on May 28, 1976, and mining operations began in 1977. On February 2, 1981, Utah International, Inc. submitted an application for a new permit under SMCRA. CDRMS issued the Trapper Mine SMCRA permit on December 31, 1982. Permit applications approved under the CDRMS regulations are for a 5-year permit term and the permit must be renewed every 5 years, updating the application with new information and planned changes in the mining or reclamation activities. The Trapper Mine SMCRA permit has been approved for renewal 6 times since 1982. The current approved permit term for operations at the Trapper Mine, RN06, is from December 31, 2012, to December 31, 2017.

If the mining plan changes during the 5-year permit term, the changes must be approved by CDRMS through a PR, technical revision, or minor revision. Each time a permit is revised or a RN is approved by the CDRMS, the appropriate changes are made to the PAP so that the PAP remains current with the mining and reclamation plans.

2.2 Project Area

The Project Area for this EA is limited by the Joint Proposed Remedy to lands within Federal Coal Leases C-07519 and C-079641 that lie within the SMCRA permit boundary as shown in **Figure 2-1**. The Project Area is approximately 2,423 acres.

The EA addresses OSMRE's review of a life-of-mine plan for mining in the Project Area from July 1, 2015, through approximately 2025, or beyond depending upon the coal delivery schedule. Because the CDRMS approval is only for the current 5-year permit term, the current CDRMS mine plan approval does not extend for the life of mining nor does the current CDRMS approval include the full extent of disturbance contemplated in the life-of-mine plan presented in this EA. TMI would be required to obtain RN approval from CDRMS for the periods of December 31, 2017, through December 31, 2022, and

December 31, 2022, through December 31, 2027, and obtain CDRMS approval for the mining operations as presented in this EA before fully implementing the life-of-mine plan for the Project Area.

The surface and coal rights in the Project Area are owned or controlled by TMI. The surface is owned by TMI while the coal is owned by the federal government and leased to TMI. Coal rights are controlled by TMI through obtaining coal leases. As described in Chapter 1.0, Purpose and Need, the BLM is the agency with authority to lease federal coal and was the issuing agency for Federal Coal Leases C-07519 and C-079641, the two leases covering the Project Area. The legal description for the two lease areas, which lie within the SMCRA permit boundary is as follows:

C-07519

Township 5 North (T5N), Range 90 West (R90W), 6th Prime Meridian (P.M.)
Section 6, Lots 8 through 19 inclusive

T6N, R90W, 6th P.M.
Section 31, Lots 5 through 20 inclusive

C-079641

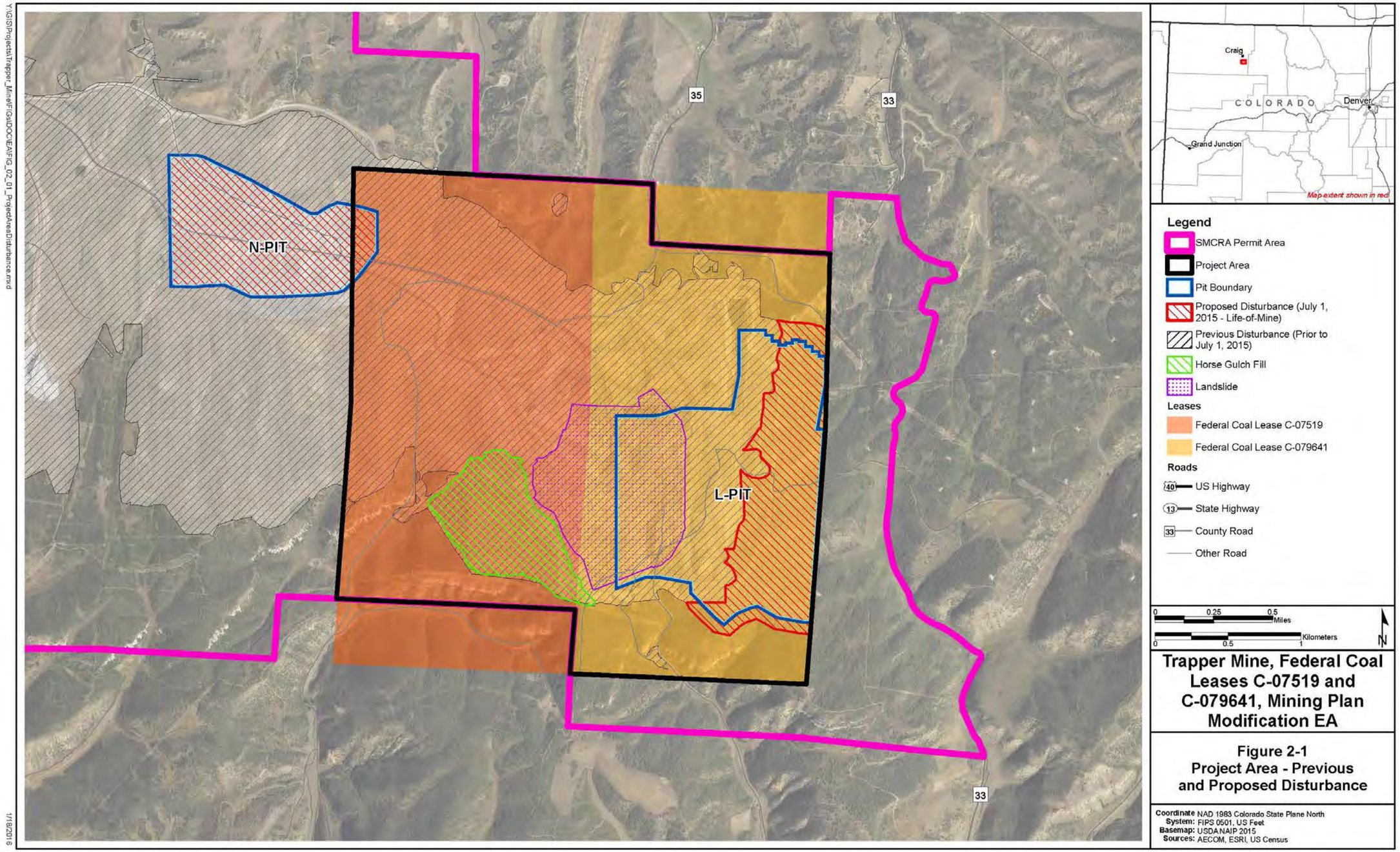
T5N, R90W, 6th P.M.
Section 5, Lots 5 through 20 inclusive

T6N, R90W, 6th P.M.
Section 32, Lots 4 through 16 inclusive

The Trapper Mine is an open-pit sub-bituminous coal mine located approximately 6 miles (9.66 km) south of the City of Craig in Moffat County, Colorado. The mine is accessed via Colorado State Highway 13. Development of the Trapper Mine began in 1954 with exploration drilling and continued with acquisition of state and federal coal leases, water rights, and permits to operate. Construction of mine facilities began in 1975 and mining operations began in 1977. The first coal was delivered to the Craig Station in 1978. The Craig Station is located adjacent to the SMCRA permit boundary to the northwest of the Project Area. Mining since 1977 generally has progressed from west to east within the SMCRA permit boundary. The Project Area is located on the eastern portion of the SMCRA permit area as shown in **Figure 2-1**.

Coal mined at the Trapper Mine is delivered by truck to the Craig Station at an average rate of approximately 2.3 mtpy (with a maximum rate of 2.6 mtpy). The coal is mined from seven coal seams of the Upper Williams Fork Formation: the “H,” “I,” “K,” “L,” “M,” “Q,” and “R” seams. Within the Project Area, the “R” seam is too deep for surface mining. Draglines were the primary earthmoving equipment used until October 8, 2006, when a 250-acre landslide occurred within the Project Area. This event required a modification of the mining plan and mining method which was approved on July 7, 2008, by CDRMS under Technical Revision 103. Following the landslide, mining has been accomplished by a combination of dragline, dozer, and truck and loader operations, depending on the depth and material being mined. The mining process is described in Section 2.3 below.

Some limited highwall mining has occurred and may occur in the future within the Project Area. Highwall mining consists of excavating horizontally along an exposed coal seam, such as in a highwall area, to recover the coal.


N-PIT
L-PIT
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Craig
COLORADO
Denver
Grand Junction
Map extent shown in red
Legend
SMCRA Permit Area
Project Area
Pit Boundary
Proposed Disturbance (July 1, 2015 - Life-of-Mine)
Previous Disturbance (Prior to July 1, 2015)
Horse Gulch Fill
Landslide
Leases
Federal Coal Lease C-07519
Federal Coal Lease C-079641
Roads
US Highway
State Highway
County Road
Other Road
0 0.25 0.5 Miles
0 0.5 1 Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 2-1
Project Area - Previous and Proposed Disturbance
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: USDA NAIP 2015
Sources: AECOM, ESRI, US Census
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The Horse Gulch Fill, shown in **Figure 2-1**, was created following the 2006 landslide to allow permanent placement of overburden materials removed during initial truck and loader mining operations since an adjacent open pit was not available for material placement due to the landslide event. Approximately 24.6 million bank cubic yards of overburden material has been permanently placed in the Horse Gulch Fill. Subsequent to construction of the Horse Gulch Fill, TMI conducted additional evaluations and modified the mining plan to allow for additional dragline mining and placement of overburden directly back in the mined pit as backfill. No additional fill placement is planned in Horse Gulch as part of the Project and the Horse Gulch Fill is currently undergoing reclamation.

There are two dual powerlines and one single powerline that cross the Project Area (**Figure 2-2**). The largest dual powerline is a 345-kilovolt (kV) line owned by Tri-State Generation and Transmission Association, Inc., which links the Craig Station with the Hayden Generating Station (Hayden Station) located approximately 21 miles (33.8 km) to the east of the Craig Station. The second dual powerline is a 230-kV line owned by Western Area Power Administration, which distributes power from the Craig Station. The single powerline is a 138-kV line owned by Tri-State Generation and Transmission Association Inc., which distributes power from the Hayden Station west toward the White River Electric Association. The two larger dual powerlines would not be affected by the planned mining operations within the Project Area. The smaller single powerline runs north to south through the proposed L Pit disturbance within the Project Area and would be moved to allow mining. That powerline is privately owned and located on private land and would be moved to private land adjacent to the planned mining areas. The current location and the realignment are shown in **Figure 2-2**.

2.3 Description of Existing Mining and Reclamation Operations

Operations at the Trapper Mine are conducted in accordance with applicable laws and regulations including SMCRA; the Colorado Surface Coal Mining Reclamation Act, most recently revised August 7, 2006; regulations of the Colorado Mined Land Reclamation Board, last revised September 14, 2005; and the CDRMS approved PAP. The PAP, including the approved revisions provides the most complete descriptions of mining, environmental protection measures and reclamation activities within the Project area for the current 5-year permit term (2012 through 2017) and, as such, is used and referenced for the purpose of this EA. The general sequence of operations is described below.

In new mine areas, the first action is to create drainage and sediment control for the area to be disturbed. Once drainage and sediment controls are in place, vegetation is cleared and topsoil is removed. Vegetation is removed using dozers. Vegetation is typically pushed into nearby disturbed areas for burial, but also can be used for erosion and sediment control purposes. Topsoil is removed using scrapers or other earthmoving equipment.

Topsoil is hauled directly for placement on graded areas undergoing reclamation or placed in temporary stockpiles. Temporary topsoil stockpiles are graded so the out-slopes are 3 horizontal to 1 vertical (3H:1V) or less and stabilized through revegetation. Topsoil salvage depths and volumes are monitored and recorded for use in material balancing during reclamation. Topsoil removal typically occurs in May through October. As a result, topsoil salvage is typically one to five pit widths in advance of mining operations to allow mining to continue to advance through the winter months.

After the topsoil has been salvaged, mining operations begin to recover the coal. Trapper Mine pits are mined using both a dip-line mining method and a strike-line mining method. Mining is completed in parallel strips. Each pit is adjacent and parallel to the previous pit. Cuts are initiated near the outcrop of the coal seam higher on the hillside and worked down the hill until the coal becomes too deep to recover, or initiated near the economic strip limit and worked up the hill until the coal outcrops.

The overburden, or rock that lies above the coal seams to be mined, is drilled and blasted to break up the rock to allow it to be moved using the mining equipment. Blasting is performed using an ammonium nitrate and fuel oil (ANFO) mixture. After overburden blasting is completed, the overburden removal begins. For the Project Area, overburden removal would occur primarily using trucks and loaders. The

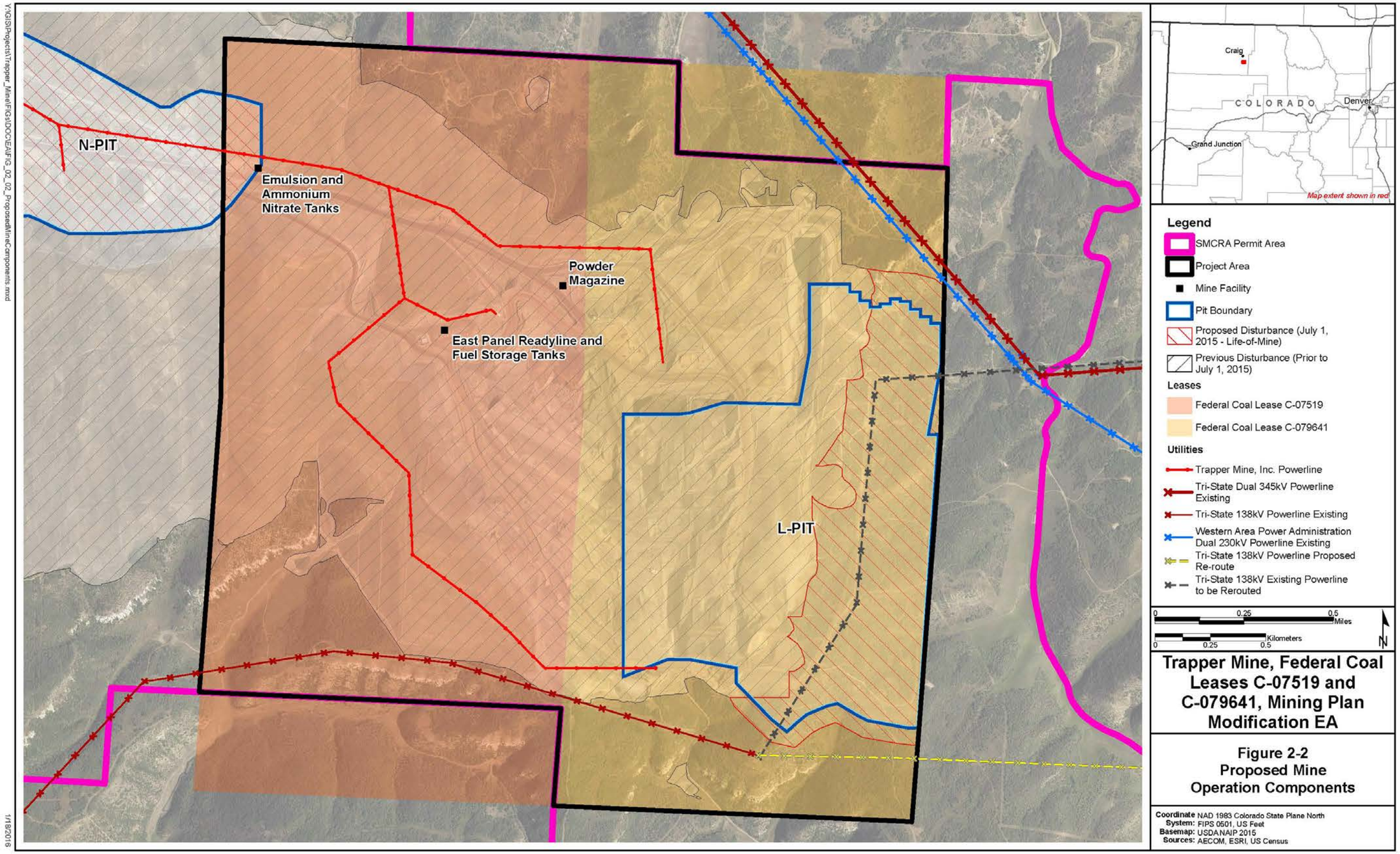
maximum coal depth for the Project Area would involve the initial use of trucks and loaders since the draglines cannot economically remove materials deeper than 200 feet. The overburden ranges in depth from 100 to 150 feet.

Following removal of overburden by the trucks and loaders, dozers scrape the remaining thin layer of overburden material to expose the uppermost coal seam. Coal is either ripped with a dozer or drilled and blasted for removal using similar blasting material (ANFO) as is used for overburden. Depending on the depth of the uppermost coal seam within the pit, the uppermost coal seam is mined using draglines or front-end loaders. The coal is loaded into haul trucks for transfer to the Craig Station.

After the uppermost coal seam is removed, interburden, or the non-coal rock material located between multiple coal seams to be mined, is removed using trucks, loaders and dozers, or using draglines and dozers, depending on the depth. Dozers prepare the lower coal seams for mining by clearing the thin layer of interburden above the lower coal seams. The coal is then loaded into haul trucks by loaders and dozers or the draglines and dozers. The draglines typically work one pass down and one pass up each cut removing the deeper interburden and coal. At the Craig Station, coal is end dumped into the primary crushing system or is stockpiled in the immediate vicinity of the crusher. Coal that is stockpiled is placed in the crusher at a later date using front end loaders operated by TMI employees. Once the coal is dumped into the crushing system, it transfers ownership to the Craig Station. Coal Combustion Residuals (CCR) are utility wastes generated during the burning of coal and include fly ash, bottom ash, and scrubber sludge. CCR not recycled for use in cement products, wallboard, and road base are hauled back to the Trapper Mine for placement as pit backfill in permitted areas. Approximately 55 percent of the total CCR produced at Craig Station, an estimated 501,000 tons annually, are placed at the Trapper Mine. CCR are placed in areas located within the SMCRA permit boundary but outside of the Project Area.

Overburden and interburden, collectively known as spoil, removed to access the coal seams in an active mine pit are used as backfill in the adjacent mine pit to begin the reclamation process. The dragline casts the spoil into the adjacent cut to backfill the pit. Dozers are also used to backfill spoil into the adjacent cut, while loaders and haul trucks are used to move material into backfill areas farther behind the active mining operation.

Backfilling is completed contemporaneously at the Trapper Mine with backfilling beginning in the pit as soon as safely possible after the mining equipment has completed coal removal and moved to an adjacent pit. After the pit has been backfilled and mining has progressed away from the mined out pit, the backfill material is rough graded, using dozers, graders, or draglines, in preparation for reclamation. In most cases rough grading of the backfill begins within 30 days of placement, with a maximum of one pile of overburden and interburden material (referred to as a spoil pile) behind the active working area of the pit. The power to the dragline is typically supplied to the machine from the spoil pile side of the pit with power cables positioned on the ground behind the draglines. The rough grading of the piles is completed quickly to allow for ease of movement of the power cables supplying the dragline. Rough grading also reduces the potential for ponding of surface water on the steeply dipping slopes and promotes runoff to avoid the potential for water to promote landslides or inhibit operations.


N-PIT
Emulsion and Ammonium Nitrate Tanks
Powder Magazine
East Panel Readyline and Fuel Storage Tanks
L-PIT
Craig
COLORADO
Denver
Grand Junction
Map extent shown in red
Legend
SMCRA Permit Area
Project Area
Mine Facility
Pit Boundary
Proposed Disturbance (July 1, 2015 - Life-of-Mine)
Previous Disturbance (Prior to July 1, 2015)
Leases
Federal Coal Lease C-07519
Federal Coal Lease C-079641
Utilities
Trapper Mine, Inc. Powerline
Tri-State Dual 345kV Powerline Existing
Tri-State 138kV Powerline Existing
Western Area Power Administration Dual 230kV Powerline Existing
Tri-State 138kV Powerline Proposed Re-route
Tri-State 138kV Existing Powerline to be Rerouted
0 0.25 0.5 Miles
0 0.25 0.5 Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 2-2
Proposed Mine Operation Components
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: USDA NAIP 2015
Sources: AECOM, ESRI, US Census
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After rough grading, final grading is conducted to blend the backfilled areas with the surrounding topography, create a reclaimed area in accordance with the CDRMS approved post-mining topography, and construct drainage patterns. The area is then prepared for topsoil placement and seeding.

The Trapper Mine's overall reclamation objectives are to restore the disturbed areas to the pre-mining uses of cropland or rangeland and wildlife habitat. To date, mining at the Trapper Mine has disturbed approximately 593 acres of cropland, and all of these areas have been reclaimed as cropland. No additional cropland disturbance or reclamation is planned within the SMCRA permit boundary. Approximately 3,925 acres of rangeland and wildlife habitat have been reclaimed since the start of mining. Reclamation of the remaining disturbed areas would be conducted to achieve the post-mining land uses of rangeland and wildlife habitat. For rangeland and wildlife habitat reclamation, the topsoil is placed on the graded overburden/interburden to a depth of 12 inches. Topsoil placement occurs in the summer and fall. Fertilizer is not used for rangeland/wildlife habitat reclamation as past experience has shown that the use of fertilizers promotes growth of more aggressive grasses and forbs while decreasing the overall plant community diversity. The prepared areas are then seeded with one of three rangeland seed mixes as approved by CDRMS (TMI 1981 et seq.). Mature shrub transplanting also can occur within the reclamation areas. Mature shrubs are transplanted using a front end loader or similar equipment. Revegetation is monitored until the vegetation establishment meets the approved standards in the PAP.

TMI is required to post a bond covering land within the SMCRA permit area where mining and reclamation operations occur. The bond is made payable to the State of Colorado and OSMRE and covers performance of all requirements contained in regulations, the PAP, and the reclamation plan. A bond must remain in place until reclamation is completed in accordance with the regulatory requirements and permit documents, and to the satisfaction of the regulatory authorities. The bond is based on the cost of having a third-party contractor complete the required reclamation work if for some reason TMI is unable to do so. Reclamation liabilities at the Trapper Mine, as calculated by CDRMS as part of the PR07 approval, are $23,016,528.92.

There are three phases of bond release based on completion of certain portions of the reclamation plan. TMI can apply for Phase I bond release after completion of backfilling, regrading, and drainage establishment. Phase I bond release allows for release of approximately 60 percent of the reclamation bond for the area. TMI can apply for Phase II bond release once topsoil has been placed and vegetative cover has been established in accordance with the reclamation plan and associated regulatory standards. Phase II bond release also evaluates control of sediment in runoff outside of the reclaimed area to ensure compliance with the requirements. Phase II bond release allows for the release of up to an additional 25 percent of the reclamation bond, and in combination with the Phase I bond release allows for 85 percent of the bond to be released for that area. Phase III bond release occurs once all surface coal mining and reclamation activities have been completed in accordance with the requirements of the SMCRA, the Colorado regulations, and the PAP, and no fewer than 10 years have passed since the need for irrigation, fertilization, or significant revegetation. Revegetation success is determined by evaluating plant cover, plant production, woody plant density, and plant species diversity. After Phase III bond release, the area is 100 percent released from any bond liability. TMI has received approval for Phase I, Phase II, and Phase III bond releases for areas within the SMCRA permit boundary and the Project Area. **Figure 2-3** shows the areas of bond release within the Project Area and **Table 2-1** provides acreages for each phase of bond release within the Project Area**.**

Table 2-1 Summary of Phased Bond Release Acreages in the Project Area

Land Status	Approximate Acreage
Total Areas Reclaimed Within the Project Area	492
Areas Which Have Achieved Phase 1 Bond Release	492
Areas Which Have Achieved Phase 2 Bond Release	314
Areas Which Have Achieved Phase 3 Bond Release	178

Equipment used at the Trapper Mine for mining, reclamation, and support of these activities includes the following:

Draglines	Water Trucks
Overburden/Parting Drills	Fuel and Lube Trucks
Track Dozers	35-ton Crane
Rubber-tired Dozers	Backhoes
Motor Graders	Cable Reel
Scrapers	Service Trucks
Hydraulic Excavators	Pickups/Sport Utility Vehicles
Front-end Loaders	Farm Tractors
Coal Drills	Tractor and 200-ton Lowboy Trailer
Haul Trucks (240-ton, 95-ton, 55-ton)	Compactor

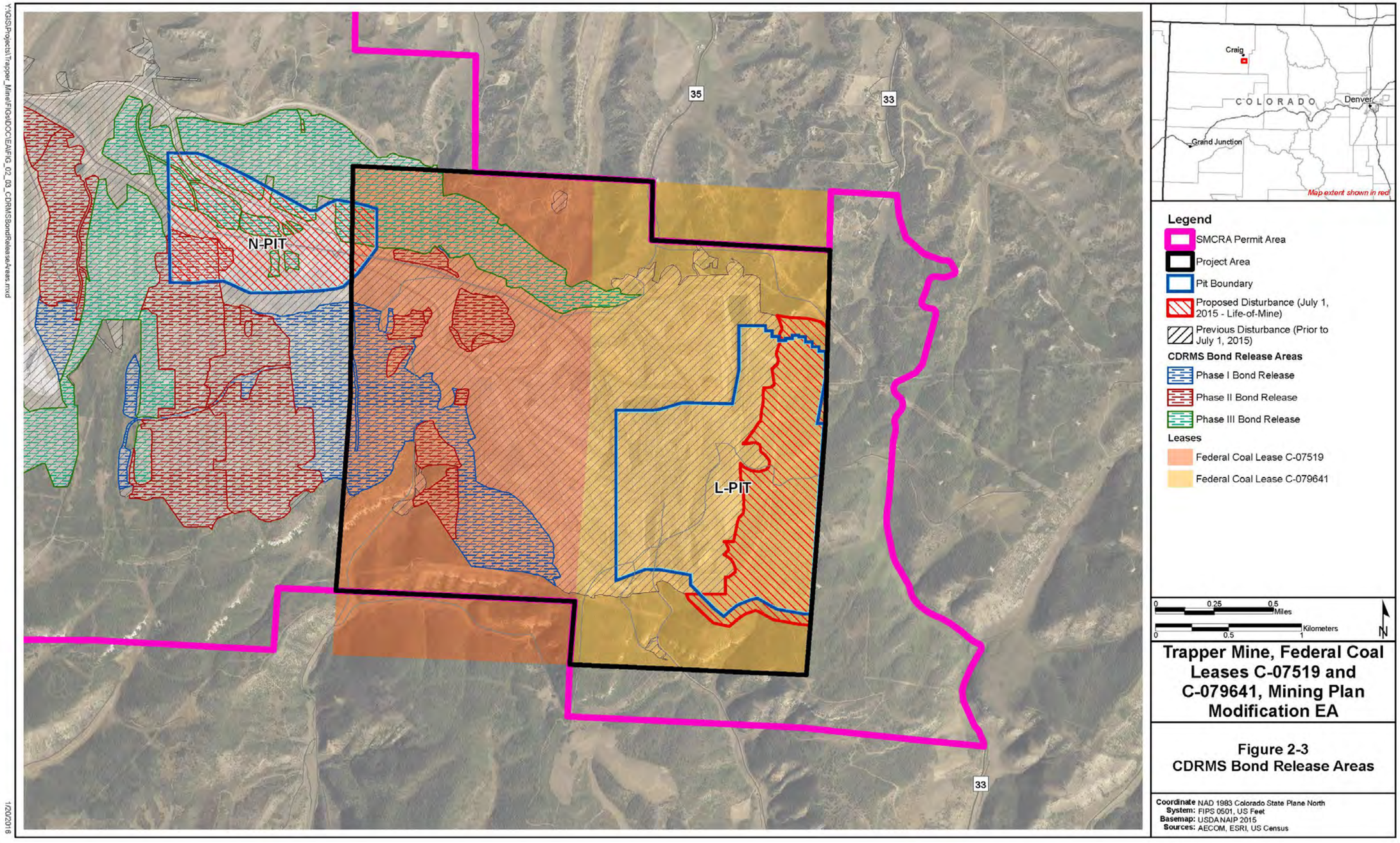
The Trapper Mine operates 24 hours a day, 7 days per week. The mine employs approximately 191 individuals (based on 2015 employee count) and operates on various schedules of 8-, 10-, or 12-hour shifts per day (TMI 2016).

2.3.1 Trapper Mine Support Facilities

Mining activities are supported by existing, permitted facilities located within the SMCRA permit boundary but outside the Project Area. The mine office, shop, and warehouse complex is located adjacent to the mine entrance approximately 2.5 miles from the Project Area. The mine office, shop, and warehouse complex includes most of the buildings and facilities needed to operate the mine, including the mine offices, truck shop, warehouse, storage yards, storage buildings, truck wash, electric shop, dragline repair shop, and fuel storage and refueling area for diesel and gasoline vehicles and other equipment. Other facilities outside of the Project Area and not located within the mine office, shop, and warehouse complex include the water pump house and water storage tanks. All of these facilities would be used to support the Proposed Action.

2.4 Alternative A - Proposed Action

Under Alternative A, the Proposed Action, OSMRE would recommend and the ASLM would sign a new MPDD for coal mining and reclamation operations at the Trapper Mine within the Project Area through the life-of-mine, estimated to be approximately 2025 or later depending on coal delivery requirements. TMI would mine the coal at the current mining rates, which average approximately 2.3 mtpy with a maximum production rate of 2.6 mtpy and would use similar mining and reclamation methods as described in Section 2.3. The operations within the Project Area would disturb an additional 257 acres of undisturbed land and re-disturb approximately 11 acres of reclaimed land.


N-PIT
L-PIT
35
33
33
Craig
COLORADO
Denver
Grand Junction
Map extent shown in red
Legend
SMCRA Permit Area
Project Area
Pit Boundary
Proposed Disturbance (July 1, 2015 - Life-of-Mine)
Previous Disturbance (Prior to July 1, 2015)
CDRMS Bond Release Areas
Phase I Bond Release
Phase II Bond Release
Phase III Bond Release
Leases
Federal Coal Lease C-07519
Federal Coal Lease C-079641
0 0.25 0.5 Miles
0 0.5 1 Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 2-3
CDRMS Bond Release Areas
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: USDA NAIP 2015
Sources: AECOM, ESRI, US Census
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2.4.1 Proposed Mine Operation Components within the Project Area

The Proposed Action would consist of the following mine components and facilities located within the Project area. Major facilities are shown on **Figure 2-2**:

- L Pit – Currently active open pit on Lease No. C-079641, projected to be mined 2015 through 2025.
- N Pit – Open pit partially located on Lease No. C-07519, projected to be mined near the end of the life-of-mine for the Project (currently estimated at 2023). This pit has not been approved by CDRMS at this time.
- TMI powerlines – Would provide power to facilities within the Project Area and to the draglines.
- East Panel Readyline and Fuel Storage Tanks area would provide plug-ins to warm diesel-powered equipment engines and fuel for the refueling to equipment.
- Support facilities necessary to conduct mining operations within the Project Area would include:
  - Haul roads used by haul trucks to transport coal to the Craig Station or move overburden and connect with in-pit roads and ramps;
  - Temporary light use ancillary roads;
  - Temporary in-pit ramps and roads;
  - Powder magazine used to store high explosives;
  - Emulsion and ammonium nitrate storage tanks for materials used in blasting;
  - Blasting equipment storage for keeping blasting equipment from freezing;
  - Temporary stockpile areas to store topsoil removed from disturbed areas for use in reclamation;
  - Temporary berms for control of water, material placement, or traffic;
  - Dewatering wells and associated waterlines;
  - Temporary construction staging areas;
  - Environmental monitoring stations for air and water monitoring; and
  - Sediment ponds and diversion ditches.

2.4.2 Existing and Proposed Disturbance

The Proposed Action would include mining from July 1, 2015, through the estimated life-of-mine (2025). Although mining operations are ongoing within the Project area, all acreages for disturbance and reclamation used in this EA are based on the disturbance and reclamation status as of July 1, 2015. **Table 2-2** summarizes the total Project area, approximate acres of previously disturbed area, approximate acreage of previously reclaimed areas, approximate acreage of new disturbance, and approximate acreage of areas currently reclaimed but planned for re-disturbance. The overall disturbed areas for the Proposed Action are shown in **Figure 2-1**.

Table 2-2 Summary of Disturbance in Project Area for Alternative A - Proposed Action

Land Status	Approximate Acreage
Total Project Area	2,423
Current Disturbed Area as of July 1, 2015	1,053
Previously Disturbed and Reclaimed Area as of July 1, 2015	494
Proposed New Disturbance After July 1, 2015	257
Proposed Re-disturbance After July 1, 2015, Within Areas Previously Reclaimed	11

2.4.3 Mining Operations

Mining operations associated with the Proposed Action would continue to be conducted in a similar manner as described for existing operations in Section 2.3. Vegetation would be removed in new disturbance areas followed by topsoil removal, blasting of the overburden, overburden/interburden and coal removal, pit backfilling, and reclamation.

As part of the Proposed Action, coal would continue to be mined in the L Pit within the Project Area from July 1, 2015, to approximately the year 2025 and in the portion of the N Pit located partially within the Project Area in the year 2023 (**Figure 2-2**). TMI proposes to continue mining in the Project area using a combination of dragline, dozer, and truck and loader operations to remove overburden and recover coal. Some limited highwall mining also could occur.

The L pit is where current mining operations are occurring. Ongoing mining in the L Pit, through completion of the EA, is being conducted in accordance with the Joint Proposed Remedy, which is described in Section 1.2.2**.**

The L pit is designed and operated as both a strike-line truck and loader pit and a dip-line dragline pit, depending on field conditions. The L Pit currently is and would be mined using a combination of truck and loader, dozer, and dragline stripping as described in Section 2.3. Coal is currently and would continue to be removed using a combination of loaders and trucks. Highwall mining also could be used in the endwalls or highwalls of the L Pit if further geologic and geotechnical studies demonstrate feasibility, and the timing of the stripping operations allows access (TMI 1981 et seq.).

TMI also proposes to mine the N Pit located partially within the Project Area over the life of the mine. Mining in this area would not begin until near the end of the life-of-mine plan in 2023. Mining previously has occurred in the N Pit area and some of that previous disturbance has been reclaimed. However, mining only recovered the coal seams closer to the surface; the “H” and “I” seams. The Proposed Action would initiate re-mining in this area to recover the coal from the deeper coal seams in the N Pit, specifically the “L,” “M,” and “Q” seams. Mining of these coal seams is not currently approved by CDRMS. Approval would be required by CDRMS prior to initiating any disturbance in the N Pit area.

The N Pit area has steep grades, weak formations, wet ground, historical spoils, and a high stripping ratio. Due to these conditions it is possible that highwall mining could be the preferred mining method in some areas. However, all or portions of the N Pit also would be mined using the standard combination of dragline, dozer, and truck and loader equipment as described for the L Pit in Section 2.3.

Table 2-3 provides additional information on the L and N Pit mine pit areas and total tonnage.

Table 2-3 Proposed Project Area Mine Plan

Mine Pit	Total Pit Area* in Acres	Estimated Federal Coal Tons**	Estimated Mining Years
L Pit	517	19,003,900	2015-2025
N Pit	17	130,800	2023
Total	**534**	**19,134,700**	**2015-2025**

* From July 1, 2015, through life- of- mine (estimated 2025).

** TMI 2015.

2.4.4 Project Environmental Protection and Mitigation Features

The surface mining permitting process under the CDRMS coal regulatory program requires applicants to incorporate design features into their mining proposals to protect or minimize impacts to environmental resources (CDRMS 1980). Each PAP submitted to CDRMS for a new or revised mining permit is required to contain resource-specific protection and mitigation plans. The resource-specific plans describe the design features for reducing or eliminating the potential impacts to various resources or how those resources would be restored to approved post-mining conditions after mining is complete. CDRMS reviews the PAP, which includes the required resource-specific plans, design features, and associated performance standards. CDRMS approval commits the applicant to implementing the design features contained in the PAP. It is important to note that the design features of the original permit also apply to the newly revised permit, unless CDRMS approves any changes to the revised permit that would replace older design features.

Section 4 of the PAP describes the design, operation, and reclamation features to reduce or eliminate potential impacts to environmental resources. **Table 2-4** contains a summary of those features with a more detailed description included in the PAP (TMI 1981 et seq.).

Table 2-4 Summary of Environmental Commitments from Trapper Mining Inc. PAP

Resource Area	Measure
Topography	Restore the area to approved post-mining topography. Grade backfilled mining areas to establish a stable post-mine topography that blends into the undisturbed areas outside the mining limits.
Air Quality	Water roads and apply chemical dust suppressants as necessary to control fugitive dust emissions. Operate in compliance with the CDPHE APCD Construction Permit (11MF253-1). Seed long-term topsoil stockpiles.
Water Resources	Route all runoff from disturbed areas through one or more sediment ponds. Construct new sedimentation structures and diversion ditches prior to topsoil removal to control runoff, avoid erosion and an increased contribution of sediment load to runoff, and protect surface water and groundwater quality. Maintain temporary sediment ponds until vegetative establishment is complete and acceptable water quality is achieved. Monitor performance of diversion ditches and sediment control structures and maintain or upgrade as needed. Control and monitor the quantity and quality of any discharges from the permit area in compliance with the Colorado Discharge Permit System (CDPS) Permit Number CO-0032115 issued by the CDPHE under the National Pollutant Discharge Elimination System Program. Revegetate permanent drainage ditches unless CDRMS approves rip rap as a channel lining.

Table 2-4 Summary of Environmental Commitments from Trapper Mining Inc. PAP

Resource Area	Measure
	Seed disturbance related to sediment pond construction, including embankments and surrounding areas, after the pond construction is completed. Design sediment ponds to contain the water and settleable sediment load from a 10-year, 24-hour storm event. Construct secondary sediment controls in the form of dozer basins to provide secondary sediment controls for precipitation and snowmelt events in disturbed areas of the mine site. Size haul road culverts to maintain proper drainage during high snowmelt or other exceptional runoff events.
Vegetation	Live transplant shrubs in accordance with approved permit commitments. Revegetate to achieve the approved post-mining land uses. Eliminate livestock grazing during vegetation establishment. Once vegetation is established, manage livestock usage to protect the established vegetative cover. Evaluate revegetation success in accordance with the standards approved by the CDRMS.
Fish and Wildlife	Re-establish appropriate and suitable forage and cover on reclaimed areas. Construct permanent stock and wildlife watering ponds. Keep soil disturbance to a minimum to reduce destruction of vegetation and food species used by wildlife. Take administrative actions for any employee found harassing wildlife. Manage livestock grazing to ensure that adequate forage is left for wildlife use and that the range is not over used. Control pesticide and herbicide use to protect livestock and wildlife. Construct powerlines to Rural Electric Association Bulletin 6140, Powerline Contacts by Eagles and Other Large Birds, standards. Limit vehicle speeds in the mine area to reduce the likelihood of collisions with wildlife. Provide topographic relief for wildlife habitat.
Threatened and Endangered Species	Continue to implement measures required as part of the Endangered Fish Recovery Agreement with USFWS.
Cultural Resources	Perform pre-disturbance field surveys. If an unidentified cultural or historical resource is discovered within or adjacent to the Project area, halt activities that may damage the resource and report the findings to the responsible regulatory agency. Complete required mitigation for cultural and historic resources.
Visual Resources	Restore disturbed areas to the approved post-mining topography.
Soils	Manage topsoil resources to minimize the negative effects of salvaging, stockpiling, and replacing soils to the extent practicable. Live-handle topsoil where possible. Salvage the A and upper B horizon soils, where practical, for use in reclamation. Restrict topsoil salvage to dry conditions where possible. Restrict topsoil salvage to the months of May through October. Locate topsoil stockpiles to avoid erosion from wind and water and additional compaction or contamination. Regrade topsoil stockpiles with outside slopes no steeper than 3H:1V and protect topsoil stockpiles by revegetating as soon as conditions allow. Clearly label topsoil stockpiles. Control weeds on topsoil stockpiles by monitoring and treating with an herbicide as needed.

Table 2-4 Summary of Environmental Commitments from Trapper Mining Inc. PAP

Resource Area	Measure
	If soil compaction occurs after topsoil replacement, rip the soil with a dozer to minimize compaction, promote stability and assist in revegetation. Leave reapplied topsoil in a rough condition to help control wind and water erosion prior to seeding. Monitor topsoil removal and maintain replacement balances to ensure adequate topsoil is available for reclamation.
Post-mining Land Use	Reclaim affected areas to land uses as high or higher than those in effect prior to mining. Establish vegetation to support livestock grazing. Establish adequate forage and cover to support year round wildlife usage. Establish permanent stock and wildlife watering ponds. Establish the post-mining hydrologic conditions in accordance with the approved hydrologic reclamation plan.

2.5 Alternative B – Disapproval of Mining Plan By ASLM

Under this alternative, OSMRE would recommend, and the ASLM would sign a MPDD that disapproves of continued mining operations at the Trapper Mine. Once the ASLM decision is issued, TMI would terminate the current mining operations in the Project Area and begin final reclamation. Solely for the purposes of estimating the impacts of this decision, OSMRE has estimated that mining operations at the Trapper Mine would cease by July 1, 2016. As of that date, an additional 2.1 million tons of coal would be mined within the Project area but 17 million tons would not be mined. Mining could occur in other areas within the SMCRA permit boundary, but following judicial review of such a decision, no further mining would occur in the areas covered by the Project area, and no additional coal removal would occur from Federal Coal Leases C-07519 and C-079641.

Once operations have ceased, TMI would start reclamation of the existing disturbed areas within the Project Area. Reclamation would proceed in accordance with the approved reclamation plan as generally described in Section 2.2. Reclamation would be expected to take approximately 3 to 5 years to complete backfilling, grading, and drainage reestablishment; topsoil replacement; and seeding. Vegetation establishment and Phase III bond release for the Project Area could take an additional 10 to 15 years.

Coal reserves identified in areas outside the Project Area in the N Pit and I Pit are shown on **Figure 2-4**. The N Pit has been previously mined for recovery of the “H” and “I” coal seams, and future mining would recover the deeper coal seams (the “L,” “M,” and “Q” seams). The 11 acre portion of the N Pit within Federal Coal Lease C-07519 would not be mined, but the area of the N Pit outside of the lease would be mined. The I Pit has not been previously disturbed. The N Pit west of Federal Coal Lease C-07519 and the I Pit are located on private and state lands with state coal. The expected coal to be mined from these pits would be approximately 4.5 million tons. The mining rate for these pits would potentially be reduced from the current average mining rate of 2.3 mtpy, due to equipment congestion in these smaller mine areas. Although detailed mining plans have not been developed for these areas, for the purposes of this analysis a mining rate of approximately 1.5 mtpy is used. The current identified reserves would be mined within 3 to 4 years of the decision by the ASLM to not recommend approval of the mining within Federal Coal Leases C-07519 and C-079641. This would not preclude the possibility that additional coal reserves could be identified within the SMCRA permit boundary.

2.6 Alternative C – No Action Alternative

Under this alternative, OSMRE would not develop a MPDD and the ASLM would not issue a decision based on the revised EA document. TMI would continue to operate under the 2009 Approval signed November 27, 2009 by the ASLM. Because of the deficiencies raised in the prior NEPA process by the

District Court in *WildEarth Guardians v. U.S. Office of Surface Mining Reclamation and Enforcement* 104 F. Supp. 3d 1208, (D. Colo. 2015), it is reasonably possible that, under this alternative, the existing MPDD would be vacated based upon a future court order. The District Court's decision is the subject of an appeal to the U.S. Court of Appeals for the 10th Circuit (Case Nos. 15-1186 and 1136) and may be reversed. If the prior EA analysis and the existing MPDD are vacated, operations at Trapper Mine would cease immediately and the effects would be equivalent to Alternative B outlined above, although TMI could continue to mine until the 2009 Approval is vacated by a court. The coal tonnage removed and the timing for the cessation of mining could vary from that outlined for Alternative B.

If the 2009 EA and the associated 2009 Approval are not vacated by a court, TMI would continue to mine as outlined in Section 2.1 under Alternative A, the Proposed Action, for the life of mining within the Project Area.

2.7 Alternatives Considered but Eliminated from Further Study

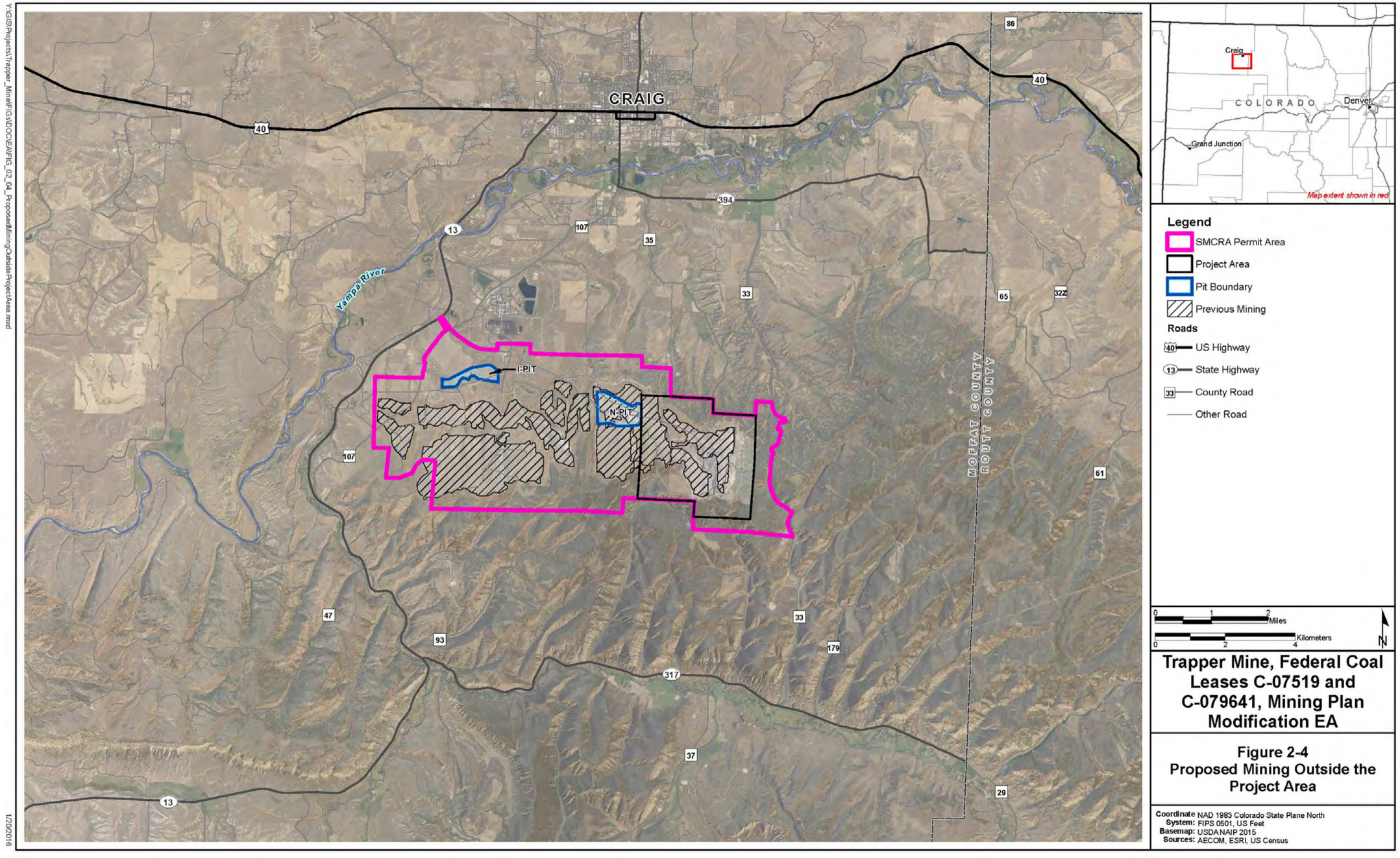
NEPA requires that alternatives to the Proposed Action be rigorously explored and objectively evaluated and that the NEPA document provide a discussion of alternatives eliminated along with the reasons for their elimination (40 CFR 1502.14). Alternatives to the Proposed Action must meet the Purpose and Need for the Project, and offer significantly lower or fewer impacts to the environment than the Proposed Action. An alternative may be eliminated from detailed study for a number of reasons, including:

- It does not meet the Project Purpose and Need;
- It is technically or economically infeasible;
- It is inconsistent with the basic policy objectives for the management of the area (such as, not in conformance with land use plans);
- Its implementation is remote or speculative;
- It is substantially similar in design to an alternative that is analyzed; or
- It would have substantially similar effects to an alternative that is analyzed.

2.7.1 Underground Mining Alternative

An alternative to mine the federal coal within the Project Area using underground mining methods was suggested during the public outreach and was evaluated and eliminated from detailed study for several reasons, including: 1) CDRMS has approved a surface mining permit for this project using surface mining techniques; and underground mining is inconsistent with the approved permit; 2) underground mining is not consistent with the Purpose and Need for this EA; and 3) the percentage of coal recovered through underground mining methods would be less than the maximum economic recovery using surface mining methods and inconsistent with the Federal Coal Lease terms and the R2P2.

This alternative also would be economically infeasible. The facilities and equipment needed for underground mining are different from surface mining. Because the infrastructure for underground mining is not in place at the Trapper Mine, new infrastructure for underground mining would need to be constructed. The capital expenditure to develop an underground mine would be prohibitive. In addition, all new surface facilities would need to be constructed, including, but not limited to, conveyors, coal stock piles, a wash plant, one or more processing waste piles, and maintenance and support facilities. In addition, all new underground mining equipment would need to be purchased such as, but not limited to, a long wall mining system, conveyor systems, drives and power stations, vehicles for transporting workers and supplies, several continuous miners, shuttle cars, large and small ventilation fans, and roof bolters.


CRAIG
Yampa River
I-PIT
N-PIT
MOFFAT COUNTY
ROUTT COUNTY
40
13
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179
317
37
29
Craig
COLORADO
Denver
Grand Junction
Map extent shown in red
Legend
SMCRA Permit Area
Project Area
Pit Boundary
Previous Mining
Roads
US Highway
State Highway
County Road
Other Road
0 1 2 Miles
0 2 4 Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 2-4
Proposed Mining Outside the Project Area
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: USDA NAIP 2015
Sources: AECOM, ESRI, US Census
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The coal seams currently mined by surface methods would not all be appropriate for recovery using underground mining. Many of the seams split or have partings making them uneconomic for underground mining. Recovery using underground mining methods is estimated by TMI to be approximately 35 percent of the 19.1 million tons proposed for recovery through surface mining in this EA (Hinkemeyer 2015).

In addition, approval by CDRMS of an application for a PR or for a new mining permit would be required to authorize underground mining. The process for TMI to design and engineer a new underground mine and for CDRMS to process a permit application or revision would take a number of years. The extended time for permitting and design add to the underground mining alternative as an economically unreasonable alternative to consider.

In summary, this alternative was not brought forward for analysis because underground mining would not respond to the Purpose and Need for this action, is not in conformance with the maximum economic recovery requirements of the federal coal leases and the R2P2, and, the economic burden to shift to underground mining would be prohibitive.

2.7.2 Air Quality Mitigation Alternatives

Two alternatives were evaluated to reduce greenhouse gas (GHG) emissions related to mining at the Trapper Mine. These two alternatives were suggested as part of the public outreach and are described below.

The first alternative considered a reduction in coal production from the Trapper Mine, which would reduce Trapper Mine's contribution of related emissions at the Craig Station from the burning of Trapper Mine coal. At the maximum permitted production rate of 2.6 mtpy as described in the Proposed Action, Trapper Mine would provide approximately 54 percent of the total coal needed to run the Craig Station. If mining operations at the Trapper Mine were reduced, it is likely the Craig Station would need to seek coal from other sources to meet the requirements to operate. Other sources would be more distant than the Trapper Mine and indirect emissions as a result of transport of that coal by truck or train to the Craig Station would increase while actual Craig Station emissions from burning of the coal would remain similar to current emissions. In addition, while the emissions from mining at the Trapper Mine would be reduced, it is expected that emissions from mining at the alternate coal source would increase if their production increased in order to meet the Craig Station demand. While the coal coming from the Trapper Mine is crushed at the Craig Station, it is likely that any coal transported from more distant sources would require crushing prior to transport, potentially resulting in increased emissions. Under this alternative, the Craig Station also might want to maintain a larger coal stockpile to ensure coal supply into the plant in the event of a delay in shipment, which also could increase air emissions.

Moreover, the effects of a reduced mining rate at the Trapper Mine would extend the environmental effects of the mining operation and the air emissions from mining equipment over a longer period of time to recover the coal within the Project Area. As currently estimated, the emissions from mining operations will cease from the Project Area in 2025. If a reduced mining rate at the Trapper Mine is implemented, the emissions from active mining within the Project Area could be extended for several years depending on the rate of reduction. The reduced mining rate would change Project economics by decreasing both costs and revenues and would require a smaller workforce resulting in layoffs and associated negative economic impacts for the region. In addition, TMI would not be in compliance with the terms of their existing contracts with the owners of the Craig Station to supply the required amount of coal.

OSMRE has determined that a reduced mining rate alternative would result in increased impacts to the environment when compared to the Proposed Action due to coal transport to supply the Craig Station from other, more distant, sources.

The second alternative evaluated the potential for reduced air emissions at the mine by changing or modifying mining related equipment to equipment which would produce lower air emissions. This

equipment replacement would reduce the emissions related to fuel combustion but would not change the emissions related to particulate matter. Trapper Mine is a relatively small contributor of the emissions related to engine combustion (primarily carbon dioxide [CO_2] and oxides of nitrogen [NO_X]) in the region. The Craig Station, Hayden Generating Station, and oil and gas operations contribute the majority of these pollutants to the regional air quality.

The cost to make the switch to equipment powered by a different fuel (such as natural gas or solar powered equipment) for the remaining 10-year life of the mine would be prohibitive for the minimal benefit to the regional air quality. To replace every piece of equipment in TMI's current fleet with newer model equipment is estimated to cost approximately $84 million. This $84 million does not take into account upgraded equipment that would use a different fuel. As a fuel alternative, natural gas engines are more expensive, and the storage and transportation of natural gas is more complex than diesel. In addition, the use of natural gas powered engines in mining equipment is relatively new and some types of equipment would not be available for replacement with natural gas powered engines. The use of solar power to run large equipment has not been tested and is not considered technologically feasible at this time. Similarly, retrofitting existing equipment with additional emissions control devices would be expensive with limited effect on regional air emissions. In addition, there is an environmental impact associated with manufacturing new equipment including, the potential environmental impacts and associated emissions created by mining operations to obtain the required metals and then the emissions that result from the manufacturing processes. It is also likely that the current equipment would be sold to a third party and may or may not continue to be used and generate emissions.

OSMRE has not brought forward this alternative for full analysis because natural gas and solar powered engine technology and retrofitting of existing equipment is not economically or technically feasible for all equipment at the Trapper Mine. Also, there is an added environmental impact from the manufacturing of new equipment; and the resulting decrease in emissions would not have a material beneficial impact on the regional air quality over the Proposed Action due to other, higher emissions contributors.

3.0 Affected Environment

The CEQ regulations state that NEPA documents "must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail" (40 CFR 1500.1(b)). While many issues may arise during scoping, not all of the issues raised warrant analysis in an EA. Issues are analyzed if: 1) an analysis of the issue is necessary to make a reasoned choice between alternatives, or 2) if the issue is associated with significant direct, indirect, or cumulative impact, or where analysis is necessary to determine the significance of the impacts. **Table 3-1** lists the resources considered for this EA and the determination as to whether the resource required additional analysis.

Table 3-1 Resources and Determination of Need for Further Analysis

Determination[1]	Resource	Rationale for Determination
PI	Topography	See discussion below.
PI	Air Quality	See discussion below.
PI	Climate Change	See discussion below.
PI	Geology and Minerals	See discussion below.
PI	Surface Water and Groundwater Resources	See discussion below.
PI	Soils	See discussion below.
PI	Vegetation	See discussion below.
PI	Wetlands and Riparian Zones	See discussion below.
PI	Fish and Wildlife Resources	See discussion below.
PI	Special Status Species	See discussion below.
PI	Cultural and Historic Resources	See discussion below.
PI	American Indian Concerns	See discussion below.
PI	Socioeconomics	See discussion below.
NI	Environmental Justice	See discussion below.
PI	Visual Resources	See discussion below.
NI	Recreation	See discussion below.
PI	Paleontology	See discussion below.
PI	Access and Transportation	See discussion below.
PI	Solid Waste	See discussion below.
PI	Noise	See discussion below.
NI	Livestock Grazing	See discussion below.
NP	Prime Farmlands	See discussion below.
NP	Alluvial Valley Floors	See discussion below.
NP	Floodplains	No Federal Emergency Management Agency (FEMA)-designated floodplains are located within the Project Area.
NP	Wild Horses	No Herd Management Areas are located within or near the Project Area.
NP	Wildfire Management	No public lands are located within or adjacent to the Project Area.

Table 3-1 Resources and Determination of Need for Further Analysis

Determination[1]	Resource	Rationale for Determination
NP	Forest Management	No public lands managed for commercial timber are located within or adjacent to the Project Area.
NP	Areas of Critical Environmental Concern	No designated Areas of Critical Environmental Concern are located within or near the Project Area.
NP	Wild and Scenic Rivers	No Wild or Scenic Rivers are located within or near the Project Area.
NP	Inventoried Roadless Areas	No inventoried roadless areas are located within or near the Project Area.
NP	Wilderness Areas	Nno Wilderness Areas or lands that meet the criteria for wilderness characteristics are located within or near the Project Area.
NP	Scenic Byways	No scenic byways are located within or near the Project Area.
NP	Realty Authorizations	No public lands that could have realty authorizations are located within or adjacent to the Project Area.
NP	Special use Authorizations	No public lands that could have special-use authorizations are located within or adjacent to the Project Area.

[1] NP = not present in the Project Area; NI = present but not affected to a degree that detailed analysis is required; and PI = present with the potential for impact; and analyzed in this EA.

3.1 General Setting

The Project Area is located approximately 6 miles (9.66 km) south of the City of Craig, Colorado, in Moffat County (**Figure 1-1**). The site lies along the north slope of the Williams Fork Mountains. Nearby communities include the cities of Craig and Hamilton.

The climate is semi-arid shrub steppe with strong seasonal variations. The mean annual precipitation is approximately 17.25 inches (43.8 centimeters [cm]) as measured at the weather station adjacent to the Trapper Mine office west of the Project Area. Between 33 and 50 percent of the precipitation is in the form of snowfall. Snowmelt runoff is the principal source of water for stream flows in northwest Colorado. The growing season is approximately 77 days.

Figure 2-1 depicts the Project Area and the SMCRA permit boundary. Within the Project Area, the existing disturbance as of July 1, 2015, and the future disturbance from July 1, 2015, through the life of mine also are shown on **Figure 2-1**. The Project Area is the focus of the Affected Environment for this EA. However, several resource discussions include a larger area, such as the SMCRA permit boundary or the region, in order to provide context for the resource.

3.2 Topography

The Trapper Mine is located along the northern slope of the Williams Fork Mountains, a 25-mile-long (40-km-long) west-northwest trending range that forms a long ridge with elevations ranging between 7,400 and 7,800 feet above mean sea level (amsl) (2,255 to 2,377 meters amsl). The Williams Fork Mountains form the drainage divide between the Williams Fork and Yampa rivers. The Yampa River flows generally east to west approximately 5 miles north of the Project Area. The Williams Fork River flows into the Yampa River several miles west of the Project Area.

Elevations in the Project Area range from approximately 6,500 to 7,800 feet amsl (1,981 to 2,377 meters amsl). See Map M3 of the PAP for the pre-mining topography. The north slope of the Williams Fork Mountains drops at grades up to 15 percent near the crest and flattens out to an approximate 2 percent grade closer to the Yampa River.

3.3 Air and Climate Resources

3.3.1 Airshed Boundary

The airshed boundary was defined using a topographic/airshed approach. An assessment was conducted to determine the reasonable airshed where regional air quality impacts could occur. Boundaries were defined by topographic features and resulted in an area covering approximately 4,000 square miles (12,360 square kilometers) (**Figure 3-1**).

The study area is identical to the study area defined for the Colowyo South Taylor/Lower Wilson Permit Expansion Area EA (OSMRE 2015). The airshed boundary covers southeastern sections of Moffat County, southwestern sections of Routt County, portions of northeastern Rio Blanco County, and a small section in extreme northern Garfield County. The Trapper Mine lies almost in the center of the airshed boundary.

The airshed boundary is presently designated as attainment or unclassified for all criteria air pollutants. Information on the measured air pollutant concentrations representative of the study area is included later in this section. As of October 2015, the only designated non-attainment area in Colorado is on the Colorado Front range for ozone (O_3).

3.3.2 Regional Climate

The climate of the area is typical of a semi-arid, continental, mid-latitude region: warm summers and cold winters are prevalent with strong diurnal and seasonal temperature variations. The flow of Pacific air dominates the climate and descends into the area as a warming and drying mass after depositing most of its moisture over the western slopes of the Sierra Nevada and Cascade mountains. This creates a large rain shadow effect over Nevada, Utah, and western Colorado.

The predominant air mass over the Rocky Mountain region during the winter season is continental polar with cold, dry air during storm-free periods. Storm systems that result in fine, light, powdery snow may become established during winter as the region lies within the mean winter storm track. During the summer, the air masses are generally maritime polar. The region is usually south of the main storm track in the summer; however, localized thundershowers and thunderstorms occur primarily during the afternoon if a moisture supply is available either locally or in the air mass (BLM 2006). Summertime thunderstorms have the potential for heavy rains that may cause flash flooding during extreme events.

3.3.3 Local Climate and Meteorology

An on-site meteorological monitoring station has existed at Trapper Mine since March 2015 (Station ID #5022). This monitoring station is equipped with a 10-meter (32.8-foot) tower that measures temperature, wind speed and direction, relative humidity, and solar radiation. The temperature and humidity measurements are collected at the 2-meter (6.6-foot) level. The Trapper Mine tower also collects data for barometric pressure, peak wind speed, temperature differences between the 10- and 2-meter levels ("delta temperature"), and standard deviation of wind direction (sigma-theta), which is computed with the on-site data logger. The monitoring site location is within the Trapper Mine at latitude/longitude coordinates of 40.4309°N (north) and -107.5322°W (west).

Additional data has been collected near the Trapper Mine at two locations. Trapper Mine personnel operate a National Weather Service Cooperative Station near the mine's administrative office (Station Craig 4SW, ID #051932) where temperature and precipitation data are collected. The latitude/longitude

coordinates for Craig 4SW are 40.4505°N and -107.5894°W. Additional temperature data are collected at the Craig-Moffat County Airport (Station ID 24046), located at latitude/longitude co-ordinates of 40.4930°N, -107.5239°W. The Craig-Moffat County Airport elevation is approximately 6,191 feet amsl (1,887 meters amsl). **Table 3-2** summarizes the temperature and precipitation data collected from all three monitoring stations referenced above. A wind rose for the Trapper Mine on-site monitoring program for the period March 11 through December 10, 2015, is provided as **Figure 3-2**.

The warmest temperatures occur in July, with the mean temperature from the Craig-Moffat County Airport measuring 68.6 degrees Fahrenheit (°F). The coldest temperatures occur in January, with the mean temperature at the Craig-Moffat County Airport measuring 13.9°F.

Annual precipitation amounts averaged over the reporting period (2005 to 2014) ranged from 13.8 inches (35.1 cm) at the Craig-Moffat County Airport to 17.25 inches (43.8 cm) at the Craig 4SW, located at the Trapper Mine administrative office. The Craig 4SW monitoring station is located at a higher elevation, which explains the difference in the measured precipitation totals. September is the wettest month on average and February is the driest month on average.

The wind rose at the Trapper Mine shows a large dominance of winds from the south through southwest. Winds are from the south through southwest nearly 50 percent of the observed hours for the monitoring period (March 10, 2015, through December 10, 2015). Winds from the northeast quadrant occur with the lowest frequency. The majority of measured wind velocities are less than 7 meters per second (roughly 15 miles per hour).

3.3.4 Regulatory Requirements

3.3.4.1 National Ambient Air Quality Standards

The regulatory framework for air quality includes both federal and state rules, regulations, and standards promulgated by the U.S. Environmental Protection Agency (USEPA) and implemented by the CDPHE. The CAA established the National Ambient Air Quality Standards (NAAQS) for seven criteria pollutants. The criteria pollutants are listed in **Table 3-3** and include carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter 10 microns or less in diameter (PM_{10}), particulate matter 2.5 microns or less in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2). The USEPA Administrator recently announced that the O_3 NAAQS would be lowered from 75 to 70 parts per billion (ppb), as published in the Federal Register (FR) on October 26, 2015.

Pursuant to the CAA, the USEPA has developed classifications for distinct geographical regions known as Air Quality Control Regions (AQCR). In Colorado, the state has been divided into eight multi-county areas that are generally based on topography and have similar airshed characteristics. The airshed boundary (**Figure 3-1**) lies in the Western Slope Air Pollution Control Region as designated by the State of Colorado. USEPA designates whole or partial counties as attainment, unclassifiable, non-attainment, or maintenance for each criteria air pollutant. AQCRs classified as in attainment, are areas in which no pollutant has exceeded the NAAQS. Regions may be designated as unclassifiable if there is not sufficient ambient monitoring data from which to formally classify the area. However, in such cases, the unclassifiable region is still treated as being in attainment. A non-attainment classification represents an area in which one or more pollutants have exceeded the NAAQS. The maintenance designation is used when an area was formerly designated as non-attainment, but monitored pollutant levels have been reduced such that the area now attains the NAAQS. Moffat County and surrounding areas have been designated as attainment or unclassifiable for all criteria pollutants based on monitoring results that were below the applicable NAAQS.

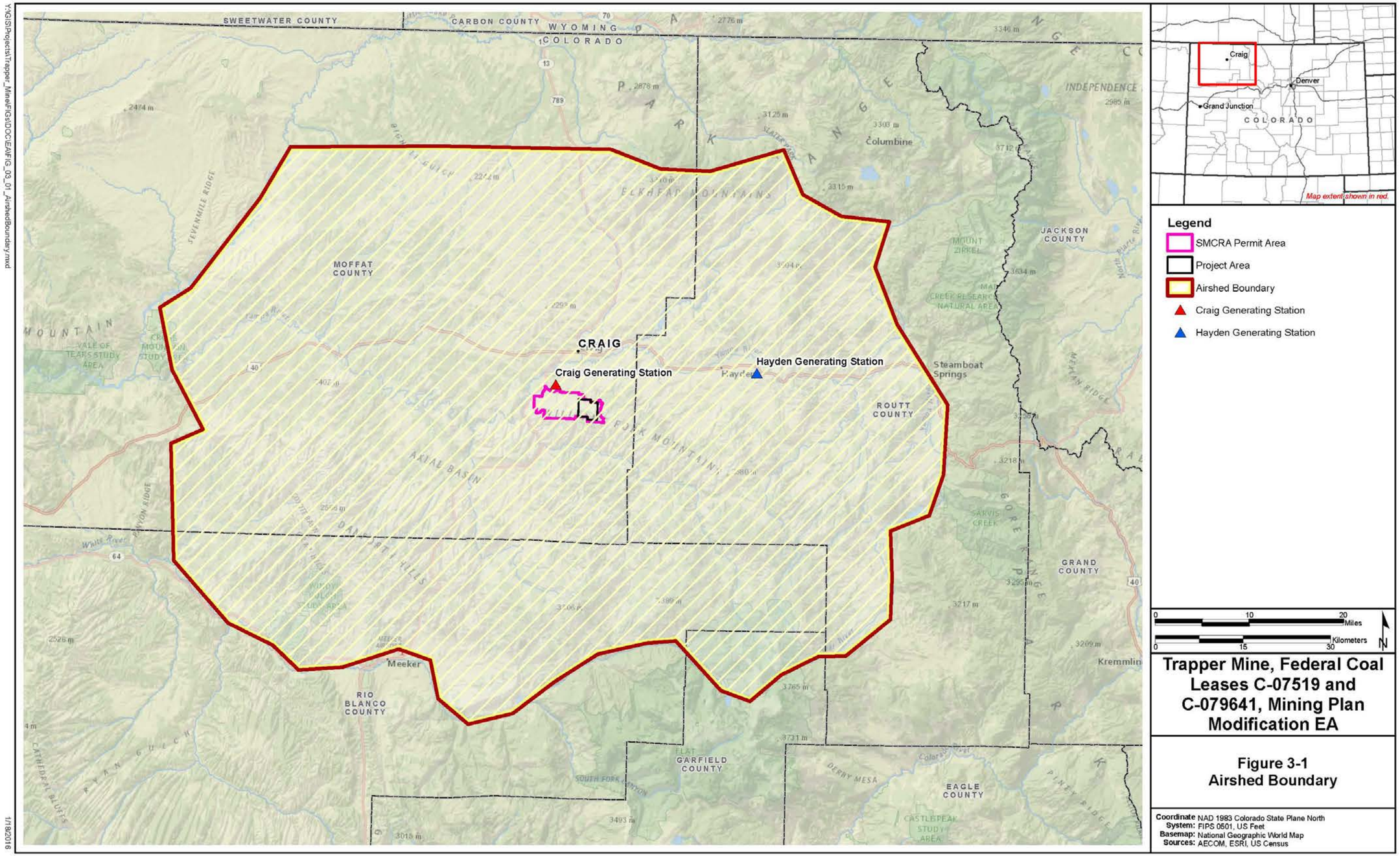
SWEETWATER COUNTY
CARBON COUNTY
WYOMING
COLORADO
MOFFAT COUNTY
CRAIG
Craig Generating Station
Hayden Generating Station
Hayden
Steamboat Springs
ROUTT COUNTY
JACKSON COUNTY
GRAND COUNTY
Columbine
INDEPENDENCE
Meeker
RIO BLANCO COUNTY
GARFIELD COUNTY
EAGLE COUNTY
Kremmling
Craig
Denver
Grand Junction
COLORADO
Map extent shown in red.
Legend
SMCRA Permit Area
Project Area
Airshed Boundary
Craig Generating Station
Hayden Generating Station
0 10 20 Miles
0 15 30 Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 3-1
Airshed Boundary
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, ESRI, US Census
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Table 3-2 Monthly Temperature and Precipitation Statistics: Craig, Colorado, and Vicinity
Period of Record: 2005-2014, except where noted

Temperature (°F)

Station	Station Number		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Trapper Mine[1]	5022	Maximum	ND	ND	65.5	66.4	74.0	87.0	84.4	85.1	78.4	76.8	61.5	ND
		Minimum	ND	ND	24.3	19.2	25.7	45.5	49.8	42.1	40.5	28.2	5.0	ND
		Average	ND	ND	45.0	42.3	47.0	66.2	65.3	66.7	61.3	50.9	30.6	ND
Craig 4SW[2]	51932	Maximum	30.1	34.4	46.6	55.3	65.8	77.9	86.4	83.2	74.4	59.6	46.7	31.1
		Minimum	6.1	11.0	20.0	26.7	36.1	43.7	51.6	49.3	40.3	30.2	19.7	9.1
		Average	18.1	22.7	33.3	41.0	51.0	60.8	69.0	66.3	57.4	44.9	33.2	20.1
Craig-Moffat County Airport[2]	24046	Maximum	29.1	34.3	46.8	57.0	67.8	80.5	88.6	88.6	76.2	60.6	47.1	30.6
		Minimum	1.2	7.8	19.1	26.4	33.9	40.1	47.8	47.8	37.2	27.7	17.1	5.6
		Average	15.2	21.0	32.9	41.7	50.9	60.4	68.2	68.2	56.7	44.1	32.1	18.0

Precipitation (inches)

Station	Station Number		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Craig 4SW[2]	51932	Rainfall	1.23	0.97	1.44	1.80	1.71	1.10	0.91	1.36	2.02	1.85	1.03	1.83	17.25
		Snowfall	11.03	8.68	8.58	6.54	1.10	0.02	0.00	0.00	0.00	2.52	6.20	15.99	60.66
Craig-Moffat County Airport[2]	24046	Rainfall	0.84	0.61	0.99	1.40	1.47	1.13	0.97	0.97	1.91	1.49	0.92	1.19	13.89
		Snowfall	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

[1] Data was gathered on-site from the Trapper Mine. The Trapper Mine on-site data collection started in March 2015 and a complete one-year data set was not available at the time the EA was prepared.

[2] Data were gathered from the National Climate Data Center from January 2005 through December 2014, www.ncdc.noaa.gov/cdo-wed/datasets, except for Craig 4SW precipitation data which were taken from Trapper Mine records. The Craig 4SW Station is located adjacent to the Trapper Mine administrative office building and is operated by Trapper Mine personnel.

°F = degrees Fahrenheit.

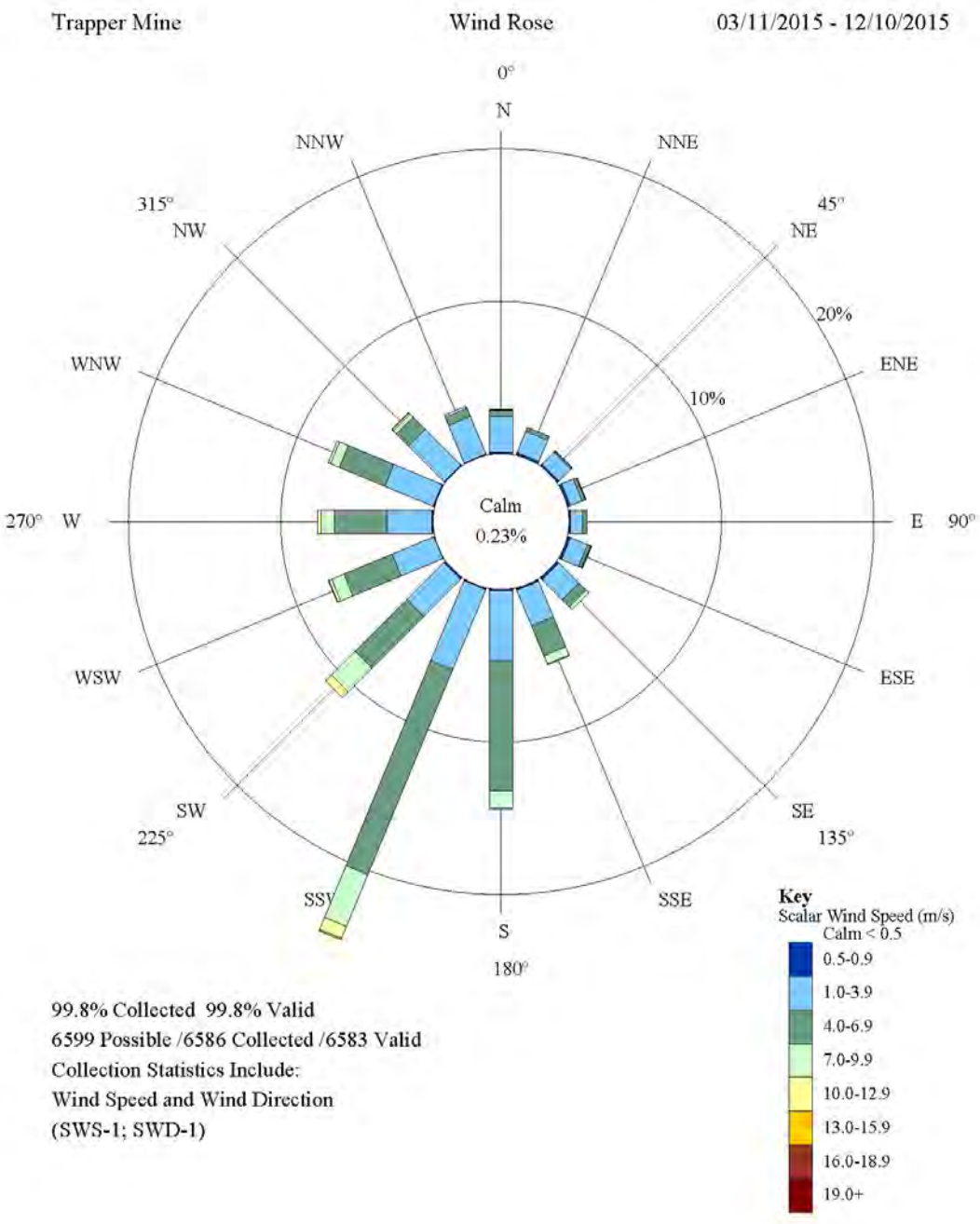


Figure 3-2 Trapper Mine Wind Rose 3/10/2015 - 12/10/2015

Table 3-3 National and State of Colorado Ambient Air Quality Primary Standards

Pollutant		Average Time	National Standard	Form
CO		8-hour	9 ppm	Not to be exceeded more than once a year
		1-hour	35 ppm	
Pb		Rolling 3-month average	0.15 µg/m^3	Not to be exceeded
NO_2		1-hour	100 ppb	98th percentile of the 1-hour daily maximum concentration, averaged over 3 years
		Annual	53 ppb	Annual mean
O_3		8-hour	70 ppb	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years. USEPA announced a revised O_3 standard on October 26, 2015
Particle Pollution	$PM_{2.5}$	Annual	12 µg/m^3	Annual mean, averaged over 3 years
		24-hour	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
SO_2		1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		3-hour	700 µg/m^3	Not to be exceeded more than once in any 12-month period

µg/m^3 = micrograms per cubic meter of air.

ppm = parts per million.

3.3.4.2 Prevention of Significant Deterioration

The CAA also divides areas where air quality is already cleaner than required by federal standards into three classes, and specifies the increments of SO_2, NO_2, and particulate pollution allowed in each class as regulated by the Prevention of Significant Deterioration (PSD) regulations (40 CFR 52.21). Designated Class I PSD areas include national parks and wilderness areas in existence as of 1977 and exceeding a certain size. Allowable increments of increased pollution in these Class I areas are very small. Class II areas include all attainment and not classifiable areas not otherwise designated as Class I. Allowable increments of increased pollution in Class II areas are modest. Class III areas may be designated by states where industrial development is anticipated, but at the time of this writing, no Class III areas are designated in Colorado or elsewhere.

The region surrounding the Trapper Mine is listed as a Class II area. Nearby Class I areas are the Flat Top Wilderness (approximately 25 linear miles [40 km] from the Project Area) and the Mount Zirkel Wilderness (approximately 35 linear miles [56 km] from the Project Area). Dinosaur National Monument (approximately 70 linear miles [113 km] from the Project Area), is officially designated as Class II, but Colorado's state regulations treat this area as equivalent to a Class I area with regard to SO_2 concentrations. The designated PSD increment for each class is listed in **Table 3-4**.

Table 3-4 Prevention of Significant Deterioration Increments

Pollutant	Averaging Time	Maximum Allowable Increase[1] (µg/m^3)		
		Class I Area	Class II Area	Class III Area
$PM_{2.5}$	Annual	1	4	8
	24-hour	2	9	18
PM_{10}	Annual	4	17	34
	24-hour	8	30	60
SO_2	Annual	2	20	40
	24-hour	5	91	182
	3-hour	25	512	700
NO_2	Annual	2.5	25	50

[1] Increment represents the maximum allowable increase in concentration above the baseline concentration established by 40 CFR 52.21.

3.3.4.3 Title V Operating Permits

The CAA Amendments of 1990 introduced a new facility-wide Federal Operating Permit program, also known as Title V permits. Title V permits are required for facilities with the potential to emit more than 100 tons per year (tpy) of a regulated pollutant, 10 tpy of any single hazardous air pollutant (HAP), or 25 tpy of any combination of HAPs. Fugitive emissions count toward the major source applicability under Title V only for specifically listed emission source categories.

At Trapper Mine, the potential to emit (not counting fugitive emissions) is below the emissions threshold requiring a Title V Operating Permit. However, Title V operating permit requirements are typically applicable for the locations of final coal combustion and the Craig Station has been issued a Title V permit (Permit Number 960PMF155, issued May 1, 2005).

3.3.4.4 Emission Standards at Coal Combustion Sources

The CAA enacted the New Source Performance Standards (NSPS) and National Emissions Standards for Hazardous Air Pollutants for specific types of equipment located at new or modified stationary pollutant sources. NSPS regulations limit emissions from new, modified, or reconstructed emission units under the regulated source categories. Stationary sources typically meet the NSPS limits by installing modern equipment and/or adding air pollution control equipment. Specific to this EA, NSPS emissions standards apply to combustion of coal at the Craig Station. Other NSPS standards also may apply at the Craig Station related to coal processing (i.e., crushing and screening).

Beginning in 2011, the Craig Station and other electricity generating facilities became subject to new emission standards to reduce mercury and other toxic air pollution from coal and oil combustion at electric generating units (EGUs). These rules set technology-based emissions limitation standards for mercury and other toxic air pollutants, reflecting levels achieved by the best-performing sources currently in operation. The final rule established HAP standards for new and existing coal- and oil-fired EGUs with a capacity of 25 MW or greater. All regulated EGUs are considered major sources under the final rule. While new sources must meet the standards at start-up of operations, existing sources generally have up to 4 years to comply with the Mercury and Air Toxics Standards (MATS). The emissions limits associated with the MATS rule are presented in **Table 3-5**. The Craig Station has already attained compliance with MATS for Units 1 and 2 and Unit 3 is scheduled to attain compliance by the end of 2015.

Table 3-5 MATS Emission Requirements[1]

		EGU Subcategory	Mercury Emission Limit (lb/GWh)
Coal- and Oil-Fired Units	Existing	Regular Coal	0.013
		Designed for Low arnk Coal[2]	0.12 or 0.040
		IGCC (Gasified Coal)	0.03
		Solid-oil Derived & Continental Liquid Oil	0.002
		Non-continental Liquid Oil	0.004
	New	Regular Coal	0.0002
		Designed for Low Rank Coal	0.04
		IGCC (Gasified Coal)	0.003
		Solid-oil Derived	0.002
		Continental Liquid Oil	0.0001
		Non-continental Liquid Oil	0.0004

[1] The Supreme Court recently held that the USEPA did not properly consider the costs of the MATS rule. See *Michigan v. USEPA*, 192 L. Ed. 2d 674 (June 29, 2015). The consequences of this decision are still being assessed by USEPA and the lower courts. For purposes of the Trapper Mine EA, the analysis includes the 2011 MATS rule because the Craig Station has already complied with those standards.

[2] Most of these units burn lignite coal.

lb/GWh = pounds of pollutant per gigawatt – electric output.

Source: USEPA February 16, 2012.

3.3.4.5 Visibility and Regional Haze

Visibility impacts are managed under a State Implementation Plan (SIP) for the reduction of Regional Haze (CDPHE 2014a). This regulation is intended to reduce the visibility impacts from existing facilities. The national visibility goal under the regional haze program is to return visibility to “natural conditions” (i.e., conditions present in the absence of anthropogenic air pollution) by 2064. The initial step in reducing visibility impairing emissions at EGUs is known as Best Available Retrofit Technology (BART).

The Craig Station has two units that are eligible for BART: Units 1 and 2. Under the Colorado Regional Haze SIP, Units 1 and 2 are required to meet emissions limits for NO_X that are based on the installation of a Selective Catalytic Reduction (SCR) to reduce NO_X emissions. The Craig Station is having SCR installed on Unit 1 by August 31, 2021, and on Unit 2 by January 31, 2018. These are the deadlines for BART controls per Colorado and USEPA regulations. The existing wet limestone scrubbers on Units 1 and 2 already meet the SO_2 emission limits in the Regional Haze SIP. According to modeling conducted as part of the BART analysis, the SCR NO_X emission controls will improve visibility in nearby Class 1 areas by 1.01 deciview (dv) at Unit 1 and by 0.98 dv at Unit 2. A deciview is a unit of measure for visibility and generally represents the change in light extinction that would be minimally perceptible to a normal human observer. Unit 3 at the Craig Station will have a Selective Non-Catalytic Reduction (SNCR) emission controls installed to reduce NO_X emissions. Modeling predicts these emission reductions will improve visibility in nearby Class I areas by 0.32 dv. The SNCR technology is new and must be installed on Unit 3 by December 31, 2017, per Colorado and USEPA regulations. Unit 3 already employs a spray dryer absorber to control SO_2 emissions, which meets the applicable emission limits in the Regional Haze SIP.

3.3.5 Regional Air Quality

The airshed boundary is currently classified as attainment or unclassified for all criteria pollutants. Monitoring of criteria pollutants in the region is generally performed near population centers or other locations of specific interest. Per USEPA guidelines, ambient monitoring is not required where pollutant concentrations are less than 60 percent of the NAAQS.As a result, the data described in this section is regionally representative, but is often from monitoring performed at some distance from the Project Area.

Table 3-6 summarizes the regional air quality data for northwestern Colorado as provided by CDPHE for Calendar Year 2014. For this EA, data are reported where the site is regionally representative of air quality conditions and located within the airshed boundary (**Figure 3-1**). If no monitoring data have been collected for a particular pollutant within the airshed boundary, a representative monitoring suite or sites from outside the study area were selected. Monitoring data collected where measurements are influenced by local industrial emission sources were omitted as such measurements are specific to the monitoring location and would not be generally representative of current conditions within the airshed boundary. Based on the reported data, all measured pollutant concentrations are below the applicable NAAQS. The measured O_3 concentrations listed in **Table 3-6** also are below the new 70 ppb NAAQS standard adopted by the USEPA in October 2015.

Table 3-6 Regional Air Quality

Monitor Location	Active Since	Monitoring Agency	Annual Samples	Elevation (feet)	Highest Measured Concentration During 2014		
					1-hour	8-hour	24-hour
PM_{10} (µg/m^3)							
Rifle	2005	CDPHE	120	5,340	NA	NA	47
Parachute High School	2001	CDPHE	119	5,100	NA	NA	39
Steamboat Springs	1987	CDPHE	346	6,740	NA	NA	84
$PM_{2.5}$ (ppb)							
Rangely	2011	BLM	325	5,430	NA	NA	17.8
NO_2 (ppb)							
Rangely	2011	BLM	8,592	5,430	19.6	NA	NA
Meeker	2011	BLM	8,584	6,540	6.1	NA	NA
SO_2 (ppb)							
Walden-Colorado Chandler Ranch	2012	USFS	4,452	7,930	1	NA	0.5
Williams Willow Creek	2012	Private	Hourly	No Data	1 (2012)	NA	1 (2012)
CO (ppm)							
Walden – Colorado, Chandler Ranch	2013	USFS	4,330	7,930	0.3	0.3	NA

Table 3-6 Regional Air Quality

Monitor Location	Active Since	Monitoring Agency	Annual Samples	Elevation (feet)	Highest Measured Concentration During 2014		
					1-hour	8-hour	24-hour
O_3							
Rifle	2009	CDPHE	192 days	5,380	NA	0.062	NA
Meeker	2010	BLM	206 days	6,540	NA	NA	NA
Rangely	2011	BLM	203 days	5,430	NA	NA	NA
Lay Peak	2012	CDPHE	212 days	6,240	NA	0.067	NA

NA = not applicable; no air quality standard exists for the pollutant and averaging time.

USFS – U.S. Forest Service

3.3.5.1 Particulate Matter (PM_{10}/$PM_{2.5}$)

Representative PM_{10} measurements have been collected at three monitoring locations in northwest Colorado; one in Rifle, one in Steamboat Springs, and one in Parachute. Data from 2014 also are available for Grand Junction but are not included here as the other data are more representative of the EA airshed boundary. The highest 24-hour concentration for Parachute measured during 2014 was 39 µg/m^3, the highest 24-hour concentration for Rifle was 47 µg/m^3, and the highest 24-hour concentration for Steamboat Springs was 84 µg/m^3.

Representative $PM_{2.5}$ measurements were collected during 2014 at Rangely, Colorado. The maximum 24-hour average $PM_{2.5}$ concentration from this site was 17.8 µg/m^3.

All measured values were below the NAAQS (PM_{10} = 150 µg/m^3, $PM_{2.5}$ = 35 µg/m^3). The reported concentrations in **Table 3-6** are conservative with respect to the NAAQS. The table lists the maximum measured concentration during 2014, and NAAQS compliance is assessed using the second-highest 24-hour average concentration for PM_{10} and the 3-year average of the 98th percentile 24-hour average concentration for PM $_{2.5}$. In a 1-year data set, the 98th percentile concentration is the 8th highest daily value.

3.3.5.2 Nitrogen Dioxide (NO_2)

The nearest representative NO_2 data for the airshed boundary were collected at the U.S. Department of Agriculture (USDA) Upper Colorado Environmental Plant Center in Meeker Colorado. The maximum hourly NO_2 measured at the site during 2014 was 6.1 ppb. For comparison, the 1-hour NO_2 NAAQS of 100 ppb is calculated as the 3-year average of the 98th percentile maximum daily 1-hour concentration. In a 1-year data set, the 98th percentile concentration is the 8th highest daily value.

Near the Trapper Mine, local NO_2 concentrations are most likely linked to emissions from the Craig Station. NO_X emissions at Craig Station occur from coal combustion at the power plant boilers. As referenced in Section 3.3.4.5, improved NO_X emission controls are being installed at the Craig Station per the Colorado Regional Haze SIP. As a result, a future reduction in NO_X emission levels from the Craig Station is anticipated.

3.3.5.3 Sulfur Dioxide (SO_2)

The nearest representative SO_2 data for the airshed boundary were collected at Chandler Ranch, near Walden, Colorado and also at a private monitoring site near the Williams Willow Creek Plant in Rio Blanco County, Colorado. The maximum hourly SO_2 measured at Chandler Ranch during 2014 was at or below 1 ppb. Williams Willow Creek also recorded a maximum 1-hour SO_2 concentration at or below 1 ppb, but this monitor only operated during 2012. For comparison, the 1-hour SO_2 NAAQS is

75 ppb, calculated as the 3-year average of the 99th percentile maximum daily 1-hour concentration. In a 1-year data set, the 99th percentile concentration is the 4th highest daily value.

Near the Trapper Mine, local SO_2 concentrations are most likely linked to emissions from the Craig Station. SO_2 emissions at Craig Station occur from coal combustion at the power plant boilers. As referenced in Section 3.3.4.5, the Craig Station already controls SO_2 emissions using either a wet scrubber (Units 1 and 2) or a spray dryer absorber (Unit 3).

3.3.5.4 Carbon Monoxide (CO)

The nearest representative CO monitoring data for the airshed boundary were collected at Chandler Ranch, near Walden. CO is predominantly an urban air pollutant, generally associated with combustion emissions from motor vehicles.

The measured concentrations were very low, which is characteristic of a remote location located away from urban emission sources. The maximum CO measured at Chandler Ranch during 2014 was 0.3 ppm for both the maximum 1-hour and 8-hour concentrations. For comparison, the CO NAAQS is 35 ppm for the 1-hour average and 9 ppm for the 8-hour average.

3.3.5.5 Ozone (O_3)

Representative O_3 measurements in northwest Colorado are collected at several locations: Rifle, Rangely, Meeker, and Lay Peak (west of Craig near Maybell). The monitoring at Rifle, Rangely, and Meeker are seasonal monitors, where the Lay Peak monitor has operated continuously since 2012.

All of the monitors show similar O_3 levels, with the peak 8-hour average concentrations during 2014 in the range of 62 to 67 ppb. By comparison, the changes announced by USEPA to the O_3 NAAQS would reduce the NAAQS to 70 ppb, measured as the 3-year average of the 4th highest daily maximum 8-hour average concentration. The measured O_3 are currently under the new O_3 NAAQS based on the 2014 monitoring data provided here.

3.3.6 Industrial Source Emissions Inventory

The airshed boundary is generally rural with anthropogenic emission sources dominated by mining, power generation, oil and gas production, and aggregate (sand and gravel) processing. The CDPHE requires permits for all new and/or modified sources of air quality emissions. The air quality permit program dates back to about 1970. Only non-major sources in existence prior to the initial adoption of the Colorado Air Quality Control Commission Regulation 3, Stationary Source Permitting and Air Pollutant Emission Notice (APEN) Requirements, would be exempt from the permit requirements.

Trapper Mine operates pursuant to an air quality permit issued by CDPHE. Regulated emissions in Trapper Mine's permit include particulate matter associated with mining operations (i.e., drilling, blasting, coal and overburden excavation and handling, etc.), coal hauling to the Craig Station, and emissions associated with placement of CCR within the mine site. Gaseous emissions associated with blasting also are regulated. Trapper Mine's air quality permit was most recently issued in 2009 and has no set expiration date. This permit would be modified as needed to address future changes in mining operations and/or changes in air pollution regulatory requirements.

Certain activities are exempt from CDPHE permit requirements. Emission sources such as dust from most paved and unpaved public roads, most agricultural operations, recreational activities, and emissions from mobile sources (e.g.,automobiles, trucks, etc.) are not regulated by CDPHE as stationary industrial sources. However, these emissions have the capacity to contribute to regional air quality emissions. Any impact associated with emissions from sources described in this section 13379.3ould be reflected in the regional air quality data described in the previous section.

Two existing coal-fired EGUs are currently operating in the airshed boundary. The Craig Station is located adjacent to the Trapper Mine and is operated by Tri-State Generation and Transmission Association Inc. The Craig Station consists of three coal-fired steam driven EGUs (Units 1, 2, and 3) with a net electric generating capacity of 1,264 MW.

The other local EGU is the Hayden Station (Hayden Station) owned and operated by the Public Service Company of Colorado, located approximately 16 miles (25.7 km) from Craig and 4 miles (6.4 km) east of Hayden (21 miles [33.8 km] from the Craig Station). It consists of two coal-fired steam-driven EGUs (Units 1 and 2). Hayden Station Units 1 and 2 have a combined rating of 446 MW.

Actual emissions data for both the Craig Station and Hayden Station are listed in **Table 3-7**.

Table 3-7 Craig Station and Hayden Generating Station: Reported Actual Emissions (2014)

EGU	2014 APENs Annual Actual Pollutant Emissions (tpy)						
	PM_{10}	$PM_{2.5}$	CO	NO_2	SO_2	VOC	HAPs
Craig	134.6	84.1	1669.3	13379.3	3763.3	58.0	52.26
Hayden	148.3	67.5	385.1	6483.6	2330.7	49.2	15.08

VOC = volatile organic compound.

3.3.7 Greenhouse Gas Emissions and Climate Change

The primary natural and synthetic GHGs in the Earth's atmosphere are water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. GHGs allow heat from the sun to pass though the upper atmosphere and warm the earth by blocking some of the heat that is radiated from the earth back into space.

CO_2 emissions occur from the combustion of fossil fuels (i.e., oil, natural gas, and coal) by industry and in the transportation sector, and as a result of other chemical reactions (e.g., the manufacture of cement). CH_4 emissions occur from livestock and other agricultural practices and also from the decay of organic waste placed in municipal solid waste landfills. CH_4 also is emitted during the production and transport of coal, natural gas, and oil. The largest natural source of CH_4 is wetlands where bacteria decompose organic matter in the absence of oxygen. Other natural CH_4 sources include termites, oceans, sediment, volcanoes, and wildfires. N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. Fluorinated gases, while not abundant in the atmosphere, are powerful GHGs that are emitted from a variety of industrial processes and are often used as substitutes for O_3-depleting substances (e.g., chlorofluorocarbons, hydrochlorofluorocarbons, and halons).

The NAAQS do not exist for GHGs. In its Endangerment and Cause or Contribute Findings for Greenhouse Gases under CAA Section 202(a) (FR EPA-HQ-OAR-2009-0171), USEPA determined that GHGs are air pollutants subject to regulation under the CAA. USEPA acted on its understanding that GHG pollutants potentially have long-term impacts on the climate because of their increasing concentrations in the earth's atmosphere, which has been tied to industrialization and the burning of fossil fuels. GHGs can be produced from the direct process of coal mining and from the combustion of mined coal. The amount of GHG emissions associated with these processes varies depending on the mining technique used (i.e., surface versus underground mining) and combustion technologies employed.

USEPA has regulated six key GHGs: CO_2, CH_4, N_2O, hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulfur hexafluoride (SF_6). Because CO_2 is the most prevalent of the regulated GHGs, the USEPA references the potential impact of GHG emissions in terms of their equivalence to CO_2 or carbon dioxide equivalent (CO_2e). In addition to the USEPA estimates, the International Energy Agency

estimated global emissions to be 29,000 million metric tons (MMT) CO_2e in 2008. On a regional scale, CDPHE (2014) estimated the total 2010 (Calendar Year) GHG emissions to be 130 MMT CO_2e for the State of Colorado.

The USEPA has promulgated rules to regulate GHG emissions and the industries responsible under the Mandatory Reporting Rule (74 FR 56260, 40 CFR 98) and the Tailoring Rule (70 FR 31514, 40 CFR 51, 52, 70, and 71). Under the USEPA's GHG Mandatory Reporting Rule, coal mines subject to the rule are required to report emissions in accordance with the requirements of Subpart FF. Subpart FF is applicable only to underground coal mines and is not applicable to surface coal mines such as Trapper Mine.

The USEPA Tailoring Rule was in part struck down by a 2014 Supreme Court decision. Based on the Supreme Court decision, a facility would be subject to PSD permitting for GHGs only if it has the potential to emit GHGs in excess of 100,000 tpy of CO_2e and also if the facility exceeded the PSD major source threshold for one or more criteria pollutants. For existing facilities this review would take place during any subsequent modifications to the facility that would trigger PSD review. Based on emission estimates for the Trapper Mine, no GHG reporting or permitting would currently apply to the mine given that the mine is not a major source for non-GHG pollutants. However, GHG emissions reporting does apply to the Craig Station and future GHG permitting could apply for future modifications (if any). The USEPA also has recently adopted regulations for GHG emissions from new and existing fossil fuel-fired EGUs (the USEPA Clean Power Plan), although the new USEPA regulations have been challenged in court.

The USEPA tracks GHG emissions in the United States (U.S.) by source sector (e.g., industrial, land use, electricity generation, etc.); fuel source (e.g., coal, natural gas, geothermal, petroleum, etc.); and economic sector (e.g., residential, transportation, commercial, agriculture, etc.). With so many GHG emission sources, from cattle to vehicles to electric power generators, no single source represents a significant percentage of national emissions.

Table 3-8 shows GHG emissions by economic sector as reported during 1995, 2000, and 2007 in units of CO_2e (USEPA 2015). Compared to 2000, the 2007 U.S. GHG emissions decreased slightly. The contribution of each major economic sector to the GHG emissions total also is shown. Note that for CO_2, "Land Use, Land-Use Change, and Forestry" represents a sink rather than a source, and is therefore presented in parentheses.

Table 3-8 U.S. Greenhouse Gas Emissions Allocated to Economic Sectors

Implied Sectors	1995 (MMT CO_2e)	2000 (MMT CO_2e)	2007 (MMT CO_2e)
Electric Power Industry	1,989.0	2,329.3	2,445.1
Transportation	1,685.2	1,919.7	1,995.2
Industry	1,524.5	1,467.5	1,386.3
Electric Power Industry	1,989. 0	2329. 3	2,445. 1
Transportation	1,685. 2	1/919. 7	1,995. 2
Industry	1,524. 5	1,467. 5	1,386. 3
Agriculture	453.7	470.2	502.8
Commercial	401.0	388.2	407.6
Residential	368.8	386.0	355.3
U.S. Territories	41.1	47.3	57.7

Table 3-8 U.S. Greenhouse Gas Emissions Allocated to Economic Sectors

Implied Sectors	1995 (MMT CO_2e)	2000 (MMT CO_2e)	2007 (MMT CO_2e)
Total Emissions	6,463.3	7,008.2	7,150.1
Land Use, Land-Use Change, and Forestry (Sink)	(851.0)	(717.5)	(1,062.6)
Net Emissions (Sources and Sinks)	**5,612.3**	**6,290.7**	**6,087.5**

Table 3-9 (USEPA 2015) shows total U.S. GHG emissions reported for 1995, 2000, and 2007 for each major GHG contributor (CO_2, CH_4, N_2O, etc.). This table also shows the largest emissions/sinks for each gas/source.

Table 3-9 U.S. Greenhouse Gas Emissions and Sinks

Gas/Source	1995 (MMT CO_2e)	2000 (MMT CO_2e)	2007 (MMT CO_2e)
CO_2	***5,407.9***	***5,955.2***	***6,103.4***
Fossil Fuel Combustion	5,013.9	5,561.5	5,735.8
Non-Energy Use of Fuels	137.5	144.5	133.9
Iron and Steel Production and Metallurgical Coke Production	103.1	95.1	77.4
Cement Manufacture	36.8	41.2	44.5
Natural Gas Systems	33.8	29.4	28.7
Land Use, Land-Use Change, and Forestry (Sink)	(851.0)	(717.5)	(1,062.6)
CH_4	***615.8***	***591.1***	***585.3***
Enteric Fermentation	143.6	134.4	139.0
Landfills	144.3	122.3	132.9
Natural Gas Systems	132.6	130.8	104.7
Coal Mining	67.1	60.5	57.6
Manure Management	34.5	37.9	44.0
N_2O	***334.1***	***329.2***	***311.9***
Agricultural Soil Management	202.3	204.5	207.9
Mobile Combustion	53.7	52.8	30.1
Nitric Acid Production	22.3	21.9	21.7
Stationary Combustion	13.3	14.5	14.7
Manure Management	12.9	14.0	14.7
HFCs, PFCs, and SF6	***105.5***	***132.8***	***149.5***
Substitution of Ozone Depleting Substances	28.5	71.2	108.3
HCFC-22 Production	33.0	28.6	17.0
Electrical Transmission and Distribution	21.6	15.1	12.7
Total Emissions	**6,463.3**	**7.008.2**	**7,150.1**
Net Emissions (Sources and Sinks)	**5,612.3**	**6,290.7**	**6,087.5**

Secondary GHGs do not have a direct atmospheric warming effect, but indirectly affect terrestrial radiation absorption by influencing the formation and destruction of tropospheric and stratospheric O_3, or in the case of SO_2, the absorptive characteristics of the atmosphere.

Additionally, some of these gases may react with other chemical compounds in the atmosphere to form compounds that are GHGs. For example, the roasting of molybdenite in ore processing is among the sources of indirect GHG emissions to the atmosphere, specifically SO_2.

National SO_2 emissions across the U.S. are listed in **Table 3-10**. SO_2 emission levels have decreased since 1995, primarily due to increased emission controls for SO_2, including the increased use of low sulfur coal from mines in the western states.

Table 3-10 U.S. Sulfur Dioxide (Indirect GHG) Emissions

Gas/Source	GHG 1995 (MMT)	GHG 2000 (MMT)	GHG 2007 (MMT)
SO_2	16.89	14.83	11.73
Energy (combustion, etc.)	15.77	13.80	10.89
Industrial Processes	1.12	1.03	0.84
Chemical manufacturing	0.26	0.31	0.23
Metals processing	0.48	0.28	0.19
Other	0.37	0.37	0.29

3.3.8 Black Carbon

Black carbon is a by-product of incomplete combustion of fossil fuels, biofuels, and biomass. It can be emitted when coal is burned, as well as through tailpipe emissions from engines that use diesel fuel (e.g., diesel trucks and locomotives). Black carbon is a likely by-product that would be emitted from haul trucks and other diesel-powered equipment used during coal mining operations. Black carbon is an unregulated pollutant; however, the USEPA does regulate diesel fuel quality, such that in recent years diesel fuel quality has been improved by placing maximum limits on fuel sulfur content.

Black carbon emissions also can be associated with coal combustion. Black carbon from coal combustion is linked with visibility impairment and regional haze because black carbon is the most strongly light-absorbing component of particulate matter. However, measurements for visibility impairment typically show other atmospheric pollutants such as sulfate, nitrates, and organics are larger contributors to visibility impairment compared to black carbon.

3.4 Geology and Minerals

3.4.1 Geology

The Trapper Mine is located in the Yampa coal field that is composed of coal-bearing rocks that are Upper Cretaceous in age. The coal-bearing rocks mainly outcrop south of the Yampa River in northwest Colorado. The Yampa coal field extends east to west about 50 miles (80.5 km) and is about 40 miles (64.4 km) north to south.

The surface bedrock in the Trapper Mine Project Area is mainly the Upper Cretaceous Williams Fork Formation, which is part of the Mesaverde Group, a regional unit that contains a large coal resource in northwest Colorado (Brownfield and Johnson 2008). The Williams Fork Formation consists of interbedded sandstones, siltstones, shale, and coals and crops out along a 6-mile-wide (9.7 km) belt that extends along the entire length of the Williams Fork Mountains (Tweto 1976). The Williams Fork Formation is underlain by the Illes Formation, also part of the Mesaverde Group. The Illes Formation is

lithologically similar to the Williams Fork Formation consisting of sandstones, mudstones, carbonaceous shale, and coal (Brownfield and Johnson 2008). The Lewis Shale, which is stratigraphically higher than the Mesaverde Group, outcrops in the northern extremity of the SMCRA permit area. The Lewis Shale also is Upper Cretaceous in age and is composed of uniform dark-gray marine shale, but also contains thin sandstones (Johnson 1987; Tweto 1976). Surficial deposits consist of alluvium, residuum derived from the Williams Fork Formation and the Lewis Shale, and landslide deposits (Madole 1989). Quaternary alluvial deposits composed of sand, silt, clay, and gravel are present in the stream drainages in the permit area and surrounding areas, but alluvium is thickest in the Yampa River and Williams Fork River valleys (CDRMS 2013). Residuum is composed of sand, silt, clay, gravel, and boulders derived from the underlying bedrock.

The landslide deposits that are part of the surficial deposits are either rotational slides or earthflows and involve the Williams Fork Formation (Madole 1989). A major landslide occurred at the mine in October 2006 (CDRMS 2013). Prior to the slide, there was heavy precipitation that facilitated the movement of an estimated 35 million cubic yards of material with original in-place dimensions of 250 acres and 100 feet (30.5 meters) deep (Buchsbaum 2011). The material was largely contained in an active pit, but the slide made it necessary for the mine to alter its mine plan.

Structurally, the mine is bounded on the west, north, and northeast by three major folds. From west to east, the Williams Fork Anticline, Big Bottom Syncline, and Breeze Mountain or Buck Peak Anticline (Brownfield and Johnson 2008). At the mine, the beds of the Williams Fork Formation dip generally to the north at an altitude of 14 to 16 degrees. The Project Area lies on the south flank of the Sand Wash Basin, a structural basin which is the southeast extension of the Greater Green River Basin (Horn and Richardson 1959; TMI 1981 et seq.).

The region is not very seismically active. From 1979 to 2014, there were 48 earthquake events greater than 1.0 magnitude within a 60-mile (96.6 km) radius of the mine, with no events with a magnitude greater than 4.3 (U.S. Geological Survey [USGS] 2015). No major faults have been found in the permit area (CDRMS 2013). A large unnamed down-to-the-north normal fault lies about 2 miles (3.2 km) south of the SMCRA permit area in T9N, R90W (Brownfield and Johnson 2008; Tweto 1976). The fault as mapped by Tweto (1976) is about 4 miles (6.4 km) long and is not classified as active. No active faults have been identified in the area (USGS and Colorado Geological Survey 2006). There is a low probability of strong ground motion if a maximum credible earthquake were to occur in the vicinity. Horizontal ground motions are expected to be 18 to 20 percent of the acceleration gravity with a 2 percent probability of exceedance in 50 years (Petersen et al. 2015).

3.4.2 Mineral Resources

Coal has been mined in the Yampa coal field since 1864, and 192 surface and underground mines have been identified (Johnson et al. 2000). The cumulative production from the Yampa coal field to 2014 is estimated to be almost 600 million tons (CDRMS 2015, Carroll 2004). In the Project Area, the Williams Fork Formation consists of three members: the lower Williams Fork, Twentymile Sandstone, and upper Williams Fork (CDRMS 2013). The upper Williams Fork member contains the coals that are mined at the Trapper Mine and are designated (from lowest to highest): R, Q, M, L, K, I, and H. Historical development began in 1954, and modern coal production began in 1977. Annual production has varied from 1.5 to about 2.5 mtpy (Colorado Mining Association 2015; TMI 2015). Total cumulative production over the entire life of the mine is expected to be 74 million tons (CDRMS 2013). The coal seams that are mined at the Trapper Mine have consisted of a mixture of subbituminous A, B, and C, and high-volatile bituminous C coals. Average, as-received, values of ash yield are 7.05 percent and sulfur content is 0.40 percent, with a heat value of 9,931 British thermal units per pound (Johnson et al. 2000).

Other important mineral resources in the vicinity of the Trapper Mine Project Area are oil and gas. To the north of the mine are the Craig and Buck Peak fields and to south are the Williams Fork and Horse Gulch fields (Colorado Oil and Gas Conservation Commission [COGCC] 2015). The oil and gas production comes from mostly upper and lower Cretaceous units, but the Williams Fork field also

produces from Jurassic, Triassic, and Permian formations. In 2011, oil and gas production was established just outside of the mine permit boundary in the east half of Section 30, T6N, R90W. Two wells have cumulatively produced approximately 43,000 barrels of oil, 92 million cubic feet of gas, and 420 barrels of water from a nominal depth interval of 6,700 to 8,100 feet (2,042 to 2,469 meters) (true vertical depth) in the Niobrara Formation.

There are numerous gravel pits located in the alluvium of the Yampa River and other local drainages (Guilinger and Keller 2002). Stone also is quarried in the area. No other important mineral resources were identified in the vicinity of the Project Area.

3.5 Water Resources

3.5.1 Surface Water

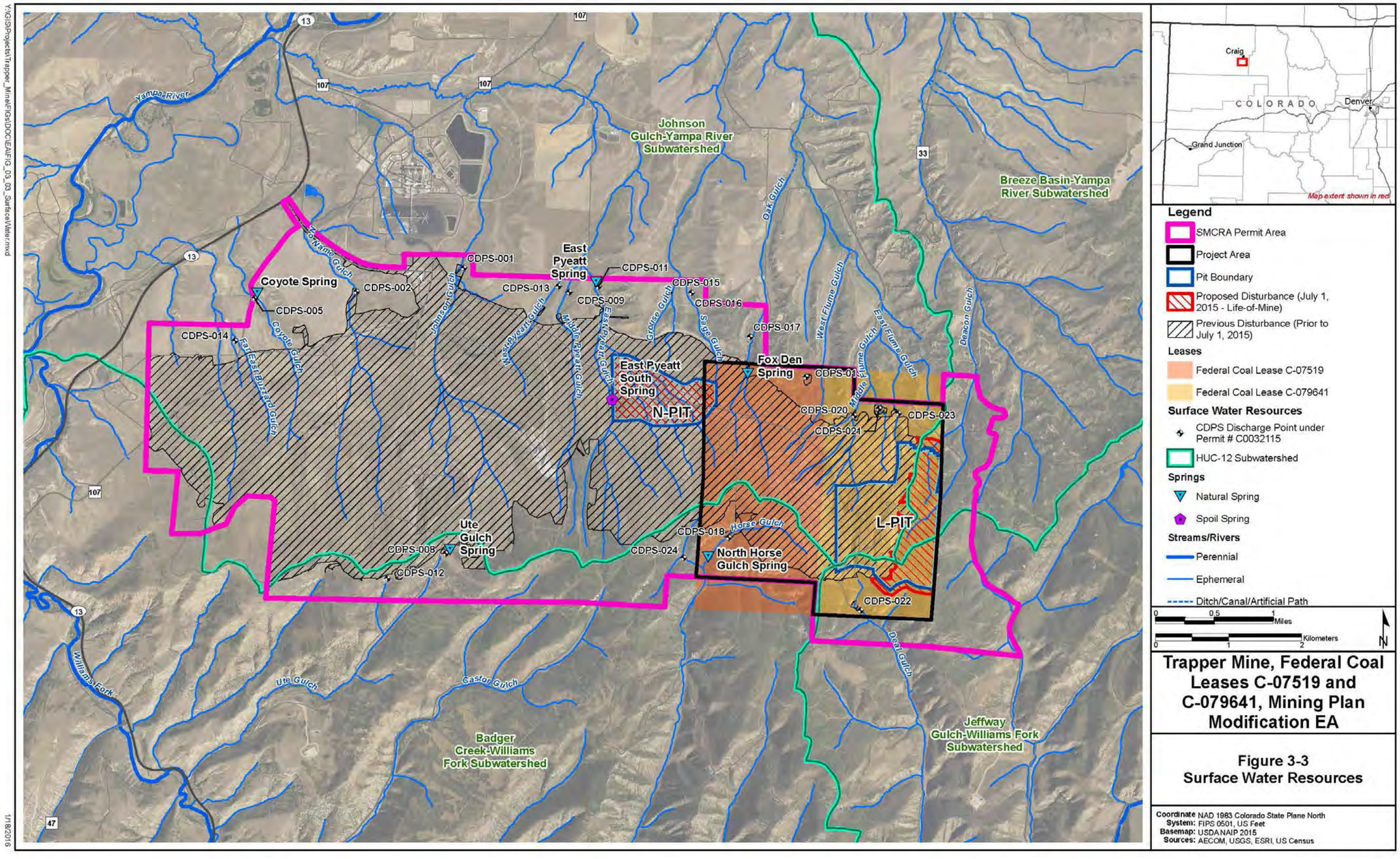
The Project Area is located in the Upper Yampa River watershed, which is part of the Upper Colorado River Basin (USGS 2015). The Yampa River is the principal drainage within the watershed. It flows north from its headwaters in the Gore Range before making a westerly turn at Steamboat Springs, Colorado. Downstream of Craig, the Yampa River is joined by the Williams Fork River, one of its major tributaries. The Williams Fork Mountains form the drainage divide between the Yampa River to the north and the Williams Fork River to the south.

TMI has extensive monitoring data for surface water quantity and quality within and adjacent to the SMCRA permit boundary. The following discussion provides a general understanding of surface water resources in the vicinity of the Project Area and within and adjacent to the broader SMCRA permit boundary.

Because the SMCRA permit boundary is located primarily on the north side of the Williams Fork Mountains, most of the smaller drainages within the boundary flow north and west to the Yampa River. These drainages include Buzzard Gulch, Coyote Gulch, No Name Gulch, Johnson Gulch, Pyeatt Gulch, Grouse Gulch, Sage Gulch, Oak Gulch, Flume Gulch, and Deacon Gulch. A small portion of the SMCRA permit area is located south of the Yampa-Williams Fork drainage divide and drains to the Williams Fork River. Tributaries to the Williams Fork within the SMCRA permit boundary include Ute Gulch, Castor Gulch, Horse Gulch, and Deal Gulch. Of these drainages, only Pyeatt, Sage, Oak, Flume, Deacon, Horse, and Deal Gulches cross the Project Area (**Figure 3-3**).

Surface water morphology in the area is influenced by the lithology and orientation of the underlying bedrock. The mine is located on the south limb of the Big Bottom syncline. Geologic formations within the syncline are dipping to the north at approximately the same angle as the topographic gradient. As a result, the Williams Fork Formation is present near the ground surface for long stretches, and surface water drainages continuously flow across the same geologic material. The resulting drainage pattern is dendritic, with broad swales in the upland areas that transition to broad valleys 50 to 100 feet (15.2 to 30.5 meters) deep (TMI 1981 et seq.). On the south side of the Williams Fork Mountains, the overall slope of the land surface is much steeper, with outcrops of resistant sandstone forming cliff faces in some areas. The steep slopes and bedrock control of channels produce a trellis drainage pattern.

The drainages north of the Williams Fork Mountains typically exhibit stream gradients ranging from 0.088 to 0.11 feet/foot (TMI 1981 et seq.). Profile views of the stream channels reveal that the stream gradient is typically higher in the upstream reaches and flattens out in the downstream direction. This geometry is a sign of the relative youth of the drainage system. The streams have continuously lowering gradients through incision in their upper reaches. This is occurring in both alluvial and non-alluvial geologic material. The stream incisions likely progress upstream during the annual spring runoff, which may initiate some natural gullying on the side slopes adjacent to the channels as the base level of the slopes is lowered. Erosion scars created by this head-cutting are naturally re-vegetated throughout the year (TMI 1981 et seq.).


Craig
COLORADO
Denver
Grand Junction
Map extent shown in red
Legend
SMCRA Permit Area
Project Area
Pit Boundary
Proposed Disturbance (July 1, 2015 - Life-of-Mine)
Previous Disturbance (Prior to July 1, 2015)
Leases
Federal Coal Lease C-07519
Federal Coal Lease C-079641
Surface Water Resources
CDPS Discharge Point under Permit # C0032115
HUC-12 Subwatershed
Springs
Natural Spring
Spoil Spring
Streams/Rivers
Perennial
Ephemeral
Ditch/Canal/Artificial Path
Miles
Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 3-3
Surface Water Resources
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: USDA NAIP 2015
Sources: AECOM, USGS, ESRI, US Census
Yampa River
Johnson Gulch-Yampa River Subwatershed
Breeze Basin-Yampa River Subwatershed
Badger Creek-Williams Fork Subwatershed
Jeffway Gulch-Williams Fork Subwatershed
Coyote Spring
East Pyeatt Spring
East Pyeatt South Spring
Fox Den Spring
Ute Gulch Spring
North Horse Gulch Spring
N-PIT
L-PIT
CDPS-001
CDPS-002
CDPS-005
CDPS-008
CDPS-009
CDPS-011
CDPS-012
CDPS-013
CDPS-014
CDPS-015
CDPS-016
CDPS-017
CDPS-018
CDPS-020
CDPS-021
CDPS-022
CDPS-023
CDPS-024
Coyote Gulch
Johnson Gulch
West Pyeatt Gulch
Middle Pyeatt Gulch
East Pyeatt Gulch
Grouse Gulch
Sage Gulch
Oak Gulch
West Flume Gulch
Middle Flume Gulch
East Flume Gulch
Deacon Gulch
Horse Gulch
Dead Gulch
Ute Gulch
Castor Gulch
Williams Fork
Far East Buzzard Gulch
Buzzard Gulch
Tom Name Gulch
1/18/2016
Y:\GIS\Projects\Trapper_Mine\FIGs\DOC\EA\FIG_03_03_SurfaceWater.mxd

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The Project Area drainages are uniformly classified as ephemeral streams. Stream flow occurs mainly in response to spring snowmelt, summer thunderstorms, seeps originating in the upper bedrock aquifers, and groundwater discharge during periods of high precipitation. Annual runoff from Trapper Mine has been estimated at approximately 1-inch per unit area (TMI 1981 et seq.). Based on this estimate, the Trapper Mine SMCRA permit area contributes approximately 730 acre-feet of runoff to the Yampa River and 200 acre-feet of runoff to the Williams Fork River each year (AECOM 2015).

Surface water flow is highly seasonal in the area, even for perennial drainages like the Yampa River and Williams Fork River. Previous investigations have documented that approximately 65 percent of annual flow in the Yampa Valley occurs in May and June, with up to 85 percent occurring from April to July (Steele et al. 1979). Baseflow throughout the remainder of the year is supplied mainly from groundwater discharge.

Stream flows in the ephemeral drainages within the SMCRA permit area also are highly variable. TMI collected baseline flow data for the SMCRA permit area in the late 1970s and early 1980s. The most complete baseline dataset available is for CDPS Site 002 on No Name Gulch located west of the Project Area. The flow data for this site, plotted on **Figure 3-4** below, shows that No Name Gulch is dry for the majority of the year. Brief pulses of sustained flow occurred in March 1979, August 1979, February 1980, and April 1980. These data reinforce the notion that flow in Project Area drainages mainly occurs in response to spring snowmelt and occasional summer thunderstorms.

Mine records indicate that from approximately 1981 to 1986, perennial flow occurred in East Pyeatt Gulch outside of the Project Area but within the SMCRA permit boundary and in Middle Flume Gulch (formerly known as the Middle East Flume Gulch) which drains the Project Area. This period of sustained flow was attributed to groundwater discharge from alluvium and seep flow originating from bedrock aquifers (TMI 1981 et seq.). TMI used streamflow hydrographs collected during this time frame to estimate the baseflow and runoff contributions in each stream. The average flow rate at East Pyeatt Gulch was approximately 0.36 cubic feet per second (cfs), with about 75 percent of the flow originating from groundwater discharge and 25 percent derived from runoff. At Middle Flume Gulch, contributions from baseflow and runoff were found to be approximately equal, and amounted to an average total flow rate of 0.16 cfs (TMI 1981 et seq.).

Local seeps and springs resulting from groundwater discharge also may contribute to surface water flows in the Project Area. TMI initiated a detailed survey of spring locations within the SMCRA permit boundary in 1997. This survey identified a number of natural springs that existed prior to mining, including Coyote Spring, East Pyeatt Spring, Fox Den Spring, Ute Gulch Spring, and North Horse Gulch Spring (**Figure 3-3**). The 1997 survey also identified several spoil springs within or adjacent to mined and backfilled areas. These spoil springs are not naturally occurring but likely formed as a result of mining activity. East Pyeatt South Spring is the only spoil spring that is currently monitored at the mine (**Figure 3-3**). Other spoil springs that were monitored historically were removed from the monitoring program when the area where the springs are located was included as part of the Phase III bond release (TMI 1981 et seq.). Bond release has resulted in discontinuing monitoring at some CDPS outfall locations, including sites 003 (East Buzzard Gulch), 006 (West Buzzard Gulch), and 010 (Elk Gulch). These outfalls were removed from the Trapper Mine's CDPS permit following Phase III bond releases.

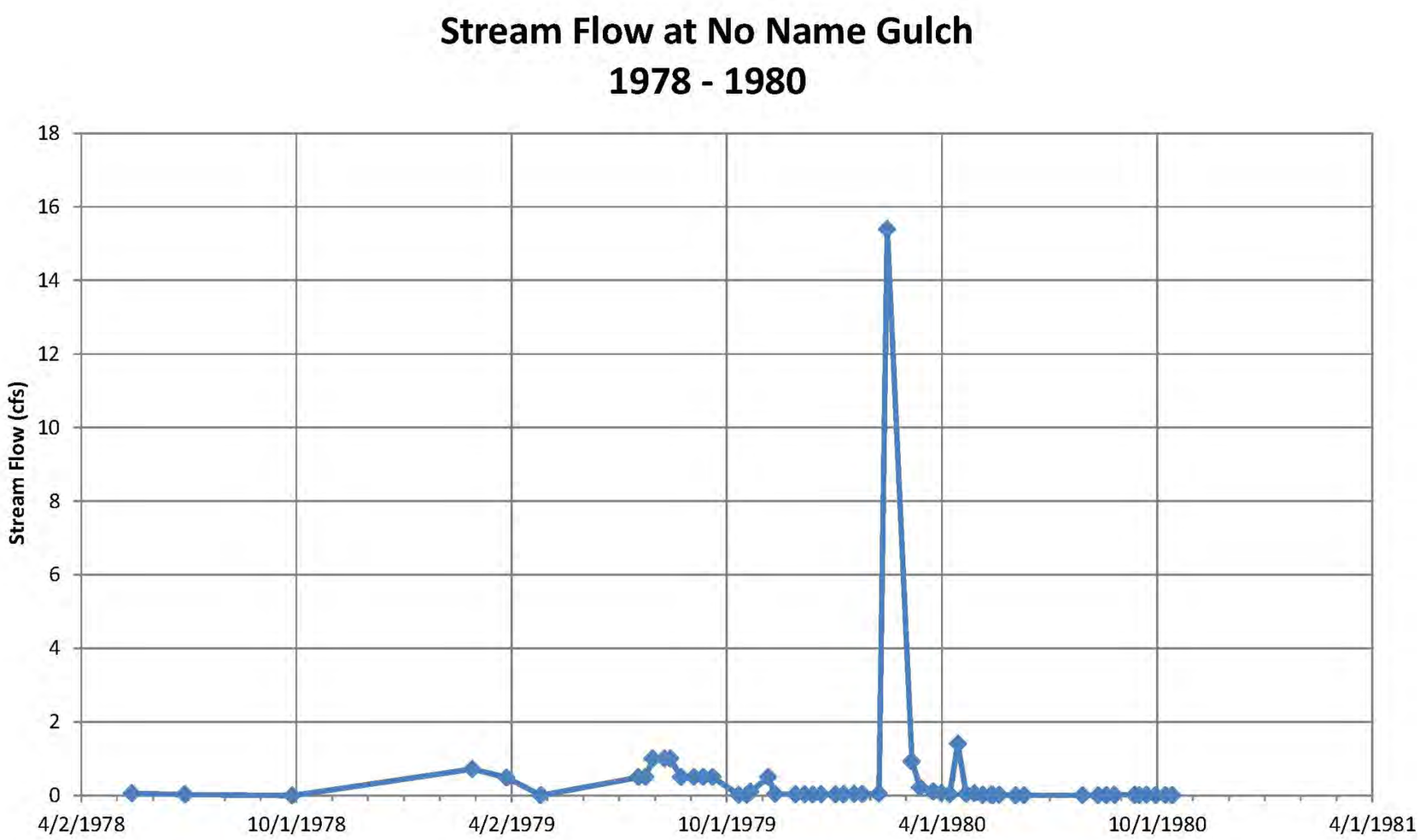
Flow measurements for the natural springs are available dating back to the 1990s. The spring flows vary depending on the time of year and the amount of precipitation that has fallen compared to historical averages. Coyote Spring is the only natural spring that appears to be perennial. Based on records dating back to 1992, flow rates at this spring have ranged from a low of 0.02 gallons per minute (gpm) in May 2003 to a high of 16 gpm in May 1999. Flow rates at the other natural springs have ranged from a low of 0 to highs of 130 gpm, 10 gpm, 25 gpm, and 11 gpm for East Pyeatt, Fox Den, North Horse Gulch, and Ute Gulch springs, respectively. At the spoil spring known as East Pyeatt South, flow rates have been measured semi-annually since 2005. During that time the lowest recorded flow was approximately 2 gpm in September 2006, and the highest recorded flow was 75 gpm in June 2011 (Hydro-Engineering 2015).

From 1974 to 1977, baseline water quality samples were collected from surface water monitoring locations in the Project Area vicinity. Since most streams within the SMCRA permit boundary were not disturbed at the onset of mining, much of the water quality data from the late 1970s and early 1980s also reflects baseline conditions (TMI 1981 et seq.). Several of the baseline sampling locations were later converted to sampling points under TMI's CDPS permit, including S1 (CDPS Site 020), S3 (CDPS Site 011), S5 (CDPS Site 002), and S11 (CDPS Site 005). The CDPS sampling locations are shown on **Figure 3-3**.

Water quality data from TMI's baseline monitoring program indicate that ephemeral streams in the SMCRA permit area generally have poorer water quality than the perennial streams they flow into. For example, at the USGS station on the Yampa River below Craig, the average total dissolved solids (TDS) concentration during the early 1980s was 202 milligrams per liter (mg/L). The average TDS concentration at the mouth of the Williams Fork was 261 mg/L during the same timeframe (Maura 1982). In contrast, baseline data from drainages within the mine permit boundary had average TDS values ranging from 1,180 mg/L at Middle Flume Gulch (CDPS Site 020) to 2,070 mg/L at East Pyeatt Gulch (CDPS Site 011). The TDS concentration was even higher at a downstream location on Flume Gulch, with an average value of 3,540 mg/L (TMI 1981 et seq.). These measurements are comparable to an independent water quality study conducted by the USGS, which found an average TDS downstream in Flume Gulch of 3,790 mg/L (Maura 1982). The difference in water quality between large perennial streams like the Yampa River and smaller ephemeral drainages is due to differences in flow volume and input sources for each type of stream. The perennial streams receive a much larger volume of low-TDS snowmelt runoff that effectively dilutes higher TDS inflows derived from smaller tributaries and groundwater discharge.

The segment of the Yampa River from Elkhead Creek to the Green River is listed on Colorado's Section 303(d) list for iron impairment and on the State's monitoring and evaluation list for sediment (CDPHE 2012). Ephemeral streams within the SMCRA permit boundary could contribute iron and sediment to this impaired segment. Baseline water quality monitoring performed between 1975 and 1977 indicated that average iron concentrations in Flume Gulch, East Pyeatt Gulch, Johnson Gulch, and No Name Gulch were generally below the 1 mg/L water quality standard for the Yampa River (CDPHE 2015). However, in several instances, individual sample results were greater than the standard. For example, an upstream sampling location on Flume Gulch (CDPS Site 020) had an average baseline iron concentration of 0.69 mg/L, but a maximum recorded concentration of 2.3 mg/L. Baseline iron concentrations were even higher downstream in Flume Gulch, with an average iron concentration of 1.2 mg/L and a maximum value of 3.6 mg/L. Iron content was generally lower in East Pyeatt Gulch, Johnson Gulch, and No Name Gulch, with average concentrations typically less than 0.25 mg/L (TMI 1981 et seq.). These data illustrate that the SMCRA permit area drainages were contributing relatively high iron concentrations to the Yampa River in their natural state before mining was initiated. However, the iron loading from the area would still have been low given the small flow volumes associated with these ephemeral streams.

Sediment is another constituent of interest for the SMCRA permit area based on Colorado's monitoring and evaluation list (CDPHE 2012). Baseline monitoring data indicate that total suspended sediment (TSS) concentrations are highly variable for ephemeral drainages in the mine area. TSS results depend on the timing of sample collection relative to spring snowmelt and major rainfall events. Maximum TSS concentrations recorded during baseline monitoring ranged from 81 mg/L at No Name Gulch to 230 mg/L at Flume Gulch (TMI 1981 et seq.). Water quality data collected from the Yampa River below Craig (USGS Station 09247600) around the same time as the baseline program exhibited TSS concentrations up to 418 mg/L (USGS 2015).



Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA

Figure 3-4
Stream Flow at No Name Gulch

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Selenium also is a constituent of interest in the SMCRA permit area in part due to high selenium concentrations in the Mancos Shale (Environmental Sciences Laboratory 2011). During baseline monitoring, selenium was reported above the laboratory detection limit in Flume Gulch, East Pyeatt Gulch, Johnson Gulch, No Name Gulch, and Coyote Gulch. Reported concentrations ranged from 0.005 to 0.02 mg/L (TMI 1981 et seq.). Water quality data collected from the Yampa River below Craig (USGS Station 09247600) between 1975 and 1980, with a total of 14 samples, showed that over half the selenium values were reported at less than the laboratory detection limit, with a maximum reported value of 0.002 mg/L (USGS 2015). The chronic aquatic life standard for selenium is 0.0046 mg/L (CDPHE 2015).

In 2014, Trapper Mine began sampling for mercury at several of the mine CDPS outfall locations. Although the results have consistently been below detection, the sampling to date has not achieved a detection limit below the 0.01 µg/L mercury standard for the Yampa River (Hydro-Engineering 2015).

3.5.2 Groundwater

The Project Area is located in the Sand Wash Basin, a large east-west trending structural depression that underlies much of northwestern Colorado. The basin outline generally follows the outcrop of Cretaceous rocks. Locally, Cretaceous strata have been folded into a series of anticlines and synclines that influence groundwater occurrence, flow directions, and recharge and discharge areas. The Trapper Mine lies on the south limb of one of these features known as the Big Bottom syncline. Cretaceous strata in the Project Area dip to the north in the direction of the syncline axis. This means that geologic formations are younger immediately north of the mine, and increase in age to the south along the flanks of the Williams Fork Mountains.

The principal bedrock formations in the Project Area are the Upper Cretaceous Lewis Shale and Williams Fork formations (**Figure 3-5**). The Lewis Shale consists of dark gray marine shale that ranges in thickness from 1,500 to 1,900 feet (457 to 579 meters) (Tweto 1976). The formation has low permeability that restricts groundwater flow, and is, thus, considered an aquitard. However, in the SMCRA permit area, the Lewis Shale has been known to produce some water, with well yields reported up to 5 gpm (TMI 1981 et seq.). The mine has one on-site monitoring well (P-3) that has been installed in the Lewis Shale. Monitoring well locations at Trapper Mine are depicted on **Figure 3-5**.

Beneath the Lewis Shale lies the Williams Fork Formation. The Williams Fork Formation has been hydrologically subdivided into four members: the upper member, Twentymile Sandstone member, middle member, and lower member (Robson and Stewart 1990). The upper member is transitional with the Lewis Shale and consists primarily of dark gray mudstones, siltstones, and shale interbedded with coal seams and sandstone units. It is underlain by the Twentymile Sandstone member, a white to light gray, moderately well sorted, fine- to very fine-grained quartz arenite. Beneath the Twentymile Sandstone, the middle and lower members of the Williams Fork Formation are composed of gray to black siltstone, silty fine-grained sandstone, and shale interbedded with coal seams. At Trapper Mine, the upper Williams Fork member and Twentymile Sandstone member are the primary bedrock aquifers monitored. The lower two members are not part of the monitoring program since they lie well below the depth of mining.

The upper member of the Williams Fork Formation is approximately 500 feet (152.4 meters) thick in the Project Area (TMI 1981 et seq.). As a whole, the upper Williams Fork Formation acts as an aquitard; however, individual sandstones and coal seams within the unit have been shown to produce water. Trapper Mine has developed a detailed conceptual model to name and characterize these minor aquifers. From youngest to oldest, the minor aquifers include the Second White sandstone, Third White sandstone, the “HI” aquifer, “KLM” aquifer, “QR” aquifer, and the “U” aquifer. The hydraulic conductivity of these aquifers varies widely due to the lenticular geometry of the sandstones and the presence of intervening shale beds. In some areas, joints in the sandstone and coal strata provide a small amount of secondary porosity that increases the aquifer hydraulic conductivity. Average hydraulic conductivity values span orders of magnitude from about 10 feet per day in the Third White sandstone to less than

0.1 feet per day in the “QR” aquifer (TMI 1981 et seq.). Groundwater conditions are monitored within each of the minor aquifers as part of mine operations.

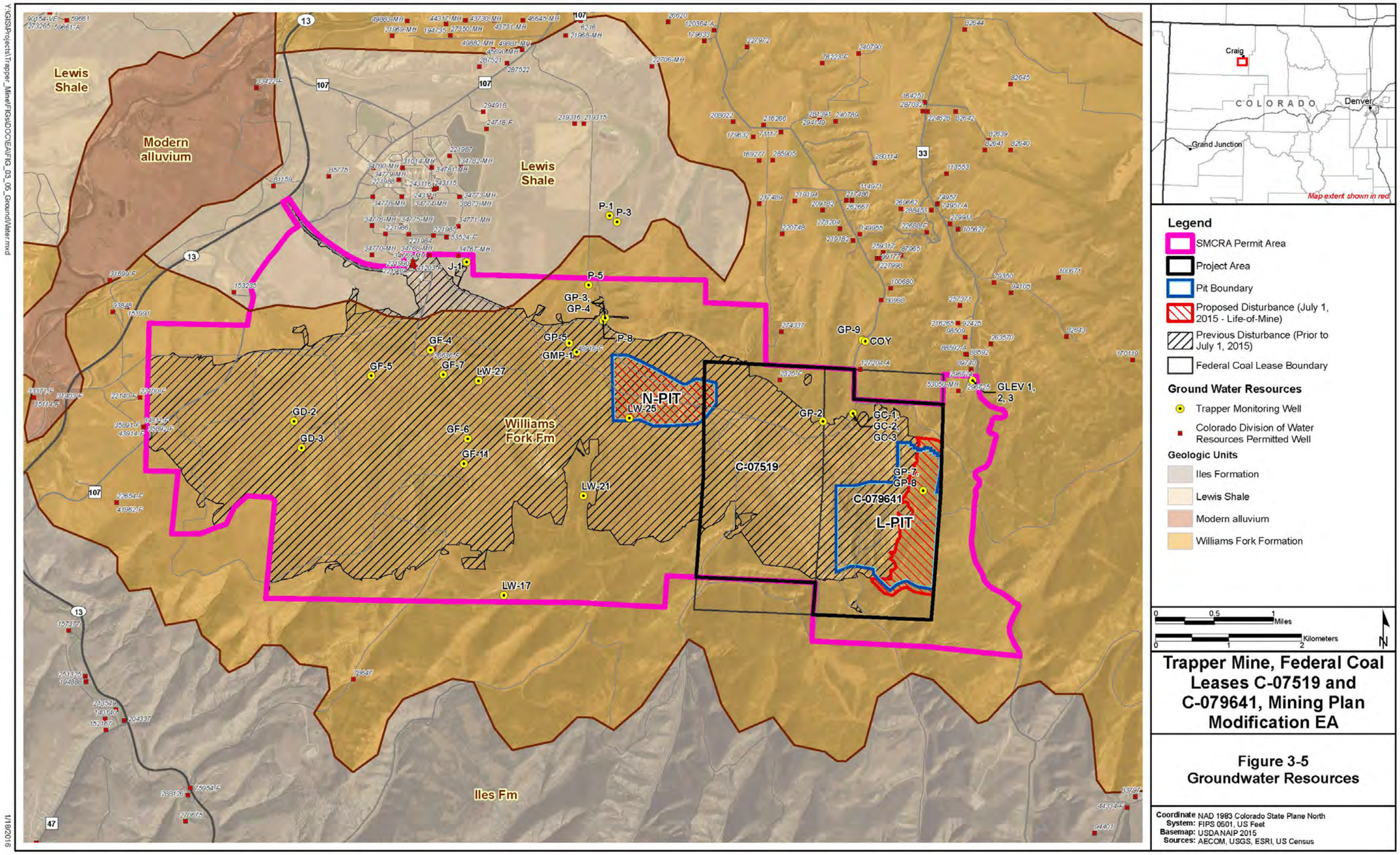
The Twentymile Sandstone is a regional sandstone aquifer that was deposited in a beach and barrier bar environment. It extends from the base of the upper Williams Fork member to a depth of over 1,100 feet (335 meters) in the Project Area (TMI 1981 et seq.). The aquifer is likely in hydraulic connection with the upper Williams Fork, but is separated from lower units by a regional confining layer formed by the middle Williams Fork member (Robson and Stewart 1990). Trapper Mine has installed two production wells in the Twentymile Sandstone. The first of these wells produced a sustained yield of 75 gpm. Near the axis of the Big Bottom syncline, wells in the aquifer may produce as much as 500 gpm. A hydraulic-conductivity value of 20 feet per day was derived for the Twentymile Sandstone based on an aquifer test conducted on monitoring well GF-1 in 1986 (TMI 1981 et seq.).

Hydraulic heads and groundwater flow directions in the bedrock aquifers are strongly influenced by the structure of the Big Bottom syncline. Because of the orientation of the syncline, older strata crop out successively higher on the Williams Fork Mountains and receive recharge at higher elevations, allowing hydraulic potential to build up within the formations. As a result, the bedrock aquifers in the Project Area are typically confined except near the formation outcrops. Some deeper wells within the SMCRA permit area are even under artesian pressure with water levels rising above ground surface. The hydraulic potential created by the southerly recharge area results in a groundwater flow direction that is predominantly to the north (Hydro-Engineering 2015). Hydraulic gradients for the bedrock aquifers at the site range from approximately 0.07 to 0.14 feet/foot (TMI 1981 et seq.).

Quaternary alluvium in the SMCRA permit area also is known to contain and transmit groundwater. **Figure 3-5** shows the extent of alluvium associated with the Yampa River. In the mine area, the hydraulic conductivity of the Yampa River alluvium has been estimated at 160 feet per day, and well yields may range as high as 900 gpm (TMI 1981 et seq.). Johnson, Pyeatt, and Flume gulches also contain relatively extensive alluvial sediments, especially north of the mine permit area where the drainages approach the Yampa River. Hydraulic conductivity values for these smaller alluvial aquifers have been estimated to range from approximately 2 to 40 feet per day (TMI 1981 et seq.).

Groundwater has been monitored in or near the SMCRA permit area since 1974. These early investigations were focused on establishing pre-mining baseline conditions for the western portion of the Project Area included in the SMCRA permit area. In 1985, baseline sampling was extended to encompass areas east of Pyeatt Gulch to obtain data for a mine expansion proposed in the 1987 permit renewal (RN01). The baseline program included measuring water levels and collecting groundwater samples from the Lewis Shale, upper Williams Fork member, Twentymile Sandstone member, and Quaternary alluvium. Some of the monitoring wells used during the baseline program continue to be sampled as part of the ongoing groundwater monitoring program in place at the site. The current mine groundwater monitoring network is depicted on **Figure 3-5**.

Groundwater chemistry varies by geologic source, though most wells sampled during the initial baseline program exhibited a calcium-bicarbonate signature (TMI 1981 et seq.). TDS concentrations are generally higher in the Lewis Shale than in other water-bearing zones at the site because the formation contains more salt available for dissolution. The average baseline TDS concentration for the Lewis Shale was 3,240 mg/L. Groundwater TDS concentrations above 1,000 mg/L are common in the Pyeatt Gulch and Flume Gulch alluvial aquifers, and contribute to the relatively high TDS associated with those streams. Within the upper Williams Fork member, TDS is highly variable depending on the aquifer interval being sampled; however, for the unit as a whole, the average baseline TDS was around 840 mg/L. Average TDS for the Twentymile Sandstone during the baseline program was approximately 570 mg/L (TMI 1981 et seq.), making it one of the better drinking water aquifers in the area.


Lewis Shale
Modern alluvium
Lewis Shale
Williams Fork Fm
Iles Fm
N-PIT
L-PIT
C-07519
C-079641
P-1
P-3
J-1
P-5
GP-3, GP-4
P-8
GP-5
GMP-1
GF-4
GF-5
GF-7
LW-27
GD-2
GD-3
GF-6
GF-11
LW-25
LW-21
LW-17
GP-9
COY
GP-2
GC-1, GC-2, GC-3
GP-7, GP-8
GLEV 1, 2, 3
Craig
COLORADO
Denver
Grand Junction
Map extent shown in red
Legend
SMCRA Permit Area
Project Area
Pit Boundary
Proposed Disturbance (July 1, 2015 - Life-of-Mine)
Previous Disturbance (Prior to July 1, 2015)
Federal Coal Lease Boundary
Ground Water Resources
Trapper Monitoring Well
Colorado Division of Water Resources Permitted Well
Geologic Units
Iles Formation
Lewis Shale
Modern alluvium
Williams Fork Formation
Miles
Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 3-5
Groundwater Resources
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: USDA NAIP 2015
Sources: AECOM, USGS, ESRI, US Census
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The Trapper Mine PAP contains an inventory of water wells within 1 mile of the SMCRA permit boundary (TMI 1981 et seq.). The inventory shows that the majority of wells are completed in the upper Williams Fork, the Twentymile Sandstone, or in deeper units. Most of the wells are used for domestic supply, but permits have been issued for irrigation, livestock, commercial, industrial, municipal, and monitoring purposes. According to state records, static water levels within these wells range from 0 feet (artesian) to approximately 700 feet (213.4 meters) below ground surface (Colorado Division of Water Resources 2015). The permitted well locations are shown on **Figure 3-5**.

3.6 Soils

The geographical extent of the Project Area for soils includes the portions of Federal Coal Leases C-07519 and C-079641 that lie within the SMCRA permit boundary. Information on Major Land Resource Areas (MLRAs) and soil types was obtained from Natural Resources Conservation Service (NRCS) literature and databases, including the *Land Resource Regions and Major Land Resource Areas of the U.S., the Caribbean, and the Pacific Basin,* USDA Handbook 296 (USDA 2006) and the Soil Survey Geographic database (USDA 2015).

A soil survey specific to the Project Area was completed for Moffat County by the USDA NRCS in 2005 (USDA, NRCS 2005). The Order 3 soil survey data for this county forms the basis for the soils information presented in this section. Although the Moffat County soil survey is listed as an Order 3, in the vicinity of the coal producing areas, the soils were mapped as a high intensity Order 2 survey (Crofts, pers. comm. 2015).

The Project Area lies within three MLRAs:

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

Soils in MLRA 34A are generally calcareous and shallow or moderately deep to sedimentary bedrock. The average annual precipitation is 7 to 12 inches (17.8 to 30.5 cm) and the freeze-free period ranges from 45 to 160 days. The dominant soil orders in this MLRA are Aridisols and Entisols. Elevations range from 5,200 to 7,500 feet (1,585 to 2,286 meters) amsl.

Soils in MLRA 34B are generally calcareous and shallow or moderately deep to shale or sandstone bedrock. Soils at lower elevations likely have significant amounts of calcium carbonate, salts and gypsum. The average annual precipitation is 13 to 15 inches (33 to 38 cm) and the freeze-free period ranges from 45 to 160 days. The dominant soil orders are Aridisols and Entisols with Mollisols at higher elevations. Elevations range from 4,100 to 7,500 feet (1,250 to 2,286 meters) amsl.

Soils in MLRA 48A are deep soils that are well drained and generally form on mountain slopes. The average annual precipitation is 16 to 20 inches (40.6 to 50.8 cm) and the freeze-free period ranges from 50 to 95 days. The dominant soil orders are Mollisols, Alfisols, Inceptisols and Entisols. Elevations range from 6,500 to 14,400 feet (1,981 to 4,389 meters) amsl.

Various soil types occur within the Project Area. The soil variability stems primarily from a variety of parent materials as influenced by topography, aspect, elevation, vegetation, and differential rates of mineral weathering. The soils formed from alluvium, colluvium, residuum, and eolian parent materials are primarily derived from sedimentary rocks. Shallow to moderately deep soils are common within the Project Area. Soil depths range from shallow on ridges and hillslopes to very deep in valley bottoms.

The NRCS database identified 17 soil mapping units within the Project Area (**Figure 3-6**). These 17 soil types are listed in **Table 3-11** with the associated acres and percent of this mapping unit within the Project Area.

Table 3-11 Soil Classifications within the Project Area

Dominant Soil Type	Mapping Unit No.	Type Description	Acres of Project Area	Percent of Project Area
Adderton	3	Adderton loam, 1 to 10 % slopes	108.9	4.5
Bulkley	22	Bulkley silty clay, 3 to 12% slopes	38.7	1.6
Clayburn	33	Clayburn loam, warm, 3 to 25% slopes	205	8.5
	35	Clayburn-Youga moist complex, 15 to 45% slopes	12.50	0.5
Cochetopa	37	Cochetopa loam, 12 to 25% slopes	110.8	4.6
	39	Cochetopa loam, warm, 3 to 12% slopes	30.2	1.2
Foidel	72	Foidel loam, cool, 3 to 25% slopes	433	17.9
	73	Foidel loam, 25 to 65% slopes	103.5	4.3
Hesperus	99	Hesperus fine sandy loam, dry, 2 to 15% slopes	7.2	0.3
Lamphier	114	Lamphier fine sandy loam, 3 to 25% slopes	364.7	15.1
	115	Lamphier fine sandy loam, 25 to 65% slopes	114.5	4.7
Rock Outcrops	160	Rock outcrop-Torriorthents complex, 50 to 75% slopes	15.3	0.6
Rock River	163	Rock River sandy loam, 12 to 25% slopes	17.7	0.7
Routt	166	Routt loam, 3 to 25% slopes	418.8	17.3
Torriorthents	197	Torriorthents-Rock outcrop, sandstone complex, 25 to 75% slopes	0.6	0.02
Ustorthents	206	Ustorthents, frigid-Borolls complex, 25 to 75% slopes	260.1	10.7
Winevada	213	Winevada-Splitro complex, 3 to 25% slopes	181.2	7.5
Total			**2,422.7**	**100.0**

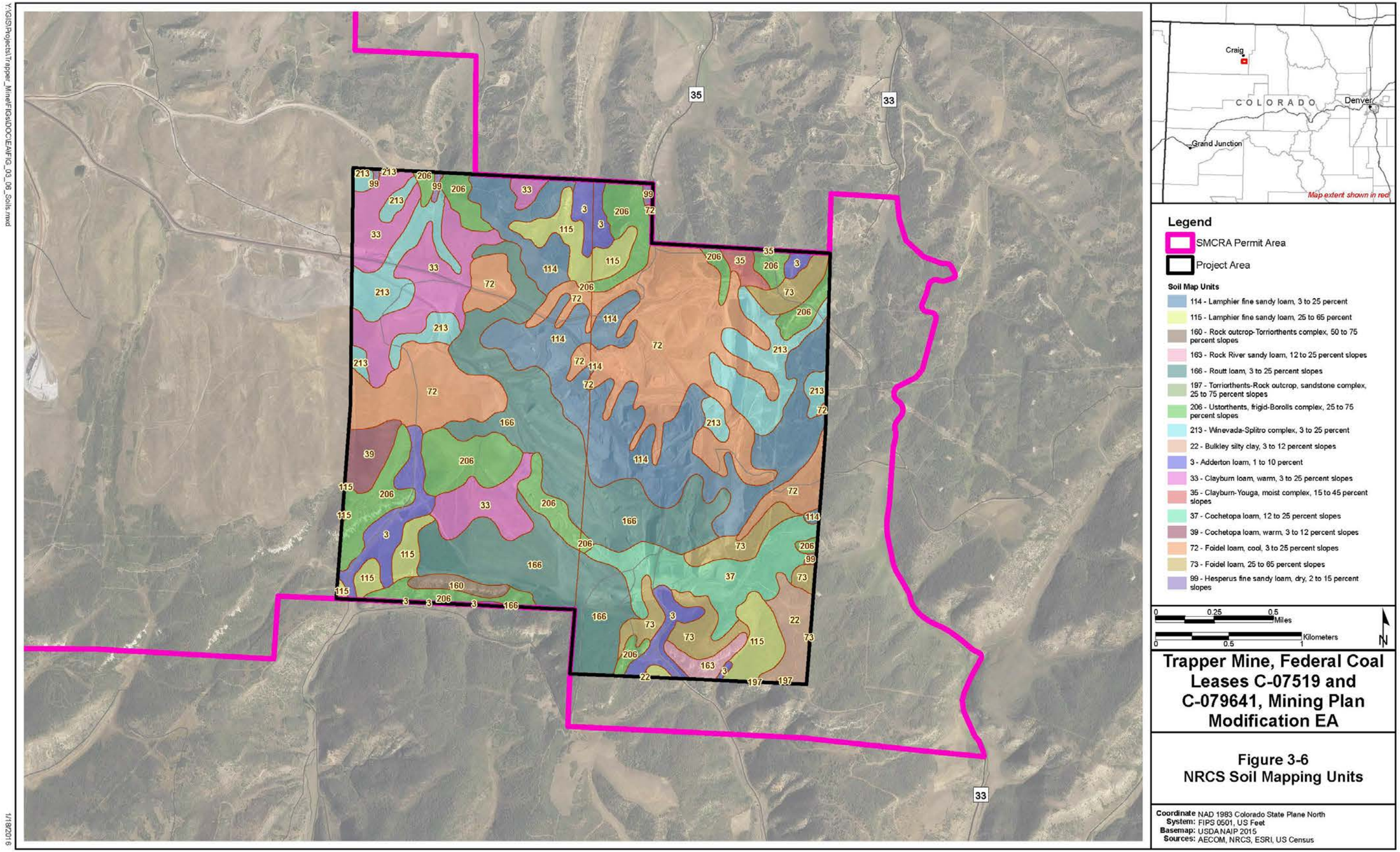
3.6.1 Moffat County Soil Mapping Units

The Moffat County soil survey mapped the soils within Moffat County, Colorado. Moffat County mapping units are classified by the dominant soil type in the unit. The purpose of the Moffat County survey was to separate landscapes into landforms with similar use and management requirements (USDA, NRCS 1989). Descriptions of the general characteristics for each soil mapping unit, the taxonomic classes, associated landforms, and typical vegetation found within the soil mapping units in Moffat County are described below. The detailed soil descriptions are typical descriptions for all of Moffat County and actual Project Area soils may show variation from the typical descriptions..

3.6.1.1 Adderton Series

Adderton soils are very deep, well drained soils formed in alluvium. These soils occur on alluvial fans and drainageways with an elevation range from 7,000 to 8,500 feet (2,134 to 2,591 meters). The mean temperature for these soil types ranges from 37 to 40°F with 50 to 75 frost-free days. Annual precipitation ranges between 16 to 20 inches.

Adderton loam, 1 to 10 percent slopes occurs in approximately 4.5 percent of the Project Area. The soil profile is mainly loam with 0 to 22 inches loam; 22 to 39 inches loam; and 39 to 60 inches fine sandy loam. The soil composition is 90 percent Adderton and similar soils and 10 percent moderately well and somewhat poorly drained soils.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35
33
Craig
COLORADO
Denver
Grand Junction
Map extent shown in red
Legend
SMCRA Permit Area
Project Area
Soil Map Units
114 - Lamphier fine sandy loam, 3 to 25 percent
115 - Lamphier fine sandy loam, 25 to 65 percent
160 - Rock outcrop-Torriorthents complex, 50 to 75 percent slopes
163 - Rock River sandy loam, 12 to 25 percent slopes
166 - Routt loam, 3 to 25 percent slopes
197 - Torriorthents-Rock outcrop, sandstone complex, 25 to 75 percent slopes
206 - Ustorthents, frigid-Borolls complex, 25 to 75 percent slopes
213 - Winevada-Splitro complex, 3 to 25 percent
22 - Bulkley silty clay, 3 to 12 percent slopes
3 - Adderton loam, 1 to 10 percent
33 - Clayburn loam, warm, 3 to 25 percent slopes
35 - Clayburn-Youga, moist complex, 15 to 45 percent slopes
37 - Cochetopa loam, 12 to 25 percent slopes
39 - Cochetopa loam, warm, 3 to 12 percent slopes
72 - Foidel loam, cool, 3 to 25 percent slopes
73 - Foidel loam, 25 to 65 percent slopes
99 - Hesperus fine sandy loam, dry, 2 to 15 percent slopes
0 0.25 0.5 Miles
0 0.5 1 Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 3-6
NRCS Soil Mapping Units
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: USDA NAIP 2015
Sources: AECOM, NRCS, ESRI, US Census

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This soil type is generally dominated by grasses with some shrubs. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: basin wildrye (*Leymus cinereus*) at 35 percent; slender wheatgrass (*Elymus trachycaulus*) at 10 percent; western wheatgrass (*Pascopyrum smithii*) at 10 percent; Letterman's needlegrass (*Stipa lettermanii*) at 5 percent; mountain big sagebrush (*Artemisia tridentate)* at 5 percent; mountain brome (*Bromus marginatus*) at 5 percent; and mountain snowberry (*Symphoricarpos oreophilus*) at 5 percent.

3.6.1.2 Bulkley Series

Bulkley soils are very deep and well drained with fine texture formed from calcareous alluvium derived from shale. This soil series occurs on alluvial fans and clayey foothills within an elevation range of 6,200 to 7,000 feet (1,890 to 2,134 meters). Mean annual temperature is between 42 and 45°F with an average frost-free period of 75 to 95 days a year. Annual precipitation ranges between 13 to 15 inches. This soil type is best for livestock grazing and wildlife habitat.

Bulkley silty clay, 3 to 12 percent slopes, occurs in a small portion of the Project Area, approximately 1.6 percent. This soils profile is 0 to 4 inches silty clay; 4 to 36 inches clay; and 36 to 60 inches silty clay. The soil composition is 80 percent Bulkley and similar soils, 10 percent Pricecreek type soils, and 10 percent Abor soils.

The vegetation cover is typically native grasses and sagebrush. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: western wheatgrass at 40 percent; Wyoming big sagebrush (*Artemisia tridentate wyomingensis*) at 15 percent; bottlebrush squirreltail (*Elymus elymoides*) at 5 percent; prairie Junegrass (*Koeleria macrantha*) at 5 percent; other perennial forbs at 5 percent; and other perennial grasses at 5 percent.

3.6.1.3 Clayburn Series

Clayburn soils are very deep, well drained mountain loam soils and consist of glacial drift, colluvium, and slope alluvium derived from sandstone and shale. Most soils in this series occur on plateaus, hills, and mountain slopes between elevations of 7,000 to 8,600 feet (2,134 to 2,621 meters). Mean temperature ranges from 37 to 40°F with 50 to 75 frost-free days and annual precipitation between 18 to 20 inches a year. This soil type is generally used for livestock grazing and wildlife habitat.

Clayburn loam, warm, 3 to 25 percent slope soils occur in approximately 8.5 percent of the Project Area. Clayburn loam, warm, 3 to 25 percent slope has a soil profile of 0 to 11 inches loam; 11 to 46 inches clay loam; and 46 to 60 inches loam. Minor soil components are about 8 percent Routt type soils and 7 percent Jerry soil types.

Native vegetation for this soil type includes grasses and sagebrush. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: Letterman's needlegrass at 15 percent; slender wheatgrass at 15 percent; mountain big sagebrush at 10 percent; Saskatoon serviceberry (*Amelanchier alnfolia*) at 5 percent; elk sedge (*Carex geyeri)* at 5 percent; mountain brome at 5 percent; mountain snowberry at 5 percent; nodding brome (*Bromus anomalus*) at 5 percent; other perennial forbs at 5 percent; other perennial grasses at 5 percent; and other shrubs at 5 percent.

Clayburn-Youga, moist complex soils are composed of 45 percent Clayburn soils, 35 percent Youga soils and small percentages of various other soil types. Clayburn-Youga soils occur in approximately 0.5 percent of the Project Area. The Clayburn soil profile is typically 0 to 17 inches loam; 7 to 50 inches clay loam; and 50 to 60 inches sandy clay loam. The profile for Youga soils varies slightly from the Clayburn with 0 to 1 inch slightly decomposed plant material; 1 to 14 inches loam; 14 to 40 inches clay loam; and 40 to 60 inches sandy clay loam. Other soils include Cochetopa at 7 percent, Foidel at 6 percent, and moderately deep soils over sandstone bedrock at 7 percent.

Native vegetation for this soil type includes grasses and sagebrush. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: Gambel's oak at 10 to15 percent; Saskatoon serviceberry at 10 percent; mountain brome at 10 percent; Letterman's needlegrass at 5 percent; elk sedge at 5 to 10 percent; mountain snowberry at 5 percent; nodding brome at 5 percent; slender wheatgrass at 5 percent; other perennial forbs at 5 percent; other perennial grasses at 5 percent; and other shrubs at 5 percent.

3.6.1.4 Cochetopa Series

Cochetopa soils are very deep, well drained mountain loam soils that are formed in colluvium and alluvium derived from sandstone and shale. These soils occur on mountain slopes, hills, and valley sides with an elevation range from 7,000 to 8,300 feet (2,134 to 2,530 meters). The mean temperature for these soil types ranges from 37 to 40°F with 50 to 75 frost-free days. Annual precipitation ranges between 18 to 20 inches. Cochetopa loam, 12 to 25 percent slopes and Cochetopa loam, warm, 3 to 12 percent slopes occur within the Project Area. Cochetopa loam, 12 to 25 percent slopes covers almost 5.8 percent of the Project Area. Both soil classes have a similar clay loam soil profile with 0 to 11 inches of loam, the 11 to 19 inches, 19 to 48 inches, and 48 to 60 inches profiles are all characterized as clay loam. The soil compositions are 85 percent Cochetopa and similar soils, approximately 8 percent Jerry soils and 7 percent Routt type soils.

This soil type supports livestock grazing and wildlife habitat, with big sagebrush, snowberry and grasses dominating the vegetation type. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition includes: slender wheatgrass at 15 percent; Letterman's neddlegrass at 10 percent; mountain big sagebrush at 10 percent; elk sedge at 5 percent; mountain brome at 5 percent; mountain snowberry at 5 percent; nodding brome at 5 percent; other perennial forbs at 5 percent; other perennial grasses at 5 percent; and other shrubs at 5 percent.

3.6.1.5 Foidel Series

The Foidel soils are very deep, well drained soils formed in loess and alluvium, colluvium, and residuum derived from sandstone and shale. These soils occur on mountain slopes, hills, and plateaus at elevations ranging from 7,000 to 8,400 feet (2,134 to 2,560 meters). The mean temperature for this soil type falls between 37 to 40°F with 50 to 75 frost-free days. Annual precipitation ranges between 18 to 20 inches. This soil type largely accommodates livestock grazing and wildlife habitat. Foidel soils support vegetation that is a mix of small shrubs and native grasses.

Foidel loam, cool, 3 to 25 percent slopes and Foidel loam, 25 to 65 percent slopes cover approximately 22.2 percent of the Project Area. These soil mapping units have a similar soil profile of 0 to 2 inches slightly decomposed plant material; 2 to 28 inches loam; 28 to 39 inches clay loam; and 39 to 60 inches clay loam. The soil composition for Foidel loam soils with slopes of 3 to 25 percent are 85 percent Foidel soils with the remaining 15 percent split between Winevada, Routt, Cochetopa, Clayburn, and coarse texture soils. Foidel, 25 to 65 percent slopes are 85 percent Foidel soils, 4 percent Skyway, Routt and Clayburn soils and 3 percent Lamphier soils.

These soils support vegetation that is a mix of small shrubs and native grasses. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: Gambel's oak at 20 percent; Saskatoon serviceberry at 10 percent; mountain brome at 10 percent; Letterman's needlegrass at 5 percent; common chokecherry (*Prunus virginiana*) at 5 percent; elk sedge at 5 percent; mountain snowberry at 5 percent; slender wheatgrass at 5 percent; other perennial forbs at 5 percent; other perennial grasses at 5 percent; and other shrubs at 5 percent.

3.6.1.6 Hesperus Series

Hesperus soils are very deep, well to moderately well drained mountain loam soils and are formed from loess and alluvium derived from sandstone and shale. Most soils in this series occur in hills and plateaus between elevations of 6,500 to 7,000 feet (1,981 to 2,134 meters). Mean temperature ranges from 40 to

43°F with 65 to 85 frost-free days per year. Annual precipitation falls between 16 to 18 inches. Hesperus fine sandy loam, dry, 2 to 15 percent slopes cover approximately 0.3 percent of the Project Area with a soil profile of 0 to 5 inches fine sandy loam; 5 to 20 inches loam; 20 to 52 inches clay loam; and 52 to 60 inches clay loam. Minor inclusions consist of about 8 percent weed and similar soils and 7 percent Pagoda soil types.

This soil type is generally used for grazing and wildlife habitat. Vegetation is likely to be grasses and sagebrush. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: Letterman's needlegrass at 15 percent; mountain big sagebrush at 15 percent; slender wheatgrass at 10 percent; western wheatgrass at 10 percent; elk sedge at 5 percent; mountain brome at 5 percent; mountain snowberry at 5 percent; nodding brome at 5 percent; other perennial forbs at 5 percent; and other perennial grasses at 5 percent.

3.6.1.7 Lamphier Series

Lamphier soils are very deep, well-drained mountain loam soils formed in alluvium and colluvium from sandstone. These soils occur mostly on mountainsides. Elevations range between 7,000 to 8,600 feet (2,134 to 2,621 meters). Mean temperature ranges from 37 to 40°F with 50 to 75 frost-free days, and annual precipitation between 18 to 20 inches a year.

Lamphier fine sandy loam, 3 to 25 percent slopes and Lamphier fine sandy loam, 25 to 65 percent slopes comprise approximately 19.8 percent of the Project Area. Lamphier soils have a profile 0 to 2 inches moderately decomposed plant material; 2 to 24 inches fine sandy loam; and 24 to 60 inches sandy clay loam. Minor soil components for 3 to 25 percent slopes include Foidel at 8 percent and Clayburn at 7 percent. Additional soil inclusions within the 25 to 65 percent slopes include Foidel, Clayburn, and Skyway at approximately 5 percent each.

This soil type is generally used for rangeland and native grasses dominate the vegetation cover. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: Gambel's oak at 20 percent; Saskatoon serviceberry at 10 percent; elk sedge at 10 percent; mountain snowberry at 10 percent; Letterman's needlegrass at 5 percent; mountain brome at 5 percent; nodding brome at 5 percent; slender wheatgrass at 5 percent; other perennial forbs at 5 percent; other perennial grasses at 5 percent; and other shrubs at 5 percent.

3.6.1.8 Rock Outcrop-Torriorthents Series

Rock outcrop-Torriorthents soils occur between 5,900 to 8,000 feet (1,798 to 2,438 meters) in elevation, receiving annual precipitation between 9 to 16 inches. Mean temperature falls between 42 to 48°F with 75 to 105 frost-free days.

Rock outcrop-Torriorthents complex, 50 to 75 percent slopes occur over approximately 0.6 percent of the Project Area and are composed of 70 percent rock outcrop, 25 percent Torriorthents, and 5 percent deep soil types. The rock outcrops occur on hills and cliffs. Torriorthents soils are shallow and form on colluvium and residuum derived from sandstone and shale. This well drained soil type is found on mountainsides and hillslopes. Vegetation consists of grasses and small shrubs with a profile of 0 to 2 inches channery sandy loam; 2 to 14 inches very channery sandy loam; and 14 to 18 inches; unweathered bedrock.

In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: Wyoming big sagebrush at 15 percent; Indian ricegrass (*Achnatherum hymenoides*) at 10 percent; Bottlebrush squirreltail at 10 percent; saltbush (A*triplex canescens)* at 10 percent; needle-and-thread grass (*Hesperostipa comata*) at 5 percent; and shadscale (*Atriplex confertifolia)* at 5 percent.

3.6.1.9 Rock River Series

Rock River soils are very deep and well drained soils formed in residuum derived from sandstone. This soil series occurs on shallow slopes within an elevation range of 6,500 to 6,800 feet (1,981 to 2,073 meters). Mean annual temperature is between 42 and 45°F with an average frost-free period of 75to 95 days a year. Annual precipitation ranges between 11 to 13 inches.

Rock River sandy loam, 12 to 25 percent slopes, is found in approximately 0.7 percent of the Project Area. This soils profile is 0 to 3 inches sandy loam; 3 to 22 inches sandy clay loam; 22 to 32 inches sandy clay loam; and 32 to 60 inches sandy loam. The soil composition is 85 percent Rock River and similar soils, 8 percent Forelle type soils, and 7 percent Berlake soils.

The vegetation cover is typically native grasses and small shrubs. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: Wyoming big sagebrush at 15 percent; needle and thread grass at 15 percent; Indian ricegrass at 10 percent; western wheatgrass at 10 percent; Nevada bluegrass (*Poa secunda*) at 5 percent; bottlebrush squirreltail at 5 percent; and prairie Junegrass at 5 percent.

3.6.1.10 Routt Series

Routt soils are very deep, well drained soils formed in loess and in residuum derived from shale. Most soils in this series occur on mountainsides and plateaus. Elevations range between 7,000 to 8,000 feet (2,134 to 2,438 meters). Mean temperature ranges from 37 to 40°F with 50 to 70 frost-free days and annual precipitation between 18 to 20 inches a year.

Routt loam, 3 to 25 percent slopes comprises approximately 17.3 percent of the Project Area. Routt loam soils have a profile 0 to 2 inches slightly decomposed plant material; 2 to 27 inches loam; 27 to 33 inches clay loam; and 33 to 60 inches clay. Minor soil components consist of Foidel, Clayburn, Binco, and Cochetopa at 5 percent each.

This soil type generally occurs on rangeland and wildlife habitat. Native grasses dominate the vegetation cover with large shrubs. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: Gambel's oak at 10 percent; Saskatoon serviceberry at 10 percent; mountain brome at 10 percent; Letterman's needlegrass at 5 percent; elk sedge at 5 percent; mountain snowberry at 5 percent; nodding brome at 5 percent; and slender wheatgrass at 5 percent.

3.6.1.11 Torriorthents-Rock Outcrop Series

Torriorthents-Rock outcrop soils occur at elevations between 6,000 and 11,280 feet (1,829 to 3,438 meters). Mean annual precipitation is 9 to 16 inches and temperature is 42 to 48°F, with approximately 75 to 105 frost-free days each year.

Torriorthents-Rock outcrop, sandstone complex, 25 to 75 percent slopes, occur over approximately 0.02 percent of the Project Area and are composed of 60 percent Torriorthents, 30 percent Rock outcrop, and 10 percent deep loamy soil types. For this series, Rock outcrop consists of sandstone and limestone ledges and exposed soft shale. The typical soil profiles for this soil mapping unit are described in Section 3.6.1.8.

The vegetation cover is typically native grasses and shrubs. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: Indian ricegrass at 10 percent; Wyoming big sagebrush at 10 percent; bluebunch wheatgrass (*Pseudoroegneria spicata*) at 10 percent; western wheatgrass at 10 percent; antelope bitterbrush (*Purshia tridentate*) at 5 percent; needle and thread grass at 5 percent; and mountain mahogany (*Cercocarpus montanus*) at 5 percent.

3.6.1.12 Ustorthents, Frigid Borolls Series

Ustorthents, frigid Borolls complex soils are shallow to moderately deep and well drained soils that are found on mountainsides and are formed from residuum and colluvium primarily derived from sedimentary rocks. Soils in this series occur mainly on mountainsides between 7,000 to 8,500 feet (2,134 to 2,591 meters). Mean temperature ranges from 37 to 45°F with 50 to 85 frost-free days and annual precipitation between 16 to 20 inches each year.

Ustorthents, frigid-Borolls complex, 25 to 75 percent slopes, cover approximately 10.7 percent of the Project Area. The soils within this complex consist of 55 percent Ustorthents, 35 percent Borolls, 5 percent Abor, and 5 percent Rencot soils. The soil profile for Ustorthents is 0 to 3 inches very channery sandy loam; 3 to 28 inches extremely channery sandy loam; and 28 to 32 inches unweathered bedrock. Borolls soils have a profile of 0 to 19 inches loam; 19 to 30 inches cobbly sandy clay loam; and 30 to 34 inches unweathered bedrock.

This soil type is generally used for rangeland where vegetation cover is a mixture of native grasses, shrubs and small trees. In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: wheatgrass varieties at 10 to 20 percent; Indian ricegrass at 0 to 10 percent; mountain big sagebrush at 10 percent; antelope bitterbrush at 0 to 5 percent; Nevada bluegrass at 0 to 5 percent; needle and thread grass at 0 to 5 percent; Saskatoon serviceberry at 5 to 10 percent; Mountain mahogany at 0 to 5 percent; Columbia needlegrass (*Achnatherum nelsonii*) at 0 to 10 percent; Gambel's oak at 0 to 10 percent; elk sedge at 0 to 10 percent; Letterman's needlegrass at 0 to 10 percent; mountain brome at 0 to 10 percent; and mountain snowberry at 0 to 10 percent.

3.6.1.13 Winevada-Splitro Series

Winevada-Splitro complex soils are well drained, occur between 7,000 to 8,500 feet (2,134 to 2,591 meters) in elevation, and are generally found on mountainsides. Mean annual precipitation is between 18 to 20 inches. Mean temperature falls between 37 and 40°F with 50 to 75 frost-free days.

The Winevada-Splitro complex, 3 to 25 percent slopes, occur in approximately 7.5 percent of the Project Area. The main soil compositions for this series are 60 percent Winevada soil types and 30 percent Splitro soils. Minor soils components include Skyway, Foidel, Lamphier, and Clayburn. Winevada soils are moderately deep and formed from residuum and colluvium derived from sandstone. General use may include livestock grazing and wildlife habitat. Vegetation for this series includes grasses and medium and large shrubs. The Winevada soil profile for the 3 to 25 percent slopes series is 0 to 10 inches loam; 10 to 25 inches loam; and 26 to 29 inches unweathered bedrock.

Splitro soils are shallow and formed in medium textured alluvium, residuum, and eolian material mainly from sandstone. Soils may be derived from basalt in some areas of Colorado. This soil type can be used for native pastureland and recreation with vegetation dominated by grasses but can include ponderosa pine and quaking aspen. The Splitro soil profile has 0 to 1 inch slightly decomposed plant material; 1 to 12 inches fine sandy loam; 12 to 14 inches fine sandy loam; and 14 to 17 inches unweathered bedrock.

In Moffat County, potential native vegetation for this soil mapping unit and the typical rangeland composition include: Saskatoon serviceberry at 0 to 10 percent; mountain big sagebrush at 10 percent; mountain brome at 5 to 10 percent; nodding brome at 10 percent; slender wheatgrass at 10 percent; elk sedge at 5 percent; mountain snowberry at 5 percent; Letterman's needlegrass at 0 to 5 percent; other perennial grasses at 10 to 15 percent; other perennial forbs at 5 percent; and other shrubs at 0 to 5 percent.

3.7 Vegetation

Quantitative vegetation inventories at the Trapper Mine commenced in the early 1970's prior to SMCRA. The studies detailed vegetation mapping using aerial photography, plant community descriptions, and intensive preparation of plant species lists. Intensive baseline sampling of the pre-disturbance plant

communities commenced in 1979 and continued through 1985. Additional surveys have been conducted since then, including a sensitive species survey completed in 2013. Information on vegetation cover, forage production, and shrub density was taken from the results of vegetation surveys conducted by TMI and available in the TMI PAP. The plant communities with map able acreages that occur in the Project Area are summarized in **Table 3-12** and are depicted in **Figure 3-7**. In addition to the plant communities, the Project Area also includes disturbed areas and reclaimed lands as listed in **Table 3-12**. A discussion of each vegetation community follows.

Table 3-12 Vegetation Communities

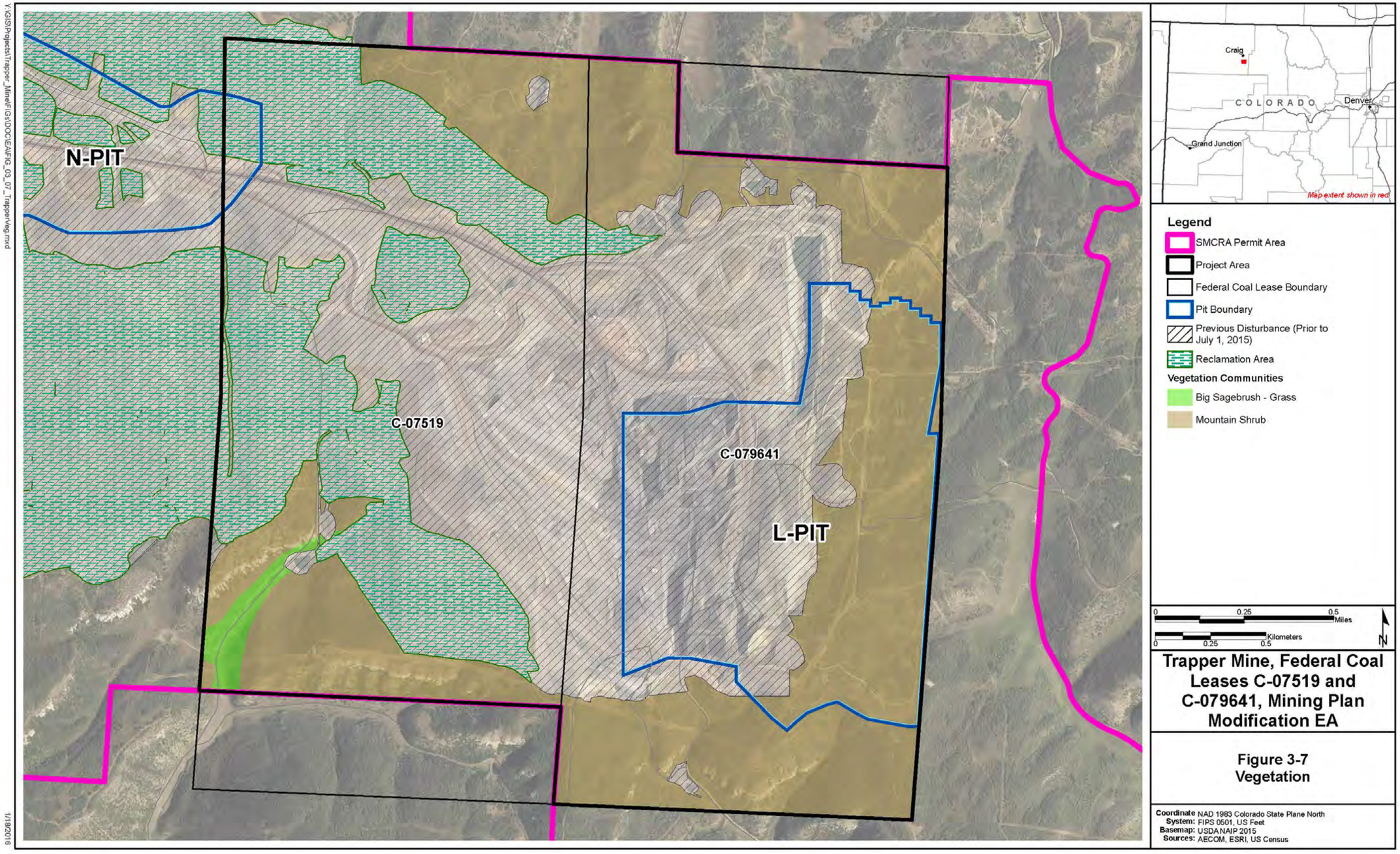
Vegetation Community Type	Acres	Percent of Project Area
Mountain Shrub	853	35.2
Big Sagebrush Grass	23	0.9
Reclaimed Rangeland	494	20.4
Disturbed Area	1,053	43.5
Totals	2,423	100.0

3.7.1 Mountain Shrub Community

The mountain shrub community is the predominant plant community in the Project Area, covering approximately 853 acres (35.2 percent of the Project Area). This is a common plant community in the Colorado Plateau ecoregion that is typically found along dry foothills and lower mountain slopes from 5,000 to 9,000 feet (1,524 to 2,743 meters) amsl. In the Project Area, shrubs are the major lifeform, with grasses growing as a secondary component. Perennial forbs are less common. The most common shrubs in the Project Area include mountain snowberry , Gambel's oak), and Saskatoon serviceberry ; with black chokecherry representing a lesser component. Kentucky bluegrass (*Poa pratensis*) and smooth brome (*Bromus inermis*) are the most common grasses within the mountain shrub community in the Project Area. Overall, the mountain shrub community provides dense cover and provides palatable forage for domestic livestock and wildlife.

3.7.2 Big Sagebrush-Grass Community

The big sagebrush-grass community covers approximately 23 acres (0.9 percent of the Project Area). This plant community usually grows along flat rolling hills in well drained soils at elevations between 7,000 to 10,000 feet (2,134 to 3,048 meters) amsl. In the Project Area, grasses are the major lifeform in the big sagebrush-grass community, with shrubs forming a secondary component. Mountain big sagebrush (*Artemesia tridentata* ssp. *vaseyana*) is the most common species and typically forms about 25 percent of the plant cover within the big sagebrush-grass community in the Project Area. Other shrubs found in minor amounts in the Project Area include mountain snowberry, Saskatoon serviceberry, and black chokecherry. The dominant grasses within the big sagebrush-grass community in the Project Area include smooth brome, Kentucky bluegrass, western wheatgrass and intermediate wheatgrass (*Thinopyrum intermedium*). The big sagebrush plant community provides forage and cover for a wide variety of wildlife and could support grazing for livestock.


N-PIT
C-07519
C-079641
L-PIT
Craig
COLORADO
Denver
Grand Junction
Map extent shown in red
Legend
SMCRA Permit Area
Project Area
Federal Coal Lease Boundary
Pit Boundary
Previous Disturbance (Prior to July 1, 2015)
Reclamation Area
Vegetation Communities
Big Sagebrush - Grass
Mountain Shrub
0 0.25 0.5 Miles
0 0.25 0.5 Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 3-7
Vegetation
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: USDA NAIP 2015
Sources: AECOM, ESRI, US Census
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3.7.3 Reclaimed Rangeland

Reclaimed rangeland occurs on areas previously disturbed by mining activities that have undergone final reclamation. Reclaimed rangeland occupies approximately 494 acres (20.4 percent) of the Project Area. These lands support a mixture of mostly native grasses, forbs, and shrubs planted from a seed mixture approved by the CDRMS. Reclaimed rangeland undergoes several years of revegetation monitoring to ensure that reclaimed areas are progressing toward the approved revegetation success standards. Some of these reclaimed areas have already met the Phase III reclamation standards and have been released from bonding. Reclaimed rangeland provides productive forage and cover for wildlife and domestic livestock.

3.7.4 Disturbed Area

Disturbed areas are not vegetation communities in the classical sense, because these areas are typically void of plant cover. Disturbed areas are the active mine disturbance areas that are being used to support the current mining operations and are not ready for final reclamation. Disturbed areas cover approximately 1,053 acres (43.5 percent) of the Project Area.

3.7.5 Noxious Weeds

Noxious weeds are those plants that have been designated by the Colorado Noxious Weed Act as species that have been included on state or county lists and which, according to the CDRMS regulations and policies, must be controlled in all mining and reclamation areas. Section 35-5.5-103 (16), of the *Colorado Noxious Weed Act* defines a noxious weed as "*an alien plant or parts of an alien plant that have been designated by rule as being noxious or has been declared a noxious weed by a local advisory board*." Under the *Colorado Noxious Weed Act*, the State maintains a "*list of plant species that are designated as noxious weeds*" that are included on one of three lists of regulated species: List A, List B, or List C. Plants in List A are designated for eradication in the state. Plants in List B are to be prevented from spreading by implementing weed management plans that have been developed in consultation with the state, local governments, and other interested parties. List C plants are widespread and well-established noxious weed species for which weed control is recommended but not required by the state, although local governing bodies may require management. Moffat County does not maintain its own list of noxious weeds but has developed an Undesirable Plant Management Plan that is part of the County's Land Use Plan of 2001 (Moffat County 2001). This plan outlines recommended steps to support federal, state, and local weed control activities but does not cite additional noxious weeds outside of the state list. The predominant noxious weeds relevant to Trapper Mine are those appearing in List C.

Weed control measures are ongoing within the Project Area and are focused on reclaimed land and areas with known noxious weeds. Noxious weeds actively controlled within the Project Area include hoary cress (*Cardaria draba*), dalmatian toadflax (*Linaria dalmatica*), houndstongue (*Cynoglossum officinale*), Scotch thistle (*Onopordum acanthium*), musk thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), and Russian knapweed (*Acroptilon repens*) (TMI 2015). Control measures include application of selective broadleaf herbicide and non-selective broadleaf herbicides where noxious weeds are found. Noxious weeds often consist of small localized patches or are interspersed with other plants to such a degree that it is extremely difficult to map these areas as a separate vegetation type.

Not all noxious weeds are List A and List B species that are required to be actively controlled within the Project Area. List C noxious weeds such as cheatgrass (*Bromus tectorum*) are prevalent throughout the region and are managed at Trapper Mine through management of revegetation efforts rather than through control with herbicides. Noxious weeds typically represent a very small part of the total plant cover in the Project Area. As recommended in the CDRMS's Bond Release Guidance, the cover and production contribution for all state listed noxious weeds is deleted prior to the calculation of the final plant cover and forage production amounts on all reclaimed lands (CDRMS 1995).

3.8 Wetlands, and Riparian Zones

Wetlands and riparian environments play an important role in the general health of various ecosystems, supporting diverse biota, filtering pollutants, and storing flood waters. Wetland delineation surveys and surveys to identify any waters of the U.S. (WOTUS) within the SMCRA permit boundary were conducted by IME Consulting (IME) in 1998 and 2008.

3.8.1 Wetlands and Riparian Zones

Pursuant to CWA regulations, the U.S. Army Corps of Engineers (USACE) has regulatory authority over disturbances to all jurisdictional WOTUS (which include wetlands).

WOTUS include all interstate waters (traditional navigable waters [TNWs]) and wetlands. Other WOTUS include channels and wetlands that connect directly, or through a significant nexus, to traditional navigable waters. Any water connected through a significant nexus is evaluated and approved by the USACE. These waters are evaluated to ensure that impacts to wetlands and streams connected to TNWs do not have downstream impact on the general health of the permitted waters. Possible impacts include reduction in flow, pollutant runoff, and impacts to biota. Not all interstate wetlands are WOTUS. Wetlands within the Project Area are all jurisdictional and considered WOTUS.

Wetlands are evaluated based on the presence of three main criteria: hydrophytic vegetation, hydric soils, and hydrology. When all three indicators are present, the USACE categorizes a wetland as jurisdictional. Wetlands within the Project Area were evaluated in accordance with the USACE Wetlands Delineation Manual (USACE 1987), and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (USACE 2010).

In 1998, IME performed field surveys within the Project Area. Most of the wetlands identified within the Project Area occurs along incised channels and are determined jurisdictional based on presence of the three defining criteria (i.e., hydrophytic vegetation, hydric soils, and hydrology). These ephemeral stream channels are seasonally inundated and supported by runoff from surrounding topography and considered isolated where they occur. Additionally, isolated spring-fed wetlands occur within the Project Area, with most of those identified being less than 0.10 acre in size. These isolated wetlands met all three criteria from the USACE. A total of 1.55 acres of jurisdictional wetlands and 0.33 acre of ponds were delineated within the Project Area in the 1998 survey; 0.399 acre of those were approved to be affected by mining activities (IME 1998). Dominant wetland vegetation includes: spreading bentgrass (*Agrostis stolonifera*), Nebraska sedge (*Carex nebrascensis*), clustered field sedge (*C. praegracilis*), and curly dock (*Rumex crispus*).

Flume Gulch has been identified as the only drainage with incised channels within the Project Area. This series of drainages includes several smaller drainages that flow into the main Flume Gulch channel, lie on the northeastern portion of the Project Area and flows north out of the Project Area along County Road (CR) 35 toward the Yampa River. Portions of Deacon Gulch occur on the eastern edge of the Project Area and will not be impacted by mining activities. The National Wetlands Inventory shows wetlands within the Project Area but most are outside of the disturbance area (National Wetland Inventory 2015). On October 2, 1998, the USACE issued Trapper Mine a Nationwide Permit 21, Surface Coal Mining Activities, which encompassed the Project Area and the associated mining activities.

3.8.2 Riparian Areas

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 waterbodies. 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. The Project Area lies mostly above 7,000 feet (2,134 meters) amsl with no perennial or intermittent

streams. Ephemeral streams rarely possess the hydrologic conditions that allow true riparian vegetation to grow. There are no riparian areas mapped within the Project Area.

3.9 Fish and Wildlife Resources

3.9.1 Regulatory Background

Laws, regulations, and policies that directly influence wildlife management decisions made as part of the EA for the Trapper Mine are primarily implemented by the USFWS and CPW. Prominent laws, regulations, directives, and agreements relevant to the fish and wildlife resources within the Project Area include:

- CRS 33-1-101, 33-2-104;
- ESA;
- Migratory Bird Treaty Act (MBTA) (16 United States Code [USC] 703 et seq.);
- EO 13186 (66 FR 3853);
- CRS 33-2-105;
- Bald and Golden Eagle Protection Act (BGEPA) (16 USC, 668 et seq.).

Information regarding wildlife species and their habitats within the Project Area was obtained from a review of the Trapper Mine PAP, published sources, public database information, BLM RMPs, CPW resource information, and USFWS data and documents.

3.9.2 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 Action, as well as the management regimes to which this habitat is subject. The analysis areas for terrestrial wildlife species are defined as follows:

- *Big Game Analysis Area*: The big game analysis area consists of the Data Analysis Units (DAUs) and Game Management Units (GMUs) that are crossed by the Project Area. The Project Area boundary is within GMU 13. Sensitive habitat is typically considered a limiting factor for big game populations; therefore, focus on these areas (e.g., winter range, migratory corridors, production areas, and summer range) within the DAUs for each species and GMU 13. DAU plans provide specific information including herd dynamics and population trends, habitat utilized by the herd, and current land use within the DAU.
- *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 within the Project Area.

The wildlife habitat located within the Project Area is predominately composed of the mountain shrub vegetation community and reclaimed rangelands. Other habitat types include sagebrush shrubland and grasslands.

The region supports a diverse terrestrial wildlife community of large and small mammals, migratory birds, and reptiles. Occurrence and density of wildlife species within the region 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 et al. 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.

3.9.3 Nongame Species

The Nongame and Small Game Terrestrial Wildlife Analysis Area supports many types of nongame species (e.g., small mammals, raptors, passerines, and reptiles) occupying the habitat types within the Project Area. Nongame species serve as predators, prey, and scavengers in ecosystems.

3.9.3.1 Small Mammals

Within the Project Area, bat species could utilize trees, caves, and rock crevices as day and maternal roost sites, as well as hibernacula. No bat surveys have been conducted within the Project Area. However, bat species with the potential to occur within the wildlife analysis area include the little brown bat (*Myotis lucifugus*), long-eared myotis (*Myotis evotis*), western small-footed myotis (*Myotis ciliolabrum*), silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Estesicus fuscus*), hoary bat (*Lasiurus cinereus*), and pallid bat (*Antrozous pallidus*) (TMI 1981 et seq.).

Other common small mammals occurring within the terrestrial wildlife analysis area include voles, shrews, chipmunks, pocket gophers, raccoons, woodrats, ground squirrels, mice, and other species that provide a substantial prey base for predators within the Project Area including larger mammals and raptors (TMI 1981 et seq.). Common small mammals that are known to occur within the Project Area include the masked shrew (*Sorex cinereus*), vagrant shrew (*Sorex vagrans*), Nuttall's cottontail (*Sylvilagus nuttallii*), white-tailed jackrabbit (*Lepus townsendii*), least chipmunk (*Tamias minimus*), yellow-bellied marmot (*Marmota flaviventris*), Richardson's ground squirrel (*Urocitellus richardsonii*), golden-mantled ground squirrel (*Callospermophilus lateralis*), northern pocket gopher (*Thomomys talpoides*), deer mouse (*Peromyscus maniculatus*), bushy-tailed wood rat (*Neotoma cinerea*), red-backed vole (*Myodes gapperi*), long-tailed vole (*Microtus longicaudus*), porcupine (*Erethizon dorsatum*), coyote (*Canis latrans*), red fox (*Vulpes vulpes),* raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), American badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), and bobcat (*Lynx rufus*) (TMI 1981 et seq.).

3.9.3.2 Migratory Birds

The MBTA provides federal legal protection from human depredation for more than 1,000 bird species (16 USC 703-712). In addition to the MBTA, bald and golden eagles are protected under the BGEPA (16 USC 668 et seq.). The majority of birds found within the Project Area and vicinity are considered migratory under the MBTA. These birds are primarily summer residents in the region. Many of the summer residents are neotropical migrants that winter in Central and South America. Many bird species are more vulnerable to disturbance during the breeding season when human disturbances can compromise successful reproduction. The timing and duration of the breeding season is species-specific and may vary according to latitude, elevation, and climatic conditions. **Table 3-13** provides a list of migratory birds known to occur or with the potential to occur within the Project Area and surrounding region.

Table 3-13 Migratory Birds Known to Occur and with the Potential to Occur in the Vicinity of the Project Area

Red-winged blackbird (*Agelaius phoeniceus*)	Brewer's blackbird (*Euphagus cyanocephalus*)	Mountain bluebird (*Sialia currucoides*)
Lazuli bunting (*Passerina amoena*)	Bushtit (*Psaltriparus minimus*)	Black-capped chickadee (*Poecile atricapillus*)
Gray catbird (*Dumetella carolinensis*)	Brown-headed cowbird (*Molothrus ater*)	Sandhill crane (*Grus canadensis*)
American crow (*Corvus brachyrhynchos*)	Mourning dove (*Zenaida macroura*)	Gadwall (*Anas strepera*)
Mallard (*Anas platyrhynchos*)	Pintail (*Anas acuta*)	Blue-winged teal (*Anas discors*)
Cinnamon teal (*Anas cyanoptera*)	Green-winged teal (*Anas crecca*)	Northern shoveler (*Anas clypeata*)

Table 3-13 Migratory Birds Known to Occur and with the Potential to Occur in the Vicinity of the Project Area

American wigeon (*Anas Americana*)	Bald eagle (*Haliaeetus leucocephalus*)	Golden eagle (*Aquila chrysaetos*)
American kestrel (*Falco sparverius*)	Prairie falcon(*Falco mexicanus*)	House finch (*Haemorhous mexicanus*)
Northern flicker (*Colaptes auratus*)	Dusky flycatcher (*Empidonax oberholseri*)	Blue-gray gnatcatcher (*Polioptila caerulea*)
American goldfinch (*Spinus tristis*)	Lesser goldfinch (*Spinus psaltria*)	Canada goose (*Branta Canadensis*)
Black-headed grosbeak (*Pheucticus melanocephalus*)	Cooper's hawk (*Accipter cooperii)*	Ferruginous hawk (*Buteo regalis*)
Red-tailed hawk (*Buteo jamaicensis*)	Rough-legged hawk (*Buteo lagopus*)	Sharp-shinned hawk (*Accipter striatus*)
Swainson's hawk (*Buteo swainsoni*)	Great blue heron (*Ardea herodias)*	Black-chinned hummingbird (*Archilochus alexandri*)
Broad-tailed hummingbird (*Selasphorus platycercus*)	Western scrub- jay (*Aphelocoma californica*)	Steller's jay (*Cyanocitta stelleri*)
Dark-eyed junco (*Junco hyemalis*)	Killdeer (*Charadrius vociferous*)	Western kingbird (*Tyrannus verticalis*)
Ruby-crowned kinglet (*Regulus calendula*)	Horned lark (*Eremophila alpestris*)	Black-billed magpie (*Pica hudsonia*)
Western meadowlark (*Sturnella neglecta*)	Common nighthawk (*Chordeiles minor*)	Bullock's oriole (*Iceterus bullockii*)
Great-horned owl (*Bubo virginianus*)	Long-eared owl (*Asio otus*)	Say's phoebe (*Sayornis saya*)
American pipit (*Anthus rubescens*)	Common poor-will (*Phalaenoptilus nuttallii*)	Common raven (*Corvus corax*)
American robin (*Turdus migratorius*)	Red-naped sapsucker (*Sphyrapicus nuchalis*)	Loggerhead shrike (*Lanius ludovicianus*)
Northern shrike (*Lanius excubitor*)	Pine siskin (*Spinus pinus*)	Wilson's snipe (*Gallinago delicata*)
Brewer's sparrow (*Spizella breweri*)	Barn swallow (*Hirundo rustica*)	Chipping sparrow (*Spizella passerina*)
Lark sparrow (*Chondestes grammacus*)	Song sparrow (*Melospiza melodia*)	Vesper sparrow (*Pooecetes gramineus*)
White-crowned sparrow (*Zonotrichia leucophrys*)	Cliff swallow (*Petrochelidon pyrrhonota*)	Tree swallow (*Tachycineta bicolor*)
Violet-green swallow (*Tachycineta thalassina*)	White-throated swift (*Aeronautes saxatalis*)	Western tanager (*Piranga ludoviciana*)
Sage thrasher (*Oreoscoptes montanus*)	Green-tailed towhee (*Pipilo chlorurus*)	Spotted towhee (*Pipilo maculatus)*
Plumbeous vireo (*Vireo plumbeus*)	Warbling vireo (*Vireo gilvus*)	MacGillivray's warbler (*Geothlypis tolmiei*)
Orange-crowned warbler (*Oreothlypis celata*)	Virginia's warbler (*Vermivora virginiae*)	Wilson's warbler (*Cardelina pusilla*)
Yellow warbler (*Setophaga petechia*)	Yellow-rumped warbler (*Setophaga coronata*)	Cedar waxwing (*Bombycilla cedrorum*)
Downy woodpecker (*Picoides pubescens*)	Hairy woodpecker (*Picoides villosus*)	Western wood-pewee (*Contopus sordidulus*)
House wren (*Troglodytes aedon*)	Rock wren (*Salpinctes obsoletus*)	

Raptors

Raptors are protected under state and federal laws including the MBTA, and bald and golden eagle are protected under the BGEPA. A variety of raptor habitats are found within and adjacent to the Project 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 or breed in the area including: red-tailed hawk (*Buteo jamaicensis*), long-eared owl (*Asio* otus), great-horned owl (*Bubo virginianus*), turkey vulture (*Cathartes aura*), golden eagle (*Aguila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk (*Buteo regalis*), prairie falcon (*Falco mexicanus*), Cooper's hawk (*Accipiter cooperii*), rough-legged hawk (*Buteo lagopus*), American kestrel (*Falco sparverius*), sharp-shinned hawk (*Accipter striatus*), and Swainson's hawk (*Buteo swainsoni*) (TMI 1981 et seq.).

Surveys were conducted between 2001 and 2015 to identify the status of a historic prairie falcon nest site at the southeast corner of Trapper Mine's SMCRA permit boundary near the Hamill property. The surveys did observe active prairie falcon and golden eagle nests within the vicinity of the Project Area (TMI 1981 et seq.).

3.9.3.3 Reptiles and Amphibians

Most reptiles occur in lower elevations and in drier habitats such as sagebrush, greasewood, and pinyon-juniper vegetation communities. Common reptile species that have been noted in the Project Area include the greater short-horned lizard (*Phrynosoma hernandesi*), Great Basin gopher snake (*Pituophis melanoleucus deserticola*), wandering garter snake (*Thamnophis elegans vagrans*), and prairie rattlesnake (*Crotalus viridis viridis*) (TMI 1981 et seq.).

Native amphibians that could potentially occur in the Project Area include the chorus frog (*Pseudacris triseriata*), tiger salamander (*Ambystoma tigrinum*), and northern leopard frog (*Lithobates pipiens*).The chorus frog and tiger salamander are not managed by CPW. The northern leopard frog is a species receiving more interest by CPW as a species in need of conservation. Northern leopard frogs are the only potentially occurring species known to inhabit ponds and other suitable habitats within the SMCRA permit boundary, but the species has not been documented in the Project Area (TMI 2015).

3.9.4 Game Species

3.9.4.1 Big Game

As described above, the analysis area for big game species includes CPW-designated big game ranges (e.g., overall range, severe winter range, production range, etc.) within the GMU 13 that overlaps with the Project Area. In Colorado, big game is managed by CPW within specific geographic areas within herd areas, or GMUs, based on objectives set within a herd management plan, also known as a DAU. Herds are capable of using multiple or single GMUs (CPW 2015-2016). 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 the interested public to determine how a big game herd in a DAU should be managed (CPW 2015a). This analysis area provides the context for Project impacts and cumulative impacts involving the habitat specifically managed for big game populations. This is further referred to as the big game analysis area through the remainder of this section.

The big game species whose overall range overlap with the Project Area include mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), moose (*Alces alces*), black bear (*Ursus americanus*), and mountain lion (*Puma concolor*). The Project Area does not overlap with the overall range for pronghorn (*Antilocapra americana*) (CPW 2014a). The Project Area does occur within DAU A-9 for pronghorn and pronghorns are known to occur within the Project Area. In 2014, this DAU had an estimated population of 12,370 individuals, and in 2004 there was an estimated population of 16,200. This is approximately 17 percent of the statewide population (CPW 2015b).

Mule Deer

Within the region, mule deer utilize a variety of vegetation communities that provide year-round suitable habitat. These vegetation communities include aspen forests and woodlands, conifer forests, shrublands, and pinyon-juniper woodlands. The White River deer herd is the largest mule deer herd in Colorado. The total herd population was estimated to be 71,380 in 2007 and 37,530 in 2014. The herd population exhibited an increasing trend from 2001 to 2005. The decrease between 2007 and 2014 may be due to a series of severe winters and droughts, which affected the area (CPW 2015b).

The entire Project Area is within the overall winter and summer range of the White River deer herd (DAU D-7) (**Figure 3-8**). CPW (2012a) defines summer range as that part of the overall range where 90 percent of the individuals are located between spring green-up and the first heavy snowfall. The northern two-thirds of the Project Area falls within winter range for mule deer. Winter range is that part of the range where 90 percent of the animals are located during average winters. Winter habitat for mule deer occurs in areas of relatively high amounts of sagebrush and bitterbrush and overall low snow accumulation – typically on south- and west-facing slopes.

Elk

In Colorado, elk are distributed across the western two-thirds of the state, generally at elevations above 6,000 feet (1,829 meters) (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 (CPW 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 often remain at higher elevations longer. Spring and fall migrations are facultative and are tied to weather and forage quality. Upland meadow and mountain shrub habitats provide the highest-quality forage areas for elk within the big game analysis area.

Elk within the Project Area are part of the White River herd (DAU E-6) as defined by CPW. The population of the White River elk herd has grown steadily since the early 1980s, and CPW has been attempting to reduce the herd size to maintain it within the management goal of 32,000 to 39,000 animals (CPW 2015b). In 2007, the herd was estimated to be 43,870 animals. In 2014, the total herd population was estimated at 39,900, and represents the largest elk herd in Colorado (CPW 2015b).

Elk seasonal ranges that overlap with the Project Area are shown on **Figure 3-9**. **Figure 3-10** shows elk resident population and production areas that overlap with the Project Area. CPW data indicate that the entire Project Area is located within designated winter and summer ranges, as well as a production area for elk. Portions of the Project Area are located within migration corridors, a resident population area, severe winter range, and a winter concentration area.

The CPW defines these ranges and production areas as follows:

- Migration corridors are a specific site through which large numbers of animals migrate; loss of which would change migration routes.
- Production areas are that part of the overall range of elk occupied by the females from May 15 to June 15 for calving.
- A resident population area is an area used year-round by a population of elk. Individuals could be found in any part of the area at any time of the year; the area cannot be subdivided into seasonal ranges. It is most likely included within the overall range of the larger population.
- Summer range is that part of the range of a species where 90 percent of the individuals are located between spring green-up and the first heavy snowfall, or during a site specific period of summer as defined for each DAU. Summer range is not necessarily exclusive of winter range; in some areas winter range and summer range may overlap.

- 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.
- 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 five winters out of six from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each DAU.
- 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.

Moose

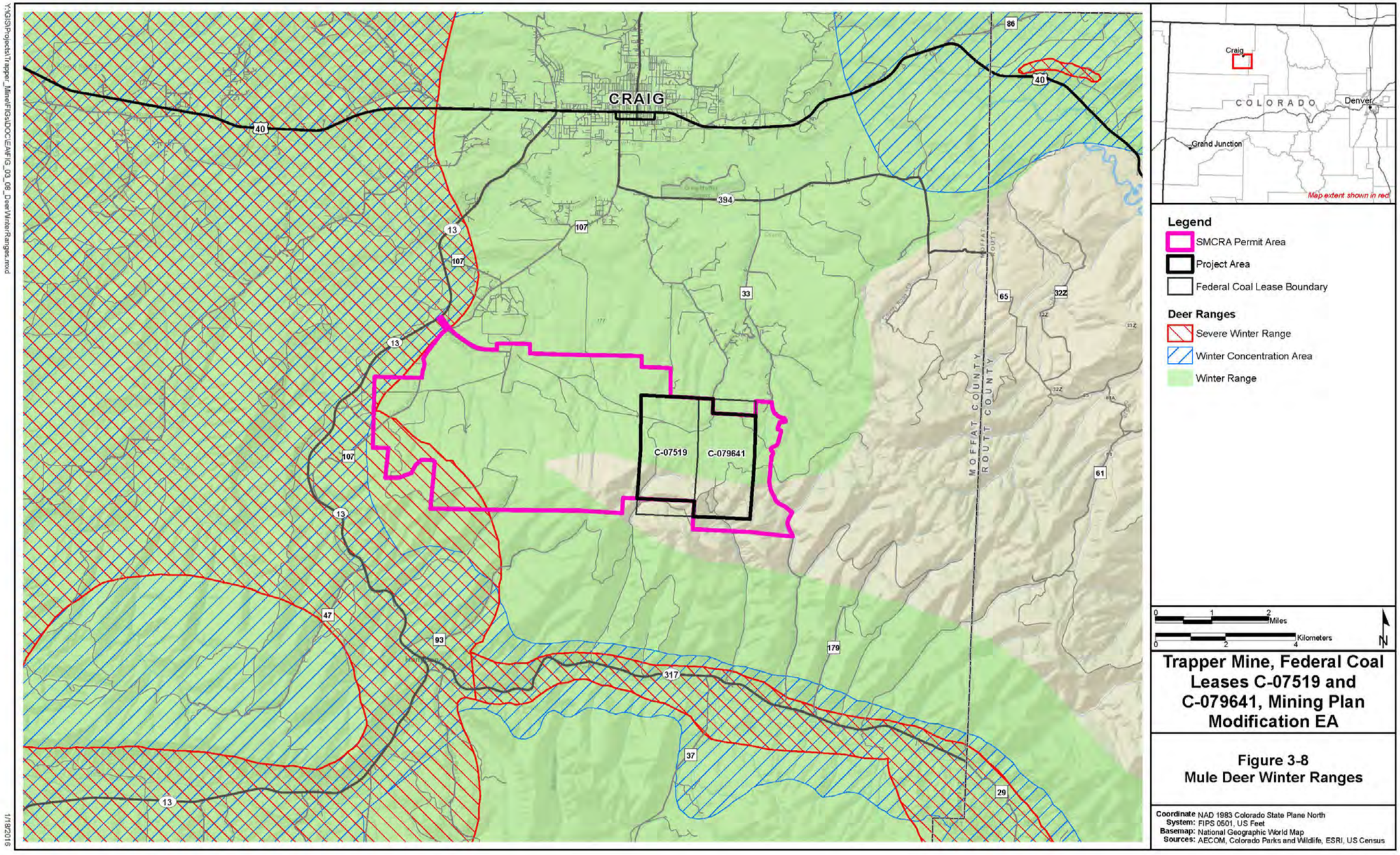
Moose are not common within the big game analysis area. Until 1978 when moose were reintroduced to North Park from Utah and Wyoming, moose were not breeding in Colorado and were only considered infrequent migrants into the state (CPW 2014b). From 2005 to 2007, moose were reintroduced to the Grand Mesa (CPW 2014c). Typically, this species is found in forested areas, primarily along riparian areas with abundant willow habitat. Typically, moose are not as susceptible to severe winter conditions as other big game animals due to their large body size and adaptions that allow them to forage in deep snow and survive in colder climates.

The Project Area boundary does not occur within any moose DAUs, but moose overall range and summer range are within the Project Area. According to CPW, moose summer range is defined as that part of the overall range where 90 percent of the individuals are located during the summer months. This summer time frame will be delineated with specific start/end dates for each moose population within the state (e.g., May 1 to September 15). Summer range is not necessarily exclusive of winter range. Moose ranges in and near the Project Area are shown in **Figure 3-11**.

Black Bear and Mountain Lion

Black bear are fairly common within the big game analysis area. The species is especially common in forested, woody riparian, and wetland areas along perennial waterbodies (Armstrong et al. 2011). Black bears usually occur at low densities in similar habitats within the region, and their presence or absence is highly dependent on existing disturbance and available food sources. The Project Area falls within DAU B-10. Fall concentration areas and summer concentration areas overlap with the Project Area (**Figure 3-12**). Fall concentration areas are 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 areas are that portion of the overall range of the species where activity is greater than the surrounding overall range from June 15 to August 15 (CPW 2012b).

Similar to black bear, mountain lions are fairly common in the region. Mountain lions generally occur at low densities in a variety of habitats found within the big game analysis area and their distribution is dependent on available food sources, primarily mule deer. The Project Area falls within the range of DAU-L7 for mountain lion.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Craig
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Severe Winter Range
Winter Concentration Area
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Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 3-8
Mule Deer Winter Ranges
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, Colorado Parks and Wildlife, ESRI, US Census
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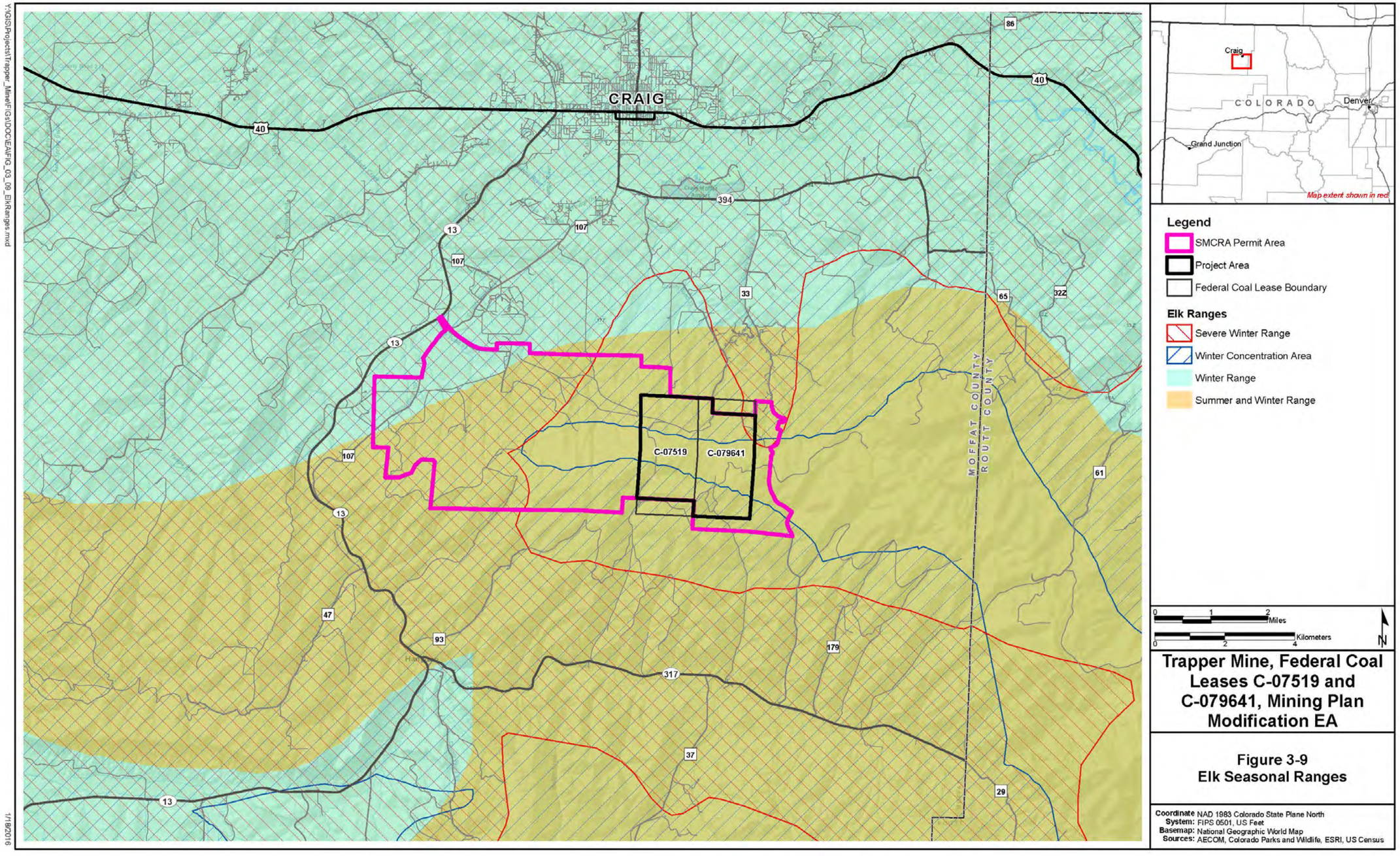
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Project Area
Federal Coal Lease Boundary
Elk Ranges
Severe Winter Range
Winter Concentration Area
Winter Range
Summer and Winter Range
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Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 3-9
Elk Seasonal Ranges
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, Colorado Parks and Wildlife, ESRI, US Census
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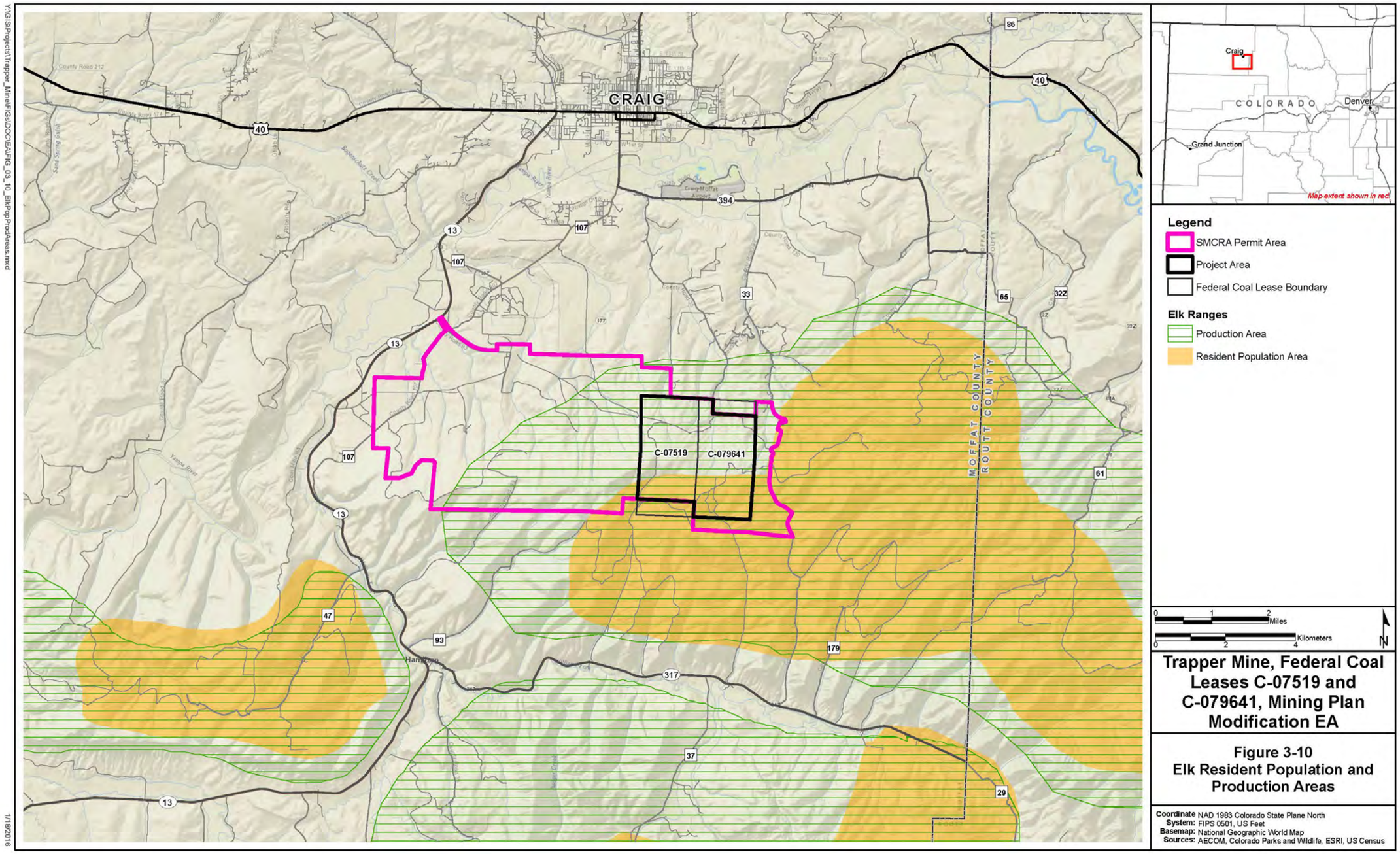
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SMCRA Permit Area
Project Area
Federal Coal Lease Boundary
Elk Ranges
Production Area
Resident Population Area
Miles
Kilometers
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Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 3-10
Elk Resident Population and Production Areas
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, Colorado Parks and Wildlife, ESRI, US Census
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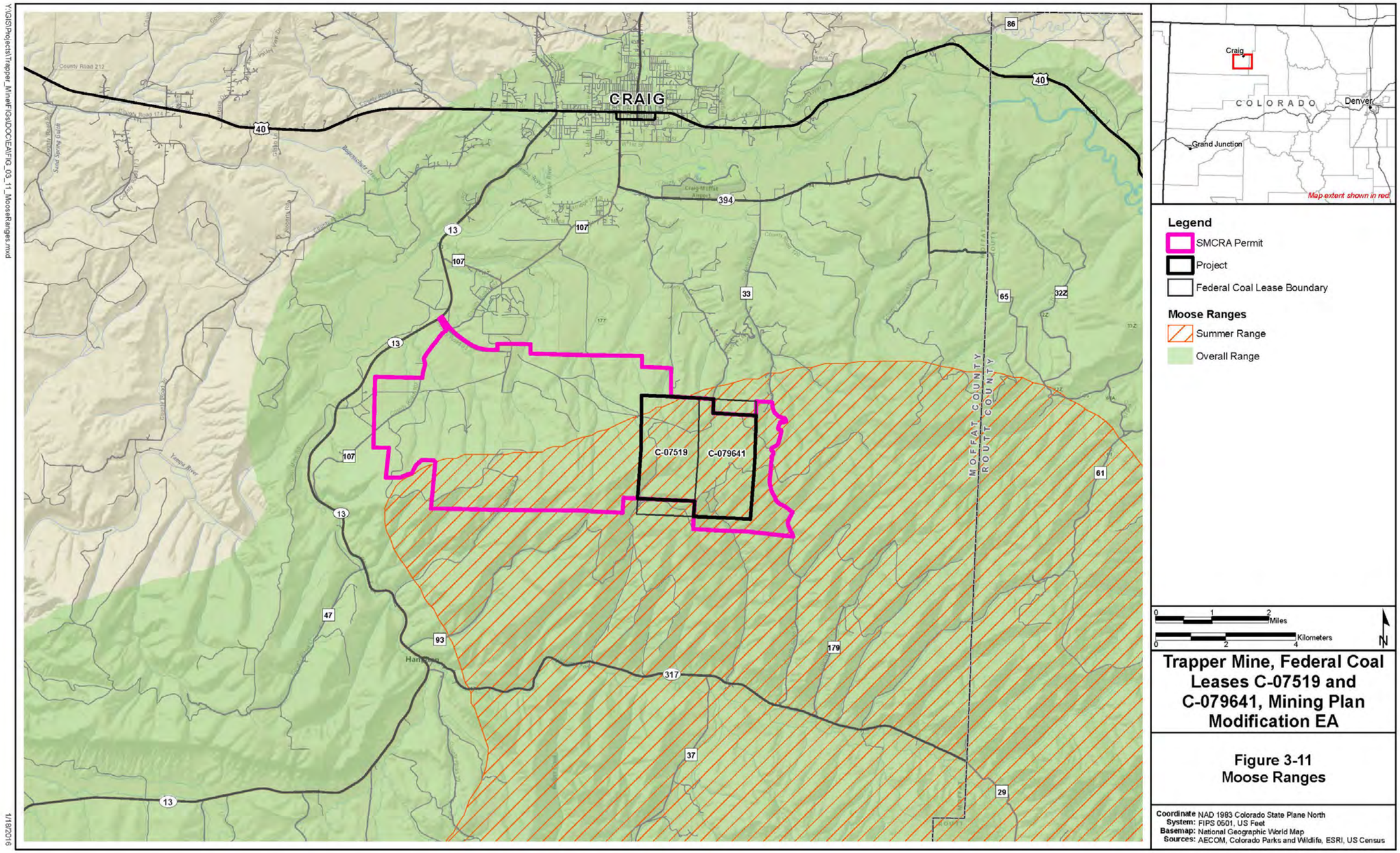
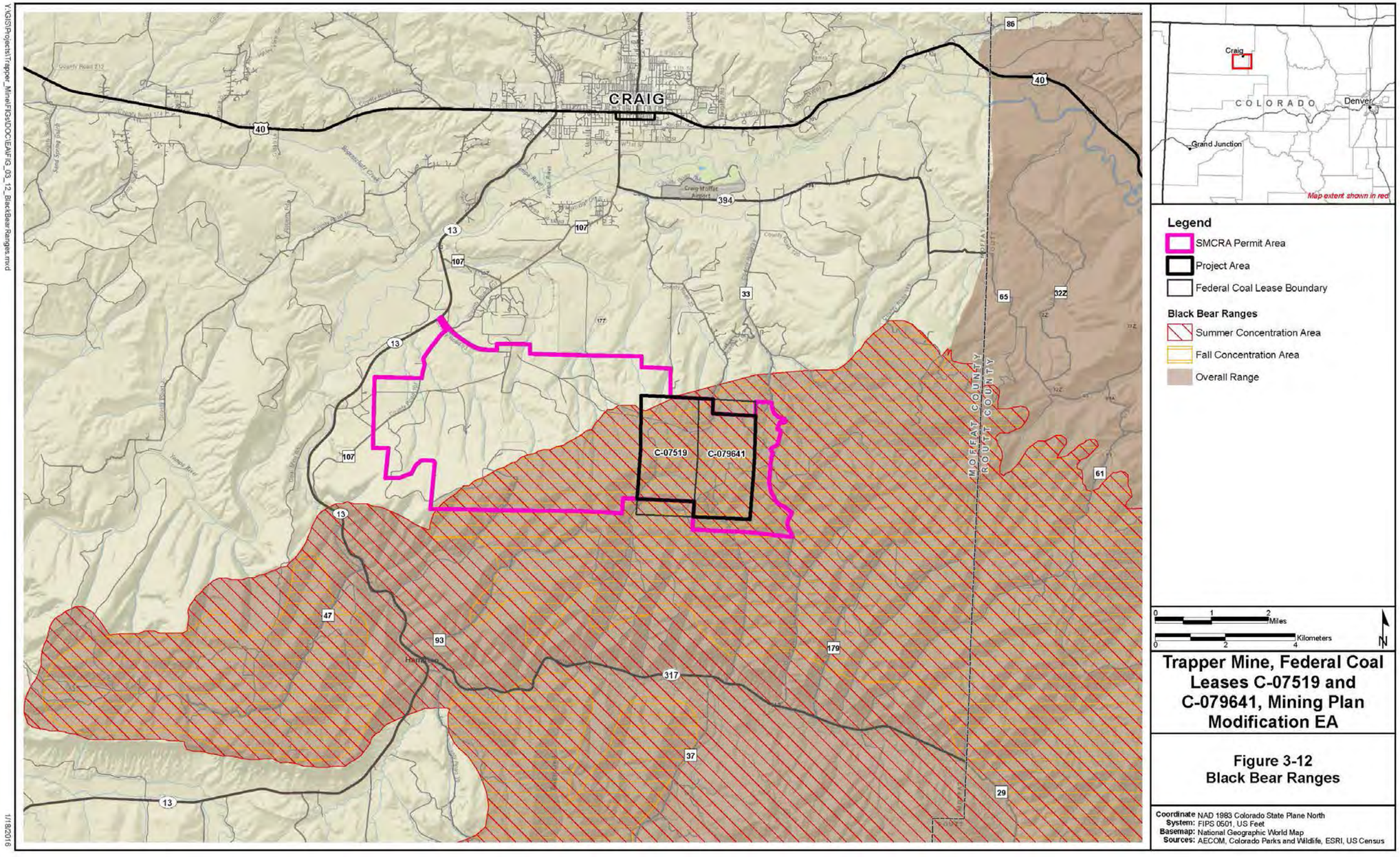


Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA

Figure 3-11
Moose Ranges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Map extent shown in red
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SMCRA Permit Area
Project Area
Federal Coal Lease Boundary
Black Bear Ranges
Summer Concentration Area
Fall Concentration Area
Overall Range
Miles
Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 3-12
Black Bear Ranges
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, Colorado Parks and Wildlife, ESRI, US Census

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3.9.4.1 Small Game Species

Small game species that occur within the region include furbearers, upland game birds, and waterfowl. Potential habitat for small game species (except waterfowl) within the Project Area includes all of the plant communities that occur there. Potential habitat for waterfowl within the wildlife analysis area is limited to sediment ponds within the Project Area.

Furbearers

Furbearers likely to occur within the wildlife analysis area include cottontail (*Sylvilagus* spp.), black-tailed jackrabbit (*Lepus californicus*), Richardson's ground squirrel, ring-tail (*Bassariscus astutus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), long-tailed weasel (*Mustela frenata*), American badger (*Taxidea taxus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), and red fox (*Vulpes vulpes*) (CPW2012b). These species have wide distributions and are found within a variety of habitat types in the greater region (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 and suitable cover sites for burrows or dens.

Upland Game Birds

Upland game bird species that occur within the wildlife analysis area include Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*), dusky grouse (*Dendragapus obscurus*), and mourning dove (*Zenaida macroura*). The Columbian sharp-tailed grouse is discussed under Special Status Species, Section 3.10. 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 Project Area is located within the Pacific Flyway. Common waterfowl species that have been reported to occur in the region or that may occur in the Project Area include Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), green-winged teal (*Anas crecca*), pintail (*Anas acuta*), gadwall (*Anas strepera*), American wigeon (*Anas americana*), and common goldeneye (*Bucephala clangula*). Other common summer residents include blue-winged teal (*Anas discors*), northern shoveler (*Anas clypeata*), redhead (*Aythya americana*), and lesser scaup (*Anas affinis*) (Cerovski et al. 2004; Kingery 1998; Stokes and Stokes 1996).

These species distributions are limited to the rivers, streams, lakes, reservoirs, ponds, and wetlands found within the greater region. These habitats are absent from the Project Area with the exception of water impounded at sediment ponds. Population numbers for these species vary annually based on available food and weather patterns. While waterfowl species are considered game birds, they also are protected under the MBTA.

3.9.5 Fish

The Project Area for aquatic biological resources includes streams located within the mine boundary (**Figure 2-1**). In addition, a downstream section of the Yampa River is considered part of the regional effects area, since deposition effects and water use are analyzed for that area. The affected environment description for aquatic biological resources focuses on perennial streams, which support fish species.

Aquatic habitat within the mine boundary of the Project Area consists of only ephemeral streams. There are no intermittent or perennial streams within the mine boundary area. Ephemeral (short-lived or transitory flow) streams provide temporary habitat during the year. Water availability would be limited to

periods when water is present as a result of spring snowmelt or storm events. None of the streams are managed for recreational sports fisheries by CPW. The Yampa River is located approximately 4.5 miles (7.2 km) north of the mine boundary, and it contains a mixture of runs, riffles and deep pools but lies outside the Project Area.

The aquatic communities in the ephemeral streams would mainly support macroinvertebrates when water is present. Macroinvertebrate groups would be represented by species that are indicative of seasonal availability of water. Fish would not occur in the streams due to a lack of water on a consistent basis throughout the year. It is possible that a few scattered pools could provide fish habitat on an infrequent basis, but there are no upgradient perennial streams that would be a source of fish during flow events.

The Yampa River, 4.5 miles (7.2 km) north of the Project Area, is part of the CPW's Middle Yampa Fish Management Unit (FMU) (CPW 2010). This section of the river contains a mixture of coldwater and warmwater fish species. The upper portion of the Middle Yampa FMU is utilized as a recreational trout fishery, while the lower portion (from Hayden downstream to the confluence with the Williams Fork River) is managed for the recovery of federally endangered fishes of the Upper Colorado River Basin and other native fish species. Special status aquatic species are discussed in Section 3.10. The typical recreational sport fish species along the Yampa River include: rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta)*, channel catfish (*Ictalurus punctatus*), northern pike (*Esox lucius*), and smallmouth bass (*Micropterus dolomieu*) (Johnson et al. 2008). Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*) and mountain whitefish (*Prosopium williamsoni*) are found in lakes and ponds in the area.

3.10 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; BLM sensitive species; and species that CPW has designated as threatened, endangered, or species of concern in Colorado. The analysis area for state listed and BLM sensitive species is the Project Area within suitable, historic, or occupied habitat and is coincident with the analysis area described for vegetation in Section 3.7.

The analysis area for federally listed species is larger and equivalent to the areas analyzed in a separate Biological Assessment (BA) submitted to the USFWS for Section 7 consultation under the ESA (OSMRE 2015). The analysis area for the yellow billed-cuckoo includes the airshed analysis boundary for mercury deposition from mining and coal combustion. The analysis area for federally listed fish species includes this same airshed analysis boundary and an adjoining area to the west between the Yampa and White rivers to their confluences with the Green River.

Special status species known to occur within Moffat County are shown in **Table 3-14**, which also describes those species that were carried forward for analysis in the EA and those that were not. Several sources of information were reviewed to identify sensitive species that have the potential to occur in the Project Area: the USFWS Information for Planning and Conservation (USFWS 2015) for federally listed species, Colorado Natural Heritage Program's (CNHP) Species Tracking Lists (CNHP 2015), the BLM sensitive species list for the LSFO (BLM 2015), published books and journal articles, and other sources of publicly available information.

Table 3-14 Special Status Species in Moffat County

	Common Name (*Scientific Name*)	Federal Status	State Status	Potential to Occur within the Project Area
Amphibians	Boreal toad *(Anaxyrus boreas)*	BLM LSFO Sensitive		No – suitable habitat is not found within the Project Area.
	Northern leopard frog *(Lithobates pipiens)*	BLM LSFO Sensitive	SC	Yes – suitable habitat is not found within the Project Area.Species occurs in the SMCRA permit area and could disperse into Project Area in the future.
Birds	Northern goshawk *(Accipter gentilis)*	BLM LSFO Sensitive	NL	No – suitable habitat is not found within the Project Area.
	Golden eagle (*Aquila chrysaetos*)	BLM LSFO Sensitive	NL	Yes – suitable foraging habitat occurs in the Project Area. The species nests east of the Project Area.
	Burrowing owl *(Athene cunicularia)*	BLM LSFO Sensitive	NL	Yes – suitable habitat is not found within the Project Area. The species is found on reclaimed lands west of the Project Area.
	Ferruginous hawk *(Buteo regalis)*	BLM LSFO Sensitive	SC	Yes – species is rare in the region, with limited potential to occur in the Project Area.
	Greater sage-grouse *(Centrocercus urophasianus)*	BLM LSFO Sensitive	SC	No – suitable habitat for the species is not present in the Project Area.
	Mountain plover *(Charadrius montanus)*	BLM LSFO Sensitive	SC	No – rare in the region with unsuitable habitat in the Project Area.
	Yellow-billed cuckoo *(Coccyzus americanus)*	Threatened	NL	Yes – suitable habitat is not found within the Project Area but occurs in a wider analysis area for this species.
	American peregrine falcon *(Falco peregrinus anatum)*	BLM LSFO Sensitive	SC	Yes – rare spring and fall migrant in the wider analysis area with limited potential to occur in the Project Area.
	Sandhill crane *(Grus canadensis)*	NL	SC	No – suitable habitat is not found within the Project Area although this species does nest in wetlands near the western SMCRA permit boundary.
	Bald eagle *(Haliaeetus leucocephalus)*	BLM LSFO Sensitive	SC	No – suitable habitat is not found within the Project Area.
	Long-billed curlew *(Numenius americanus)*	NL	SC	No – rare in the region within suitable habitat in the Project Area.
	Brewer's sparrow *(Spizella berweri)*	BLM LSFO Sensitive	NL	Yes – suitable habitat occurs in the Project Area where there is adequate shrub cover.
	Mexican spotted owl *(Strix occidentalis)*	Threatened	NL	No – suitable habitat is not found within the Project Area.
	Columbian sharp-tailed grouse *(Tympanuchus phasianellus columbianus)*	BLM LSFO Sensitive	SC	Yes – found within reclaimed areas.

Table 3-14 Special Status Species in Moffat County

	Common Name (*Scientific Name*)	Federal Status	State Status	Potential to Occur within the Project Area
Fish	Bluehead sucker *(Catostomus discobolus)*	BLM LSFO Sensitive	NL	No – no suitable habitat in the Project Area.
	Flannelmouth sucker *Catostomas latipinnis)*	BLM LSFO Sensitive	NL	No – no suitable habitat in the Project Area.
	Mountain sucker *(Catostomas platyrhynchus)*	BLM LSFO Sensitive	SC	No – no suitable habitat in the Project Area.
	Bonytail chub *(Gila elegans)*	Endangered	SE	Yes – suitable habitat is not found within the Project Area but occurs in a wider analysis area for this species.
	Humpback chub *(Gila cypha)*	Endangered	ST	Yes – suitable habitat is not found within the Project Area but occurs in a wider analysis area for this species.
	Roundtail chub *(Gila robusta)*	BLM LSFO Sensitive	SC	No – occurs outside Project Area in the wider analysis area.
	Colorado River cutthroat trout *(Oncorhynchus clarkii pleuriticus)*	BLM LSFO Sensitive	SC	No – occurs outside Project Area in the Yampa and White rivers.
	Colorado pikeminnow *(Ptychocheilus lucius)*	Endangered	ST	Yes – suitable habitat is not found within the Project Area but occurs in a wider analysis area for this species.
	Razorback sucker *(Xyrauchen texanus)*	Endangered	SE	Yes – suitable habitat is not found within the Project Area but occurs in a wider analysis area for this species.
Mammals	Townsend's big-eared bat *(Corynorhinus townsendii)*	NL	SC	No – suitable habitat is not found within the Project Area.
	White-tailed prairie dog *(Cynomys ludovicianus)*	BLM LSFO Sensitive	NL	No – the species is not present in the Project Area, but potential habitat occurs on reclaimed land and in native range land.
	Spotted bat *(Euderma maculatum)*	BLM LSFO Sensitive	NL	No – suitable habitat is not found within the Project Area.
	Canada lynx *(Lynx canadensis)*	Threatened	SE	No – suitable habitat is not found within the Project Area.
	Black-footed ferret *(Mustela nigripes)*	Endangered	SE	No – the geographic range of re-introduced populations of the species is outside the Project Area.
	Kit fox *(Vulpes macrotis*	NL	SE	No – Project Area is outside the geographic range of the species.
Reptiles	Midget faded rattlesnake *(Crotalus oreganus concolor)*	BLM LSFO Sensitive	SC	No – no suitable habitat; the species is restricted to outcrops of the Green River Formation in the region.
Plants	Ute ladies'-tresses *(Spiranthes diluvalis)*	Threatened	NL	No – no suitable habitat in the Project Area.

Table 3-14 Special Status Species in Moffat County

	Common Name (*Scientific Name*)	Federal Status	State Status	Potential to Occur within the Project Area
	Dudley bluffs twinpod *(Physaria obcordata)*	Threatened	NL	No – no suitable habitat in the Project Area.
	Duchesne milkvetch *(Astragalus duchesnensis)*	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.
	Tufted cryptantha *(Cryptantha caespitosa)*	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.
	Uinta Basin spring- parsley *(Cymopterus duchesnensis)*	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.
	Singlestem buckwheat (*Eriogonum acaule*)	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.
	Woodside buckwheat *(Eriogonum tumulosum)*	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.
	Clay Hill buckwheat *(Eriogonum viridulum)*	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.
	Flaming Gorge evening primrose *(Oenothera acutissima)*	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.
	Colorado feverfew *(Parthenium ligulatum)*	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.
	Gibbens' beardtongue *(Penstemon gibbensii)*	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.
	Yampa beardtongue (*Penstemon yampaensis*)	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.
	Rock tansy *(Sphaeromeria capitata)*	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.
	Hairy Townsend daisy *(Townsendia strigosa)*	BLM LSFO Sensitive	NL	No – the Project Area is outside the geographic range of the species.

Note*:* SE – State endangered; ST - State threatened; SC - State species of concern; NL – Not Listed.

Sources: BLM 2015; CNHP 2015; OSMRE 2015; USFWS 2015a.

3.10.1 Federally Threatened, Endangered, and Candidate Species

3.10.1.1 Colorado River Federally Endangered Fish

<u>Bonytail Chub (Endangered with Critical Habitat)</u>

Currently, no self-sustaining populations of bonytail chub are known to exist in the wild, with very few individuals being reported throughout the Colorado River Basin (USFWS 2002a). The last known riverine area where bonytail chub were common was the Green River in Dinosaur National Monument, where Vanicek (1967) and Holden and Stalnaker (1970) collected 91 specimens from 1962 to 1966. From 1977 to 1983, no bonytail chub were collected from the Colorado or Gunnison rivers in Colorado or Utah. However, in 1984, a single bonytail chub was collected from Black Rocks on the Colorado River. Several suspected bonytail chub were captured in Cataract Canyon from 1985 to 1987. Current stocking plans for bonytail chub identify the middle Green River and the Yampa River in Dinosaur National Monument as the highest priority for stocking in Colorado (USFWS 2008).

The typical types of habitat used by bonytail chub consist of mainstem riverine areas and impoundments in the Colorado River system. Deep pools and eddies with slow to fast currents and muddy to rocky bottoms are characteristic of the riverine habitat (Kaeding et al. 1986). Based on five specimens captured in the Upper Colorado River Basin, four were captured in deep, swift, rocky canyon areas (i.e., Yampa Canyon, Black Rocks, Cataract Canyon, and Coal Creek Rapid) (USFWS 2002a). Critical habitat for the bonytail chub in the analysis area is present along the Yampa River and its 100-year flood plain within Dinosaur National Monument, which is roughly 60 miles (96.6 km) downstream from Craig, Colorado (**Figure 3-13**).

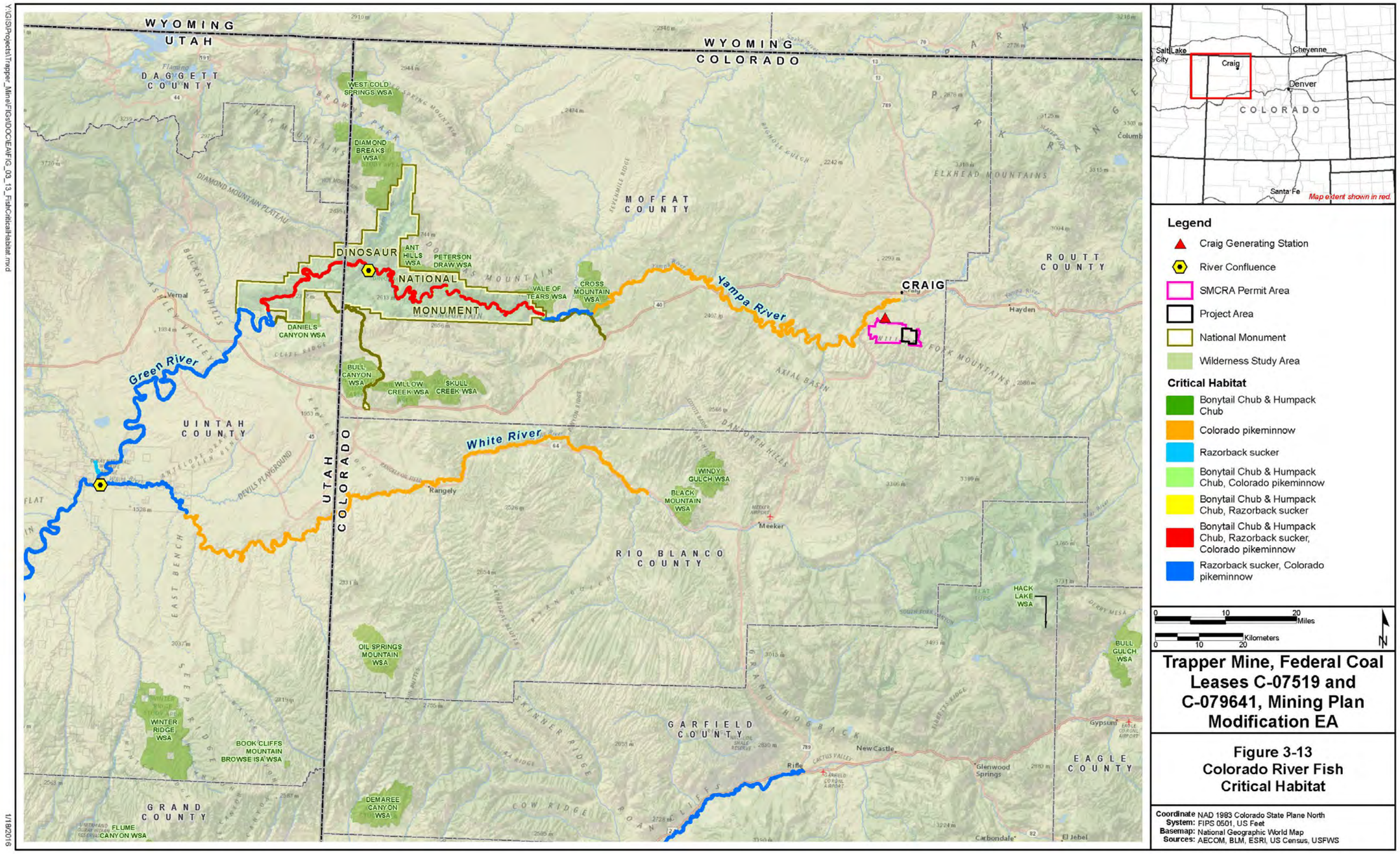
The bonytail chub is an omnivorous feeder with a diet consisting of a wide variety of aquatic and terrestrial insects, small fish, worms, algae, plankton, and plant matter (Lower Colorado Multi-Species Conservation Program 2014).

Colorado Pikeminnow (Endangered with Critical Habitat)

Wild populations of Colorado pikeminnow are now found only in the upper basin of the Colorado River above Lake Powell. Three wild populations of Colorado pikeminnow exist in 1,090 miles (1,754 km) of riverine habitat in the Green River, upper Colorado River, and San Juan River sub-basins. The occurrence of Colorado pikeminnow in the Yampa River extends from the confluence with the Green River upstream to the Craig area. The most recent population estimates are still being analyzed, but the results seem to indicate a population decline throughout the entire Green River sub-basin which includes the Yampa and White rivers. The decline is likely due to introduced non-native predatory fish (USFWS 2014a).

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 that are maintained by high spring flows (USFWS 2002b). Habitat, that was the focus of sampling efforts for Colorado pikeminnow in the Green River during low flow periods, includes small eddies and pools in nearshore areas and mid-channel sites near sand and gravel bars (Bestgen et al. 2010). Colorado pikeminnow is a long-distance migrator, with adults moving hundreds of miles to and from spawning areas. 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. Spawning occurs over riffle areas with gravel or cobble substrate between late June and early September. Spawning has been observed for Colorado pikeminnow in the lower 20 miles (32.2 km) of the Yampa River above the Green River confluence. This species primarily feeds on other fish, but smaller individuals also eat insects and other invertebrates.

Critical habitat is present in the Yampa River and its 100-year flood plain within Dinosaur National Monument and continues upstream to Craig, Colorado. Critical habitat continues beyond the analysis area downstream below the Yampa's confluence with the Green River (**Figure 3-13**).


WYOMING
UTAH
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COLORADO
DAGGETT COUNTY
MOFFAT COUNTY
ROUTT COUNTY
UINTAH COUNTY
RIO BLANCO COUNTY
GARFIELD COUNTY
GRAND COUNTY
EAGLE COUNTY
UTAH
COLORADO
DINOSAUR NATIONAL MONUMENT
CRAIG
Green River
Yampa River
White River
Vernal
Rangely
Meeker
Hayden
New Castle
Rifle
Glenwood Springs
Carbondale
Gypsum
El Jebel
WEST COLD SPRINGS WSA
DIAMOND BREAKS WSA
ANT HILLS WSA
PETERSON DRAW WSA
VALE OF TEARS WSA
CROSS MOUNTAIN WSA
DANIELS CANYON WSA
BULL CANYON WSA
WILLOW CREEK WSA
SKULL CREEK WSA
WINDY GULCH WSA
BLACK MOUNTAIN WSA
HACK LAKE WSA
BULL GULCH WSA
OIL SPRINGS MOUNTAIN WSA
WINTER RIDGE WSA
BOOK CLIFFS MOUNTAIN BROWSE ISA WSA
DEMAREE CANYON WSA
FLUME CANYON WSA
Salt Lake City
Cheyenne
Craig
Denver
COLORADO
Santa Fe
Map extent shown in red.
Legend
Craig Generating Station
River Confluence
SMCRA Permit Area
Project Area
National Monument
Wilderness Study Area
Critical Habitat
Bonytail Chub & Humpack Chub
Colorado pikeminnow
Razorback sucker
Bonytail Chub & Humpack Chub, Colorado pikeminnow
Bonytail Chub & Humpack Chub, Razorback sucker
Bonytail Chub & Humpack Chub, Razorback sucker, Colorado pikeminnow
Razorback sucker, Colorado pikeminnow
0 10 20 Miles
0 10 20 Kilometers
N
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 3-13
Colorado River Fish Critical Habitat
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, BLM, ESRI, US Census, USFWS
Y:\GIS\Projects\Trapper_Mine\FIGs\DOC\EAFIG_03_13_FishCriticalHabitat.mxd
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Humpback Chub (Endangered with Critical Habitat)

Currently, six populations of humpback chub are known to exist: 1) Black Rocks, Colorado River, Colorado; 2) Westwater Canyon, Colorado River, Utah; 3) Yampa Canyon, Colorado; 4) Desolation/Gray Canyons, Green River, Utah; 5) Cataract Canyon, Colorado River, Colorado; and 6) mainstem Colorado River in Marble and Grand canyons, Colorado. Populations in the Yampa River and Cataract Canyon are too small to monitor through mark-recapture analysis. The Yampa Canyon population is the closest occurrence to Trapper Mine, roughly 60 miles (96.6 km) west of Craig, Colorado. Critical habitat for the humpback chub is present in the analysis area along the Yampa River and its 100-year flood plain within Dinosaur National Monument (**Figure 3-13**), which is roughly 60 miles (96.6 km) downstream from Craig, Colorado.

Humpback chub 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. Humpback chub exhibit minimal movement from the canyon reaches, as indicated by a 1-mile (1.6-km) movement distance in the Black Rocks area (Kaeding et al. 1990). As young humpback chub mature, they shift toward deeper and swifter offshore habitats (USFWS 2002c). In the Yampa and Green rivers, juvenile and adults use habitats consisting of rocky shoreline runs and small shoreline eddies. Humpback chub are opportunistic feeders that consume aquatic and terrestrial arthropods, small fishes, diatoms, planktonic crustaceans, and algae (USFWS 2015b).

Razorback Sucker (Endangered with Critical Habitat)

The largest population of the razorback sucker in the Upper Colorado River Basin exists in the middle Green River between the Duchesne and Yampa rivers, and is considered a single reproducing population (USFWS 2002d). The estimated numbers range from approximately 500 to 950 fish. Relatively low numbers are present in the Yampa, White, and Upper Colorado rivers. There are no current population estimates of razorback sucker in the Yampa River due to low numbers captured in recent years. Razorback suckers mainly occur in the lower 4 miles (6.4 km) of the Yampa River and occasionally utilize the river up to the confluence with the Little Snake River.

Razorback suckers are permanent residents of the Green River below the confluence with the Yampa River and depend on in-channel habitat for spawning and flooded off-channel habitats for several phases of their development. The razorback sucker is found in deep clear to turbid waters of large rivers and some reservoirs over mud, sand, or gravel substrates. Habitat types used by razorback suckers vary depending on the life stage and time of year. Adults use eddies, pools, and backwaters during the nonbreeding period from 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). In the upper basin, bottomlands, low-lying wetlands, and oxbow channels that are perennially flooded or ephemerally connected to the main channel by high spring flows are important habitats for all life stages of razorback sucker. Razorback suckers in riverine environments consume a mixture of benthic invertebrates, algae, detritus, and inorganic materials, with little evidence of zooplankton consumption.

Critical habitat for the species is present in the Yampa River and its 100-year flood plain from about the east service road within Dinosaur National Monument and continuing downstream beyond the confluence with the Green River (BLM 2012) (**Figure 3-13**). Designated critical habitat also occurs along the White River upstream for approximately 15 miles (24 km) from its confluence with the Green River (**Figure 3-13**).

3.10.1.2 Yellow-billed Cuckoo (Threatened with Proposed Critical Habitat)

The yellow-billed cuckoo declined substantially in western Colorado during the 20th Century but was never very common. The most recent records show only sparse occurrences in western Colorado. The

Colorado Breeding Bird Atlas II (2007-2011) shows two confirmed occurrences on the Western Slope (Wickersham 2015). One is along the North Fork of the Gunnison near Paonia and Hotchkiss in Delta County (Wickersham 2015). The second is along the Gunnison River in Gunnison County. The previous Colorado Breeding Bird Atlas (1987-1994) had a confirmed record along the Yampa River, west of Steamboat Springs in Routt County (Kingery 1998).

Other recent records also indicate that the species is rare and breeding is not well documented on the Western Slope. Reports of single yellow-billed cuckoos have come primarily from the Grand Junction area and Mesa County in 2001, 2002, 2005, and 2008, with a report of more than one cuckoo at Orchard Mesa Wildlife Area in 2006 (USFWS 2011). More recently, cuckoos have been observed or heard by USFWS staff and include one along the Gunnison River in Grand Junction in 2013, one along the Colorado River in 2014, and one along the North Fork of the Gunnison River in 2015. It is unknown if these birds were nesting (USFWS 2015c). Additional reports include a cuckoo south of Montrose in Montrose County near the Uncompahgre River in 2009, a cuckoo along the Gunnison River near Gunnison in 2007 (USFWS 2011), and detections by the Rocky Mountain Bird Observatory along the Yampa River near Craig in 2007 and 2008, and in far western Colorado near Nucla in 2005 and 2008 (Beason 2012USFWS 2011; Dexter 1998). The detections near Craig and Nucla in 2008 resulted from surveys completed by the Rocky Mountain Bird Observatory in five western counties. However, surveys repeated in two of the counties in 2009 failed to detect these birds. Surveys by the Rocky Mountain Bird Observatory in 2010 were conducted near historical detections and at sites with suitable habitat in Archuleta, Conejos, Montezuma, and Rio Grande counties in southcentral and southwest Colorado; no cuckoos were detected (Beason 2012). Survey results to date are insufficient to determine population size or trend.

Yellow-billed cuckoos winter in South America and typically arrive on the Western Slope of Colorado in late May and leave by late August (Andrews and Righter 1992), with outlying records as late as mid-September and mid-October. The species typically breeds at elevations below 6,000 feet (1,829 meters) amsl but occasionally breeds at elevations as high as 8,500 feet (2,591 meters) amsl (Andrews and Righter 1992).

The yellow-billed cuckoo nests in large, contiguous, blocks of riparian habitat (greater than 50 acres), particularly woodlands with cottonwoods (*Populus fremontii*) and willows (*Salix* sp.). A dense multi-layered canopy of understory foliage appears to be an important factor in nest site selection. The multilayered canopy provides shade and traps moisture to create the relatively cooler and more humid streamside conditions that are believed to be important for nesting success. At the landscape level, the amount of cottonwood-willow-dominated vegetation in the landscape and the width of riparian habitat appear to influence yellow-billed cuckoo distribution and abundance (USFWS 2014b). Cuckoos appear to avoid nesting in isolated patches of about 1 to 2 acres in size or in narrow, linear riparian habitats that are less than 33 to 66 feet (10 to 20 meters) wide (Halterman et al. 2015).

Overall, migration and wintering habitats appear to be less restrictive to this species (USFWS 2014b). Single birds have been detected in isolated habitat patches or linear riparian corridors during migration or the early breeding season (mid to late June). Migrating yellow-billed cuckoos also have been found in coastal scrub, second-growth forests and woodlands, hedgerows, forest edges, and in smaller riparian patches than those used for breeding (USFWS 2014b).

The Project Area does not contain riparian habitat for the cuckoo. However the species has been described as an occasional, localized breeder along the Yampa River near Craig, Colorado (USFWS 2014c). Proposed critical habitat for the species occurs along the Yampa River from approximately 5 miles (8 km) west of Craig to about 8 miles (13 km) east of Hayden, which is within the wider analysis area for the cuckoo. The last known sighting of the cuckoo along the Yampa River occurred in 2008 and was within the proposed critical habitat. No information is available to indicate if the birds observed were nesting in the area or in the process of migration.

Yellow-billed cuckoos usually forage within riparian habitats that are similar to breeding habitats, but they may undertake short flights from riparian habitats into surrounding low vegetation to capture prey

(Halterman et al. 2015). Cuckoos primarily eat large insects such as caterpillars, cicadas, and grasshoppers. They will consume frogs and small lizards and have been known to take eggs and young of other birds. Yellow-billed cuckoos will eat small fruits and seeds on wintering grounds and occasionally during the breeding season (Bennett and Keinath 2003).

3.10.2 State Listed and BLM Sensitive Species

3.10.2.1 Northern Leopard Frog

The northern leopard frog is a species of concern in Colorado, as well as a BLM sensitive species. It inhabits the banks and shallows of marshes, ponds, lakes, reservoirs, beaver ponds, streams, and other habitats with permanent surface water (Hammerson 1986). This species is absent from otherwise suitable habitats where predatory fish, bullfrogs, or crayfish are abundant. Northern leopard frogs inhabit ponds and other suitable habitats within the SMRCA permit boundary, but the species has not been documented in the Project Area.

3.10.2.2 Golden Eagle

The golden eagle is a BLM sensitive species that is resident throughout Colorado, but is more common in winter. The species is found in a wide array of habitats with open landscapes within Colorado (Andrews and Righter 1992). Nests are located on cliffs, and trees in rugged areas. Golden eagle presence in an area is largely dictated by the availability of its preferred prey, rabbits and hares. Golden eagles are relatively common in Moffat County, and individuals occur regularly within the Project Area. There is a known golden eagle nest to the east of the Project Area.

3.10.2.3 Burrowing Owl

The burrowing owl is a BLM sensitive species. It is a summer resident in Colorado that occurs in grasslands and occasionally in semi-desert shrublands (Andrews and Righter 1992). Burrowing owls usually nest in prairie dog towns, but will nest in burrows dug by other mammals. The species is uncommon on the Western Slope. Burrowing owls have been documented on reclaimed lands west of the Project Area but not within the Project Area itself.

3.10.2.4 Ferruginous Hawk

The ferruginous hawk is a species of concern in Colorado as well as a BLM sensitive species. The species breeds in grasslands, semi-desert shrublands, and the ecotone between shrublands and pinyon-juniper woodlands. Nests are found on elevated sites, such as rock outcrops, power poles, or isolated trees. Winter concentrations are found around prairie dog towns (Travsky and Beauvais 2005). Although this species is rare in Moffat County, suitable habitat for ferruginous hawks is present within the Project Area. There is a historic breeding record near Craig, Colorado (Andrews and Righter 1992).

3.10.2.5 American Peregrine Falcon

The American peregrine falcon is a state species of concern and a BLM sensitive species that is found in open spaces associated with cliffs and bluffs that overlook rivers and open bodies of water. Habitat does exist, but is limited in the Project Area. There have been no reported sightings in the Project Area.

3.10.2.6 Brewer's Sparrow

Brewer's sparrow is a BLM sensitive species that is locally common in Moffat County throughout the year. It primarily inhabits and breeds in sagebrush shrublands. It also occurs in other shrublands dominated by mountain mahogany or rabbitbrush (Andrews and Righter 1994). Habitat exists for this species within the Project Area in older reclaimed lands and shrublands on unmined land.

3.10.2.7 Columbian Sharp-tailed Grouse

The Columbian sharp-tailed grouse is a species of concern in Colorado and a BLM sensitive species. It is found where deciduous shrubs (gamble oak and serviceberry) are interspersed with bunch grasses, sagebrush, aspen, irrigated meadows, wheat fields, and/or alfalfa fields. Display grounds are on knolls or ridges (Marks 2007). The entire Project Area is within Columbian sharp-tailed grouse overall range and winter range (CPW 2014). Approximately 410 acres of designated production areas for this species are located within the northwest corner of the Project Area (17 percent of the analysis area) (**Figure 3-14**). This species is known to occur within the Project Area although no leks are known to occur within the Project Area. Reclaimed areas at Trapper Mine have shown an increased presence of Columbian sharp-tailed grouse. TMI has worked cooperatively with CPW to develop reclaimed areas to promote Columbian sharp-tailed grouse habitat and evaluate the presence of the species. Lek count data from reclaimed areas west of the Project Area are provided in **Table 3-15**.

Table 3-15 Columbian Sharp-tailed Grouse Lek Counts in the Vicinity of the SMCRA Permit Area Boundary

Lek Description	Year Found	2006	2007*[1]	2008*[2]	2009	2010	2011	2012	2013	2014*[3]
Above Cottonwood Spring. (D-B-84)	1998	40	30 (4/5)	18 (4/22)	20 (4/21)	27 (4/27)	27 (4/29)	32 (4/9)	31 (4/30)	26 (4/9)
D Pit Haulroad by LSWT JW3	1998	10	7 (4/16)	6 (4/30)	3 (4/23)	5 (4/27)	2 (5/3)	1 (4/10)	0 (5/1)	0 (4/22)
C Pit Reclamation West Edge (C-C-92)	2001	3	2 (4/5)	5 (5/12)	5 (4/22)	3 (4/27)	0 (5/3)	0 (4/4)	0 (4/30)	0 (4/22)
D Pit Reclamation by LSWT NNM5 (D-B-90)	2002	17	15 (5/9)	13 (4/22)	12 (4/22)	7 (4/27)	0 (5/3)	0 (4/5)	0 (4/30)	2 (4/9)
D Pit Reclamation at top of Elk Drainage	2010	ND	ND	ND	ND	16 (5/7)	12 (5/2)	11 (4/4)	8 (4/30)	7 (4/9)
A Pit Reclamation S of Ash Pit (A-A-93)	2003	18	13 (5/3)	26 (4/29)	9 (4/21)	11 (4/27)	0 (4/29)	0 (4/5)	ND	0 (4/10)
Johnson Gulch (rock pile ridge)	2011	ND	ND	ND	ND	ND	7 (5/9)	14 (4/10)	8 (5/2)	6 (4/10)
Empire Reclamation Area	2006	16	16	19 (4/29)	13 (4/21)	19 (4/27)	11 (5/2)	24 (4/4)	10 (4/30)	12 (4/9)
D Pit Reclamation by LSWT CE6 (D-B-90)	2006	12	19	15 (4/30)	22 (4/21)	23 (4/27)	31 (5/23)	34 (4/4)	34 (4/30)	45 (4/22)
A Pit Reclamation east of Ash Pit (A-B-94)	2006	9	8 (5/3)	8 (5/3)	4 (4/21)	0 (4/20)	0 (5/16)	0 (4/5)	--	0 (4/10)
A East Reclamation (A-B-97)	2008	ND	ND	14 (4/29)	13 (4/22)	17 (4/20)	17 (4/29)	24 (4/5)	18 (4/26)	18 (4/25)
H Pit (top of ridge)	2009	ND	ND	ND	5 (4/30)	8 (4/20)	11 (5/3)	14 (4/11)	13 (4/30)	11 (4/21)

Table 3-15 Columbian Sharp-tailed Grouse Lek Counts in the Vicinity of the SMCRA Permit Area Boundary

Lek Description	Year Found	2006	2007*[1]	2008*[2]	2009	2010	2011	2012	2013	2014*[3]
F Pit (SW corner of reclaim)	2014	ND	ND	ND	ND	ND	ND	ND	ND	7 (4/11)
Satellite Leks		2	6	3	14	11	19	18	12	17
Annual Total		127	116	127	120	147	137	172	134	151

[1] 13 females were trapped on Lek 1 and taken to Middle Park by CPW.

[2] 9 females were trapped on leks 1, 6 and 7 and taken to Middle Park by CPW.

[3] 10 and 8 males were trapped on leks 1 and 7, respectively, in September 2014 by CPW and relocated to Middle Park.

ND – No data.

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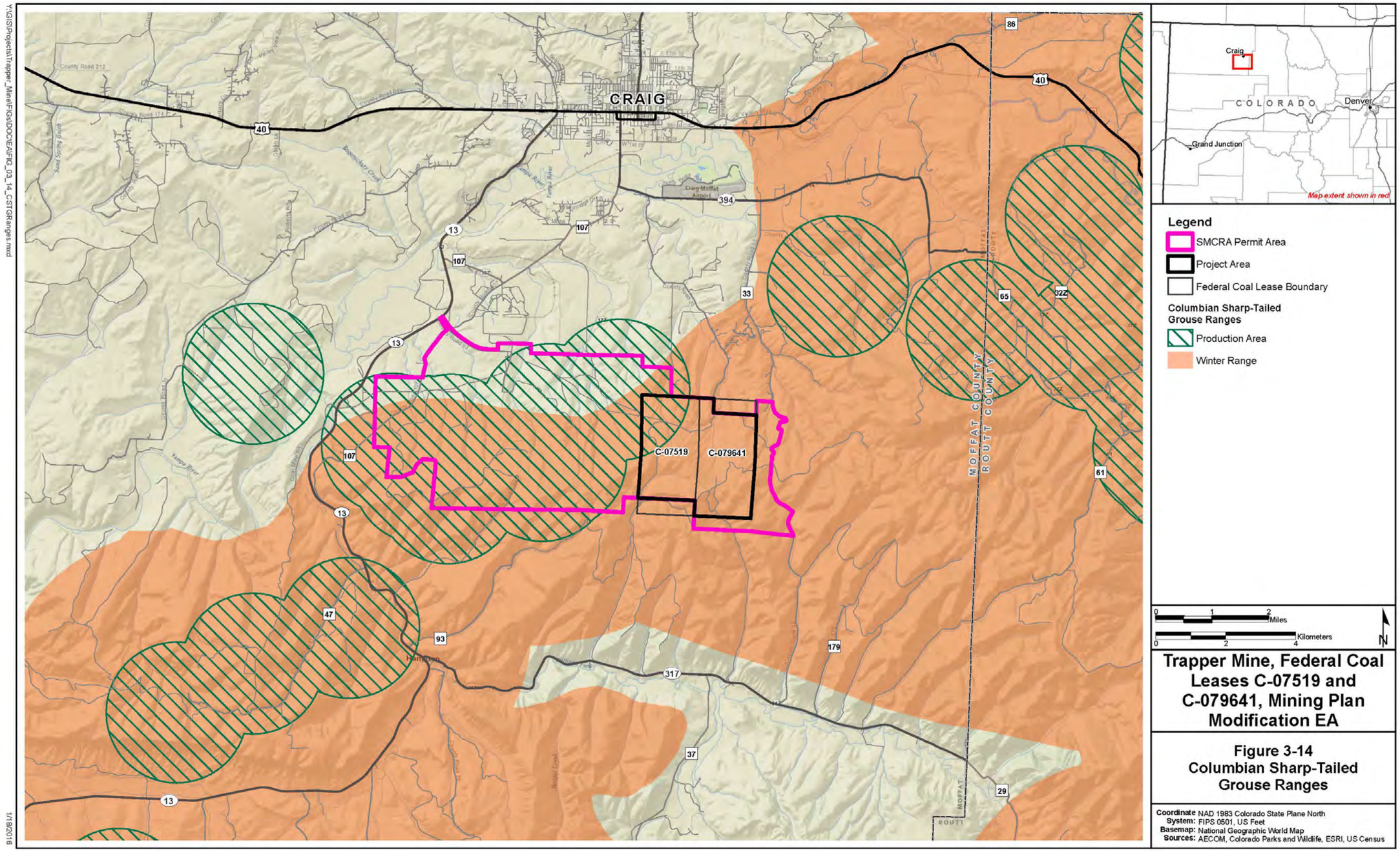
CRAIG
C-07519
C-079641
MOFFAT COUNTY
ROUTT COUNTY
Craig
COLORADO
Denver
Grand Junction
Map extent shown in red
Legend
SMCRA Permit Area
Project Area
Federal Coal Lease Boundary
Columbian Sharp-Tailed Grouse Ranges
Production Area
Winter Range
Miles
Kilometers
Trapper Mine, Federal Coal Leases C-07519 and C-079641, Mining Plan Modification EA
Figure 3-14
Columbian Sharp-Tailed Grouse Ranges
Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, Colorado Parks and Wildlife, ESRI, US Census
Y:\GIS\Projects\Trapper_Mine\FIGs\DOC\EA\FIG_03_14_CSTGRanges.mxd
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3.11 Cultural Resources

3.11.1 Introduction

Cultural resources can be defined as “those parts of the physical environment – natural and built – that have cultural value of some kind to some sociocultural group” (King 1998). In broader terms, the concept of “cultural resources” embraces an “intricate mosaic of things and institutions and values, beliefs and perceptions, customs and traditions, symbols and social structures” (King 1998:9). This broader perspective forms the context in which the direct, as well as the indirect, effects of any undertaking are assessed.

The mining plan modification of the Trapper Mine is considered a federal undertaking, which is subject to compliance with Section 106 of the NHPA, as amended through 2014 (54 USC 300101 *et seq*.). The NHPA, as amended, requires that federal agencies take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in regulations issued by the ACHP, found at 36 CFR 800, Protection of Historic Properties, which became effective in 2004. Historic properties are defined at 36 CFR 800.16(l)(1) as any resource determined eligible for listing in the National Register of Historic Places (NRHP).

NEPA also considers effects to cultural and historic resources. The term “cultural resources” covers a wider range of resources than “historic properties,” such as sacred sites, archaeological sites not eligible for the NRHP, and archaeological collections. The ACHP and the CEQ encourage integration of the NEPA process with Section 106 of NHPA and other planning and environmental reviews.

The following sections define the area of potential effects (APE), identify tribal concerns, define historic properties, describe the regional culture history, and identify previous surveys and known cultural resources. This information provides the context in which the environmental consequences and cumulative impacts of this Project on historic properties in the APE can be assessed and interpreted.

3.11.2 Definition of the APE

The APE for direct project effects is defined as all associated mine-related disturbance and facilities with the Project Area. In addition to the APE, a number of cultural resource surveys have been conducted within the broader Project Area, SMCRA permit boundary, and extending 0.25 mile (0.4 km) beyond the SMCRA permit boundary.

3.11.3 American Indian Concerns

OSMRE has notified the Colorado SHPO and has corresponded with the following American Indian tribes that consider the Project Area to be located within their traditional territory.

- Eastern Shoshone Tribe
- Southern Ute Indian Tribe
- Ute Mountain Ute Tribe
- Ute Indian Tribe
- Navajo Nation
- Hopi Tribe

The Hopi Tribe has requested additional information on a site identified as eligible for listing as described in Section 3.11.7 below.

3.11.4 Historic Properties

Historic properties are defined at 36 CFR 800.16(l)(1) as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP. Historic properties can be identified through historical documentation, field survey, and/or oral evidence. The significance of the known resources is evaluated within a regional cultural context. Historic properties and other cultural resources within the APE are discussed in Section 3.11.7.

3.11.5 Regional Culture History

Several recent studies have established a cultural history of northwestern Colorado. The most current and comprehensive study is the Northern Colorado River Basin cultural context, prepared by Reed and Metcalf (1999). Other pertinent studies, although somewhat dated, are the prehistory of northwestern Colorado (Grady 1984) and history of northwestern Colorado (Athearn 1982).

The prehistory of northwestern Colorado extends back more than 12,000 years, when current evidence suggests that native peoples first arrived in this area (Reed and Metcalf 1999). These early inhabitants, collectively grouped as Paleoindians, are described generally as hunters of big game animals, many of which (e.g., mammoth, mastodon, and large bison) are now extinct. The succeeding Archaic era, which lasted from approximately 8,400 years ago until the Christian era, is characterized by a broad-based subsistence strategy focused on hunting and gathering (Reed and Metcalf 1999). The Formative era is distinguished from the preceding Archaic era by a major subsistence focus on horticulture, especially corn growing (Reed and Metcalf 1999). This period overlaps with the Archaic focus, approximately 2,500 years ago and continues approximately 700 years when climatic changes upset this carefully honed pattern of subsistence. Not all of the early inhabitants of western Colorado pursued a Formative lifestyle; some places were simply unsuitable for horticulture and those groups continued to hunt and gather. In some places, horticultural and non-horticultural groups lived side by side. Besides cultigens, Formative sites are marked by small arrow points, grinding stones, pottery, and living structures. The concluding Protohistoric era refers to aboriginal occupation of western Colorado between the end of the Formative era and the expulsion of the Ute tribes to reservations in 1881 (Reed and Metcalf 1999).

The distribution of prehistoric sites varies depending on the age of the materials and the consequences of natural and cultural disturbances. Paleoindian artifacts are scarce near the Project Area (Reed and Metcalf 1999), an observation that is probably more attributable to natural (erosion and deposition) and cultural (modern disturbance) factors than true absence. Fremont tradition sites are located well to the west of the Project Area (Reed and Metcalf 1999). The Formative-era Gateway and Anasazi tradition sites are located farther to the south (Reed and Metcalf 1999). The non-horticultural cultural systems scattered throughout the area are included under the Aspen tradition. A greater frequency of Aspen tradition sites are found near the Project Area (Reed and Metcalf 1999). Evidence for Protohistoric sites is scarce and located south of the Project Area (Reed and Metcalf 1999).

Athearn (1982) has succinctly summarized the non-aboriginal history of northwestern Colorado. Visits by Euroamericans and other non-natives prior to the mid-19th Century were infrequent. The discovery of gold, in 1859, near Denver, precipitated a major rush to Colorado. Mining eventually spread beyond the Front Range into other parts of Colorado, but it did not significantly develop in northwestern Colorado until the late 19th Century and early 20th Century. The development of transportation networks, especially the railroad, had a dramatic effect and spurred settlement and development throughout the region. Athearn (1982) describes the modern (1890-1980) development of northwestern Colorado as follows:

> *…towns were founded, natural resources developed, and vast areas of the public domain were withdrawn from use by homesteaders and cattlemen. The period was one of consolidation and reorganization; the old frontier rule of "he who got there first" was no longer in effect. Now settlers had to deal with large corporations, governmental agencies, and the law.*

3.11.6 Previous Surveys

Between 1970 and 2013, 22 cultural resources surveys have been conducted within the broader SMCRA permit boundary of the Trapper Mine, including the APE (**Table 3-16**) and extending 0.25 mile beyond. The earliest surveys in the 1970s were completed by the University of Colorado at Boulder and Colorado State University's Laboratory of Public Archaeology. Since the early 1980s, however, the surveys have been conducted by consulting firms. During these 43 years, the surveys were completed at a somewhat regular pace (approximately one survey every other year), except for 1981 when four survys were completed. The areas surveyed ranged from 1 to 281,600 acres and a total of 591 sites were recorded. Many of those surveys (e.g., Arthur et al. 1981; Lischka 1975; Mehls and Mehls 1991; Sherman et al. 1999; Treat and Newkirk 1981) included acres outside the SMCRA permit boundary, and the total sites recorded do not reflect the site density within the SMCRA permit boundary or APE. These surveys also resulted in the recording of 126 Isolated Finds (IFs). IFs are generally defined as "transportable artifacts representing a single activity" and a single feature may be treated as an IF (Colorado SHPO 2015).

3.11.7 Known Cultural Resources

Five cultural resources have been recorded within the direct APE. A Protohistoric rock art site (5MF.948) was documented in Federal Coal Lease C-079641 and determined eligible for listing in the NRHP. The other four resources were evaluated as not eligible for listing in the NRHP: a prehistoric sheltered camp with rock art (5MF.290) in Federal Coal Lease C-07519; and a prehistoric open camp/historic homestead (5MF.950) and two IFs (5MF.1145 and 5MF.1146) in Federal Coal Lease C-079641. These five resources are listed at the beginning of **Table 3-17**.

Thirty-two cultural resources have been recorded outside the direct APE, but within the SMCRA permit boundary including 0.25 mile (0.4 km) beyond the boundary. Of these, 14 are sites and 18 are IFs. **Table 3-17** summarizes these sites and IFs. Of the total number of resources, 24 are prehistoric in age and cultural affiliation, one site dates to the Protohistoric era, nine sites are historic, one site has both prehistoric and historic components, and the age of one site is unknown. Prehistoric site types include open camp, open lithic, sheltered camp, and rock art. The historic site types include homestead, shepherd's camp, temporary shelter, and linear routes (highway, road, and wagon road). Most of the IFs are prehistoric lithic artifacts.

Additional sites have been located outside the direct APE, but within the SMCRA permit boundary including 0.25 mile (0.4 km) beyond the boundary. A historic highway (5MF.5138) has been recommended as eligible for listing in the NRHP. Additional data are needed for two prehistoric open camps (5MF.288 and 5MF.945) before their eligibility for listing in the NRHP can be evaluated;

Table 3-16 Summary of Previous Surveys within SMCRA Permit Boundary Plus 0.25-mile Buffer

Survey ID	Completion Date	Author(s)	Institution	Description*	Results		
					Acres	Sites	IFs
MF.LM.R1036	7/30/2013	C.E. Conner	Grand River Institute	Survey of Lease Modification Area	860	3	0
MC.LM.R652	5/15/2012	C.E. Conner, C. Martin, and B. Davenport	Grand River Institute	Survey of Williams Fork Mountain's Exploration Project Phase IV	139	4	1

Table 3-16 Summary of Previous Surveys within SMCRA Permit Boundary Plus 0.25-mile Buffer

Survey ID	Completion Date	Author(s)	Institution	Description*	Results		
					Acres	Sites	IFs
MF.LM.R898	6/9/2011	P. O'Brien	BLM LSFO	Survey for TMI's Proposed Williams Fork Mountain's Exploration Phase 2	121	1	0
MF.LM.R890	5/26/2011	P. O'Brien	BLM LSFO	Survey for TMI's Proposed Williams Fork Mountain's Exploration Phase 1	57	1	0
MF.LM.R704	7/19/2006	T. Bott	Metcalf Archaeological Consultants	Empire Mine Seismic Line #2	44	0	2
MC.CH.R98	5/4/2000	M.W. Painter and R.D. Vickers	Centennial Archaeology	Survey of 12-Region Wide Fencing Upgrade Locations	320	7	4
MC.CH.R96	6/7/1999	S.A. Sherman, T.R. Metcalf, M.W. Painter, D.C. Jones, and C.J. Zier	Centennial Archaeology	Survey of Interstates 25, 70, 225, and 270, U.S. Highway 34 and 160; and SH 13 and 470	16,570	255	22
MC.CM.R1	9/1/1991	S. Mehls, and C. Mehls	Western Historical Studies	Coal Mining Survey	281,600	81	0
MC. LM. NR135	6/28/1983	C.J. Zier	Metcalf-Zier Archaeologists	Survey of Drill Hole Locations for Williams Fork	29	0	0
MF.LM.R619	8/1/1981	C.S. Arthur, J.L. Brower, S.M. Collins, J.E. Ingmanson, C.J. Jennings, L.M. Viola, and G.J. Krause	CSU Laboratory of Public Archaeology	Archaeological Investigations Along Colowyo Coal Company Railroad Spur	220	21	0
MC.E.R58	7/24/1981	P. Treat and J.A. Newkirk	Gilbert/ Commonwealth	Survey of Craig-Rifle 230- to 345-kV Transmission Line	1,498	5	10
MF.LM.R531	7/2/1981	M. Loscheider	Archaeological Services	Addendum to Trapper Mine Survey	1	8	0
MC.LM.R294	5/22/1981	G.E. Williams, and M. Emery	Powers Elevation	Phases I and II Survey of Mobil-Pagoda Pipeline	835	7	4

Table 3-16 Summary of Previous Surveys within SMCRA Permit Boundary Plus 0.25-mile Buffer

Survey ID	Completion Date	Author(s)	Institution	Description*	Results		
					Acres	Sites	IFs
MR.LM.R524	11/1/1980	C.F. Caraveo and J.W. Greer	Archaeological Services	Survey of Trapper Mine	5,583	7	18
MC.LM.R2	5/1/1977	C. Arthur and C.H. Jennings	CSU Laboratory of Public Archaeology	Reconnaissance Survey of Proposal Coal Lease Areas	14,280	53	0
MF.LM.R616	3/1/1977	P.R. Williams and C.H. Jennings	CSU Laboratory of Public Archaeology	Archaeological Reconnaissance of Utah International Craig Underground	1,120	1	0
MC.LM.R50	9/1/1975	C.S. Arthur	CSU Laboratory of Public Archaeology	Interim Report on Reconnaissance Survey of Proposed Coal Lease Areas	23,000	54	0
MF.LM.R287	6/1975	J.J. Lischka	CU Boulder	W.R. Grace & Company Railroad Corridors & Colowyo Mine Site	10,152	72	65
MF.CU.R7	8/7/1973	J.J. Hester and B. Williams	CU Boulder	Archaeological Survey of Proposed Railroad Construction	Unknown	4	0
MF.CU.R8	11/19/1972	J.E. Smith	CU Boulder	Archaeological Appraisal of Proposed Plant Site	Unknown	1	0
MF.CU.R3	5/5/1972	D.A. Breternitz	CU Boulder	Survey of Archaeological Resources Within Coal Stripping Area, Williams Fork Mountains	Unknown	3	0
MF.CU.R4	10/20/1970	D.A. Breternitz	CU Boulder	Archaeological Appraisal of Proposed Hayden and Yampa-Williams Fork Power Plant Sites	320	3	0

CSU = Colorado State University.

CO = Colorado University.

Table 3-17 Summary of Identified Sites within Project Area and SMCRA Permit Boundary Plus 0.25-mile Buffer

Site No. (5MF.___)	Recording Date	Description	Age	Date	Lease Areas?	NRHP Eligibility
948	**8/21/2013**	**Rock Art**	**Protohistoric**	**UD-**	**Yes**	**Determined Eligible**
950	**5/12/1987**	**Open Camp/Homestead**	**Prehistoric/Historic**	**1910-1969**	**Yes**	**Determined Not Eligible**
290	**7/29/1980**	**Shelter Camp/Rock Art**	**Unknown**	**UD**	**Yes**	**Determined Not Eligible**
1145	**7/3/1980**	**Isolated Find (P)**	**Prehistoric**	**UD**	**Yes**	**Recommended Not Eligible**
1146	**7/3/1980**	**Isolated Find (P)**	**Prehistoric**	**UD**	**Yes**	**Recommended Not Eligible**
7402.1	5/5/2014	Road	Historic	UD	No	Determined Not Eligible
7566.1	5/5/2014	Wagon Road	Historic	UD	No	Does Not Support Eligibility of Linear Resource
5138	2/6/2002	Highway	Historic	1916	No	Recommended Eligible
445	4/11/1999	Open Camp	Prehistoric	UD	No	Recommended Needs Data
2427	5/13/1987	Homestead	Historic	1920	No	Determined Not Eligible
2253	10/2/1985	Temporary Shelter	Historic	UD	No	Determined Not Eligible
1960	8/15/1984	Homestead	Historic	1920	No	Determined Not Eligible
1399	7/1/1981	Shepherd's Camp	Historic	1900-1930	No	Determined Not Eligible
1202	5/27/1981	Isolated Find (flake)	Prehistoric	UD	No	Determined Not Eligible
947	7/8/1980	Open Camp	Late Plains Archaic	UD	No	Determined Not Eligible
945	7/7/1980	Open Camp	Prehistoric	UD	No	Determined Not Eligible
946	7/7/1980	Open Lithic	Late Plains Archaic	UD	No	Determined Not Eligible
1130	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1131	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1132	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1133	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible

Table 3-17 Summary of Identified Sites within Project Area and SMCRA Permit Boundary Plus 0.25-mile Buffer

Site No. (5MF.___)	Recording Date	Description	Age	Date	Lease Areas?	NRHP Eligibility
1134	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1135	7/3/1980	Isolated Find (H)	Historic	UD	No	Recommended Not Eligible
1136	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1137	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1138	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1139	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1140	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1141	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1142	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1143	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1144	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
1147	7/3/1980	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
903	10/13/1976	Isolated Find (P)	Prehistoric	UD	No	Recommended Not Eligible
348	8/1/1975	Homestead	Historic	1920	No	Determined Not Eligible
288	6/10/1972	Open Camp	Prehistoric	UD	No	Recommended Needs Data

Sites in **bold** are found within the Project Area.

Sites highlighted in gray are eligible for listing in the NRHP; sites highlighted in blue require additional data for eveluation.

P = Prehistoric; H = Historic.

UD - Undated

3.12 Socioeconomics

The Trapper Mine is located approximately 6 miles (9.7 km) southwest of the City of Craig and approximately 16 miles (25.7 km) west of the Town of Hayden. The mine is to the east of SH 13 in Moffat County. The Town of Hayden is within Routt County. **Table 3-18** details the populations of these communities. Ethnic demographics are further discussed in Section 3.13.

Table 3-18 Population Estimates

Community	2000 Census	2010 Census	2014 Estimate
Craig	9,189	9,464	8,846
Hayden	1,634	1,810	1,837

Source: U.S. Census Bureau 2013, 2015.

The population of Craig and Hayden have been increasing since 2000, with 3 percent total growth from 2000 to 2010 for Craig, and 11 percent growth from 2000 to 2010 for Hayden. Growth for Hayden is expected to turn static, while it is estimated that Craig has experienced negative growth since the 2010 census.

Per capita personal income has grown in both Craig and Hayden between 2000 and 2014, with Craig and Hayden recording 26 and 39 percent growth, respectively. The growth rate for Craig was less than the State of Colorado average. Per capita personal income is shown in **Table 3-19**. Mean household income grew for each municipality during the 2000 to 2014 timeframe with the City of Craig recording higher mean household income growth than the Town of Hayden, but less than the State of Colorado. Mean household income growth for the Town of Hayden also was lower than the average for the State of Colorado. Mean household income is portrayed in **Table 3-20**.

Table 3-19 Per Capita Personal Income

Community	2000	2014 Estimate	% Change
Craig	$18,140	$22,936	26
Hayden	$18,574	$25,795	39
State of Colorado	$24,049	$31,674	32

Source: U.S. Census Bureau 2015.

Table 3-20 Mean Household Income

Community	2000 Estimate	2014 Estimate	% Change
Craig	$45,836	$59,186	29
Hayden	$47,317	$59,718	26
State of Colorado	$59,313	$79,990	35

Source: U.S. Census Bureau 2015.

The three largest employment sectors in Craig in terms of employment are educational services and health care, retail trade, and arts and entertainment, respectively. The agriculture, forestry, fishing and hunting, and mining sector is Craig's fourth largest employment sector. The three largest employment sectors in Hayden are education and health care, retail trade, and construction. The agriculture, forestry, fishing and hunting, and mining sector is Hayden's fourth largest employment sector. The top three employment industries for the State of Colorado roughly mirror those of Craig and Hayden (U.S. Census Bureau 2013).

Both Moffat and Routt counties have recorded declining unemployment rates over the past several years as local and national economic conditions improved. The preliminary July 2015 unemployment rates for Moffat and Routt counties were 4.4 percent and 3.2 percent, respectively. The July 2015 preliminary unemployment for the State of Colorado was 3.8 percent (U.S. Bureau of Labor Statistics 2015). The

unemployment scenario for mining is less optimistic as Bureau of Economic Analysis data indicates a decrease of 10 percent in total full- and part-time employment within the mining sector from 2010 to 2014 (Bureau of Economic Analysis 2015). Routt County also recorded a decrease in employment of 2 percent during the same timeframe. Moffat County experienced a decline in employment related to workers in the oil and gas and residential and commercial construction industries as workers have left Moffat County to seek jobs elsewhere as a result of declines in these industries. Such worker relocations are not typically reflected in employment statistics as workers leave the area for work elsewhere instead of filing for unemployment in the area (Comstock/Grobe Moffat County, Pers. Comm. 2015)

Craig and Hayden median home price growth rates have exceeded that of the State of Colorado, as has the growth rate for median rent (**Table 3-21**); however, more recent data suggests a downturn in home prices, as the Craig Chamber of Commerce reports its fourth quarter median price of home sales in Moffat County at approximately $130,000 (Craig Chamber of Commerce 2014). Recent data on real estate website, Zillow (Zillow.com) also reflects a potential softening of local home prices (Zillow 2015).

Table 3-21 Housing Characteristics

Community	2000 Median Home Price	2010 Median Home Price	Percent Change	2000 Median Rent	2010 Median Rent	Percent Change
Craig	$101,900	$160,100	57	$450	$719	60
Hayden	$132,100	$216,800	64	$662	$882	33
State of Colorado	$166,600	$236,600	42	$671	$852	27

Source: U.S. Census Bureau 2013.

The mining industry in Moffat County is the largest industry in the county in terms of employee compensation, consisting of 19 percent of total county private nonfarm compensation (Bureau of Economic Analysis 2014). The Trapper Mine directly employed 192 workers as of the end of 2014. These workers were mostly from the municipalities of Craig and Hayden, in Moffat and Routt counties, respectively. In 2014, TMI expended approximately $19.7 million in gross wages, including benefits (TMI 2015). This amount rose to $20.3 million in 2015.

Trapper Mine supports many businesses both directly and indirectly. A number of industries directly provide services to the daily operation of the mine, while a number of industries, such as retail and the accommodation industry, are indirectly supported by the mine. The local expenditures on goods and services within the City of Craig in 2015 totaled $6.0 million. Total 2015 expenditures on goods and services in neighboring Routt and Rio Blanco counties totaled $5.2 million and $83,000, respectively (TMI 2015). The Economic Development Council of Colorado (EDCC) prepared a report detailing the economic activity within the Yampa-White River Region of Northwest Colorado (EDCC 2015). The most recent data available at the time of the report was for 2012. Moffat County's coal mining sector contributed about $229 million, or 31 percent of the county Gross Regional Product of $742 million (EDCC 2015). Coal mining in Moffat County also directly employed 776 workers for a total of 1,144 direct and indirect workers supported by the mining industry, providing direct labor income of $61.1 million and total income of $75.3 million. Routt County's coal mining sector contributed about $191 million, or 12 percent of the county gross regional product of $1,618 million (EDCC 2015). Coal mining in Routt County directly employed 586 workers for a total of 1,152 direct and indirect workers supported by the mining industry, providing direct labor income of $62.4 million and total income of $93.3 million (EDCC 2015). Coal mining in Rio Blanco also contributes revenue and employment to the local economy. These contributions are detailed in the Colowyo Coal Mine South Taylor/Lower Wilson Permit Expansion Area Project, Federal Mining Plan Modification EA (OSMRE 2015).

Coal production in Moffat County has been declining over the past several years.Production declined by 89,000 tons, or 21 percent, in September 2015 compared to September 2010 (CDRMS 2015). Total coal

production for the full year 2014 was approximately 4.4 million tons, down 8 percent from 4.8 million tons in 2010. This represents an average monthly decline in production of 34,000 tons, from 400,000 average monthly tons in 2010 to 366,000 average monthly tons in 2014 (CDRMS 2015).

A national program, established by SMCRA , is in place that includes an inventory of high priority abandoned mine sites, a reclamation fee paid by the coal mining industry, and a funding mechanism comprised largely of grants to states and Indian tribes with approved OSMRE programs to provide clean-up of these abandoned mines. This fee is known as the Abandoned Mine Lands fee (USDOI 2015). During the 2010 to 2015 timeframe, Trapper Mine paid a total of $3.9 million in federal Abandoned Mine Land fees. A federal coal lease royalty tax rate of 12.5 percent is applied to mined coal per 43 CFR 3473. Of the revenue collected through federal mineral lease royalties, 49 percent is distributed to the state and 51 percent to the federal government. The federal government disperses approximately 78 percent of its share to the Reclamation Fund for western water projects, and 22 percent to the General Fund of the U.S. Treasury. The state distributes its portion to the State Public School Fund (48.3 percent), Colorado Water Conservation Board (10 percent), school districts (1.7 percent). Approximately 40 percent of the state's portion is directed to the Local Impact Program through the Department of Local Affairs (DOLA). Trapper Mine paid a total of $36.9 million in federal mineral lease royalties during the 2010 to 2015 timeframe, 49 percent ($18.1 million) of which was distributed to Colorado. In addition, from 2010 to 2015, Trapper Mine paid approximately $1.5 million to the CSLB for State-leased coal with the money used to support public schools.

Colorado severance tax on surface-mined coal is 36 cents per ton produced, with the first 300,000 tons produced per quarter exempt (Section 39-29-106, CRS). Of the state severance tax received, half is distributed to the DNR and the remaining half to the DOLA. DOLA then distributes funds to local impact grants and counties based on the number of production employees living in the energy-impacted communities, as well as permits, production, population and highway user miles (Colorado 2010; Colorado DOLA 2015). Trapper Mine paid a total of $4.8 million from 2010 through 2015 in severance tax, averaging $796,500 a year, of which a portion was distributed to local governments and impact grant funds. Trapper Mine also paid $8.0 million in property tax during the 2010 to 2015 timeframe (TMI 2015). It also is estimated that TMI paid Moffat County over $1.36 million in tax revenue for the 2015 tax year (TMI 2015).

TMI is socially involved in the community in a number of ways. Local community participation has included reclamation of a pit resulting in a waterfowl sanctuary which will become a part of the South Beach State Park, construction of the Trapper Fitness Center for the benefit of local residents, donation of labor and equipment for Loudy-Simpson Park soccer field construction, construction of the "back nine" at the Yampa Valley golf course, construction and maintenance of local athletic facilities, and educational mine tours. Further discussion of TMI community involvement is included in Section 4.12.1.

3.13 Environmental Justice

Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (USEPA1998). EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, tasks "each Federal agency [to] make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations."

According to the CEQ and USEPA guidelines established to assist federal and state agencies, a minority population is present in a Project Area if:

- The minority population of the affected area exceeds 50 percent; or
- The percentage of the minority population in the affected area is meaningfully greater than the percentage in the general population.

Of the total estimated 2014 population of Moffat County, the large majority classify themselves as White (82.2 percent). The second largest ethnic/racial group is Hispanic or Latino (14.3 percent) followed by those who classify themselves as American Indian or Alaska Native (1.5 percent), and Asian (0.8 percent) (U.S. Census Bureau 2015). All of the minority populations within Moffat County are below the Colorado average,

The guidance recommends that low-income populations in an affected area be identified using the annual statistical poverty thresholds from the Bureau of Census. In identifying low-income populations, agencies may consider a community as either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure. In 2014 the U.S. Census Bureau annual income poverty threshold for a family of three was $18,850 (U.S. Census Bureau 2014). The percent of the population living below the poverty level in Moffat County is 11.5 percent. The state average is 13.2 percent (U.S. Census Bureau 2015). The number of people living below the poverty level in Moffat County is well below the state average. Additionally, all of the minority populations within Moffat County are below the Colorado average. These factors indicate the lack of an environmental justice population in the study area. The analysis of environmental justice populations was not carried forward into Chapter 4.0 because of the lack of an environmental justice population in the study area.

3.14 Recreation

Popular forms of recreation on public lands in the region include boating and river based recreation, camping, hiking, horseback riding, hunting, mountain biking, off-highway vehicle use, and wildlife viewing on public lands managed by the BLM. Most of these activities occur west of the Town of Craig where public lands are more prevalent; however the Yampa River does flow immediately to the west of the Craig Station approximately 4.5 miles (7.2 km) north of the Project Area. Recreation on the Yampa River has been managed by CPW (previously the Colorado Division of Wildlife) since 1999 under an agreement with the BLM (BLM 2010). Boating activities on the Yampa River are typically limited to late spring and early summer when spring runoff occurs and there is peak water flow. By July, the irrigation water demand decreases the water levels and boating becomes less feasible.

The land within the Project Area is private and state-owned and therefore not open to public recreation except when landowners agree to lease portions of their land for specific activities such as for hunting or fishing. Recreational activities are not allowed within the Project Area while active mining operations are in process due to public safety concerns. All routes that provide access to the Project Area are gated and require keys or access codes to open. Because public land recreational opportunities do not exist within the Project Area or vicinity, recreation was not carried forward for further analysis in this EA.

3.15 Visual Resources

OSMRE does not have its own visual standards and utilizes the BLM visual management standards to assess visual impacts of projects. The BLM manages visual resources using an inventory system to identify visual values and minimize visual impacts to the overall landscape character of federally managed lands.

3.15.1 BLM Visual Resources Management

3.15.1.1 Visual Resource Inventory

The Visual Resource Inventory (VRI) process consists of scenic quality evaluations, analysis of scenic sensitivity, and delineation of distance zones. The combination of these three factors result in

BLM-administered lands being placed in one of four VRI classes to inform the RMP decision makers in assigning the Visual Resource Management (VRM) class. VRI Class I is assigned to lands where previous management decisions have determined that a natural landscape is to be maintained, such as for national wilderness areas and national scenic and wild rivers. Classes II through IV are assigned through a combined assessment of scenic quality, sensitivity levels and distance zones (BLM 1986).

3.15.1.2 Visual Resource Management

For BLM-managed lands, VRM classes are assigned through RMPs with consideration of the actions proposed during the RMP process. All actions that would result in surface disturbance must consider VRM objectivesto assess the level of allowable change to the viewshed. Per the BLM Manual H-8410-1 (BLM 1986) the VRM Class objectives are defined below:

- **Class I**: Preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
- **Class II:** Retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- **Class III**: Partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- **Class IV**: Provide for management activities which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

The BLM LSFO RMP states that areas suitable for coal mining are generally classified as VRM Class IV (BLM 2011).

3.15.1.3 Visual Resources Surrounding the Project Area

Trapper Mine is located in the Intermountain Semidesert Province Ecoregion on the northern slope of the Williams Fork Mountains with the Yampa River to the west and north. The Williams Fork River runs south of the SMCRA permit area. The mine area ranges from approximately 6,500 to 7,800 feet (1,981 to 2,377 km) amsl and is dominated by a mountain shrub community to the east that transitions into a sagebrush steppe community in the western portion.

3.15.1.4 View Points

Viewers of the Trapper Mine Project Area would be travelers on U.S. Highway 40, SH 13 and SH 394, and CRs 35, 93, and 107 (see Section 3.17) in the vicinity of the Project Area where roads are traversing comparatively higher or more open ground.

Some recreationists may experience views of Trapper Mine while engaging in disbursed recreation on public lands. This would require an individual to be on relatively high or open ground. The draglines would be visible from portions of the Yampa River for approximately 5 miles (8 km) east of Craig, intermittent areas of the Yampa River for 8 miles (13 km) west of Craig, and intermittent areas north of Craig. Trapper Mine would not be visible from the Williams Fork River since mining occurs on the north side of the Williams Fork Mountains. The dragline booms would be visible but would likely blend with the exposed soils in a manner that would limit the ability to distinguish the booms. However, as mining

activitiesmove up the hillside, the dragline house, which is painted white, would become more visible because the color would contrast with the exposed soils.

3.15.2 Lighting

Trapper Mine lies in the light shadow of the Craig Station. The Craig Station is the dominant nighttime light source in the vicinity of the City of Craig. Lighting within the Trapper Mine is limited to active mining areas. All mining equipment has lights that are used at nighttime. Portable light plants also are used within the active mining areas and are moved as needed to ensure working areas are well lit. Lighting for nighttime activities is required for worker safety. All lighting is directed downward to provide the maximum amount of light for work areas and least visual disturbance outside the work area..

There are no lights on the haul roads. The main office complex located west of the Project Area does have nighttime lighting that is typical of an office complex.

3.16 Paleontological Resources

The Potential Fossil Yield Classification (PFYC) system is used by the BLM and USFS to provide an assessment method to determine the potential for fossils in geologic units (BLM 2007). The PFYC system includes the following classifications:

- **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 significant non-vertebrate fossils.
- **Class 3** - Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence. A Class 3 formation may have unknown potential.
- **Class 4** - Class 4 geologic units are Class 5 units that have lowered risks of human-caused adverse impacts or lowered risk of natural degradation. Proposed ground-disturbing activities would require assessment to determine whether significant paleontological resources occur in the area of a Proposed Action and whether the action would impact the resources.
- **Class 5** - Highly fossiliferous geologic units that regularly and predictably produce vertebrate fossils or scientifically significant non-vertebrate fossils and that are at high risk of natural degradation or human-caused adverse impacts.

The higher the PFYC number, the higher the fossil yield potential and greater sensitivity to adverse impacts. The Williams Fork Formation in northwestern Colorado has yielded valuable fossils including dinosaurs, other vertebrates, fossil tracks, and plants (Sullivan and Lucas 2006). Fossils that have been observed at the Trapper Mine include mollusks, evidence of burrowing animals in soft sediment (bioturbation), angiosperm leaf impressions, in situ tree stumps, and root casts (Massoth 1982). Because of the high-potential for important fossils in the Williams Fork Formation, the BLM has assigned a PFYC system rating of 5 (BLM 2010). The Lewis Shale that outcrops within the mine permit area has a PFYC rating of 3. TMI reports minimal fossil finds (Hinkemeyer Pers. Comm., 2015). No pre-blasting paleontological surveys have been performed so information on actual fossil yield is limited.

3.17 Access and Transportation

Trapper Mine is located approximately 6 miles south of the City of Craig. The primary access to the mine is from U.S. Highway 40 (east to west route) to SH 13 (north-to-south- route). SH 394 (east-to-west route) runs from Craig eastward and is located east of the Trapper Mine. The 2014 Annual Average Daily Traffic (AADT) count (Colorado Department of Transportation [CDOT] 2015) for U.S. Highway 40 varies depending on which side of the intersection with SH 394 counts are taken at. West of the intersection, the AADT is 5,200 vehicles of which 8.7 percent are commercial-size trucks. East of the

intersection the AADT increases to 7,200 with 5.3 percent commercial-size trucks. The 2014 AADT for SH 13 and 394 were recorded at 5,000 and 4,400 vehicles, respectively, with 8.6 and 3.6 percent, respectively, commercial-size trucks. Trapper Mine is accessed from CR 107 (off SH 13), which becomes a private road shortly after turning off SH 13. Other county roads that terminate at the mine permit boundary include CRs 35, 93, and 107, which terminate at locked gates. CR 33 runs adjacent to the eastern edge of the SMCRA permit boundary. CR 177 once led all the way to the Trapper Mine SMCRA permit boundary but has since been abandoned.

Trapper Mine-related traffic outside of the SMCRA permit boundary typically consists of passenger vehicles for commuting to work and trucks delivering supplies to the mine. Coal is delivered from the Trapper Mine to the Craig Station via a private road. Trucks haul CCR back to the mine for placement in areas outside of the Project Area via the same private road. That road is located partially within the SMCRA permit boundary and partially within the boundary of the Craig Station. The transportation of coal from the mine to the power plant requires 27,368 truck trips per year. Deliveries of fly ash from the power plant to the mine require 9,858 truck trips per year (Air Resource Specialists 2015). The mine employs approximately 191 employees and operates 7 days per week on 8-, 10-, and 12-hour shifts (TMI 2015); when shift changes occur, traffic necessary to transport employees to work and employees from work occur over a condensed period of time.

3.18 Solid Waste

Solid waste is defined by the Resource Conservation Recovery Act (RCRA) as a broad range of materials that include garbage, refuse, wastewater treatment plant sludge, non-hazardous industrial waste, hazardous waste, and other materials (solid, liquid, or contained gaseous substances) resulting from industrial, commercial, mining, agricultural, and community activities (USEPA 2011). Solid waste includes hazardous waste and non-hazardous waste and is regulated under different subtitles of the RCRA. Non-hazardous waste is regulated under RCRA Subtitle D and hazardous waste is regulated under Subtitle C.

The Trapper Mine generates mostly non-hazardous solid waste (TMI 1981 et seq.). The mine also generates small amounts of hazardous waste and is registered as a Conditionally Exempt Small Quantity Generator (CESQG) (USEPA 2015a). Under the generator requirements for a CESQG, no more than 2,200 pounds (1,000 kilograms) of hazardous waste can be stored onsite at any given time. The hazardous waste is disposed at permitted offsite facilities.

Non-hazardous waste consists of lumber, concrete, tires, office waste, empty barrels, oil filters, and rags. Most of these materials can be disposed in pits under a landfill permit (or Certificate of Designation) that was granted by Moffat County in 1980 and 1981. Scrap iron is recycled if it is recoverable. If it cannot be recovered, scrap iron is placed in the landfill. Petroleum waste including waste oil and lubricants are recycled or blended into the mine's petroleum supply. Shop wash that may contain small amounts of petroleum is directed through drains into a retention pond where oil is separated from the water and the water is allowed to be discharged (TMI1981 et seq.).

Another major waste stream is utility waste that is comprised of flyash, bottom ash, and scrubber sludge from the Craig Station. These utility wastes are generated from the burning of coal and are collectively referred to as CCR. CCR are placed into pits during backfilling or placed and encapsulated into spoil piles. The CCR placement pits are located outside of the Project Area but represent a potential indirect effect as a result of the mining operation. An annual average of 507,000 tons of CCR has been disposed at the mine since 1999 (TMI 2015). The placement of CCR into mine pits is regulated by rules of various agencies including the CDRMS, CDPHE, Moffat County, and the CSLB (TMI 1981 et seq.). The CDPHE has primacy from the USEPA for implementation of the RCRA rules. In order to conduct mine-filling, the CDRMS requires that applicants conduct a baseline groundwater study to describe the hydrologic setting, define the chemical and physical characteristics of the CCR and overburden, and assess the leaching potential of the CCR. The CCR at Trapper Mine were subjected to leach testing and determined to present a low potential for toxic metals to be leached from the materials (TMI 1981 et seq.). An

assessment of the percolation rate of the groundwater also was conducted to determine the potential for the movement of contaminants if leaching of the material were to occur. The percolation analysis indicated that movement of any leached contaminants to the groundwater table would be very slow. In addition, the material would be less likely to leach because of relatively low permeability of the CCR.

Regulations require that the CCR be isolated from surface and groundwater. The CCR must be placed above the expected post-mining groundwater level and no less than 50 feet (15 meters) horizontally from surface drainages. The CCR must be covered with a minimum of 6 feet (2 meters) of cover. Groundwater monitoring is required before and after CCR are placed into pits.

The USEPA revised disposal regulations for CCR in 2015 and determined that CCR would be regulated as non-hazardous waste under Subtitle D versus a hazardous waste under Subtitle C. Although CCR will not be regulated as a hazardous waste, the USEPA has issued new requirements for existing CCR landfills regarding certification, operating criteria, groundwater monitoring and corrective action, and closure and post-closure care. However, according to the USEPA, “the final rule does not apply to CCRs placed in active or abandoned underground or surface coal mines, consistent with the approach in the proposed rule” (USEPA 2015b). Management of the placement of CCR in surface coal mines will be handled through separate regulatory actions by the DOI and USEPA, but the agencies are expected to work cooperatively to develop regulations that are protective of public health and the environment.

TMI submits Toxic Release Inventory (TRI) reports to the USEPA each year mainly because of power plant CCR that are disposed within the SMCRA permit boundary. The TRI reporting is required under Section 313 of the Emergency Planning and Community Right-to-Know Act Toxic Chemical Release Inventory. CCR contains constituents that exceed, on an annual basis, the threshold reporting values metallic compounds (USEPA 2015a). TMI falls under the “otherwise use” category of TRI reporting that includes on-site landfilling of CCR and must report any TRI compound or chemical that is present in quantities that exceed 10,000 pounds, with the exception of mercury (which has a threshold reporting limit of 100 pounds) (USEPA 2000). Land Project Area, even in a permitted landfill, is considered a release to the environment and therefore reportable under TRI. Other minor contributors to releases at the mine are particulate emissions to the air.

3.19 Noise

The USEPA defines environmental noise as the amplitude, duration, and the character of sounds from all sources. Noise can be considered objectionable based on intermittence, beat frequency, shrillness and level. Noise is measured in a logarithmic unit called the decibel (dB), and is most often measured in A-weighted decibels dB(A). A-weighted decibels are most closely related to human perception of noise due to the removal of low frequency sound that is less preceivable to human auditory senses.

Many factors affect outdoor noise propagation and reception including manmade features, environments, and terrain. Vegetation can play a noticeable role in how efficiently sound travels in open environments. Dense trees and large shrubs can reduce noise levels substantially, while lakes and ponds can enhance acoustical propagation over long distances. Terrain that is flat with hard groundcover allows sound to travel relatively unobstructed. Hilly terrain and soft ground cover can reduce sound levels over distance. Barriers and berms can be constructed to reduce noise associated with highways and some types of industrial, mining, and power generating activities.

Ambient noise is the noise present in any given environment, and is often unnoticed. Noticeable noise levels can be considered a nuisance, such as traffic or loud music, especially if the noise interferes with or disrupts noise-sensitive activities, such as sleep, learning, entertainment, or enjoyment of outdoor activities. Noise can become damaging at levels exceeding 85 dB(A). At this level, noise can cause a loss of hearing if exposure occurs over extended periods. If noise levels reach 150 dB(A), eardrums can rupture. Example noise levels are outlined in 10 dB(A) intervals in **Table 3-22** (CDOT 2015).

Table 3-22 Example Noise Sources and Sound Levels

Noise Source	Sound Level dB(A)	Noise Source	Sound Level dB(A)
Threshold of Hearing	0	Freeway Traffic at 50 feet	70-80
Remote Outdoor Location (no wind)	20-30	Heavy Truck/Motorcycle at 25 feet	85-95
Living Room	35-45	Shouting at 5 feet	95-105
Quiet Neighborhood	45-55	Commercial Jet	110-120
Conversational Speech at 5 feet	55-65		

The State of Colorado has a noise statute that outlines the maximum permissible noise levels for land use zoning as shown in **Table 3-23**. In addition to these levels, noise can exceed the maximum sound levels by 10 dB(A) for up to 15 minutes in a 1-hour period. Periodic, impulsive, or shrill noises are considered a nuisance when the dB(A) level is 5 decibels lower than the levels in **Table 3-23** (CRS 25-12-103).

Table 3-23 Colorado Maximum Permissible Noise Levels

Zone	Maximum Sound Level dB(A)	
	7:00 AM to 7:00 PM	7:00 PM to 7:00 AM
Residential	55	50
Commercial	60	55
Light Industrial	70	65
Industrial	80	75

Ambient noise for the Project Area includes environmental natural sources such as wind and wildlife as well as manmade noise sources such as existing mining activity, nearby roads, rail lines and aircraft overflights. In addition, the Project Area is used for oil and gas production activities which contribute to ambient levels. Current mining activities that contribute noise include pit and surface types of mining, haul road traffic, and reclamation activites. The nearest sensitive noise receptor is an individual home that is 0.46 mile (0.74 km) from the major haul road and 0.86 mile (1.4 km) from the pit and most recent reclamation areas. The next closest sensitive receptor is more than 1.0 mile (1.6 km) from the Project Area.

Major noise emissions from the Project would be equipment associated with surface mining and reclamation activities. Such equipment is listed in **Table 3-24** with the associated noise levels. Equipment noise includes scraping and dumping of materials, backup beepers, blast warning sirens, and large engines. Not all equipment will operate in tandem and additional noise sources will be present including impulsive noise from blasting within the mine pit.

Table 3-24 Open Pit Mining Equipment Noise Levels

Noise Source	Noise Level dB(A)[1]	Noise Source	Noise Level dB(A)[1]
Draglines	92	Water Trucks	68
Overburden/Parting Drills	84	Fuel and Lube Trucks	68
Track Dozers	99	35-ton Crane	97
Rubber Tired Dozers	85	Backhoe	80
Motor Graders	85	Service Truck	65

Table 3-24 Open Pit Mining Equipment Noise Levels

Noise Source	Noise Level dB(A)[1]	Noise Source	Noise Level dB(A)[1]
Scrapers	85	Pickups/SUVs	55
Hydraulic Excavators	84	Farm Tractors	84
Front-end Loaders	79	Tractor and 200-ton Lowboy Trailer	91
Coal Drills	98	Compactor	80
Haul Trucks (240-, 95-, and 55-ton)	84		

[1] Federal Highway Administration 2015; Sensogut 2007; Suter 2002.

Trapper Mine and the Project Area are located in a nonresidential, undeveloped area. This area has hilly terrain with small valleys becoming flat to the north. To the south and east, large hills and valleys occur for miles, and the Yampa River is approximately 4.5 miles (7.2 km) south. Directly west of the Project Area, reclamation exists from past mining and occurs on slopes. It is vegetated mainly with grasses and small shrubs.

Noise levels within the Project Area would increase with proximity to active mining areas. The degree of increase at any one location would depend on the distance from the source, ambient noise levels and factors influencing acoustical propagation, such as obstructions or acoustically absorptive ground cover. The various stages of the mining process will require different equipment to be in use. The type and number of equipment used at any one time will produce varying noise levels. Mining noise transmission would be limited by the mining activities as well. The depth of mining within the pit will create a barrier for noise as mining activities go deeper creating a natural wall between activity and the environment. Reclamation is being performed on the western side of the mine as extraction opportunities move eastward. These activities include contouring the land surface, replacing topsoil, grading, and reseeding. Reclamation will occur at grade and will contribute to mining noise. Traffic from haul roads will contribute to noise production in the area as well.

3.20 Livestock Grazing

There is minimal active livestock grazing within the Project Area or within the active mining areas of the SMCRA permit boundary. Private livestock grazing does occur on TMI-owned lands which have had Phase 3 bond release within the SMCRA permit boundary and on TMI-owned lands outside and adjacent to the SMCRA permit boundary.

The BLM is responsible for managing portions of public lands for livestock grazing by permitting animal unit months in designated grazing allotments. One of the primary land uses within the LSFO is livestock grazing. Sheep and cattle have historically grazed along north-facing slopes where the vegetation is more plentiful due to greater soil moisture relative to soil on south-facing slopes. There are no BLM administered grazing allotments within the Project Area; however, three allotments are immediately adjacent to the permitted boundary. They are the South Big Bottom, East Ute Gulch, and the Upper Castor Gulch allotments. The South Big Bottom Allotment supports four cattle during the month of May on 80 acres;the East Ute Gulch Allotment supports 19 cattle from late May through October 31 on 1,462 acres; and the Upper Castor Gulch Allotment supports 12 cattle from early June to mid-November on 468 acres (GeoCommunicator 2015).

Surface disturbance would not affect any of the adjacent BLM allotments or their AUM production as mining activities would not occur within the allotments. The prevailing wind direction is from the southwest; therefore, fugitive dust emissions would be blown away from the allotments to the northeast the majority of the time. Because of the lack of public grazing lands within or adjacent to the Project Area, grazing was not carried forward for further analysis in this EA.

3.21 Prime Farmlands

The CSCMRA (CRS 34-33-101 et seq.) requires surface coal mining and reclamation applicants to conduct a reconnaissance inspection within the SMCRA permit area for the existence of prime farmland historically used for cropland and submit the results to the U.S. Soil Conservation Service. Prime farmland is defined by the USDA as land that has the most beneficial combination of physical and chemical characteristics for the production of food, feed, fiber, and oilseed crops and is available for use (USDA 2015). The physical and chemical characteristics typically include acidity/alkalinity, sodium content, soil moisture and permeability, erosion potential, slope, and length of the growing season (USDA 2015).

In the Proposed Decision and Finding of Compliance for the Trapper Mine PR07 (CDRMS 2015) the CDRMS determined that no areas of prime farmland currently exist within the SMCRA permit area including within the Project Area. Therefore prime farmlands were not carried forward in this EA.

3.22 Alluvial Valley Floors

The CSCMRA (CRS 34-33-101 et seq.) defines alluvial valley floors (AVFs) as unconsolidated stream-laid deposits holding streams where water availability is sufficient for subirrigation or flood irrigation agricultural activities. This does not include upland areas overlain by colluvial deposits composed chiefly of debris from sheet erosion, deposits by unconcentrated runoff or slope wash, together with talus, other mass movement accumulation, and wind-blown deposits. The CSCMRA prohibits surface coal mining operations from interrupting, discontinuing, or precluding farming on alluvial valley floors that are irrigated or naturally subirrigated, excluding undeveloped range lands which are not significant to farming on said alluvial valley floors and those lands upon which the Colorado Mined Land Reclamation Board finds that the farming which will be interrupted, discontinued, or precluded is of such small acreage as to be of negligible impact on said land's agricultural production. The CSCMRA further prohibits surface coal mining operations from materially damaging the quantity and quality of surface water and groundwater systems that supply alluvial valley floors. These prohibitions do not apply to those surface coal mining operations which in the year preceding August 3, 1977, either produced coal in commercial quantities and were located within or adjacent to alluvial valley floors or had obtained permit approval to conduct surface coal mining operations within said alluvial valley floors. The CSCMRA further requires that surface coal mining and reclamation operations preserve throughout the mining and reclamation processes the essential hydrologic functions of alluvial valley floors. The CSCMRA allows surface coal mining and reclamation permit applicants that propose to operate in or adjacent to a valley holding a stream or any streams to request the regulatory authority to submit a written alluvial floor determination with respect to the valley floor. The determination is based on available data, field studies, or a combination of available data and field studies.

In the Proposed Decision and Finding of Compliance for the Trapper Mine PR07 (CDRMS 2015) the CDRMS determined that there are two alluvial valleys that meet the AVF criteria: the Yampa River in the Big Bottom area and the Williams Fork River near its confluence with the Yampa River. Due to a lack of adequate available water for crop production, the Flume, Johnson, No Name, and Pyeatt gulches have been determined to not have AVFs. This also applies to a 20-acre portion of the upper Flume Gulch that was previously determined to contain an AVF.

Impacts to the Yampa River AVF were determined to be negligible by the CDRMS. Drainages that flow from the SMCRA permit area to the Yampa River AVF contribute very little surface water to the Yampa River (approximately 0.07 cfs per square mile) and the groundwater contribution is so minor that it is undetectable (CDRMS 2015). The greatest contributor of water to the Yampa River AVF is the Yampa River, which loses water to the AVF as it flows past the Trapper Mine. Additionally, surface disturbing activities associated with the Trapper Mine occur at least 1 mile (1.6 km) from the southern boundary of the AVF. For these reasons the CDRMS determined that no activities within the Trapper Mine permit boundary would impact farming on the Yampa River AVF.

Impacts to the Williams Fork River also were determined to be negligible by the CDRMS. The Williams Fork River is located to the south of the proposed permit area. Surface water that flows from the Trapper Mine is limited almost exclusively to spring snowmelt. Any discharge from sediment ponds would flow down the drainages and infiltrate the permeable Twentymile Sandstone outcrop, which dips northward away from Williams Fork River and underneath Trapper Mine leaving almost no chance for surface or subsurface flow to reach the Williams Fork River (CDRMS 2015). Additionally, water in the sediment ponds is typically evaporated. Therefore, the CDRMS determined that no activities within the Trapper Mine SMCRA permit boundary would impact farming on the Williams Fork River AVF. Since neither AVF would be affected by the Trapper Mine, AVFs werenot carried forward in this EA.

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4.0 Environmental Consequences

4.1 Introduction

This chapter discusses the potential direct and indirect effects of Alternative A, the Proposed Action, and Alternative B, Disapproval of the Mining Plan Modification by the ASLM. Alternative C, the No Action Alternative, is not evaluated in detail because the environmental consequences of Alternative C would fall within the range of impacts described for Alternative A and Alternative B, depending on when Alternative C is implemented. Each of these alternatives is described in Chapter 2.0. The information about the existing condition of the environment from Chapter 3.0 was used as a baseline to measure and identify potential impacts from the project. Mitigation measures also were considered and incorporated, including current mitigation measures being practiced by TMI, as well as potential future mitigation measures, as appropriate.

Direct impacts are defined as those impacts which are caused by the action and occur at the same time and place (40 CFR 1508.8(a)). Indirect impacts are those that are caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable (40 CFR 1508.8(b)).

An impact, or effect, is defined as a modification to the environment brought about by an outside action. Impacts vary in significance from no change, or only slightly discernible change, to a full modification or elimination of the resource. Impacts can be beneficial (positive) or adverse (negative). Impacts are described by their level of significance (i.e., major, moderate, minor, negligible, or no impact). For purposes of discussion and to enable use of a common scale for all resources, resource specialists considered the following impact levels in qualitative terms.

- Major Impact: Impacts that potentially could cause irretrievable loss of a resource; significant depletion, change, or stress to resources; or stress within the social, cultural, and economic realm.
- Moderate Impact: Impacts that potentially could cause some change or stress to an environmental resource but the impact levels are not considered significant.
- Minor Impact: Impacts that potentially could be detectable but slight.
- Negligible Impact: Impacts in the lower limit of detection that potentially could cause an insignificant change or stress to an environmental resource or use.
- No Impact: No discernible or measurable impacts.

Impacts can be short-term meaning these impacts generally occur over a short period during a specific point in the mining process and these changes generally revert to pre-disturbance conditions at or within a few years after the ground disturbance has taken place. Long-term impacts are defined as those that substantially would remain beyond short-term ground-disturbing activities. Long-term impacts would generally last the life of the Project and beyond.

The impact analysis applies quantitative thresholds when available, to determine the level of significance. Some resource areas are more conducive to quantification than others. For example, impacts on vegetation can be characterized partly using acreage, and air quality can be measured against air quality standards. Evaluations of some resources are inherently difficult to quantify with exactitude. In these cases, levels of impact are based on best available information and professional judgment.

Several resource topics that were discussed in Chapter 3.0 are not discussed in this chapter because these resources do not occur in the study area or are not affected by the alternatives. These resource

topics include Environmental Justice, Recreation, Livestock Grazing, Prime Farmlands and Alluvial Valley Floors. For additional information on these resources refer to **Table 3-1** and the resource-specific discussions in Chapter 3.0. Cumulative effects from of the alternatives are discussed in Chapter 5.0.

4.1.1 Summary of Direct and Indirect Environmental Impacts

Table 4-1 summarizes and compares the potential direct and indirect environmental impacts associated with Alternative A, the Proposed Action and Alternative B, Disapproval of the Mining Plan Modification by the ASLM. Alternative C, the No Action Alternative also is shown on the table with the range of potential impacts.

Table 4-1 Comparison of Direct and Indirect Impacts

Resource	Alternative A - Proposed Action	Alternative B – Disapproval of the Mining Plan Modification by the ASLM	Alternative C – No Action
Topography	After reclamation, direct impacts to topography would be negligible in the long-term. There would be no indirect impacts to topography.	Same as Alternative A.	Same as Alternative A.
Air and Climate Resources			
Direct mining criteria emissions	In the worse-case mining year ((Year 2020) direct mining emissions are below standards for PM_{10}/$PM_{2.5}$ and combustion emissions (NO_X, SO_2, CO, and VOCs) and impacts to air quality would be short-term during the life of mining and negligible.	Direct mining emissions would be reduced by approximately 40 percent based on the expected reduced mining rate and would continue to be below the standards. Impacts to air quality would be short-term during the life of mining and negligible.	Direct mining emissions would range from those outlined for Alternative A to a reduction of approximately 40 percent based on the reduced mining rate of Alternative B. These impacts would be short-term during the life of mining and negligible.
Direct GHG emissions	GHG emissions from mining would be approximately 482,014 metric tons CO_{2e} in the worst case year (2020). GHG impacts would be minor and could be long-term but would diminish after mining ceases.	Direct GHG emissions would be reduced by an estimated 40 percent based on the expected reduced mining rate. GHG impacts would be minor and could be long-term but would diminish after mining ceases.	GHG emissions would range from a maximum of 482,014 metric tons CO_{2e} to approximately 40 percent less than that number based on a reduced mining rate of Alternative B. These impacts would be minor and could be long-term but would diminish after mining ceases.
Indirect coal combustion criteria emissions	Emissions from Craig Station attributable to Trapper Mine coal would be 1,468 tpy SO_2, 7,445 tpy NO_X, 650 tpy CO, and 78 tpy VOCs. Following installation of improved emissions controls for NO_X expected emissions	Emissions from Craig Station attributable to Trapper Mine coal would be reduced by an estimated 40 percent based on the expected reduced mining rate; however, overall emissions from the Craig	Indirect coal combustion emissions attributable to Trapper Mine coal would range from those outlined in Alternative A to an estimated 40 percent reduction based on the reduced mining rate of Alternative B. The

Table 4-1 Comparison of Direct and Indirect Impacts

Resource	Alternative A - Proposed Action	Alternative B – Disapproval of the Mining Plan Modification by the ASLM	Alternative C – No Action
	attributable to Trapper Mine would be 1,145 tpy. The emissions attributable to Trapper Mine would be short term occurring over the life of the mine and would be negligible.	Station would remain unchanged. The emissions attributable to Trapper Mine would be short term occurring over the life of the mine and would be negligible.	emissions attributable to Trapper Mine would be short term occurring over the life of the mine and would be negligible.
Indirect combustion emissions from transport and placement of CCR	Emissions from transport and placement of CCRs from Craig Station at Trapper Mine would be 13.63 tpy PM_{10}, 2.53 tpy $PM_{2.5}$, 12.1 tpy NO_X, 1.5 tpy SO_2, 5.15 tpy CO, and 0.7 tpy VOCs. The emissions attributable to Trapper Mine would be short term occurring over the life of the mine and would be negligible.	Combustion emissions attributable to the transport of CCR from Trapper Mine coal would be reduced by an estimated 40 percent based on the reduced coal delivery rate; however, overall combustion emissions from CCR transport would remain unchanged. The emissions attributable to Trapper Mine would be short term occurring over the life of the mine and would be negligible.	Indirect coal combustion emissions from the transport and placement of CCR attributable to Trapper Mine coal would range from those outlined in Alternative A to an estimated 40 percent reduction based on the reduced mining rate of Alternative B. The emissions attributable to Trapper Mine would be short term occurring over the life of the mine and would be negligible.
Indirect combustion GHG emissions	Indirect GHG emissions from coal combustion and transport of CCR to placement location would be 5,342,951 tpy which represents approximately 4.1% of total Colorado GHG emissions based on 2010 data and 0.07% of national emissions based on 2010 data. GHG impacts would be minor and could be long-term but would diminish after mining ceases.	Indirect GHG emissions attributable to combustion of Trapper Mine coal and transport of CCR would be reduced by an estimated 40 percent based on the reduced mining rate, but overall GHG emissions from Craig Station would continue at the same rate. GHG impacts would be minor and could be long-term but would diminish after mining ceases.	Indirect GHG emissions from the combustion of Trapper Mine coal and transport and placement of CCR would range from those outlined in Alternative A to an estimated 40 percent reduction in based on the reduced mining rate of Alternative B. The emissions attributable to Trapper Mine would be minor and could be long-term but would diminish after mining ceases.
Indirect coal combustion mercury emissions	Indirect mercury emissions from coal combustion at the Craig Station attributable to Trapper Mine coal would be 8.23 lb/yr at the maximum mining rate of 2.6 mtpy. Impacts as a result of these mercury emissions are discussed below under indirect impacts to the	Indirect mercury emissions from combustion of Trapper Mine coal would be reduced by an estimated 40 percent due to the reduced mining rate but overall mercury emissions from coal combustion at the Craig Station would remain unchanged.	Indirect mercury emissions from the combustion of Trapper Mine coal would range from those outlined in Alternative A to an estimated 40 percent reduction based on the reduced mining rate of Alternative B. Impacts as a result of these mercury

Table 4-1 Comparison of Direct and Indirect Impacts

Resource	Alternative A - Proposed Action	Alternative B – Disapproval of the Mining Plan Modification by the ASLM	Alternative C – No Action
	yellow-billed cuckoo and Colorado River fish.	Impacts as a result of these mercury emissions are discussed below under indirect impacts to the yellow-billed cuckoo and Colorado River fish.	emissions are discussed below under indirect impacts to the yellow-billed cuckoo and Colorado River fish.
Geology and Minerals	Negligible to minor long-term impact to the overall geologic column by eliminating the column in the pit areas; no impact to mining of other minerals.	Same as Alternative A.	Same as Alternative A.
Water Resources			
Direct Surface Water Impacts	Negligible short- and long-term potential for direct impacts to surface water from changes in mine drainage patterns, sediment releases, spills, release of iron, selenium, TDS, and acid mine drainage.	Same as Alternative A.	Same as Alternative A.
Indirect Surface Water Impacts	Indirect impacts to the Yampa River from mercury releases from the Project Area and from coal combustion emissions cannot be determined based on existing information. Water diversion for use at Craig Station would have a negligible to minor long-term impact on instream flows in the Yampa River.	Same as Alternative A.	Same as Alternative A.
Direct Groundwater Impacts	Negligible short and long-term impacts to groundwater aquifers as a result of disruption during mining; negligible long-term impacts to water quality or quantity of springs in the Project Area vicinity; avoidance of impacts to senior water users through implementation of a water augmentation plan for water uses within the Project Area;	Same as Alternative A.	Same as Alternative A.

Table 4-1 Comparison of Direct and Indirect Impacts

Resource	Alternative A - Proposed Action	Alternative B – Disapproval of the Mining Plan Modification by the ASLM	Alternative C – No Action
Indirect Groundwater Impacts	Negligible long-term impacts to groundwater as a result of placement of coal combustion residuals within the SMCRA Permit Boundary. Negligible indirect impacts to the Yampa River from discharges of sediment or iron from the Project Area.	Same as Alternative A.	Same as Alternative A.
Soils	Negligible long-term impacts to soil resources upon completion of reclamation activities.	Same as Alternative A.	Same as Alternative A.
Vegetation	Impacts to vegetation would be minor and long-term until reclamation is complete.	Same as Alternative A.	Same as Alternative A.
Wetlands	No additional wetlands disturbance would occur.	The N Pit has been previously disturbed so there would be no new wetlands disturbance from re-mining in that pit. Detailed wetlands mapping has not occurred within the I Pit area so impacts to wetlands are unknown.	There would be no impacts from ongoing activities in the Project Area. If the approval is vacated, impacts from mining outside the Project Area in the I Pit are not known as detailed wetlands mapping has not occurred for this area.
Fisheries and Wildlife			
Direct Wildlife Impacts	Impacts to wildlife would be mitigated by contemporaneous reclamation, enforcement of posted speed limits, and, in the case of some species, the limited habitat available within the Project Area. Short-term negligible impacts to big game and migratory birds; short-term, minor impacts to raptors, small mammals and reptiles	Same as Alternative A.	Same as Alternative A.
Direct Fisheries Impacts	No direct impact to fisheries since there are no fish present in Project Area streams.	Same as Alternative A.	Same as Alternative A.

Table 4-1 Comparison of Direct and Indirect Impacts

Resource	Alternative A - Proposed Action	Alternative B – Disapproval of the Mining Plan Modification by the ASLM	Alternative C – No Action
Indirect Fisheries Impacts due to mining	Indirect impacts to fisheries from water quality discharges from the Trapper Mine would be short- and long-term and negligible based on the existing sediment control system and spill prevention and mitigation measures. Indirect impacts to Colorado River fishes as a result of mercury and selenium emissions cannot be quantified based on the available data.	Same as Alternative A.	Same as Alternative A.
Special Status Species			
Direct Impacts	No or negligible short-term impacts to state and BLM listed special status species including northern leopard frog, golden eagle, burrowing owl, ferruginous hawk, Brewer's sparrow. Minor impacts to Columbian sharp-tailed grouse due to loss of production area within the Project Area.	Same as Alternative A.	Same as Alternative A.
Indirect Impacts to Colorado River Fishes	It is not possible to quantify the amount of mercury which endangered fish would be exposed to or the impact as a result of that mercury exposure.	Although the emissions attributable to Trapper Mine coal would be reduced based on the reduced mining rate, it is assumed that Craig Station would continue to operate at current levels, obtaining coal from another source. It is not possible to quantify the amount of mercury which endangered fish would be exposed to or the impact as a result of that mercury exposure.	The mercury emissions attributable to Trapper Mine coal would range from current levels to levels based on a reduced mining rate of Alternative B. It is not possible to quantify the amount of mercury which endangered fish would be exposed to or the impact as a result of that mercury exposure.
Indirect Impacts to Yellow-billed cuckoo	It is not possible to determine the severity of impacts to yellow-billed cuckoos from either mercury or selenium emissions from coal	Coal combustion emissions would continue under Alternative B but the amount attributable to Trapper mine would be reduced based on the	Emissions from coal combustion would range from current emissions attributable to Trapper Mine coal to a reduced emissions based on the

Table 4-1 Comparison of Direct and Indirect Impacts

Resource	Alternative A - Proposed Action	Alternative B – Disapproval of the Mining Plan Modification by the ASLM	Alternative C – No Action
	combustion due to lack of information.	reduced mining rate. The impacts cannot be quantified at this time due to lack of information.	reduced mining rate of Alternative B. The impacts cannot be quantified at this time due to lack of information.
Cultural Resources	As long as TMI complies with recommendations for the Rock Art Site mitigation, no impacts are anticipated to cultural resources.	The area of the N Pit has been previously disturbed so there would be no new impacts. Due to the lack of detailed mining plans for the I Pit, impacts cannot be fully quantified,	There would be no impacts from continued mining within the Project Area as in Alternative A. For mining in areas outside of the Project Area as in Alternative B, there would be no new impacts from mining in the N Pit but the area of impact for the N pit has not been fully defined and impacts cannot be quantified.
Socioeconomics	There are beneficial socioeconomic impacts locally, regionally and state-wide from continued mining at the Trapper Mine over the 10-year life-of-mine.	Mining would continue in areas outside of the Project Area so socioeconomic benefits also would continue until mining ceases but would be reduced due to the reduced mining rates and reduced timing for completion of mining (3 to 4 years).	The beneficial socioeconomic impacts would continue over the life-of-mine for the Project Area, estimated at 10 years. If mining does not continue within the Project Area, under Alternative B mining would continue to provide socioeconomic benefits but these benefits would be reduced by 6-7 years due to the reduced mining rate and reduced timing for completion of mining .
Visual Resources	Negligible to minor short-term visual impacts over the life of the mine. Lighting from mining activities creates a minor short-term impact over the life of the mining operation.	Same as Alternative A.	Same as Alternative A.
Paleontology	Negligible, long-term impacts due to loss of paleontological resources There could be beneficial impacts from exposing paleontological resources for discovery.	Same as Alternative A.	Same as Alternative A.

Table 4-1 Comparison of Direct and Indirect Impacts

Resource	Alternative A - Proposed Action	Alternative B – Disapproval of the Mining Plan Modification by the ASLM	Alternative C – No Action
Access and Transportation	No changes to current access and transportation.	Access and transportation numbers could be somewhat reduced due to the reduced mining rate. The reduction would be short-term and minor during mining operations.	Impacts could range from no change if the existing mining operations continue as in Alternative A, to short-term minor impacts if mining ceases in the Project Area and mining outside the Project Area as in Alternative B results in a reduced mining rate with associated reduction in employees and deliveries.
Solid Waste			
Direct Impacts from Solid Waste Generation and Disposal	No direct impacts from solid waste disposal.	Same as Alternative A.	Same as Alternative A.
Indirect Impacts from Placement of CCR	Negligible long-term impacts with placement in accordance with approved plans and reclamation upon completion of placement in an area.	Same as Alternative A as CCR placement would continue at the Trapper Mine.	Same as Alternative A.
Noise	Depending on the location of the mine pit, the closest residence ranges from 0.46 to 0.7 mile (0.7 km to 1.1 km) from mining activities. Short-term, negligible impacts, until reclamation is complete and heavy equipment is no longer operating in the area.	Closest residence to the proposed I Pit is approximately 0.66 miles (1 km). Impacts would be the same as Alternative A, until reclamation is complete and heavy equipment is no longer operating in the area.	The closest residence would vary depending on when mining ceases, however, impacts would be the same as Alternative A.

4.2 Topography

4.2.1 Alternative A – Proposed Action

4.2.1.1 Direct Impacts

Approximately 257 acres of previously undisturbed lands would be disturbed within the Project Area, and 11 acres of previously disturbed and reclaimed land would be re-disturbed within the Project Area, disrupting the existing topography during mining. In addition, there are 1,053 acres of currently disturbed land within the Project Area. All areas previously disturbed and to be disturbed in the future would be

contemporaneously reclaimed through backfilling and grading to the approved post-mining topography and establishment of surface drainage patterns per the approved reclamation plan. After reclamation has been completed, the long-term impacts to topography would be negligible.

4.2.1.2 Indirect Impacts

There would be no indirect impacts to topography under Alternative A.

4.2.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.2.2.1 Direct Impacts

Under Alternative B, mining in the Project Area would cease and closure and reclamation would be initiated. The additional 257 acres of new disturbance and 11 acres of re-disturbance would not occur. The existing 1,053 acres of disturbance would be reclaimed to the approved post-mining topography. It is anticipated that mining would occur in areas outside of the Project Area in the N and I pits. This mining would occur over a time period of 3 to 4 years which is shorter than the proposed Project life-of-mine of approximately 10 years. The short-term impacts to topography would occur in a different area within the SMCRA permit boundary, but would be similar to those under Alternative A. Under Alternative B mining would cease and final reclamation would occur earlier. After reclamation has been completed, the long term impacts to topography would be negligible.

4.2.2.2 Indirect Impacts

There would be no indirect impacts to topography under Alternative B.

4.2.3 Mitigation Measures

No mitigation measures would be necessary for topography.

4.3 Air and Climate Resources

4.3.1 Alternative A – Proposed Action Alternative

4.3.1.1 Direct Impacts from Surface Coal Mining

This section covers the direct air emissions associated with the proposed surface mining activities at the Trapper Mine within the Project Area. Direct impacts include the following:

- PM_{10} and $PM_{2.5}$ emissions associated with the Trapper Mine operations, including but not limited to, emissions from drilling, blasting, coal excavation and removal, overburden excavation and removal, and emissions from coal/overburden hauling on unpaved roads within the Project Area.
- NO_X, SO_2, CO, and VOC emissions associated with fuel combustion in mining equipment and haul trucks.
- Combustion emissions associated with blasting (i.e., NO_X).
- GHG emissions, including but not limited to fugitive CH_4 releases from the coal mining seams and GHGs associated with fuel combustion in mining equipment and haul trucks.
- Black carbon emissions associated with fuel combustion in mining equipment and haul trucks.

O_3 impacts are discussed in the Cumulative Impacts section (Chapter 5.0) as the contribution of individual source emissions to regional O_3 levels cannot be accurately quantified. However, emissions of O_3 precursors (NO_X and VOCs) are quantified in this section.

All emission calculations were quantified using the maximum allowable mining rate at the Trapper Mine based on TMI's air quality permit (i.e., 2.6 mtpy). For PM_{10} and $PM_{2.5}$, emissions were quantified for each year up to 2025 (when the coal reserves in the Project Area would be exhausted based on TMI's

proposed mining plans). CDRMS has only approved detailed mining plans through 2017 and additional regulatory review and approval by CDRMS would be required prior to mining through 2025. Based on the calculated PM_{10}/$PM_{2.5}$ emissions, a worst-case year was selected and the emissions from other pollutants were then evaluated for the selected worst-case year. As documented below, the worst-case emissions year was determined to be 2020.

Particulate Matter

Particulate matter emissions (PM_{10} and $PM_{2.5}$) occur from mining activities, as well as emissions associated with diesel fuel combustion in the mining equipment and trucks. Mining activities include drilling, blasting, coal and overburden removal and handling, and coal hauling by truck from the Trapper Mine to the adjacent Craig Station.

PM_{10} and $PM_{2.5}$ emission controls are imposed through the fugitive dust control plan contained in the Trapper Mine air emissions permit issued by the CDPHE – Permit 11MF253-1, Modification 2, Issued May 8, 2009 (CDPHE 2009). These emissions controls are summarized in **Table 4-2**.

Table 4-2 Fugitive Dust Emission Controls at Trapper Mine as Required by CDPHE Air Permit 11MF253-1, Modification 2, Issued May 8, 2009

Trapper Mine Fugitive Dust Control Measures
1. Topsoil and overburden stockpiles shall be compacted and revegetated within 1 year of completion of stockpile construction. 2. Emissions from material handling (i.e., removal, loading, and hauling), except for dragline operations, shall be controlled by watering two or more times per day except when ambient temperatures are below 32°F or precipitation is occurring. 3. Unpaved haul roads shall be treated with chemical stabilizers per suppliers' recommendations and watered as often as needed to control fugitive particulate emissions. Haul roads shall be graveled. 4. Reclamation works and sequential extraction of material shall be initiated to keep the total disturbed areas at any one time to a minimum. 5. Drilling of overburden for blasting shall employ water spray units or bag filters. 6. Sequential blasting shall be employed for particulate reduction associated with blasting activities. No blasting shall take place when wind speeds exceed 30 miles per hour, unless safety conditions warrant otherwise. 7. The utility waste placed at the mine shall be kept sufficiently moist until the waste is covered to control fugitive emissions.

Table 4-3 summarizes the PM_{10} and $PM_{2.5}$ emissions for each year through 2025 when the Trapper Mine coal reserves within the Project Area would be exhausted, based on the proposed mining plans and a peak production rate of 2.6 mtpy. Once the worst-case year was determined, the appropriate fuel combustion emissions were then added to the PM_{10}/$PM_{2.5}$ emission totals.

The emission calculations used standard USEPA factors for western surface coal mines from USEPA's Compilation of Air Pollutant Emission Factors, or AP-42 (USEPA 2015), combined with year-by-year projections of mine operations provided by TMI, to calculate the total PM_{10} and $PM_{2.5}$ emissions

Table 4-3 Projected Trapper Mine PM_{10} Emissions through 2025

Mining Year	PM_{10} Emissions (tpy)	$PM_{2.5}$ Emissions (tpy)
2016	555.65	80.23
2017	557.70	82.58
2018	553.54	80.76

Table 4-3 Projected Trapper Mine PM_{10} Emissions through 2025

Mining Year	PM_{10} Emissions (tpy)	$PM_{2.5}$ Emissions (tpy)
2019	540.13	84.93
2020	617.48	93.70
2021	618.58	97.23
2022	564.35	87.83
2023	513.34	79.60
2024	398.98	64.13
2025	263.12	40.76

Based on **Table 4-3**, the peak PM_{10}/$PM_{2.5}$ emissions would occur in Calendar Years 2020 and 2021. In the TMI proposed mining plans, both 2020 and 2021 would be years with higher than average stripping ratios, so the overburden volumes to be handled and transported within the mine pit and the associated air emissions are greater. However, the magnitude of the emissions between 2020 and 2021 would be virtually the same. Beginning in 2019, TMI's anticipated mining plans would include mining in the N Pit outside of the Project Area. The selection of the worst-case year also considered the relative location of the PM_{10}/$PM_{2.5}$ emissions based on TMI's anticipated mining plans. In 2020, there would be a higher concentration of emissions in the L Pit, which is the current active Trapper Mine pit. The L Pit also would be closer to the eastern SMCRA permit boundary in 2020 and the separation distance between the emissions location and ambient air would be less. For these reasons, 2020 was selected as the worst-case year for the air quality analysis as it would be likely to produce higher air quality impacts to nearby ambient air.

Note that only a fraction of the N Pit lies inside the Project Area. For worse-case year (2020), TMI's anticipated mine plan would include mining in the N Pit outside of the Project Area and the associated N Pit emissions would occur outside of the Project Area.

A more detailed PM_{10}/$PM_{2.5}$ inventory for the worst-case year (2020) is summarized in **Table 4-4**. The emission calculations used standard USEPA factors for western surface coal mines from USEPA's Compilation of Air Pollutant Emission Factors, or AP-42 (USEPA 2015a). The calculations used AP-42 Section 11.9 (Western Surface Coal Mines) and other AP-42 sections as appropriate for an individual emissions source. The AP-42 emission factors were combined with projections of mine operations provided by TMI to calculate the total PM_{10} and $PM_{2.5}$ emissions for the worst-case year (2020). Where specific $PM_{2.5}$ emission factors were unavailable, the calculations used a worst-case assumption that all PM_{10} emissions were in the $PM_{2.5}$ fraction.

Table 4-4 Worst-Case Year (2020) Trapper Mine PM_{10} and $PM_{2.5}$ Direct Emissions

Mining Operation	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Drilling: Coal & Overburden	0.97	0.97
Blasting: Coal & Overburden	0.06	0.003
Truck Loading: Coal	8.48	0.88
Bulldozing: Coal	30.93	2.53
Bulldozing: Overburden	35.70	19.62
Overburden Replacement	78.58	11.79

Table 4-4 Worst-Case Year (2020) Trapper Mine PM_{10} and $PM_{2.5}$ Direct Emissions

Mining Operation	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Dragline	111.55	9.60
Topsoil Removal: Scraper	2.15	2.15
Topsoil: Scraper Travel Mode	27.93	2.79
Topsoil Unloading: Scraper	1.48	1.48
Grading: Haul Roads	6.03	0.60
Coal/Overburden Truck Hauling	87.95	8.79
Light Duty Vehicle Traffic	2.05	0.20
Wind Erosion	196.84	29.53
TOTAL	590.70	90.93

Combustion Emissions

Combustion emissions include NO_x, SO_2, CO, and VOCs from combustion of diesel fuel in mining equipment and trucks along with emissions associated with blasting. Emissions for mining equipment and trucks were calculated using the USEPA MOVES2014 model (USEPA 2014) using the most relevant equipment listed under the "nonroad construction" category and data provided by TMI listing the annual operating time (hours) for each major piece of mining equipment and/or truck. Blasting emissions were calculated using the emissions factor from AP-42 Chapter 13, Table 13.3-1 based on the anticipated use of ANFO and the expected number of blasts during the worst-case year (2020).

The combustion emissions are documented in **Table 4-5**. Calculations for HAP emissions associated with fuel combustion in the mining equipment and trucks are reported in **Table 4-6**.

Table 4-5 Direct Mining Emissions for Worst-Case Year (2020) Fuel Combustion and Blasting

Emissions Source	NO_X (tpy)	SO_2 (tpy)	CO (tpy)	VOCs (tpy)
Fuel Combustion: Mining Equipment & Trucks	987	52	378	72
Blasting	74	9	291	No Data
TOTAL	1,061	61	669	72

Table 4-6 Direct Mining Emissions for Worst-Case Year (2020) HAPs – Fuel Combustion (tpy)

Benzene	Toluene	Xylene	1,3-Butadiene	Formaldehyde	Acetaldehyde	Acrolein	Napthalene
0.41	0.15	0.11	0.02	0.13	0.07	0.01	0.06

GHG Emissions

GHG emissions include CO_2, CH_4, and N_2O. The direct Trapper Mine GHG emissions are associated with the fuel combustion in mining equipment and trucks, and blasting. In addition, fugitive CH_4 emissions are released at surface mines from the coal seams.

GHG emissions from fuel combustion in mining equipment and trucks were calculated using the equipment operating time for the worst-case year (2020) and applicable emission factors from the USEPA MOVES2014 model (USEPA 2014). Similar to the other pollutant estimates, data from MOVES2014 was applied using the most applicable equipment type under the "nonroad construction" category. For blasting, emissions data from AP-42 Table 13-3.1 were applied based on the estimated ANFO use in blasting for the worst case year (2020). Emissions estimates for CH_4 at surface coal mines were taken from an USEPA's Surface Mines Emissions Assessment (USEPA 2005), which reports CH_4 releases in cubic feet per ton of coal removed.

GHG emissions are reported on the basis of CO_2e. This accounts for the differences in the global warming potential (GWP) of the individual constituents. **Table 4-7** lists the estimated direct GHG emissions and the GWP for the individual GHG gasses. GHG emissions are shown in MT for consistency with international standards (1 MT = 1,000 kg = 1.1 tons US). For the N_2O estimates, if specific N_2O emissions data were not available, all NO_X emissions were assumed to be in the form of N_2O in order to provide for a worst-case assessment.

Table 4-7 Direct Mining Emissions for Worst-Case Year (2020) GHG Emissions (tons and MT per year)

	CO_2	CH_4	N_2O	CO_2e
Global Warming Potential	1	36 [1]	298	
Fuel Combustion (tons)	86,711	--	987	380,973
Blasting (tons)	291	3	74	22,364
Coal Seams (tons)	--	3,524	--	126,878
TOTAL (tons)	87,002	3,527	1,061	530,215
TOTAL (M T)	79,093	3,206	965	482,014

[1] USEPA lists the CH_4 GWP as a range of 28 to 36. The GWP of 36 was used for CH_4 in order to provide an upper bound on the GHG emissions estimate, see www3.epa.gov/climatechange/ghgemissions/gases/ch4.html.

Black Carbon

Black carbon is a subset of the $PM_{10}/PM_{2.5}$ emissions associated with diesel fuel combustion. Black carbon is effective at absorbing light and has a disproportionally larger impact on visibility degradation compared to other forms of particulate matter. Some researchers also link black carbon emissions to climate-related air quality impacts.

Black carbon has been calculated as a percentage of the $PM_{2.5}$ emissions associated with diesel fuel combustion based on Cai and Wang (2014). The calculated black carbon emissions based on diesel fuel consumption from the worst-case year (2020) is provided in **Table 4-8**.

Table 4-8 Direct Mining Related Emissions for Worst-Case Year (2020) – Black Carbon (tpy)

$PM_{2.5}$	Black Carbon Ratio	Black Carbon Emissions
64 tpy	0.813	52 tpy

4.3.1.2 Indirect Impacts Associated with Coal Combustion

Indirect impacts associated with coal combustion include emissions at the Craig Station from combustion of coal to generate electricity. Based on the CDPHE-issued Craig Station Title V operating permit (Permit 96OPMF155, Issued May 1, 2005), the Craig Station includes three coal-fired EGUs, with a combined

net electric generating capacity of 1,264 MW. Unit 1 was placed in service in 1980, Unit 2 in 1979, and Unit 3 in 1984. Coal from the Trapper Mine is used almost exclusively at Units 1 and 2 and coal from other sources is fired in Unit 3. The emission controls at the Craig Station are summarized in **Table 4-9**.

In addition, some of the Craig Station CCR (e.g., fly ash and bottom ash) is used as backfill at the Trapper Mine. Some of the CCR are recycled for beneficial uses and the remainder is placed in former mining pits at the Trapper Mine. The emissions associated with the CCR transport and placement at Trapper Mine are included in the indirect impacts. This would include fugitive dust emissions (PM_{10} and $PM_{2.5}$) associated with the hauling of CCR by truck to the placement site, and associated diesel fuel combustion emissions from the trucks, including GHG emissions.

Table 4-9 Summary of Air Emission Controls – Craig Generating Station

	Unit 1	Unit 2	Unit 3
Capacity (Net)	428 MW	428 MW	408 MW
In-service Date	1980	1979	1984
Particulate Matter	Fabric Filter Baghouse	Fabric Filter Baghouse	Fabric Filter Baghouse
SO_2	Wet Limestone Scrubber	Wet Limestone Scrubber	Spray Dryer Absorber (Dry Scrubber)
NO_X	Low NO_X Burners with Overfire Air	Low NO_X Burners with Overfire Air	Low NO_X Burners with Overfire Air
	Add SCR by 2021 to meet emission limits of the Colorado Regional Haze SIP (see discussion below)	Add SCR by 2018 to meet emission limits of the Colorado Regional Haze SIP (see discussion below)	Add SNCR by 2018 to meet emission limits of the Colorado Regional Haze SIP (see discussion below)
Mercury	Ancillary control provided by existing systems for other pollutants	Ancillary control provided by existing systems for other pollutants	Ancillary control provided by existing systems for other pollutants

Criteria Pollutant Emissions from Electricity Generation (SO_2, NO_X, CO, and VOCs)

Coal combustion for generation of electricity produces air emissions. These emissions were estimated based on coal combustion at Craig Station Units 1 and 2 for the maximum coal production rate under TMI's air permit, or 2.6 mtpy.

As described previously, coal from the Trapper Mine is used almost exclusively at Craig Station Units 1 and 2. Where supported by reliable technical information, emissions data unique to Units 1 and 2 were used to help estimate the Trapper Mine-related indirect emissions.

A summary of Craig Station emissions is provided in **Table 4-10**. For SO_2 and NO_X, unit-specific emissions data for 2014 were obtained for the Craig Station from the USEPA Air Markets Program Data (AMPD). Based on these data, it is evident that the level of SO_2 emissions control at Units 1 and 2 is substantially better than Unit 3. More than 50 percent of the total SO_2 emissions at Craig Station during 2014 were from Unit 3. As described in **Table 4-9**, Units 1 and 2 control SO_2 through a wet scrubber while Unit 3 uses a spray dryer absorber. NO_X emissions control also appears to be better at Units 1 and 2 compared to Unit 3, although the differences are not as dramatic as the unit-to-unit variation in SO_2 emissions.

Table 4-10 Indirect Coal Combustion Emissions (tpy)

	SO_2 Emissions			NO_X Emissions				
	Unit 1	Unit 2	Unit 3	Unit 1	Unit 2	Unit 3	CO	VOCs
Craig Station Emissions Total (2014)	799.02	963.36	2,000.90	3,768.07	4,603.28	5,367.91		
Trapper Mine Coal Combustion Contribution (78.67%)	628.59	757.88	--	2,964.34	3,621.40	--		
Trapper Mine Coal Combustion Contribution Adjusted to 2.6 mtpy	710.58	856.73	--	3,350.99	4,093.76	--	650.0	78.0

The USEPA AMPD database lists SO_2 and NO_X emissions; but not emissions for CO and VOCs. The SO_2 and NO_X estimate were based on the reported 2014 emissions at Craig Station Units 1 and 2, adjusted to a coal combustion level of 2.6 mtpy, as explained below. Trapper Mine contributes about 50 percent of the coal used at Craig Station. In 2014, the total coal combustion for Craig Station was estimated to be about 4.6 mtpy, which means that Trapper Mine contributed 2.3 mtpy. Based on 2014 load data reported to the AMPD database, Units 1 and 2 represented 63.56 percent of the total electric load generated at Craig Station. Assuming that the load and coal combustion are related, the overall coal combustion at Units 1 and 2 would have been 2.92 mtpy in 2014 (63.56 percent of 4.6 mtpy). Using this figure, the 2.3 mtpy contributed by Trapper Mine would have been 78.67 percent of the overall coal combusted at Units 1 and 2. This fraction was used to assign the appropriate level of 2014 Craig Station emissions to coal sourced at the Trapper Mine.

For CO and VOC, Craig Station emissions were based on AP-42 Section 1.1.1 (Coal Combustion). Also, for CO and VOC, the AP-42 factors (lb/ton) were applied to the 2.6 mtpy mining rate for Trapper Mine coal to derive the indirect emissions information. The indirect emissions are based on the maximum coal combustion of 2.6 mtpy and do not represent a specific future year.

Based on the above data, the Craig Station emissions associated with Trapper Mine coal at a 2.6 mtpy mining rate would be: SO_2 – 1,468 tpy, NO_X – 7,445 tpy, CO – 650 tpy, and VOCs – 78 tpy.

The NO_X emissions estimates shown above do not include the expected future benefits of improved emissions controls at Craig Station. Both Unit 1 and Unit 2 are planning to install SCR for NO_X emissions control (see **Table 4-9**) to meet the emissions limits contained in the Regional Haze SIP (CDPHE 2014a). The SIP specifies the required NOx emissions limits and the owner/operator (Tri-State Generation and Transmission) then selects the appropriate emissions control technology to achieve the required limits. The Unit 2 SCR is scheduled to be operational by 2018 and the Unit 1 SCR is scheduled to be operational by 2021. Based on the Colorado Visibility and Regional Haze SIP (CDPHE 2014a), Unit 1 will have a maximum allowable NO_X limit of 0.07 lb/million British thermal unit (MMBtu) and Unit 2 will have a maximum allowable NO_X limit of 0.08 lb/MMBtu. CDPHE (2014a) lists the baseline NO_X emissions level at Units 1 and 2 at 0.35 lb/MMBtu, so the reduction in NO_X would be on the order of 80 percent at each unit, for a total reduction of about 8,000 tpy. The reductions attributable to Trapper Mine coal would be a portion of the total Unit 1 and 2 reductions, or about 6,300 tpy, leaving post-control indirect NO_X emissions attributable to Trapper Mine coal of 1,145 tpy.

Mercury Emissions from Electricity Generation

The CDPHE has provided mercury emissions data for Craig Station for the 2014 reporting year (Tri-State Generation and Transmission Association 2015). These Craig Station mercury emissions data are based on continuous emissions monitoring system equipment installed at each Craig Station unit.

The Craig Station is generally recognized to have one of the lower mercury emission rates for electric generating units in the United States. Based on 2009 mercury emissions data compiled by Environmental Integrity Project (2011), Craig Station was at the time ranked second-lowest among coal-fired power plants in the U.S. in terms of mercury emissions per unit of electricity generation, expressed as lb/GWh.

The 2014 mercury emissions data for Craig Station are summarized in **Table 4-11**.

Table 4-11 Actual 2014 Craig Station Mercury Emissions (lb/yr) as reported by Craig Station to CDPHE

Unit 1	4.41
Unit 2	4.85
Unit 3	33.69
Total	42.95

lb/yr = pounds per year.

In the CDPHE mercury emissions reports, data for Units 1 and 2 are reported in terms of mass (lb/yr). The Unit 3 mercury data are based on the reported emissions rate (lb/GWh). The Unit 3 mercury emissions rate (0.009 lb/GW-hour) was converted to mass (lb/yr) using the Unit 3 2014 production data listed in the AMPD database. The total mercury emissions derived here are consistent with the Craig Station mercury emissions listed in the 2014 USEPA TRI (USEPA 2014).

The mercury continuous emissions monitoring system monitoring data show that Craig Station mercury emissions are substantially less at Unit 1 and Unit 2 compared to Unit 3. This is most likely due to the differences in pollution control systems at the three Craig Station units. As described previously, Units 1 and 2 each use wet scrubbing systems for SO_2 emissions control, compared to a spray dryer absorber (dry scrubbing) at Unit 3. Wet scrubbing systems have been shown to be very effective at providing ancillary control benefits for mercury emissions. This is because the oxidized form of mercury (Hg_{2+}) is water soluble and can be easily removed by the wet scrubber technology. Also, even though Unit 3 does not reduce mercury to the same level of effectiveness as Units 1 and 2, the Unit 3 mercury emissions are still well below the maximum allowable limits established by Colorado State regulation.

The Trapper Mine coal contribution to the Craig Station mercury emissions can be estimated by applying the 78.67 percent coal contribution factor attributable to Trapper Mine coal, as previously defined, to the reported 2014 mercury emissions listed above from Units 1 and 2. The last step for this analysis is then to adjust the mercury emissions estimate to the maximum Trapper Mine coal production rate of 2.6 mtpy. As summarized in **Table 4-12**, these calculations derive 8.23 lb/yr as the indirect mercury emissions rate derived from combustion of Trapper Mine coal at the Craig Station as a result of Alternative A.

Table 4-12 Estimated Craig Station Mercury Emissions from Trapper Mine Coal (lb/yr)

	Mercury Emissions for Trapper Mine 2014 Combustion Rates (2.3 mtpy)	**Mercury Emissions at Maximum Trapper Coal Combustion Rates (2.6 mtpy)**
Unit 1	3.47	3.92
Unit 2	3.82	4.31
TOTAL	7.29	8.23

CCR Placement at Trapper Mine

The delivery and placement of CCR at Trapper Mine is characterized as an indirect emission since placement is in areas outside of the Project Area. Trapper Mine receives a portion of the CCR from Craig Station for placement, with the remainder recycled for beneficial uses. The emission calculations address the CCR returned to Trapper Mine for placement, regardless of the origin of the coal. The CCR volume returned to the Trapper Mine for placement is estimated at approximately 501,000 tpy.

PM_{10} and $PM_{2.5}$ emissions are principally fugitive dust from truck traffic carrying the CCR from Craig Station to the placement site at Trapper Mine. Other sources of emissions include bulldozing and wind erosion at the placement site, and exhaust emissions associated with the diesel fuel combusted by the haul trucks. **Table 4-13** summarizes the indirect PM_{10}/ $PM_{2.5}$ emissions associated with the CCR placement.

Table 4-13 Indirect PM_{10} and $PM_{2.5}$ Emissions from CCR Placement at Trapper Mine

Emissions Source	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
CCR Hauling: Truck Traffic	7.82	0.78
CCR Bulldozing	1.16	0.35
Wind Erosion	3.80	0.57
Fuel Combustion – Haul Trucks	0.85	0.83
TOTALS	13.63	2.53

The fuel combustion for haul trucks that transport the CCR to the Trapper Mine placement site also releases pollutants such as NO_X, SO_2, CO, and VOCs. These emissions were calculated using the USEPA MOVES2014 model (USEPA 2014) and estimated operating time for the trucks. The relevant emissions are summarized in **Table 4-14**.

Table 4-14 Indirect Emissions for Worst-Case Year (2020) Fuel Combustion: CCR Transfer by Truck to Trapper Mine

	NO_X (tpy)	SO_2 (tpy)	CO (tpy)	VOCs (tpy)
Fuel Combustion: CCR Haul Trucks	12.1	1.5	5.15	0.7

Indirect GHG Emissions

Indirect GHG emissions are associated with combustion of the coal provided to Craig Station by the Trapper Mine. Indirect emissions also are associated with diesel fuel combustion from the haul trucks which carry the CCR materials back to Trapper Mine for final placement.

At the Craig Station, CO_2 emissions associated with coal combustion are listed in the AMPD database, so the CO_2 emissions estimates were handled in a manner similar to the SO_2 and NO_X emissions described above. The total 2014 Craig Station CO_2 emissions were obtained from the AMPD and the portion derived from Trapper Mine coal was calculated. This value was then adjusted to the permitted maximum coal production rate of 2.6 mtpy.

Because the AMPD reports only CO_2 emissions, the total GHG emissions as CO_2e needed to be determined by including emissions of other GHG pollutants, specifically CH_4 and N_2O. Using the AP-42 emission factors (Section 1.1, Coal Combustion) and the GWP of each pollutant, a CO_2e factor was determined and compared to the CO_2-only emissions factor from AP-42. This ratio was then used to adjust the CO_2-only emissions reported in the AMPD for Craig Station. Because CO_2 dominates the

GHG emissions for coal combustion compared to CH_4 and N_2O, the calculated adjustment factor was very small (0.03 percent).

GHG emissions associated with the diesel fuel combustion in the trucks hauling CCR to the placement site were calculated using the USEPA MOVES2014 emissions model (USEPA 2014). MOVES2014 only lists data on CO_2 emissions; so other GHG emissions were not calculated for the CCR placement. However, like coal combustion, GHGs from diesel fuel combustion are dominated by the CO_2 emissions and omitting the other GHG pollutants from the calculation does not introduce a significant error in the overall estimate. Also, the CCR placement is a very small fraction of the overall indirect GHG emissions.

The indirect GHG emissions are shown in **Table 4-15**. GHG emissions are shown in MT for consistency with international standards (1 MT = 1,000 kg = 1.1 tons US).

Table 4-15 Indirect GHG Emissions reported at CO_2e Coal Combustion and CCR Placement

	GHG Emissions as CO_2e (MT per yr)	Indirect Project Emissions as compared to State/National Totals
Coal Combustion at 2.6 mtpy	5,341,966	NA
CCR Placement (transportation)	985	NA
Total Indirect GHG Emissions	5,342,951	NA
Colorado GHG Emissions (2010)	129.95 million	4.1%
Nationwide GHG Emissions (2007)	7,150.1 million	0.07%

The indirect GHG emissions also are shown in comparison to the state and national GHG inventories. The Colorado inventory is taken from CDPHE (2014b) and represents the statewide GHG inventory for Calendar Year 2010. The indirect emissions associated with combustion of 2.6 mtpy of coal at Craig Station is about 4.1 percent of the statewide GHG inventory. The nationwide GHG inventory is described under the Section 3.3, Existing Environment and represents the nationwide GHG inventory for Calendar Year 2007. The project-related indirect emissions are 0.07 percent of the national GHG emissions. Overall, the project is a very small contributor to the GHG emissions on a state-wide and nation-wide level.

There are no reliable scientific methods to quantify the contribution, if any, to possible changes in global temperatures associated with an individual source of GHG emissions. However, some potential impacts to the State of Colorado generally associated with climate change have been listed by USEPA (2015b). Whether or not such impacts would actually occur is under scientific debate and the actual occurrence of the GHG-related impacts listed below is somewhat speculative.

- The region may experience warmer temperatures with less snowfall/precipitation.
- The temperature increases are projected to be more pronounced in the winter months and more pronounced at night. The temperature increases also may be more pronounced at higher elevations.
- The projected warmer temperatures may result in earlier snowmelt and earlier peak stream flows.
- The potential for more pronounced and longer-lasting droughts may increase.
- Crop and livestock production may shift northward.
- The increased temperatures may promote more evaporation, resulting in less soil moisture and greater needs for irrigation water.

- Drier conditions could stress forest vegetation (i.e., ponderosa and lodgepole pine) and increase the susceptibility to wildfire.
- Grasslands and rangeland may extend into areas previously covered by forests.
- Ecosystem stresses may increase and possibly alter habitat for species such as mountain lion, black bear, long-nose sucker, marten, and bald eagle.

Another approach to address possible climate change impacts is to calculate the so-called "social cost of carbon" (SCC). The SCC protocol was developed for use in cost-benefit analyses for proposed regulations that could impact cumulative global GHG emissions (USEPA 2013). The SCC estimates economic damages associated with increases in carbon emissions and includes, but is not limited to changes in net agricultural productivity, human health, and property damages associated with increased flood risks.

The SCC is typically expressed as the cost in dollars per MT of emissions and there is a wide range of costs, with the greatest influence on costs caused by the discount rate. The discount rate is a measure to estimate the present value for costs/damages that may occur far out into the future. For 2020 emissions, the range in SCC presented by the USEPA is $13/MT to $137/MT, represented as 2011 dollars (USEPA 2013).

OSMRE has elected not to specifically quantify the SCC. First, the GHG emissions associated with the project are mostly from the indirect effects of coal combustion, and there is no consensus on the appropriate fraction of SCC tied to electricity generation that should be assigned to the coal producer. In addition, there is no certainty that GHG emissions at Craig Station would actually be reduced if Trapper Mine coal from the Project Area was not mined given that Craig Station has alternative sources for coal, and the Trapper Mine also has non-federal coal reserves that could be mined (see Section 2.5). Also, in order to provide any meaningful insight, the projected SCC would need to be viewed in context with other Project costs and benefits associated with the Proposed Action. Given the uncertainties associated with assigning a specific and accurate SCC to the Project, and the uncertainties that indirect GHG emissions would actually be reduced under any reasonable Project alternatives, OSMRE has elected to quantify direct and indirect GHG emissions and evaluated these emissions in the context of state and national GHG emission inventories (**Table 4-15**).

4.3.1.3 Air Dispersion Modeling Analysis

An air dispersion modeling analysis was conducted by Air Resource Specialists (2015) to assess the air quality impacts associated with Alternative A against the NAAQS. The modeling analysis was based on the emissions calculated for Alternative A for the worst-case year, 2020.

Modeling Overview

The air quality modeling analysis was conducted with the USEPA AERMOD dispersion model – Version 15181 (USEPA 2004). AERMOD is the standard air dispersion model recommended by the USEPA for use in regulatory actions such as permitting. The AERMOD modeling generally followed the recommendations in USEPA's Guideline for Air Quality Models (USEPA 2005b) and USEPA's current AERMOD Implementation Guidance (USEPA 2015a). Recommended USEPA regulatory defaults were used for all AERMOD model inputs unless noted otherwise in the discussion below.

One of the basic inputs to AERMOD is meteorological information (wind speed, wind direction, temperature, etc.). In the modeling analysis, the AERMOD modeling was performed using two different meteorological data sets. One data set was the on-site monitoring data collected at Trapper Mine for the period March through September 2015. However, as the Trapper Mine on-site data do not span a full 12-month period, a second more complete dataset also was used. The CDPHE was solicited to recommend the alternate meteorological data, and CDPHE provided data collected at the Colowyo Mine Gossard monitoring site during 2012 (CDPHE 2015a). The Gossard monitoring site is located at Latitude 40.313 North and Longitude -107.799 West at an elevation of 6,325 feet (1,928 meters) amsl.

Both the on-site Trapper Mine data and Gossard monitoring site data were processed using the USEPA AERMET program (Version 15181) following current regulatory recommendations. Once the modeling was conducted, it was observed that the Gossard meteorological data consistently returned higher model predictions compared to the on-site Trapper Mine data.

Receptor Information

The model calculations are performed at "receptors", which are defined geographic locations where the public has access. Locations within the Trapper Mine SMCRA permit boundary are not accessible to the public and as such, model receptors are excluded from these locations.

Because emissions at a surface mine are released at or near the ground, the expectation is that the maximum predicted model impacts would occur at the Trapper Mine SMCRA permit boundary. Only if the emissions are elevated would the modeling predict maximum impacts downwind of the SMCRA permit boundary. Based on the modeling results, the maximum impacts for all pollutants occurred at the Trapper Mine SMCRA permit boundary.

Given this expected result, the AERMOD receptors were placed along the Trapper Mine SMCRA permit boundary and out to a distance of approximately 500 meters (1,640 feet) downwind of the boundary. The selected receptor density was 100 meters (328 feet), i.e., receptors were placed using a rectangular grid pattern with the separation between receptors of 100 meters (328 feet). More receptors were placed along and near the north and east SMCRA permit boundary as the emission sources at Trapper Mine tended to be clustered near those areas of the mine.

Background Concentrations

Background is how the model accounts for emissions not explicitly included in the modeling inputs. Background levels are used to generate the total impact from all important emission sources. For background, recommendations were provided by CDPHE (CDPHE 2015b) for each of the pollutants and averaging times of concern. The recommended CDPHE background values were based on nearby ambient air monitoring data collected in northwest Colorado. **Table 4-16** summarizes the background concentration values recommended by CDPHE and also includes the source/year for the nearby monitoring data used by CDPHE to assign the background value. In some cases, the background values were provided in units of ppm or ppb, so the table also displays the background concentration after being converted to the appropriate modeling units (µg/m^3).

Table 4-16 Recommended Background Concentration Values from CDPHE

Pollutant	Averaging Time	CDPHE-provided Background	Background Concentration (µg/m^3)	Monitoring Site & Data Year
CO	1-hour	1 ppm	1,145	Williams Willow Creek, 2012
	8-hour	1 ppm	1,145	
SO_2	1-hour	1 ppb	2.62	Williams Willow Creek, 2012
NO_2	1-hour	7 ppb	13.16	Williams Willow Creek, 2012
	Annual	1 ppb	1.88	
PM_{10}	24-hour	23 µg/m^3	23	Colowyo West, 1997-98
$PM_{2.5}$	24-hour	14 µg/m^3	14	Williams Willow Creek, 2012
	Annual	3 µg/m^3	3	

The background concentrations listed above for each pollutant and averaging time were added to the AERMOD concentration results for determination of the total impacts and for comparison to the NAAQS.

Emissions Information

This section summarizes how the estimated Trapper Mine emissions information was input to the modeling. The emissions data for the 2020 worst-case modeling year are summarized in Section 4.3.1.1. The modeling analysis included the direct emissions associated with mining activities and the indirect emissions associated with CCR transfer and placement to the extent that the modeled indirect emissions occur within the Trapper Mine SMCRA permit boundary.

In the AERMOD modeling, emissions were assigned as either occurring in the mine pit or along the haul roads. In cases where the road travel occurs internal to the mine pit (e.g., overburden hauling), these emissions were assigned to the pit. Road emissions included the following category of emissions: coal haul trucks, CCR haul trucks, light-duty vehicles, and road graders. All other emissions were assigned to the mine pit or CCR placement area as appropriate.

The haul road sources were modeled using the “volume source” option in AERMOD and standard approaches for modeling haul road emissions (USEPA 2011). The horizontal dimensions for the volume source were based on the road width plus a small buffer to account for the lateral air displacement generated by the passing truck. The vertical dimension for the volume sources was assigned based on 1.7 times the truck height, with the source release height at the mid-point of the volume. The 90-ton coal haul truck dimensions were used for these calculations as the coal haul trucks comprise most of the road traffic emissions.

The road locations were modeled based on the existing road locations as determined using digital images of the Trapper Mine (i.e., Google Earth). However, in 2020, the N pit will bisect the haul road leading from L Pit back to the Craig Station, so the L Pit haul road will be relocated to the north in order to bypass N Pit. TMI defined the expected future haul road location through this region for input to the model. Each road segment was assigned the appropriate level of emissions based on the expected traffic volume and type of truck traffic (coal haul truck vs. CCR haul truck) along that particular road segment.

For the mine pits and CCR placement areas, the area poly source option in AERMOD was employed. AERMOD does have a pit source option that was considered, but was not employed for the Trapper Mine modeling analysis. At the Trapper Mine, the mine pit is not the classic hole-in-the ground simulated by AERMOD when using the pit source option. The mine pit instead carves into the side of the hill, and the pit is relatively open to the north, which also is the direction of the prevailing winds. Thus, the pit retention calculations in the AERMOD pit source option would not have been appropriate. As such, the pit source option for characterizing Trapper Mine emissions was not chosen and the area poly source option was used instead.

Within AERMOD, the L Pit was characterized as four area-poly sources and N Pit was characterized as two area-poly sources. Within each pit, the area-poly sources were approximately of equal dimensions. However, because the overburden stripping ratios increase as one moves further south in both the L Pit and N Pit, a higher fraction of the pit emissions were assigned to the southernmost area-poly sources in each pit.

The area-poly source locations were assigned based on the expected disturbance areas for Year 2020 as defined by TMI’s anticipated mining plans, plus the projected disturbance areas for the year prior and the preceding year (i.e., Years 2019-2021). The 3-year period accounts for land disturbance generated during the 2020 worst-case year from pre-stripping and from backfilling/reclamation.

It also is necessary to properly simulate the vertical distribution of emissions within the pit area-poly sources. The vertical distribution of emissions can be large given the vertical separation between the pit

floor and the top of the pit and failure to properly simulate the vertical distribution of pit emissions could lead to serious errors in the model results. The area poly source option includes assigning an optional vertical dimension value, which in essence turns the two-dimensional area-poly source into a three-dimensional pseudo-volume source. The vertical separation distance between the pit floor and the top of the pit was used to assign the vertical dimension value in AERMOD. This value was larger for those area sources at the south end of the pit where the pit walls are higher. The base elevation for all pit sources within a given pit (L Pit and N Pit) was assigned a single value, which assumes that the pit floor remained at a constant elevation for all pit area-poly sources. The source release height was set at 25 percent of the vertical separation between the pit floor and the top of the pit, which skewed the majority of the emissions toward the bottom of the pit and is a conservative assumption in terms of the AERMOD modeling.

Lastly, the PM_{10}/$PM_{2.5}$ emissions inventory for the pit sources showed that wind erosion is a significant contributor to the total emissions. Wind erosion emissions do not occur continuously, but instead only occur during periods of high wind velocities. This effect was simulated in the AERMOD model by restricting the wind erosion emissions to those hours where the wind speed exceeded the defined threshold velocity of approximately 12 miles per hour.

Particle Deposition

For the PM_{10}/$PM_{2.5}$ modeling, the particle deposition options in AERMOD were employed. With particle deposition, some of the plume mass is lost during transport downwind due to the fact that particles can fall from the plume and adhere to the ground and/or vegetation. Larger sized particles are deposited at a faster rate than smaller particles.

For the Trapper Mine modeling, the PM_{10} emissions were classified as either coarse or fine based on the particle size and the emissions inventory. The coarse fraction represents those particles larger than $PM_{2.5}$, but smaller than PM_{10}. The coarse particles were assigned a mean diameter of 6.25 microns, which is the middle of the size range. The fine fraction represents those particles smaller than $PM_{2.5}$, and were assigned a mean diameter of 1.25 microns, again based on the midpoint of the size range. The emissions inventory was used to assign the mass fraction to each category (coarse versus fine). The assigned mass fraction varied depending on whether the emissions being modeled were from the road volume sources or the pit area-poly sources.

$PM_{2.5}$ emissions also were modeled using deposition. However, for the $PM_{2.5}$ modeling, the only classification was the “fine” category and 100 percent of the $PM_{2.5}$ emissions were assigned to this size category.

O_3 Limiting Method

For the NO_2 modeling only, AERMOD was employed using the O_3 limiting method option. When this option is applied, the chemical conversion of NO_X emissions to the regulated form, NO_2, is assumed to be limited by the available O_3 in the atmosphere.

The inputs to the O_3 limiting method are the fraction of NO_X emissions released as NO_2 and the background O_3 concentrations. The NO_2 fraction of emissions from diesel-fired equipment and trucks was derived using data generated by Caterpillar (2011). Caterpillar stated that the NO_2 fraction for their diesel-fired equipment was in the range of 5 to 15 percent, and the mid-range of 10 percent was used for the Trapper Mine NO_X emissions modeling analysis. For the background O_3 levels, monitored O_3 data from the CDPHE Lay Peak O_3 monitoring site located near Maybell (west of Craig) was used to develop a conservative seasonal/diurnal O_3 concentration profile. For each month of data (January through December), a diurnal (24-hour) O_3 concentration profile was developed using the peak monitored monthly O_3 concentration for that hour. This approach retains some conservatism in the analysis because the peak O_3 concentration in any month would overestimate the background level during most hours, and the resulting NO_2 model prediction would be higher (i.e., conservative).

AERMOD Modeling Results

This section summarizes the AERMOD modeling results for Trapper Mine emissions and compares the predicted concentrations to the applicable NAAQS. Where the NAAQS is expressed in units of ppb or ppm, the NAAQS concentration value has been converted to µg/m^3 to allow for direct comparison against the AERMOD modeling results. The AERMOD modeling addresses the following regulated pollutants: CO, SO_2, NO_2, PM_{10}, and $PM_{2.5}$.

The AERMOD modeling results are summarized in **Table 4-17**. Only the worst-case modeling result from the two meteorological data sets (Trapper Mine On-Site versus Gossard) is shown in the results table. As noted above, for all pollutants and averaging times, the Gossard data provided the worst-case modeling result.

As demonstrated by **Table 4-17**, the predicted AERMOD concentration for each pollutant and averaging time, plus an appropriate background level to account for impact from emission sources not explicitly included in the modeling, demonstrates compliance with all applicable NAAQS.

Table 4-17 AERMOD Modeling Results – Trapper Mine (all concentrations in µg/m^3)

Pollutant	Averaging Time	Form[1] – AERMOD Modeled Concentration[2]	Background Concentration	Cumulative Impact (AERMOD plus Bkgnd)	NAAQS
CO	1-hour	2nd High – 3,791.54	1,145	4,936.54	10,000
	8-hour	2nd High – 907.4	1,145	2,052.4	40,000
SO_2	1-hour	4th High – 49.41	2.62	52.03	195.6
NO_2	1-hour	8th High – 159.27	13.16	172.43	188
	Annual	1st High – 24.67	1.88	26.55	100
PM_{10}	24-hour	2nd High – 62.12	23	85.12	150
$PM_{2.5}$	24-hour	8th High – 12.78	14	26.78	35
	Annual	1st High – 3.94	3	6.94	12

1 The AERMOD concentration shown is the concentration expressed in the form of the NAAQS. For example, since the SO_2 NAAQS is based on the 99th percentile daily maximum concentration, the 4th highest concentration value from AERMOD is reported (i.e., over 365 days, the highest 3 days are excluded to reach the 99th percentile concentration). Other pollutants are addressed similarly based on the form of the NAAQS.

2 The Modeled Concentration was chosen as the higher value of the Gossard and On-Site Trapper modeling results for each pollutant and averaging period. The Gossard meteorological data provided higher results for every scenario.

Maximum Impact Locations

The location of the maximum modeled concentration described in **Table 4-17** varies between pollutants and averaging periods and depends largely on the emission distribution and the nature of the meteorology data. The dominant wind direction (south through southwest) resulted in all maximum modeled concentrations to be along either the north or east Trapper Mine SMCRA permit boundary.

For PM_{10} and $PM_{2.5}$, the emissions were dominated by mining activities in and near the mine pits. As such, the maximum modeled PM_{10} 24-hour concentration occurred along the Trapper Mine permit boundary to the northeast of the N Pit. This impact was believed to be dominated by mining-related emissions associated with the N Pit and also from emissions associated with the L Pit coal hauling where the haul road bypasses the N Pit on the north side. Even though N Pit had fewer emissions compared to the L Pit, the shorter transport distance from the N Pit to the SMCRA permit boundary plus the contribution from the coal hauling emissions contribute to the increase in the PM_{10} impacts in this area.

The maximum modeled $PM_{2.5}$ concentrations both occurred along the eastern SMCRA permit boundary. The maximum modeled $PM_{2.5}$ concentration occurred to the northeast of the L Pit. The worst-case $PM_{2.5}$ impact locations were the result of the relatively high concentration of emissions within the L Pit and the direction of the prevailing winds.

The maximum modeled NO_2 concentration occurred along the northeastern section of the SMCRA permit boundary to the north of the L Pit. These impacts were influenced by the high concentration of NO_X emissions from the truck and mining equipment in the L Pit.

For pollutants such as carbon monoxide (CO), annual mean nitrogen dioxide (NO_2) and sulfur dioxide (SO_2), haul road truck traffic is the dominant source of emissions. For these pollutants, the maximum modeled impacts occur near where the coal haul road leading to the Craig Station passes through the SMCRA permit boundary of the mine. The impacts occur at this particular location because the transport distance to potential receptors is minimized at this location. The CO 1-hour and 8-hour, NO_2 annual, and SO_2 1-hour maximum modeled impacts were all located within a few hundred meters of where the coal haul road passes through the Trapper Mine SMCRA permit boundary.

4.3.1.4 Summary of Air Quality and Climate Impacts for the Proposed Action

Direct mining-related air quality impacts would include emissions associated with coal/overburden/interburden handling and transfer and emissions from combustion of diesel fuel in trucks and mining equipment. Although air emissions would be released into the environment from mining activities, air quality dispersion modeling demonstrated that NAAQS would not be exceeded. As such, the direct air quality impacts would be negligible. Direct air quality impacts would be short-term and would occur throughout the life of Alternative A.

Indirect air quality impacts would occur from combustion of Trapper Mine coal at Craig Station Units 1 and 2 and placement of CCR at the Trapper Mine outside the Project Area. The coal combustion releases air emissions, most notably SO_2 and NO_X. Craig Station employs pollution abatement equipment to reduce these emissions and has plans to further reduce NO_X emissions in the 2018-2021 timeframe. Given that coal to operate Craig Station would be available from sources other than the Trapper Mine, Craig Station emissions would likely continue if Trapper Mine coal was unavailable. The indirect air quality emissions attributable to Trapper Mine would be short-term occurring for the life of mining activities and would be negligible. Craig Station emissions would continue in the long term.

The indirect air quality impacts associated with mercury emissions released during coal combustion are discussed in Section 4.10.

Emissions of greenhouse gasses (GHGs) occur from both direct and indirect sources. Direct GHG emissions include fugitive releases of CH_4 from the coal seams and GHG emissions from combustion of diesel fuel in the truck fleet and mining equipment. Indirect GHG emissions occur from coal combustion at Craig Station. There is concern that GHG emissions are a contributor to climate change, but the nature and magnitude of any such climate impact is uncertain and cannot be accurately quantified at present. Also, any climate impacts that may occur are difficult to assign to an individual emission source of GHGs such as Trapper Mine and Craig Station. Climate impacts would potentially be long-term, but any contribution to climate change associated with direct/indirect emissions from Trapper Mine would be minor and would diminish after the life of the mine.

4.3.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

Under Alternative B, TMI would not mine any future coal within the Project Area. If Alternative B were selected, the most likely outcome would be that TMI would instead transfer its mining operations to other coal reserves within the SMCRA permit boundary that are located outside the Project Area. Under Alternative B, the maximum coal production rate is expected to decrease to an estimated 1.5 mtpy and these coal reserves would likely be exhausted within about 3 to 4 years.

4.3.2.1 Direct Mining Impacts

If mining were to be transferred to other coal reserves within the SMCRA permit boundary, the expected direct air emissions from the mining activities would be reduced based on the anticipated reduced mining rate of 1.5 mtpy. At the reduced mining rate, direct air quality impacts would be expected to be about 40 percent less than those described under Alternative A and these impacts would cease once mining for the other reserves was completed within about 3 to 4 years. However, some year-to-year variation in direct emissions would be expected depending on the specifics of the mine plan for these other reserves. For example, direct mining emissions might be higher or lower in any given year depending on the year-to-year variation in overburden stripping ratios. Also, because these other coal reserves are generally to the west of the Project Area, mining of these reserves would likely occur closer to the Craig Station, and the reduced coal hauling distances would be expected to result in lower emissions from this activity.

An increase in air emissions impacts, tied to cessation of mining activities in the Project Area, would result from reclamation activities that would need to commence at TMI's existing L Pit. Over the near-term, reclamation activities would be extensive as TMI worked to backfill the current mine pit and recontour/reclaim the existing land disturbance in the L Pit. Although reclamation plans have not been fully developed by TMI, it is expected that the necessary backfill material would need to come from the new pit operations, which would substantially increase overburden hauling distances in the near-term. As such, the extensive activities for reclamation at L Pit would be expected to cause additional air emissions over and above the Trapper Mine direct mining emissions for a period of a few years. Once the L Pit reclamation activities were completed, the direct mining emissions would only be related to mining activity in the areas outside the Project Area.

Under Alternative B, it also is expected that a short-term disruption in mining might occur as TMI transferred mining equipment from the current mine pit to the new coal reserves. Any disruption in coal supply from Trapper Mine might require Craig Station to seek alternative sources for coal until Trapper Mine's coal production started at the new mining pit. The reduced mining rate of 1.5 mtpy also would require Craig Station to seek coal from other sources in order to make up the deficit. Any alternative coal supply would need to come from a more distant mine and there would be an increase in air quality emissions associated with transport of any substitute coal from the more distant coal source.

4.3.2.2 Indirect Emissions Associated with Coal Combustion

Under Alternative B, Craig Station would receive coal mined at the Trapper Mine from reserves outside the Project Area. Any deficit in coal production at Trapper Mine under Alternative B would likely be replaced by coal from a more distant alternative coal supplier. As such, it is expected that there would be no change in the Craig Station operation and no change in the associated Craig Station air quality/climate emissions. The indirect air quality impacts under Alternative B would be unchanged from those described for Alternative A. However, the TMI contribution to the indirect impacts from Craig Station emissions would decrease by approximately 40 percent.

4.3.2.3 Summary of Air Quality and Climate Impacts for Alternative B

Direct air quality impacts under Alternative B would occur from mining activities. Under Alternative B, emissions would be anticipated to be below the levels described under Alternative A by about 40 percent and NAAQS would not be exceeded. As such, the direct air quality impacts under Alternative B would be negligible. Direct air quality impacts would be short-term and occur for the life of mining activities outside the Project Area or 3 to 4 years, which is a shorter duration than the projected 10-year life-of-mine for Alternative A.

Indirect air quality impacts occur from combustion of coal mined by TMI at Craig Station Units 1 and 2 and placement of CCR at the Trapper Mine. The coal combustion releases air emissions, most notably SO_2 and NO_X. Craig Station employs pollution abatement equipment to reduce these emissions and plans to further reduce NO_X emissions in the 2018-2021 timeframe. The indirect air quality emissions

attributable to Trapper Mine coal would be short-term, occurring for the life of mining activities, and would be negligible. Indirect emissions from Craig Station would continue for the long term.

The indirect air quality impacts associated with mercury emissions released during coal combustion are discussed in Section 4.10.

Emissions of GHGs occur from both direct and indirect sources. There is concern that GHG emissions are a contributor to climate change, but the nature and magnitude of any such climate impact is uncertain and cannot be accurately quantified at present. Also, any climate impacts that may occur are difficult to assign to an individual emission source of GHGs such as Trapper Mine and Craig Station. Climate impacts would be potentially long-term, but any contribution to climate change associated with direct/indirect emissions from Trapper Mine would be minor and would diminish after the life of the mine.

4.3.3 Mitigation Measures

No mitigation measures beyond those required by the Trapper Mine air quality permit would be required for air quality.

4.4 Geology and Minerals

4.4.1 Alternative A – Proposed Action

4.4.1.1 Direct Impacts

Alternative A would result in the removal of the recoverable coal seams in the N and L pits. At this time, CDRMS has neither received nor approved an application that includes detailed mining plans for the N Pit. The CDRMS would need to approve mining in the N Pit prior to initiating mining in this pit. The coal would be mined according to the methods described in Section 2.3.4. 19.1 million tons of coal would be mined through 2025 (as indicated in Section 2.4). In addition to the coal, over the life of mining for the Project Area, mining would remove an estimated 150 million cubic yards of geological strata (overburden and interburden) above and between coals assuming a stripping ratio of 10:1 (10 cubic yards per ton of coal (Stubblefield and Fish, 1991). The original character of the overburden and interburden would be permanently altered and the geological column would be permanently altered within the pit area. However, the Project Area represents a small portion of the overall geologic column and coal reserves associated with the Yampa coal field. Therefore, the effect would be negligible to minor, but would be permanent. At the end of mine life, the pit would be backfilled as part of closure and reclamation.

Coal mining was a contributing factor to the massive G Pit (now L Pit) landslide that took place in October 2006. There are many areas of naturally occurring landslides on the slopes of the Williams Fork Mountains indicating an inherent instability, which could be aggravated by mining. Several smaller mass wasting events occurred in the G Pit area in the years leading up to the October 2006 event (Agapito Associates, Inc. 2008). Potential impacts due to mass movements include endangerment of personnel, loss of recoverable coal resources, and loss of equipment. In the case of the October 2006 incident, monitoring of ground conditions enabled areas to be evacuated prior to the catastrophic failure. PR06 was submitted to address the adverse conditions presented by the slide and enable safe recovery of much of the coal that could have been lost (DRMS 2009). In addition, geotechnical monitoring of the slide area was implemented through revisions of PR05 and through implementation of Minor Revisions 212 and 213 and Technical Revision 99. The purpose of the monitoring was to measure the movement of the slide mass. The geotechnical monitoring was initiated in March 2008 and was accomplished by use of inclinometers in boreholes, piezometers (wells to measure groundwater levels), and benchmarks initially at 16 sites in and near the slide mass (TMI 2008). The most recent monitoring report indicated that there is a “minimal amount of movement” and that a new ground control plan would be submitted to CDRMS after approval of the PR07 (TMI 2015).

There is a potential that mining operations would preclude access to other mineral resources such as oil and gas within the Project Area. In areas leased and designated for coal mining, it may not be possible

to extract other minerals during the mining operations. Such impacts would be relatively short-term since loss of access would be temporary and after mining is conducted, it would be possible to conduct oil and gas exploration and production. Additionally, since horizontal drilling may be the preferred method of recovery, it is not a given that mining operations would prevent access to the deeper oil and gas resources.

Coal mining would not interfere with the mining of sand and gravel deposits located in major alluvial drainages like the Yampa River outside the Project Area. In addition, the mine has its own aggregate resources to partially supply aggregate needs at the mine lessening the burden on local aggregate supplies.

4.4.1.2 Indirect Impacts

After active coal mining has ceased, some material would be disturbed as a result of the reclamation activities. Natural processes of erosion and occurrence of landslides would continue in unmined areas. The potential for landslides would continue and would represent a long-term but moderate risk based on historic evidence of slope instability. It is expected that reclaimed areas would have a lesser risk of landslides due to reclamation design which would reduce slope instability.

4.4.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.4.2.1 Direct Impacts

Under Alternative B, mining would cease within the Project Area and impacts to geological resources in the Project Area also would end. An estimated 2.1 million tons of coal would be mined from July 1, 2015, to the assumed cessation date of July 1, 2016 (see Section 2.5). Alternative B would result in the loss of an estimated 17million tons of coal reserves and a shortened mine life. Although the amount of coal involved is small compared to the overall coal resource in the Yampa coal field, the loss of the coal reserve would be long-term. Some mining of coal would continue within the SMCRA permit boundary outside of the Project Area. Therefore, the effect would be negligible to minor, but would be permanent.

Alternative B would have similar impacts to Alternative A on the access and extraction of other mineral resources during mining activities outside of the Project Area.

4.4.2.2 Indirect Impacts

After active coal mining has ceased, some material would be disturbed as a result of the reclamation activities within the Project Area and for mining outside the Project Area. Natural processes of erosion and occurrence of landslides would continue in unmined areas. These natural processes represent a long-term but moderate risk for slope instability. It is expected that reclaimed areas would have a lesser risk of landslides due to reclamation design which would be designed to reduce slope instability.

4.4.3 Mitigation Measures

No mitigation measures are recommended for geological resources or hazards. TMI would continue to monitor ground conditions as directed by DRMS and provisions of the existing and future ground control plans. A new ground control plan would be amended by technical revisions or minor permit revisions as appropriate for changing ground conditions.

4.5 Water Resources

4.5.1 Alternative A – Proposed Action

4.5.1.1 Surface Water

Under Alternative A, the currently active L Pit on Lease No. C-079641 would continue to be mined from 2015 through 2025. Coal also would be mined from the N Pit, an open pit partially located on Lease No. C-07519, near the end of the life of mine for the Project Area (estimated at 2023). At this time, CDRMS

has neither received nor approved an application from TMI to revise the Trapper Mine PAP to add the N Pit. However, for this analysis, it was assumed that the N Pit would be added to the PAP and the portion of the N Pit within the Project Area would be mined prior to the end of the life-of-mine for the Project Area in 2025.

Direct Impacts

Surface mining of the L and N Pits would disturb a total of 148 acres in the Breeze Basin-Yampa River subwatershed, 94 acres in the Jeffway Gulch-Williams Fork subwatershed, and 16 acres in the Johnson Gulch-Yampa River subwatershed (**Figure 3-3**). In addition, approximately 11 acres of land previously disturbed and reclaimed in the Johnson Gulch-Yampa River subwatershed would be redisturbed for mining activities. The planned mining disturbance would physically alter the drainage characteristics of the landscape, and would remove some channel segments altogether. For example, eastward expansion of the L Pit would physically disrupt the uppermost channel reaches of Deacon Gulch and its headwater tributaries in the Breeze Basin-Yampa River subwatershed. The disturbed channels would cease to function for 8 to 10 years until the L Pit was backfilled and re-contoured during reclamation. Other drainages in the Project Area that could be impacted by mining include the main channels and tributaries of Sage Gulch (N Pit), Oak Gulch (N Pit), Middle Flume Gulch (L Pit), East Flume Gulch (L Pit), and Deal Gulch (L Pit).

During mining, diversion ditches would be constructed to capture runoff from disturbed areas and route the water into sediment ponds. These sediment ponds would help maintain downstream water quality by controlling the sediment load in water discharged from the Project Area and the SMCRA permit area. In the short term, the system of diversion ditches and sediment ponds required for mining could alter the volume or timing of peak flows in Sage Gulch, Oak Gulch, Middle Flume Gulch, East Flume Gulch, Deacon Gulch, and Deal Gulch by impounding water that would have otherwise flowed downstream. This impact would be negligible because flow would only be impounded within a small upstream portion of the affected watersheds. The impacted drainages also are ephemeral streams that contribute relatively small amounts of flow to the Yampa River. Overall, impacts from altering the mine drainage patterns would be short term. Once mining is completed, the open pits would be backfilled and graded to approximate pre-mine drainage conditions.

Stream flow monitoring performed by TMI also supports the conclusion that peak flow impacts from the altered drainage patterns would be negligible. Downstream flow in the ephemeral gulches is maintained to some degree through permitted discharges at Trapper Mine's CDPS outfalls. Flumes installed at the outfalls also provide a relatively continuous record of flow measurements in the receiving drainages. At Middle East Flume Gulch, flow rates recorded at CDPS site 021 averaged approximately 0.15 cfs between January 2005 and December 2014 (Hydro-Engineering 2015). By comparison, the average baseline flow rate for this stream (recorded between 1981 and 1986) was 0.16 cfs, indicating that the flow rate has not discernibly changed during the period of active mining.

Surface mining operations represent a source of coal fines and sediment that is easily eroded by wind and flowing water. Without proper drainage protections, these eroded materials can impact surface water quality as they are transported downgradient and deposited in stream channels. The system of diversion ditches and sediment ponds implemented by TMI helps to prevent these types of water quality impacts. TMI's sediment ponds are designed to treat the runoff and settleable sediment load from a 10-year, 24-hour storm event (TMI 1981 et seq.). The mine also uses secondary sediment control structures called dozer basins to augment the function of designed sediment ponds. The dozer basins are constructed in disturbed areas, upstream of the sediment ponds, as excavations with a minimal embankment and a notched spillway. They are intended to be temporary structures that are either cleaned out periodically, or abandoned in place once they fill up with sediment. Overall, the combination of diversion ditches and primary and secondary sediment control structures would reduce potential water quality impacts from eroded sediment to negligible levels during the life of mine.

Other pollutants present in the mine area, such as fuel, oil, hydraulic fluid, and explosives, could impact surface water quality through accidental leaks or spills. Slow leaks that remain undetected for a long period of time could infiltrate to groundwater, creating localized contamination issues that may eventually discharge to surface water. Left untreated, accidental spills also could impact water quality if the chemicals are flushed into nearby streams. TMI reduces the potential for these types of impacts through implementation of a Spill Prevention, Control, and Countermeasures (SPCC) Plan. BMPs required under the SPCC Plan include berms and secondary containment structures around chemical storage areas, spill response training for workers, and stocking spill cleanup kits close to the work site. If any inadvertent leaks or spills occurred, they would be properly contained and cleaned up, with reporting to appropriate agencies as required. Furthermore, operational water quality sampling at the CDPS outfalls shown on **Figure 3-3** also would enable tracking of water quality to identify and address any unforeseen issues. With implementation of these BMPs, potential water quality impacts from accidental spills and leaks would be reduced to negligible levels during the life of mine.

Monitoring records from CDPS site 020 (**Figure 3-3**) indicate that TDS may have increased in Middle Flume Gulch compared to data from the 1970s. As discussed in Section 3.5, the average baseline TDS concentration in this stream was 1,180 mg/L from 1974 to 1977 (TMI 1981 et seq.). Recent data collected between 2005 and 2014 exhibit an average TDS concentration of 1,360 mg/L (Hydro-Engineering 2015). No analysis was made of whether this increase is statistically significant. However, the TDS concentration trend graph for CDPS site 020 shows a distinct jump in TDS concentrations after April 2008.

Increasing surface water TDS would be an expected consequence of mining mostly due to groundwater discharge from backfill material. The backfill contains the mineral pyrite, which oxidizes to produce sulfate ions in the presence of meteoric water. Increasing sulfate is a major contributor to higher TDS. Post-mining, groundwater and surface water TDS would be expected to increase to varying degrees across the site depending on the pyritic sulfur content of the backfill material, which typically ranges from 0.1 to 0.3 percent. These sulfur contents, while generally low for a coal mine, may result in elevated TDS and sulfate concentrations which could last for 300 years or more if the entire mass of pyrite in the backfill is oxidized (TMI 1981 et seq.). However, calculations presented in the PAP indicate that higher surface water TDS derived from the mine would have a negligible impact on the Yampa River over the long term, increasing the average TDS of the river by no more than one tenth of one percent (TMI 1981 et seq.).

The sulfur content of the coal mined by TMI also is relatively low at less than 0.5 percent (TMI 1981 et seq.). At the Trapper Mine, the sedimentary rock-dominated mine spoil material typically contains enough carbonate available for dissolution to effectively buffer acidic water generated by pyrite oxidation. This buffering capacity helps minimize acid drainage effects and also helps prevent trace metals from being mobilized into solution (TMI 1981 et seq.). As such, surface water quality impacts from acid mine drainage and trace metals over the long term would be negligible.

It also is unlikely that Alternative A would affect the iron impairment in the Yampa River in the short- or long-term. As discussed in Section 3.5, baseline surface water quality monitoring at the mine indicated that average iron concentrations were generally below the 1 mg/L water quality standard for the Yampa River. However, in some cases, individual sample results exceeded the standard even before mining was initiated. Discharges from the mine area are currently regulated under CDPS Permit CO-0032115. TMI maintains five permitted outfalls downstream of the proposed Project Area mine pits: CDPS site 016 on Sage Gulch, CDPS sites 020, 021, and 023 on tributaries of Flume Gulch, and CDPS site 022 on Deal Gulch (**Figure 3-3**). No flow has been recorded at CDPS site 016 since 1997, which suggests that the eastern portion of the N Pit is unlikely to produce measurable flow in Sage Gulch. The other four outfalls are permitted for a maximum 30-day average total recoverable iron concentration of 3 mg/L, and a daily maximum total recoverable iron concentration of 6 mg/L (TMI 2012). Over the past 10 years, average total iron concentrations recorded at these outfalls have typically been below the 3 mg/L standard, ranging from 0.32 to 0.80 mg/L (Hydro-Engineering 2015). These values also are below the water quality standard for the Yampa River.

The primary effluent limitation for total recoverable iron was exceeded at CDPS sites 020 and 021 on March 6, 2012, when the reported iron concentrations reached 4.03 and 10.6 mg/L, respectively (Hydro-Engineering 2015). These iron values were associated with higher than average flow rates and similarly elevated TSS concentrations. The reported iron concentrations were likely influenced by suspended sediment in the samples. It also should be noted that under TMI's CDPS permit, no specific effluent limit applies to iron in cases of large discharge volumes cause by precipitation or snowmelt events (TMI 2012). Overall, mining operations under Alternative A would be unlikely to affect the Yampa River's iron impairment. Total iron concentrations at permitted outfalls near the Project Area have remained similar to baseline conditions and have rarely exceeded primary effluent limitations except during large precipitation or snowmelt events.

Runoff from actively mined areas and groundwater discharge from backfill material could contribute elevated selenium concentrations to surface water drainages. TMI's CDPS permit does not include an effluent limit for selenium (TMI 2012). While the future potential for selenium impacts is difficult to quantify, baseline and recent water quality samples collected at the mine suggest that there is limited risk of selenium contamination. Baseline selenium concentrations reported for Flume Gulch and other mine drainages generally ranged from about 0.005 to 0.02 mg/L (TMI 1981 et seq.). TMI collected additional selenium data from its permitted outfalls after active mining began. From 2005 to 2014, average detected selenium concentrations at CDPS sites 020, 021, 022, and 023 were 0.005 mg/L, 0.002 mg/L, 0.001 mg/L, and 0.01 mg/L, respectively (Hydro-Engineering 2015). These averages were calculated using detected concentrations only (i.e., non-detect sample results were excluded), and are consistent with baseline values. As long as TMI's water quality compliance efforts continue to be effective, mining operations under Alternative A would pose negligible risk of increasing selenium concentrations in Project Area drainages during and after mining.

Mercury contamination would be another potential water quality issue associated with coal mining. TMI's CDPS permit does not include an effluent limit for mercury (TMI 2012). However, in 2014, TMI began sampling for mercury at several of the mine CDPS outfall locations. Although the results have consistently indicated mercury is below the detection limit, the analyses to date has not achieved a detection limit below the 0.01 µg/L mercury standard for the Yampa River (TMI 2015). Thus, it is not possible to determine the degree to which (if any) the mine has in the past or would in the future contribute mercury to the Yampa River.

Continued compliance with reclamation requirements and TMI's CDPS permit would help ensure that water quality is maintained throughout the reclamation phase and is suitable for designated uses prior to the release of the reclamation bond. Over the long term, final reclamation would further reduce the potential for water quality impacts. Mine pits that have been backfilled after mining would result in surfaces that would be consistent with the approved post-mining topography and that would be covered with topsoil and revegetated. During reclamation, drainage patterns would be re-established per the approved reclamation plan and the potential for water quality impacts would be further reduced in part because there would be less potential for erosion and spills.

Overall direct impacts to surface water would be negligible in both the short term and long term.

Indirect Impacts

Indirect surface water impacts from the mining of coal would be related to water usage at the Craig Station. The Craig Station adjacent to the Trapper Mine diverts surface water in much greater quantities than the mine, which would be considered an indirect impact because the mine supplies coal to the power plant. The water diverted by the Craig Station comes from the Yampa River, Elkhead Reservoir, Yamcolo Reservoir, and other sources as needed. The plant-related diversions averaged about 12,000 acre-feet per year between 1980 and 2014 (OSMRE 2015). During that same time period, the average annual flow of the Yampa River near Maybell, Colorado (USGS Station 09251000, downstream of the Craig Station and Trapper Mine) was approximately 1.1 million acre-feet per year (USGS 2015). Thus, the Craig Station appropriates about 1 percent of the total Yampa River flow upstream of Maybell.

The Craig Station has valid water rights for its diversions and could continue using water from the Yampa River into the future even if Alternative A is not approved. The impact of these continued diversions would be mitigated to some degree by an instream water right (6-02CW106) on the Yampa River from Elkhead Creek to the confluence with the Green River (Colorado Water Conservation Board 2015). The instream water right is designed to maintain minimum flows in the Yampa to support fish populations and recreation (District Court, Water Division 6, Colorado 2005). The impact of water withdrawals from the Yampa River for use at the Craig Station would be long term and negligible to minor.

Another potential indirect impact from Alternative A would be atmospheric mercury deposition resulting from coal combustion, as the mine continues to supply coal to the Craig Station. Atmospheric mercury can affect surface water quality as it settles into streams and lakes through precipitation or dry deposition. The potential for mercury contamination through atmospheric deposition is extremely complex because atmospheric mercury can be derived from any number of local, regional, or global sources. Thus, it is not possible to determine how much mercury could be deposited in the Yampa River or Project Area drainages from continued operation of the Craig Station.

4.5.1.2 Groundwater

Direct Impacts

Under Alternative A, mining in the L and N pits would remove coal from the upper Williams Fork Formation. Although, as a whole, the upper Williams Fork Formation acts as an aquitard, individual sandstones and coal seams within the unit have been shown to produce water. These discrete water bearing zones would be permanently impacted where they are part of either the overburden, interburden, or coal removed during mining. Individual units that would be permanently impacted by mining in the L Pit include the Second White sandstone aquifer, the Third White Sandstone aquifer, the HI aquifer, and deeper coal units. Intervals planned for mining in the N Pit include the “L,” “M,” and “Q” coal seams. Consequently, future mining in the N Pit would permanently impact the KLM and QR aquifers.

The aquifers would be impacted as the geologic material that transmits groundwater is removed and replaced with backfill or mine spoils. TMI refers to these backfilled zones as “spoil aquifers.” The spoil aquifers would continue to store and transmit groundwater into the future, and would likely act as a single aquifer system, replacing the pre-mine condition of interbedded aquifers and confining units within the mine areas. Experience at the mine has shown that some surface water infiltration and re-saturation of the spoil aquifers would be expected to occur as evidenced by increasing water levels in backfill monitoring wells. Hydraulic conductivity values measured at monitoring wells completed in the spoil aquifer range from approximately 0.5 to 5 feet per day (15 to 152 centimeters per day). This range is comparable to native geologic material at the mine (TMI 1981 et seq.). Overall, it appears that TMI’s practice of backfilling former mine pits would create a more continuous permanent aquifer system with fewer confining layers. The hydraulic conductivity of the spoil aquifers may be similar to pre-mine conditions.

Alternative A would not disrupt the regional Twentymile Sandstone aquifer or deeper aquifer units. The Twentymile Sandstone is approximately 500 feet (152 meters) deep beneath the SMCRA permit area, well below the base of the planned mine pits. Even in areas where mining extends to the deeper “Q” coal seam, there would still be another aquitard and aquifer zone (i.e., the “U” aquifer) that would provide a buffer between mining and the top of the Twentymile Sandstone.

Alternative A could directly impact the Flume Gulch alluvial aquifer by removing upstream channel segments and alluvial sediments associated with the Flume Gulch drainage. Alluvial sediments that are removed to facilitate mining would not be restored during reclamation. Impacts to the Flume Gulch alluvium would be expected to be permanent but negligible because only a relatively short tributary segment of Flume Gulch would be removed during mining. The alluvium also tends to be thin or absent in upstream reaches of the Project Area drainages.

Spatial data provided by TMI shows that there are two springs in the Project Area: North Horse Gulch Spring and Fox Den Spring (**Figure 3-3**). No impacts would be expected to North Horse Gulch Spring because it is located outside of the previously disturbed area and over a mile from both the L and N pits. Conversely, the potential for impacts to Fox Den Spring would be higher since the spring is on the edge of the previously disturbed mine area, and only about 1,600 feet (488 meters) northeast of the N Pit (**Figure 3-6**). Fox Den Spring exists near the southern limits of the Third White sandstone (a part of the upper Williams Fork member) and is thought to emanate from this unit. To date, mining in the area has had no obvious effects on flows from Fox Den Spring, and the spring flow is not expected to be impacted during post-mine conditions (TMI 1981 et seq.). Sulfate and TDS concentrations measured at Fox Den Spring are similar to levels documented in monitoring wells completed in the Third White sandstone. Long term, the static water level of the spoil aquifer in this vicinity would be expected to be below the base of the Third White Sandstone, meaning there would be limited potential for groundwater in the spoil aquifer to mix with groundwater discharging from Fox Den Spring. Thus, the water quality of the spring likely would not be affected during post-mine conditions (TMI 1981 et seq.).

Post-mining, the spoil aquifer also might cause new springs to form as new preferential flow paths would be created. The flow regime through backfilled areas would likely be too complex to accurately predict where and how many spoil springs could form. However, TMI does not anticipate that spoil springs would develop in the Flume Gulch drainage, primarily because groundwater within the spoil aquifer in the eastern half of the Project Area would be able to drain into underlying permeable sandstone beds (TMI 1981 et seq.). If any spoil springs are identified post-mining, TMI would monitor the spring flows and water quality in accordance with the mine's approved monitoring plan and CDPS discharge permit.

Under Alternative A, groundwater would continue to be used for dust suppression and potable purposes. During water year 2014, TMI dewatered approximately 131 acre-feet of groundwater from its mine operations (Cummins 2015). The entire dewatering volume was pumped to an inactive mine pit and stored for later use as dust suppression water on the mine's haul roads and topsoil stockpiles. In addition to the dewatering water, TMI used another 195 acre-feet for dust suppression supplied from other inputs flowing into the inactive pit. These inflows included direct precipitation, runoff into the pit, groundwater discharge, and approximately 20 acre-feet of return flow from the Craig Station (Cummins 2015). Overall, dust suppression at the mine consumed 326 acre-feet during water year 2014. During that timeframe, TMI also pumped approximately 32 acre-feet of groundwater for potable use from its permitted water supply well in the Twentymile Sandstone (Cummins 2015). Water used for dust suppression and potable purposes represents a minor depletion of potentially non-renewable groundwater within the upper Williams Fork and Twentymile Sandstone aquifers. These depletions are conducted in accordance with Colorado water law under a court-approved augmentation plan decreed in Case No. W1178-77. By complying with this plan, groundwater and surface water depletions caused by mine operations would be effectively managed during mining to avoid impacts to senior water rights and downstream users.

Domestic wells within one mile of the Project Area are generally completed in the Third White Sandstone or deeper water-bearing units (TMI 1981 et seq.). Groundwater level drawdown resulting from mine dewatering could lower the static water levels in these wells. The potential for this impact was evaluated by reviewing groundwater hydrographs from monitoring wells installed in the vicinity of the L Pit. The monitoring wells in this area, shown on **Figure 3-5**, include GC-2 and GP-9 in the Third White Sandstone, GC-1 and GP-7 in the HI aquifer, and GP-2 and GP-8 in the KLM aquifer. The PAP suggests that mining would not significantly affect groundwater levels in the Third White Sandstone because the nearest Third White Sandstone well is approximately 6,000 feet (1,829 meters) north of the surface mine area (TMI 1981 et seq.). This statement is supported by hydrographs from wells GC-2 and GC-9, which reveal that water levels have actually increased in the Third White Sandstone over the past 15 years. In the HI aquifer, water level trends have been inconsistent. A sharp increase in water levels has occurred in GC-1 since 2009, while water levels have gradually fallen in GP-7 since 2001, registering a total decrease of 14 feet (4 meters). In contrast, large declines in the KLM aquifer potentiometric surface began in the late 1990s to early 2000s. The total decreases observed in wells GP-2 and GP-8 were

around 31 feet and 37 feet (9 to 11 meters), respectively (Hydro-Engineering 2015). The water levels in these wells have since rebounded to some degree and are approaching their static levels.

Groundwater drawdown typically diminishes with distance from a pumping or dewatering source. Most of TMI's monitoring wells are closer to the mining area than the nearest domestic water wells (**Figure 3-5**), so actual drawdown in the domestic wells is expected to be less than the changes observed in on-site monitoring wells. As such, based on recent water level trends, groundwater declines in the nearby domestic wells should be no more than about 30 feet (9 meters) in the KLM aquifer, and no more than 14 feet (4 meters) in the HI aquifer. These impacts would be negligible because the private wells within one mile of the Project Area had on average 250 feet (76 meters) of available head at the time of installation (Colorado Division of Water Resources, 2015). Any water level declines from mine-induced drawdown would be short term and minor and would not impact the long-term viability of these wells.

Accidental leaks or spills of chemicals used in the mining process would have the potential to impact groundwater quality without prompt action to clean up the spill and contaminated soil material. TMI would reduce the potential for these types of impacts through implementation of their SPCC Plan. Any inadvertent leaks or spills would be properly contained and cleaned up, with reporting to appropriate agencies as required. Furthermore, operational water quality sampling at monitoring wells shown on **Figure 3-5** would enable tracking of water quality to identify and address any unforeseen issues. With implementation of these BMPs, potential water quality impacts from accidental spills and leaks would be reduced to negligible levels.

Groundwater quality also would have the potential to be impacted by leachate from mine spoils and by infiltration of mine runoff. In areas where mine spoils contain pyritic sulfur, impacts from leachate would be discernible through changes in groundwater TDS and sulfate concentrations. **Table 4-18** presents baseline and recent TDS and sulfate concentrations for several monitoring wells near the Project Area. The well locations are shown on **Figure 3-5**. The table illustrates that as expected, average TDS values during the period of active mining (assumed to be the last 10 years) increased relative to baseline concentrations by as much as 40 percent. The trend of increasing TDS concentrations holds true for aquifers in both the upper Williams Fork member (i.e., the Third White sandstone and HI interval) and the alluvial aquifer. Sulfate concentrations also increased over baseline values in three of the four monitoring wells, suggesting an influence from pyritic sulfur. Higher groundwater TDS and sulfate concentrations in mined and reclaimed areas would be expected and would likely persist for many years as pyritic sulfur in spoil material is slowly oxidized. These groundwater quality impacts are considered minor because they would be confined to localized areas around the mine spoils. To the extent that impacted groundwater from the mine discharges to surface water, it still would not contain enough dissolved solids to increase the TDS concentration of the Yampa River above predetermined material damage levels (CDRM 2010).

Table 4-18 Summary of Groundwater Quality Data for Selected Constituents

Site ID[1]	Aquifer Interval	Sampling Period	Total Dissolved Solids (TDS)		Sulfate (SO_4)		Iron (Fe) (total recoverable)	
			n	mg/L	n	mg/L	n	mg/L
GC-1	HI	1974-1985 for TDS and SO_4, 1981-1985 for Fe	20	893.8	13	312.1	13	7.6
		2005-2014	20	1,027.4	10	359.0	10	0.8
GC-2	Third White Sandstone	1974-1985 for TDS and SO_4, 1981-1985 for Fe	15	728.0	9	419.0	1	11.2
		2005-2014	20	1,036.4	10	364.0	10	2.0

Table 4-18 Summary of Groundwater Quality Data for Selected Constituents

Site ID[1]	Aquifer Interval	Sampling Period	Total Dissolved Solids (TDS)		Sulfate (SO_4)		Iron (Fe) (total recoverable)	
			n	mg/L	n	mg/L	n	mg/L
GC-3	Alluvium	1974-1985 for TDS, 1981-1985 for Fe, 1974-1985 for SO_4	19	1,077.3	12	347.2	15	50.5
		2005-2014	46	1,402.3	10	552.0	34	1.7
COY	Alluvium	1974-1985 for TDS, 1981-1985 for Fe, 1974-1985 for SO_4	3	1,690.0	3	815.7	7	13.8
		2005-2014	20	1,920.0	10	1,002.0	10	0.5

[1] See **Figure 3-5** for well locations.

n = Number of observations.

Source: Hydro-Engineering 2015.

Indirect Impacts

Table 4-18 shows total recoverable iron concentration results for baseline and recent time periods. The iron data are important because they provide a measure of potential indirect impacts from iron mass loading as groundwater from the spoil aquifer discharges into Project Area drainages. In the small subset of wells presented in the table, total iron concentrations decreased markedly compared to average baseline values. It is difficult to pinpoint an exact reason for this decrease. However, the data suggest that native groundwater in the Project Area had a high iron content prior to mining, and that mining would be unlikely to worsen this condition. Based on this information and discussion presented in Section 4.5.1.1, Alternative A would be unlikely to affect the iron impairment in the Yampa River.

CCR produced at the Craig Station as part of the coal combustion process are hauled to for CCR placement at the Trapper Mine, outside of the Project Area. CCR placement would be an indirect effect of Alternative A. The placement site is under the jurisdiction of the SMCRA permit and is approved to receive CCR under a Certificate of Designation from Moffat County, with regulatory oversight from CDPHE. The placement site, CCR placement requirements, design features, operating criteria, monitoring requirements, closure and post-closure monitoring standards, and record-keeping and reporting requirements are regulated under the SMCRA permit and through CDHPE. Further, groundwater monitoring at the site indicates that metals of potential concern in the CCR material are present at low levels in site groundwater; however, limited permeability and infiltration has kept these concentrations within background ranges observed elsewhere at the mine. Therefore, the potential indirect impact to groundwater as a result of CCR placement at the Trapper Mine would be long-term and negligible.

Overall, potential direct and indirect impacts to surface water and groundwater resources under Alternative A are expected to be negligible to minor and short- to long-term.

4.5.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.5.2.1 Direct Impacts

Under Alternative B, mining in the Project Area would cease. There would be no further disruption of Project Area stream channels, and no further effects to downstream flows or water quality. Similarly, there would be no additional effects to groundwater springs or interception of groundwater within the Project Area. Alternative B would not, however, preclude mining in other portions of the SMCRA permit

boundary outside of the Project Area. Mining would likely continue in the N Pit outside of the Project Area and in the I Pit in the western SMCRA permit area (**Figure 2-4**). Surface water and groundwater impacts from mining in these areas would be similar in nature to impacts from Alternative A.

The area of the anticipated N Pit has previously been mined to remove the H seam, and has been partially reclaimed. This area would be reopened under Alternative B to recover deeper coal intervals. This would essentially undo reclamation efforts at the N Pit and would alter the drainage characteristics of East Pyeatt Gulch. Runoff from the N Pit would be captured in diversion ditches and routed to a sediment pond associated with CDPS outfall 011. Flow rates in East Pyeatt Gulch could be impacted as runoff is captured in this pond, but a comparison of baseline and recent flow data from the gulch suggests that the impact would be negligible. The average flow rate in East Pyeatt Gulch was 0.36 cfs during the baseline monitoring period (1981 to 1986) and increased to 0.45 cfs during the previous ten years of mining and reclamation (TMI 1981 et seq.; Hydro-Engineering 2015). No assessment was made of whether this change is statistically significant; the increase appears mainly to be driven by a period of high flows that occurred during the spring and summer of 2009. TMI also has a long period of water quality data available for East Pyeatt Gulch dating back to the mid-1970s. The data indicate that TDS concentrations in the gulch have not appreciably changed since the baseline period. The average baseline TDS concentration was 2070 mg/L compared to recent TDS concentrations that averaged 1,910 mg/L over the past 10 years (Hydro-Engineering 2015; TMI 1981 et seq.). These data suggest that short and long term flow and water quality impacts to East Pyeatt Gulch would likely be negligible under Alternative B.

Construction of the anticipated I Pit would directly alter the drainage characteristics and watersheds of Coyote Gulch and No Name Gulch. The area of the I Pit in the western SMCRA permit boundary has not been previously mined, so there is no post-mining data available for comparison to help predict future impacts. However, hydrologic data collected near the L and N Pits suggest that implementation of TMI's CDPS Permit and drainage control measures would help limit surface water quality and quantity impacts to negligible levels in the short term and long term.

Mining of the N and I Pits under Alternative B would directly impact groundwater in the upper Williams Fork Formation by removing native water-bearing strata and replacing the strata with backfill or mine spoils. In the N Pit, this would affect the KLM and QR aquifers; water-bearing intervals above the H coal seam were already removed during the previous phase of mining. As the pits are backfilled, the footprint of the spoil aquifer would increase. This could have implications for development of spoil springs as new preferential flow paths develop through the spoil material. There is already a well-defined spoil spring on the western edge of the N Pit known as the East Pyeatt South Spring. In the 10 years since this spring has been monitored, TDS and sulfate concentrations have ranged from 2,200 to 3,300 mg/L and 980 to 1,630 mg/L, respectively (Hydro-Engineering 2015). These concentrations could increase through time as pyritic sulfur in the spoil material is slowly oxidized.

An important difference between Alternative A and Alternative B is the rate and duration of mining. Coal reserves in the N and I pits are smaller and would be depleted by 2020 after only 3 to 4 years of mining (available coal reserves are projected to last until 2025 under Alternative A). In the absence of additional reserves, final reclamation would be implemented across the mine after completion of mining in the N and I Pits by backfilling open mine pits, grading the backfill to achieve the approved post-mining topography, removing buildings and structures, replacing topsoil, and reseeding the reclaimed areas. By re-establishing vegetation, reclamation would gradually reduce erosion from the Project Area, reduce sediment loads in runoff, and eliminate the need for runoff to be captured in sediment ponds. Final reclamation would occur 5 to 6 years earlier than Alternative A based on the currently identified coal reserves available under Alternative B.

Indirect Effects

Under Alternative B, the mine would continue to supply coal to the Craig Station until approximately 2020, albeit at an estimated reduced rate of 1.5 mtpy from reserves outside of the Project Area. There is

currently no evidence that a diminishing coal supply from Trapper Mine would affect the Craig Station; if the mine stopped operating or reduced coal production, the plant would presumably obtain coal from another source. As long as the Craig Station continues to burn coal, it would continue to divert water for cooling, generate emissions, and produce CCR. Indirect water resource impacts from these activities would be the same as Alternative A.

Overall, potential direct and indirect impacts to water resources under Alternative B are expected to be negligible to minor and short-term to long-term.

4.5.3 Mitigation Measures

No mitigation measures would be necessary for water resources.

4.6 Soils

4.6.1 Alternative A – Proposed Action

4.6.1.1 Direct Impacts

The proposed disturbance from July 2015, to the life-of-mine would affect approximately 257 acres (**Table 4-19**). As part of the mining process, topsoil would be removed using scrapers or similar equipment typically between May and October. The soil would typically be hauled directly to reclamation areas for immediate use or placed in stockpiles. If placed in temporary stockpiles, the stockpiles would be graded with 3H:1V outslopes and would be temporarily revegetated for stabilization. Topsoil would be salvaged during development of the pit, and during development of overburden stockpiles, temporary stockpiles, access roads and sediment ponds. A and upper B horizon soils would be removed for re-use, unless the soils are clayey or stony.

Table 4-19 Disturbance to Soil Types, Proposed Action Alternative

Soil Unit	Approximate Disturbed Acres
Adderton loam, 1 to 10% slopes	1.2
Bulkley silty clay, 3 to 12% slopes	20.4
Cochetopa loam, 12 to 25% slopes	52.8
Foidel loam, cool, 3 to 35% slopes	36.0
Foidel loam, 25 to 65% slopes	28.4
Hesperus fine sandy loam, dry, 2 to 15% slopes	1.4
Lamphier fine sandy loam, 3 to 25% slopes	70.5
Lamphier fine sandy loam, 25 to 65% slopes	10.1
Ustorthents, frigid-Borollis complex, 25 to 75% slopes	7.3
Winevada-Splitro complex, 3 to 25% slopes	29.3
Total	257

A horizon soils are generally high in organic matter but structurally weak, while upper B horizons have a moderately stable structure, but tend to be higher in clay near the C horizon interface. TMI would remove the A and upper B horizon soils together where they become mixed. This mixing can serve to increase fertility of more sterile clay soils and help soils heavy in organic matter become more stable and resistant to erosion. The lower B and C horizons would not be salvaged due to their clayey nature that makes them infertile with weak soil structure. In areas where there is rocky ground or terrain, topsoil salvage is not always practiced. Where the terrain varies and topsoil salvage would be practicable, or where the

horizon depths change, soils would be scraped at varying depths within the profile. This can provide for a more loamy mixture or a slightly heavier mix with more clay.

Within the Trapper Mine Project Area soils would be used for reclamation to achieve a post-mining land use of rangeland and wildlife habitat. Rangeland and wildlife habitat dedicated reclamation areas would receive approximately 12 inches of topsoil. Where possible, soils would be moved from salvaging in new areas directly to reclamation sites to minimize impacts to the chemical, physical, and biological properties of the soil. Direct haul of soils would be the preferred method for reclamation practices due to the less disruptive, direct placement, and preservation of the natural components of the soil. Direct hauling prevents compaction and chemical changes that would otherwise occur during long periods in a stockpile.

Stockpiled soils would be vegetated with fast growing native species prior to winter months. These soils can lose fertility, organic matter content, and microbial activity during stockpiling or become compacted or lose their capacity to retain water. Should compaction occur, TMI would use methods to break up the soil (e.g., discing) once placed in reclamation areas to fluff the soil and aid with the seeding process.

Impacts to soil resources in the Project Area would be minor in the short-term and negligible in the long-term following reclamation. The process of scraping the A and upper B horizons together mixes the soil horizons. This can make poor soils more productive and stable in areas that were unproductive before mining. However, mixing the horizons can make productive areas less productive leading to difficulty with revegetation of some species. TMI's record of reclamation and bond release shows that the reclamation techniques practiced at the Trapper Mine are successful.

4.6.1.2 Indirect Impacts

There are no indirect impacts to soils under Alternative A.

4.6.2 Alternatives B – Disapproval of the Mining Plan Modification by the ASLM

4.6.2.1 Direct Impacts

Under Alternative B mining would cease and no new ground disturbance would occur within the Project Area. Reclamation activities would occur in the Project Area through backfilling and grading the existing disturbed area to the approved post-mining topography, topsoil replacement, and revegetation within the Project Area. Structures and equipment would be broken down and moved to new mining areas outside of the Project Area. These activities would last 3 to 5 years and proceed through the Phase III bond release, expected to be completed within an additional 10 to 15 years. Additional mining within the SMCRA permit boundary would cause disturbance to the soils within the N and I Pit areas outside of the Project Area. The area of the N Pit has been previously disturbed and soils have been salvaged for reclamation. The I Pit soils have not been previously disturbed. Similar techniques for topsoil salvage and replacement would be practiced for areas outside of the Project Area.

Impacts to soil resources would be minor in the short-term and negligible in the long-term after reclamation activities.

4.6.2.2 Indirect Impacts

There are no indirect impacts to soils under Alternative B.

4.6.3 Mitigation Measures

No mitigation measures would be necessary for soils.

4.7 Vegetation

4.7.1 Alternative A – Proposed Action

4.7.1.1 Direct Impacts

Alternative A would remove approximately 257 acres of mountain shrubland through new disturbance over the next 10 years. Current disturbance of 1,053 acres exists in the Project Area. This previous disturbance also was mountain shrublands. Under the approved reclamation plan for the SMCRA permit, approximately 494 acres of previously disturbed mountain shrubland have been reclaimed to rangeland/wildlife habitat within the Project Area and approximately 178 acres of the reclaimed area has achieved Phase III bond release. The remainder of the current disturbance and future disturbance also would be reclaimed to rangeland and wildlife habitat, dominated by native perennial grasses and a mixture of native shrubs and forbs.

Mountain shrubland may not regenerate; previous reclamation areas have trended to establishment of a big sagebrush-grass community as it matures. The total time through Phase III bond release would be approximately 23 to 30 years. The total amount of impacted mountain shrubland vegetation (257 acres) would be small in comparison to that available in the region.

The potential for acid generating mine spoil underlying replaced topsoil and inhibiting plant growth has been evaluated by TMI on graded spoil throughout the SMCRA permit boundary. The test results have demonstrated that the Trapper Mine spoil is inert and will not inhibit plant growth. Based on past testing results, CDRMS no longer requires TMI to test spoil prior to topsoil placement and revegetation.

The direct impact to vegetation would be minor and long-term until reclamation is complete and vegetation has become established.

The additional disturbance increases the potential for the establishment and spread of noxious weeds. However, with implementation of established protocols to identify noxious weeds and TMI's current weed control practices, according to State regulations and CDRMS guidelines, the overall impact in the Project Area would be negligible.

4.7.1.2 Indirect Impacts

There are no indirect impacts to vegetation.

4.7.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.7.2.1 Direct Impacts

Under Alternative B, all mining related activities in the Project Area would cease and closure and reclamation of the 1,053 acres of currently disturbed land would be initiated. The existing disturbance would be reclaimed to rangeland/wildlife habitat. There would be no further impacts related to future disturbance and conversion of plant communities from mountain shrubland to reclaimed rangeland habitat. The reclamation of previously disturbed lands would be conducted using native grasses, forbs, and shrubs planted with prescribed seed mixes. Additional vegetation disturbance would occur in the N and I Pits outside the Project Area. The N Pit has been previously disturbed and reclaimed. The I Pit would be new disturbance. The mining activities outside of the Project Area would occur over 3 to 4 years, followed by reclamation. Overall the reclamation within the Project Area and mining and reclamation in other areas would take from 17 to 25 years, slightly less time than Alternative A. The impacts would be the same as described for Alternative A; minor and long-term until reclamation is complete and vegetation has become established.

4.7.2.2 Indirect Impacts

There are no indirect impacts to vegetation from Alternative B.

4.7.3 Mitigation Measures

No mitigation measures would be necessary for vegetation.

4.8 Wetlands and Riparian Zones

4.8.1 Alternative A – Proposed Action

4.8.1.1 Direct Impacts

Mining operations within the Project Area have resulted in the disturbance of 0.399 acre of wetlands. No additional wetlands disturbances would occur as part of Alternative A. The existing impacts to the disturbed wetlands have occurred from January 21, 1998 and would continue through the final mine closure. The wetlands disturbance was permitted under USACE Nationwide Permit 21, permit number 199875575. Nationwide Permit 21 covers the dredge and fill activities associated with wetland loss due to surface coal mining activities. The USACE determined that dredged and fill material released in waters of the U.S. would not impact threatened or endangered species. Wetlands mitigation would be conducted in accordance with TMI's reclamation plan. TMI would reestablish the approved post-mining topography contour within the Project Area. This contouring would replace the drainage bottoms approximately to their previous character, resulting in new fringe wetlands in accordance with SMCRA Permit C-1981-010. In addition, TMI has volunteered to take steps to protect 1.46 acres of wetlands created from past reclamation activities outside of the Project Area on CSLB-managed lands.

There would be no new impacts to wetlands under Alternative A.

4.8.1.2 Indirect Impacts

Indirect impacts to wetlands could occur from water quality impacts associated with Alternative A. As discussed in Section 4.5, impacts to water quality are expected to be negligible to minor and short-term to long-term.

4.8.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.8.2.1 Direct Impacts

Under Alternative B no additional impacts would occur to wetlands, waters of the U.S., and riparian areas within the Project Area. Reclamation of the existing impacts to 0.399 wetlands within the Project Area would be the same as described for Alternative A. The reclamation measures currently in place would continue through the Phase III bond release ensuring the Project Area under Alternative B would be reclaimed in the same manner as under the life of mine plan of Alternative A. Reclamation includes re-contouring of land, revegetation, and erosion and sediment control.

New disturbance would occur outside of the Project Area within the SMCRA permit boundary. The N Pit area has been previously disturbed and new mining activities would result in no new wetlands disturbance. Prior to disturbance associated with mining in the I Pit, a new wetlands inventory would occur and, if wetlands are determined to be present, mitigation measures would be implemented. These mitigation measures would be designed to reduce wetlands impacts to minor to negligible. Overall impacts from Alternative B are expected to be negligible to minor and short-to long-term until completion of any needed wetlands mitigation and re-establishment of drainage patterns upon completion of mining and reclamation.

4.8.2.2 Indirect Impacts

Indirect impacts to wetlands could occur from water quality impacts associated with Alternative B. The indirect impacts under Alternative B would be the same as discussed for indirect impacts under the Alternative A.

4.8.3 Mitigation Measures

The proposed disturbance from July 1, 2015, to the life-of-mine would not affect the wetlands that are within the Project Area. The existing 0.399 acre of impacts to wetlands was disturbed under current mining. Mitigation measures for these wetlands would occur during the reclamation process by restoring the area to the approximate original topography. No additional mitigation measures are necessary for wetlands.

4.9 Fish and Wildlife Resources

4.9.1 Alternative A – Proposed Action

4.9.1.1 Direct Impacts

Short-term impacts to wildlife, lasting a few minutes to less than 5 years, would occur primarily through gradual loss of habitat and disturbance by mining and human presence. These impacts, as described below, would be minor. Areas of habitat that are lost due to mining (257 acres) are less than 1 percent of available habitats in the region and the related activities within the Project Area would be reclaimed contemporaneously, as soon as mining has progressed beyond to the next mine pit and it is safe to begin reclamation. At the end of the Project, all disturbed mine land and support infrastructure would be reclaimed in accordance with the approved reclamation plan, which includes goals to replace or improve wildlife habitat. At the end of the Project, disturbance to wildlife as a result of noise (Section 4.17) and human activity would cease (10 years to completion of mining and an additional 3 to 5 years to complete reclamation activities). Full Phase III bond release would likely occur in the following 15 to 20 years. Development of big sagebrush may take an additional 10 to 20 years.

<u>Big Game</u>

Within the Project Area, Alternative A would remove land that is coincident with big game ranges. Alternative A would remove 257 acres of mule deer summer range, and a smaller portion of winter range. Likewise, Alternative A would remove 257 acres of elk summer and winter range, with a small portion of that also being classified as winter concentration area. The disturbance also would remove 257 acres that are categorized as overall and summer range for moose, overall range and fall concentration area for black bear, production area for elk, and a small amount of habitat designated for the resident elk population. General habitat for mountain lions and pronghorn also would be impacted. The impact would be short-term, until contemporaneous reclamation is successful in reestablishing these habitats within the Project Area. With contemporaneous reclamation, impacts to these habitats would be negligible, primarily due to the focus on reclamation and revegetation for wildlife habitat.

Big game would tend to displace from areas being disturbed to areas outside of the Project Area and would avoid active mining sites and infrastructure. Based on observations at the existing mining operations, within the SMCRA permit boundary, both elk and mule deer have acclimated to the disturbance from mining operations and exist in proximity to the disturbance associated with mining. Herds are commonly found on previously and newly reclaimed areas that are adjacent to active mining operations. With foraging opportunities available, mountain lions and black bears could utilize the Project Area, but may reduce use due to noise and mine activities. The overall impact due to displacement would be minor and short-term, lasting only during the active mining years and until contemporaneous reclamation activities are complete in any area within the Project Area.

<u>Migratory Birds</u>

Direct impacts to migratory birds within the Project Area could include mortalities and injuries to birds and eggs in unidentified nests. Disturbance to 257 acres of suitable habitat in mountain shrub vegetation could reduce nesting opportunities for species adapted to habitats in those areas. Migratory birds also would tend to be displaced from active mining areas; however, with contemporaneous reclamation, habitat would become available to birds adapted to grassland and early successional shrubland habitats within 3 to 5 years. Mountain shrubland habitats are more widely available outside the Project Area.

Noise produced by mining operations also may affect migratory birds. Noise can interfere with establishment of breeding territories for songbirds that vocalize during breeding, or interfere with alarm calls of birds and mammals (Larkin 1996; U.S. Department of the Interior 2003). These impacts would be localized and short-term in any active mining areas. The overall impact would be negligible due to the limited acres of disturbance at any one time, availability of habitat outside of the Project Area and contemporaneous reclamation.

Raptors

Direct impacts to raptors could result from vehicle strikes. However the possibility would be negligible due to implemented design features and speed control. Therefore, the primary impacts that may result to raptors under this alternative would be from loss of 257 acres of potential foraging habitat and disturbance to individuals perching within the Project Area. Foraging opportunities could return on contemporaneously reclaimed land in 3 to 15 years. Noise and human presence could disturb individuals that forage or perch in the area. Potential disturbance from mining and reclamation activities would end within 3 to 15 years, depending on the mining and reclamation schedule for each area.

Nesting habitat is limited in the Project Area and vegetation removal could reduce nesting opportunities to a minor extent. Nesting raptors are often sensitive to disturbance from human related activities, particularly prior to eggs being laid. Raptors may abandon nests with eggs or become less attentive to hatchlings, thus increasing the potential for mortality from predation or exposure. The amount of disturbance that an individual raptor will tolerate varies among species and individuals (CPW 2003) and the degree to which an individual has acclimatized to human activity. Impacts to nesting raptors could extend beyond the actual disturbance area up to 0.5 mile (0.8 kilometer) away (CPW 2003). Only two known nest sites are within this disturbance range, and none are known from the proposed disturbance area within the Project Area. The known nests near the Project Area include a golden eagle nest and a prairie falcon nest; there are no nests that would be impacted directly by the Project. The direct impact to raptors would be minor and short-term due to the limited habitat lost relative to that available in the region, the limited duration of mining activities and contemporaneous reclamation allowing foraging opportunities to be regained.

Small Mammals and Reptiles

In addition to the loss of habitat for small mammals and reptiles, some mortality could occur from construction, mining activities, and vehicle operation. The loss of approximately 257 acres of mountain shrubland with possible habitat would be negligible compared to the existing available habitat in the region outside the Project Area. Habitat would develop on disturbed lands within 3 to 15 years for most species with contemporaneous reclamation. The direct impact would be short-term and minor.

Fisheries

Direct disturbance to aquatic habitat and species within the Project Area would be limited to ephemeral streams, which support macroinvertebrates when water is present. Some of these may be disturbed by mining over the next 10 years. Contemporaneous reclamation would return functional channels to the post mining landscape within a short period of time of completion of mining in any given area. Fish are not present in these streams due to the lack of water on a consistent basis. Direct impacts to fisheries would be short-term and negligible.

4.9.1.2 Indirect Impacts

Potential indirect impacts could occur in the Yampa River, located approximately 4.5 miles (7 km) north of the Project Area, as a result of potential discharges from the Project Area to the Yampa River or as a result of emissions from coal combustion at the Craig Station.

Surface disturbance increases the potential for localized sediment input to ephemeral streams. However, sediment control structures, sediment ponds, and diversion ditches would be used as part of project design features, which would reduce the amount of sediment that could potentially be carried

downstream. In addition, mining activities near streams would pose a risk of petroleum product or hazardous material spills. As part of the project design features, a SPCC Plan would be implemented to reduce risk of a spill and the potential to affect aquatic habitat and macroinvertebrates. The potential impacts to water quality are discussed in Section 4.5. The potential effects of mine dewatering and water use and emissions from the Hayden Station on fish species in the Yampa River are discussed in Section 4.10, Special Status Species. The indirect impacts to fisheries could be short-term and long-term and would be negligible due to the controls implemented to prevent impacts to off-site water quality and habitat degradation.

4.9.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.9.2.1 Direct Impacts

Under Alternative B, all mining related activities in the Project Area would cease and closure and reclamation would be initiated on the existing disturbance within the Project Area. There would be no further impacts as a result of habitat loss related to the proposed 257 acres of additional disturbance. The reclamation of wildlife habitat and the cessation of noise and human disturbance would occur earlier in the Project Area than under Alternative A, but would have the same overall short-term, negligible to minor impacts as Alternative A until reclamation activities cease and reclamation is successfully established.

However, mining would continue in areas outside of the Project Area. As a result, direct impacts would continue until reclamation activities have ceased and reclamation has been successfully established in areas within and outside of the Project Area. Impacts similar to those described for Alternative A would continue to occur in areas outside the Project Area until mining ceases at Trapper Mine.

4.9.2.2 Indirect Impacts

Reclamation activities would continue for 3 to 5 years, during which a lower-level of impacts (described above) would continue to affect big game, raptors, migratory birds, small mammals and reptiles. There would be no additional indirect impacts to fisheries. Impacts would diminish appreciably upon completion of reclamation. Big game would eventually lose improvements to habitat in the disturbed areas, as reclaimed rangelands mature and develop a uniform structure, similar to the big sagebrush rangelands in the region.

4.9.3 Mitigation Measures

No mitigation measures would be necessary for wildlife.

4.10 Special Status Species

4.10.1 Alternative A – Proposed Action

4.10.1.1 Direct Impacts

Several special status species are known in the vicinity of the Project Area or have habitat within or in the vicinity of the Project Area. These species include BLM sensitive species and Colorado species of concern. Federally listed species do not occur within or near the Project Area but do occur in a wider analysis area and are discussed for potential direct and indirect impacts.

<u>Northern Leopard Frog</u>

The northern leopard frog has not been observed within the Project Area but is known to occur in the vicinity. Alternative A would have no direct impact on the northern leopard frog. No habitat occurs for the species in the Project Area.

Golden Eagle

Golden eagles are known to use the Project Area for foraging and there is a known golden eagle nest within 0.5 mile of the Project Area. Golden eagles could be impacted by noise and mine activity under Alternative A. This could result in individuals avoiding or flushing from foraging areas or perch sites in the Project Area. A total of about 257 acres of vegetation removed through mine activities would impact habitat for rabbits, hares, and ground squirrels – the staples of the golden eagle diet. This would directly result in lower foraging opportunities for golden eagles in the Project Area when vegetation is cleared, but the area is small compared to the total foraging habitat surrounding the Project Area. There is a small possibility for golden eagles to collide with vehicles operating in the Project Area, but the potential is small due to the limited occurrence of golden eagles in the Project Area and enforcement of speed limits within the Project Area. Direct impacts to this species would be negligible due to the limited amount of foraging habitat that would be affected (less than one percent) compared to that available in the region and the limited possibility of direct mortality.

Burrowing Owl

Burrowing owls have not been documented within the Project Area but have been documented on reclaimed lands to the west of the Project Area. Alternative A would have little direct impact on the burrowing owl. No potential habitat would be removed for mining operations. There is a small possibility that burrowing owls could be struck by moving vehicles during the course of normal operations. Overall, direct impacts to this species would be negligible due to no disturbance of suitable habitat, lack of a documented presence of the species within the Project Area and the unlikelihood of direct mortality due to enforcement of speed limits.

Ferruginous Hawk

Ferruginous hawk habitat exists within the Project Area, but this species has not been documented in the Project Area. Alternative A would have little direct impact on the ferruginous hawk because of its lack of documented presence. Foraging habitat for the species exists in reclaimed rangeland and the big sagebrush-grass community. No big sagebrush-grass vegetation and only a small amount (11 acres) of reclaimed rangeland may be re-disturbed. Potential foraging opportunities for ground squirrels and rabbits in the Project Area would remain intact. Noise and mine activity under Alternative A could result in individuals avoiding or flushing from foraging areas or perch sites in the Project Area if these were used in the future. There is little to no possibility that ferruginous hawks could be struck by moving vehicles during the course of normal operations due to the lack of their documented presence within the Project Area and the enforcement of speed limits. Overall, the direct impacts to this species would be negligible due to the limited amount of habitat for the species in the Project Area and the unlikelihood of individuals using the Project Area in the next 9 to 10 years.

Peregrine Falcon

American peregrine falcon habitat is limited within the Project Area and this species has not been documented within the Project Area. Alternative A would have little direct impact on the peregrine falcon. Foraging habitat for the species exists in native habitats and on reclaimed rangeland. Vegetation cleared for mine activities would remove about 257 acres of mountain shrubland and habitat for small birds; thus, reducing potential foraging opportunities for peregrine falcons. There is little to no possibility that peregrine falcons could be struck by moving vehicles during the course of normal operations due to the lack of their documented presence within the Project Area and the enforcement of speed limits. Overall, the direct impacts to this species would be negligible due to the limited amount of habitat for the species in the Project Area and the unlikelihood of individuals using the Project Area in the next 9 to 10 years

Brewer's Sparrow

Brewer's sparrow is unlikely to experience direct impacts from Alternative A. It is unlikely to occur in the 257 acres of mountain shrubland vegetation that will be disturbed in the next 9 to 10 years. It has the greatest potential to occur in reclaimed rangeland vegetation and native sagebrush shrublands in and

near the Project Area (22 acres of big sagebrush-grass vegetation; 494 acres of reclaimed rangeland). It is anticipated that a very small amount of reclaimed rangeland (11 acres) would be re-disturbed by re-mining in the N Pit. As a result, there would be short-term, negligible direct impacts to this species during mining activities that re-disturb reclaimed rangeland.

Columbian Sharp-tailed Grouse

Columbian sharp-tailed grouse habitat has been created on reclaimed lands to the west of the Project Area and the use of these reclaimed lands by the grouse is well-documented and increasing. The entire Project Area is within Columbian sharp-tailed grouse overall range and winter range. Approximately 410 acres of designated production areas for this species are located within the northwest corner of the Project Area. This species is known to occur within the Project Area, although no leks are known to occur. Alternative A has the potential to directly affect the Columbian sharp-tailed grouse by removing 257 acres of native mountain shrubland vegetation. There is a potential for individual mortality due to vehicle collisions related to normal mine operations; however, the likelihood is small with the enforcement of speed limits within the Project Area. The overall direct impacts to the Columbian sharp-tailed grouse would be minor due to the small amount of habitat affected by Alternative A relative to the availability habitat in the region, the lack of documented leks in the proposed disturbance area, and the small potential for direct mortality to individual grouse due to enforcement of speed limits.

Colorado River Watershed Fish

The closest habitat for the Colorado River endangered fish species is the Yampa River located approximately 4.5 miles (7 km) north of the Project Area (**Figure 3-13**). There is no habitat or designated critical habitat for the Colorado River fish in or adjacent to the Project Area. Direct impacts to the Colorado River fish are related to water depletions from Trapper Mine water usage. In the BA issued for RN06, the net annual water depletion was estimated at 94.8 acre-feet (OSMRE 2015). The USFWS determined in the subsequent Biological Opinion (BO) that the Trapper Mine's net water depletions fit under the Programmatic Biological Opinion on the Management Plan for Endangered Fishes in the Yampa River Basin (Yampa River PBO). The Yampa River PBO states that in order for actions to fall under the umbrella of the document and rely on a Recovery Implementation Program Recovery Action Plan (RIPRAP) to offset depletions, the following criteria must be met:

1. A Recovery Agreement must be offered and signed prior to conclusion of Section 7 consultation.
2. A fee to fund recovery actions will be submitted for new depletion projects greater than 100 acre-feet per year.
3. Re-initiation stipulations will be included in all individual consultations under the umbrella of this program.
4. The USFWS and project proponent will request that discretionary federal control be retained for all consultations under this program.

TMI and the USFWS signed a RIPRAP that identifies actions believed to be required to recover the endangered fish in the most expeditious manner (USFWS 2013). TMI agreed to a one-time contribution based on its share of the costs of the Recovery Implementation Program to fund recovery actions (USFWS 2013). No additional depletions would occur under Alternative A and no further actions are needed for depletions.

Colorado River watershed habitat for endangered fish also could be affected by sediment loading, and releases of mercury and selenium. The Trapper Mine lies approximately 4.5 miles south of the Yampa River. Mining activities under Alternative A could increase sediment loading in streams being carried offsite and eventually reaching the Yampa River in the short-term as indicated in Section 4.5. However mitigation measures would greatly decrease the likelihood of sediment reaching the Yampa River. The impact of selenium discharges from the mine reaching the Yampa River are considered to be long-term

and negligible based on the analysis in Section 4.5.1.1. Based on available water monitoring data, it is unknown if mining activities are contributing to mercury levels in the Yampa River.

Yellow Billed Cuckoo

The yellow-billed cuckoo is described as an occasional, localized breeder along the Yampa River near Craig (USFWS 2014c). The species was last documented in that area in 2008 but breeding was not confirmed. Proposed critical habitat for the species occurs along the Yampa River from approximately 8 miles (13 km) east of Hayden to approximately 5 miles (8 km) west of Craig. As discussed above for the Colorado River Watershed Fish, the impact of selenium discharges and sediment loading is expected to be long-term and negligible. Based on available water monitoring data, it is unknown if mining activities are contributing to mercury levels in the Yampa River.

4.10.2 Indirect Impacts

Indirect impacts from Alternative A to endangered fishes are related to coal combustion at the Craig Station. Combustion of coal releases mercury into the atmosphere which may be deposited directly into habitat for the endangered fish in the Colorado River watershed or may wash into the Colorado River or its tributaries after being deposited on land. The indirect effects area for the Colorado River watershed fish is the airshed boundary and the area between the Yampa and White Rivers to their confluences with the Green River to the east (**Figure 3-1**).

The specific impacts to the Colorado River fish from mercury in the Yampa and White rivers is highly uncertain. It is not known to what extent the level of mercury in these systems may be impacting these species at a population level. Additionally, given the longer life of the Colorado pikeminnow and its position higher in the food chain as a top predator, mercury would likely affect this species to a greater degree than the razorback sucker, bonytail chub, or humpback chub. This is due to the fact that the pikeminnow would have a greater chance to bio-accumulate higher concentrations of mercury during its lifespan. In contrast, the bonytail chub and humpback chub are middle feeders and the razorback sucker is a bottom feeder that feed on organisms lower in the food chain with potentially lower concentrations of mercury.

Mercury can affect an individual's central nervous system, alter their behaviors (e.g., reduced predator avoidance), and disrupt the endocrine system resulting in reduced reproductive success (Lusk 2010). While the specific effects of mercury and other heavy metals on pikeminnow are known, the role these contaminants play on suppressing populations of the Colorado River fish are not well understood (USFWS 2011). For the Colorado River fish, Beckvar (2005) determined that survival, growth, reproduction, and behavior begin to be affected by mercury at 0.2 micrograms per gram (µg/g) in the whole fish. In the 1960s, Colorado pikeminnow in the Yampa River Basin had a median level of mercury per fish weight of approximately 0.6 µg/g. In 2010, that level had dropped to approximately 0.5 µg/g (Lusk 2010).

Mercury emissions have been previously described in Section 4.3.1.2 with the amount of mercury emissions attributable to combustion of Trapper Mine coal at the Craig Station estimated to be 7.29 lbs/yr (3.31 kg/yr) for the average mining rate of 2.3 mtpy, and 8.23 lbs/year (3.73 kg/yr) for the maximum mining rate of 2.6 mtpy. These rates represent approximately 17 percent and 19 percent, respectively, of the total mercury emissions from Craig Station.

No current data or modeling is available to indicate how much of the mercury that is emitted by the Craig Station is deposited annually within the airshed used in this assessment. However, a recent BA conducted for the Four Corners Power Plant and Navajo Mine Energy Project (FCPP & NMEP) (OSMRE 2014) included detailed modeling of the emissions and deposition of mercury produced at the FCPP. In those models, it was determined that approximately 95 percent of all mercury emitted by the FCPP rises high enough into the atmosphere to be carried by prevailing wind currents out of the area analyzed in that BA. It is important to note that it is unknown if this modeling accurately reflects the

conditions at the Craig Station, because environmental conditions in the Four Corners region are different from those in Craig, Colorado.

The Mercury Deposition Network (MDN) has a system of receptors that monitor levels of mercury. The nearest receptor to the Trapper Mine is the Buffalo Pass-Summit Lake site east of Steamboat Springs, which is approximately 45 miles (72 km) east of the Trapper Mine and the Craig Station. These monitoring stations measure the levels of mercury that are deposited in precipitation events (i.e., wet deposition). Data from this station in 2013 indicated that there was an annual deposition of 9.757 micrograms per square meter ($\mu g/m^2$) of mercury at that location (NADP 2015). There are no other monitoring sites within the airshed; consequently, it would be speculative to accurately determine how much mercury is being deposited throughout the airshed due to the spatial variability of the deposition on an annual basis. It should be noted that the MDN clearly indicates that deposition can vary spatially across regional airsheds.

Using the results of the emission and deposition modeling conducted at FCPP as a possible scenario, and assuming that the average annual deposition of 9.757 $\mu g/m^2$ of mercury is equally distributed throughout Yampa and White river watersheds (a combined total of 13,267 square miles [21,351 square kilometers]); an annual deposition of 739.14 pounds of mercury is calculated. The entirety of the Colorado River Fish indirect effects evaluation area is within these two watersheds and is 4,059 square miles (6,532 square kilometers). Therefore, assuming an even distribution of mercury deposition, there would be a total of 226.17 pounds of mercury dropped annually over the entire indirect effects area. However, if the results of the FCPP & NMEP model are used, then only five percent of the mercury deposited would be emitted from local sources; and the other 95 percent would come from global or other distant sources. This would indicate that the proportional amount of mercury deposited annually that comes from the Craig Station and the Hayden Station, the two local generating stations, is 11.3 pounds (5 percent from local sources) across the entire indirect effects evaluation area.

The proportion of local mercury attributable to the Craig Station can be estimated by comparing the ratio of coal that is combusted between the Craig Station and the Hayden Station, both located within the indirect effects evaluation area. The Craig Station consumes coal at a rate of 4.8 mtpy, and the Hayden Station uses coal at a rate of 1.75 mtpy. Using these numbers, the Craig Station would contribute 8.3 pounds annually (0.733 x 11.31 pounds) of local mercury to mercury deposition within the evaluation area; and the Hayden Station would contribute 3.02 pounds of local mercury (0.267 x 11.31 pounds).

Applying percentages to the sourced coal that is consumed in the three units at the Craig Station estimates TMI's contribution to locally deposited mercury. Trapper Mine sourced coal that is combusted in Units1 and 2 contributes 19.16 percent of the mercury emitted from the Craig Station, and other coal that is consumed in Units 1, 2, and 3 contributes 80.84 percent of the mercury emissions. Applying these ratios to the local mercury deposition from the Craig Station (8.3 pounds) would indicate that Trapper Mine coal results in 1.6 pounds (0.1916 x 8.3 pounds) of locally deposited mercury; and other coal results in 6.7 pounds (0.8084 x 8.3 pounds) of locally deposited mercury. Therefore the mercury deposited over the study area attributable to Trapper Mine would be 1.6 pounds annually at the maximum mining rate of 2.6 mtpy.

The assumption of an even deposition of mercury is impracticable, because the prevailing winds from the southwest to the northeast likely result in higher amounts of deposition east of the Craig Station than other parts of the affected area. However, barring further detailed modeling into the analysis of mercury deposition, precise estimates of local deposition are unavailable at this time.

The actual amount of mercury deposited annually would vary based on the chemical speciation of the mercury in the atmosphere, as well as the climatic conditions, and the amount of coal combusted to meet regional electricity needs. Therefore, the amount of mercury annually deposited in the affected area that may be attributable to the combustion of coal from Trapper Mine could vary yearly.

It is important to note that the calculations above are in reference to wet deposition of mercury. Some research has shown that dry deposition can be equal to or greater than wet deposition. Dry deposition occurs when mercury settles out of the air, and wet deposition occurs when mercury is deposited in rain or other types of precipitation. Research has shown this rate to be anywhere from 0.8 to 4.8 times higher in the central and eastern United States (Zhang et al. 2012). The rate of dry deposition is highly dependent on the meteorological conditions and the chemical speciation of the mercury. Although most all of the sites analyzed in Zang et al. (2012) were in the eastern United States with more precipitation than that experienced in western Colorado, one site analyzed was in Salt Lake City, Utah. At that site, total mercury was 2.5 times that of the wet deposition of mercury (Zhang et al. 2012). The USFWS applied this ratio 2.5:1 in the BO for the Mining Plan Modification for the South Taylor/Lower Wilson Area at the Colowyo Coal Mine (USFWS 2015). Applying this factor to the Trapper Mine coal that is combusted at the Craig Station provides a total mercury deposition of 4 pounds annually over the entire indirect effects area from Alternative A.

In addition to impacts to individual Colorado River fish, impacts also could occur to designated critical habitats for the four species within the indirect effects area. Mercury from the combustion of Trapper Mine coal at the Craig Station that is deposited either directly or indirectly into the designated critical habitat for these species would have the potential to adversely impact critical habitat. It is difficult to quantify the level of these impacts to critical habitats as a result of Alternative A given the lack of information on the origin of mercury in the indirect effects area. However, if it is assumed that only five percent of the mercury generated at the local generating stations is deposited into the area, the impact from Alternative A may be small. However, when added to the other regional and global sources of mercury deposited into the area, Alternative A may result in cumulatively adverse impacts (Chapter 5.0).

Of the amount of mercury annually deposited in the indirect effects area (as well as the larger Yampa and White river basins), it is reasonable to assume that some portion would deposit directly or indirectly into the Yampa or White rivers or their tributaries. Some of this mercury would be converted into methylmercury (MeHg) and, thereby, has the potential to adversely affect the Colorado River fish. However, due to a lack of data or modeling it is not possible to quantify the amount of mercury that would enter the Yampa and White rivers, or be converted to MeHg. Therefore, at this time it is not possible to accurately predict the full impact to the Colorado River fish or their habitat.

Due to the uncertainties in how mercury is potentially affecting the Colorado River fish species, it is difficult to draw a conclusion of indirect impacts from Alternative A as some of the data appear to be contradictory. In a recent study, pikeminnow populations in the Yampa River were reported to be declining but had low mercury concentrations compared to other river segments (Osmundson and Lusk 2012). Conversely, pikeminnow in the White River had high levels of mercury concentrations but the population has been increasing (Osmundson and Lusk 2012). The increase in the pikeminnow population in the White River was attributed to upstream movement of juvenile pikeminnow that originated in downstream Green River reaches during 2006 and 2007 and not from reproduction occurring in the White River itself (Bestgen et al. 2010). Further studies are required to determine how mercury is affecting species in the Yampa and White rivers before a conclusion can be drawn between Alternative A and impacts to the Colorado River fish and their critical habitats.

In addition to mercury, impacts to the Colorado River fish from increases in selenium from the combustion of coal at the Craig Station could occur. Selenium, a trace element, is a natural component of coal and soils in the area and can be released to the environment by the irrigation of selenium-rich soils and the burning of coal in power plants with subsequent emissions to air and deposition to land and surface water. Contributions from anthropogenic sources have increased with the increases of world population, energy demand, and expansion of irrigated agriculture. Selenium, abundant in western soils, enters surface waters through erosion, leaching, and runoff. While required in the diet of fish at very low concentrations (0.1 µg/g) (Sharma and Singh 1984), it is unknown if selenium is adversely affecting endangered fish in the Yampa Basin. Excess dietary selenium causes elevated selenium concentrations to be deposited into developing eggs, particularly the yolk (Buhl and Hamilton 2000). If concentrations in the eggs are sufficiently high, developing proteins and enzymes become dysfunctional or result in

oxidative stress, conditions that may lead to embryo mortality, deformed embryos, or embryos that may be at higher risk for mortality.

Of the four Colorado River fish species, selenium would disproportionately affect the razorback sucker more than the other three species. As with all sucker species, the razorback sucker is a bottom feeder and more likely to ingest selenium that has precipitated to the river bottoms.

Combustion of coal at the Craig Station could result in some amount of selenium being emitted and subsequently deposited. However, as it is not monitored as it is emitted, unlike mercury, there is no information as to how much is released. When selenium is present in flue gas, it tends to behave much like sulfur and is removed to some extent via SO_2 air scrubbers in place or absorbs onto alkaline fly ash that is subsequently removed by a fabric filter baghouse (EPRI 2008). Therefore, due to the lack of information available, it is unknown if selenium is impacting Colorado River fish species in the Yampa and White rivers.

Consultation on the potential effects of Alternative A is being conducted with the USFWS under Section 7 of the ESA. In general, the level of indirect impacts to listed Colorado River Fish from mercury and selenium resulting from coal combustion under Alternative A cannot be determined due to the uncertainties described above.

Yellow-Billed Cuckoo

The yellow-billed cuckoo could be indirectly impacted byfrom coal combustion and mercury in the environment. For the yellow-billed cuckoo, mercury bio-accumulates through the ingestion of aerial insects emerging from benthic life stages that develop in aquatic environments with mercury or from predatory spiders that eat these (Buckland-Nicks et al. 2014; Cristol et al. 2008; Edmonds et al. 2012; Evers et al. 2012; Gann et al. 2014). Dietary mercury concentrations associated with adverse effects to birds are normally greater than 0.1 mg/kg wet weight (USDOI 1998). Once ingested, MeHg rapidly moves into the bird's central nervous system, resulting in behavioral and neuromotor disorders (Scheuhammer et al. 2012, 2007; Tan et al. 2009). The developing central nervous system in avian embryos is especially sensitive to this effect, and permanent brain lesions and spinal cord degeneration are common (Bryan et al. 2003; DOI 1998; Heinz et al. 2009; Scheuhammer et al. 2007; Young 1998). Therefore, adverse effects are described for the eggs, embryos, nestlings and fledglings due to elevated mercury burdens in the female parent.

Uptake of mercury by birds usually has been shown to impact fish-eating birds more severely than insectivorous birds (Boening 2000; Zolfaghari et al. 2009). Additionally, Howie (2010) found that the lateral extent of elevated mercury levels in birds and invertebrate prey species varied from approximately 250 to 650 meters (820 to 2,133 feet) from an affected water body. After this distance, mercury levels in the blood and feathers could not be distinguished from background levels, indicating that only those individuals that forage adjacent to affected water bodies show signs of bioaccumulation of mercury.

No information is available on the levels of mercury found in invertebrates in the Yampa River or elsewhere within the indirect effects area. However, it could be assumed that given the levels of mercury that currently exist in the Yampa River, that the aquatic invertebrates may contain elevated levels of mercury. However, the amount of mercury that may be present would vary depending on the water temperature and its hardness (Boening 2000).

Any yellow-billed cuckoos present in the area would be at risk for mercury contamination. However, that risk would be minor considering that the primary food sources for the cuckoo largely are not aquatic, but individual cuckoos could occasionally consume lizards that are higher in the food chain and that may have consumed insects of an aquatic origin. Under this scenario, the concentration of MeHg would magnify from the environment as it bioaccumulates from insect to lizard and eventually a cuckoo that consumes the lizard. Therefore, it is not possible to entirely discount the potential for yellow-billed cuckoos to bio-accumulate mercury from Alternative A; however, given the infrequency of this species

within the area historically, it is unknown how many individuals would have the potential to be affected. Furthermore, it is difficult to determine the level of impact given that there is no threshold information regarding mercury levels that adversely affect yellow-billed cuckoos or actual amounts of mercury in yellow-billed cuckoos that inhabit the area. Based on the low numbers of cuckoos that are thought to use the area, it would be difficult to obtain these data.

Since the yellow-billed cuckoo may not return to the same breeding areas in successive years, it is possible that if any individuals were impacted by mercury in one year, individuals may travel to a new location in subsequent years that are not impacted by mercury generated from the Craig Station. Also, because cuckoos are migrants that are present for only a few months each year, the potential for mercury exposure in the area would be lower than if the species were a year-round resident.

In addition to impacts to individual yellow-billed cuckoos, the proposed critical habitat for this species also may be impacted by Alternative A. The USFWS has proposed critical habitat for the western yellow billed cuckoo along the Yampa River.

The indirect effects of Alternative A would result in some level of mercury deposition in the area. Some of this mercury may affect the invertebrates that make up the cuckoo's prey base, thereby affecting the proposed critical habitat. Different orders of invertebrates often react to mercury differently, although the larval stages are usually most susceptible to mercury. Levels of 1 to 10 µg/L normally cause acute toxicity for the most sensitive developmental stage of many different species of aquatic invertebrates (Boening 2000). It should be noted, however, that aquatic insects are not the primary food source for cuckoos. It is unknown how much of the mercury deposited from Trapper Mine coal burned at the Craig Station would eventually enter into the bodies of yellow-billed cuckoos. Therefore, it is not possible to determine the severity of this impact.

Combustion of coal at the Craig Station could result in some amount of selenium being emitted and subsequently deposited. Impacts from elevated selenium in birds can affect reproduction in developing embryos by acting as a teratogen, lower body weight, decrease immune function, or result in histopathological lesions (Hamilton 2004). However, as is described in the previous section, there is a lack of information on the amount of selenium emitted or absorbed at the Craig Station from Alternative A. Therefore, it is unknown if the indirect effects of selenium are impacting the yellow-billed cuckoo or proposed critical habitat.

There are many uncertainties surrounding the yellow-billed cuckoo. Consultation on the potential effects of Alternative A is being conducted with the USFWS under Section 7 of the ESA. In general, the level of indirect impacts to the yellow-billed cuckoo from mercury and selenium resulting from coal combustion under Alternative A cannot be determined due to the uncertainties described above.

4.10.3 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.10.3.1 Direct Impacts

Under Alternative B, activities within the Project Area would cease and reclamation would occur. However, mining would continue in areas outside of the Project Area. As a result direct impacts would continue in the Project Area until reclamation activities have ceased and reclamation has been successfully established but impacts, similar to those described for Alternative A, would continue to occur in areas outside the Project Area until mining ceases at the Trapper Mine.

4.10.3.2 Indirect Impacts

Indirect impacts to the Colorado River fish and yellow-billed cuckoo would continue in the long-term due to the coal combustion and emissions of mercury and selenium. Although these impacts would continue for as long as the Craig Station is operational, the portion attributable to combustion of Trapper coal would decrease based on the expected decreased mining rate for the 3- to 4-year life of mining outside

of the Project Area. For reasons previously described, the exact indirect impacts based on coal combustion cannot be determined.

4.10.4 Mitigation Measures

4.10.4.1 Colorado River Fish

OSMRE has voluntarily developed a number of conservation measures in coordination with TMI and USFWS that would aid in improving the scientific knowledge and preservation of these species in the Yampa and White river basins. The objective of these conservation measures would be to help toward the recovery and ultimate goal of down listing or delisting these species in the future. The proposed conservation measures would become mandatory commitments with the approval of the BA and issuance of the BO. Additional details can be found in the BA in **Appendix B**.

TMI would contribute funding toward active research projects in the Yampa and White River Basins to study mercury deposition and the uptake in fish species in these areas. TMI would provide funding in the amount of $45,000 for upcoming mercury deposition studies being conducted in the Yampa and White rivers by the USGS Water Quality Division, and investigation of MeHg uptake in fish tissues to be conducted jointly by BLM and USGS Fort Collins Office in cooperation with CPW in the same river systems.

Additionally, TMI would contribute $10,000 of funding for recovery actions that are managed by the Upper Colorado River Endangered Fish Recovery Program. TMI would provide the funding to the National Fish and Wildlife Foundation to distribute to the Upper Colorado River Endangered Fish Recovery Program. The details of the specific activities that will be funded are described in the BA in **Appendix B**.

4.10.4.2 Yellow-billed Cuckoo

OSMRE has voluntarily developed a number of conservation measures in coordination with TMI and USFWS that would aid in improving the scientific knowledge about the population of yellow-billed cuckoos that have been known to occur on the Yampa River. TMI would provide $5,000 to fund a protocol survey during the breeding season in proposed critical habitat along the Yampa River. TMI would either conduct the survey itself or hire a permitted contractor to perform the survey. The results of the survey will be provided to USFWS. Further details of the specific activities that will be funded are described in BA in **Appendix B**.

4.11 Cultural Resources

Surface-disturbing activities or construction of associated infrastructure may directly or indirectly affect cultural resources in the APE, including historic properties (i.e., NRHP-eligible sites), as well as those cultural resources that require additional information to determine eligibility (i.e., “needs data”). The sites categorized as needing additional data (the “needs data” sites) will be managed as if they are eligible for listing in the NRHP until further evaluation has been completed.

The direct effects area includes all associated mine-related disturbances and facilities, including topsoil stockpiles, overburden stockpiles, access roads, power lines, water lines, sediment ponds, and diversion ditches.

The indirect effects area, which encompasses those historic properties for which the setting is essential to their NRHP eligibility, is defined as the geographic area which is not planned for disturbance and lies within the Project Area. Indirect effects may include increased soil erosion and gullying, vibration from blasting, and dust from operations. In addition, enhanced access to now remote areas would increase the potential for illicit artifact collection and/or vandalism of cultural resources. Other indirect effects may include deterioration of the site setting, thereby diminishing those aspects for which nearby cultural resources are considered eligible for the NRHP.

One cultural resource site is located within the indirect APE (**Table 4-20**).

Table 4-20 Historic Properties Within Indirect APE

Site Number	Site Type	Cultural Affiliation	NRHP Evaluation	Relationship To Proposed Disturbance
5MF.948	Rock Art	Protohistoric	Eligible	Indirect APE, located approximately 700 feet south of L Pit disturbance limit

4.11.1 Alternative A – Proposed Action

4.11.1.1 Direct Impacts

No cultural resources sites eligible for listing on the NRHP are located within the direct effects area, so no direct effects to cultural resources would occur as a result of Alternative A.

4.11.1.2 Indirect Impacts

Alternative A includes the continued operation of the L Pit, which is located 700 feet north of site 5MF.948, a rock art site that is dated to the Protohistoric era (A.D. 1300-1881). The site was recorded in July 1980 by Archaeological Services of Laramie, Wyoming. Features noted on the site include pictographs made with red and yellow ochre; petroglyphs of shield, spears, bison, mounted horseman, and standing warriors; and a charred bone fragment. The rock art adorns the vertical face of a sandstone cliff, on private lands within Federal Coal Lease C-079641. The site has been determined eligible for listing in the NRHP and avoidance is recommended, especially if construction activity is anticipated within 50 feet of the site.

The site faces south and is found at least 200 feet below the lowest planned mining elevation, so direct mining activity would not disturb the site, and mining activities would not be visible from the site. In addition, given the aspect and position of the rock art panel, it would be protected from atmospheric and auditory effects such as fly rock and air blast. However, TMI plans to construct a sediment control pond directly below and within the viewshed of the site.

Concern has been expressed that the site could be damaged by nearby blasting operations in existing and planned mining areas. TMI has acknowledged this risk and engaged Agapito Associates, Inc. (AAI) to complete analysis of the potential for vibration damage to the site. AAI calculated the blasting vibration levels (measured as peak particle velocity or PPV) sufficient to cause spalling or cracking of the rock forming the cliff on which the rock art is depicted and have recommended that vibration levels not exceed PPV of 2 inches per second. If sufficient protection from rock fall is implemented, a maximum PPV of 5 inches per second may be more appropriate. Charge weights for blasting range between 3,000 and 5,000 pounds. A charge weight of 3,000 pounds could be used at distances greater than 1,330 feet, while a 5,000-pound charge weight could be used at distances greater than 1,720 feet. When the blast area is nearer than these limits, the charge weight must be reduced to maintain a safe vibration level that would not harm the rock art at the site.

As part of the CDRMS mid permit term review, TMI will be submitting the AAI report to the CDRMS and agreeing to abide by the recommendations of the report (Hinkemeyer 2015). If any mining or mining-related activity occurs within 50 feet of any historic property, then the location would be fenced. This commitment would apply to the rock art site. If TMI complies with the AAI recommendations and the fencing commitments, the site would not be adversely affected by Alternative A.

4.11.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.11.2.1 Direct Impacts

Under this alternative, Alternative A would not be approved and the current mining operations in the Project Area would be terminated. No additional coal removal would occur within the Project Area. No additional disturbance beyond the existing disturbance footprint would occur and reclamation would be completed. Under these circumstances, no historic properties or "needs data" sites would be directly affected within the Project Area. The areas encompassed within the N and I Pits were previously surveyed for cultural resources in the late 1970s and early 1980s and no cultural resources are known to exist in these areas.

Under Alternative B TMI would move to coal recovery outside of the Project Area in the N Pit and the I Pit. The area of the N Pit has been previously disturbed and re-disturbance of this area would not result in direct impacts to cultural resources.

TMI has indicated the pit boundary for the I Pit but has not yet completed design of the infrastructure that would be needed to mine that pit including the topsoil stockpiles, overburden stockpiles, roads, sediment ponds, power lines, water lines, so impacts to cultural resources as a result of construction of infrastructure to support mining in the N and I Pits cannot be fully quantified.

4.11.2.2 Indirect Impacts

Any coal mined under Alternative B would be further away from site 5MF.948 and indirect impacts to that site would not occur. No additional known cultural resources would be indirectly affected by Alternative B.

4.11.3 Mitigation Measures

4.11.3.1 Unanticipated Discoveries

If a previously unidentified cultural resource is discovered in the Project Area, TMI would take measures to protect the find locality and provide written notice to the CDRMS and the OSMRE within 48 hours of the discovery. A Colorado-permitted archaeologist meeting the Secretary of the Interior's Professional Qualification Standards would, as soon as possible, evaluate the discovery, make a recommendation as to the NRHP eligibility of the resource, and provide written notice to the CDRMS and the OSMRE within 48 hours. The CDRMS and OSMRE would then consult with the SHPO and the BLM (for federally managed sites) on the NRHP eligibility determination(s) and develop appropriate measures necessary to mitigate any adverse effects through the development of a treatment plan.

Should the discovery involve a burial or a resource thought to have potential religious and cultural significance, the tribe(s) with an interest would be notified and consulted as appropriate. When agreement is reached among all of the involved parties, the appropriate mitigation, if necessary, would be implemented. The tribes, OSMRE, CDRMS, SHPO, and the surface landowner must agree to any proposed treatment measures.

4.11.3.2 Human Remains

If human remains are exposed during mining activities, mining activities would be halted immediately near the discovery. The remains would be appropriately covered and stabilized, and access to the immediate area would be blocked by flagging and/or temporary fencing. All mining operations would cease within a radius of 100 feet around the discovery site.

Unmarked burials located on private or state land would be treated under CRS 24-80-411 and CRS 24-80 Part 13. TMI would contact the county sheriff, the county coroner, and the appropriate land managing agency official to notify them of the discovery. The coroner would conduct an on-site inquiry within 48 hours of notification and may enlist the assistance of specialists to determine if the remains are

of forensic interest. If the remains are not of a forensic interest, the coroner would contact the State Archaeologist. Before further disturbance, the State Archaeologist would have a qualified archaeologist examine the human remains and determine whether or not they are more than 100 years old and to evaluate the integrity of their archaeological context. If the on-site inquiry discloses that the human remains are Native American, the State Archaeologist would notify the Colorado Commission of Indian Affairs to formulate a treatment plan within 10 days of the discovery. The State Archaeologist and Colorado Commission of Indian Affairs would coordinate Native American tribal notifications and subsequent consultations. If the remains are verifiably non-Native American, the county coroner would convey the remains to the Colorado State Anatomical Board for proper disposition.

For unmarked Native American burials identified on federally managed lands, the requirements of the Native American Graves Protection and Repatriation Act would apply in accordance with 43 CFR 10, Subpart B.

4.11.4 American Indian Concerns

Several tribes were contacted in 2015 regarding Alternative A (**Appendix C**). The Hopi Tribe has requested consultation related to the rock art at site 5MF.948. No other concerns have been raised regarding any religious or sacred sites near the mine.

4.12 Socioeconomics

4.12.1 Alternative A – Proposed Action

Under Alternative A, mining operations at the Trapper Mine would continue within the Project Area from July 1, 2015, through the life-of-mine, estimated to be approximately 2025 or later depending on coal delivery requirements. The coal would be mined at the current mining rates which average approximately 2.3 mtpy with a maximum production rate of 2.6 mtpy.

4.12.1.1 Direct Impacts

Trapper Mine currently employs approximately 191 workers. Employment levels would stay approximately the same under Alternative A until closure activities begin within the Project Area. In 2014, TMI spent approximately $19.7 million in gross wages including benefits. This amount rose to $20.3 million in 2015. This direct beneficial impact to TMI workers would continue until closure activities begin within the Project Area or potentially longer as TMI moves to other areas of coal within the SMCRA permit boundary. Direct support of industries that supply services to the Trapper Mine also would continue. This includes the Craig Station, which receives Trapper Mine coal and would continue to operate at or near its current level, assuming that its coal supply from multiple sources remains relatively constant. Additionally, industries such as welding, fabrication, and equipment rental would continue to directly benefit from the continuation of mining operations at the Trapper Mine until the completion of mining and reclamation. Payments of local, state and federal taxes also would continue. Trapper Mine paid $3.9 million in federal Abandoned Land fees, $4.8 million in severance tax, $1.2 million of which was distributed to local governments and impact grant funds, as well as $8.0 million in property tax and $36.9 million in royalties between 2010 and 2015. Local services would continue to benefit from the local distribution of 50 percent of the State of Colorado's share of severance taxes. These payments would continue at approximately the same amount until mining is completed for the Project Area.

TMI has been involved in the community in a number of ways. TMI community involvement has included but is not limited to construction and donation of a fitness center in Craig, donation of labor, equipment and funds to the construction and subsequent operation of local athletic facilities, construction of a portion of the Yampa Valley golf course at no cost to the community, and participation in hunting programs for disabled individuals. Local community participation and the resulting community benefit would continue to be associated with the Project Area until mine closure activities would begin in 2025.

Overall socioeconomic benefits from Alternative A would be beneficial and last for the life of the mining and reclamation operations within the Project Area.

4.12.1.2 Indirect Impacts

Indirect beneficial impacts, such as support by TMI employees of the retail and accommodation industries, as well as local real estate, would continue from the continuation of mining operations at the Trapper Mine until closure. Indirect beneficial impacts also include local purchases, salaries and benefits to local workers at the Craig Station, which receives Trapper Mine coal.

4.12.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

Under Alternative B, TMI would terminate the current mining operation in the Project Area. Coal reserves identified in areas outside of the Project Area include the N and I Pits as shown on **Figure 2-4**. The expected coal to be mined from these pits would be approximately 4.5 million tons at an anticipated reduced mining rate of 1.5 mtpy, resulting in the potential of 3 to 4 years of continued mining on a reduced level.

4.12.2.1 Direct Impacts

Under this alternative, direct employment of approximately 191 workers would be reduced, along with the subsequent payment of $20.3 million in gross wages and benefits as reported for 2015. A reduction in employment and subsequent gross wages and benefits would occur starting at cessation of mining within the Project Area, with further reductions after the 3 to 4 years of mining in areas outside of the Project Area and assuming no additional reserves are identified. Local, state, and federal tax payments would markedly decrease based on the reduced mining rate and would end at mine closure. It is estimated, based on 2010-2015 averages, approximately $174.5 million in gross wages and benefits, $5.9 million in Abandoned Mine Land fees, $7.2 million in severance tax, $55.4 million in royalties, and $12.0 million in property tax revenue from mining within the Project Area would be eliminated if mining did not continue. This reduction in revenue would be partially offset by the mining in other areas of the SMCRA permit boundary. The loss of direct employment income as well as local, state, and federal tax revenue would have substantial effects on a region that has strong economic ties with the mining sector. Although the effect to the State of Colorado from a reduction in severance tax collection would likely be minor, local areas would not receive the 50 percent disbursement of these funds, resulting in an adverse impact to the ability of local areas to provide services such as law enforcement and health care. Industries that directly contribute to the mine would potentially incur a large decline in business and associated revenue as well as employment. These industries include welding, fabrication, and equipment rental businesses. The housing industry also could potentially incur an adverse impact as those directly employed by Trapper Mine may leave the area. Local school enrollment also could be adversely affected as directly employed workers and their families leave the area.

Under Alternative B, community involvement by TMI, which has ranged from funding of local sports fields and fitness centers to support of disabled hunter programs, would likely be reduced.

Overall impacts from Alternative B would be beneficial during the shortened life of the mining operations outside the Project Area and adverse once mining operations cease.

4.12.2.2 Indirect Impacts

Industries to which the mine contributes indirectly would potentially incur a large decline in business and associated revenue as a result of the reduced mining operations and shortened mine life. Indirect employment levels also would likely be reduced. These industries include the retail and accommodation industries in Craig and vicinity. The real estate industry also could potentially incur an adverse impact as those indirectly supported by TMI may leave the area. Local school enrollment also could be affected as indirectly employed workers and their families leave the area. Indirect impacts also potentially include a

reduction of availability of goods and services to local workers from the Craig Station, which receives Trapper Mine coal.

4.12.3 Mitigation Measures

No mitigation measures have been identified for socioeconomic resources.

4.13 Visual Resources

The mining of the Project Area would create a visual intrusion to the landscape from points where it is visible. It would create a noticeable change to the continuity of color, form, line and texture of the landscape. There also may be a certain amount of exhaust and dust emissions released into the air above the mine areas that may be visible; however, TMI has controls in place to limit these emissions in accordance with the air permit. Although the mine is not located on federally managed lands, OSMRE requires evaluation under the BLM visual resource management objectives and activities should conform to BLM Class IV (see Section 3.14).

4.13.1 Alternative A – Proposed Action

4.13.1.1 Direct Impacts

Under Alternative A, mining in the Project Area would continue and is visible from certain locations until reclamation allows the area to successfully blend with the natural surroundings which could take 20 to 30 years. The Project Area is located at approximately 6,900 feet (2,103 meters) amsl and topography and vegetation block the view of the mine from many locations. The Project Area cannot be seen from the west or the south. Visibility from the south is blocked by the Williams Fork Mountain ridgeline. Views from a small amount of higher elevation areas (7,500 feet [2,286 meters] amsl) to the east in the Williams Fork Mountains look upon the Project Area. The majority of the mine viewshed is to the north and mostly in the eastern portion of Moffatt County. The mine is visible from the town of Craig but not from Hayden. Some portions of Highway 13 north of Craig (paralleling Fortification Creek) also are within the mine viewshed. Because mining within the SMCRA permit boundary has occurred since the 1970s it is unlikely that the residents of Craig notice it as a visual intrusion, but visitors to the region might notice the visual intrusion. The mine is visible from portions of the Yampa River extending approximately 5 miles (8 km) east of Craig and intermittently 13 miles (21 km) west (most of the western visibility would only include the draglines).

Overall, the visual impacts from the Project would be negligible to minor and short-term. These impacts would meet the BLM Class IV objectives.

TMI does operate throughout the night and utilizes lighting systems that are visible from the City of Craig. Lighting at the Trapper Mine is minimal and is kept to only that lighting necessary for operator safety. The lighting is directed downward to minimize the light cast outward. The Craig Station lighting is far more visible and overshadows the Trapper Mine lights. As a result, the visibility of the mine lights is minor and would last for the duration of mining operations.

4.13.1.2 Indirect Impacts

There would be no indirect impacts to visual resources as a result of Alternative A.

4.13.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.13.2.1 Direct Impacts

Under Alternative B, OSMRE would not recommend approval of continued mining to the ASLM and the ASLM would not approve continued mining. TMI would cease mining activities in the Project Area and begin reclaiming the disturbed areas. Operational visibility and nighttime lighting would persist as mining continues in other areas of the SMCRA permit boundary. Final reclamation within the Project Area would

be similar to Alternative A; however the reclamation would occur once mining operations cease. Visual intrusions as a result of mining would continue for areas outside the Project Area for an additional three to four years due to ongoing mining within the SMCRA permit boundary. Overall, the visual impacts from these continued mining activities would be negligible to minor and short-term. These impacts would meet the BLM Class IV objectives.

4.13.2.2 Indirect Impacts

There would be no indirect impacts to visual resources under Alternative B.

4.14 Paleontological Resources

4.14.1 Alternative A – Proposed Action

4.14.1.1 Direct Impacts

As the Project Area lies within a PFYC Class 5 zone, there is the potential that the ground disturbing activities would adversely affect fossils. If any such fossils of paleontological interest are located in the Project Area, ground disturbing and overburden removal activities could damage the fossils and the information that could have been gained from them would be lost. Activities under Alternative A also could pose a beneficial impact to paleontological resources by increasing the chances for discovery of scientifically important fossils within the Project Area. Surface coal mining and related activities could have a permanent adverse impact on paleontological resources. Paleontological resources not identified and transported prior to or during mining operations would be permanently lost. Because the Project Area disturbance is small compared to the overall Williams Fork Formation, impacts to paleontological resources are expected to be long-term and negligible.

4.14.1.2 Indirect Impacts

There would be no indirect impacts to paleontological resources from Alternative A.

4.14.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.14.2.1 Direct Impacts

Under Alternative B, mining would cease and closure and reclamation would be initiated. Additional disturbance would occur outside of the Project Area in the N and I Pits. The N Pit has been previously disturbed so the discovery of paleontological resources would be unlikely, but the I Pit is new disturbance. Impacts to paleontological resources as a result of Alternative B would be similar to impacts from Alternative A.

4.14.2.2 Indirect Impacts

There would be no indirect impacts to paleontological resources as a result of Alternative B.

4.14.3 Mitigation Measures

The following protection measures for paleontological resources are taken from the BLM LSFO ROD and Approved RMP (BLM 2011):

- Proposed surface disturbing actions will be evaluated to determine inventory needs and identify sites that could be potentially impacted by such activities. Surface disturbing activities in PFYC Class 4 and 5 paleontological areas that are devoid of thick soils and vegetation and with steep, unsafe cliffs will be inventoried by a qualified paleontologist with a valid Colorado BLM paleontology permit who is approved by the authorized officer. Mitigation measures for specific locations will be identified on a case-by-case basis.

- If paleontological resources are discovered during mining operations on BLM managed lands, mine employees shall immediately notify the BLM and shall not disturb such discovered resources until the Field Office Manager issues specific instructions. Within 5 working days after notification, the Field Office Manager shall evaluate any paleontological resources discovered and shall determine whether any action may be required to protect or to preserve such discoveries.

Should paleontological resources be encountered as a result of the Project, OSMRE would be consulted as appropriate.

4.15 Access and Transportation

4.15.1 Alternative A – Proposed Action

4.15.1.1 Direct Impacts

Under Alternative A Trapper Mine employee commuter traffic would continue to and from the mine when shift changes occur. The 37,226 annual truck trips required for the transportation of coal from the Project Area and CCR from the Craig Station also would continue. AADT counts on U.S Highway 40 and State Highways 13 and 394 would not change as a result of the proposed project.

Roads within the SMCRA permit boundary consist of haul roads and light use ancillary roads. In-pit routes of travel and ramps are not considered roads because they are temporary and frequently move to accommodate mining activities; however, they would continue to be constructed, used, modified, and moved until they are reclaimed. No new roads would be constructed under Alternative A. Roads and routes of travel would be watered to abate the effects of fugitive dust emissions as required by air quality standards. Overall there would be no changes to transportation and access as a result of Alternative A.

4.15.1.2 Indirect Impacts

There would be no indirect impacts to access and transportation as a result of Alternative A.

4.15.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.15.2.1 Direct Impacts

Under Alternative B mining within the Project Area would cease and reclamation activities would begin. Traffic related to mining within the Project Area would be reduced as reclamation is completed (approximately 3 to 5 years). Heavy equipment operating within the Project Area would cease with the exception of equipment engaged in reclamation activities. Mining activity may still occur in other areas within the SMCRA permit boundary resulting in continued internal traffic although the rate of mining would decrease from an average 2.3 mtpy to approximately 1.5 mtpy. The 37,226 truck trips would be reduced as a result of the reduced mining rate, but the hauling of CCR waste would not change assuming the Craig Station continued to operate at current capacity. Changes to AADT counts for U.S Highway 40 and State Highways 13 and 394 would be short-term and minor and occur mostly from fewer employees and reduced delivery of supplies as a result of the reduced mining rate. Over the long term, once mining is completed, traffic rates to and from the mine would be reduced.

4.15.2.2 Indirect Impacts

There would be no indirect impacts to access and transportation as a result of Alternative B.

4.15.3 Mitigation Measures

No mitigation measures would be necessary for access and transportation.

4.16 Solid Waste

4.16.1 Alternative A – Proposed Action

4.16.1.1 Direct Impacts

Direct impacts may occur through the mishandling or improper disposal of solid waste. Those impacts may include contamination of soil and water resources and could be long term if leaks or sources of contamination are not discovered in a timely manner. Under Alternative A, impacts to the environment from the potential release of hazardous or solid waste are not anticipated to occur. Solid waste that may be generated during coal mining would be mainly non-hazardous materials which would be disposed in mined out pits. Waste that can be disposed in mined out pits consists of inert materials such as trash, lumber, concrete, scrap iron, and unsalvageable tires (TMI 1981 et seq.).

Construction sites and all facilities would be maintained in a sanitary condition at all times. Waste materials that cannot be disposed on-site would be disposed of promptly at appropriate off-site waste disposal facilities. All hazardous waste would be accumulated and disposed off-site according to applicable rules and regulations. Human waste from the mine facilities is transported through a flow line to the Craig Station sewage system. The sewage at work sites in portable toilets would be transported off-site for disposal.

Assuming TMI follows the procedures outlined above for waste disposal, including hauling all materials that are not inert to an appropriate disposal facility, there would be no impacts from disposal of solid waste within the mined out pits.

4.16.1.2 Indirect Impacts

A waste stream deposited outside of the Project Area but which could result in indirect impacts is CCR from the Craig Station. Indirect impacts may occur if buried CCR material becomes leached and regulated constituents are released to the environment.

The CCR would continue to be placed into pits during backfilling or placed and encapsulated into spoil piles as long as the Craig Station is active. An annual average of 501,000 tons of CCR have been placed at the mine since 1999 (TMI 2015). The placement of CCR into mine pits is regulated by rules of various agencies including the CDRMS, CDPHE, Moffat County, and the CSLB (TMI 2015). In order to conduct mine-filling, the CDRMS requires that the applicant conduct a baseline groundwater study to describe the hydrologic setting, define the chemical and physical characteristics of the coal combustion residuals and overburden, and assess the leaching potential of the waste.

The CCR were subjected to leach testing and determined to present a low potential for toxic metals to be leached from the materials (TMI 1981 et seq.). The leaching potential of toxic metal constituents was tested in order to determine whether the CCR could be considered characteristic hazardous waste. CCR was subjected to the Extraction Procedure (EP) Toxicity test and the leachate was analyzed for a number of metal constituents (TMI 1981 et seq). Of concern regarding hazardous waste determination are the eight RCRA metals: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Concentrations of the RCRA metals in the EP toxicity leachate were orders of magnitude below the toxicity limits. Given the EP toxicity results, the CCR were shown to be a non-hazardous waste. The percolation rate of the groundwater was also evaluated to determine the potential for the movement of contaminants in the event leaching of the material were to occur. The percolation analysis indicated that movement of any leached contaminants to the groundwater table would be very slow, and the material would be less likely to leach because of relatively low permeability of the CCR.

The CDRMS also requires that the waste be isolated from surface and groundwater. The waste must be placed above the expected post-mining groundwater level and no less than 50 feet (15 meters) horizontally from surface drainages. Also, the coal combustion residuals must be covered with a

minimum of 6 feet (2 meters) of cover. Groundwater monitoring is required before, during, and after the waste is placed into pits.

As discussed in Section 4.5.1.2 impacts to groundwater as a result of CCR placement are expected to be negligible due to the groundwater monitoring and the limited permeability and infiltration of groundwater into buried CCR. The CCR placement locations will be reclaimed in accordance with the approved reclamation plan and long term indirect impacts from CCR placement are expected to be negligible.

4.16.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.16.2.1 Direct Impacts

Under Alternative B, mining operations would cease. As part of closure/reclamation, all materials or products not necessary for closure or reclamation activities would be removed from the Project Area. Facility structures would be demolished in-place and covered with a minimum of 6 feet (2 meters) of suitable material. The area will be regraded to achieve the approved post-mining topography followed by topsoil and seeding as described in the reclamation plan. All demolition materials (e.g., culverts, fencing) related to sedimentation ponds will be placed within the ponds and covered with a minimum of 6 feet (2 meters) of suitable material or transported to the pit area during the reclamation process. Solid waste disposal could continue for mining related solid waste as a result of mining in areas outside of the Project Area using the same practices as currently employed. As a result the direct impacts of solid waste disposal under Alternative B would be the same as those outlined for Alternative A.

Once all mining and reclamation activities are completed, no impacts from solid waste generation and disposal would be anticipated.

4.16.2.2 Indirect Impacts

CCR placement and the associated indirect impacts would continue under Alternative B. As discussed in Section 4.5.1.2, impacts to groundwater as a result of CCR placement are expected to be negligible due to the groundwater monitoring and the limited permeability and infiltration. As described above for Alternative A, the CCR placement locations are subject to monitoring and operational requirements. As a result, the impacts from CCR placement under Alternative B would be the same as described above for Alternative A.

4.16.3 Mitigation Measures

No mitigation measures would be necessary for solid waste since there are regulatory programs that govern the handling of waste materials.

4.17 Noise

4.17.1 Alternative A – Proposed Action

Project noise under Alternative A would remain consistent with current mining activities. TMI currently mines at an average rate of 2.3 mtpy with a maximum production rate of 2.6 mtpy. These production rates would not increase under Alternative A. In addition, TMI would use the same equipment as described in Chapter 2.0. Reclamation activities would continue as before occurring as the mining process moves eastward. Production and disturbance rates would continue 24 hours a day, 7 days a week through the end of the life of mine in 2025.

4.17.1.1 Direct Impacts

Currently the closest sensitive receptor is an isolated residence located approximately 0.46 mile (0.74 km) to the north of the disturbance area. As mining activities continue eastward, the nearest sensitive receptor would shift to a residence located 0.70 mile (1.13 km) north of the Project Area and

L Pit. Operational noise associated with reclamation, haul trucks and the mine pit have not elicited any complaints for noise at the Trapper Mine. Given the topography and vegetative cover, it is likely that most noise would be attenuated before reaching any residences or receptors and noise related impacts would be short-term, during the life of the mining and reclamation operations, and negligible.

4.17.1.2 Indirect Impacts

Indirect impacts include noise associated with haul trucks carrying coal to the Craig Station or CCR back to the Trapper Mine for placement. In addition, the noise associated with the activities at the Craig Station would be an indirect noise impact. No information is available to quantify the noise associated with the Craig Station; however, there are no residences within close proximity to the Craig Station so noise related indirect impacts would be negligible but would occur long-term over the life of the Craig Station.

4.17.2 Alternative B – Disapproval of the Mining Plan Modification by the ASLM

4.17.2.1 Direct Impacts

Under Alternative B, mining activities within the Project Area would be terminated. TMI would continue to mine within the SMCRA permit boundary outside of the Project Area. Reclamation within the Project Area would begin once mining ceased. All noise for this process would be directly related to tearing down and moving structures and equipment, backfilling and grading the land to the approved post-mining topography, topsoil replacement, and seeding activities. Reclamation activities within the Project Area are expected to be completed 3 to 5 years after closure with the impacts associated with these activities being similar to Alternative A. The closest residence to the activities in the N and I pits outside of the Project Area is located 0.66 mile (1 km) west of the I Pit.

Within the I and N Pit mine areas outside of the Project Area, mining would occur at a slower rate than the mining presently being conducted, resulting in less noise production. Direct impacts of Alternative B would be short-term and negligible.

4.17.2.2 Indirect Impacts

Indirect impacts under Alternative B would be the same as described for Alternative A.

4.17.3 Mitigation Measures

No mitigation measures would be necessary for noise.

5.0 Cumulative Impacts

5.1 Introduction

This chapter discusses the potential contribution to cumulative impacts of Alternative A, the Proposed Action Alternative, and Alternative B, Disapproval of the Mining Plan Modification by the ASLM. Alternative C, the No Action Alternative, is not evaluated in detail because the potential contribution to cumulative impacts of Alternative C would fall within the range described for Alternative A and Alternative B, depending on when Alternative C is implemented. Each of these alternatives is described in Chapter 2.0.

Cumulative impacts are those impacts that result from incremental effects of an action when added to other past and present actions, and reasonably foreseeable future actions regardless of what agency or other entity undertakes such other actions. Cumulative impacts occur over a given time period. The time period for cumulative effects includes the time period when the impacts of past and present actions and reasonably foreseeable future actions overlap with the time period when project impacts would occur (including construction, operation, and reclamation phases).

This section considers past and present actions and reasonably foreseeable future actions within a cumulative impact assessment area (CIAA) defined for each resource. The CIAA varies by resource and was determined based on the location, extent, and type of resource impacts as described in Chapter 4.0. The CIAA for each resource, and the time frame associated with each CIAA, are included on **Table 5-1**.

Table 5-1 CIAA and CIAA Time Frame by Resource

Resource	CIAA Area	CIAA Time Frame
Topography	SMCRA permit boundary	Until approved post-mining topography is achieved
Air Quality	Airshed boundary	Direct – Through the life of mine and Phase III bond release Indirect – Through the life of the Craig Station
Climate Change	Airshed boundary	Direct – Through the life of mine and Phase III bond release Indirect – Through the life of the Craig Station
Geology and Minerals	SMCRA permit boundary	Through the life of mine and backfilling operations
Surface Water and Groundwater Resources	Yampa River and associated drainages from the confluence of Elkhead Creek to the confluence of the Williams Fork River	Through the life of mine and Phase III bond release
Soils	SMCRA permit boundary	Through the life of mine and completion of reclamation
Vegetation	SMCRA permit boundary	Through the life of mine and Phase III bond release
Wetlands	SMCRA permit boundary	Through the life of mine and Phase III bond release
Small game and migratory birds, including raptors	SMCRA permit boundary	Through the life of mine and Phase III bond release

Table 5-1 CIAA and CIAA Time Frame by Resource

Resource	CIAA Area	CIAA Time Frame
Big Game	Game Management Unit	Through the life of mine and Phase III bond release
BLM/State Sensitive species	SMCRA permit boundary plus 1-mile (1.6 km) radius around disturbed areas	Through the life of mine and Phase III bond release
Yellow-billed cuckoo	SMCRA permit boundary plus 2-miles (3.2-km) up and downstream of the Craig Station on the Yampa River	Direct – Through the life of mine and Phase III bond release Indirect – Through the life of the Craig Station
Colorado River Fish	Airshed boundary	Indirect – Through the life of the Craig Station
Cultural and Historic Resources	SMCRA permit boundary plus 0.25-mile (0.4-km) buffer zone	Through the life of mine
Socioeconomics	Moffat, Routt, and a portion of Rio Blanco counties	Through the life of mine and completion of reclamation
Visual Resources	Viewshed for the Project Area	Through the life of mine and completion of reclamation
Paleontology	SMCRA permit boundary	Through the life of mine
Access and Transportation	Moffat, Routt, and a portion of Rio Blanco counties	Through the life of mine and completion of reclamation
Solid Waste	SMCRA permit area plus the Moffat County landfill and the Hayden Generating Station CCR placement area	Direct – Through the life of mine and completion of reclamation Indirect – Through the life of the Craig Station
Noise	Project Area and 0.5-mile (0.8-km) buffer	Through the life of mine and completion of reclamation

For all resources, the CIAA for Alternatives A and B are the same because under Alternative B, mining at the Trapper Mine would continue in areas outside of the Project Area and the other past and present actions and reasonably foreseeable future actions would remain the same.

5.2 Past and Present Actions

Past and present actions in Moffat, Routt, and the eastern third of Rio Blanco County, including the Colowyo Coal Mine and the town of Meeker, include coal mining, sand and gravel mining, power generation, livestock grazing, ranching, recreation, and oil and gas development. These activities have the potential to affect natural and human resources in the area.

Coal mining has been present in these three counties for decades. A number of mines that were active as of August 3, 1977, when SMCRA went into effect became permitted by CDRMS. Some mine operators chose not to seek permits and several mines that obtained permits from CDRMS have since been reclaimed and their permits terminated. Past and present coal mining includes mines categorized by CDRMS as presently active, inactive, mines in temporary cessation, and mines in permanent cessation.

Active coal sites include those that are producing, idled (not producing but not in temporary cessation), or are no longer producing and are in the process of conducting final reclamation. Active coal mining operations within the three counties include:

- The Colowyo Mine, operated by Colowyo Coal Company, is a producing surface coal mine located approximately 30 miles (48 km) southwest of the Project Area in Moffat and Rio Blanco counties. The Foidel Creek Mine, operated by the Twentymile Coal Company, is a producing underground mine located approximately 35 miles (56 km) southeast of the Project Area in Routt County.
- The Peabody Sage Creek Mine, operated by Peabody Sage Creek Mining, LLC, is an idled underground mine located in Routt County adjacent to and immediately north of the Foidel Creek Mine.

The Williams Fork Mine is a site located in Routt County that is in temporary cessation (CDRMS 2015). Coal sites in temporary cessation have facilities on the ground, but have temporarily stopped producing pending the possibility of obtaining new coal contracts. The Hayden Gulch Loadout, the Seneca II- West Mine and the Yoast Mine are coal sites in Routt County in permanent cessation (CDRMS 2015). Permanent cessation sites are those that are no longer producing and whose reclamation is a few years old, but whose reclamation has not progressed to the point that site-wide Phase III bond release has been achieved. Coal exploration has occurred in the past and continues in the region with approximately ten active coal exploration permits in the three counties described above (CDRMS 2015).

Other active mining operations within Moffat, Routt, and the eastern third of Rio Blanco County include sand, gravel, and crushed stone material operations (aggregate mining).

There are two power generating stations in the general vicinity of the Project Area:

- Craig Station located northwest and adjacent to the Project Area is operated by Tri-State Generation and Transmission Association; approximately 300 people work at the 1,264-MW plant (Tri-State 2015b). Plant construction began in 1974 with the first operating unit completed in 1979. The plant site covers 1,120 acres. Its main water source is the Yampa River with supplemental allocations from nearby reservoirs. Craig Station receives its coal supply primarily from two sources: Trapper Mine and the Colowyo Mine sited about 30 miles (48 km) southwest of Craig Station. Trapper Mine delivers coal to the plant via 100-ton haul trucks from the mine site. Colowyo Mine delivers coal to the Craig Station daily by train. The station also augments these two sources of coal with spot coal purchases from other mines in northwestern Colorado (OSMRE 2015).
- The Hayden Station, located approximately 21 miles (34 km) east of the Craig Station in Routt County, is a 446-MW plant operated by Xcel Energy. Construction began in 1962 with operation of Unit 1 in 1965 and a second unit in 1976. The Hayden Generating Station receives its coal from the Twentymile Coal Company's Foidel Creek Mine and occasionally the Colowyo Mine. Coal is delivered to the station via train (OSMRE 2015).

Historically, the Project Area and the vicinity have been used for ranching and livestock grazing, in particular cattle and sheep. In addition to livestock grazing, the area also supports wildlife including big game species. Hunting is the primary recreational activity in the area. Routt County includes a 2,965-acre ski area with an annual average of 350,000 to 400,000 visitors.

Other existing developments in the region include towns and connecting roads. U.S. Highway 40 is the major east-west highway located north of the Project Area connecting the towns of Hayden, Craig, and Maybell. State Highway 13 is located immediately west of the mine and runs from the northeast to the southwest along the western permit boundary and also runs north of the City of Craig. This is the main highway connecting Craig with Meeker and Rifle to the south and Wyoming to the north. Various county maintained and unmaintained dirt roads and two tracks are located within the CIAA.

Electric transmission lines of various capacities traverse the Project Area and vicinity. Wilson Reservoir is located approximately 30 miles (48 km) southwest of the Project Area, and Elk Head Reservoir is located approximately 17 miles (27 km) northeast of the Project Area.

Oil and gas operations have been occurring in the vicinity of the Project Area since the 1920s. Numerous oil and gas wells have been drilled within Moffat, Routt, and Rio Blanco counties. The COGCC database lists a total of 137 wells as producing within a 20-mile (32-km) radius of the Project Area; 6 wells in the drilling stage, 4 wells used for injection, 2 wells awaiting completion, and 51 wells listed as shut-in or temporarily abandoned. Potential impacts from oil and gas development are more dispersed over a larger area than for mining operations (COGCC 2015).

5.3 Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions in the general vicinity of the Project Area include additional coal mining, continued livestock grazing, ranching and recreational activities, and ongoing oil and gas operations.

It is reasonable to assume that coal mining will occur in the future. This may occur either as an extension of current mining operations or in new areas. Reasonably foreseeable future activities at the current mining operation within the CIAA include:

- The Colowyo Coal Company's Colowyo Mine is in the process of obtaining approval for the Collom Expansion through OSMRE, BLM, and CDRMS. The Collom Expansion would extend mining operations for approximately 20 to 40 years, depending on the mine production rate. A NEPA document is being prepared to address the Collom Expansion. Produced coal would likely be supplied to the Craig power plant as well as other customers throughout the country. (OSMRE 2015).
- The Twentymile Coal Company's Foidel Creek Mine has a recent lease modification application under review by the BLM LSFO. The lease modification would add 310 acres and about 340,000 tons of federal coal to the Foidel Creek Mine (BLM 2015). CDRMS is presently reviewing an application for a PR that would include the mining of these 310 acres of federal coal.

Supplies of coal to the Craig and Hayden stations from the mines described above are not exclusive contracts. In the absence of any data to the contrary, it is assumed that the Craig and Hayden stations would continue operating at current levels even if Trapper Mine, Colowyo Mine, and Foidel Creek Mine stopped supplying coal, and would purchase coal from other suppliers.

Ranching and livestock grazing operations in the area are expected to continue at current levels for the reasonably foreseeable future. Additionally, hunting and other recreational activities also are likely to continue at current levels into the reasonably foreseeable future.

According to the COGCC data base, there are 67 oil and gas wells which are permitted through COGCC but have not yet been drilled within a 20-mile (32-km) radius of the Project Area (COGCC 2015). The BLM's Colorado State Office conducts quarterly competitive lease sales to sell available oil and gas lease parcels. The act of leasing does not authorize any development or use of the surface of lease lands, without further application by the lessee and approval by the BLM. Oil and gas operations are anticipated to continue in the future in the vicinity of the Project Area. In 2014, 112 parcels comprising 86,423.66 acres within the LSFO were nominated for the February 2015 Competitive Oil and Gas Lease Sale (OSMRE 2015). In support of this, the BLM LSFO completed an EA for this oil and gas lease sale that included parcels in the vicinity of the Project Area. Additional lease parcels were nominated in 2015 for the 2016 sale and future lease parcels are expected to become available in subsequent years. Within the Project Area, oil and gas development may potentially occur after completion of coal mining and reclamation of the current and proposed mining areas is completed.

5.4 Cumulative Impacts

This section describes potential cumulative impacts to resources in the vicinity of the Project Area from the past and present actions and reasonably foreseeable future actions in conjunction with the

alternatives. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). For each resource, the contribution to cumulative impacts in the CIAA is described. The CIAAs vary by resource, as shown in **Table 5-1**, and range in geographic size from the Project Area with a buffer (for noise impacts) to a watershed (water) and all or portions of three counties (socioeconomics and transportation). For the analysis of the cumulative impacts, it is assumed that all design features and any applicable mitigation measures for Alternative A would be implemented.

5.4.1 Topography

The CIAA for topography is the SMCRA permit boundary. Overall, mining of the Project Area under Alternative A or outside the Project Area under Alternative B would result in a short-term contribution to cumulative impacts on topography during mining operations. The contribution to cumulative impacts under both alternatives would cease, once the approved post-mining topography is achieved.

5.4.2 Air and Climate Resources

The CIAA for air quality encompasses the airshed boundary (**Figure 3-1**). For air quality, the direct and indirect emissions associated with the Trapper Mine are already occurring in the local environment (Section 4.3). As such, any cumulative air quality impacts are already reflected in the air quality monitoring data collected in western Colorado and the cumulative air quality impacts are already represented by the baseline air quality conditions described in Section 3.3.

Direct emissions at Trapper Mine are dominated by the PM_{10} and $PM_{2.5}$ fugitive dust emissions. Fugitive dust emission impacts such as occur from surface mining operations tend to be localized. As a fugitive dust plume moves downwind, gravitation and other physical forces deplete the emissions plume and particle deposition occurs. The localized nature of fugitive dust emissions minimizes the potential for large-scale cumulative air quality impacts with other regional emission sources.

Also, in the dispersion modeling studies described in Section 4.1.3, the cumulative impacts have already been addressed through the incorporation of a “background” concentration for the pollutants modeled. Background represents the contribution to ambient air quality impacts from sources not explicitly included in the modeled emissions source inventory. As such, the modeled air quality impacts reported in Section 4.1.3 are already representative of the expected cumulative air quality impacts.

5.4.2.1 Regional Air Emission Sources

Table 5-2 summarizes the air emissions from industrial and commercial sources located within the airshed boundary (**Figure 3-1**). These data were compiled from APENs submitted to CDPHE by the regulated air emission sources and are reported in the Colowyo South Taylor EA (OSMRE 2015). The APEN emissions inventory is dominated by the two coal-fired electric generating stations in the region: Craig Station and Hayden Generating Station.

Table 5-2 Air Emissions Inventory for EA Air Quality Study Area Compiled from CDPHE APEN Data

Pollutant	Emissions (tpy)
$PM_{2.5}$	837
PM_{10}	3,462
SO_2	5,609
NO_X	19,147
CO	3,350
VOCs	2,798

Source: OSMRE 2015.

Table 5-3 summarizes the county-by county data for northwest Colorado as compiled by the 2011 USEPA National Emissions Inventory (OSMRE 2015). These data include the industrial/commercial emission sources listed in the previous table, plus non-industrial emissions sources such as mobile sources (automobiles and trucks).

Table 5-3 Air Emissions Inventory in tpy by County 2011 National Emissions Inventory Data

County	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOCs
Garfield	25,325	16,123	4,170	1,210	187	91,075
Moffat	8,188	15,308	5,243	1,351	3,978	5,618
Rio Blanco	6,497	4,810	5,091	1,128	339	26,960
Routt	17,218	7,732	7,856	2,126	2,243	3,758
TOTAL	57,228	43,974	22,359	5,814	6,746	127,411

Source: OSMRE 2015.

5.4.2.2 Cumulative Direct and Indirect Air Emissions

Table 5-4 provides a cumulative summary of the direct and indirect emissions that would be associated with Alternative A. The direct/indirect emissions data are reported for the worst-case year (2020).

Table 5-4 Summary of Trapper Mine Direct and Indirect Air Quality Emissions

	CO tpy	NO_X tpy	PM_{10} tpy	$PM_{2.5}$ tpy	SO_2 tpy	VOCs tpy	CO_2e MT/yr
Fugitive Dust			591	91			
Fuel Combustion	378	987	66	64	52	72	380,973
Blasting	291	74	<1	<1	9		22,364
Coal Seams							126,678
CCR Disposal	5	12	14	3	2	1	985
Craig Station	650	7,445			1,468	78	5,341,966
TOTAL	1,324	8,518	671	158	1,531	151	5,872,966
Contribution	2.3%	19.4%	3.0%	2.7%	22.7%	0.1%	4.1%

Also shown in **Table 5-4** is the relative contribution of the direct/indirect emissions to the county-wide emission totals described earlier, or in the case of the CO_2e emissions, the comparison is to the statewide 2010 GHG emissions inventory (CDPHE 2014b). Generally, the direct/indirect emissions for the Trapper Mine would contribute about 2 to 3 percent to the emissions total from the four-county area (Moffat, Routt, Rio Blanco, and Garfield) of the airshed boundary. The exception would be the SO_2 and NO_X emissions, which are dominated by the coal-fired electric generating station emissions (Craig Station and Hayden Station). For NO_X and SO_2, the Trapper Mine contribution would be about 20 percent, primarily from the indirect emissions associated with combustion of coal from Trapper Mine at Craig Station. Overall, Alternative A's direct contribution to cumulative air quality impacts would continue throughout the life of the mine and from closure to Phase III bond release. The indirect contribution to cumulative air quality impacts would continue throughout the life of the Craig Station.

5.4.2.3 Air Quality Impacts

PM_{10}, $PM_{2.5}$, NO_2, and SO_2 Impacts

In the dispersion modeling studies described in Section 4.1.3, the cumulative impacts have already been addressed through the incorporation of a "background" concentration for the pollutants modeled. Background represents the contribution to ambient air quality impacts from sources not explicitly included in the modeled emissions source inventory. As such, the air quality impacts already reported in Section 4.1.3 would be representative of the expected cumulative air quality impacts for the areas immediately surrounding the Trapper Mine.

O_3 Impacts

Cumulative O_3 impacts would be best represented by air quality monitoring data within the airshed boundary. These data are summarized in **Table 5-5**. For the monitoring stations reported in **Table 5-5**, only the Lay Peak and Meeker monitoring stations occur within the airshed boundary. As stated before, the Trapper Mine direct and indirect emissions already exist, and therefore, any cumulative impacts associated with the Trapper Mine-related emissions and other regional emissions are included in the O_3 monitoring data from these locations.

The measured O_3 concentrations are compared to the O_3 NAAQS adopted by USEPA in October 2015 (70 ppb). Based on the current O_3 monitoring levels representative of the airshed boundary (i.e., Lay Peak and Meeker monitoring stations), the O_3 levels in the airshed would comply with the more restrictive NAAQS adopted in 2015.

Table 5-5 Western Colorado O_3 Measurements Representative of Trapper Mine Air Quality Study Area Based on 2014 Monitoring Data

Monitor	Location (County)	2014 O_3 Concentrations (ppb)			NAAQS (ppb)
		1st Maximum	4th Maximum	3-year Average of 4th Maximum (2012-2014)	
Rifle	Garfield	62	61	63	70
Lay Peak	Moffat	67	62	64	70
Meeker	Rio Blanco	63	62	63	70
Rangely	Rio Blanco	66	62	74	70

Source: OSMRE 2015b.

The Colorado Air Resource Management Modeling Study (CARMMS) also is a useful tool for assessing projected cumulative impacts to O_3 levels. CARMMS was commissioned by BLM to track air quality across the different Colorado field offices, with a focus on addressing how potential future oil and gas development might affect air quality. CARMMS simulates the air quality effects of oil and gas development out to the year 2021, and simulates different levels of projected development. The "high" development scenario is based on reasonably foreseeable development scenarios developed by each local BLM field office. With the decline in oil prices in 2015, it remains to be seen whether the projections for new oil and gas development in western Colorado reflected by the BLM scenarios will occur.

The CARMMS information is most useful in the projections of future O_3 levels. The CARMMS modeling applied the Community Airshed Model with Extensions (CAMx), which simulates pollutant emissions, transport, and dispersion using a 4-km (2.5 mile) grid. The 4-km grid spacing means that local features associated with the Trapper Mine would not be detected by the CAMx model, so the AERMOD modeling conducted for PM_{10}, $PM_{2.5}$, SO_2, and NO_2 is considered a more realistic depiction of the local impacts near the Trapper Mine (see Section 4.3.1.3). However, as O_3 was not explicitly modeled for the Trapper

Mine, the CARMMS information is useful for tracking potential O_3 levels and is the only available information that would capture future emissions associated with expected oil and gas development in the region.

The CARMMS modeling output for the 4th highest daily maximum concentration was reviewed for the "high" development scenario. The area of Moffat County surrounding Craig showed projected O_3 levels from the CARMMS modeling generally in the 67 to 70 ppb range, which is within the updated NAAQS. Immediately near Craig and the Craig Station, the projected O_3 levels from the CARMMS modeling would be in the 65 to 70 ppb range. In close proximity to the Craig Station, the NO_X emissions from the power plant likely deplete the O_3 levels, and this effect appears in the CARMMS modeling.

In western sections of Moffat County and Rio Blanco County near Rangely, the projected O_3 levels are above the 70 ppb NAAQS level based on the CARMMS modeling for the "high" development scenario. However, the CARMMS areas of modeled O_3 concentrations above 70 ppb are outside the Trapper Mine airshed boundary. As stated previously, the projected elevated O_3 levels in western sections of Moffat County and Rio Blanco County are likely due to the emissions associated with existing and future oil and gas development in the Uinta Basin of eastern Utah and are not tied to the Trapper Mine direct and indirect emissions.

5.4.2.4 Acid Deposition and Visibility Impacts

Acid deposition and visibility are of concern in designated Class I PSD areas. Downwind of the air quality study area, Class I areas include the Mt. Zirkel Wilderness located in the Park Range east of Steamboat Springs.

Acid deposition and visibility impacts are generally associated with SO_2 and NO_X emissions from coal-fired electric generating stations, which would include the Craig Station. The indirect impacts associated with combustion of coal from Trapper Mine have been documented in Section 4.3.1.2.

Other coal fired electric generating stations that could impact visibility and acid deposition at the Mt. Zirkel Wilderness include the Hayden Station (Hayden, Colorado), the Jim Bridger Station (northeast of Rock Springs, Wyoming), and the Bonanza Station (southeast of Vernal, Utah). The relative impacts to acid deposition and visibility from Jim Bridger are somewhat mitigated by the distance to the Mt. Zirkel Class I area, and the relative impacts from Bonanza are somewhat mitigated by the distance and small electric generating capacity of this unit.

In addition, improved emission controls are expected at all nearby electric generating stations within the next 5 to 10 years. These improvements are intended to help mitigate any ongoing impacts related to visibility and acid deposition. Most of the future emission control improvements would reduce NO_X emissions. NO_X reductions would occur at Craig Station from installation of SCR at Units 1 and 2 and SNCR at Unit 3 to meet emission limits established by the Colorado Regional Haze SIP (see **Table 4-9**). These reductions are required at the Craig Station over the 2018-2021 timeframe. Similar emissions reductions are scheduled to occur at the other regional coal-fired electric generating stations in response to BART regulations and other requirements of the Colorado Regional Haze SIP rules. After these emission reductions occur, the visibility and acid deposition impacts to Class I areas such as Mt. Zirkel Wilderness should be reduced.

5.4.2.5 Cumulative GHG Impacts

As summarized under the Environmental Consequences, the project-related direct and indirect GHG emissions would be dominated by the indirect emissions linked to combustion of the Trapper Mine coal at the Craig Station. The indirect GHG emissions at Craig Station represent 4.1 percent of the Colorado GHG emissions total (2010 data) and 0.07 percent of the national GHG emissions total (2007 data) as shown on **Table 4-15**.

The GHG-related impacts from an individual emissions unit cannot be accurately quantified. Possible GHG impacts have already been described in Section 4.1.3.2, and these impacts represent the possible cumulative effects of all GHG emissions (USEPA 2015).

- The region may experience warmer temperatures with less snowfall/precipitation.
- The temperature increases are projected to be more pronounced in the winter months and more pronounced at night. The temperature increases also may be more pronounced at higher elevations.
- The projected warmer temperatures may result in earlier snowmelt and earlier peak stream flows.
- The potential for more pronounced and longer-lasting droughts may increase.
- Crop and livestock production may shift northward.
- The increased temperatures may promote more evaporation, resulting in less soil moisture and greater needs for irrigation water.
- Drier conditions could stress forest vegetation (i.e., ponderosa and lodgepole pine) and increase the susceptibility to wildfire.
- Grasslands and rangeland may extend into areas previously covered by forests.
- Ecosystem stresses may increase and possibly alter habitat for species such as mountain lion, black bear, long-nose sucker, marten, and bald eagle.

Whether or not the cumulative GHG impacts listed above would actually occur is under scientific debate and the actual occurrence of any such impacts would at this time be speculative.

5.4.2.6 Cumulative Air Quality and Climate Impacts – Alternative B

Alternative B is not expected to have significantly different cumulative air quality and climate impacts compared to Alternative A. Cumulative impacts in the airshed boundary would be dominated by non-project-related emissions, and these emissions and associated impacts would continue under Alternative B. Indirect impacts tied to coal combustion at the Craig Station would be expected to continue under Alternative B. TMI could mine alternative coal resources from lands outside the subject leases and/or Craig Station could secure alternative coal sources to operate at or near current levels. Overall, the net result would be no substantial changes in the contribution to cumulative air emissions and impacts under Alternative B.

5.4.3 Geology and Minerals

The CIAA for geology and minerals is the SMCRA permit boundary. From 1978 to 2014, the Trapper Mine has cumulatively produced 78,740,532 million tons of coal for an approximate average of 2.13 mtpy (TMI 2015). Under Alternative A, approximately 19 million tons of coal would be mined resulting in an additional increment of 25 percent of expected cumulative production by 2025 (or a total of 97,875,232 tons). The additional production would contribute an incremental removal of overburden and interburden which would be proportional to the amount of coal removed depending on the stripping ratio encountered during mining.

Cumulative coal production from 1864 to 2014 in Moffat and Routt counties (including the Colowyo and the Foidel Creek mines) is approximately 594 million tons (Carroll 2004; Colorado Division of Reclamation and Mining Safety 2015). The mining of an additional 19 million tons of coal under Alternative A would represent 3 percent of the total cumulative production from these counties. However, the additional 19 million tons of coal represents a tiny fraction of the coal resource in the Yampa Coal Field which was estimated at 7.6 billion tons of coal less than 500 feet deep (Brownfield et al. 2000).

Overall, the contribution to cumulative impacts to geology during the life of the mine and backfilling operations would be negligible.

Under Alternative A, the contribution to cumulative effects on other mineral resources would be minimal, because impacts would be short term and probably avoidable in case of oil and gas drilling.

It is not possible to assess the incremental cumulative effects of geologic hazards (landslides and slope instability) due to the proposed project because of widespread unstable conditions in the CIAA. Coal mining activities have contributed to slope instability (landslides) in the past. There also are naturally occurring landslides in the CIAA. Overall, given appropriate design and monitoring, geologic hazards are not expected to contribute appreciably to cumulative impacts in the CIAA.

Under Alternative B coal mining would cease in the Project Area, resulting in a permanent loss of approximately 17 million tons of coal. Mining for coal would continue in areas outside the Project Area, with a projected known resource of 4.5 million tons. The loss of 17 million tons of coal reserves would be minimal compared to the total estimated coal resource mined in the CIAA. Overall, the contribution to cumulative impacts would be similar to Alternative A. Overall, there would be no expected contribution to cumulative effects to other mineral resources under Alternative B. As with Alternative A, it is not possible to assess the cumulative incremental effects of geologic hazards (landslides and slope instability) because of widespread unstable conditions in the CIAA.

5.4.4 Water Resources

The CIAA for water resources is the Upper Yampa River watershed in Moffat County. This area encompasses the Yampa River and its tributaries from Elkhead Creek to the Williams Fork River, and the Williams Fork downstream from the confluence of its South and East forks. Within the CIAA, the types of past and present actions and reasonably foreseeable future actions that could contribute to cumulative water resources effects include oil and gas development, aggregate mining, power production at the Craig Station, and livestock grazing.

The CIAA for water resources does not include other active coal mines in the Upper Yampa River watershed, most of which are located in Routt County. However, the analysis presented below does incorporate cumulative impacts from coal mining in the watershed by reference from the Yampa River Cumulative Hydrologic Impact Assessment (CHIA) (CDRMS 2010).

There are a number of active oil and gas wells in the analysis area. Activities during the production phase of oil and gas development mainly include visiting well sites to take measurements, collect hydrocarbons, and dispose of waste material. In the CIAA for water resources there are limited opportunities to pump hydrocarbons directly into distribution lines and most wells have separate tanks for oil and produced water. Accidental spills of these materials could result in cumulative surface water or groundwater quality impacts. These impacts would generally be confined to a localized area around the well pad, and are considered negligible at the scale of the analysis area.

Surface disturbance from future oil and gas exploration and development could contribute to cumulative water quality impacts through increased runoff and erosion as new well pads and access roads are constructed. In the short term, erosion from the disturbed areas could increase sediment loads in the Yampa River and its tributaries. However, during construction of oil and gas locations in Colorado, and prior to interim reclamation, oil and gas operations must be covered under a Construction General Permit. Once interim reclamation has been successfully completed, oil and gas sites are subject to water quality controls under COGCC regulations (COGCC 2015). With these controls in place, water quality impacts from oil and gas operations are expected to be negligible in the short term and long term.

Aggregate mining also could contribute to cumulative water quality and water quantity effects. Current aggregate mining operations are concentrated around the Yampa River near Craig. The proximity of these operations to the river increases the potential for water quality impacts. Aggregate mines also have

the potential to form “gravel pits” which may need to be dewatered during active mining. Dewatering pumping can lower water levels in nearby groundwater supply wells and also may result in surface water depletions. Post-mining, evaporative losses can increase as gravel pits fill with runoff and groundwater. Relative to the size of their operations, aggregate mines have the potential for greater impacts to groundwater and surface water supplies than Alternative A, mainly because the aggregate mines are located in closer proximity to the Yampa where groundwater is present at shallower depths.

Coal combustion at the Craig Station also could contribute to cumulative water resource effects. Some of these potential impacts, such as the amount of surface water diverted annually by the Craig Station, have already been discussed in Section 4.5 as indirect effects related to Alternative A. Other potential cumulative impacts from the Craig Station include runoff of oil, grease, sediment, or dissolved metals from operation areas and coal storage piles. The potential for these types of water quality impacts would (presumably) be managed through implementation of a CDPS permit and routine monitoring of the Craig Station’s CDPS outfalls.

Even with the presence of oil and gas development, mines, and the Craig Station, much of the cumulative impact analysis area is still undeveloped rangeland used for grazing. Livestock grazing can increase erosion and sedimentation with potential cumulative impacts to water quality. However, grazing practices on public lands in the project area are managed by the BLM LSFO to protect other resources and resource uses. In the long term, cumulative water resource effects from grazing are expected to be minor.

The Yampa River CHIA (CDRMS 2010) identifies four main types of probable surface water consequences associated with surface and underground coal mining in the Yampa River Basin:

1. Increased erosion from mine permit areas
2. Temporary changes in the timing of runoff in nearby stream flow regimes
3. Development of spoil aquifers
4. Increased TDS concentrations in mine discharge

Of these effects, CDRMS indicates that increasing TDS concentrations in mine discharge pose the greatest risk of cumulative impacts to the Yampa River. To further evaluate this impact, the agency developed a salinity mass-loading model for the Yampa River using a modeling routine written by USGS. The model sums streamflow discharge and dissolved solids concentrations based on a node system created for the stream network. The CDRMS model has been divided into three separate modeling domains; two upstream domains that account for coal mine discharges in the eastern part of the Upper Yampa River watershed, and a downstream model of the Yampa River main stem to a point below Colowyo Mine. Calculated TDS results from the two upstream models are used as inputs in the main stem model, along with TDS inputs associated with the Trapper Mine area, the Williams Fork River, Colowyo Mine, and Dry Creek.

The salinity model results provide an indication of the cumulative TDS increase from mining and a prediction of the average TDS concentration expected in the Yampa River at Maybell. The predicted TDS increase varies by month and by flow conditions in the river. For example, during the high flow month of June, mining discharges are expected to increase the average river TDS concentration by approximately 50 mg/L. But prior to spring snowmelt in March, the TDS increase in the river could be as high as 200 mg/L. Predicted future TDS concentrations in the river at Maybell range from an average of 120 mg/L in June to 522 mg/L in March. Overall, this represents a 29 percent increase in the river TDS compared to baseline levels. Although this increase is entirely attributable to coal mining, it does not meet the material damage criteria for surface water quality established in the Yampa River CHIA. As such, cumulative surface water quality impacts from coal mining in the Yampa River watershed are not expected to be significant.

For groundwater, CDRMS defines several smaller cumulative impact analysis areas in the CHIA because of the structural and stratigraphic controls that help confine groundwater impacts to a smaller area relative to surface water. The cumulative impact analysis area encompassing Trapper Mine includes only one other coal mining operation; the Williams Fork underground mine (formerly the Eagle No. 5 and No. 9 Mine) that is in temporary cessation. Even if the Williams Fork Mine resumes operation, cumulative groundwater impacts are expected to be negligible, largely because the mine has historically extracted coal from stratigraphic intervals below the upper Williams Fork Formation mined by TMI.

There is some possibility for the two mines to create cumulative drawdown effects in the Twentymile Sandstone. Trapper uses the Twentymile Sandstone for its potable water supply, extracting 32 acre-feet of groundwater from the sandstone during water year 2014 (Cummins 2015). The Williams Fork Mine also may indirectly remove water from the Twentymile Sandstone by dewatering deeper formations. Groundwater level declines in the Twentymile Sandstone are predicted to reach 20 feet at a five mile radius from the Williams Fork Mine and up to 60 feet at a one mile radius from the affected area (CDRMS 2010). The additive effect of groundwater pumping and mine dewatering from the Twentymile Sandstone could lower groundwater levels in nearby private wells completed in this unit. Impacts are contingent upon resumed operations at the Williams Fork Mine and would likely be negligible.

Overall, the contribution from Alternative A to cumulative water resource impacts is expected to be minor. Federal and state regulations that apply to mining, oil and gas, and power generation facilities in the analysis area are designed to reduce water quality and water supply impacts to acceptable levels. The contribution to cumulative impacts would still occur to some degree through the life of the mine and Phase III bond release, particularly with respect to sediment erosion from disturbed ground, water depletions for power generation, and evaporative losses from inactive gravel pits. TDS concentrations in the Yampa River also are projected to increase by 29 percent as a result of coal mining, but no material damage to water resources would occur (CDRMS 2010).

Overall, cumulative water resource impacts would be less under Alternative B because the rate and duration of mining at Trapper Mine would be reduced. Mining would shift away from the Project Area to other parts of the SMCRA permit boundary where coal reserves are only expected to last 3 to 4 years. Consequently, reclamation would be implemented sooner under Alternative B, shortening the length of time that mine operations would affect groundwater and surface water resources. Cumulative impacts from other past and present actions and reasonably foreseeable future actions in the CIAA would be the same as Alternative A, and are not expected to result in material damage to water resources.

5.4.5 Soils

The SMCRA permit boundary is the CIAA for soils. Mined areas in the CIAA outside the Project Area have been subjected to ongoing reclamation activities. Under Alternative A, surface disturbing activities would continue within the permit boundary and would contribute to cumulative impacts on soil. Soil disturbance would be minimized by TMI's reclamation efforts which help prevent erosion and compaction of soils. Placing topsoil directly into reclamation areas or temporary, vegetated stockpiles also would help reduce the amount of sedimentation and disturbance that occurs in the permit boundary. While mining activities occur within the SMCRA permit area, no other development (including oil and gas) would be permitted in the Project Area, which would limit the cumulative impacts to surface disturbing activities. Overall, the Alternative A would have a minor contribution to cumulative impacts during the life of the mine. The contribution to cumulative impacts would cease following the completion of successful reclamation.

Under Alternative B, mining operations would be discontinued within the Project Area in exchange for immediate reclamation activities, including filling, contouring, and grading of soils and the addition of topsoil and seeding. Mining would continue to occur in areas outside of the Project Area under Alternative B, so the contribution to cumulative impacts to soils would continue to be minor during the life of the mine and would cease following successful reclamation.

5.4.6 Vegetation

The CIAA for vegetation is the SMCRA permit boundary, and the duration is through the life of the mine and Phase III bond release. Additional mining under Alternative A would impact vegetation in the CIAA. Mining under Alternative A would add to the past and present actions and reasonably foreseeable future actions in the SMCRA permit boundary, resulting in a minor contribution to cumulative impacts due to the removal of mountain shrubland for mining and the eventual reclamation to reclaimed rangeland and wildlife habitat. This would ultimately convert 257 acres of vegetation through contemporaneous reclamation as mining is completed in the various parts of the Project Area and add to the current total of 494 acres that have been released from reclamation liabilities. Within the Project Area, 22 acres of big sagebrush shrubland and 596 acres of mountain shrubland would remain undisturbed in the CIAA. In the long-term, Alternative A would increase the past and present disturbance and reclamation footprint by about 17 percent from 1,548 acres to 1,805 acres.

As contemporaneous reclamation is implemented, an earlier seral stage plant community with a diverse mosaic of grasslands and grass-shrub rangelands would develop. The reclaimed lands provide a varied array of habitats that are productive for wildlife and livestock that forage in the Project Area. The change in vegetation could shift use patterns of livestock and big game in the CIAA to favor reclaimed sites with more productive forage. At moderate grazing levels, livestock and big game can help to maintain a diverse and healthy plant community. The overall contribution to cumulative impacts to vegetation under Alternative A would be minor due to the localized effects and the improved productivity on mined lands that become reclaimed.

Mining and reclamation under Alternative B would conclude earlier and in a smaller footprint within the Project Area than with Alternative A. However, mining would continue within the SMCRA permit boundary outside the Project Area. This would continue to cumulative impacts to vegetation in areas outside of the Project Area where non-federal mining continues. There would be some additional disturbance of reclaimed lands to support mine facilities in this portion of Trapper Mine. Overall, with disturbance continuing but in a slightly smaller area, the contribution to cumulative impacts for vegetation under Alternative B is considered minor to negligible.

5.4.7 Wetlands and Riparian Zones

The CIAA for wetlands and WOTUS is the SMCRA permit boundary for the Trapper Mine. Approximately 1.55 acres of wetlands and WOTUS have been identified in the SMCRA permit boundary. Any past impacts to wetlands or WOTUS in the CIAA have been or will be mitigated (see Section 4.7). Impacts from construction activities that occur within the CIAA also are mitigated to prevent runoff into drainages and wetlands. Oil and gas permitting practices and leasing approvals generally include mitigation for wetlands and would not occur within the active mining area. Alternative A would not disturb additional wetlands within the SMCRA permit boundary and, therefore, would not contribute to cumulative impacts

Under Alternative B, mining activities would cease within the Project Area, and reclamation activities would occur earlier than under Alternative A. Overall, mining would continue outside the Project Area and could result in a minor to negligible contribution to cumulative impacts to wetlands and WOTUS within the SMCRA permit boundary during the life of the mine and Phase III bond release.

5.4.8 Fish and Wildlife Resources

The CIAA for fish and wildlife resources is the SMCRA permit boundary for small game, mammals, reptiles, and migratory birds. The CIAA for big game is the surrounding Game Management Unit. Overall, mining in the Project Area would contribute to cumulative impacts to fish and wildlife species during the life of the mine and Phase III bond release; however, the contribution would be minor to negligible. In the long-term, Alternative A would increase the footprint of productive reclaimed rangeland and wildlife habitat by about 17 percent in the Project Area from 1,548 acres to 1,805 acres, which could support more elk and deer and improve the quality of seasonal ranges within a small portion of the Game Management Unit.

Other activities in the region have the potential to contribute to cumulatively impacts to wildlife under Alternative A. Livestock can compete for forage with big game and other wildlife species. Livestock grazing at Trapper Mine within the SMCRA permit boundary is managed to avoid harmful impacts on reclaimed lands and in native habitats. With these management practices, it is unlikely that livestock would displace big game or other wildlife within the SMCRA permit boundary. Oil and gas development in the vicinity of the Project Area would have the potential to displace wildlife species from developed areas for the life of those projects. Big game species would be particularly susceptible to this type of impact. However, oil and gas development on both federal and state leases is strictly regulated and subject to wildlife protection mitigation measures and best management practices to minimize disturbance to big game and other wildlife. Dispersed recreation may disturb individual animals and could result in minor and temporary displacement of big game from suitable habitats in the Game Management Unit. Cumulative impacts from these activities would likely be negligible due to the short-term duration and localized area of impacts.

The additional, surface disturbance under Alternative A in combination with dispersed recreation and oil and gas development increase the potential for sedimentation to occur and, therefore, may potentially impact fisheries downstream from the Project Area. However, with the implementation of sediment control features in the Project Area, the additional potential for sedimentation from Alternative A would be negligible. As a result, the contribution to cumulative impacts to fisheries also would be negligible due to the lack of habitat and unlikelihood of impacts to this resource.

Mining and reclamation under Alternative B would conclude earlier and within a slightly smaller footprint within the Project Area than with Alternative A. However, mining would continue within the SMCRA permit boundary outside the Project Area. This would continue to disturb wildlife habitat in areas outside of the Project Area where mining continues. There would be some additional disturbance of reclaimed lands to support mine facilities in this portion of Trapper Mine. Overall, with disturbance continuing but in a slightly smaller area, the contribution to cumulative impacts to wildlife resources under Alternative B would be negligible.

5.4.9 Special Status Species

The CIAA for BLM and State sensitive species is the SMCRA permit boundary plus a 1-mile radius around the disturbance areas. The CIAA for the yellow-billed cuckoo is the SMCRA permit boundary plus 2-miles up- and downstream of the Craig Station on the Yampa River. The CIAA for the federally listed Colorado River fish species is the topographic airshed boundary. Continued development of mining operations in the Project Area would contribute incrementally to other surface uses that occupy and adversely modify habitat for the special status species that occur.

The duration of the cumulative impacts for BLM and State listed species would last through the life of mine and Phase III bond release. The duration of cumulative impacts to the federally listed species, which are all indirect, would continue past the life of mine and Phase III bond release though the life of the Craig Station.

Overall, there would be a negligible to minor contribution to the short-term cumulative loss or degradation of habitat for the northern leopard frog, golden eagle, burrowing owl, ferruginous hawk, peregrine falcon, Brewer's sparrow, and Columbian sharp-tailed grouse. Following reclamation, the contribution to cumulative impacts from these activities would be at negligible levels.

The Colorado River fish are of particular concern. Other activities that occur in the region would have the potential to result in water depletions, including other mining operations in the region. However, any future depletion(s) would be subject to the RIPRAP and would be offset through funding of the RIPRAP program. Given the combination of BMPs and design features that would be implemented as requirements under Alternative A and other reasonably foreseeable actions in the CIAA, these actions would not be expected to appreciably change the current aquatic conditions in the Yampa River. Consultation with the USFWS under Section 7 of the ESA also has included several conservation

measures designed to mitigate cumulative impacts to the Colorado River fish species and western yellow-billed cuckoo.

Neither Alternative A nor B would be expected to directly contribute to cumulative impacts to the Colorado River fish species or western yellow-billed cuckoo through the life of the mine and Phase III bond release. However, indirect impacts from the combustion of Trapper Mine coal at the Craig Station would continue to release mercury and selenium through the life of the Craig Station. Some portion of this mercury is reasonably likely to end up in the Yampa River, which would contribute to cumulative impacts to the Colorado River fish and western yellow-billed cuckoo. It is reasonably foreseeable that combustion at the Craig Station would continue to occur if coal was not supplied by Trapper Mine. Therefore, while mining within or outside the Project Area would contribute to cumulative impacts to the Colorado River fish and western yellow-billed cuckoo from water depletions, mercury deposition would occur even if mining was eliminated in the Project Area as coal would be supplied from elsewhere. The level of cumulative impacts to these federally listed species is unknown due to the uncertainties related to the impacts described in Chapter 4.0.

Mining and reclamation under Alternative B would conclude earlier and within a slightly smaller footprint than with Alternative A within the Project Area. However, mining would continue within the SMCRA permit boundary outside the Project Area. This would continue to disturb potential habitat in areas outside of the Project Area where mining continues. Consequently, mining in these areas could contribute to cumulative impacts for the golden eagle, Brewer's sparrow, and Columbian sharp-tailed grouse where suitable native habitats are disturbed. It is unlikely or uncertain whether the burrowing owl, ferruginous hawk, peregrine falcon, or northern leopard frog would be impacted due to these species having a limited distribution or limited potential to occupy undisturbed parts of the remaining SMCRA permit area. There would be some additional disturbance of reclaimed lands to support mine facilities in this portion of Trapper Mine. Overall, with disturbance continuing but in a slightly smaller area, the contribution to cumulative impacts to BLM and State listed species would remain negligible.

5.4.10 Cultural Resources

The CIAA for cultural resources encompasses the full SMCRA permit boundary plus a 0.25-mile (0.4-km) buffer. The 0.25-mile buffer is included because sites found in this area, especially those for which setting is a key element of their NRHP eligibility, could be indirectly affected by mining and mining-related activities.

Most cultural resources tend to degrade over time due to natural processes, but many can survive relatively intact for many years depending on the extent of erosion and deposition. Modern human activity can exacerbate the damage that naturally occurs to cultural resources. Cumulative impacts to cultural resources can be broad and include past, present, and future activity within and adjacent to the SMCRA permit area. The CIAA has been historically used for livestock grazing and recreational activities such as hunting, in addition to mining. All of these activities could have resulted in sustained impacts to extant historic properties (i.e., NRHP-eligible cultural resources) within the CIAA.

Continued use and/or development of the CIAA would have the potential to diminish the integrity of cultural resources directly through physical disturbance or indirectly through the degradation of the historic environmental setting. Increased use of the area also opens up areas that have not been previously disturbed or are more remote, which could increase the potential for collection or vandalism of cultural resources by mine employees and other visitors.

Previous studies conducted between 1970 and 2013, have identified 32 cultural resources (14 sites and 18 IFs) outside the direct APE but within the SMCRA boundary plus a 0.25-mile (0.4-km) buffer. An unknown number of these sites have likely been impacted by past mining activities based on the fact that 6,895 acres have been disturbed by mining activities within the CIAA. On a beneficial note, further development outside previously surveyed areas would result in additional cultural resource studies. Assuming that established documentation requirements are followed, these new areas of development would be intensively surveyed, newly recorded or known cultural resources would be evaluated or re-

evaluated for NRHP eligibility, and effects to any historic properties (NRHP-eligible sites) and "needs data" site would be assessed. Impacts to adversely affected historic properties would be appropriately mitigated. The information gained from any new cultural resources studies would expand knowledge and understanding of the regional culture history. The potential impacts of Alternative A would be avoided through implementing design features and mitigation measures described in Section 4.11.3. Similar measures could be implemented for other types of federal undertakings and also would limit additional impacts to cultural resources. Because no impacts to NRHP-eligible or "needs data" cultural resources have occurred or are predicted under Alternative A, overall there would be no contribution to cumulative impacts to cultural resources during the life of the mine.

Mining and reclamation under Alternative B would conclude sooner than Alternative A within the Project Area and disturb less area. Mining elsewhere in the CIAA could disturb known or unrecorded cultural resources. While sites may have been impacted by past mining activities, it is anticipated that cultural resource surveys and evaluation of identified sites would be conducted prior to development outside of previously surveyed areas in the SMCRA permit boundary that may be mined in the future. Therefore, the overall contribution to cumulative impacts to cultural resources under Alternative B would be similar to Alternative A.

5.4.10.1 American Indian Concerns

The CIAA for American Indian concerns is the SMCRA permit area plus a 0.25-mile (0.4 km) buffer. The Hopi Tribe has indicated an interest in the rock art site, 5MF.948, but they have not communicated any concerns about this site or any other cultural resources within the CIAA. Thus, no contribution to cumulative impacts to areas of American Indian concerns is anticipated under either Alternative A or B.

5.4.11 Socioeconomics

The socioeconomic cumulative impact analysis area includes Moffat and Routt counties, as well as a portion of Rio Blanco County including the town of Meeker. There are several active coal mines in the CIAA, including the Colowyo Coal Mine, and the Foidel Creek Mine and several other coal mines that are inactive and undergoing reclamation. There also are numerous active oil and gas wells within the CIAA, as well as aggregate mining activity. Furthermore, both the Hayden and Craig stations and the Yampa Valley Regional Airport are within the CIAA. The socioeconomic impacts of Alternative A would contribute, in addition to these additional mining and energy development activities, to the direct and indirect support of industries that supply services to these industries. This direct and indirect support would further support employment across a range of industries, resulting in sustained local income and a continuation of local spending. Steady employment in these industries also would assist in sustaining school enrollment as well as the local housing market. These cumulative activities combined with the incremental input from Alternative A also would continue to contribute to the federal, state, and local tax base, which in turn would provide continued support to local services such as health care, education, and law enforcement. This local and state economic contribution would continue until 2025 when mining would substantially decrease. Overall, the socioeconomic benefits from Alternative A would result in a beneficial contribution to cumulative impacts through the life of the mine and reclamation.

Under Alternative B, the socioeconomic impacts described above as well as under Alternative A, Section 4.12, would end within the Project Area in 2016. Mining in other areas within the SMCRA permit boundary could continue with appropriate approvals from regulatory authorities. The lack of mining within the Project Area would result in the estimated loss, based on 2010-2015 averages, of approximately $174.5 million in gross wages and benefits, $5.8 million in Abandoned Mine Land fees, $7.2 million in severance tax, $55.4 million in royalties, and $12.0 million in property tax revenue over the proposed mining timeframe, although this would be partially offset by the potential for mining on private and state lands within the SMCRA permit boundary. Ultimately, mine revenue would cease at the end of reclamation activities. Any decreases as a result of a reduced mining rate or delay in moving into other areas would add to the socioeconomic impacts already caused by uncertain oil and gas prices, as well as the unclear future of the local ranching and agriculture industry, and the Craig Station as proposed

carbon emissions rules may be implemented (Jaffe 2015). Potential limitations on land use within Northwest Colorado Greater Sage-grouse breeding areas and habitat could further contribute to socioeconomic impacts, across a range of resources, including but not limited to oil and gas development and ranching and agriculture (Jaffe 2015). Under Alternative B, closure of the Project Area to future mining would contribute negligible to minor cumulative socioeconomic impacts at the state level and moderate to major cumulative socioeconomic impacts at the local level, depending on the amount of coal reserves available in other areas. Overall, Alternative B would result in a beneficial contribution to cumulative socioeconomic impacts through the life of the mine and reclamation; however, there would be a reduction in the contribution to cumulative impacts as compared to the Alternative A as a result of the reduced life of the mine. This may be partially offset by potential mining on private and state lands within the SMCRA permit boundary.

5.4.12 Visual Resources

The CIAA for visual resources is the Project Area plus the viewshed for the Trapper Mine Project Area. Due to topography the mine is only visible from intermittent locations to the north and northeast; the Town of Craig and Highways 40 and 13 (north of Craig). Under Alternative A, the visual impact of the mine would contribute to the visual changes to the landscape along with other non-natural components of the environment. Incremental changes would be minimal, due in part to the fact that Trapper Mine has previously disturbed approximately 6,900 acres within the SMCRA permit boundary. Non-natural components that are located within the viewshed of the mine include the Craig Station to the northwest of the project area, the Town of Craig, U.S. Highway 40, State Highway 13, electric transmission lines, sand, gravel, and stone quarries, and oil and gas wells and infrastructure. Intermittent portions of the Yampa River to the east and west of Craig have views of the Trapper Mine, multiple quarries, and oil and gas development.

Other regional non-natural components not located within the viewshed of the mine include the Colowyo Mine, approximately 20 miles (32 km) southwest of the project area; the Foidel Creek, Sage Creek, Yoast, and Seneca II-West mines approximately 15 to 20 miles (24 to 32 km) to the east of the Project Area, the Hayden Station, the town of Hayden, the cities of Steamboat Springs and Craig, the Yampa Valley Airport, highways and roads, electric transmission lines, and oil and gas wells and facilites.

The contribution to cumulative impacts under Alternative A would continue throughout the life of the mine and reclamation (up to 30 years) and contribute to the visual impacts within the CIAA until final reclamation is complete. Under Alternative B, Trapper would cease mining operations and begin reclamation activities on the Project Area and the cumulative impact contribution of the project would be shorter in duration, by approximately 10 years. Final reclamation would leave no scars where the mining has occurred. This may not result in a noticeable reduction to cumulative impacts for an additional 3 to 4 years as mining would continue within the SMCRA permit boundary.

Overall, the contribution to cumulative visual impacts under both Alternative A and Alternative B would be negligible to minor and would cease following the completion of successful reclamation.

5.4.13 Paleontological Resources

The CIAA for paleontological resources is the SMCRA permit boundary. Mining under Alternative A could incrementally add to the potential impacts to paleontological resources in the SMCRA permit area. Other regional activities that may impact paleontological resources include future oil and gas development and additional mining. Future ground disturbing activities associated with mining within the Project Area would be subject to paleontological protection measures. Given the small area disturbed relative to the existing disturbance in the SMCRA permit area and the overall large land area of the region, as well as the limited number of surface disturbing activities other than mining that may occur, Alternative A's overall contribution to cumulative impacts would be negligible and would cease following the completion of mining.

Mining under Alternative B would create less surface disturbance then under Alternative A. Overall, the contribution to cumulative impacts would be negligible and would cease following the completion of mining.

5.4.14 Access and Transportation

The CIAA for access and transportation includes Moffat and Routt counties and the eastern third of Rio Blanco County including the Colowyo Mine and the town of Meeker. Primary transportation routes in the CIAA are U.S. Highway 40 and State Highways 13, 131, 317, and 394. Commuter and supply traffic to and from the mine is the only cumulative contribution to traffic rates in the CIAA. Transportation of coal and CCR utilizes mine roads only and has no effect to the local transportation network. Continued mining would contribute to the tax revenue generated for Moffat County that helps support road maintenance. Other projects that contribute to both negative (road use) and positive (tax revenue) impacts to transportation within the CIAA include the Craig and Hayden stations, the Colowyo and Foidel Creek coal mines, stone and material quarries, and oil and gas development. The Steamboat Springs Ski Resort and Dinosaur National Monument also contribute to traffic volumes in the CIAA through visitation. In 2012 the Steamboat Ski Resort had 89,598 visitors (Yampa Valley Data Partners 2012) and Dinosaur National Monument had 261,643 visitors (NPS 2012).

Implementation of Alternative A would not contribute any additional daily traffic to the transportation routes in the CIAA. Under Alternative B mining would continue at Trapper Mine in areas outside of the Project Area; however, transportation and access impacts would be slightly reduced as compared to Alternative A due to the lower mining rate.

Overall, the contribution to cumulative access and transportation impacts under both Alternative A and Alternative B would be negligible and would cease following the completion of mining and reclamation.

5.4.15 Solid Waste

The CIAA for solid waste is the SMCRA permit area plus the Moffat County landfill and the Hayden Station CCR placement area. The Moffat County landfill is a municipal landfill located about 2 miles (3 km) south of Craig, Colorado accessed by County Road 107. Alternative A is not expected to change the amounts of non-hazardous solid waste that is disposed at the landfill.

The Hayden Station is located in Sections 7, 8, 17, and 18 in Township 6 North, Range 87 West about 21 miles (34 km) east of Project Area. The CCR placement area is located south of the Hayden Station. The Hayden Station generated approximately 128,000 tons of CCR in 2014 (USEIA 2015). Alternative A would not be expected to change the amount of CCR disposed by the Hayden Station.

Section 4.15 discusses the CCR placement in the SMCRA permit area from the Craig Station. Alternative A would not be expected to change the amount of CCR placed in the Trapper Mine SMCRA permit area.

Alternative B would result in a decrease in the amount of municipal solid waste that is disposed at the county landfill due to the decreased mining rate and earlier cessation of mining. Alternative B would have no effect on the generation of CCR because the Craig Station and Hayden Station are expected to continue to operate at current rates and generate and handle CCR.

Overall, the direct contribution to cumulative solid waste impacts under both Alternative A and B would be negligible and would cease following the completion of reclamation. The indirect contribution to cumulative impacts under both alternatives would negligible through the life of the Craig Station.

5.4.16 Noise

The CIAA for noise is the Project Area and a 0.5-mile (0.8-km) buffer surrounding the SMCRA permit boundary. Noise sources related to mining include haul trucks, excavation and drilling equipment,

pre-blast/post-blast warning sirens, backup alarms on mobile equipment, and impulsive noises associated with infrequent blasting activities within the mine pit. Noise levels under Alternative A would remain consistent with current activities as production rates would remain the same. The majority of noise creating activities will occur within the mine pit area including loading trucks, excavation activities, and drilling and blasting below grade which will attenuate noise. Haul road traffic and reclamation work that occur at grade will likely produce the majority of noise traveling off site. The nearest sensitive receptor is a single residence 0.46 mile (0.7 km) north of the permit boundary. Topography around the permit boundary is hilly to the north and becomes mountainous to the south. These features provide noise attenuation, and it is likely that most noise is attenuated before reaching any residences or receptors; therefore, noise related impacts would be negligible. Overall, Alternative A, including future reclamation activities, would create no changes to the current contribution to cumulative noise impacts. The contribution to these impacts would cease following the completion of reclamation.

Under Alternative B, mining activities within the Project Area would cease and reclamation activities would begin. Noise generated under Alternative B would include filling and recontouring of the mine pit areas, laying topsoil, and seeding. Noise duration for this alternative would be shorter than Alternative A but mining would continue in areas outside of the Project Area. Noise associated with these activities would involve the same sources as Alternative A in other areas of the SMCRA Permit boundary. Overall, Alternative B would result in no changes to the current contribution to cumulative noise impacts; however, the contribution to cumulative impacts would be shorter in duration than under Alternative A due to the decreased life of mine. This may be partially offset by potential mining on private and state lands within the SMCRA permit boundary.

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6.0 Consultation and Coordination

The following individuals or organizations were notified of the Project and their input was requested. These individuals or organizations also were notified of the release of the EA and asked to provide any comments on the document.

- USFWS
- Colorado SHPO
- Eastern Shoshone Tribe
- Ute Mountain Ute Tribe
- Ute Indian Tribe
- Southern Ute Tribe
- Navajo Nation
- Hopi Tribe
- City of Craig
- Town of Hayden
- Landowners Adjacent to the SMCRA permit boundary
- WildEarth Guardians

6.1 Public Comment Process

Public comments were solicited through several methods. OSMRE published legal notices in the *Craig Daily Press* on October 14 and 21, 2015, and the *Rio Blanco Herald Times* on October 22, 2015 (**Appendix A**). The legal notice also was posted in public locations in Craig and Meeker. A public outreach letter describing the Project, announcing the public outreach meeting, and soliciting comments was mailed on October 16, to a total of 15 recipients, including city governments, adjacent landowners, and other interested parties. On October 20, 2015, a total of 6 letters were sent to American Indian tribes. A total of 21 parties received the outreach letter. The legal notices and letters invited the public to comment on issues of concern for the Project, and informed the interested citizens of the public outreach meeting.

OSMRE developed a Project website, which provided additional Project notice, Project information, and comment opportunities: http://www.wrcc.osmre.gov/initiatives/trappermine.shtm. The website was activated on October 16, 2015. The website provided the legal notices, outreach notices letters, outreach meeting materials, mailing address, and an email address for comments to be sent.

The public outreach meeting was held on October 29, 2015, from 4:00 PM until 8:00 PM at the Moffat County Fairgrounds, Pavilion Building, 640 Victory Way, Craig, Colorado 81625. Five hundred and one individuals signed in at the public meeting and 195 comment forms were completed during the meeting. A total of 3,855 individuals or organizations submitted comments by the end of the comment period. Ninety two comments were received after the comment period closed on November 12, 2015. Both comments received during the comment period and comments received after the comment period ended were evaluated for relevance in preparing this EA.

Public comments included the following issues:

- General support of the project;
- Concerns over impacts to air quality and climate change;
- Concerns over impacts to socioeconomics if the mine were to shut down;
- Community support and environmental stewardship activities completed by TMI
- Concerns over Impacts to rare or imperiled fish, wildlife, and plants; and

All comments received have been considered in the preparation of this document. A summary discussion of the issues raised during scoping is discussed in Section 1.6.

6.2 U.S. Fish and Wildlife Service Section 7 Consultation

On November 16, 2015, OSMRE reinitiated the Section 7 consultation process with USFWS when they submitted a draft biological assessment (BA). The BA requested to reinitiate the consultation process due to the indirect effects of mercury and selenium deposition on listed species. The final BA was submitted on December 9, 2015 (**Appendix B**).

6.3 American Indian Consultation

On October 16, 2015, OSMRE sent a letter to the following tribes explaining the project and requesting consultation under Section 106 of the NHPA (Appendix C).

- Eastern Shoshone Tribe
- Southern Ute Indian Tribe
- Ute Mountain Ute Tribe
- Ute Indian Tribe
- Navajo Nation
- Hopi Tribe

The Hopi Tribe requested additional information on the Project by letter dated November 23, 2015.On January 22, 2016, OSMRE sent a letter to each of the tribes explaining that the EA and unsigned FONSI would be available for review and comment January 25, 2016, through February 22, 2016.

6.4 Cooperating Agencies

The following is a list of Cooperating Agencies for the preparation of this EA:

- BLM
- Colorado DNR, including the Executive Director's Office, CDRMS, CPW, and CSLB
- CDPHE, APCD
- Moffat County Commissioners
- Rio Blanco County

Table 6-1 lists the participants in the preparation of this EA from the Cooperating Agencies.

Table 6-1 Participants from Cooperating Agencies

Name	Agency	Title
Kathy McKinstry	BLM LSFO	Planning and Environmental Coordinator
Jennifer Maiolo	BLM LSFO	Mining Engineer
Desa Ausmus	BLM LSFO	Wildlife Biologist
Chad Meister	BLM Colorado State Office	Natural Resource Specialist (Air Quality)
Amy Laughlin	Colorado DNR	Policy Advisor
Dan Hernandez	CDRMS	Senior Environmental Protection Specialist
Phillip Courtney	CSLB	Solid Minerals Leasing Manager
Michael Warren	CPW	Energy Liaison, Northwest Region
Ingrid Hewitson	CDPHE APCD	Air Quality Planner
Chuck Grobe	Moffat County	County Commissioner
Jeff Comstock	Moffat County	Director, Natural Resources Department
Mark Sprague	Rio Blanco County	Natural Resource Specialist

6.5 Preparers

Table 6-2 shows a list of the preparers of this EA and those who participated in the preparation of this EA from OSMRE.

Table 6-2 Office of Surface Mining Reclamation and Enforcement

Name	Title
Robert Postle	Manager, Program Support Division
Marcelo Calle	Manager, Field Operations Branch
Nicole Caveny	Environmental Protection Specialist
Bobbi Hernandez	Civil Engineer
Roberta Hernandez	Civil Engineer
Gene Hay	Mining Engineer
Jeremy Iliff	Archeologist
Jacob Mullinix	Soils Scientist

Table 6-3 shows a list of the key preparers of this EA from the third party consultants, AECOM and Air Resource Specialists.

Table 6-3 Consultants

Name	Title	Resource/Role
Bill Killam, AECOM	Senior Project Manager	Senior NEPA Reviewer
Anne Baldrige, AECOM	Senior Project Manager	Project Manager
Eve Bingham, AECOM	Senior Project Manager	Assistant Project Manager
Bill Berg, AECOM	Senior Geologist	Geology, Paleontology, Solid Waste
Sue Coughenour, AECOM	Document Production Specialist	Technical Editor

Table 6-3 Consultants

Name	Title	Resource/Role
Rob DeBaca, AECOM	Senior Biologist	Vegetation, Wildlife, Special Status Species
Chris Dunne, AECOM	Project Ecologist	Recreation, Visual Resources, Livestock Grazing, Alluvial Valley Floors, Prime Farmland
Steve Graber, AECOM	Human Resource Specialist	Socioeconomics, Environmental Justice
Meagan Jones, AECOM	Environmental Scientist	Soils, Wetlands, Noise
Matt Spansky, AECOM	Project Hydrogeologist	Water Resources
Gordy Tucker, AECOM	Cultural Resources Team Lead	Cultural Resources
Howard Gebhart, Air Resource Specialists	Senior Project Scientist	Air Quality and Climate Change

7.0 References

Chapter 1.0 References

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3.1 General Setting

None

3.2 Topography

None

3.3 Air

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3.4 Geology References

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Appendix A

Legal Notice and Outreach Letter

Public Notice
Trapper Mine Mining Plan Modification
Environmental Assessment

The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region, will prepare an environmental assessment (EA) to analyze environmental impacts of a Federal mining plan approval for current and future mining within Federal Coal Leases Nos. C-079641 and C-07519 held by Trapper Mining Inc. as part of the Trapper Mine. The EA will cover the time period beginning July 1, 2015, and continuing through the planned life of mine for the portion of the two Federal coal lease areas lying within the approved Surface Mining Control and Reclamation Act of 1977 (SMCRA) Permit Area (the Project). As required by the National Environmental Policy Act of 1969 (NEPA), the EA will disclose the potential for direct, indirect, and cumulative impacts to the environment from the Project.

Preparation of the EA will be completed pursuant to the Court-approved Joint Proposed Remedy, as approved by the United States District Court for the District of Colorado on September 14, 2015, in the case entitled *WildEarth Guardians v. U.S. Office of Surface Mining et al.*, Case 1:13-cv-00518-RBJ (D. Colo. 2015). As part of the Court-approved remedy, OSMRE agreed to conduct a new NEPA analysis for Trapper's current and future mining activities within Federal Coal Leases Nos. C-079641 and C-07519.

The Trapper Mine is located approximately 6 miles south of the town of Craig in Moffat County, Colorado, east of Colorado Highway 13. The proposed Project is occurring on two federal coal leases administered by the Bureau of Land Management (BLM) and located within the eastern portion of the Trapper Mine's approved SMCRA Permit Area. Federal Coal Lease C-07519 was issued by the BLM in June 1958 and Federal Coal Lease C-079641 was issued by the BLM in October 1962. The leases within the SMCRA Permit Area cover a total of approximately 2,423 acres of Federal mineral estate. As of July 1, 2015, approximately 19 million tons of recoverable Federal coal remains within the Project area. The Trapper Mine uses a combination of dragline, truck shovel, and highwall mining methods to remove the overburden and mine the coal.

The EA will update, clarify, and provide new and additional environmental information for the Project. As a result of the EA process, OSMRE will determine whether or not there are significant environmental impacts. An environmental impact statement will be prepared if the EA identifies significant impacts. If a finding of no significant impact is reached, and pursuant to 30 CRF 746.13, OSMRE will prepare and submit to the Assistant Secretary for Lands and Minerals Management (ASLM) a mining plan decision document recommending approval, disapproval, or conditional approval of the mining plan. The ASLM will approve, disapprove, or conditionally approve the mining plan approval document within the mining plan decision document, as required under the Mineral Leasing Act of 1920.

OSMRE will hold an open-house public outreach meeting that will include displays and handouts explaining the status of the Project. The public outreach meeting will also provide opportunities to ask questions of OSMRE and Trapper representatives about the Project and the NEPA process, and opportunities to provide written comments on the project. ***The meeting will be held on, October 29, 2015, from 4-8 pm at Moffat County Fairgrounds, Pavilion Building, 640 E. Victory Way, Craig, Colorado 81625.***

OSMRE is soliciting public comments on the Project. Your comments will help to determine the issues and alternatives that will be evaluated in the environmental analysis. You are invited to direct these comments by email: osm-nepa-co@osmre.gov, ensure the subject line reads: ATTN: OSMRE, Trapper

Mine MPDD EA. Comments may also be received by mail: OSMRE WR, C/O Nicole Caveny, C-079641 and C-07519 EA, 1999 Broadway, Suite 3320 Denver, CO 80202 and be postmarked no later than November 12, 2015, in order to be considered during the preparation of the EA. Comments received, including names and addresses of those who comment, will be considered part of the public record for this Project and will be available for public inspection. Additional information regarding the Project may be obtained from Nicole Caveny at (303) 293-5078. When available, the EA and other supporting documentation will be posted at and may be obtained from http://www.wrcc.osmre.gov/initiatives/trappermine.shtm.

United States Department of the Interior

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT

Western Region Office
1999 Broadway, Suite 3320

Denver, CO 80202-3050

October 13, 2015

Dear Interested Public Land User,

The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region, will prepare an environmental assessment (EA) to analyze environmental impacts of a Federal mining plan approval for current and future mining within Federal Coal Leases Nos. C-079641 and C-07519 held by Trapper Mining Inc. as part of the Trapper Mine. The EA will cover the time period beginning July 1, 2015, and continuing through the planned life of mine for the portion of the two Federal coal lease areas lying within the approved Surface Mining Control and Reclamation Act of 1977 (SMCRA) Permit Area (the Project). As required by the National Environmental Policy Act of 1969 (NEPA), the EA will disclose the potential for direct, indirect, and cumulative impacts to the environment from the Project.

Preparation of the EA will be completed pursuant to the Court-approved Joint Proposed Remedy, as approved by the United States District Court for the District of Colorado on September 14, 2015, in the case entitled *WildEarth Guardians v. U.S. Office of Surface Mining et al.*, Case 1:13-cv-00518-RBJ (D. Colo. 2015). As part of the Court-approved remedy, OSMRE agreed to conduct a new NEPA analysis for Trapper's current and future mining activities within Federal Coal Leases Nos. C-079641 and C-07519.

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The EA will update, clarify, and provide new and additional environmental information for the Project. As a result of the EA process, OSMRE will determine whether or not there are significant environmental impacts. An environmental impact statement will be prepared if the EA identifies significant impacts. If a finding of no significant impact is reached, and pursuant to 30 CFR 746.13, OSMRE will prepare and submit to the Assistant Secretary for Lands and Minerals Management (ASLM) a mining plan decision document recommending approval, disapproval, or conditional approval of the mining plan. The ASLM will approve, disapprove, or conditionally approve the mining plan approval document within the mining plan decision document, as required under the Mineral Leasing Act of 1920.

OSMRE will hold an open-house public outreach meeting that will include displays and handouts explaining the status of the Project. The public outreach meeting will also provide opportunities to ask questions of OSMRE and Trapper representatives about the Project and the NEPA process, and opportunities to provide written comments on the project. **The meeting will be held on October 29, 2015, from 4-8 pm at Moffat County Fairgrounds, Pavilion Building, 640 E. Victory Way, Craig, Colorado 81625.**

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OSMRE WR
C/O: Nicole Caveny
Trapper Mine EA
1999 Broadway, Suite 3320
Denver, CO 80202-3050

Comments may also be emailed to: osm-nepa-co@osmre.gov, ensure the subject line reads: ATTN: OSMRE, Trapper Mine MPDD EA. Comments sent by mail or email should be postmarked or received no later than November 12, 2015, in order to be considered during the preparation of the EA. Comments received, including names and addresses of those who comment, will be considered part of the public record for this Project and will be available for public inspection. Additional information regarding the Project may be obtained from Nicole Caveny at (303) 293-5078. When available, the EA and other supporting documentation will be posted at, and may be obtained from, http://www.wrcc.osmre.gov/initiatives/trappermine.shtm.

Sincerely,

Marcelo Calle, Manager
Field Operations Branch

Appendix B

Biological Assessment

Reinitiation of Consultation for the Trapper Mining Inc. Trapper Mine, Mining Plan Modification

Prepared for:

United States Fish and Wildlife Service
Ecological Services
Western Colorado Field Office
445 West Gunnison Ave
Suite 240
Grand Junction, Colorado 81501-5711

Prepared by:

Office of Surface Mining Reclamation and Enforcement
Western Region Office
1999 Broadway St, Suite 3320
Denver, CO 80202

and

AECOM
1601 Prospect Parkway
Fort Collins, CO 80525

List of Acronyms and Abbreviations

ACEC	Area of Critical Environmental Concern
AGFD	Arizona Game and Fish Department
BLM	Bureau of Land Management
BA	Biological Assessment
BO	Biological Opinion
CCICED	China Council for International Cooperation on Environment and Development
CDLA	Colorado Department of Local Affairs
CDPHE	Colorado Department of Public Health and Environment
CDPS	Colorado Discharge Permit System
CDRMS	Colorado Division of Reclamation, Mining and Safety
CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
CPW	Colorado Parks and Wildlife
DOI	U.S. Department of the Interior
DPS	distinct population segment
EA	Environmental Assessment
EPRI	Electrical Power Research Institute
ESA	Endangered Species Act of 1973
FCPP & NMEP	Four Corners Power Plant and Navajo Mine Energy Project
FR	Federal Register
GEM	gaseous elemental mercury
Hg(0)	elemental mercury
Hg(II)	gaseous divalent mercury
Hg(p)	particulate mercury
kg	kilogram
MDN	Mercury Deposition Network
MeHg	Methyl mercury
mtpy	million tons per year
NPDES	National Pollutant Discharge Elimination System
NTT	National Technical Team
OSMRE	Office of Surface Mining Reclamation and Enforcement
PBM	particle bound mercury
PCE	primary constituent element
P.M.	Prime Meridian

PR	Permit Revision
PRBO	Point Reyes Bird Observatory
RFD	Reasonable Foreseeable Development
RGM	reactive gaseous mercury or gaseous oxidized mercury
RN	Permit Renewal
SMCRA	Surface Mining Control and Reclamation Act of 1977
UNEP	United Nations Environmental Program
U.S.	United States
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WQCD	Water Quality Control Division
WW	Wet Weight

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1.0 Introduction

OSMRE Western Region is completing an Environmental Assessment (EA) to analyze environmental impacts of the current and future mining within the two lease areas at Trapper Mine in Moffat County, Colorado (**Figure 1, Figure 2**). Preparation of the EA will be completed pursuant to the Court-approved Joint Proposed Remedy, as approved by the United States District Court for the District of Colorado on September 14, 2015 in the case entitled WildEarth Guardians v. U.S. Office of Surface Mining et al., Case 1:13-cv-00518-RBJ (D. Colo. 2015). As part of the Joint Proposed Remedy, OSMRE agreed to complete the EA, including all public participation components, on or before April 30, 2016.

Reinitiation of consultation with U.S. Fish and Wildlife Service (USFWS) for a mining plan decision document modification for the Trapper Mine is requested by the Office of Surface Mining Reclamation and Enforcement (OSMRE) Western Region at this time to discuss impacts associated with mining activities within two Federal Coal Leases (C-07519 and C-079641) for the period of July 1, 2015, through the life of the mining, and to discuss indirect impacts from combustion of Trapper coal at the Craig Generating Station in Craig, Colorado. As determined by the court, the indirect impacts of coal combustion were not considered in previous consultations and are being analyzed as an interrelated effect of mining. OSMRE finds that combustion of the coal mined at the Trapper Mine is a reasonably foreseeable future action; however, the Trapper Mine and the Craig Generating Station are independent operations with independent utility.

The EA applies to the portions of Federal Coal Leases Nos. C-07519 and C-079641 that lie within Trapper's Surface Coal Mining Control and Reclamation Act of 1977 (SMCRA) permit boundary that has been previously approved by the Colorado Division of Reclamation, Mining and Safety (CDRMS) under Coal Mining Permit number C-1981-010 (Project Area) (**Figure 2**). CDRMS administers the approved Colorado State Coal Regulatory Program (30 CFR Part 906). The preparation of the EA does not affect Trapper's mining or reclamation activities on State, County, or private lands or minerals, or other Federal Coal Leases.

The two Federal Coal Lease areas, which lie within the CDRMS permit boundary, have the following legal description:

- C-07519 - Township *5* North, Range 90 West, 6th P.M. (Prime Meridian) Section 6 lots 8 through 19 inclusive and Township 6 North, Range 90 West, 6th P.M, Section 31 lots 5-20 inclusive
- C-079641 – Township 5 North, Range 90 West 6th P.M., Section 5 lots 5 through 20 inclusive and Township 6 North, Range 90 West 6th P.M. Section 32 lots 4 through 16 inclusive

The above-mentioned tracts of land also are shown on USGS 7.5-minute quadrangle map of Castor Gulch and on **Figure 1**.

The impacts associated with ongoing mining and reclamation operations within these two Federal Coal Lease areas at the Trapper Mine were originally consulted on in 2009 as part of the 2009 mining plan decision document modification (CDRMS Permit Revision 06). The consultation history is described in Section 1.2; the Biological Opinions from these are provided in **Appendix A**.

In addition to the Project Area described in reference to the federal leases above, the effects analysis in a biological assessment utilizes the term **Action Area**; which is defined, by USFWS, as all areas to be affected directly or indirectly by the federal action and not merely the immediate area (or Project Area) involved in the action. The Action Area varies in this Biological Assessment (BA) due to the differing effects of mercury on the subject species. The Action Areas for the species addressed in this BA are described in Chapter 4 and are shown in **Figure 3, Figure 4, Figure 5**, and **Figure 6**.

1.1 Species Addressed

The USFWS lists 12 species as endangered, threatened, or candidates for listing in the Action Area (USFWS 2015a, [provided in Appendix A]). One of these, the greater sage-grouse (*Centrocercus urophasianus*) was removed recently from listing consideration as a candidate due to adequate conservation measures in place to protect the species; it is not analyzed in this biological assessment. Three species – black footed ferret (*Mustela nigripes*), Mexican spotted owl (*Strix occidentalis lucida*), and Canada lynx (*Lynx canadensis*) – were adequately analyzed under previous consultations (described in Section 1.2).

Eight federally listed species (**Table 1**) are included in this biological assessment based on their potential association with the Action Area. Four of those species have designated critical habitat and one species has proposed critical habitat that occur in the Action Area (**Table 1**).

Table 1 Threatened, Endangered, Proposed and Candidates Species Addressed in Biological Assessment

Common Name	Scientific Name	Federal Status	Critical Habitat Status (Year)
Birds			
Yellow-billed cuckoo	*Coccyzus americanus*	T	Proposed (2014)
Fish			
Colorado pikeminnow	*Ptychocheilus lucius*	E	Final Designated (1994)
Bonytail chub	*Gila elegans*	E	Final Designated (1994)
Humpback chub	*Gila cypha*	E	Final Designated (1994)
Razorback sucker	*Xyrauchen texanus*	E	Final Designated (1994)
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	T	No
Plants			
Dudley Bluffs twinpod	*Physaria obcordata*	T	No
Ute ladies'-tresses	*Spiranthes diluvialis*	T	No

Status: E=Endangered; T=Threatened

Source: USFWS 2015a.

1.2 Consultation History

1.2.1 Trapper Mine Permit Renewal (RN-06)

On February 28, 2013, OSMRE submitted a BA for an informal consultation regarding the 5-year permit renewal for Trapper Mine (SMCRA Permit C-1981-010) Permit Renewal Application Number 6 (RN-06). USFWS issued a Biological Opinion (BO) on June 21, 2013 (see Appendix A) that concurred with OSMRE's effects determinations as follows:

- **No effect**: black-footed ferret (*Mustela nigripes*), Mexican spotted owl (*Strix occidentalis lucida*), Canada lynx (*Lynx canadensis*), Ute ladies'-tresses (*Spiranthes diluvialis*)
- **May Affect, Likely to Adversely Affect**: Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker *(Xyrauchen texanus*), bonytail chub (*Gila elegans*), and humpback chub (*Gila cypha*) due to annual water depletions of 150.2 acre-feet from the Yampa River

- **May affect, is not likely to adversely affect the continued existence of:** Candidate, wolverine (*Gulo gulo*)
- **Will not affect the continued existence of:** Candidate, yellow-billed cuckoo (*Coccyzus americanus*)

On June 15, 2009, OSMRE submitted a BA titled Section 7 Consultation, Trapper Mining Inc. "Trapper" mine, Permit C-1981-010 Proposed Trapper Mine Plan for 5 Year Permit Term 2008-2012, PR-06 (2009 PR-06 BA). USFWS issued a BO on September 17, 2009 (See Appendix A). USFWS concurred with the determinations provided by OSMRE as follows:

- **No Effect**: black-footed ferret, Mexican spotted owl, Canada lynx, and Ute ladies'-tresses
- **May Affect, Likely to Adversely Affect**: Colorado pikeminnow, razorback sucker, bonytail chub, and humpback chub due to annual net depletions of 94.8 acre-feet within the upper Colorado River watershed
- **Will not affect the continued existence of**: Candidate, yellow-billed cuckoo

A previous consultation is referred to in the 2009, PR-06 BA. USFWS provided a letter of concurrence to OSMRE (E-6-RO-95-F-001-GJ73) on August 28, 1995, with a "not likely to jeopardize" determination for the Colorado pikeminnow, bonytail chub, and humpback chub due to an additional annual depletion of 7.95 acre-feet from the upper Colorado River watershed.

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2.0 Description of the Trapper Mine

The Trapper surface coal mine is located in Moffat County, Colorado, approximately 6 miles south of the Town of Craig, Colorado on State of Colorado, and private lands (**Figure 1**). The Trapper mine approved CDRMS permit area encompasses approximately 11,157 acres, of which approximately 2,423 acres are part of the two federal coal leases being analyzed in the EA (**Figure 2**). The EA will be prepared to analyze the potential environmental impacts associated with current and future mining within the Project Area.

Trapper's production from the two lease areas is expected to be approximately 19.1 million tons from July 1, 2015, through the life of mine, currently anticipated to be 2024. The average production rate is approximately 2.3 million tons per year from eight coal seams of the Williams Fork Formation with a maximum production rate of 2.6 million tons per year. Trapper currently produces coal and will continue to produce coal in the future from the L Pit located on Federal Coal Lease C-079641. Future mining also will occur in the N Pit located partially within Federal Coal Lease C-07519.

Coal is mined using dragline, truck and shovel and highwall augering methods. The coal is transported by haul truck to the Craig Generating Station located to the north of the mine. Trapper currently has no provisions to ship coal to other locations.

The Trapper Mine extends across the northern slope of the Williams Fork Mountains between elevations of 6,500 to 7,800 feet above sea level. The crest of the Williams Fork Mountains forms a ridge running east-west at elevations between 7,400 to 7,800 feet above sea level (OSMRE 2009).

The Yampa River flows generally east to west approximately 6 miles north of the Project Area, and the Williams Fork River skirts the south side of the permit area and flows into the Yampa River approximately one mile west of the permit area. Within the permit area, on north facing slopes, portions of the Buzzard, Coyote, No Name, Johnson, Pyeatt and Flume gulches flow generally south to north primarily in response to snowmelt or heavy rains. These gulches eventually discharge flows into the Yampa River. Drainages within the southern portion of the permit area include portions of Ute, Castor, Deer, Elk, and Horse gulches that flow generally southward into the Williams Fork River (OSMRE 2009).

The mountain shrub community within the permit area gradually thins in terms of density and cover from east to west giving way to a community of big sagebrush (*Artemisia tridentata*) and grasses to the western side of the permit area. Descending northward from the ridge of the Williams Fork Mountains at elevations above 7,200 feet, Gamble's oak (*Quercus gambelii*) dominates the mountain shrub community, and serviceberry (*Amelanchier alnifolia*) and chokecherry (*Prunus virginiana*) are less abundant. Snowberry (*Symphoricarpos oreophilus*) is the most prominent understory component with occasional big sagebrush, yellow rabbitbrush (*Chrysothamnus viscidiflorus*) or bitterbrush (*Purshia tridentata*). Gamble's oak becomes less dominant at lower elevations where it gives way to sagebrush, serviceberry, and chokecherry except on protected, east-facing slopes. At the lowest elevations, serviceberry and chokecherry give way to a community dominated by sagebrush, rabbitbrush and grasses (OSMRE 2009).

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3.0 Evaluated Species and Critical Habitat

The effects determinations remain unchanged since the 2009 and 2013 consultations (no effect) for the black-footed ferret, Mexican spotted owl, and Canada lynx. Those species will not be analyzed further in this document. This BA will address additional impacts from mercury and selenium from combustion of Trapper Mine coal on Colorado River fish species and the yellow-billed cuckoo. This impact was not analyzed in previous consultations. Ute ladies'-tresses is re-analyzed due to new information on the range and potential habitat for the species. The greenback cutthroat trout is assessed due to ongoing improvements in the science regarding cutthroat trout lineages and distributions present on the Western Slope.

3.1 Listed Species

3.1.1 Colorado Pikeminnow (Endangered)

The Colorado pikeminnow (*Ptychochielus lucius*), formerly Colorado squawfish, is the largest cyprinid fish endemic to the Colorado River Basin. This species historically reached a maximum length of approximately 6 feet and a maximum weight of 80 pounds. Young are silvery and usually have a dark, wedge-shaped spot at the base of the caudal fin. Adults are strongly counter shaded with a dark, olive back and a white belly. Today, fish rarely exceed approximately 3 feet in length or weigh more than 18 pounds (USFWS 2002a).

3.1.1.1 Status

The Colorado pikeminnow was originally listed in 1967 in the antecedent to the existing Endangered Species Act of 1973 (ESA) and continued as endangered under provision of the Endangered Species Conservation Act of 1969 (USFWS 2015b). Its listing continued as endangered when the 1973 version of the ESA was published. Its status is the same today (USFWS 2015b). The latest revised Colorado pikeminnow recovery plan was approved on August 1, 2002 (USFWS 2002a). The final rule for determination of critical habitat was published on March 21, 1994, and the final designation became effective on April 20, 1994 (USFWS 1994).

3.1.1.2 Distribution

The Colorado River is divided into upper and lower basins at Lee's Ferry, Arizona (approximately nine miles below Glen Canyon Dam), by the Colorado River Compact of 1922. A Recovery Implementation Program for the four endangered fish species in the Upper Colorado River Basin (i.e., humpback chub, bonytail chub, Colorado pikeminnow, and razorback sucker) was initiated in January 1988 as a collaborative program comprised of federal, state, and private cooperators. The program provides specific goals for the recovery of endangered Colorado River fish while promoting sustainable water development and use (USFWS 1987).

The range of the Colorado pikeminnow is known or believed to include Arizona, California, Colorado, New Mexico, and Utah, where they inhabit warm water reaches of the Colorado, Green, White, Yampa, and San Juan rivers and associated tributaries. Natural Colorado pikeminnow populations survive only in the Upper Basin, and are relatively high only in the Green River Basin of Utah and Colorado (USFWS 2015b).

All waters within the Action Area are associated with the Upper Colorado River Basin. The Yampa River and White River are important flow contributors to downstream fisheries in the Green River in Utah, which provides vital nursery habitat and most of the Upper Colorado River Basin's remaining spawning and juvenile concentration areas. The Upper Colorado River Basin is home to the endangered humpback chub, bonytail chub, Colorado pikeminnow, and razorback sucker. These four endangered fish are found only in the Colorado River system (USFWS 2015b).

Within the Action Area, the Colorado pikeminnow occurs along the Yampa River near the Craig Generating Station. Population trends in the Green River sub-basin, which includes the Yampa River, indicate a low population that fluctuated from 2001 to 2008. A recent survey in the Yampa in 2011 and 2012 indicates a declining population in this area, likely due to introduced non-native predatory fish (USFWS 2014d).

3.1.1.3 Habitat Requirements

Critical habitat was designated in 1994 within the 100-year flood plain of the Colorado pikeminnow's historical range. Within the Action Area, the lower White River and its 100-year flood plain downstream from Rio Blanco Lake were designated as critical habitat (**Figure 3**). Additionally, critical habitat is present in the Yampa River and its 100-year flood plain within Dinosaur National Monument and upstream to Craig. Critical habitat continues beyond the Action Area downstream below the Yampa's confluence with the Green River.

The White River is used throughout the year by adult and sub-adult Colorado pikeminnow. Following closure of Taylor Draw Dam in 1984, pikeminnow were confined to the 32.5 miles of the White River below the dam. The White River in Colorado does not appear to support spawning activity, young-of-year nurseries, or juvenile concentrations areas, but portions of the White River in Utah serve as concentration areas for adults and juveniles (BLM 2012a).

Critical habitat primary constituent elements (PCEs) are the same for the four endangered Upper Colorado River Basin fish (i.e., Colorado pikeminnow, razorback sucker, bonytail chub, and humpback chub) (50 CFR 13378). Primary constituent elements are those physical and biological features of a landscape that are essential for individuals of a species to survive and reproduce. PCEs for the Upper Basin fish are listed below (USFWS 1994).

- **Water:** This includes a quantity of water of sufficient quality (i.e., temperature, dissolved oxygen, lack of contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species.
- **Physical Habitat:** This includes areas of the Colorado River system that are inhabited or potentially habitable by fish for use in spawning, nursery, feeding, and rearing, or corridors between these areas. In addition to river channels, these areas also include bottom lands, side channels, secondary channels, oxbows, backwaters, and other areas in the 100-year flood plain, which, when inundated, provide spawning, nursery, feeding, and rearing habitats, or access to these habitats.
- **Biological Environment:** Food supply, predation, and competition are important elements of the biological environment and are considered components of this constituent element. Food supply is a function of nutrient supply, productivity, and availability to each life stage of the species. Predation and competition, although considered normal components of this environment, are out of balance due to introduced nonnative fish species in many areas (USFWS 1994).

Additionally, spawning takes place over clean cobbles and rubble in relatively swift waters. Preferred temperature for embryo development, juvenile growth, and adult spawning is from 20.0 to 26.0 degrees Celsius (°C) (68.0 to 78.8 degrees Fahrenheit [°F]). Juveniles utilize slackwater, backwater, and side channel areas with low or no current velocity and silt/sand substrates. Larger individuals, greater than 200 millimeters (7.9 inches) occur in turbid, deep, and strongly, flowing waters (AGFD 2002a).

3.1.1.4 Life History

The Colorado pikeminnow is a long-distance migrator and top ecosystem predator. Colorado pikeminnow live in warm-water reaches of the Colorado River mainstem and larger tributaries, and require uninterrupted stream passage for spawning migrations and dispersal of young (USFWS 2002a).

The species is adapted to a hydrologic cycle characterized by large spring peaks of snowmelt runoff and low, relatively stable base flows. High spring flows create and maintain in-channel habitats, and reconnect flood plain and riverine habitats, a phenomenon described as the spring flood-pulse.

Throughout most of the year, juvenile, sub-adult, and adult Colorado pikeminnow use relatively deep, low-velocity eddies, pools, and runs that occur in near shore areas of main river channels. In the spring, Colorado pikeminnow adults use flood plain habitats, flooded tributary mouths, flooded side canyons, and eddies that are available only during high flows. Such environments may be particularly beneficial for Colorado pikeminnow because other riverine fishes gather in flood plain habitats to exploit food and temperature resources, and may serve as prey. These low-velocity environments also may serve as resting areas for Colorado pikeminnow. River reaches of high habitat complexity appear to be preferred (USFWS 2008).

Young pikeminnow may feed on crustaceans and aquatic diptera larvae. Aquatic and terrestrial insects make up the majority of the diet as fish exceed 1.97 inches. Fish predominate in the diets of pikeminnow larger than 3.9 inches. The condition of young fish entering winter periods may have a role in determining their overwinter survival. Low fat stores and poor condition may result in low overwinter survival of young pikeminnow (AGFD 2002a).

3.1.1.5 Threats

The primary threats to the Colorado pikeminnow are:

- Stream flow reduction, regulation, and habitat modification (including impoundment and reservoir operations)
- Competition with and predation by nonnative fish
- Pesticides and pollutants (BLM 2008; USFWS 2002a)

3.1.2 Bonytail Chub (Endangered)

The bonytail chub (*Gila elegans*) is a large cyprinid fish (minnow family) endemic to the Colorado River Basin that can live up to 50 years. They are streamlined fish with a small head, slender body, and pencil-thin caudal peduncle. The head is flattened, the mouth is slightly overhung by the snout, and there is a small, smooth fleshy hump behind the head of adults; the hump is smaller than that of humpback chub. This species attains a maximum size of about 2.2 feet in total length and 2.4 pounds in weight. The color is dark gray above fading to a white belly, with yellow pigment at the base of the paired fins (pelvic and pectoral). Like the humpback chub, adult bonytail chub in spawning condition exhibit small pimple-like tubercles on the head and fins (USFWS 2002c).

3.1.2.1 Status

The bonytail chub was first listed as endangered under the ESA in 1980 (USFWS 2015c). A recovery plan was originally approved on September 4, 1990 (USFWS 1990). Recovery goals were subsequently published in an amendment and supplement to the recovery plan dated August 1, 2002 (USFWS 2002c). The final rule for determination of critical habitat was published on March 21, 1994 (59 FR 13374), and the final designation became effective on April 20, 1994 (USFWS 1994).

3.1.2.2 Distribution and Population

Bonytail chub are one of four endangered fish species addressed in a Recovery Implementation Program for the Upper Colorado River Basin (USFWS 1987) that was initiated in January 1988 and is described above in Section 3.1.1.2.

Until the 1950s, bonytail chub was historically common or abundant in warm water reaches of large rivers from Mexico to Wyoming. It was found in the mainstem Colorado River near the Colorado-Utah

border in the Black Rocks area (USFWS 2008). The last known riverine area where bonytail chub were common was the Green River in Dinosaur National Monument, where Vanicek (1967) and Holden and Stalnaker (1970) collected 91 specimens from 1962 to 1966. From 1977 to 1983, no bonytail chub were collected from the Colorado or Gunnison rivers in Colorado or Utah. However, in 1984, a single bonytail chub was collected from Black Rocks on the Colorado River. Several suspected bonytail chub were captured in Cataract Canyon in 1985 to 1987. Current stocking plans for bonytail chub identify the middle Green River and the Yampa River in Dinosaur National Monument as the highest priority for stocking in Colorado (USFWS 2008).

Bonytail chub are so rare that it is not possible to conduct population estimates. The stocking program is being implemented to reestablish populations in the upper Colorado River Basin. From 1996 through 2004, 44,472 sub-adult bonytail chub were stocked in the Green and Upper Colorado River sub-basins. The recovery goals call for reestablished populations in the Green River and Upper Colorado River sub-basins, each with greater than 4,400 adults that are self-sustaining with recruitment (USFWS 2002c).

As of 2002, bonytail chub are found only in isolated populations in the Yampa River, Green River, Colorado River at the Colorado/Utah border, and at the confluence of the Green and Colorado rivers. In the lower basin, bonytail chub are found only in Lake Mohave in Arizona (AGFD 2002b). Stocking in the Middle Green River and Yampa River in Dinosaur National Monument in recent years may have led to increased observations of the species throughout the upper Colorado River Basin since 2009 (USFWS 2014d).

3.1.2.3 Habitat Requirements

All waters within the Action Area are associated with the Upper Colorado River Basin. The White River is an important flow contributor to downstream fisheries in the Green River in Utah, which provides vital nursery habitat and most of the Upper Colorado River Basin's remaining spawning and juvenile concentration areas. Kenney Reservoir, located along the White River near Rangely, Colorado, operates on a run-of-the-river basis, which generally maintains natural flow regimes to support habitat for bonytail chub. Critical habitat for the bonytail chub in the Action Area is present along the Yampa River and its 100-year flood plain within Dinosaur National Monument (**Figure 3**).

Little is known about the specific habitat requirements of bonytail chub because the species was extirpated from most of its historic range prior to extensive fishery surveys. The bonytail chub is adapted to mainstem rivers where it has been observed in pools and eddies. Similar to other closely related *Gila* spp., bonytail chub in rivers probably spawn in spring over rocky substrates Spawning in reservoirs has been observed over rocky shoals and shorelines. It is hypothesized, based on available distribution data that flooded bottomland habitats are important growth and conditioning areas for bonytail chub, particularly as nursery habitats for young. Flow recommendations have been developed that specifically consider flow-habitat relationships within historic habitat of bonytail chub in the upper basin, and were designed to enhance habitat complexity and to restore and maintain ecological processes (USFWS 2002c).

Primary constituent elements for all four endangered fish species are described above in Section 3.1.1.3.

3.1.2.4 Life History

The bonytail chub's large fins and streamlined body are an adaptation to torrential flows. Of five specimens captured in the upper basin, four were captured in deep, swift, rocky canyon regions (Yampa Canyon, Black Rocks, Cataract Canyon, and Coal Creek Rapid), but the fifth was taken in a reservoir (Lake Powell). All fish taken from the lower basin since 1974 were caught in reservoirs. Individuals found in reservoirs are believed to inhabit their former habitats now inundated by impoundments. Vanicek (1967), who handled numerous bonytail chub, detected no difference in habitat selection from roundtail chub. These fish were generally found in pools and eddies in the absence of, although occasionally adjacent to, strong current and at varying depths generally over silt and silt-boulder substrates. No

quantitative habitat data are available for this species. Adult bonytail chub captured in Cataract Canyon and Desolation/Gray Canyons were sympatric with humpback chub in shoreline eddies among emergent boulders and cobble, and adjacent to swift current (USFWS 2002c).

Little is known of the food habits of the bonytail chub. In rivers, adults eat primarily terrestrial insects, plant debris, and algae; whereas, young bonytail chub eat aquatic insects. In lakes they apparently feed on algae and plankton (AGFD 2002b).

3.1.2.5 Threats

The primary threats to bonytail chub are:

- Stream flow reduction, regulation, and habitat modification (including impoundment and reservoir operations)
- Competition with and predation by nonnative fishes
- Pesticides and pollutants (BLM 2008; USFWS 2002a)

3.1.3 Humpback Chub (Endangered)

The humpback chub (*Gila cypha*) is a member of the cyprinid family (minnow), and is distinguishable from other chubs by a pronounced hump that arises above the gills and extends to the origin of the dorsal fin. It has a flattened, concave head; small eyes; a sub-terminal, beak-like mouth; a long snout that protrudes over the lower jaw; and large fins. It is gray or olive colored on its back, with silver sides and a white belly. During the spawning season, adults will develop rosy-red fins and gill covers (USFWS 2015d).

3.1.3.1 Status

The humpback chub was originally listed in 1967 in the antecedent to the existing ESA (USFWS 2015d) and continued as endangered under provision of the Endangered Species Conservation Act of 1969. Its listing continued as endangered when the 1973 version of the ESA was published. Its status is the same today. The humpback chub was then included in the U.S. List of Endangered Native Fish and Wildlife issued on June 4, 1973, and it received protection as endangered in the ESA of 1973 (USFWS 2015d). The latest revised humpback chub recovery plan was approved on September 19, 1990 (USFWS 2002d). The final rule for determination of critical habitat was published on March 21, 1994, and the final designation became effective on April 20, 1994 (USFWS 1994).

3.1.3.2 Distribution and Population

Humpback chub are one of four endangered fish species addressed in a Recovery Implementation Program for the Upper Colorado River Basin that was initiated in January 1988 and is described above in Section 3.1.1.2 (USFWS 1987).

The historical distribution of the humpback chub is not well known, because the humpback chub was not described as a species until 1946; however, the original distribution of this species was presumably limited to swift, deep-water areas in the mainstem Colorado River Basin, downstream to below the Hoover Dam site. In the Upper Basin in Colorado, the humpback chub has been found in the Yampa, Gunnison, Green, and Colorado rivers. However, the greatest numbers of humpback chub in Colorado are found at the Black Rocks area of the Colorado River downstream of Grand Junction and in Utah along the Westwater Section of the Colorado River (BLM 2012b).

Presently the species is restricted to six population centers in: 1) the Colorado and Little Colorado rivers in Grand Canyon, Arizona; 2) the Colorado River in Black Rocks, Colorado, and 3) Westwater Canyon, Utah. Hybridization with roundtail chub (*Gila robusta*) and bonytail chub, where they occur with humpback chub, is recognized as a threat to humpback chub (AGFD 2002c). A larger proportion of

roundtail chub has been found in Black Rocks and Westwater Canyon during low flow years (Chart and Lentsch 2000; Kaeding et al. 1990), which increase the chances for hybridization.

All waters within Action Area are associated with the Upper Colorado River Basin. The White River is an important flow contributor to downstream fisheries in the Green River in Utah, which provides vital nursery habitat and most of the Upper Colorado River Basin's remaining spawning and juvenile concentration areas. Kenney Reservoir operates on a run-of-the-river basis, which generally maintains natural flow regimes to support habitat for this species along the White River near Rangely, Colorado. Critical habitat for the humpback chub is present in the Action Area along the Yampa River and its 100-year flood plain within Dinosaur National Monument (**Figure 3**).

Population estimates from 1998 to 2000 indicated 400 wild humpback chub in the Yampa River. Later sampling and genetic testing of 400 *Gila* spp. taken in the Yampa River during 2007 for captive breeding study eventually proved to be humpback/roundtail chub (*Gila robusta*) hybrids (USFWS 2014d). Genetic sampling on wild-caught chubs in the Yampa continues, but it remains unknown whether any pure humpback chubs remain there.

3.1.3.3 Habitat Requirements

Humpback chub habitat preferences are not well understood. The humpback chub have been associated with a variety of habitats ranging from pools with turbulent to little or no current; substrates of silt, sand, boulder, or bedrock; and depths ranging from one meter to as deep as 15 meters (USFWS 2015d).

Populations of humpback chub are restricted to deep, swift, canyon-bound regions of the mainstem and large tributaries of the Colorado River Basin. Adults require eddies and sheltered shoreline habitats maintained by high spring flows. These high spring flows maintain channel and habitat diversity, flush sediments from spawning areas, rejuvenate food production, and form gravel and cobble deposits used for spawning. Spawning occurs on the descending limb of the spring hydrograph at water temperatures typically between 16 and 22°C. Young require low-velocity shoreline habitats, including eddies and backwaters that are more prevalent under base-flow conditions (USFWS 2002d).

Primary Constituent Elements for all four endangered fish species are described above in Section 3.1.1.3.

3.1.3.4 Life History

The humpback chub is omnivorous, feeding on aquatic arthropods, smaller fish and algae. Adults require eddies and sheltered shoreline habitats maintained by high spring flows. Young require low-velocity shoreline habitats, including eddies and backwaters. Humpback chub live and complete their entire life cycle in canyon-bound reaches of the Colorado River mainstem and larger tributaries. These reaches are characterized by deep water, swift currents, and rocky substrates. Sub-adults use shallow, sheltered shoreline habitats, whereas adults use primarily offshore habitats of greater depths (USFWS 2002d).

Some areas of the Colorado River are turbulent. Consequently, it is believed that the hump causes the humpback chub to be pushed to the bottom where water velocities are lower and where the chub can hold its position without exerting excess energy. Grooves associated with the hump may aid in directing water to the humpback chub's gills. The long snout and beak-like mouth may allow the fish to feed without the mouth becoming filled with rushing water (USFWS 2015d).

3.1.3.5 Threats

The primary threats to humpback chub are:

- Stream flow reduction, regulation, and habitat modification (including impoundment and reservoir operations)
- Competition with and predation by nonnative fishes
- Pesticides and pollutants (BLM 2008; USFWS 2002d)

3.1.4 Razorback Sucker (Endangered)

Razorback sucker (*Xyrauchen texanus*), also known as the humpback sucker, is a member of the *Catostomidae* family. The species can grow more than three feet in length, weigh more than 10 pounds, and live 40 or more years in the Lower Colorado River Basin (USFWS 2015e). Fish in the upper Colorado River basin tend to be smaller than those in the Lower Colorado River Basin (USFWS 2002b).

3.1.4.1 Status

Razorback sucker was first listed as endangered under the ESA in 1991 (USFWS 2015e). The most recent recovery plan was approved on August 1, 2002 (USFWS 2002b). The final rule for determination of critical habitat was published on March 21, 1994, and the final designation became effective on April 20, 1994 (USFWS 1994).

3.1.4.2 Distribution and Population

Razorback suckers are one of four endangered fish species addressed in a Recovery Implementation Program for the Upper Colorado River Basin that was initiated in January 1988 and is described above in Section 4.1.4.2 (USFWS 1987).

Historically, the razorback sucker occurred throughout much of the Colorado River Basin (3,500 miles), primarily in the mainstem and major tributaries in Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming; and in the States of Baja California Norte and Sonora of Mexico. In the lower Colorado River Basin, razorback suckers occurred from the Colorado River delta upstream to Lee's Ferry, Arizona. In the Upper Colorado River basin, razorback suckers occurred in the Colorado River, Green River, and San Juan River basins.

Presently, in the upper basin the razorback sucker is restricted to about 750 miles of the lower Yampa and Green rivers, the mainstem of the Colorado River, and the lower San Juan River. In the lower basin, the species occurs only in Lake Mohave, upstream in Lake Mead and the Grand Canyon, and downstream sporadically on the mainstem and associated impoundments and canals. When the species was listed as endangered, it had been 30 years since evidence of natural recruitment had been found. Presently, the largest surviving population exists in Lake Mohave.

The species has been reintroduced at several locations in the upper and lower Colorado River Basin. Despite several attempts to reintroduce razorback suckers into the Colorado River Basin, totaling over 12 million young and juveniles, most have been lost to predation by nonnative introduced fishes (USFWS 2015e).

There are no current population estimates for razorback suckers in the Action Area. The most recent study by Bestgen et al. (2002) used data from 1998 and 1999 to arrive at an estimate of about 100 wild razorback suckers in the Middle Green River.

3.1.4.3 Habitat Requirements

All waters within the Action Area are associated with the Upper Colorado River Basin. The White River is an important flow contributor to downstream fisheries in the Green River in Utah, which provides vital nursery habitat and most of the Upper Colorado River Basin's remaining spawning and juvenile concentration areas. Kenney Reservoir operates on a run-of-the-river basis, which generally maintains natural flow regimes. Critical habitat for the species is present in the Yampa River and its 100-year flood plain from about the east service road within Dinosaur National Monument and continues downstream beyond the confluence with the Green River (BLM 2012a) (**Figure 3**). Designated critical habitat also occurs along the White River upstream for approximately 15 miles from its confluence with the Green River (**Figure 3**).

Habitats required by adults in rivers include deep runs, eddies, backwaters, and flooded off-channel environments in spring; runs and pools often in shallow water associated with submerged sandbars in summer; and low-velocity runs, pools, and eddies in winter. Spring migrations of adult razorback sucker were associated with spawning in historic accounts, and a variety of local and long-distance movements and habitat-use patterns have been documented. Spawning in rivers occurs over bars of cobble, gravel, and sand substrates during spring runoff at widely ranging flows and water temperatures (typically greater than 14°C). Spawning also occurs in reservoirs over rocky shoals and shorelines. Young require nursery environments with quiet, warm, shallow water such as tributary mouths, backwaters, or inundated flood plain habitats in rivers, and coves or shorelines in reservoirs. Flow recommendations have been developed that specifically consider flow-habitat relationships in habitats occupied by razorback sucker in the upper basin, and were designed to enhance habitat complexity and to restore and maintain ecological processes (USFWS 2015b).

Primary Constituent Elements for all four endangered fish species are described above in Section 3.1.1.3.

3.1.4.4 Life History

Adult razorback suckers occupy different habitats seasonally. Spawning in rivers occurs over bars of cobble, gravel and sand substrates during spring runoff at widely ranging flows and water temperatures, typically greater than 57°F (USFWS 2002b). Examination of stomach contents of adult razorback suckers from Lake Mohave indicates that the species is a benthic feeder, whose diet includes planktonic crustaceans, diatoms, filamentous algae, and detritus (USFWS 2015e).

3.1.4.5 Threats

The primary threats to the razorback sucker include:

- Water developments such as dams and water diversions and water depletions
- Habitat alterations, and reductions or loss of important micro-habitats
- Introduction of non-native fish that compete for resources and can hybridize with this species
- Pollutants and pesticides (USFWS 2002b)

3.1.5 Greenback Cutthroat Trout (Threatened)

Greenback cutthroat trout are cold-water fish belonging to the trout, salmon and whitefish family. They have dark, round spots on the sides and tail and two colorful blood-red stripes on each side of the throat under the jaw, hence the name "cutthroat." During the spring spawning season the entire belly may become crimson red (USFWS 2015i).

3.1.5.1 Status

The greenback cutthroat trout was listed in 1967 as endangered in the antecedent to the ESA (32 FR 4001). Its listing continued as endangered when the 1973 version of the ESA was published. Its status was reclassified to threatened in 1978 (43 FR 16343 16345).There is no designated critical habitat rule for the greenback cutthroat trout.

3.1.5.2 Distribution and Population

The original distribution of the subspecies is not precisely known due to its rapid decline in the 1800s (USFWS 2015i). It is assumed that the original distribution included all mountain and foothill habitats of the South Platte River and Arkansas River drainage systems, including drainages at lower elevations than it occupies today. The subspecies may have extended as far east as present day Greeley, Colorado, during the mid-1800s (USFWS 2015i). Currently, 145 populations, in 227.7 kilometers (km) of streams and 166.74 hectares (ha) of lakes have been documented within greenback historic range on the eastern side of the Continental Divide (USFWS 2015i). However, it seems that the only true greenback population based on genetic information occurs in Bear Creek on Pike's Peak west of Colorado Springs, Colorado.

<u>Genetics</u>

Until about 2007, the ranges of cutthroat trout subspecies in Colorado were described as following major geographic boundaries. Greenback cutthroat trout (*Oncorhynchus clarkii stomias*) were thought to occupy the eastern side of the Continental Divide, and Colorado River cutthroat trout (*O. c. pleuriticus*) were thought to live on the western side. Rio Grande cutthroat trout (*O. c. virginalis*) were described as living only within the Rio Grande drainage. The Rio Grande subspecies and its range remain clear and undisputed. However, the greenback and Colorado River subspecies and their ranges came into question when Metcalf et al. (2007) published a genetic study that was the first to reveal a more complex distribution and history. Metcalf et al. (2012) conducted further phylogeographic research that analyzed mitochondrial DNA of living Colorado cutthroat trout populations and cutthroat trout collected as museum specimens in the late 1890s to early 1900s. The main purpose was to clarify the native ranges of cutthroat trout subspecies before widespread fish stocking in the state.

The results of this study have profound consequences under the ESA. The results show that only one greenback cutthroat trout population remains in existence; this population is present in Bear Creek on Pikes Peak in the Arkansas River drainage (Metcalf et al. 2012). The other "greenback" streams that are present on the eastern side of the Continental Divide are cutthroat trout that had been stocked from the Western Slope of the Continental Divide at earlier times (Metcalf et al. 2012). Another significant conclusion of the genetic study is the identification of two separate distinct lineages of the Colorado River cutthroat trout, which had previously been considered to consist of one lineage across the entire Western Slope of Colorado (Metcalf et al. 2012).

The two Western Slope cutthroat trout lineages have been distinguished with the names of blue lineage and green lineage (Metcalf et al. 2012). The Colorado River cutthroat trout's (blue lineage) historic range was on the Western Slope and included the Yampa and White Rivers (USFWS 2014a). The blue lineage fish on the Eastern Slope are hypothesized as being stocked from the Western Slope (Trappers Lake) (USFWS 2014a). It's unknown how far south the blue lineage fish occurred historically on the Western Slope (i.e., Colorado River). The general consensus is that the blue lineage does not merit special protection under the ESA at this time (USFWS 2014a). It is also generally agreed that the Gunnison, Dolores and the Colorado rivers on the Western Slope included the historic range of the green lineage (USFWS 2014a). However, other questions remain for both lineages, and the listing status of *O. c. stomias* cannot be resolved until pending taxonomic issues are resolved and a taxonomic revision is undertaken (USFWS 2014a).

Currently, the best available science indicates that the subspecies associated with the Action Area for Trapper Mine is the Colorado River cutthroat trout (*O. c. pleuriticus*) blue lineage (USFWS 2014a). The

green lineage that may be related to the greenback cutthroat trout occurs farther south outside the Action Area. The subspecies representing the blue lineage does not carry federal protection under the ESA.

3.1.5.3 Habitat Requirements

This species inhabits cold water streams and cold water lakes with adequate stream spawning habitat present during spring. Field studies however, have indicated that water temperatures averaging 7.8°C or below in July may have an adverse effect on greenback fry (young fish) survival and recruitment. In general, trout require different habitat types for different life stages: juvenile (protective cover and low velocity flow, as in side channels and small tributaries); spawning (riffles with clean gravels); over-winter (deep water with low velocity flow and protective cover); and adult (juxtaposition of slow water areas for resting and fast water areas for feeding, with protective cover from boulders, logs, overhanging vegetation or undercut banks). Both water quality and quantity are important. Greenbacks, like other cutthroat trout, generally require clear, cold, well-oxygenated water.

3.1.5.4 Life History

Greenbacks are opportunistic feeders over a wide range of prey organisms, but a large percentage of the diet can be terrestrial insects. Greenbacks also feed on crustaceans such as fresh-water shrimp, aquatic insects, and small fish.

Spawning occurs usually from late May to mid-July in higher elevations. Male cutthroat spawn first at age two, and females mature a year later. Females build an egg pit in gravel generally three to eight inches deep and one foot in diameter. A 10-inch female will lay about 800 eggs. Larger fish of about four to seven pounds will lay up to 6,000 eggs.

Size and growth of greenbacks varies and is dependent on elevation and population size. Mature fish typically reach a maximum of 1 to 2 pounds (0.45 to 0.91 kg).

3.1.5.5 Threats

The main reasons cited for the subspecies' decline are hybridization, competition with nonnative salmonids, and overharvest. New threats have arisen, or have become more prevalent, and these include: increased human population growth within the range of the subspecies along with potential for new water depletions; new introductions of nonnative species; fragmentation and genetic isolation of small populations; the effects of fire and firefighting with chemical retardants; and the effects of global climate change. Additional threats are those whose impacts are limited to specific populations and do not occur at a range-wide level, and these include: the ongoing negative effects of past mining operations on water quality; the impacts of grazing, logging, and road and trail construction and use on riparian habitat and streambanks, causing increased erosion, sediment deposition, and in turn elevated water temperatures and higher turbidity; and the co-occurrence of nonnative salmonids with greenback populations.

3.1.6 Yellow-billed Cuckoo (Threatened)

The yellow-billed cuckoo (*Coccyzus americanus*) is a member of the avian family Cuculidae. Like all members of this family, the cuckoo shares the common feature of a zygodactyl foot, in which two toes point forward and two toes point backwards. The yellow-billed cuckoo is a medium-sized bird of about 12 inches (30 centimeters) in length, and weighing about 2 ounces (60 grams). The species has a slender, long-tailed profile, with a fairly stout and slightly down-curved bill, which is blue-black with yellow on the basal half of the lower mandible. Plumage is grayish-brown above and white below, with rufous primary flight feathers. The tail feathers are boldly patterned with black and white below. The legs are short and bluish-gray, and adults have a narrow, yellow eye ring. Juveniles resemble adults, except the tail patterning is less distinct, and the lower bill may have little or no yellow. Males and females differ slightly. Males tend to have a slightly larger bill, and the white in the tail tends to form oval spots, whereas in females the white spots tend to be connected and less distinct (USFWS 2014b).

3.1.6.1 Status

The cuckoo was listed as threatened on October 3, 2014 (79 FR 59992). Critical habitat was proposed on August 15, 2014 (79 FR 48548). There is no recovery plan for the cuckoo.

3.1.6.2 Distribution and Population

The USFWS considers the yellow-billed cuckoos that occur in the western U.S. a distinct population segment (DPS). The area for the western DPS of the yellow-billed cuckoo is west of the crest of the Rocky Mountains. For the northern tier of Rocky Mountain states (Montana, Wyoming, and northern and central Colorado), the crest coincides with the Continental Divide. In the southern tier of Colorado and New Mexico, the crest coincides with the eastern boundary of the upper Rio Grande drainage, including the Sangre de Cristo Mountains and excluding the drainage of the Pecos River. Based on historic accounts, the species was generally local but uncommon in scattered drainages of the arid and semiarid portions of western Colorado, western Wyoming, Idaho, Nevada, and Utah.

The yellow-billed cuckoo declined substantially in western Colorado during the 20th century. Cuckoos occurred along the Colorado River in Palisade, near Grand Junction (Mesa County) annually from the 1950s through the 1960s. Cuckoos also were regularly detected as recently as the mid-1980s along the Uncompahgre and Gunnison rivers near Delta (Delta County) (USFWS 2014b). The Colorado Breeding Bird Atlas II (2007-2011) shows two confirmed occurrences on the Western Slope (Wickersham, 2015). One is along the North Fork of the Gunnison near Paonia and Hotchkiss in Delta County (Wickersham, 2015). The second is along the Gunnison River in Gunnison County. The previous Colorado Breeding Bird Atlas (1987-1994) had a confirmed record along the Yampa River, west of Steamboat Springs in Routt County (Kingery 1998). The species typically breeds at elevations below 6,000 feet but occasionally ranges up to elevations as high as 8,500 feet (Andrews and Righter 1992).

Other recent records also indicate that the species is rare and breeding is not well documented on the Western Slope. Reports of single yellow-billed cuckoos have come primarily from the Grand Junction area and Mesa County in 2001, 2002, 2005, and 2008, with a report of more than one cuckoo at Orchard Mesa Wildlife Area in 2006 (Arnold 2010; Beason 2010a; Wright 2010). More recently, cuckoos have been observed or heard by USFWS staff and include one along the Gunnison River in Grand Junction in 2013, one along the Colorado River in 2014, and one along the North Fork of the Gunnison River in 2015. It is unknown if these birds were nesting (C. Clayton USFWS pers. comm. August 4, 2015). Additional reports include a cuckoo south of Montrose in Montrose County near the Uncompahgre River in 2009, a cuckoo along the Gunnison River near Gunnison in 2007 (Hicks 2010), and detections by the Rocky Mountain Bird Observatory along the Yampa River near Craig in 2007 and 2008, and in far western Colorado near Nucla in 2005 and 2008 (Beason 2010a; Beason 2010b; Dexter 2010). The detections near Craig and Nucla in 2008 resulted from surveys completed by the Rocky Mountain Bird Observatory in five western Colorado counties. However, surveys repeated in two of the counties in 2009 failed to detect birds. Surveys by the Rocky Mountain Bird Observatory in 2010 were conducted near historical detections and at sites with suitable habitat in Archuleta, Conejos, Montezuma, and Rio Grande counties in southcentral and southwest Colorado; no cuckoos were detected (Beason 2010b). Survey results to date are insufficient to determine population size or trend.

The cuckoo is described as an occasional, localized breeder along the Yampa River near Craig (USFWS 2014c), which is within the Action Area. To date, the last known sighting of the cuckoo along the Yampa River occurred in 2008 and was within the proposed critical habitat. No information is available to indicate if the birds observed were nesting in the area or in the process of migration (C. Clayton, USFWS, pers. Comm. July 28, 2015). Proposed critical habitat for the species occurs along the Yampa River from approximately 5 miles west of Craig to about 8 miles east of Hayden, which also lies within the Action Area (**Figure 4**).

3.1.6.3 Habitat Requirements

The Yellow-billed cuckoo nests in large, contiguous, blocks of riparian habitat (>20 hectares), particularly woodlands with cottonwoods (*Populus fremontii*) and willows (*Salix* sp.). Dense multi-layered canopy of understory foliage appears to be an important factor in nest site selection, while cottonwood trees are an important component of foraging habitat in California. The multilayered canopy provides shade and traps moisture to create the relatively cooler and more humid streamside conditions which are believed to be important for nesting success. Yellow-billed cuckoos along the Lower Colorado River occupied riparian areas that had higher canopies, denser cover in the upper layers of the canopy, and sparser shrub layers when compared to unoccupied sites. At the landscape level, the amount of cottonwood-willow-dominated vegetation cover in the landscape and the width of riparian habitat appear to influence yellow-billed cuckoo distribution and abundance (USFWS 2014b).

Cuckoos appear to avoid nesting in isolated patches about one to two acres in size or in narrow, linear riparian habitats that are less than 33-66 ft. wide (Halterman et al. 2015). Single birds have been detected in such isolated patches or linear habitats during migration or the early breeding season (mid-late June). They also may undertake short flights into surrounding low vegetation after locating prey items from a perch wooded riparian habitats (Halterman et al. 2015).

Migration and wintering habitat needs are not well known, although they appear to include a relatively wide variety of conditions (USFWS 2014b). Migrating yellow-billed cuckoos have been found in coastal scrub, second-growth forests and woodlands, hedgerows, forest edges, and in smaller riparian patches than those used for breeding. Wintering yellow-billed cuckoos generally use woody lowland vegetation near fresh water (USFWS 2014b).

At this writing, PCEs for proposed critical habitat have been published but are not in effect. These will be available when the rule on critical habitat goes into effect. As proposed, there are three PCEs described as:

- **Riparian Woodlands:** Riparian woodlands with mixed willow-cottonwood vegetation, mesquite thorn-forest vegetation, or a combination of these that contain habitat for nesting and foraging in contiguous or nearly contiguous patches that are greater than 325 feet (100 meters) in width and 200 acres or more in extent.
- **Adequate Prey Base:** Presence of a prey base consisting of large insect fauna (e.g., cicadas, caterpillars, katydids, grasshoppers, large beetles, dragonflies) and tree frogs for adults and young in breeding areas during the nesting season and in post-breeding dispersal areas.
- **Dynamic Riverine Processes:** River systems that are dynamic and provide hydrologic processes that encourage sediment movement and deposits that allow seedling germination and promote plant growth, maintenance, health, and vigor.

3.1.6.4 Life History

The Western yellow-billed cuckoo's clutch size is usually two or three eggs, and development of the young is very rapid, with a breeding cycle of 17 days from egg-laying to fledging of young. Although yellow-billed cuckoos usually raise their own young, they are facultative (discretionary) brood parasites, occasionally laying eggs in the nests of other yellow-billed cuckoos or other bird species (USFWS 2014b). Western yellow-billed cuckoos winter in South America and are present in their breeding range in the western U.S. from about mid-April or early May through September or early October. Cuckoos typically arrive on the Western Slope of Colorado in late May and leave by late August (Andrews and Righter 1992), with outlying records in mid-September and mid-October. They feed on larger insects than any other insectivorous birds, with the possible exception of some raptors (Point Reyes Bird Observatory [PRBO] 2012). Yellow-billed cuckoos eat primarily large insects such as caterpillars, cicadas, and grasshoppers. Yellow-billed cuckoos also will consume frogs and small lizards and have

been known to take eggs and young of other birds. Yellow-billed cuckoos will eat small fruits and seeds on wintering grounds and occasionally during the breeding season (Bennett and Keinath 2003).

3.1.6.5 Threats

The primary threats to western yellow-billed cuckoo are loss and degradation of low-elevation riparian woodland habitats from (USFWS 2014c):

- Agriculture and other uses
- Dams and river flow management
- Alteration of flow schemes in rivers
- Urban expansion
- Invasive non-native plants, particularly tamarisk
- Livestock grazing
- Off-road vehicle and other recreational uses
- Pesticide applications impacting habitat

The loss of forested habitat on its wintering grounds in South America also is a substantial threat (Wiggins 2005).

3.1.7 Dudley Bluffs Twinpod (Threatened)

The Dudley Bluffs twinpod (*Physaria obcordata*) is an herbaceous perennial of the *Brassicaceae* (mustard family) that is endemic to northwestern Colorado. The species' scientific name (*obcordata)* refers to the heart-shaped fruit. Plants have flowering stems that are five to seven inches tall that arise from a basal rosette of silvery leaves. Flowers are yellow, and typically present in May and June (CNHP 2013).

The genus for Dudley Bluffs twinpod changed from *Lesquerella* to *Physaria in a recent taxonomic revision.* This revision has not yet been incorporated into the official listing of the species (USFWS 2015f, USFWS 2015g).

3.1.7.1 Status

The Dudley Bluffs twinpod was first listed on February 6, 1990, and is currently designated as threatened under the ESA. In June 2008, the USFWS completed a five-year review of the status of the Dudley Bluffs twinpod. This status review concluded no change in its listed status under the ESA was necessary (USFWS 2015f). No critical habitat rules have been published for the Dudley Bluffs twinpod.

3.1.7.2 Distribution and Population

Dudley Bluffs twinpod is found exclusively in the Piceance Basin of Rio Blanco County, Colorado and lies in the heart of several recent and ongoing natural gas field expansions. Some occurrences are separated by as much as 26 miles (CNHP 2013). Because its habitat occurs only in a very restricted range on specific substrates, this greatly limits the ability of the species to expand its range or withstand stochastic events. The species has not shown an ability to occupy or re-occupy habitats in disturbed or reclaimed suitable and occupied habitats, with the exception of one population on the edge of the Piceance Basin on Calamity Ridge, where substrate characteristics display important differences from the populations found in the central portion of the Piceance Basin (BLM 2012a). The Dudley Bluffs twinpod is sympatric with the Dudley Bluffs bladderpod in the Piceance Creek/Ryan Gulch area, and also occurs in the Yellow Creek drainage. Additional occurrences are known farther

to the northwest in the East Fork of Spring Creek, Fletcher Gulch, and Yanks Gulch drainages. Recent discoveries have also been made in a few locations on bluffs south of the White River. It has also been reported that the Dudley Bluffs twinpod occurs primarily on the Thirteen-mile Creek Tongue and on the Parachute Creek Member of the Green River Formation (CNHP 2013).

The known populations of the Dudley Bluffs twinpod include approximately 10 occurrences comprised of at least 40 distinct mapped areas. The plants occur on an estimated 320 acres on BLM, state, and private lands in the northern Piceance Basin in Rio Blanco County, within a 20-mile by 30-mile area. Approximately 88 percent of the total occupied Dudley Bluffs twinpod habitat occurs on public lands managed by the BLM. The estimated total number of Dudley Bluffs twinpod plants is around 35,000 (CNHP 2011). At the Ryan Gulch Area of Critical Environmental Concern (ACEC), the Dudley Bluffs twinpod population increased in size and numbers between 1993 and 2000. This increase may be linked to a livestock exclosure designed to prevent the browsing of flower heads and trampling of plants.

3.1.7.3 Habitat Requirements

The Dudley Bluffs twinpod grows on barren white shale outcrops of the Green River Formation exposed along down-cut drainages. Most of the suitable substrates are on the Thirteen-mile Creek Tongue and the Parachute Creek Member of the Green River Formation. The Dudley Bluffs twinpod occurs almost solely on steep side slopes of these formations. However, it is also found occasionally in small wash settings below side slopes where soil and substrates have eroded and deposited on more level sites. Shifting substrates and soil loss from highly erosive soils, especially on steep slopes, are probably major sources of natural mortality. The elevation range for the Dudley Bluffs twinpod is 5,960 to 7,440 feet (BLM 2012a).

3.1.7.4 Life History

Dudley Bluffs twinpod is a perennial plant that has star-shaped hairs and bright yellow flowers that bloom early in the spring (April to May) and fruits that set from late May into June. The Dudley Bluffs twinpod is generally more robust than the bladderpod (CNHP 2011).

During the spring of 1991 and 1992, field research by Tepedino (2009) was conducted in the Lower Ryan Gulch population, indicating that the Dudley Bluffs twinpod is an obligate out-crosser (plants that require pollen from other plants in order to successfully reproduce) that requires pollinators. This study focused on the Dudley Bluffs twinpod, but some pollinators were collected for the Dudley Bluffs bladderpod as well. Primary pollinators for Dudley Bluffs twinpod are ground-nesting native bees in the families *Andrenidae* and *Halictidae*. Most species that frequented Dudley Bluffs twinpod flowers are generalists, which also visit a variety of other flower types. Only two bee species were likely mustard family specialists (*Andrena hicksi* and *Andrena walleyi*). The only non-bee pollinator of any importance was a species of the dipteran, *Gonia* (Tachinidae). Although no bee is likely to travel more than six-tenths of a mile from the nesting site, the field research indicated there was no evidence that sexual reproduction of plants at the Ryan Gulch population was being limited by inadequate pollination in 1992 (Tepedino 2009).

3.1.7.5 Threats

Primary threats to the Dudley Bluffs twinpod include:

- Energy development (oil and gas, wind)
- Oil shale and nacholite mining
- Road construction and maintenance
- Weed infestations
- Off-road vehicle use

- Overgrazing
- Trampling by wild horses (CNHP 2011)

3.1.8 Ute Ladies'-tresses (Threatened)

Ute ladies'-tresses (*Spiranthes diluvialis*) is a perennial herb with erect, glandular-pubescent stems 12 to 60 centimeters tall arising from tuberous-thickened roots. Basal leaves are narrowly linear, up to one centimeter wide and 28 centimeters long, and persist at the time of flowering. Leaves become progressively smaller up the stem and are alternate. The inflorescence is a sparsely pubescent three to 15 centimeters long spike of numerous small white or ivory-colored flowers arranged in a gradual spiral. Individual flowers are 7.5 to 15 millimeters long and faintly fragrant (with a vanilla-like scent). The lip petal is oval to lance-shaped, narrowed at the middle, and has crispy-wavy margins. Sepals are separate or fused only at the base (not fused into a hood-like structure) and are often spreading at their tips. Fruits are cylindrical capsules with numerous seeds (USFWS 2015h).

3.1.8.1 Status

The Ute ladies'-tresses orchid was listed as threatened under the ESA on January 17, 1992. A draft recovery plan was published in 1995; at this time, no final plan has been published. In 1992, the species was known from fewer than 6,000 individuals in 10 extant and seven historical (and presumed extirpated) populations in Colorado, Nevada, and Utah. Its listing was due to it being extremely vulnerable to extinction from habitat loss/modification, small population size, and low reproductive rate.

3.1.8.2 Distribution and Population

When it was first listed under the ESA in 1992, Ute ladies'-tresses was known only from north-central Colorado, northern and south-central Utah, and southeastern Nevada. Since 1993, Ute ladies'-tresses has been discovered across a greater geographic area that includes southeastern Wyoming, southwestern Montana, western Nebraska, eastern Idaho, and north-central Washington, and new populations have been documented in northwestern Colorado and northern Utah (Fertig et al. 2005). Since 1992, the known number of extant populations of *S. diluvialis* has increased to over 50. Survey work and monitoring studies suggest that the global population may be over 83,000 individuals (Fertig et al. 2005).

This species has not been found in the Action Area. However, it is known to exist within Dinosaur National Monument, in Utah and Colorado (**Figure 5**). In addition to several large Green River populations, smaller populations also have been found in small creeks and hay meadows where intermittent disturbance such as haying and irrigation were occurring that prevented late-seral plant community formation. A new population was found in 2007 in the Roaring Fork Valley, about 35 miles southeast of the Action Area (**Figure 5**).

3.1.8.3 Habitat Requirements

No critical habitat rules have been published for the Ute ladies'-tresses. When Ute ladies'-tresses was listed in 1992, it was known primarily from moist meadows associated with perennial stream terraces, flood plains, and oxbows at elevations between 4,300 to 6,850 feet. Surveys since 1992 have expanded the number of vegetation and hydrology types occupied by Ute ladies'-tresses to include seasonally flooded river terraces, sub-irrigated or spring-fed abandoned stream channels and valleys, and lakeshores. In addition, populations have been discovered along irrigation canals, berms, levees, irrigated meadows, excavated gravel pits, roadside barrow pits, reservoirs, and other human-modified wetlands. Over one-third of all known Ute ladies'-tresses populations are found on alluvial banks, point bars, flood plains, or ox-bows associated with perennial streams (USFWS 2015h).

The orchid occurs primarily in areas where the vegetation is relatively open and not overly dense or overgrown, although a few populations in eastern Utah and Colorado are found in riparian woodlands.

3.1.8.4 Life History

The Ute ladies'-tresses orchid is a long-lived perennial forb that probably reproduce exclusively by seed. The life cycle of the orchid consists of four main stages: seedling, dormant, vegetative, and reproductive (flowering or fruiting) (Fertig et al. 2005). Ute ladies'-tresses produce white-flowers and can grow up to 20 inches high from tuberous roots. It blossoms from late July to early September. The plant relies on insects for pollination. The seeds are short-lived. Flowering stem numbers fluctuate from year-to-year; some non-flowering plants seem to be able to persist underground in season-long dormancy. This orchid usually produces an overwintering rosette of basal leaves (USDA 2011). It is likely that the species requires a decade of vegetative growth prior to flowering; consequently, areas of constantly changing alluvial deposition with early seral vegetation would be devoid of the orchid (BLM 2012a).

3.1.8.5 Threats

Suitable orchid habitat is being reduced in areas and becoming increasingly fragmented due to conversion of land to urban and suburban uses and certain water and stream system management practices associated with municipal, agricultural, and recreational uses. The naturally small size and scattered distribution of populations makes the species particularly vulnerable to the effects of habitat fragmentation and overall decline of suitable habitat (USFWS 1995). Primary threats to the Ute ladies'-tresses include:

- Development of oil and gas and oil shale
- Recreational off-road vehicle use
- Livestock grazing
- Trampling by wildlife and livestock (BLM 2012a)

4.0 Effects Analysis

4.1 Colorado River Watershed Fish

As there is no habitat or designated critical habitat for the Colorado River fish in the Project Area, impacts from the Proposed Action are related to the indirect impacts related to coal combustion at the Craig Generating Station and disposal of fly ash at the Trapper Mine. The Action Area for the Colorado River fish is the topographic mercury deposition airshed and the area between the Yampa and White Rivers to their confluences with the Green River to the east (**Figure 6**).

The topographic airshed encompasses the Project Area and Craig and Hayden Generating Stations and was defined using topographic features. Defining the air quality region of impact through a topographic airshed methodology allows for an assessment that utilizes the theoretical motion of the atmosphere, the blocking features of local topography and the location of emissions sources. This method most accurately defines the region of impact and helps to limit the analysis to a region with identifiable impacts.

This topographic airshed was used in the development of the EA associated with the proposed action. Meeker is near the southwestern corner of the affected airshed. From Meeker, the airshed boundary tracks northwest along Route 64, and turns northward near the mouth of Crooked Wash. The western boundary passes through Sagebrush Draw, Elk Springs Ridge, and Cross Mountain. The boundary turns northeast near the Little Snake River near Thompson Spring. The boundary follows the Little Snake River to the northeast until about three miles north of Red Wash Butte. From there, the northern boundary extends eastward, passing near Great Divide, and then crosses Highway 13 and the Elkhead Mountains. The northeastern corner of the airshed boundary is about two miles north of Saddle Mountain near Slater Creek. From there, it heads southeast to the town of Clark and then follows the general path of Elk Creek Road to Steamboat Springs. From Steamboat Springs, the boundary continues southward past Lake Catamount, Stagecoach Reservoir, and the town of Yampa. From Yampa, the boundary follows Bear River and turns westward near Trappers Lake. The southern boundary continues from Trappers Lake and generally follows the White River back to Meeker (**Figure 6**).

4.1.1 Water Depletion

Impacts from water depletion resulting from operations at Trapper Mine and associated activities were described in the previous consultations, the most recent being in 2013. The BOs from consultations in 2009 and 2013 are included in Appendix A.

4.1.1.1 Forms of Mercury in the Environment

Mercury is emitted by both natural and anthropogenic sources. Natural sources include volcanoes, geothermal sources, and exposed naturally mercury-enriched geological formations. These sources also may include re-emission of historically deposited mercury as a result of incursion from the surface or subsurface back into the atmosphere from sources such as fires, weather events, and changes in land use. Anthropogenic sources of mercury include burning of fossil fuels, incinerators, mining activities, metal refining, and chemical production facilities.

Mercury is a naturally occurring element. It can be found in soils and the atmosphere, as well as water bodies. Atmospheric transport and deposition is an important mechanism for the global deposition of mercury (EPRI 2014), as it can be transported over large distances from its source regions and across continents. It is considered a global pollutant. Atmospheric mercury is primarily inorganic and is not biologically available. However, once this mercury is deposited terrestrially, it can be converted into a biologically available form, methylmercury (MeHg), through a process known as methylation. MeHg bio-accumulates in food chains, and particularly in aquatic food chains, meaning that organisms exposed to

MeHg in their food can build up concentrations that are many times higher than the ambient concentrations in the environment.

Inorganic atmospheric mercury occurs in three forms:

- Elemental mercury vapor (Hg(0)), also referred to as gaseous elemental mercury (GEM)
- Gaseous divalent mercury, Hg(II), also referred to as reactive gaseous mercury (RGM) or gaseous oxidized mercury
- Particulate mercury, Hg(p), also referred to as particle bound mercury (PBM); PBM can be directly emitted or can form when RGM adsorbs on atmospheric particulate matter

In the global atmosphere, GEM accounts for more than 90 percent of total mercury, on average, while both RGM and PBM typically account for less than 5 percent (EPRI 2014). The reactive form of mercury is often deposited on land or water surfaces much closer to their sources due to its chemical reactivity and high water solubility. PBM is transported and deposited at intermediate distances depending on aerosol diameter or mass. Within the atmosphere, numerous physical and chemical transformations of mercury can occur depending on many factors.

The various forms of mercury have very different physical and chemical characteristics, resulting in large differences in their removal rates from the atmosphere, and consequently, in their atmospheric lifetimes (EPRI 2014). GEM has a lifetime ranging from several months to more than a year because of its low reactivity, low water solubility, and slow deposition rate. It also is considered a global pollutant, because it is transported over long distances. On the other hand, the lifetimes of both RGM and PBM are much shorter, with lifetimes ranging from a few hours to a few days. These forms are considered local-scaled pollutants because these are removed efficiently by dry and wet deposition, particularly RGM. Thus, the scale of mercury pollution ranges from local to global dimensions.

4.1.2 Mercury from Coal Combustion

Not analyzed previously are the potential impacts to the Colorado River federally listed fish species from the combustion of Trapper Mine coal at the Craig Generating Station. The primary impact from coal combustion to the Colorado River fish is the emission and subsequent deposition of mercury. It should be noted that while the impacts of mercury on fish have been described in a few studies, the specific impacts to the Colorado River fish from mercury in the Yampa and White Rivers is highly uncertain. It is not known to what extent the level of mercury in these systems may be impacting these species at a population level.

Additionally, given the longer life of the Colorado pikeminnow and its position higher in the food chain as a top predator, mercury would likely affect this species to a greater degree than the razorback sucker, bonytail chub, or humpback chub. This is due to the fact that the pikeminnow would have a greater chance to bio-accumulate higher concentrations of mercury during its lifespan. In contrast, the bonytail chub and humpback chub are middle feeders and the razorback sucker is a bottom feeder that feed on organisms lower in the food chain with potentially lower concentrations of mercury.

4.1.2.1 Effects of Mercury in Aquatic Systems and Fish

Aquatic systems receive mercury by direct deposition from the atmosphere and from overland transport from within the watershed (U.S. Environmental Protection Agency [USEPA] 1997). Mercury primarily enters aquatic systems in an inorganic form where it can adsorb to suspended solids and settle to the bottom (USEPA 1997). It also can be photo reduced in the upper few centimeters of the water's surface and escape into the atmosphere. RGM at the sediment water boundary can be transformed into MeHg by sulfate-reducing bacteria; however, this is a reversible reaction that can transform MeHg back to RGM, depending on site-specific conditions. The most important areas for methylation are anoxic areas of the aquatic environment, such as wetlands or surface waters that remain stratified.

Most mercury that bio-accumulates in fish tissue is in the form of MeHg (USEPA 1997). Rates of methylation processes and bioaccumulation typically vary and depend on many factors. The effects of mercury on fish are numerous. Lusk (2010) describes the potential affects as:

1. Potent neurotoxin:
    a. Affects the central nervous systems (reacts with brain enzymes, then lesions)
    b. Affects the hypothalamus and pituitary, affects gonadotropin-secreting cells
    c. Altered behaviors: Reduced predator avoidance, reproduction timing failure
    d. Reduced ability to feed (emaciation and growth effects)
2. Endocrine disruptor
    a. Suppressed reproduction hormones in male and female fish
    b. Reduced gonad size and function, reduced gamete production
    c. Altered ovarian morphology, delayed oocyte development
    d. Reduced reproductive success
    e. Transfer of dietary Hg of the maternal adult during oogenesis and into the developing embryo
3. Inability to grow new brain cells or significantly reduce brain mercury

4.1.2.2 Regional Mercury Data

The Colorado Department of Public Health and Environment, Water Quality Control Division maintains a list of all waters in Colorado that exceed the total maximum daily loads for a variety of contaminants. Maintenance of this list is in accordance with Section 303(d) of the Federal Clean Water Act. The Water Quality Control Division does not list the Yampa or White Rivers as impaired for mercury levels (USEPA 2012). Elkhead Reservoir, in the upper Yampa watershed is the only mercury-impaired surface water in the region; it recorded elevated mercury levels in fish tissues in 2012 (USEPA 2012).

Beckvar et al. (2005) suggested that a threshold-effect level of ≤ 0.2 micrograms per gram (µg/g) wet weight (WW) mercury in whole body fish as being protective of juvenile and adult fish. The USFWS reported that 78 percent of the Colorado pikeminnow collected in Colorado had levels of mercury above the 0.2 µg/g threshold, including within the Yampa River Basin (Osmundson and Lusk 2012). Samples taken from pikeminnow in the Yampa River in 2006 had levels of mercury between 0.42 and 0.68 µg/g (CDPHE 2015). Osmundson and Lusk (2012) found a range of 0.39 to 0.58 µg/g with a mean level of 0.48 µg/g in Yampa River pikeminnow. The mercury levels reported above are lower than what was reported for pikeminnow that were captured in 1960s from the Yampa River (Lusk 2010). In that study, archived fish samples from museums were tested using similar methods as the pikeminnow captured recently and compared to what was reported by Osmundson and Lusk (2012). That information was presented to the San Juan Recovery Program and indicated that fish collected in 1960 had mercury levels of approximately 0.62 µg/g, approximately 0.10 µg/g higher than current levels. It should be noted that due to the limited number of fish in the Yampa River, sample sizes for these studies is generally low (less than 10). Therefore, additional study is needed to know conclusively how mercury is currently affecting these species.

Within the White River, Osmundson and Lusk (2012) found that mercury concentrations in pikeminnow were some of the highest observed within occupied critical habitat. Mercury levels in pikeminnow have been reported at 0.31 to 0.96 µg/g by Krueger (1988). More recent studies have shown a mean concentration of 0.95 µg/g in White River pikeminnow with a range of 0.43 to 1.83 µg/g (Osmundson and Lusk 2012).

4.1.2.3 Mercury Emissions Associated with Trapper Mine Coal

While mercury emission and subsequent deposition occurs at varying spatial scales (i.e., globally, nationally and regionally) this BA evaluates the potential for mercury emitted from the combustion of Trapper coal at the Craig Generating Station and its possible impact to the Colorado River Fish and their habitat. Two coal fired power plants operate in the region; the Craig Generating Station is located near Craig, Colorado and the Hayden Generating Station is sited approximately four miles east of Hayden, Colorado (21 miles east of the Craig Generating Station). In 2014, the last year data are available, the Craig Generating Station emitted 19.2 kg of mercury.

Trapper Mine sends all of its produced coal to the Craig Generating Station; their coal supplies as much as 54 percent of the annual fuel for the Craig Generating Station. In 2014, the total coal consumption rate for Craig Generating Station was about 4.6 million tons per year (mtpy), which means that Trapper Mine contributed at a rate of 2.3 mtpy. The Craig Generating Station has three power generating units, and Trapper Mine coal is almost exclusively used at Units #1 and #2. Based on 2014 load data reported to the EPA Clean Air Markets database, Units #1 and #2 represented 63.56% of the total electric load generated at Craig Generating Station. If the load and coal consumption are assumed to be related, then the coal consumption at Units #1 and #2 would have been 2.92 mtpy in 2014 (63.56% of 4.6 mtpy). Using this figure, the 2.3 mtpy contributed by Trapper Mine would have been 78.76% of the overall coal consumption at Units #1 and #2.

Emissions monitoring data obtained from CDPHE for 2014 show that mercury emissions are substantially less at Unit #1 (2.0 kg) and Unit #2 (2.20 kg) compared to Unit #3 (15.28 kg). This is most likely due to the differences in pollution control systems at the three Craig generating units. Units #1 and #2 each use wet scrubbing systems for sulfur dioxide (SO_2) emissions control, compared to a spray dryer absorber (dry scrubbing) at Unit #3. Wet scrubbing systems have been shown to be extremely effective at providing ancillary control benefits for mercury emissions. This is because the oxidized form of mercury (Hg^{2+}) is water soluble and can be readily removed by the wet scrubber technology.

Applying the 78.76% factor to the reported 2014 mercury emissions listed above, the Trapper contribution to the Craig mercury emissions would be 1.57 kg at Unit #1 and 1.73 kg at Unit #2. Adjusting the mercury emissions estimate to the maximum production rate of 2.6 mtpy under the proposed action would result in mercury emissions of 3.73 kg per year that is attributable to combustion of Trapper Mine Coal at the Craig Generating Station.

The proposed action assumes a constant rate of mining at Trapper Mine and a stable rate of combustion at the Craig Generating Station each year from July 1, 2015 through the life of the mine in 2024. This would result in a total of 35.06 kg of mercury emitted from the Craig Generating Station as a result of the combustion of Trapper Mine coal over the next 9.4 years.

No current data or modeling are available to indicate how much of the mercury that is emitted by either the Craig Station or the Hayden Station is deposited annually within the airshed used in this assessment. However, a recent BA conducted for the Four Corners Power Plant and Navajo Mine Energy Project (FCPP & NMEP) (OSMRE 2014) included detailed modeling of the emissions and deposition of mercury produced at the Four Corners Power Plant. In those models, it was determined that approximately 95 percent of all mercury emitted by the Four Corners Power Plant rises high enough into the atmosphere to be carried by prevailing wind currents and out of the area analyzed in that BA. It is important to note that it is unknown if this modeling accurately reflects the conditions at the Craig Generating Station, because environmental conditions in the Four Corners region are different from those in Craig, Colorado.

The Mercury Deposition Network (MDN) has a system of receptors that monitor levels of mercury. The nearest receptor to the Trapper Mine is the Buffalo Pass-Summit Lake site east of Steamboat Springs, which is approximately 45 miles east of the Trapper Mine and the Craig Generating Station. These monitoring stations measure the levels of mercury that are deposited in precipitation events (i.e., wet deposition). Data from this station in 2013 indicated that there was an annual deposition of 9.757 $\mu g/m^2$

of mercury at that location (NAPD 2015). There are no other monitoring sites within the airshed; consequently, it would be speculative to accurately determine how much mercury is being deposited throughout the airshed due to the spatial variability of the deposition on an annual basis. It should be noted that the MDN clearly indicates that deposition can vary spatially across regional airsheds.

Using the results of the emission and deposition modeling conducted at FCPP as a possible scenario, and assuming that the average annual deposition of 9.757 $\mu g/m^2$ of mercury is equally distributed throughout the Yampa and White River watersheds (a combined total of 34,362 km^2); an annual deposition of 335.27 kg of mercury is calculated. The entirety of the Colorado River Fish Action Area is within these two watersheds and is 10,514 km^2 (**Figure 6**). Therefore, assuming an even distribution of mercury deposition, there would be a total of 102.59 kg of mercury dropped annually over the entire Action Area. However, if the results of the FCPP & NMEP model are used, then only five percent of the mercury deposited would be emitted from local sources; and the other 95 percent would come from global or other distant sources. This would indicate that the proportional amount of mercury deposited annually that comes from the two local generating stations is 5.13 kg (5 percent from local sources) across the entire Action Area.

The proportion of local mercury attributable to the Craig Generating can be estimated by comparing the ratio of coal that is combusted amongst the two generating stations. The Craig Generating Station consumes coal at a rate of 4.8 mtpy, and the Hayden Generating Station uses coal at a rate of 1.75 mtpy. Using these numbers, the Craig Generating Station would contribute 3.75 kg of local mercury (0.733 x 5.13 kg); and the Hayden Generating Station would contribute 1.37 kg of local mercury (0.267 x 5.13 kg).

Applying percentages to the sourced coal that is consumed in the three units at the Craig Generating Station estimates Trapper's contribution to locally deposited mercury. Trapper sourced coal that is combusted in Unit #1 and Unit #2 contributes 19.16 percent of the mercury emitted from the Craig Generating Station, and other coal that is consumed in Unit #1, Unit #2, and Unit #3 contributes 80.84 percent of the mercury emissions. Relating these percentages to the local mercury deposition from the Craig Generating Station (3.75 kg), shows that Trapper Mine coal results in 0.72 kg of locally deposited mercury; and other coal results in 3.04 kg of locally deposited mercury.

The assumption of an even deposition of mercury is impracticable, because the prevailing winds from the west to the east likely result in higher amounts of deposition occurring east of the Craig Generating station. However, barring further detailed modeling into the analysis of mercury deposition, precise estimates of local deposition are unavailable at this time.

Furthermore, the amount of mercury deposited annually will vary based on the chemical speciation of the mercury in the atmosphere, as well as the climatic conditions, and the amount of coal combusted to meet regional electricity needs. Therefore, the amount of mercury annually deposited that may be attributable to coal from Trapper mine could vary yearly.

It is important to note that the calculations above are in reference to wet deposition of mercury. Some research has shown that dry deposition can be equal to or greater than wet deposition. Research has shown this rate to be anywhere from 0.8 to 4.8 times higher in the central and eastern United States (Zhang et al. 2012). The rate of dry deposition is highly dependent on the meteorological conditions and the chemical speciation of the mercury. Although most all of the sites analyzed in Zang et al. (2012) were in the eastern United States with more precipitation than that experienced in western Colorado, one site analyzed was in Salt Lake City, Utah. At that site, total mercury was 2.5 times that of the wet deposition of mercury (Zhang et al. 2012). The USFWS applied this ratio 2.5:1 in the Biological Opinion for the Mining Plan Modification for the South Taylor/Lower Wilson Area at the Colowyo Coal Mine. Applying this factor to the Trapper Mine coal that is combusted at the Craig Generating Station provides a total mercury deposition of 1.8 kg (0.72 kg x 2.5) in the Action Area from the proposed action.

In addition to impacts to individual Colorado River fish, impacts also could occur to designated critical habitats for the four species in the Action Area. Mercury from the combustion of Trapper coal at the Craig Generating Station that is deposited either directly or indirectly into the designated critical habitat for these species would have the potential to adversely impact critical habitat. This would occur primarily by increasing the amount of contaminants present in those areas (PCE #1). Bio-accumulation of MeHg could degrade food resources for the species (PCE #3 – in part). It is difficult to quantify the level of these impacts from the proposed action to critical habitats given the lack of information on the origin of mercury in the Action Area. However, if it is assumed that only five percent of the mercury generated at the local generating stations is deposited into the Action Area, the impact from the proposed action may be minor. However, when added to the other regional and global sources of mercury deposited into the area, the proposed action may result in cumulatively adverse impacts.

Of the amount of mercury annually deposited in the Action Area (as well as the larger Yampa and White River Basins), it is reasonable to assume that some portion would deposit directly or indirectly into the Yampa or White Rivers or its tributaries. Some of this mercury would be converted into MeHg and, thereby, has the potential to adversely affect the Colorado River fish. However, due to a lack of data or modeling it is not possible to quantify the amount of mercury that would enter the Yampa and White Rivers, or be converted to MeHg. Therefore, at this time it is not possible to accurately predict the full impact to the Colorado River fish or their habitat.

Due to the uncertainties in how mercury is potentially affecting the Colorado River fish species, it is difficult to draw a conclusion to impacts from the proposed action as some of the data appear to be contradictory. In a recent study, pikeminnow populations in the Yampa River were reported to be declining but had low mercury concentrations compared to other river segments (Osmundson and Lusk 2012). It should be noted that mercury levels in the Yampa River were still above the: human consumption advisory level of 0.3 µg/g WW set by the USEPA; toxicity threshold of 0.2 µg/g WW (Beckvar et al. 2005); and, the 0.1 µg/g WW for the protection of fish eating birds and mammals (Yeardley et al. 1989). Conversely, pikeminnow in the White River had high levels of mercury concentrations but the population has been increasing (Osmundson and Lusk 2012). The increase in the pikeminnow population in the White River was attributed to upstream movement of juvenile pikeminnow that originated in downstream Green River reaches during 2006 and 2007 and not from reproduction occurring in the White River itself (Bestgen et al. 2010). Further studies are required to determine how mercury is affecting species in the Yampa and White Rivers before a conclusion can be drawn between the proposed action and impacts to the Colorado River fish and their critical habitats.

4.1.3 Mercury from Mine Discharge

In addition to the potential for mercury to be deposited from coal combustion at the Craig Generating Station, mercury also may be released from water discharges directly from the mine. Water discharge is specifically managed under Trapper Mine's Colorado Discharge Permit System (CDPS) Permit No. C-0032115 issued by the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division (WQCD). However, under the CDPS Permit, discharge water is not typically monitored for mercury levels. During the renewal process of the CDPS permit every five years, the WQCD may require that a permit holder sample for mercury (or other contaminants not normally sampled for) if cause is shown (e.g., abnormally high levels shown from other sampling such as the CDRMS sampling discussed below).

CDRMS, which issues the SMCRA mining permit, does require mercury analyses of samples from points on receiving waters up-gradient and down-gradient of the mine, when the permit is first written. The operator is required to develop a monitoring plan for receiving waters; this includes background data (before mining), upstream sample points, and downstream sample points, and the same is required for groundwater. When CDRMS staff review annual hydrology reports that contain the data for receiving waters, they compare this data to CDPHE standards (Regulation 31, The Basic Standards and Methodologies for Surface Water). Prolonged or extreme exceedances of the mercury standard could result in the issuance of a violation of the permit.

The CDRMS requested that Trapper monitor for mercury in 2014 to gather data for baseline sampling in the Deacon and Jeffway Gulch areas. Trapper also monitors at WQCD's established CDPS discharge sites. The discharge sampling sites are shown on Figure 2. The results from six sites were consistently below the detectable threshold of the monitoring equipment. The concentrations of mercury in the most recent tests in 2014 and 2015 were less than 0.0002 mg/L (0.2 µg/L). These samples were collected and analyzed for mercury, according to USEPA method 245.1. The state mandated detection level for mercury is 0.001 milligrams per liter (mg/L).

Therefore, it is not possible to quantify the amount of mercury released from the mine that may be impacting the Colorado River fish downstream in the Yampa River. Using these data, it is not possible to determine whether or not there is some amount or no amount of mercury being released; therefore, it could be stated that mine discharges may be contributing to the amount of mercury in the Yampa River at some amount less than 0.0002 mg/L. It should be noted that all permitted discharge points flow into sediment ponds before discharging into streams that could flow to the Yampa River. Impacts from mercury are discussed above.

The ash that is not recycled for uses elsewhere is used as fill by Trapper Mine for land reclamation. This accounts for approximately 55 percent of the ash produced by the Craig Generating Station. The ash is buried in a mined-out pit during the reclamation process, and could contribute as one source of mercury at the mine. However, the ash is placed in manner to isolate it from the water table. There likely is no impact, as demonstrated by the collected water samples having no detectable levels of mercury.

4.1.4 Selenium

In addition to mercury, impacts to the Colorado River fish from increases in selenium as a result of the combustion of coal at the Craig Generating Station could occur. Selenium, a trace element, is a natural component of coal and soils in the area and can be released to the environment by the irrigation of selenium-rich soils and the burning of coal in power plants with subsequent emissions to air and deposition to land and surface water. Contributions from anthropogenic sources have increased with the increases of world population, energy demand, and expansion of irrigated agriculture. Selenium, abundant in western soils, enters surface waters through erosion, leaching, and runoff. While required in the diet of fish at very low concentrations (0.1 µg/g) (Sharma and Singh 1984), it is unknown if selenium is adversely affecting endangered fish in the Yampa Basin. Excess dietary selenium results in higher than normal selenium concentrations to be deposited into developing eggs, particularly the yolk (Buhl and Hamilton 2000). If concentrations in the egg are sufficiently high, developing proteins and enzymes become dysfunctional or result in oxidative stress, conditions that may lead to embryo mortality, deformed embryos, or fry that hatch in a weakened condition that places them at a higher risk of mortality.

Reporting limits for selenium in water is generally one microgram per liter (µg/L), while the USEPA has set the maximum contaminant level goal of 0.05 mg/L (50 µg/L) for human consumption. During sampling of the Yampa River between 1997 and 1998, levels between less than one and 4.8 µg/L were found near Craig; between less than one and 4.9 µg/L near Maybell; and less than one and 3.6 µg/L near Deerlodge Park (USGS 2001). The peak reported levels for these sites all occurred in March, possibly during the beginning of the snow runoff. Concentrations were less than 1 µg/L during May through October. However, it should be noted that selenium in water may be less important than dietary exposure when determining the potential for chronic effects to a species (USFWS 2014e).

Of the four Colorado River fish species, selenium would disproportionately affect the razorback sucker more than the other three species. As with all sucker species, the razorback sucker is a bottom feeder and more likely to ingest selenium that has precipitated to the river bottoms. While the reportable limit of selenium in water is 1 µg/L, the safe level of selenium for protection of fish and wildlife in water is considered to be below 2 µg/L and chronically toxic levels are considered to be greater than 2.7 µg/L (USFWS 2014e). Excess selenium in fish have been shown to have a wide range of adverse effects

including mortality, reproductive impairment, effects on growth, and developmental and teratogenic effects including edema and finfold, craniofacial, and skeletal deformities.

Combustion of coal at the Craig Generating Station could result in some amount of selenium being emitted and subsequently deposited. However, unlike mercury, selenium is not monitored in the emissions, and no selenium release data are available. When selenium is present in flue gas, it tends to behave much like sulfur and is removed to some extent via the sulfur dioxide (SO_2) air scrubbers in place and also absorbs onto alkaline fly ash that is subsequently removed by a fabric filter baghouse (EPRI 2008). Therefore, due to the lack of information available, it is unknown if selenium is impacting Colorado River fish species in the Yampa and White rivers.

Selenium could be present in the ash deposited and buried at Trapper Mine or could be naturally occurring in the local environment or the mined coal. Selenium at the four CDPS monitoring sites (Johnson Gulch, No-name Gulch, Easy Pyeatt Gulch, Middle Flume Gulch, and Jeffway Gulch spring) at Trapper Mine averaged less than 3.8 µg/L of selenium in 2015. However, concentrations typically varied greatly between sampling periods and among the four sites. The range was <1 µg/L (below the detection threshold of the testing equipment) to 7.6 µg/L. With pollution controls in place at Trapper Mine, selenium should deposit in settling ponds and not increase above background levels in discharge waters.

The state standard for selenium is 3.4 µg/L. From these data it is not possible to determine whether selenium levels are attributable to what is found in the coal or in the ambient environment. Overall, selenium concentrations at the mine were typically within the seasonal ranges found in the Yampa River when it was sampled in 1997 and 1998 (see above).

4.1.5 Additional Conservation Measures

OSMRE has voluntarily developed a number of conservation measures in coordination with Trapper and USFWS that would aid in improving the scientific knowledge and preservation of these species in the Yampa and White river basins. The objective of these conservation measures would be to help toward the recovery and ultimate down listing or delisting these species in the future. The proposed conservation measures would become mandatory commitments with the approval of the BA and issuance of the BO. These measures are provided in overview within this BA, but will be detailed in Appendix B, Mitigation Measures prior to issuance of the final BA and BO.

Trapper would contribute funding toward active research projects in the Yampa and White River Basins to study mercury deposition and the uptake in fish species in these areas. Trapper would provide funding in the amount of $45,000 for upcoming mercury deposition studies being conducted in the Yampa and White Rivers by the U.S. Geological Survey Water Quality Division, and investigation of MeHg uptake in fish tissues to be conducted jointly by BLM and USGS Fort Collins Office in cooperation with Colorado Parks and Wildlife in the same river systems. The division of funds and details for these scientific studies will be described in Appendix B, Conservation Measures, to be prepared later.

Additionally, Trapper would contribute $10,000 of funding for recovery actions that are managed by the Upper Colorado River Endangered Fish Recovery Program (Recovery Program). Trapper would provide the funding to the National Fish and Wildlife Foundation to distribute to the Recovery Program. The details of the specific activities that will be funded will be described in Appendix B, Conservation Measures, to be prepared later.

4.2 Greenback Cutthroat Trout

The Action Area for greenback cutthroat trout for this BA is the same Action Area defined for the Colorado River Fish species. Given that the Action Area lies well outside the range of greenback cutthroat trout, no impacts would occur from continued mining at Trapper Mine. The best available science indicates that the Colorado River cutthroat trout subspecies resides in the Action Area (USFWS 2014a). This particular subspecies has no federal status.

4.3 Yellow-Billed Cuckoo

The yellow-billed cuckoo could be impacted by mercury in the environment. For the yellow-billed cuckoo, as with other birds using riparian environments, mercury bio-accumulates through the ingestion of aerial insects emerging from benthic life stages that develop in aquatic environments with mercury or from predatory spiders that eat these (Cristol et al. 2008; Buckland-Nicks et al. 2014; Edmonds et al. 2012; Evers et al. 2012; Gann et al. 2014). Dietary mercury concentrations associated with adverse effects to birds are normally greater than 0.1 mg/kg WW (DOI 1998). Once ingested, MeHg rapidly moves into the bird's central nervous system, resulting in behavioral and neuromotor disorders (Scheuhammer et al. 2012, 2007; Tan et al. 2009). The developing central nervous system in avian embryos is especially sensitive to this effect, and permanent brain lesions and spinal cord degeneration are common (Bryan et al. 2003; DOI 1998; Heinz et al. 2009; Scheuhammer et al. 2007; Young 1998). Therefore, adverse effects are described for the eggs, embryos, nestlings and/or fledglings associated with elevated Hg burdens in the female parent and due to foraging.

Uptake of mercury by birds usually has been shown to impact fish-eating birds more severely than insectivorous birds (Boening 2000; Zolfaghari et al. 2009). Additionally, Howie (2010) found that the lateral extent of elevated mercury levels in birds and invertebrate prey species varied from approximately 250 to 650 meters from an affected water body. After this distance, mercury levels in the blood and feathers could not be distinguished from background levels, indicating that only those individuals that forage adjacent to affected water bodies show signs of bioaccumulation of mercury.

No information is available on the levels of mercury found in invertebrates in the Yampa River or elsewhere within the Action Area. However, it could be assumed that given the levels of mercury that currently exist in the Yampa River, that the aquatic invertebrates may contain elevated levels of mercury. However, the amount of mercury that may be present would vary depending on the water temperature and its hardness (Boening 2000).

Any yellow-billed cuckoos present in the Action Area would be at risk for mercury contamination. However, that risk would be low considering that the primary food sources for the cuckoo largely are not aquatic, but individual cuckoos could occasionally consume lizards that are higher in the food chain and that may have consumed insects of an aquatic origin. Under this scenario, the concentration of MeMg MeMg would magnify from the environment as it bioaccumulates from insect to lizard and eventually a cuckoo that consumes the lizard. Therefore, it is not possible to entirely discount the potential for yellow-billed cuckoos in the Action Area to bio-accumulate mercury from the proposed action; however, given the infrequency of this species within the Action Area historically, it is unknown how many individuals would have the potential to be affected. Furthermore, it is difficult to determine the level of impact given that there is no threshold information regarding mercury levels that adversely affect yellow-billed cuckoos or actual amounts of mercury in yellow-billed cuckoos that inhabit the Action Area. Given the low numbers of cuckoos that are thought to use in the Action Area, it would be difficult to obtain these data.

Given that the yellow-billed cuckoo may not return to the same breeding areas in successive years, it is possible that if any individuals were impacted by mercury in one year, individuals may travel to a new location in subsequent years that are not impacted by mercury generated from the Craig Generating Station. Also, because cuckoos are migrants that are present for only a few months each year, the potential for mercury exposure in the Action Area would be lower than if the species was a year-round resident.

In addition to impacts to individual yellow-billed cuckoos, the proposed critical habitat for this species also may be impacted by the proposed action. The USFWS has proposed critical habitat for the western yellow billed cuckoo along the Yampa River.

As stated above, the proposed action would result in some level of mercury deposition in the Action Area. Some of this mercury may affect the invertebrates that make up the cuckoo's prey base, thereby affecting the proposed critical habitat (PCE #2). Different orders of invertebrates often react to mercury

differently, although the larval stages are usually most susceptible to mercury. Levels of 1 to 10 µg/L normally cause acute toxicity for the most sensitive developmental stage of many different species of aquatic invertebrates (Boening 2000). It should be noted, however, that aquatic insects and amphibians are not the primary food source for cuckoos. It is unknown how much of the mercury deposited from Trapper coal burned at the Craig Generating Station would eventually enter into the bodies of yellow-billed cuckoos in the Action Area. Therefore, it is not possible to determine the severity of this impact to the proposed critical habitat and its PCEs.

Mercury is not anticipated to affect the cottonwoods or other riparian vegetation that comprises the majority of habitat for this species, because woody plants are generally insensitive to the harmful effects of mercury due to the roots serving as a barrier to MeMg (Boening 2000).

Combustion of coal at the Craig Generating Station could result in some amount of selenium being emitted and subsequently deposited. However, unlike mercury, selenium is not monitored in the emissions, and no selenium release data are available. When selenium is present in flue gas, it tends to behave much like sulfur and is removed to some extent via the Sulfur dioxide (SO_2) air scrubbers in place and also absorbs onto alkaline fly ash that is subsequently removed by a fabric filter baghouse (EPRI 2008).

Selenium could be present in the ash deposited and buried at Trapper Mine or could be naturally occurring in the local environment or the mined coal. Selenium at the four CDPS monitoring sites at Trapper Mine averaged less than 3.8 µg/L of selenium in 2015. However, concentrations typically varied greatly between sampling periods and among the four sites. The range was <1 µg/L to 7.6 µg/L. With pollution controls in place at Trapper Mine, selenium should deposit in settling ponds and not increase above background levels in discharge waters.

The state standard for selenium is 3.4 µg/L. From these data it is not possible to determine whether selenium levels are attributable to that found in the coal or in the ambient environment. Overall, selenium concentrations at the mine were typically within the seasonal ranges found in the Yampa River when it was sampled in 1997 and 1998 (see above).

Therefore, due to the lack of information on the sources of selenium in the region, it is unknown if selenium is impacting yellow-billed cuckoos in the Action Area or proposed critical habitat. Impacts from elevated selenium in birds can affect reproduction in developing embryos by acting as a teratogen, lower body weight, decrease immune function, or result in histopathological lesions (Hamilton 2004).

4.3.1 Additional Conservation Measures

OSMRE has voluntarily developed a number of conservation measures in coordination with Trapper and USFWS that would aid in improving the scientific knowledge about the population of yellow-billed cuckoos that have been known to occur on the Yampa River. Trapper would provide $5,000 to fund a protocol survey during the breeding season in proposed critical habitat along the Yampa River. Trapper would either conduct the survey itself or hire a permitted contractor to perform the survey. The results of the survey will be provided to USFWS. Further details will be provided in Appendix B, Mitigation Measures, to the final BA prior to the issuance of the BO.

4.4 Dudley Bluffs Twinpod

The Action Area for Dudley Bluffs Twinpod for this BA is the Trapper Mine Project Area. Given the lack of habitat for this species within or near the Project Area, no impacts would occur from continued mining at Trapper Mine. Populations of this species are restricted to specific geologic formations south of the White River. Populations of this species are outside the Action Area and would not be affected by the proposed action.

4.5 Ute Ladies'-tresses

The Action Area for Ute ladies'-tresses for this BA is the Trapper Mine Project Area. Given the lack of habitat for this species within or near the Project Area, no impacts would occur from continued mining at Trapper Mine. Prior consultation with USFWS for Trapper (i.e., PR-06) included the Ute ladies'-tresses and also made the determination that mining at Trapper would have No Effect on this species. Recent discovery of new populations of this species in the Roaring Fork Valley remain outside the Action Area and would not be affected by the proposed action.

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5.0 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the Proposed Action are not considered in the cumulative effects section because they would require separate consultation pursuant to Section 7 consultation under the ESA.

5.1 Future Atmospheric Deposition

In the future, mercury and selenium, which are globally transmitted pollutants, would continue to accumulate within the Yampa River and White River Basins whether or not the Craig Generating Station continued to operate and whether or not Trapper continued to produce coal. A number of studies and international agreements related to future mercury emissions make future trends in global mercury emissions unclear. While concern exists that global mercury emissions will continue to increase over the next 25 years (with China being a particular concern), a recent United Nations report showed that global mercury emissions to the atmosphere were relatively stable between 1990 and 2005, with increased emissions in Asia offset by decreased emissions in Europe and North America (UNEP 2013a) during the same time period. However, some analysis supports a conclusion that increased mercury emissions since 2005 from China are now offsetting more recent reductions in North America and Europe (UNEP 2013a), resulting in an increase in global mercury levels. In late 2011, China released new national emissions standards to control SO_2, NO_X, and particulate emissions, which should result in reduced mercury emissions if successfully implemented (CCICED 2011). On October 10, 2013, China joined 91 other countries in signing the Minamata Convention on Mercury, also known at the Global Mercury Treaty, which includes provisions for controlling mercury releases from large-scale industrial plants, including coal-fired power plants (UNEP 2013b).

5.2 Colorado River Fish

Future water depletions from the Yampa River not related to a federal action would include increased irrigation for agricultural purposes should there be an increase in these activities. If populations increased in Moffat County as projected (CDLA 2015), there also would be the potential to draw additional water from the Yampa River if unused water rights become available. An increased human population also would have the potential to increase development and urbanization in the historic floodplain that can result in reduced peak flows because of the flooding threat. Development in the floodplain makes it more difficult to transport large quantities of water that would overbank and create low-velocity habitats that these species require for various life history stages.

Contamination from runoff (i.e., sewage treatment plants, feedlots, residential and agricultural development, and atmospheric deposition of contaminants) could affect water quality in the Yampa River. A decrease in water quality could adversely affect Colorado River fish and their critical habitat.

Increased recreational use (boating, fishing, off road vehicle use, and camping) in the Yampa River is expected to increase as the human population increases both in Colorado and in Moffat County (CDLA 2015). Potential effects include angling pressure, non-point source pollution, increased fire risk, and harassment of native fishes.

Combustion of coal at the two regional generating stations will continue into the future. A portion of the coal that is combusted there may come from private coal reserves, without a federal nexus and therefore is not a federal action. While the amount of coal to be combusted is unknown, it would emit mercury and selenium which could result in cumulative impacts to the Colorado River fish species. The amount of the impact would be dependent on the mercury levels in the combusted coal.

5.3 Greenback Cutthroat Trout

Because there are no known populations of greenback cutthroat trout within or near the Action Area, no cumulative effects to this species would occur. The Trapper Mine Project would not contribute to the cumulative impacts to this species. As stated previously, the best available science indicates that the blue lineage of Colorado River cutthroat trout live in the Yampa and White rivers in the Action Area (USFWS 2014a).

5.4 Yellow-billed Cuckoo

Increases in development in the historic floodplain would affect the cuckoo by potentially reducing peak flows because of the flooding threat. Development in the floodplain makes it more difficult, if not impossible, to transport large quantities of water that will overbank and create low velocity habitats and contribute to the riparian successional processes that create habitat for this species. As populations increase, more water may be drawn from the Yampa River, thereby reducing river flows and decreasing available habitat for the cuckoo.

Contamination of the water from sources such as livestock operations and runoff from developments could adversely affect the cuckoo. A decrease in water quality and gradual changes in floodplain vegetation could adversely affect the cuckoo, its prey base, and its habitat.

Combustion of coal at the two regional generating stations will continue into the future. A portion of the coal that is combusted there may come from private coal reserves without a federal nexus which would not constitute a federal action. While the amount of coal to be combusted is unknown, it would emit mercury which could result in cumulative impacts to the cuckoo. However, the amount of the impact would be dependent on the mercury levels in the combusted coal.

5.5 Dudley Bluffs Twinpod

Because there are no known populations of Dudley Bluffs twinpod within or near the Action Area, no cumulative effects to this species would occur. As stated previously, the nearest known populations to Trapper are south of the White River. The Trapper Mine Project would not contribute to the cumulative impacts to this species.

5.6 Ute Ladies’-tresses

As there are no known populations of Ute Ladies’-tresses within or near the Action Area, no cumulative effects to this species would occur. As stated previously, the nearest known populations to Trapper are approximately 35 miles away. The Trapper Mine Project would not contribute to the cumulative impacts to this species.

6.0 Conclusions

6.1 Colorado River Watershed Fish

The four fish that collectively make up the Colorado River fish species all occur within the Yampa River north of the Trapper Mine and adjacent to and west of the Craig Generating Station and the White River to the southwest of Trapper Mine. Continued combustion of coal mined at the Trapper Mine at the Craig Generating Station would release both mercury and selenium into the environment. Of the amounts emitted annually, it can be reasonably assumed that some would deposit either directly or indirectly into the Yampa River and White River. However, as stated above, the amount that would actually enter the river or be available for bioaccumulation in the fish species is not known without detailed modeling.

In the future, mercury and selenium, which are globally transmitted pollutants, would continue to accumulate within the Yampa and White River Basins regardless of whether or not mining continues at the Trapper Mine or the Craig Generating Station continues to operate. It is currently unknown however, how much of the mercury that is deposited into the basins comes from the Craig Generating Station. The uncertainty of source attribution would be addressed through the implementation of the additional conservation measures listed in Section 4.15. Given the potential for the release of mercury from the combustion of coal produced at the Trapper Mine and the subsequent deposition in the Yampa River, OSMRE determines that the Trapper Mine Project **May Affect,** and is **Likely to Adversely Affect** the Colorado River Fish. Additionally, while potentially not significant alone, the deposition of mercury into critical habitat from the proposed action along with other regional and global sources of mercury may be affecting the PCEs for that critical habitat. Therefore, the proposed action **May Affect,** and is **Likely to Adversely Affect** the critical habitat for the four Colorado River fish species.

6.2 Greenback Cutthroat Trout

Given that the distribution of greenback cutthroat trout is outside the Action Area, OSMRE determines that the Proposed Action would have **No Effect** on greenback cutthroat trout.

6.3 Yellow-Billed Cuckoo

While proposed critical habitat exists within the Action Area, there have been no confirmed sightings of the yellow-billed cuckoo in the Action Area since 2008. Additionally, it is not known if the previous sightings represented nesting pairs or migrants. As this species is a migrant that may not return to previous nesting locations in subsequent years, the potential to suffer adverse impacts from mercury or selenium would be less than in non-migrant species or migrants that return to the same breeding grounds. Therefore, OSMRE determines that the proposed action **May Affect**, and is **not Likely to Adversely Affect** yellow-billed cuckoos. Additionally, while mercury deposition may affect aquatic insects, these are not the primary prey item for yellow-billed cuckoos; furthermore, mercury deposition would not impact riparian trees. Therefore, OSMRE determines that the proposed action is not likely to destroy or adversely modify proposed critical habitat for yellow-billed cuckoos in the Action Area.

6.4 Dudley Bluffs Twinpod

Given the lack of suitable habitat within or near the Project Area and the distance to the nearest known population of this species, OSMRE determines that the Proposed Action would have **No Effect** on Dudley Bluffs Twinpod.

6.5 Ute Ladies'-tresses

Given the lack of suitable habitat within or near the Project Area and the distance to the nearest known population of this species, OSMRE determines that the Proposed Action would have **No Effect** on Ute ladies'-tresses.

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8.0 List of Preparers

8.1 Contractor, AECOM

Robert DeBaca

PhD/Biology

MS/Biology

BA/Biology

BA/Environmental Conservation

Years of Experience: 26

8.2 OSMRE

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Figures

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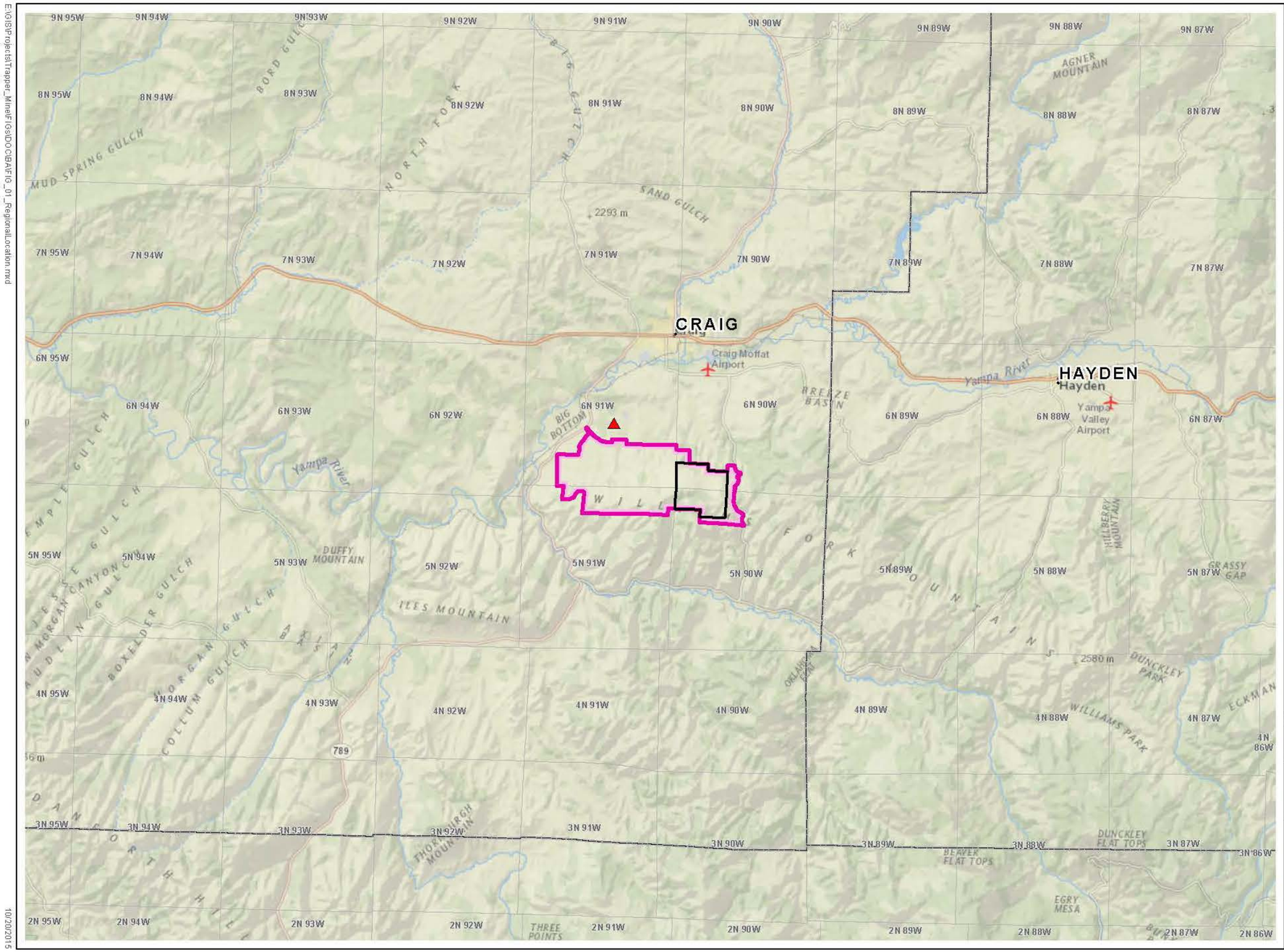

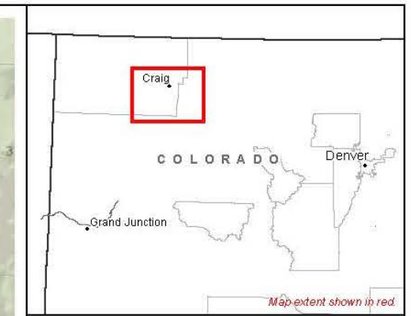

Legend

- Craig Generating Station
- SMCRA Permit Area
- Project Area

0 4 8 Miles

0 5 10 Kilometers

N

Trapper Mine BA

Figure 1
Regional Location

Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, ESRI, US Census

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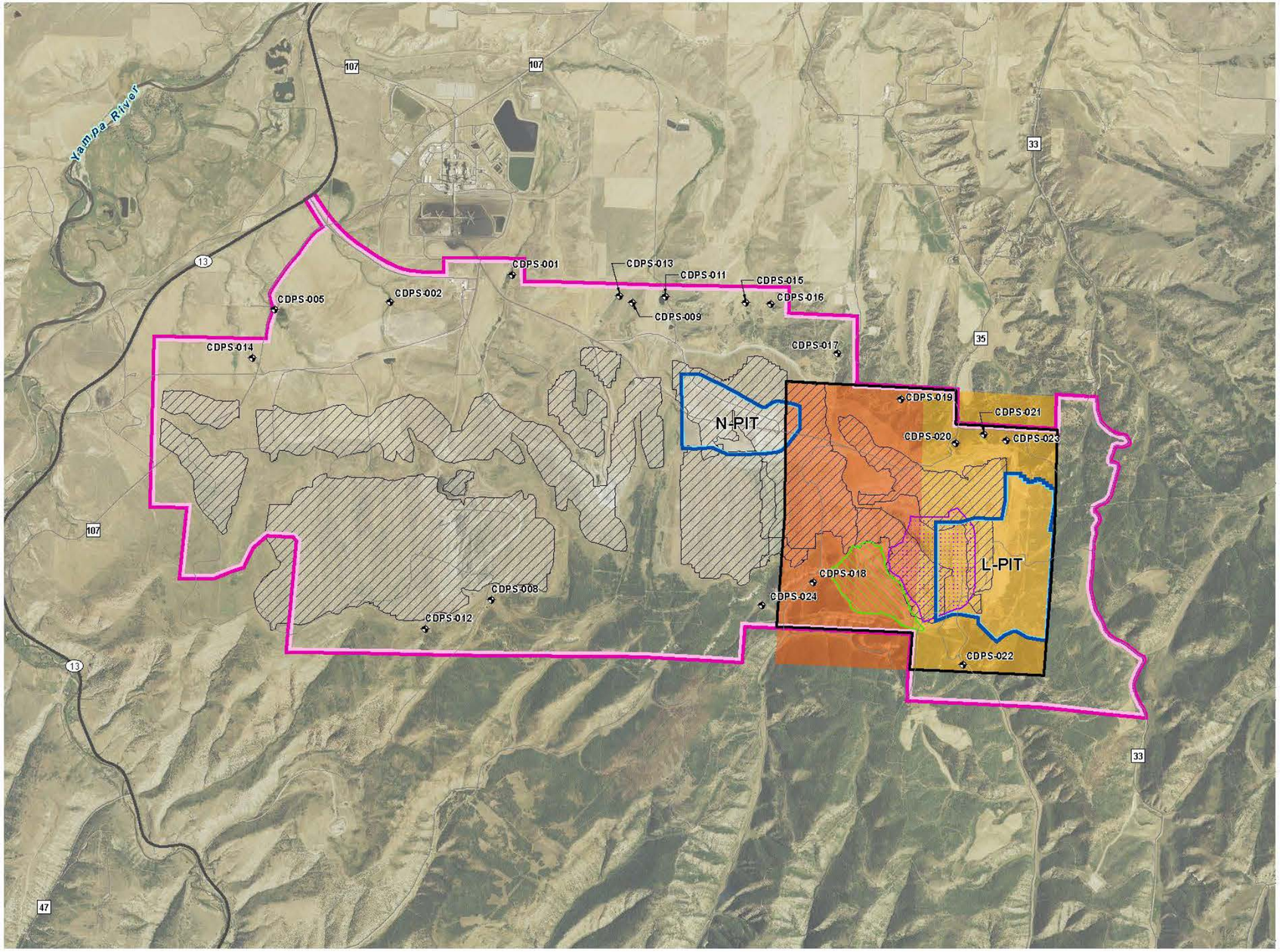

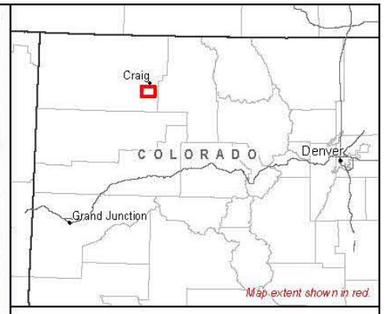

Legend

- SMCRA Permit Area
- Project Area
- Pit Boundary
- Previous Mining
- Horse Gulch Fill
- Landslide
- CDPS Discharge Point under Permit #C00032115

Leases

- Federal - C-07519
- Federal - C-079641

Roads

- 40 US Highway
- 13 State Highway
- 33 County Road
- Other Road

0 0.5 1 Miles

0 1 2 Kilometers

N

Trapper Mine BA

Figure 2
Mine Components

Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: USDA NAIP 2013
Sources: AECOM, ESRI, US Census

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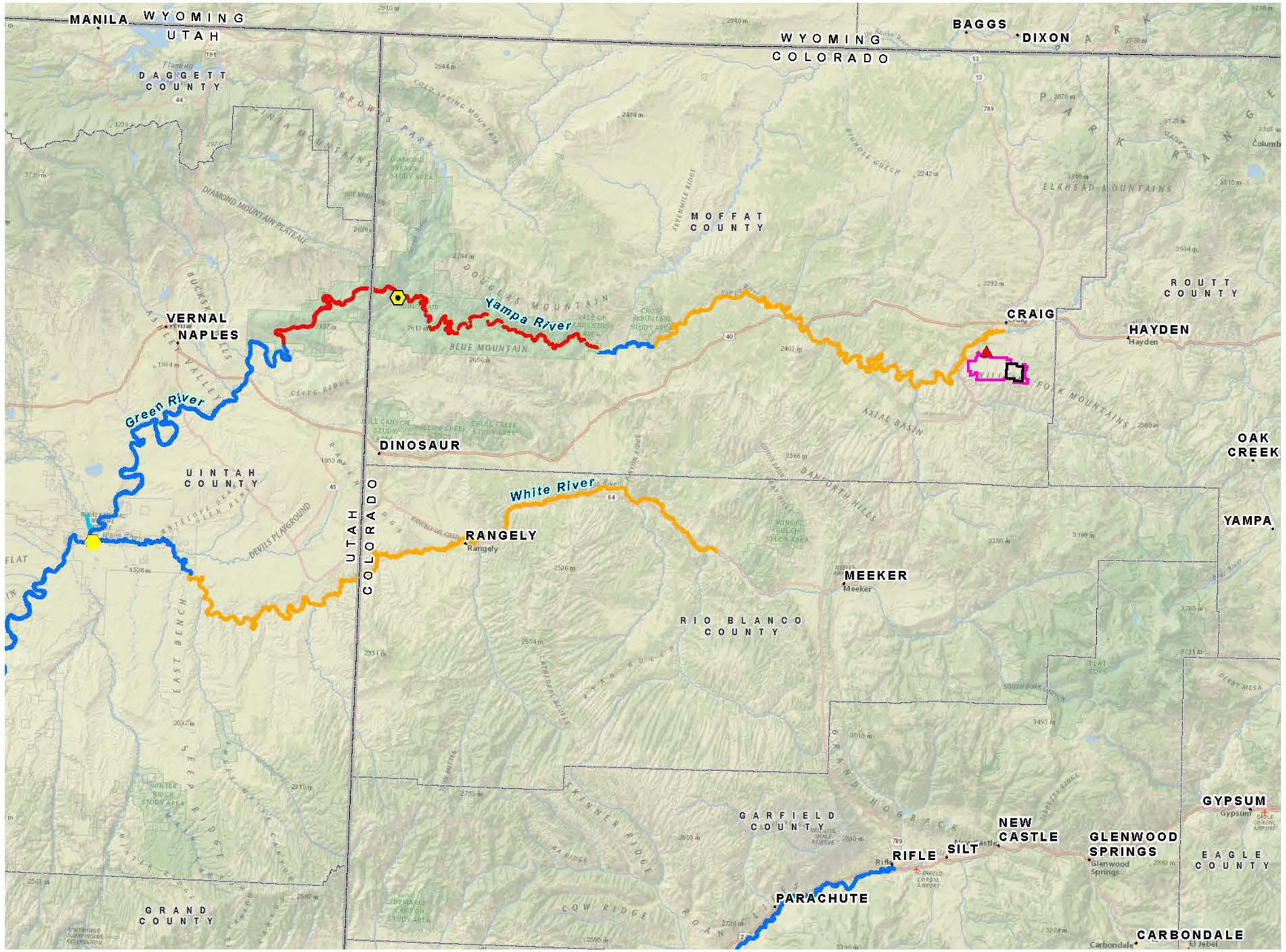

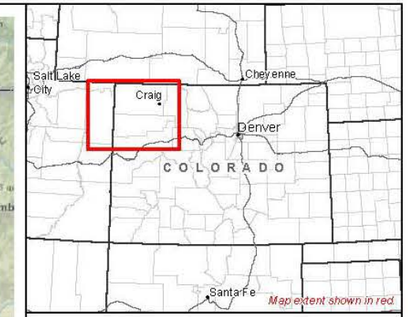

Legend

- Craig Generating Station
- River Confluence
- SMCRA Permit Area
- Project Area

Critical Habitat

- Bonytail Chub & Humpack Chub
- Colorado pikeminnow
- Razorback sucker
- Bonytail Chub & Humpack Chub, Colorado pikeminnow
- Bonytail Chub & Humpack Chub, Razorback sucker
- Bonytail Chub & Humpack Chub, Razorback sucker, Colorado pikeminnow
- Razorback sucker, Colorado pikeminnow

0 10 20 Miles

0 10 20 Kilometers

N

Trapper Mine BA

Figure 3
Colorado River Fish Critical Habitat

Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, ESRI, US Census, USFWS

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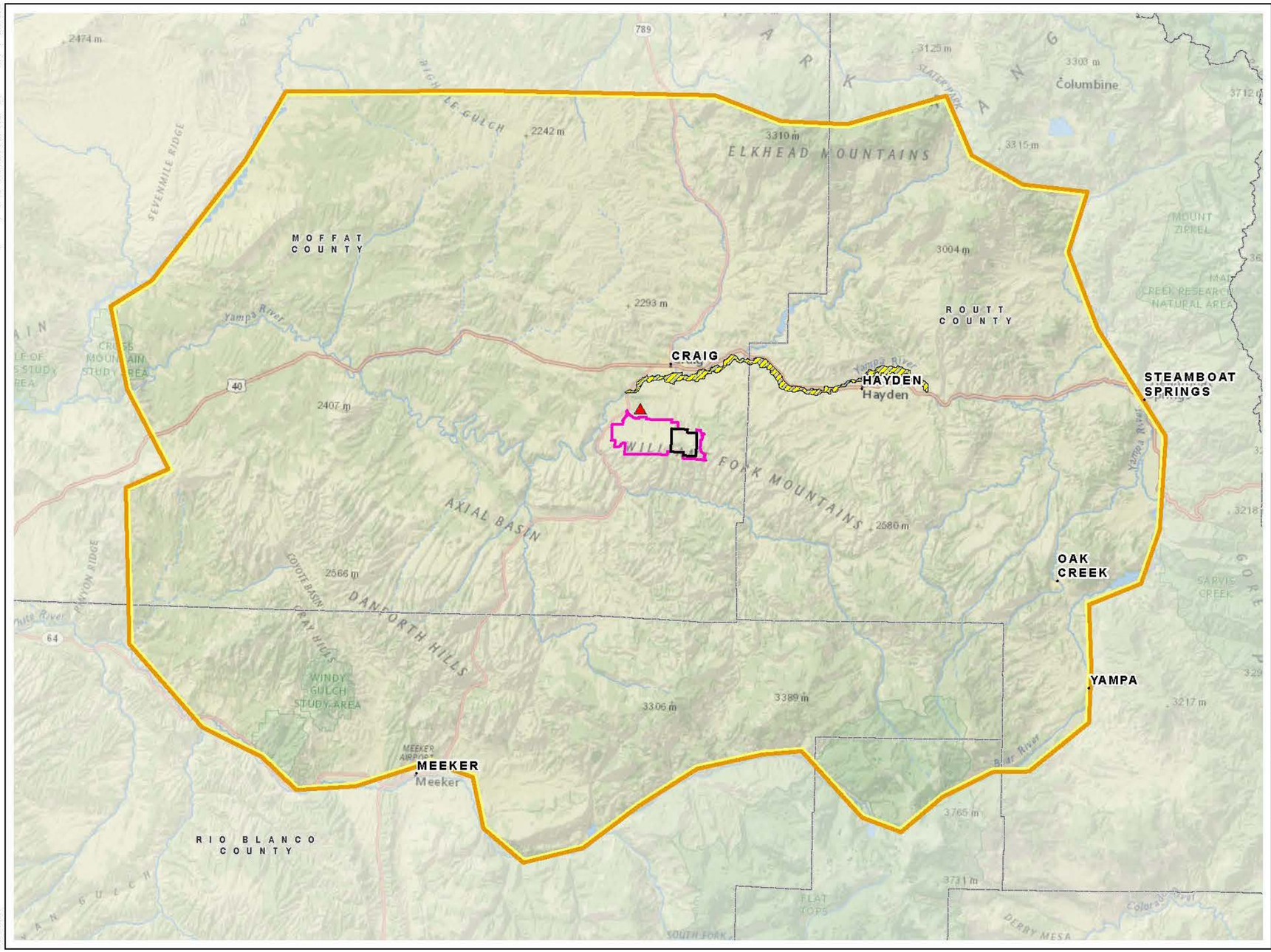

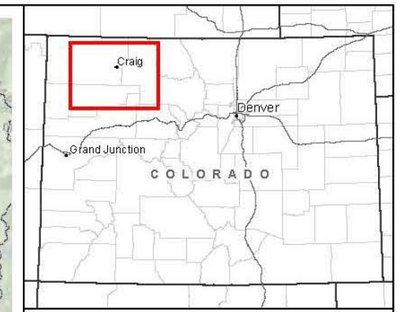

Legend

- Craig Generating Station
- SMCRA Permit Area
- Project Area

Yellow-billed Cuckoo Habitat

- Yellow-billed Cuckoo Action Area
- Yellow-billed Cuckoo Critical Habitat

0 5 10 Miles

0 5 10 Kilometers

N

Trapper Mine BA

Figure 4
Yellow-billed Cuckoo Habitat

Coordinate System: NAD 1983 Colorado State Plane North, FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, ESRI, US Census, CNHP

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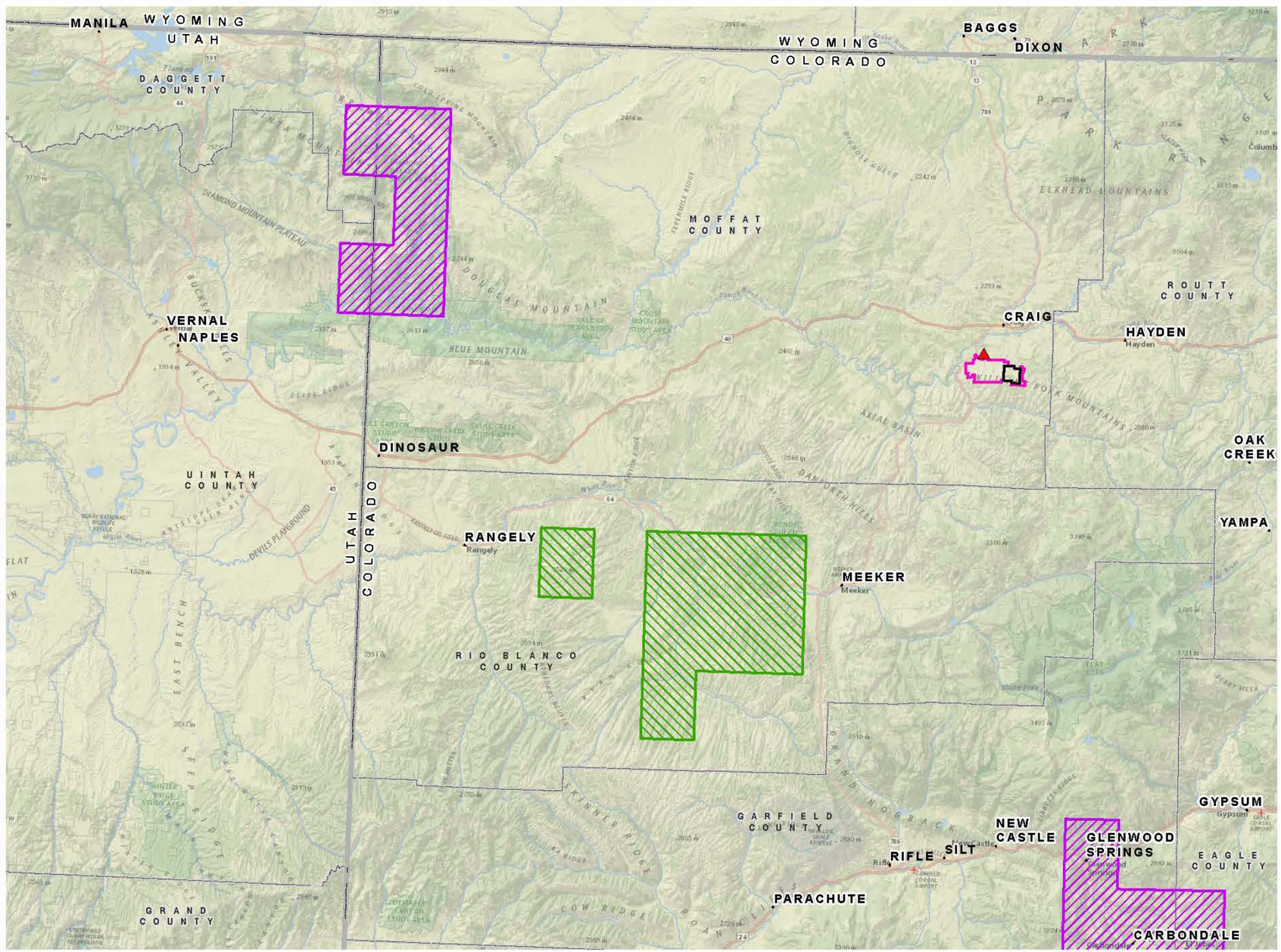

Legend

- Craig Generating Station
- SMCRA Permit Area
- Project Area
- Quadrangle Maps with Ute Ladies'-tresses Habitat
- Quadrangle Maps with Dudley Bluffs Twinpod Habitat

0 10 20 Miles

0 10 20 Kilometers

N

Trapper Mine BA

Figure 5
Ute Ladies'-tresses and Dudley Bluffs Twinpod

Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, ESRI, US Census, CNHP

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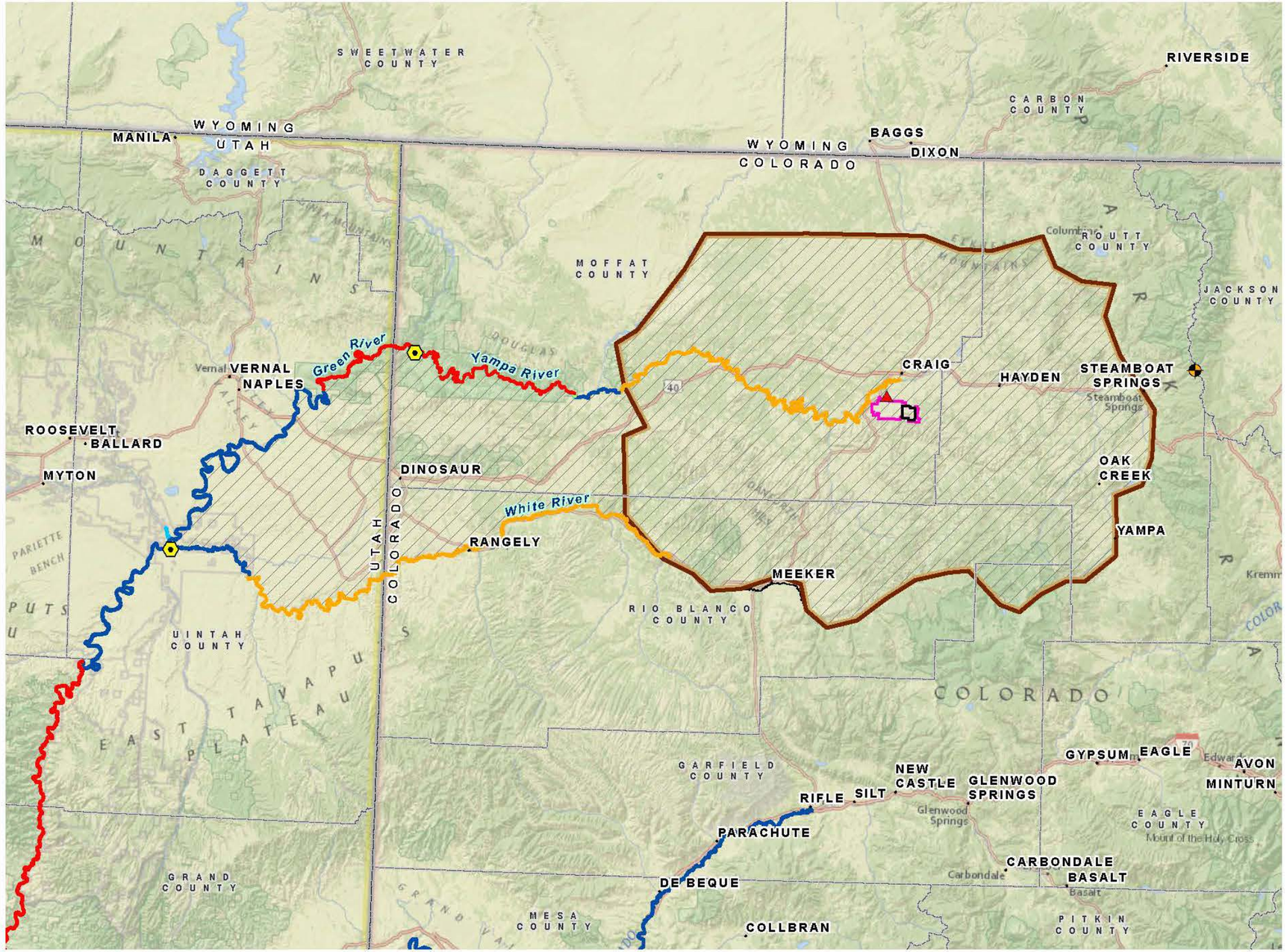

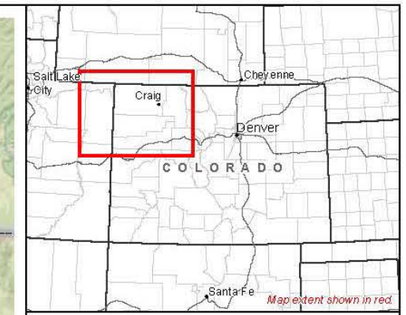

Legend

- Craig Generating Station
- River Confluence
- Mercury Data Monitoring Site
- SMCRA Permit Area
- Project Area
- Topographic Airshed
- Colorado River Fish Action Area

Critical Habitat

- Bonytail Chub & Humpack Chub
- Colorado pikeminnow
- Razorback sucker
- Bonytail Chub & Humpack Chub, Colorado pikeminnow
- Bonytail Chub & Humpack Chub, Razorback sucker
- Bonytail Chub & Humpack Chub, Razorback sucker, Colorado pikeminnow
- Razorback sucker, Colorado pikeminnow

0 10 20 Miles

0 10 20 Kilometers

N

Trapper Mine BA

Figure 6
Colorado River Fish Action Area

Coordinate System: NAD 1983 Colorado State Plane North FIPS 0501, US Feet
Basemap: National Geographic World Map
Sources: AECOM, ESRI, US Census, USFWS

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Appendix A

Consultation Documents

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Western Colorado Ecological Services Field Office
445 WEST GUNNISON AVENUE, SUITE 240
GRAND JUNCTION, CO 81501
PHONE: (970)243-2778 FAX: (970)245-6933
URL: www.fws.gov/mountain-prairie/es/Colorado/;
www.fws.gov/platteriver/

Consultation Code: 06E24100-2015-SLI-0270 September 24, 2015
Event Code: 06E24100-2015-E-00585
Project Name: Mine EA

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Mine EA

Official Species List

Provided by:

Western Colorado Ecological Services Field Office
445 WEST GUNNISON AVENUE, SUITE 240
GRAND JUNCTION, CO 81501
(970) 243-2778
http://www.fws.gov/mountain-prairie/es/Colorado/
http://www.fws.gov/platteriver/

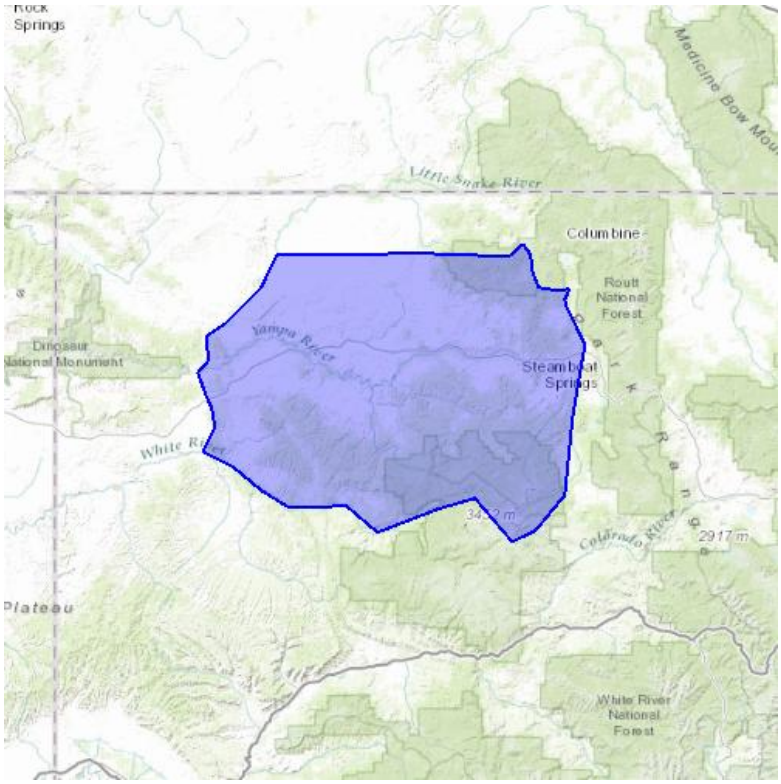
Consultation Code: 06E24100-2015-SLI-0270
Event Code: 06E24100-2015-E-00585

Project Type: MINING

Project Name: Mine EA

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Garfield, CO | Moffat, CO | Rio Blanco, CO | Routt, CO

United States Department of Interior
Fish and Wildlife Service

Project name: Mine EA

Endangered Species Act Species List

There are a total of 13 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	**Status**	**Has Critical Habitat**	**Condition(s)**
Greater sage-grouse *(Centrocercus urophasianus)* Population: entire	Candidate		
Mexican Spotted owl *(Strix occidentalis lucida)* Population: Entire	Threatened	Final designated	
Yellow-Billed Cuckoo *(Coccyzus americanus)* Population: Western U.S. DPS	Threatened	Proposed	
Fishes			
Bonytail chub *(Gila elegans)* Population: Entire	Endangered	Final designated	
Colorado pikeminnow *(Ptychocheilus lucius)* Population: Entire, except EXPN	Endangered	Final designated	
Greenback Cutthroat trout *(Oncorhynchus clarki stomias)* Population: Entire	Threatened		

Humpback chub *(Gila cypha)* Population: Entire	Endangered	Final designated	
Razorback sucker *(Xyrauchen texanus)* Population: Entire	Endangered	Final designated	
Flowering Plants			
Dudley Bluffs twinpod *(Physaria obcordata)*	Threatened		
Ute ladies'-tresses *(Spiranthes diluvialis)*	Threatened		
Mammals			
Black-Footed ferret *(Mustela nigripes)* Population: entire population, except where EXPN	Endangered		
Black-Footed ferret *(Mustela nigripes)* Population: U.S.A. (specific portions of AZ, CO, MT, SD, UT, and WY)	Experimental Population, Non-Essential		
Canada Lynx *(Lynx canadensis)* Population: Contiguous U.S. DPS	Threatened	Final designated	

Critical habitats that lie within your project area

The following critical habitats lie fully or partially within your project area.

Birds	**Critical Habitat Type**
Yellow-Billed Cuckoo *(Coccyzus americanus)* Population: Western U.S. DPS	Proposed
Fishes	
Colorado pikeminnow *(Ptychocheilus lucius)* Population: Entire, except EXPN	Final designated
Razorback sucker *(Xyrauchen texanus)* Population: Entire	Final designated

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
764 Horizon Drive, Building B
Grand Junction, Colorado 81506-3946

IN REPLY REFER TO:
ES/GJ-6-CO-04-F-012-YP041
TAILS 06E24100-2013-F-0098

13-06-28-05

June 21, 2013

Memorandum

To: Environmental Protection Specialist, Office of Surface Mining, Reclamation and Enforcement, Denver, Colorado

From: Western Colorado Supervisor, Fish and Wildlife Service, Ecological Services, Grand Junction, Colorado

Subject: Trapper Mine Permit Renewal application No. 6 (RN-6)

In accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.), and the Interagency Cooperation Regulations (50 CFR 402), the Fish and Wildlife Service (Service) transmits this correspondence to serve as the final biological opinion (BO) for the Trapper Mine Permit renewal No. 6 (RN-6).

The proposed action is the Office of Surface Mining (OSM) renewal of the permit for Trapper Mining Inc. This constitutes an on-going activity. However, in updating its water use under the permit, water depletions from the Yampa River have increased to a total of 160.10 acre-feet per year.

A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin was initiated on January 22, 1988. The Recovery Program was intended to be the reasonable and prudent alternative for individual projects to avoid the likelihood of jeopardy to the endangered fishes from impacts of depletions to the Upper Colorado River Basin. In order to further define and clarify the process in the Recovery Program, a section 7 agreement was implemented on October 15, 1993, by the Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP) which identifies actions currently believed to be required to recover the endangered fishes in the most expeditious manner.

On January 10, 2005, the Service issued a final programmatic biological opinion (PBO) on the *Management Plan for Endangered Fishes in the Yampa River Basin* (this document is available for viewing at the following internet address: http://www.r6.fws.gov/crrip/yampaPBO.htm). The Service has determined that projects that fit under the umbrella of the Yampa River PBO would

avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts. The Yampa River PBO states that in order for actions to fall within the umbrella of the PBO and rely on the RIPRAP to offset its depletion, the following criteria must be met.

1. A Recovery Agreement must be offered and signed prior to conclusion of section 7 consultation.

2. A fee to fund recovery actions will be submitted as described in the proposed action for new depletion projects greater than 100 acre-feet/year. The 2013 fee is $19.82 per acre-foot and is adjusted each year for inflation.

3. Reinitiation stipulations will be included in all individual consultations under the umbrella of this programmatic.

4. The Service and project proponents will request that discretionary Federal control be retained for all consultations under this programmatic.

The Recovery Agreement was signed by the Service and the Water User. In the letter dated June 6, 2013, Trapper Mine Inc. agreed to make a one-time contribution based on its share of the costs of the Recovery Implementation Program to fund recovery actions specified in the Colorado River PBO. The OSM has agreed to condition its approval documents to retain jurisdiction should section 7 consultation need to be reinitiated. Therefore, the Service concludes that the subject project meets the criteria to rely on the RIPRAP to offset depletion impacts and is not likely to jeopardize the continued existence of the species and is not likely to destroy or adversely modify designated critical habitat.

The reinitiation criteria for the Yampa River PBO apply to all projects under the umbrella of the PBO. For your information the reinitiation notice from the Yampa River PBO is presented below.

REINITIATION NOTICE

This concludes formal consultation on the subject action. The Recovery Action Plan is an adaptive management plan because additional information, changing priorities, and the development of the States' entitlement may require modification of the Recovery Action Plan. Therefore, the Recovery Action Plan is reviewed annually and updated and changed when necessary and the required time frames include changes in timing approved by means of the normal procedures of the Recovery Program, as explained in the description of the proposed action. Every 2 years, for the life of the Recovery Program, the Service and Recovery Program will review implementation of the Recovery Action Plan actions that are included in this BO to determine timely compliance with applicable schedules. As provided in 50 CFR section 402.16, reinitiation of formal consultation is required for new projects where discretionary Federal Agency involvement or control over the action has been retained (or is authorized by law) and under the following conditions:

1. hThe amount or extent of take specified in the incidental take statement for this opinion is exceeded. The implementation of the Recovery actions contained in this opinion will further decrease the likelihood of take caused by water depletion impacts.

2. hNew information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion. In preparing this opinion, the Service describes the positive and negative effects of the action it anticipates and considered in the section of the opinion entitled "EFFECTS OF THE ACTION." New information would include, but is not limited to, not achieving one or more response criteria that will be developed as part of the terms and conditions to minimize incidental take. The Service retains the authority to determine whether a significant decline in population has occurred, but will consult with the Recovery Program's Biology Committee prior to making its determination. In the event that one or more population criteria have not been achieved, the Service is to first rely on the Recovery Program to take timely actions to correct the deficiency.

3. hThe section 7 regulations (50 CFR 402.16 (c)) state that reinitiation of consultation is required if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the BO. It would be considered a change in the action subject to consultation if the Recovery Action Plan items listed as part of the proposed action (Green River Action Plan: Yampa and Little Snake rivers) in this opinion are not implemented within the required timeframes. Also, the analysis for this BO assumed implementation of the Green River Mainstem Action Plan of the RIPRAP because the Colorado pikeminnow (*Ptychocheilus lucius)* and razorback sucker *(Xyrauchen texanus*) that occur in the Yampa River use the Green River and are considered one population. The essential elements of the Green River Plan are as follows: 1) provide and protect instream flows; 2) restore floodplain habitat; 3) reduce impacts of nonnative fishes; 4) augment or restore populations; and 5) monitor populations and conduct research to support recovery actions. The analysis for the non-jeopardy determination of the Yampa Plan that includes about 53,000 acre-feet/year of new water depletions from the Yampa River Basin relies on the Recovery Program to provide and protect flows on the Green River. Specifically, the analysis for this BO assumed operation of Flaming Gorge Dam to meet the flow recommendations according to the upcoming Record of Decision on the Flaming Gorge Dam Operations environmental impact statement (EIS)[1].

   The Service recognizes that the RIPRAP is an adaptive management plan that is modified according to additional information and changing priorities. The plan is reviewed annually and updated when necessary. The required timeframes include changes in timing approved by means of normal procedures of the Recovery Program. In 2006, and every 2 years thereafter, for the life of the Recovery Program, the Service and the Recovery Program will review implementation of the RIPRAP actions to determine timely compliance with applicable schedules.

[1] That decision has not been made as of the date of this letter.

Also, the analysis for this BO assumed impacts to peak flows based on anticipated future uses of water, if water is used in a substantially different timing regime that adversely affects endangered fishes in a way not considered in this opinion, then reinitiation of consultation is required. The Recovery Program will monitor all new water projects that deplete more than 100 acre-feet/year to determine their impacts to peak flows on the Yampa River. In addition, the Recovery Program will monitor projects individually depleting 100 acre-feet/year or less in cumulative increments of 3,000 acre-feet/year to determine their impacts to peak flows.

4. QThe Service lists new species or designates new or additional critical habitat, where the level or pattern of depletions covered under this opinion may have an adverse impact on the newly listed species or habitat. If the species or habitat may be adversely affected by depletions, the Service will reinitiate consultation on the PBO as required by its section 7 regulations. The Service will first determine whether the Recovery Program can avoid such impact or can be amended to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for such depletion impacts. If the Recovery Program can avoid the likelihood of jeopardy and/or adverse modification of critical habitat no additional recovery actions for individual projects would be required, if the avoidance actions are included in the Recovery Action Plan. If the Recovery Program is not likely to avoid the likelihood of jeopardy and/or adverse modification of critical habitat then the Service will reinitiate consultation and develop reasonable and prudent alternatives.

If the annual assessment indicates that either the recovery actions specified in this opinion have not been completed or that the status of all four fish species has not sufficiently improved, the Service intends to reinitiate consultation on the Yampa Plan to specify additional measures to be taken by the Recovery Program to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletions. If other measures are determined by the Service or the Recovery Program to be needed for recovery prior to the review, they can be added to the Recovery Action Plan according to standard procedures, outlined in that plan. If the Recovery Program is unable to complete those actions which the Service has determined to be required, consultation on projects with a Federal nexus may be reinitiated in accordance with ESA regulations and this opinion's reinitiation requirements. The Service may also reinitiate consultation on the Recovery Program if fish populations do not improve according to the population response criteria to be developed within one year of the issuance of this BO. Failure to maintain a positive response, whenever achieved, will be considered a negative response and subject to reinitiation.

If the Service reinitiates consultation, it will first provide information on the status of the species and recommendations for improving population numbers to the Recovery Program. Only if the Recovery Program does not implement recovery actions to improve the status of the species, will the Service reinitiate consultation with individual projects. The Service intends to reinitiate consultations simultaneously on all depletions.

All individual consultations conducted under this programmatic opinion will contain language requesting the applicable Federal agency to retain sufficient authority to reinitiate consultation should reinitiation become necessary. The recovery agreements to be signed by non-Federal

entities who rely on the Recovery Program to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts related to their projects will provide that such non-Federal entities also must request the Federal agency to retain such authority. Non-Federal entities will agree by means of recovery agreements to participate during reinitiated consultations in finding solutions to the problem which triggered the reinitiation of consultation.

If you have any questions regarding this consultation or would like to discuss it in more detail, please contact Kurt Broderdorp of our Grand Junction Ecological Services Field Office at (970) 243-2778, extension 24.

Attachment

cc: FWS/UCREFRP, Denver

KBroderdorp:OSMTrapperMinePermitRenewalAppNo6BOF012YP041.docx:062113:KM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
764 Horizon Drive, Building B
Grand Junction, Colorado 81506-3946

IN REPLY REFER TO
ES/GJ-6-CO-04-F-012-YP26
TAILS 65413-2009-F-0179

09-09-22-05

September 17, 2009

Memorandum

To: Natural Resource Specialist, Office of Surface Mining, Reclamation and Enforcement, Denver, Colorado

From: Acting Western Colorado Supervisor, Fish and Wildlife Service, Ecological Services, Grand Junction, Colorado

Subject: Trapper Mine PR-06 Biological Opinion

This responds to your June 15, 2009, request for formal consultation under section 7 of the Endangered Species Act of 1973, as amended. Your request is for the Trapper Mine located in Moffat County, Colorado, six miles south of Craig. The Mine proposes to mine coal from an additional 312 acres within its 10,382.3-acre permit area. The subject project will cause an average annual depletion of 94.8 acre-feet/year to the Yampa River, which may affect the endangered Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), bonytail (*Gila elegans*), and their designated critical habitat.

A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin was initiated on January 22, 1988. The Recovery Program was intended to be the reasonable and prudent alternative to avoid jeopardy to the endangered fishes from impacts of water depletions to the Upper Colorado River Basin. In order to further define and clarify the process in the Recovery Program, a section 7 agreement was implemented on October 15, 1993, by the Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP) which identifies actions currently believed to be required to recover the endangered fishes in the most expeditious manner.

On January 10, 2005, the Service issued the final programmatic biological opinion on the *Management Plan for Endangered Fishes in the Yampa River Basin* (this document is available for viewing at the following internet address: http://www.r6.fws.gov/crrip/yampaPBO.htm). The Service has determined that projects that fit under the umbrella of the Yampa River PBO would avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts to the Yampa River basin. For projects involving water depletions less than 100 AF/year to fit under the umbrella of the Yampa River PBO, the Federal agency requesting consultation must document the project location, the amount of the water depletion, identify if

the depletion is new or historic, and provide the information to the Service when consultation is initiated. This information was provided in your consultation request; therefore, the requirements have been met for the subject project to fit under the umbrella of the Yampa River PBO.

The Service requests that the Office of Surface Mining, Reclamation, and Enforcement retain discretionary Federal authority for the subject project in case reinitiation of section 7 consultation is required. For your information the reinitiation notice from the Yampa River PBO is presented below.

REINITIATION NOTICE

This concludes formal consultation on the subject action. The Recovery Action Plan is an adaptive management plan because additional information, changing priorities, and the development of the States' entitlement may require modification of the Recovery Action Plan. Therefore, the Recovery Action Plan is reviewed annually and updated and changed when necessary and the required time frames include changes in timing approved by means of the normal procedures of the Recovery Program, as explained in the description of the proposed action. Every 2 years, for the life of the Recovery Program, the Service and Recovery Program will review implementation of the Recovery Action Plan actions that are included in this biological opinion to determine timely compliance with applicable schedules. As provided in 50 CFR section 402.16, reinitiation of formal consultation is required for new projects where discretionary Federal Agency involvement or control over the action has been retained (or is authorized by law) and under the following conditions:

1. _The amount or extent of take specified in the incidental take statement for this opinion is _ exceeded. The implementation of the Recovery actions contained in this opinion will _ further decrease the likelihood of take caused by water depletion impacts. _

2. _New information reveals effects of the action that may affect listed species or critical _ habitat in a manner or to an extent not considered in this opinion. In preparing this _ opinion, the Service describes the positive and negative effects of the action it anticipates _ and considered in the section of the opinion entitled "EFFECTS OF THE ACTION." _ New information would include, but is not limited to, not achieving one or more response _ criteria that will be developed as part of the terms and conditions to minimize incidental _ take. The Service retains the authority to determine whether a significant decline in _ population has occurred, but will consult with the Recovery Program's Biology _ Committee prior to making its determination. In the event that one or more population _ criteria have not been achieved, the Service is to first rely on the Recovery Program to _ take timely actions to correct the deficiency. _

3. _The section 7 regulations (50 CFR 402.16 (c)) state that reinitiation of consultation is _ required if the identified action is subsequently modified in a manner that causes an effect _ to the listed species or critical habitat that was not considered in the biological opinion. It _ would be considered a change in the action subject to consultation if the Recovery Action _

Plan items listed as part of the proposed action (Green River Action Plan: Yampa and Little Snake rivers) in this opinion are not implemented within the required timeframes. Also, the analysis for this biological opinion assumed implementation of the Green River Mainstem Action Plan of the RIPRAP because the Colorado pikeminnow and razorback sucker that occur in the Yampa River use the Green River and are considered one population. The essential elements of the Green River Plan are as follows: 1) provide and protect instream flows; 2) restore floodplain habitat; 3) reduce impacts of nonnative fishes; 4) augment or restore populations; and 5) monitor populations and conduct research to support recovery actions. The analysis for the non-jeopardy determination of the Yampa Plan that includes about 53,000 AF/year of new water depletions from the Yampa River Basin relies on the Recovery Program to provide and protect flows on the Green River. Specifically, the analysis for this biological opinion assumed operation of Flaming Gorge Dam to meet the flow recommendations according to the Record of Decision on the Flaming Gorge Dam Operations environmental impact statement (EIS).

The Service recognizes that the RIPRAP is an adaptive management plan that is modified according to additional information and changing priorities. The plan is reviewed annually and updated when necessary. The required timeframes include changes in timing approved by means of normal procedures of the Recovery Program. In 2006, and every 2 years thereafter, for the life of the Recovery Program, the Service and the Recovery Program will review implementation of the RIPRAP actions to determine timely compliance with applicable schedules.

Also, the analysis for this biological opinion assumed impacts to peak flows based on anticipated future uses of water, if water is used in a substantially different timing regime that adversely affects endangered fishes in a way not considered in this opinion, then reinitiation of consultation is required. The Recovery Program will monitor all new water projects that deplete more than 100 AF/year to determine their impacts to peak flows on the Yampa River. In addition, the Recovery Program will monitor projects individually depleting 100 AF/year or less in cumulative increments of 3,000 AF/year to determine their impacts to peak flows.

4. ÅThe Service lists new species or designates new or additional critical habitat, where the level or pattern of depletions covered under this opinion may have an adverse impact on the newly listed species or habitat. If the species or habitat may be adversely affected by depletions, the Service will reinitiate consultation on the programmatic biological opinion as required by its section 7 regulations. The Service will first determine whether the Recovery Program can avoid such impact or can be amended to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for such depletion impacts. If the Recovery Program can avoid the likelihood of jeopardy and/or adverse modification of critical habitat no additional recovery actions for individual projects would be required, if the avoidance actions are included in the Recovery Action Plan. If the Recovery Program is not likely to avoid the likelihood of jeopardy and/or adverse modification of critical habitat then the Service will reinitiate consultation and develop reasonable and prudent alternatives.

If the annual assessment indicates that either the recovery actions specified in this opinion have not been completed or that the status of all four fish species has not sufficiently improved, the Service intends to reinitiate consultation on the Yampa Plan to specify additional measures to be taken by the Recovery Program to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletions. If other measures are determined by the Service or the Recovery Program to be needed for recovery prior to the review, they can be added to the Recovery Action Plan according to standard procedures, outlined in that plan. If the Recovery Program is unable to complete those actions which the Service has determined to be required, consultation on projects with a Federal nexus may be reinitiated in accordance with ESA regulations and this opinion's reinitiation requirements. The Service may also reinitiate consultation on the Recovery Program if fish populations do not improve according to the population response criteria to be developed within one year of the issuance of this biological opinion. Failure to maintain a positive response, whenever achieved, will be considered a negative response and subject to reinitiation.

If the Service reinitiates consultation, it will first provide information on the status of the species and recommendations for improving population numbers to the Recovery Program. Only if the Recovery Program does not implement recovery actions to improve the status of the species, will the Service reinitiate consultation with individual projects. The Service intends to reinitiate consultations simultaneously on all depletions.

All individual consultations conducted under this programmatic opinion will contain language requesting the applicable Federal agency to retain sufficient authority to reinitiate consultation should reinitiation become necessary. The recovery agreements to be signed by non-Federal entities who rely on the Recovery Program to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts related to their projects will provide that such non-Federal entities also must request the Federal agency to retain such authority. Non-Federal entities will agree by means of recovery agreements to participate during reinitiated consultations in finding solutions to the problem which triggered the reinitiation of consultation.

This concludes formal consultation for the subject project. If you have any questions regarding this consultation or would like to discuss it in more detail, please contact Terry Ireland of our Grand Junction Ecological Services Field Office at (970)243-2778, extension 16.

cc: FWS/UCREFRP, Denver

TIreland:OSMTrapperMineBOYP26.doc:091709:KM

Appendix B

Trapper Mining Inc. Conservation Measures Commitment Letter

TRAPPER MINE

TRAPPER MINING INC.

November 9, 2015

Mr. Creed Clayton
United State Fish and Wildlife Service
Ecological Services
Western Colorado Field Office
445 West Gunnison Ave
Suite 240
Grand Junction, Colorado 81501-5711

Office of Surface Mining Reclamation and Enforcement (OSMRE) Biological Assessment for the Trapper Mine Mining Plan Modification Wildlife Mitigation Measures

Dear Mr. Clayton:

Thank you for meeting with Forrest Luke and I on behalf of Trapper, OSMRE and AECOM on October 23, 2015 regarding OSMRE's Biological Assessment (BA) for the Trapper Mine Mining Plan Modification and Environmental Assessment. We appreciated having a good and productive discussion concerning wildlife mitigation measures as the analysis of the BA goes forward.

As noted, prior to our meeting, OSMRE personnel directed Trapper to consider the use of the Colowyo wildlife mitigation commitments as a guide scaled for the difference in production between the two projects. Trapper believes mitigation measures totaling $53,550 to be a similar commitment amount based upon the tons of coal being analyzed by the two separate actions (101.3 Mtons for Colowyo vs. 19.1 Mtons for Trapper). Trapper will voluntarily raise this amount to $60,000 to be spent on Mitigation Measures as agreed upon by the OSMRE, USFWS and Trapper.

Based on the discussions of October 23, 2015, and subsequent conversations with OSMRE and AECOM personnel, Trapper plans to commit $45,000 for Colorado Fish Research, $10,000 for Colorado Fish On-The-Ground Recovery Efforts and $5,000 for a Yellow-billed Cuckoo protocol survey within the recently proposed Critical Habitat Area. Trapper will develop a MOU or agreement document for signature by the agency involved in each of these measures detailing money to be provided and the purpose for the money. These proposed conservation measures would become mandatory commitments with the approval of the BA and issuance of the BO. Trapper commits to fund these projects within 45 days of issuance of the Trapper Mine BO.

P.O. Box 187 Craig, Colorado 81626 (970) 824-4401 !

I. $45,000 Commitment for Research Purposes for the Colorado River Fish

a. ×Water Quality Testing

Trapper will be able to provide funding in the amount of $23,280 for quarterly water quality testing in two locations along both the White River and the Yampa River, beginning in June 2016 and ending in March of 2019. This amount would allow sampling for 12 quarters of data from each of the four designated sites, or a total of 48 individual water quality samples. The water from these sites would be tested for both total mercury (Hg) and methylmercury (MeHg).

Please provide us with contact information for the USGS Water Quality Division (GJ) personnel that you have been discussing this project with so that Trapper can begin to formalize its commitment.

b. ×Fish Tissue Mercury Sampling

Trapper will provide $21,720 for a mercury deposition study that will be conducted by the USGS (in cooperation with the BLM's Little Snake Field Office) for the investigation of MeHg uptake in fish tissues to be conducted by Colorado Parks and Wildlife.

We have spoken with Desa Ausmus (BLM LSFO Wildlife Biologist) about the fish-tissue mercury sampling effort she is arranging with USGS (Fort Collins). Ms. Ausmus indicated USGS could likely use some supplemental funds to add to the effort they are planning (to provide more and better data and results). Her belief is that the $65,000 that BLM has committed to this study would last them approximately 3 years, although project details are still being worked out. This study is to help find out what the current mercury concentrations (and possibly other minerals) are in fish in the Yampa and White Rivers. Most likely a surrogate fish species (probably smallmouth bass) would need to be sampled due to the difficulty of obtaining enough endangered fish for sampling. Trapper will continue to work with Ms. Ausmus and her USGS contact (Travis Schmidt) to formalize its commitment.

II. $10,000 Commitment for Colorado River Fish Recovery Efforts

Trapper will provide $10,000 for recovery actions that are managed by the Upper Colorado River Endangered Fish Recovery Program (Recovery Program). Trapper would provide the funding to the National Fish and Wildlife Foundation to distribute to the Recovery Program.

We understand you have had discussions with Kevin MacAbee, with the Upper Colorado Endangered Fish Recovery Program, concerning their current projects and funding status.

We would appreciate receiving his contact information so Trapper can begin to formalize that commitment.

III. <u>$5,000 commitment for a Protocol Survey for the Yellow-Billed Cuckoo</u>

Trapper will provide $5,000 for a protocol survey during the breeding season in proposed critical habitat along the Yampa River. Trapper would either conduct the survey itself or hire a contractor to perform the survey. The results of the survey will be provided to USFWS. Thanks for noting that USFWS does offer training in protocol surveys for the Yellow-billed Cuckoo. Trapper understands that and will ensure that whoever does the survey will be trained in accordance with USFWS guidelines for conducting those surveys and has the correct certifications in-place. Trapper is in contact with Jason Beason, Special Monitoring Projects Coordinator, Bird Conservancy of the Rockies and will continue to work with them to formalize its commitment.

Again, thank you for our productive discussions and Trapper will proceed accordingly.

Stephen R. Hinkemeyer, Engineering & Business Development Manager

Forrest Luke, Environmental & Public Affairs Manager

Copies:
Barb Osmundson, USFWS
Nicole Caveny, OSMRE
Marcello Calle, OSMRE
Bob Postle, OSMRE
Desa Ausmus, BLM LSFO
Rob DeBaca, AECOM
Anne Baldrige, AECOM
Jim Mattern, Trapper Mine
Kathy Innes, Trapper Mine

Appendix C

American Indian Consultation

United States Department of the Interior

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT

Western Region Office
1999 Broadway, Suite 3320
Denver, CO 80202-3050

November 5, 2015

Chairman Herman G. Honanie
P.O. Box 123
Kykotsmovi, AZ 86039

Dear Chairman Honanie,

The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region, will prepare an environmental assessment (EA) to analyze environmental impacts of a Federal mining plan approval for current and future mining within Federal Coal Leases Nos. C-079641 and C-07519 held by Trapper Mining Inc. as part of the Trapper Mine. The EA will cover the time period beginning July 1, 2015, and continuing through the planned life of mine for the portion of the two Federal coal lease areas lying within the approved Surface Mining Control and Reclamation Act of 1977 (SMCRA) Permit Area (the Project). As required by the National Environmental Policy Act of 1969 (NEPA), the EA will disclose the potential for direct, indirect, and cumulative impacts to the environment from the Project. In accordance with the 2011 Department of Interior Policy on Consultation with Indian Tribes and 36 CFR Part 800.2(c)(2)(ii), the regulations implementing Section 106 of the National Historic Preservation Act of 1966 (as amended), OSMRE requests continued consultation with your tribe for the stages of the proposal development and implementation of the final federal action.

Preparation of the EA will be completed pursuant to the Court-approved Joint Proposed Remedy, as approved by the United States District Court for the District of Colorado on September 14, 2015, in the case entitled *WildEarth Guardians v. U.S. Office of Surface Mining et al.*, Case 1:13-cv-00518-RBJ (D. Colo. 2015). As part of the Court-approved remedy, OSMRE agreed to conduct a new NEPA analysis for Trapper's current and future mining activities within Federal Coal Leases Nos. C-079641 and C-07519.

The Trapper Mine is located approximately 6 miles south of the town of Craig in Moffat County, Colorado, east of Colorado Highway 13. The proposed Project is occurring on two federal coal leases administered by the Bureau of Land Management (BLM) and located within the eastern portion of the Trapper Mine's approved SMCRA Permit Area. Federal Coal Lease C-07519 was issued by the BLM in June 1958 and Federal Coal Lease C-079641 was issued by the BLM in October 1962. The leases

within the SMCRA Permit Area cover a total of approximately 2,423 acres of Federal mineral estate. As of July 1, 2015, approximately 19 million tons of recoverable Federal coal remains within the Project area. The Trapper Mine uses a combination of dragline, truck shovel, and highwall mining methods to remove the overburden and mine the coal.

The EA will update, clarify, and provide new and additional environmental information for the Project. As a result of the EA process, OSMRE will determine whether or not there are significant environmental impacts. An environmental impact statement will be prepared if the EA identifies significant impacts. If a finding of no significant impact is reached, and pursuant to 30 CFR 746.13, OSMRE will prepare and submit to the Assistant Secretary for Lands and Minerals Management (ASLM) a mining plan decision document recommending approval, disapproval, or conditional approval of the mining plan. The ASLM will approve, disapprove, or conditionally approve the mining plan approval document within the mining plan decision document, as required under the Mineral Leasing Act of 1920.

A site that may be of interest is the Recurve Rockshelter (site number 5MF948). The site was first recorded in 1980 and was plotted in a side canyon of an intermittent tributary of the Williams Fork. The location of the 5MF948 can be found on Map M45 in the Trapper Mining Inc. (Trapper) Permit. In 2013, Trapper hired archaeological consulting firm Grand River Institute (GRI) to complete three block surveys to allow for planned expansion of the mine to the east. GRI found that 5MF948 was incorrectly documented. The site is actually located within the permit area approximately 700 feet of mining projected to occur in 2016 based on map M10a of the permit. Site 5MF948 appears to consist of a number of petroglyphs on an outcrop of the Twentymile Sandstone. The outcrop has a south southeast aspect and is located on the opposite side of the mountain from where the Trapper mine is located. Unfortunately, a number of the petroglyphs have been shot with a firearm and have been damaged. The Colorado Division of Reclamation and Mining Safety (DRMS) have not found evidence that the damage has occurred from mining operation. However, DRMS has required that Trapper complete a study to evaluate if 5MF948 is far enough away from blasting at the mine, and given the expected sizes of the blasts, whether or not site will be affected.

If you are interested, we would be willing to meet with you at your convenience to discuss the proposed mining plan modification and its impact on cultural resources. If you wish to provide comments please send those to:

OSMRE WR
C/O: Nicole Caveny
Trapper Mine EA
1999 Broadway, Suite 3320

You also have the option to submit comments and/or questions to: OSM-NEPA-CO@OSMRE.gov, please ensure the subject line reads: ATTN: OSMRE, Trapper Mine MPDD EA. Additional information regarding the Project may be obtained from Nicole Caveny, telephone number (303) 293-5078. We would appreciate receiving those comments with the next 60 days. For your convenience, information about the South Taylor Project can be accessed on the OSMRE Western Region website at: http://www.wrcc.osmre.gov/initiatives/trappermine.shtm.

Thank you for taking the time to consider this project. If this letter has not been sent to the correct representative, please help us update our records. OSMRE will be in contact with your office in the coming weeks to inquire if you have had time to consider this project further. In the meantime, if you have any questions, please contact me directly at (303) 293-5035.

Sincerely,

Marcelo Calle, Manager
Field Operations Branch

Copy:
Alfred Lomahquahu, Jr., Vice Chairman
Vernita Selestewa, Tribal Secretary

Attachments

United States Department of the Interior

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT

Western Region Office
1999 Broadway, Suite 3320
Denver, CO 80202-3050

October 27, 2015

President Russell Begaye
P.O. Box 7440
Window Rock, AZ 86515

Dear President Begaye,

The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region, will prepare an environmental assessment (EA) to analyze environmental impacts of a Federal mining plan approval for current and future mining within Federal Coal Leases Nos. C-079641 and C-07519 held by Trapper Mining Inc. as part of the Trapper Mine. The EA will cover the time period beginning July 1, 2015, and continuing through the planned life of mine for the portion of the two Federal coal lease areas lying within the approved Surface Mining Control and Reclamation Act of 1977 (SMCRA) Permit Area (the Project). As required by the National Environmental Policy Act of 1969 (NEPA), the EA will disclose the potential for direct, indirect, and cumulative impacts to the environment from the Project. In accordance with the 2011 Department of Interior Policy on Consultation with Indian Tribes and 36 CFR Part 800.2(c)(2)(ii), the regulations implementing Section 106 of the National Historic Preservation Act of 1966 (as amended), OSMRE requests continued consultation with your tribe for the stages of the proposal development and implementation of the final federal action.

Preparation of the EA will be completed pursuant to the Court-approved Joint Proposed Remedy, as approved by the United States District Court for the District of Colorado on September 14, 2015, in the case entitled *WildEarth Guardians v. U.S. Office of Surface Mining et al.*, Case 1:13-cv-00518-RBJ (D. Colo. 2015). As part of the Court-approved remedy, OSMRE agreed to conduct a new NEPA analysis for Trapper's current and future mining activities within Federal Coal Leases Nos. C-079641 and C-07519.

The Trapper Mine is located approximately 6 miles south of the town of Craig in Moffat County, Colorado, east of Colorado Highway 13. The proposed Project is occurring on two federal coal leases administered by the Bureau of Land Management (BLM) and located within the eastern portion of the Trapper Mine's approved SMCRA Permit Area. Federal Coal Lease C-07519 was issued by the BLM in June 1958 and Federal Coal Lease C-079641 was issued by the BLM in October 1962. The leases

within the SMCRA Permit Area cover a total of approximately 2,423 acres of Federal mineral estate. As of July 1, 2015, approximately 19 million tons of recoverable Federal coal remains within the Project area. The Trapper Mine uses a combination of dragline, truck shovel, and highwall mining methods to remove the overburden and mine the coal.

The EA will update, clarify, and provide new and additional environmental information for the Project. As a result of the EA process, OSMRE will determine whether or not there are significant environmental impacts. An environmental impact statement will be prepared if the EA identifies significant impacts. If a finding of no significant impact is reached, and pursuant to 30 CFR 746.13, OSMRE will prepare and submit to the Assistant Secretary for Lands and Minerals Management (ASLM) a mining plan decision document recommending approval, disapproval, or conditional approval of the mining plan. The ASLM will approve, disapprove, or conditionally approve the mining plan approval document within the mining plan decision document, as required under the Mineral Leasing Act of 1920.

A site that may be of interest is the Recurve Rockshelter (site number 5MF948). The site was first recorded in 1980 and was plotted in a side canyon of an intermittent tributary of the Williams Fork. The location of the 5MF948 can be found on Map M45 in the Trapper Mining Inc. (Trapper) Permit. In 2013, Trapper hired archaeological consulting firm Grand River Institute (GRI) to complete three block surveys to allow for planned expansion of the mine to the east. GRI found that 5MF948 was incorrectly documented. The site is actually located within the permit area approximately 700 feet of mining projected to occur in 2016 based on map M10a of the permit. Site 5MF948 appears to consist of a number of petroglyphs on an outcrop of the Twentymile Sandstone. The outcrop has a south southeast aspect and is located on the opposite side of the mountain from where the Trapper mine is located. Unfortunately, a number of the petroglyphs have been shot with a firearm and have been damaged. The Colorado Division of Reclamation and Mining Safety (DRMS) have not found evidence that the damage has occurred from mining operation. However, DRMS has required that Trapper complete a study to evaluate if 5MF948 is far enough away from blasting at the mine, and given the expected sizes of the blasts, whether or not site will be affected.

If you are interested, we would be willing to meet with you at your convenience to discuss the proposed mining plan modification and its impact on cultural resources. If you wish to provide comments please send those to:

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C/O: Nicole Caveny
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Sincerely,

Marcelo Calle, Manager
Field Operations Branch

Copy:
Jonathan Nez, Vice President
Dr. Alan S. Downer, THPO

Attachments

United States Department of the Interior

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT

Western Region Office
1999 Broadway, Suite 3320
Denver, CO 80202-3050

October 27, 2015

Chairman Darwin St. Clair
P.O. Box 538
Fort Washakie, WY 82514

Dear Chairman St. Clair,

The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region, will prepare an environmental assessment (EA) to analyze environmental impacts of a Federal mining plan approval for current and future mining within Federal Coal Leases Nos. C-079641 and C-07519 held by Trapper Mining Inc. as part of the Trapper Mine. The EA will cover the time period beginning July 1, 2015, and continuing through the planned life of mine for the portion of the two Federal coal lease areas lying within the approved Surface Mining Control and Reclamation Act of 1977 (SMCRA) Permit Area (the Project). As required by the National Environmental Policy Act of 1969 (NEPA), the EA will disclose the potential for direct, indirect, and cumulative impacts to the environment from the Project. In accordance with the 2011 Department of Interior Policy on Consultation with Indian Tribes and 36 CFR Part 800.2(c)(2)(ii), the regulations implementing Section 106 of the National Historic Preservation Act of 1966 (as amended), OSMRE requests continued consultation with your tribe for the stages of the proposal development and implementation of the final federal action.

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in June 1958 and Federal Coal Lease C-079641 was issued by the BLM in October 1962. The leases within the SMCRA Permit Area cover a total of approximately 2,423 acres of Federal mineral estate. As of July 1, 2015, approximately 19 million tons of recoverable Federal coal remains within the Project area. The Trapper Mine uses a combination of dragline, truck shovel, and highwall mining methods to remove the overburden and mine the coal.

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C/O: Nicole Caveny
Trapper Mine EA
1999 Broadway, Suite 3320

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at: http://www.wrcc.osmre.gov/initiatives/trappermine.shtm.

Thank you for taking the time to consider this project. If this letter has not been sent to the correct representative, please help us update our records. OSMRE will be in contact with your office in the coming weeks to inquire if you have had time to consider this project further. In the meantime, if you have any questions, please contact me directly at (303) 293-5035.

Sincerely,

Marcelo Calle, Manager
Field Operations Branch

Copy:
Clint Wagon, Co-Chairman
Willie Ferris, Historic Preservation

Attachments

United States Department of the Interior

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT

Western Region Office
1999 Broadway, Suite 3320
Denver, CO 80202-3050

October 27, 2015

Chairman Clement Frost
P.O. Box 737
356 Ouray Drive
Ignacio, CO 81137

Dear Chairman Frost,

The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region, will prepare an environmental assessment (EA) to analyze environmental impacts of a Federal mining plan approval for current and future mining within Federal Coal Leases Nos. C-079641 and C-07519 held by Trapper Mining Inc. as part of the Trapper Mine. The EA will cover the time period beginning July 1, 2015, and continuing through the planned life of mine for the portion of the two Federal coal lease areas lying within the approved Surface Mining Control and Reclamation Act of 1977 (SMCRA) Permit Area (the Project). As required by the National Environmental Policy Act of 1969 (NEPA), the EA will disclose the potential for direct, indirect, and cumulative impacts to the environment from the Project. In accordance with the 2011 Department of Interior Policy on Consultation with Indian Tribes and 36 CFR Part 800.2(c)(2)(ii), the regulations implementing Section 106 of the National Historic Preservation Act of 1966 (as amended), OSMRE requests continued consultation with your tribe for the stages of the proposal development and implementation of the final federal action.

Preparation of the EA will be completed pursuant to the Court-approved Joint Proposed Remedy, as approved by the United States District Court for the District of Colorado on September 14, 2015, in the case entitled *WildEarth Guardians v. U.S. Office of Surface Mining et al.*, Case 1:13-cv-00518-RBJ (D. Colo. 2015). As part of the Court-approved remedy, OSMRE agreed to conduct a new NEPA analysis for Trapper's current and future mining activities within Federal Coal Leases Nos. C-079641 and C-07519.

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Sincerely,

Marcelo Calle, Manager
Field Operations Branch

Copy:
Elise Redd, Culture Department Director
Alden Naranjo, NAGPRA Coordinator

Attachments

United States Department of the Interior

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT

Western Region Office
1999 Broadway, Suite 3320
Denver, CO 80202-3050

October 27, 2015

Chairperson Gordon Howell
P.O. Box 190
Ft. Duchesne, UT 84026

Dear Chairperson Howell,

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Marcelo Calle, Manager
Field Operations Branch

Copy:
Ronald Wopsock, Vice Chairperson
Betsy Chapoose, NAGPRA Representative

Attachments

United States Department of the Interior

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT

Western Region Office
1999 Broadway, Suite 3320
Denver, CO 80202-3050

October 27, 2015

Chairman Manuel Heart
124 W. Mike Wash Road Tribal Complex
P.O. Drawer JJ
Towaoc, CO 81334

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Sincerely,

Marcelo Calle, Manager
Field Operations Branch

Copy:
Juanita Plentyholes, Vice-Chairwoman
Terry Knight, THPO

Attachments

Archeological Site 5MF948; Petroglyph

Archeological Site 5MF948; Petroglyph

Archeological Site 5MF948; Petroglyph

Archeological Site 5MF948; Petroglyph

Archeological Site 5MF948; Petroglyph

Archeological Site 5MF948; Petroglyph

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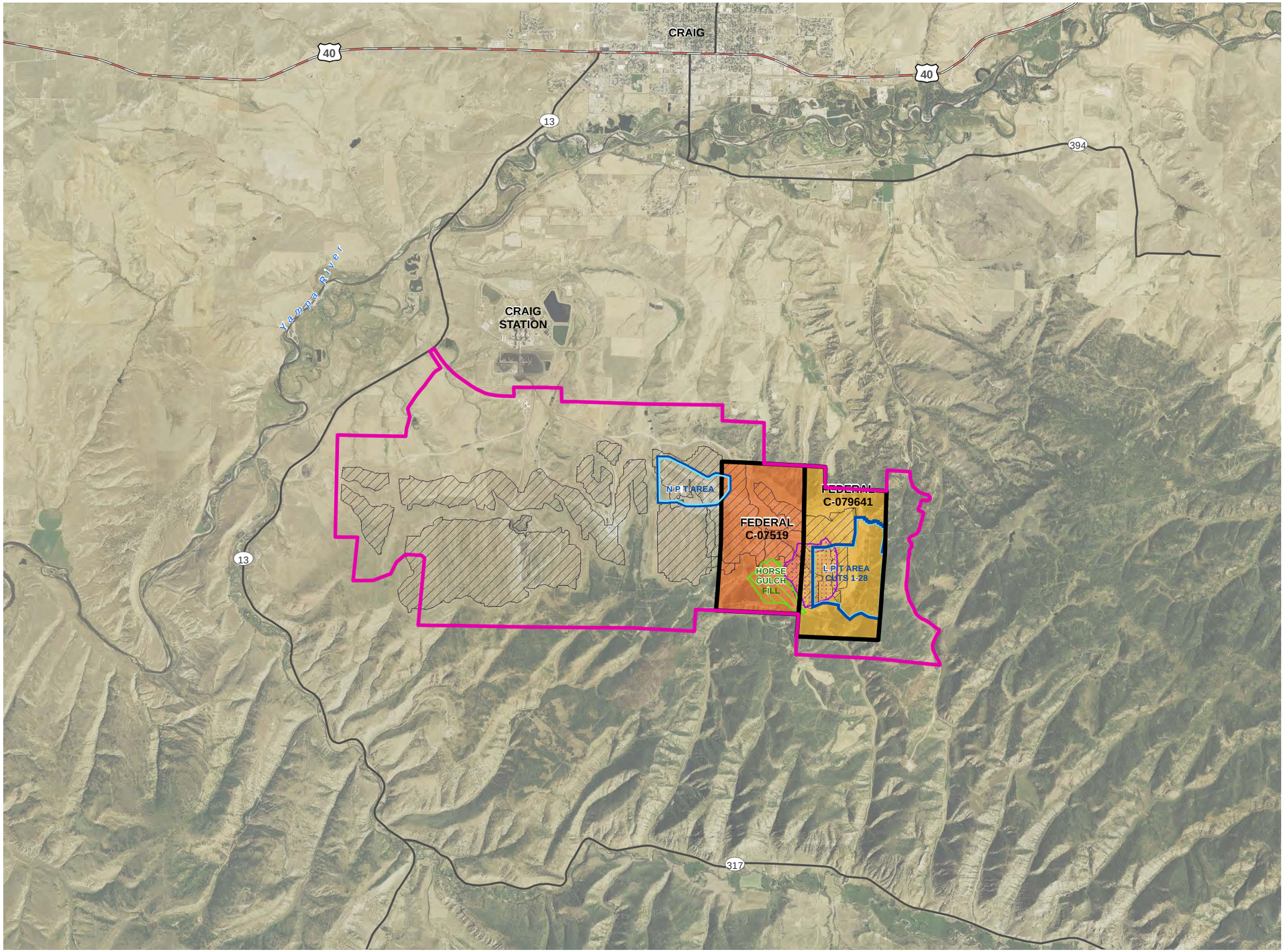
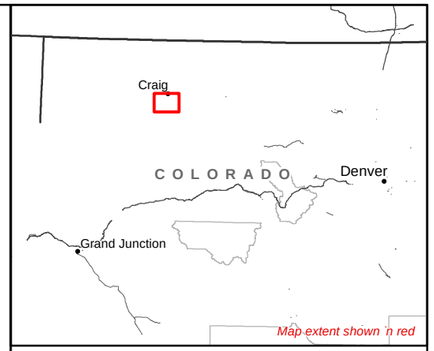
Archeological Site 5MF948; Petroglyph

Archeological Site 5MF948; Petroglyph

C:\Trapper_Mine_EA\FIGs\DOC\1_PDEIS\FIG_xx_Project_Location.mxd





Legend

- SMCRA Permit Boundary
- Project Area
- Pit Outline
- Horse Gulch Fill
- Landslide
- Previous Mining

Leases

- Federal | C-07519
- Federal | C-079641

DRAFT

0 1.25 2.5 Miles

0 4,000 8,000 Feet

N

Trapper Mine EA

Figure 1-1
Project Location

10/13/2015