U.S. Department of the Interior
Bureau of Land Management
Uncompahgre Field Office
2465 South Townsend Avenue
Montrose, CO 81401

ENVIRONMENTAL ASSESSMENT

NUMBER: DOI-BLM-CO-150-2008-53 EA

CASEFILE/PROJECT NUMBER: COC70615

PROJECT NAME: Elk Creek East Tract Coal Lease

LEGAL DESCRIPTION:

T.13S., R.90W., 6th PM.
Sec. 3: Portion of W½;
Sec. 4: N½ and Portion of N½S½;
Sec. 5: Portion of E½.

APPLICANT: Oxbow Mining, LLC

PURPOSE AND NEED FOR THE PROPOSED ACTION

Oxbow Mining, LLC (OMLLC) has submitted a Lease-by-Application (LBA) to the Bureau of Land Management (BLM) seeking to lease BLM mineral estate under public lands located adjacent to their currently operating coal mine (the Elk Creek Mine). The BLM action is to decide whether or not to lease the coal in response to the LBA. The purpose of this action is to evaluate the expanded development and mine operations of the Elk Creek East Tract (ECET), to continue producing coal at, or near, current levels for approximately 1 additional year. The need to prepare an environmental assessment in accordance with the National Environmental Policy Act (NEPA) was triggered when OMLLC submitted a Land Use LBA. The BLM is responding to an application to lease coal resources and is preparing an EA. The EA will analyze the action to provide access to Federal lands for the extraction of the coal resources, as established by the Mineral Leasing Act (MLA) of 1920, as amended by the Federal Coal Leasing Amendments Act (FCLAA) of 1976, and the Federal Land Policy and Management Act (FLPMA) of 1976.

BACKGROUND/INTRODUCTION

Currently, OMLLC operates the Elk Creek Mine, which is an underground longwall coal mine just north of the town of Somerset, Colorado (**Figure 1**). Coal mining has been conducted in the North Fork Valley for over 100 years. The Elk Creek Mine has been in operation since 2002, and produces approximately 5,000,000 tons of coal annually. The ECET would provide a logical extension of OMLLC's D-Seam workings within the current Elk Creek Mine. It would also allow the mine to continue producing coal at the current rate, instead of ceasing production as recoverable leased coal reserves are exhausted. The decision to lease these lands is a necessary requisite for mining, but is not in itself the enabling action that will allow mining. The most

detailed analysis prior to mine development would occur after the lease is issued, when the lessee files an application for a mining permit and mining plan approval, supported by extensive mining and reclamation plans.

PROPOSED ACTION AND ALTERNATIVES

Proposed Action

The Proposed Action for the LBA tract is to hold a competitive coal lease sale for the ECET (**Figure 2**). The tract encompasses approximately 785.79 acres of BLM-managed surface and mineral estate, and is located 1.5 miles northeast of Somerset, Colorado. This lease would allow OMLLC to continue operations by providing a logical extension to the mine's current D-Seam workings.

Proposed Action Alternative

Under the Proposed Action Alternative, coal would be mined underground from the ECET in 2 or 3 panels that would extend the life of the current mine by approximately 12 months. The 12 months of extended mine operations would be preceded by approximately 6 months of underground preparation work (which is within the current Mining Plan of Operation), which would be conducted while longwall operations continue on panels within the existing lease boundaries. Coal would be mined using underground longwall mining techniques. Pillars would be left in place in gateroads and bleeders, and full extraction of coal would occur in the longwall block. A typical belt conveyor would be used for transportation of the coal to the surface. Coal would be transported by belt from the existing surface facilities to the existing rail loadout located on private lands off Highway 133, near the town of Somerset, Colorado (**Figure 2**).

Surface disturbance would be temporary, and would be limited to approximately 5.63 acres for gob vent boreholes (GVBs), associated temporary drill pads, and light-use roads (**Table 1**). GVBs would ventilate potentially explosive gases from the mine in order to provide a safe environment for miners working underground. Venting of the potentially explosive gasses for the safety of the miners is the overriding consideration for the Proposed Action Alternative. Under the Proposed Action Alternative, no measures for capture and use or conversion of the coal mine methane (CMM) have been identified.

Up to 15 GVBs could be drilled from a total of 9 drill pads (six wells would utilize directional drilling in order to minimize surface disturbance). Drill pads for each borehole would be 80 feet x 130 feet (approximately 0.24 acres), and overall surface disturbance resulting from GVB pads would be approximately 2.15 acres (**Table 1**). Each drill pad would be cleared of surface vegetation and roughly leveled with a bulldozer. GVBs would be drilled from 10 to 50 feet above the target coal seam prior to mining. All of the GVBs would be drilled at the same time over a period of a few weeks before mining of the longwall panels. During the time the longwall panel beneath the GVBs is being mined, and for approximately 1 year after the completion of mining, the GVB pump would require weekly inspection and maintenance. Areas of the pad used for drilling and construction that would no longer be needed for operation and maintenance of the GVB would be reclaimed once the GVB pumps are in place. The operating size of each pad would be approximately 0.15 acre.

The following design features apply to the GVB pads:

- Reclamation would begin as soon as practical in order to restore the land to its previous productive use.
- Generally level areas would be chosen for pad locations in order to minimize the need for cutting and filling.
- Natural or artificial features, such as topography, vegetation, or artificial berms, would be used in order to help screen drill pads.
- Topsoil and soil from the pad site would be stockpiled for reclamation. Topsoil would be stockpiled separately from other soil horizons.
- Pads would be partially reclaimed, once drilling is completed, to an operating size of approximately 0.15 acre.
- Pads would be totally reclaimed after underground mining activities are completed, longwall panels are sealed, and there is no longer a need for mine ventilation (2 to 3 years from the time construction is completed).
- During reclamation, drill pads would be recontoured back to their original contour and rough texture, or to a natural looking contour that blends with the surrounding topography.
- Topsoil that has been stockpiled would be spread over the surface of the reclamation area, and any areas of compacted surface would be mechanically ripped in order to loosen the soil.
- Reclamation would use a BLM-approved seed mix (**Table 2**).
- Reclaimed areas would be monitored annually until they are considered successful. (Reclamation would be considered "successful" when evidence of surface erosion is no greater than in adjacent undisturbed areas, and when natural, perennial plant cover has achieved a density of 75 percent of the pre-disturbance plant cover.)

Access to drill pads would be provided by a combination of existing two-track ranch roads, reopened reclaimed light-use roads, and new temporary light-use roads (**Figure 2**). Reclaimed roads that would be reopened, and new temporary light-use roads, would be located entirely on BLM-managed public lands. Reopened roads and new roads would be minimally prepared by the clearing of vegetation and scratch-grading. A total of approximately 4.75 miles of light-use roads on BLM-managed public lands would be required in order to reach the drill pads. Of these 4.75 miles, approximately 2.45 miles would follow existing roads and would, therefore, not result in any new disturbance. An additional 2.05 miles (3.10 acres) of roads would be utilized that were initially constructed for exploration activities, subsequently reclaimed, and now proposed to be reopened. In addition, 1 segment of new road, approximately 0.25 miles long (0.38 acres), would be required. The total disturbance from road construction would be limited to the 2.05 miles of reopened reclaimed roads and the 0.25 miles of new roads, for a total of approximately 2.3 miles (3.48 acres) of disturbance (**Table 1**).

The following design features would apply to access roads:

- New roads and other linear facilities would be located and constructed to follow the contour of the landform or to mimic lines in the vegetation (avoiding straight roads and

steep slopes).

- New and reopened roads would be a maximum of 12.5 feet wide.
- Cutting and filling, and crowning and ditching, of temporary roads would be kept to the minimum necessary.
- After there is no longer a need for mine ventilation (2 to 3 years from the time construction is completed), both the reopened exploration roads and the new road segment would be reclaimed, recontoured, and revegetated in accordance with BLM direction, and using a BLM-approved seed mix (Table 2).
- Short-term reclamation would include partially revegetating roads in order to reduce the amount of bare ground created during construction and drilling activities.
- During reclamation, roads would be recontoured back to their original contour and rough texture in order to match the "texture" of the surrounding landscape.
- Roads would be ripped in order to loosen compacted soil, and seeded using a BLM-approved seed mix.

Under the Proposed Action Alternative, the mining operation would be short term, lasting approximately 1 year. Due to the economic limitations of this short-term operation, the Proposed Action Alternative includes venting methane gas directly into the atmosphere via GVBs and the mine ventilation system.

OMLLC will be required to continue to evaluate the technical and economic feasibility of converting or using gas resources that will be released to the atmosphere by the mine ventilation system. Within 1 year after the lease is approved, OMLLC (utilizing a neutral contractor approved by the BLM) will identify existing methane recovery projects that may be applicable to the ECET. At the end of the 1-year period, OMLLC will submit a report to the BLM outlining the technical and economic feasibility of mitigating, capturing, or using the CMM being vented, as applicable to the ECET. If needed, OMLLC will provide the BLM with summaries of the status of the projects identified on an annual basis. These summaries would include the effectiveness of methane capture, any operational difficulties or constraints, and an assessment of the suitability of the project cost and adaptability to the ECET until mining is complete.

Table 1 Surface disturbance under the Proposed Action Alternative

Disturbance	Linear miles	Acres
Drill pads	n/a	2.15
Reopened roads	2.05	3.10
New roads	0.25	0.38
Total	**2.30**	**5.63**

Table 2 Approved Seed Mixture for Use on BLM-managed Public Lands

Name (Variety)	Species	Pounds per acre
Western Wheatgrass (Arriba)	*Pascopyrum smithii*	0.96
Slender Wheatgrass (San Luis)	*Elymus trachycaulum*	0.66
Mountain Brome (Bromar)	*Bromus marginatus*	1.5
Big Bluegrass (Sherman)	*Poa ampla*	0.18
Bottlebrush Squirreltail	*Elymus elymoides*	0.96
Canada Wildrye	*Elymus canadensis*	0.94

Table 2 Approved Seed Mixture for Use on BLM-managed Public Lands

Name (Variety)	Species	Pounds per acre
American Vetch	*Vicia Americana*	0.6
Rocky Mountain Penstemon	*Penstemon strictus*	0.09
Western Yarrow	*Achillea lanulosa*	0.06
Total		**5.95** (double rate for broadcasting)

No Action Alternative

In accordance with the National Environmental Policy Act (NEPA) and the Council of Environmental Quality (CEQ) regulations, which require a No Action Alternative be presented in all environmental analyses in order to serve as a "base line" or "benchmark" from which to compare all proposed "action" alternatives, the No Action Alternative is analyzed in this EA. Under the No Action Alternative, the application for leasing would not be approved. As a result, Federal coal reserves within the ECET would not be recovered and would, therefore, be bypassed. Production at the Elk Creek Mine would eventually cease once coal reserves under existing leases were mined. Under the No Action Alternative, there would be no surface disturbance, ventilation of explosive gases, removal of coal, or any other impacts associated with the activities described under the Proposed Action Alternative.

Alternatives Considered but Eliminated from Detailed Analysis

If an alternative is considered during the environmental analysis process, but the agency decides not to analyze the alternative in detail, the agency must identify those alternatives and briefly explain why they were eliminated from detailed analysis (40 CFR 1502.14). An action alternative may be eliminated from detailed analysis if:

- it is ineffective (does not respond to the Purpose and Need for the Proposed Action);
- it is technically or economically infeasible (considering whether implementation of the alternative is likely, given past and current practice and technology);
- it is inconsistent with the basic policy objectives for the management of the area [such as, not in conformance with the Resource Management Plan (RMP)];
- its implementation is remote or speculative;
- it is substantially similar in design to an alternative that is analyzed; and/or
- it would result in substantially similar impacts to an alternative that is analyzed.

Alternatives specific to this EA that were considered, but that will not be analyzed in detail, are discussed below.

Coal Mine Methane Capture

An alternative analyzing the capture of coal mine methane (CMM or methane) was considered; however, the alternative was not carried through the entire analysis process. The alternative was eliminated from detailed analysis due to the environmental impacts associated with methane

capture, as well as with the economic infeasibility associated with the infrastructure required for methane capture, as explained below.

The development and implementation of technologies for mitigating the release of methane is economically infeasible and technically difficult. Gunnison Energy Corporation (GEC), an affiliate of OMLLC, evaluated the technical capability and potential for uses of methane recovered from the Elk Creek Mine. (Initial assessments of these options were for the Sanborn Creek Mine in 2001.) GEC owns substantial oil and gas rights in the North Fork Valley, including rights overlying the Sanborn Creek and Elk Creek Mine properties, which minimizes the potential for conflicting claims. GEC also owns certain natural gas gathering systems in the North Fork Valley, which could contribute to the delivery of recovered methane to market, if such an option were pursued. The initial assessments of options for the Sanborn Creek Mine included the generation of electricity for sale. That assessment concluded that poor project economics, and a number of regulatory impediments, made the option of generating electricity for sale infeasible.

From 2003 through 2005, testing of the Sanborn Creek Mine GVBs was approved by the BLM and the Colorado Division of Minerals and Geology (now the Colorado Division of Reclamation, Mining and Safety) in order to determine the quality and quantity of methane gas generated from the sealed coal mine workings. Analysis indicated that the levels of contaminants in the gas (including carbon dioxide, oxygen, and nitrogen) were treatable, but that the cost of treatment of the gas, the cost of gas compression, and the unavailability of access to existing pipeline systems were prohibitive for delivery of the gas.

During 2010, GEC evaluated the option for potential pipeline gathering and transportation routes for delivery of any gas collected to market. Several potential pipeline routes were considered. Proposed routes varied from the creation of 7 miles of new roads within U.S. Forest Service (USFS) roadless areas, to the creation of 11 miles of new roads that would impact a myriad of surface ownership/management parcels. All routes involved obtaining permits from multiple government agencies, obtaining right-of-way (ROW) agreements with some combination of surface owners/managers, and final design and construction. The alternative analyzing methane capture would require access in an area with a complex property ownership pattern (with impacts for up to 17 individual surface owners). Additionally, the time that it would take to exercise that option would go beyond the timeframe it would take to mine the proposed lease tract. Since this mining project would be an addition to an existing mine, uninterrupted mining would need to take place for this project to be economically viable.

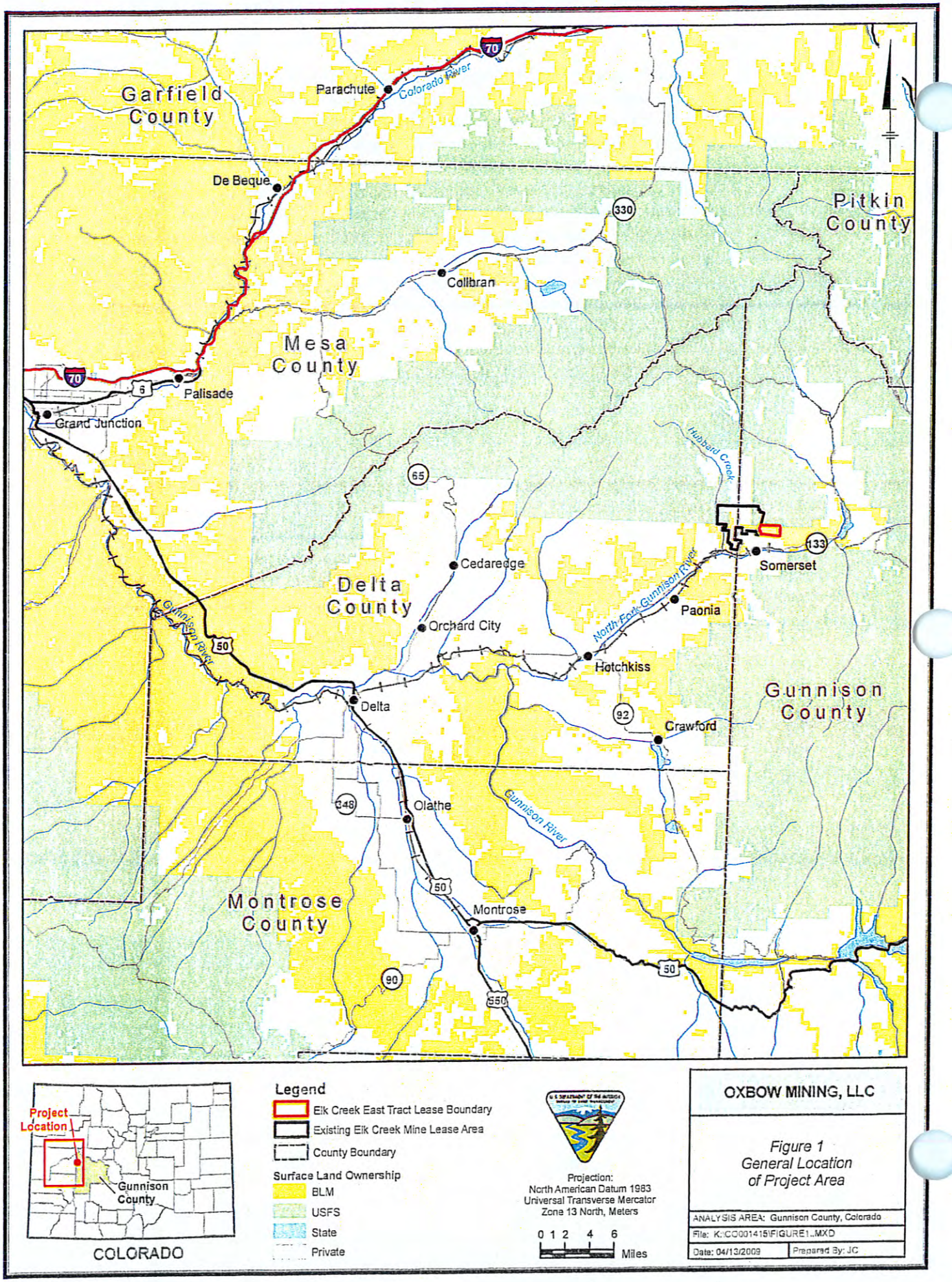
In 2007, OMLLC and Vessels Coal Gas (Vessels) evaluated the potential of generating electricity by utilizing vented CMM. The evaluation included consideration of the potential for using CMM from the sealed Sanborn Creek Mine (in cooperation with local electric cooperatives). Through the analysis, no feasible alternative was identified. On May 2, 2011, Vessels filed 3 Notice of Stakings (NOSs) for 1 well each on 3 of GEC's oil and gas leases which are over 1 mile to the west of the ECET. The on-sites for the NOSs are scheduled for the end of June 2011. On May 13, 2011, GEC submitted letters requesting suspension of these 3 leases wherein they state they are entering into an agreement with Vessels to allow the capture of methane from lands within the boundaries of these leases which is currently being vented as part of the mining operations conducted by OMLLC. The leases are due to expire on May 31, 2011. Additional time is needed to process the requests. These GEC leases are spatially removed from the ECET. GEC and OMLLC will continue to evaluate potential alternatives for the capture and

use of CMM. The adaptive management strategy includes the BLM's requirement that OMLLC identify several existing methane recovery projects with technologies that could be applied to circumstances at the ECET, and submit reports annually to the BLM summarizing the technical and economic feasibility of these projects in terms of their application to ECET.

The level of analysis, as summarized above, provided the BLM with adequate information to determine that an alternative analyzing CMM capture is not economically feasible. Additionally, CMM capture infrastructure would include more miles of road and pipeline construction and surface disturbance than would the Proposed Action Alternative. The surface impacts for the capture of methane included multiple private surface property owners; between 7 and 11 additional miles of road and pipeline construction (with potential impacts to USFS roadless areas), on a project with a timeline of approximately 1 year. Due to the economic and technical infeasibility, and the increased potential for environmental impacts, the CMM alternative was not considered a viable alternative for the ECET, and was eliminated from detailed analysis.

Methane Flaring

An alternative analyzing the flaring of CMM was also considered and eliminated from detailed analysis. Any proposed flaring system intended for use at a coal mine in the U.S. would need to be approved by the Mine Safety and Health Administration (MSHA). MSHA would need to conduct a thorough review of the proposed flaring system in order to establish the requirements for the system. It is not likely that a thorough review, and approval, would occur prior to the development and operation of the mine expansion. Additionally, flaring of methane can result in the release of other air pollutants, including nitrogen oxides and carbon monoxide, which are criteria pollutants and regulated gases.


Garfield County
Parachute
Colorado River
70
De Beque
330
Pitkin County
Collbran
Mesa County
70
6
Palisade
Grand Junction
Hubbard Creek
65
Cedaredge
Somerset
133
Delta County
Gunnison River
50
Orchard City
North Fork Gunnison River
Paonia
Hotchkiss
Gunnison County
Delta
92
Crawford
348
Olathe
Gunnison River
50
Montrose County
Montrose
50
90
550
Project Location
Gunnison County
COLORADO
Legend
Elk Creek East Tract Lease Boundary
Existing Elk Creek Mine Lease Area
County Boundary
Surface Land Ownership
BLM
USFS
State
Private
Projection:
North American Datum 1983
Universal Transverse Mercator
Zone 13 North, Meters
0 1 2 4 6
Miles
OXBOW MINING, LLC
Figure 1
General Location
of Project Area
ANALYSIS AREA: Gunnison County, Colorado
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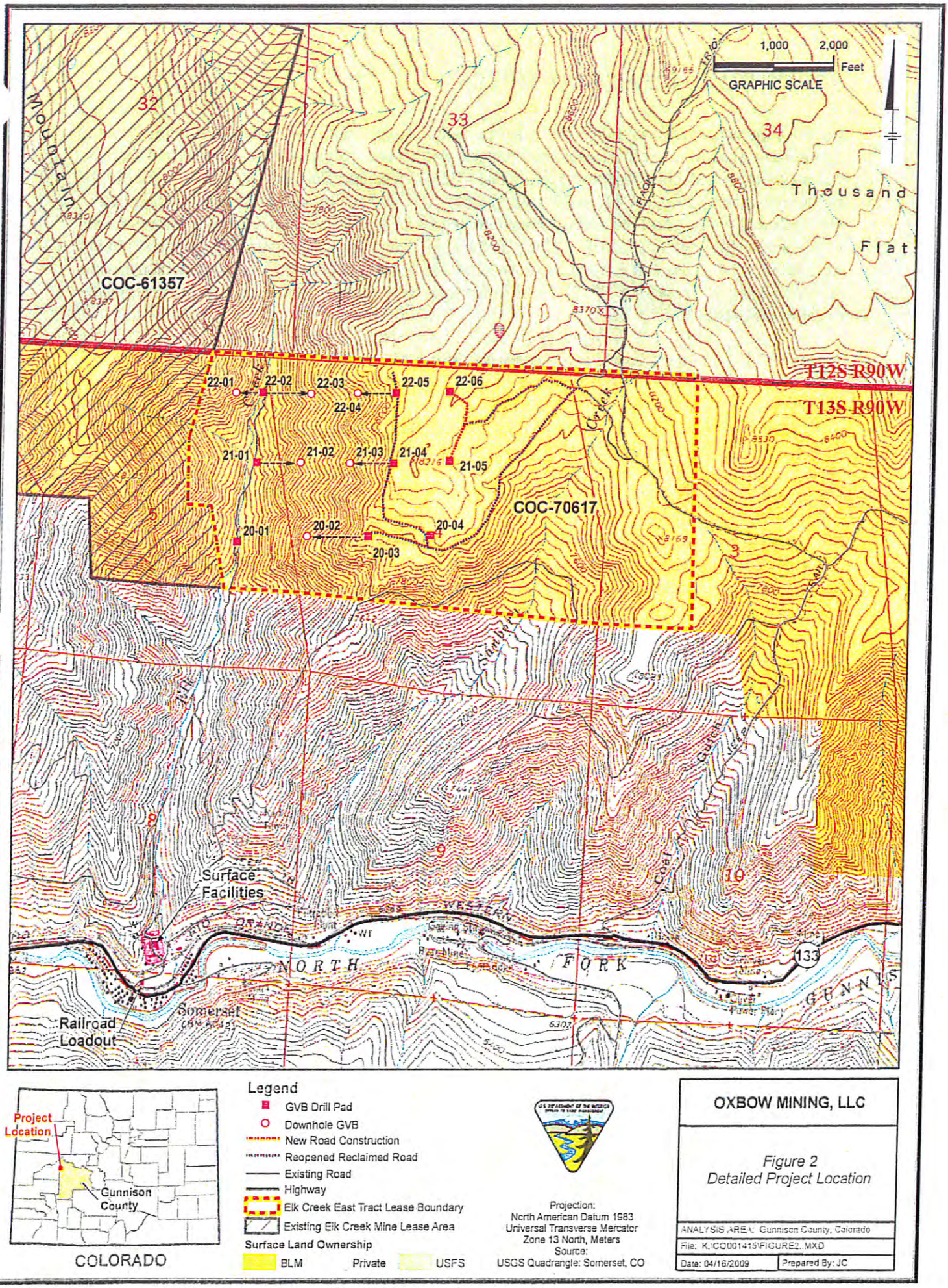
Date: 04/13/2009
Prepared By: JC



OXBOW MINING, LLC

Figure 2
Detailed Project Location

ANALYSIS AREA: Gunnison County, Colorado	
File: K:\CO001415\FIGURE2..MXD	
Date: 04/16/2009	Prepared By: JC

SCOPING AND IDENTIFIED ISSUES

Public comments were solicited via a letter, dated August 20, 2008, that was mailed to the appropriate agencies, specific interested parties, and to the general public. The letter was also posted on the BLM Uncompahgre Field Office (UFO) website. The EA was made available for public review from August 11, 2009, to September 25, 2009, through legal notices published in the *Federal Register*, and the *Delta County Independent*. In addition, there were announcements of the availability of the EA in *The Daily Sentinel* in Grand Junction. A public hearing was held on September 9, 2009, at the Paonia Town Hall, in Paonia, Colorado. Public comments were received through September 29, 2009. All comment letters were reviewed and considered in the development of the EA.

A total of 13 comment letters were received during the public comment period. Two verbal comments were offered at the public hearing. Most of these comments asked the BLM to expedite the application-approval process, and limit the environmental analysis, as required by the NEPA, to an EA. Generally, these requests were based upon: 1) benefit to the local economy; 2) the national need for energy; 3) past environmental analyses covering all, or part, of the proposed lease; 4) the fact that coal mining has already begun in the area; and 5), leaving recoverable coal in the ground would waste Federal mineral resources.

Several comments asked that surface impacts resulting from the drilling, as well as the operation of the GVBs, be analyzed in the environmental analysis, especially since the original 2000 coal leasing Environmental Impact Statement (EIS) did not address these surface impacts (See Final Environmental Impact Statement, Iron Point Exploration License, Iron Point Coal Lease Tract, Elk Creek Coal Lease Tract, Delta and Gunnison Counties, Colorado, USFS and BLM 2000). One comment specifically requested that surface impacts to off-highway vehicle (OHV) trails be analyzed, and asked that specific mitigation measures be adopted in order to protect OHV trails within the proposed lease.

Two comments raised the issue of methane release from the GVBs. These comments asked that the impacts to global climate change resulting from the release of methane from mine ventilation systems and GVBs be analyzed in the environmental analysis process. These comments also asked that methane recovery or flaring systems be employed in order to mitigate the potential impacts of methane release to global climate change. One comment suggested that the magnitude of potential impacts warranted the production of an EIS, rather than an EA.

Finally, one comment stated that impacts to waters and wetlands could require a permit from the U.S. Army Corps of Engineers.

On April 22, 2011, the BLM posted a revised draft EA for a 14-day public comment period. In addition to the public comments received during public scoping, the following additional issues were raised:

Public Comment on Draft EA	Comment Response
Global Climate Change as part of the environmental setting	See Section on Climate Change

Climate tipping points	See Section on Climate Change: A climate tipping point is when global climate changes from one stable state to another stable state.
NEPA document must discuss end use or life cycle impacts	See Section on Air Quality
Future NEPA for LBA must assess cumulative impacts on climate change	See Sections for Climate Change and Cumulative Impacts
Because impacts of Lease on Climate Change is Significant, BLM must issue an EIS	See climate change section. The consideration in the determination of the significance of the BLM action is based on the CEQ regulations (40 CFR 1508.27): which requires considerations of both context and intensity: (a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, for a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short-term and long-term effects are relevant. (b) Intensity. This refers to the severity of effect. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action.
Tiering to 2000 FEIS for Iron Point Coal Lease is inadequate	You may tier to a NEPA document for a broader action when the narrower action is clearly consistent with the decision associated with the broader action. In the tiered document, you do not need to reexamine alternatives analyzed in the broader document depending upon the nature of the proposed changes or new information or circumstances. The scope of this EA is within the analysis of the 2000 FEIS.
BLM must consider all reasonable alternatives under (a) NEPA and (b) CEQ and EPA guidance	The EA evaluated a reasonable range of alternatives
Insufficient analysis of methane capture	See section on the Alternatives Considered but Eliminated from Detailed Analysis

The EA fails to include a complete discussion of mitigation measures	The decision to lease these lands is a necessary requisite for mining, but is not in itself the enabling action that will allow mining. The most detailed analysis prior to mine development would occur after the lease is issued, when the lessee files an application for a surface mining permit and mining plan approval, supported by extensive mining and reclamation plans.
The EA must disclose cumulative actions of leases because they are reasonably foreseeable future actions	The EA does discuss possibility of lease modifications in its cumulative impact analysis.

PLAN CONFORMANCE REVIEW

The Proposed Action is subject to, and has been reviewed for, conformance with the BLM Unsuitability Criteria for coal leasing (**Appendix A**), and with the following RMP (43 CFR 1610.5-3, 1617.3):

Name of Plan: Uncompahgre Basin RMP

Date Approved: July 26, 1989, as amended

Decision Number/Page: Mineral Resources Decision, Coal Management, page 31, Record of Decision (ROD)

Decision Language: Management Units 1, 3, 4, 7, 8, and 16 are acceptable for further leasing consideration with no special restrictions.

The Proposed Action Alternative is consistent with current land management planning for the proposed lease.

Other Related NEPA Documents:

North Fork Coal EIS (BLM 2000)

Standards for Public Land Health

In January of 1997, the Colorado BLM approved the Standards for Public Land Health (**Table 3**). These standards describe conditions needed in order to sustain public land health in relation to all uses of public lands. A finding for each Standard will be made in the Affected Environment, Environmental Consequences, and Mitigation Measures section of this EA (next section).

Table 3 Standards for Public Land Health

Standard	Definition/Statement
Standard 1 Upland Soils	Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic processes. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface run-off.
Standard 2 Riparian Systems	Riparian systems associated with both running and standing water function properly and have the ability to recover from major surface disturbances, such as fire, severe grazing, or 100-year floods. Riparian vegetation captures sediment, and provides forage, habitat, and bio-diversity. Water quality is improved or maintained. Stable soils store and release water slowly.
Standard 3 Plant and Animal Communities	Healthy, productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species and habitat's potential. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations, and ecological processes.
Standard 4 Threatened and Endangered Species	Special status, threatened and endangered species (Federal and State), and other plants and animals, and their habitats, officially designated by the BLM, are maintained or enhanced by sustaining healthy, native plant and animal communities.
Standard 5 Water Quality	The water quality of all water bodies, including groundwater where applicable, located on or influenced by BLM-managed public lands will achieve or exceed the Water Quality Standards established by the State of Colorado. Water Quality Standards for surface and ground waters include the designated beneficial uses, numeric criteria, narrative criteria, and anti-degradation requirements set forth under State law as found in (5 CCR 1002-8), as required by Section 303(c) of the Clean Water Act.

AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES

This section examines how the alternatives may impact the natural, cultural, and socioeconomic resources (the "environmental consequences") on public lands managed by the UFO (the "affected environment"). Resources include ecosystem components (such as air quality, soils, wildlife, etc.), human uses and values (such as domestic livestock grazing, timber, recreation, etc.), and special management areas [such as Areas of Critical Environmental Concern (ACECs), Wilderness Study Areas (WSAs), etc.]. This section discusses and reviews the current conditions/elements of relevant resources, as specified by law, statute, regulation, Executive Order (EO), policy, or guideline, followed by a discussion of potential environmental impacts and proposed mitigation measures.

Environmental Impact Analysis

Within each resource area, when applicable, definitions of the following types of impacts are included in the evaluation of potential environmental impacts (all possible impacts are not described and, unless otherwise stated, impacts described in this chapter are assumed to be adverse). Comparison of impacts is intended to provide an impartial assessment to help inform the decision-maker and the public. The impact analysis does not imply or assign a value or numerical ranking to impacts. Actions resulting in adverse impacts to one resource may impart a beneficial impact to other resources. In general, adverse impacts described in this chapter are considered important if they result from, or relate to, the implementation of any of the alternatives. These impacts are defined as follows:

- **direct impacts** -- impacts that are caused by the action, and that occur at the same time and in the same general location as the action.

- **indirect impacts** -- impacts that occur at a different time or in a different location than the action to which the impacts are related.

- **short- or long-term impacts** -- When applicable, the short-term or long-term aspects of impacts are described. For the purposes of this EA, short-term impacts occur during or after the activity or action and may continue for up to 2 years. Long-term impacts occur beyond the first 2 years.

Table 4 lists the resource areas considered in this section; those that could be impacted are brought forward for analysis. Any element not affected by the alternatives will not be analyzed in this document; the reasons for no impact will be stated. Environmental impact analysis was based upon available data and literature from State and Federal agencies, peer-review scientific literature, and resource studies conducted in the proposed lease.

Table 4 Environmental Assessment Resource Areas

Element	Not Applicable or Not Present	Present, but No Impact	Applicable and Present; Brought Forward for Analysis
Air Quality			X
ACEC	X		
Wilderness	X		
Lands with Wilderness Characteristics	X		
Wild and Scenic Rivers	X		
Cultural Resources			X
Native American Religious Concerns		X	
Farmlands, Prime/Unique	X		
Soils			X
Vegetation			X
Invasive, Non-native Species			X
Threatened and Endangered Species			X
Migratory Birds			X
Wildlife, Terrestrial			X
Wildlife, Aquatic			X
Wetlands and Riparian Zones			X
Floodplains			X
Water Quality, Surface and Ground			X
Wastes, Hazardous or Solid			X
Environmental Justice			X

AIR QUALITY

Affected Environment

The Clean Air Act (CAA), which was last amended in 1990, requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for pollutants considered harmful to public health and to the environment. The CAA established 2 types of national air quality standards:

- **Primary standards** – Primary standards set limits in order to protect public health, including the health of "sensitive" populations (such as asthmatics, children, and the elderly).

- **Secondary standards** – Secondary standards set limits in order to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings (EPA 2009).

National Ambient Air Quality Standards (EPA 2011)

	Primary Standards		Secondary Standards	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour [1]	None	
	35 ppm (40 mg/m^3)	1-hour [1]		
Lead	0.15 $\mu g/m^3$ [2]	Rolling 3-Month Average	Same as Primary	
	1.5 $\mu g/m^3$	Quarterly Average	Same as Primary	
Nitrogen Dioxide	53 ppb [3]	Annual (Arithmetic Average)	Same as Primary	
	100 ppb	1-hour [4]	None	
Particulate Matter (PM_{10})	150 $\mu g/m^3$	24-hour [5]	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 $\mu g/m^3$	Annual [6] (Arithmetic Average)	Same as Primary	
	35 $\mu g/m^3$	24-hour [7]	Same as Primary	
Ozone	0.075 ppm (2008 std)	8-hour [8]	Same as Primary	
	0.08 ppm (1997 std)	8-hour [9]	Same as Primary	

	Primary Standards		Secondary Standards	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
	0.12 ppm	1-hour [10]	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Average)	0.5 ppm	3-hour [1]
	0.14 ppm	24-hour [1]		
	75 ppb [11]	1-hour	None	

[1] Not to be exceeded more than once per year.
[2] Final rule signed October 15, 2008.
[3] The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard
[4] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).
[5] Not to be exceeded more than once per year on average over 3 years.
[6] To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.
[7] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).
[8] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)
[9] (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(c) EPA is in the process of reconsidering these standards (set in March 2008).
[10] (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").
(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1.
[11] (a) Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

The State of Colorado implements the NAAQS, and develops air quality attainment and maintenance plans, in order to keep Colorado in compliance with the Federal NAAQS. According to the 2007 Colorado Air Quality Control Commission Report to the Public, the proposed lease is located within the Western Slope Region for air quality planning (CDPHE 2008). This region is currently in attainment for all NAAQS.

The lease area is designated as a Class II Area, as defined by the Federal Prevention of Significant Deterioration (PSD) provision of the CAA. The PSD Class II designation allows for moderate growth or degradation of air quality within certain limits above baseline air quality. Currently, OMLLC operates the Elk Creek Mine under air emission discharge permits obtained from the State of Colorado.

Fugitive dust from roads, agriculture, energy development, and controlled and uncontrolled vegetation burns are the primary sources of air quality impacts in this region.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Implementation of the Proposed Action Alternative would result in emissions of some criteria pollutants, as well as greenhouse gases. Particulate matter would be emitted when drill rigs and other vehicles associated with the mining activities travel on existing dirt roads or overland access routes to drilling locations. Additional emissions of particulate matter would be generated from processing equipment, transfer points, the train loadout, and ventilation shafts. Air quality would also be impacted by engine exhaust emissions, locomotive emissions, and other diesel engine emissions (such as generators).

Currently, OMLLC operates the Elk Creek Mine under a construction permit that was issued by the Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD) on July 29, 2009. The permit is valid for a period of 5 years (until July 29, 2014). This time period covers the time period in which the Proposed Action Alternative would be implemented. The CDPHE APCD has permitted the mine in accordance with the rules and regulations of the Colorado Air Quality Control Commission and the Colorado Air Pollution Prevention Control Act. The permit sets limits on particulate matter less than 10 microns in diameter (PM_{10}), nitrogen oxides (NOx), and carbon monoxide (CO). Additionally, the State imposes limits on processing rates and diesel fuel consumption, and requires specific control measures (such as enclosure of transfer points, and enclosure and spray bars on crushers and screens). Colorado does not regulate $PM_{2.5}$ in permits.

Ozone is a pollutant that is formed in the atmosphere through emissions of oxides of nitrogen (NOx) and volatile organic compounds (VOCs) in the presence of sunlight; therefore, the State considers one of the precursors, NOx, when it issues permits. Through permitting, the State regulates NOx at the Elk Creek Mine.

Ozone is a secondary pollutant which is chemically formed in the atmosphere via interactions of oxides of nitrogen (NOx) and volatile organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions. Ozone is not emitted directly from a source; rather, its formation is complex, generally results from a combination of emissions from various sources, and is considered a regional pollutant with the potential to be transported across long ranges. Prediction of potential ozone formation is a complex process, involving analysis of significant quantities of VOCs and NOx emissions from various sources within a region and their interactions within the atmosphere and the associated meteorological conditions. Therefore, it is typically not appropriate to assess potential ozone impacts of a single project on potential regional ozone formation and transport. Rather, BLM Colorado assesses potential ozone impacts from its authorized activities on a regional basis, when an adequate amount of data are available and where such analysis has been deemed appropriate.

A detailed air quality assessment, including modeling, of the original mine was conducted as part of the environmental analysis for the Elk Creek Coal Lease Tract in 2000. (See Final Environmental Impact Statement Iron Point Exploration License; Iron Point Coal Lease Tract; Elk Creek Coal Lease Tract Delta and Gunnison Counties, Colorado, USFS and BLM 2000.) In this Final EIS (FEIS), an air quality assessment was completed for the original Oxbow mine, which was permitted by the State to produce up to 4.8 million tons of coal annually. The Proposed Action Alternative analyzed in this EA is an expansion of that original mine, with a permit of up to an additional 3.96 million tons of coal annually. It is important to note that the

Proposed Action is to continue mining operations into an additional area. That is, the action would not constitute adding 3.96 million tons of coal to the existing 4.8 million tons; mining the 3.96 million tons would be in place of the prior 4.8 million tons.

The air quality analysis conducted for the original mine included an emissions inventory and modeling analysis. That emissions inventory quantifies PM_{10}, NOx, and SO_2 emissions. The modeling analysis also includes a visibility impacts assessment in the West Elk Wilderness Area as well as an atmospheric deposition impacts assessment. Emissions that were calculated and modeled included tailpipe emissions from mining equipment, haul trucks, and locomotives (railway emissions). The results of that detailed impact assessment predicted no significant impacts to air quality as a result of authorizing the Oxbow mine.

The proposed expansion of the mine is for 3.96 million tons of coal annually, and the emissions-generating equipment used will be less than levels analyzed for the Elk Creek Coal Lease Tract in 2000. That is, the equipment used for the mine expansion will be the same equipment that is being used in the current mining operations. Therefore, the air quality impacts associated with the proposed mine expansion can be presumed to be equal to, or less than, impacts predicted in the original air quality impact assessment. The air quality assessment for this EA tiers to that original assessment.

Since the FEIS for Elk Creek Coal Lease Tract was a combined analysis for three lease tracts, the specific quantities of emissions and air quality impacts associated with the Elk Creek Coal Lease Tract were not brought forward in this EA; rather those emissions quantities and associated impacts are tiered to in this EA. To view the quantified emissions inventory and air quality impacts assessment, see Final Environmental Impact Statement Iron Point Exploration License; Iron Point Coal Lease Tract; Elk Creek Coal Lease Tract Delta and Gunnison Counties, Colorado, USFS and BLM 2000. Appendix M, *Air Quality Impacts Assessment,* contains the detailed air quality impact assessment.

Moreover, in relation to railway emissions, due to more stringent regulations since the FEIS was written, the EPA predicted that, on a nationwide average, NOx emissions from locomotives in the year 2010 would be about 40 percent less than emissions compared to 1999 levels (FEIS, page 3-7). The FEIS air quality impact analysis, which relied on emissions factors for 1999, determined NOx emissions to be insignificant; therefore, it can be presumed that NOx emissions associated with locomotives from the proposed mine expansion would decrease when compared to previous levels.

The Proposed Action Alternative would provide a logical extension to the mine's current D-Seam workings at a lower production rate of 3.96 million tons of coal annually, as compared to its current production levels. The total generation of air pollutants (including carbon monoxide, particulate matter, including PM2.5 and PM10, oxides of nitrogen, and VOCs) would be less than (or, on a short-term basis, equivalent to) current emissions. Therefore, activities under the Proposed Action Alternative are not anticipated to require a modification of the existing construction permit, and are not expected to exceed the NAAQS.

Combustion

Historically, the coal mined in Colorado has been used as one of the sources of fuel to generate electricity in power plants located throughout the U.S., and shipped overseas. The mines in Colorado have sold, and are expected to sell, coal into the open coal market. The mine's ability

to sell coal in this market is determined by the annual production rates at that mine. Coal sales are made on short term contracts or sold on a spot market. This market is very dynamic and competitive. During the coal lease application process, it is uncertain and speculative to predict who might purchase future Colorado coal, how it would be used, and where the coal might be transported to. Moreover, the restrictions and control measures vary by the location in which the coal is burned.

Coal-burning power plants currently supply about 50 percent of the electric power generated in the U.S. The demand for power is increasing in the U.S. and throughout the world. According to a recent report by the North American Electric Reliability Corporation, peak demand for electricity in the U.S. is expected to double in the next 22 years (Associated Press 2007). Many developing countries, including China and India, are also relying heavily on coal to meet their rapidly increasing power demands as coal is more economical and more available than other sources of electrical generation. The regulatory mechanisms proposed under the Climate Security Act of 2008, as well as the past regulation of pollutants under the CAA, are imposed at the point when coal is burned and converted to electric energy. A percentage of coal produced in Colorado is sold in an open market where coal is purchased on short term contracts or spot prices based on a coal feed stock that is suitable for each buyer's power generating facility. Coal production at any one mine is not tied in any predictable way over a period of time to any one power plant.

According to the U.S. Energy Information Administration (2009), nearly 94 percent of all coal consumed in the U.S. during 2009 was used in the generation of electric power. Because of this, it can reasonably be assumed that the coal will be shipped to a coal-fired power plant. It would be possible to provide a quantification of GHG emissions associated with the burning of the mined coal at a specific facility; however, the types and location of the facilities the coal might be processed in is speculative and not foreseeable. The terms of the agreements between the coal combustion facilities and the coal company are not within the regulatory authority of the BLM. The contractual agreements between the coal plant and the coal company are outside the scope of this analysis, and the BLM does not determine at which facilities the coal is used. The EPA and state governments where the coal is burned provide the regulatory emissions standards for the combustion of the coal. Different emissions control devices on a power plant could greatly affect the amount of carbon dioxide that is released into the atmosphere. (For example, a power plant that practices CO_2 capture would ultimately release a much smaller quantity of CO_2 than a traditional power plant that is 50 years old.)

In order to calculate the CO_2 equivalent emissions from coal, the following information would be needed:

- the number of tons of coal produced per year from a mine;
- the heat content of that coal in BTUs per ton; and
- the facility in which the coal is slated to be burned.

Even though the BLM cannot reasonably predict the destination of where the coal will be burned, it is still possible to do emissions calculation if the number of tons of coal produced per

year from a mine, and the heat content of that coal in BTUs per ton, is known. This information is known for the proposed lease tract. However since the type of facility the coal might be processed in (i.e., the control efficiency of the facility) is speculative; calculations were made using average numbers in U.S. facilities. Therefore the emissions calculation does not represent an accurate estimate of potential GHG emissions from this specific project. That said, assuming the Proposed Action Alternative would generate 3.96 million tons of high-quality low-sulfur super-compliant bituminous coal per year, with an average heat content of 24.2 million British thermal units (BTUs) per ton, nearly 9.6 million metric tons of carbon dioxide equivalent (CO_2e) would be emitted. This amount represents nearly 8 percent of all CO_2e emissions in Colorado during 2007, nearly 0.14 percent of all CO_2e emissions in the U.S. during 2007, and nearly 0.04 percent of global CO_2 emissions during 2007 (CAIT-US 2011). These calculations are based upon default emission factors for stationary combustion in the Energy Industries (IPCC 2006), assuming no other use of the coal and complete total combustion, and therefore represent a conservative overestimate of potential GHG emissions.

EPA Regulations

In its *Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act*, the EPA determined that GHGs are air pollutants subject to regulation under the CAA. The EPA is in the early stages of determining how to regulate carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons. As of March 2011, the EPA has not set GHG emission limits for stationary sources. However, the EPA is gathering detailed GHG emission data from thousands of facilities throughout the U.S., and will use the data in order to develop an improved national GHG inventory, as well as to establish future GHG emission control regulations. Beginning in 2010, many facilities across the US, including coal fired power plants, estimated GHG emissions in accordance with the EPA's "Greenhouse Gas Mandatory Reporting Rule" and will report annual GHG emissions beginning on March 31, 2011.

Beginning in 2011, GHG emissions from some facilities will become subject to Federal air quality permitting programs, such as the Title V Operating Permit Program and the Prevention of Significant Deterioration (PSD) Program. Historically, GHG emissions were not measured by facilities under these programs, and air quality permits did not address greenhouse gases. However, the EPA, as well as State and local air quality permitting agencies, will begin reviewing GHG emissions under these programs in accordance with the EPA's "Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule." This review may lead to more accurate estimates of GHG emissions from these facilities, and may prompt GHG emission monitoring in some cases.

Based largely upon GHG emission data submitted under the Mandatory Reporting Rule, the EPA plans to develop stationary source GHG emissions reduction rules that could mandate substantial reductions in U.S. greenhouse gas emissions. Alternatively, Congress may develop cap-and-trade legislation as another means to reduce GHG emissions. Consequently, a GHG emissions calculation for coal burned at a power plant is likely to be increasingly regulated in the near future. The first EPA regulation to limit emissions of GHGs imposed carbon dioxide emission standards on light-duty vehicles, including passenger cars and light trucks (GPO 2010e). As of February 2011, the EPA had not set GHG emission limits for stationary sources (such as compressor stations); however, the EPA is gathering detailed GHG emission data from thousands of facilities throughout the U.S., and will use the data in order to develop an improved national GHG inventory, as well as to establish future GHG emission control regulations.

Black Carbon

Black carbon is a by-product of incomplete combustion. It can be emitted when coal is burned, as well as through tailpipe emissions from engines that use diesel fuel (such as diesel trucks and locomotives). Black carbon, therefore, is a likely by-product emitted from haul trucks used during coal mining operations. Black carbon emissions from diesel tailpipe emissions are largely dependent upon the content of the diesel fuel, and not upon the type of engine used. Black carbon is an unregulated pollutant; however, the EPA does regulate diesel fuel quality. Regulations have become more stringent in recent years, thereby improving the quality of diesel fuel. Black carbon emissions are anticipated to be minimal due to this being an underground with nominal truck traffic.

Black carbon is not emitted from the coal when it is being mined. Black carbon emissions associated with coal combustion occur at the facility where the coal is being burned, not where it is being mined.

This analysis did not quantify indirect emissions of black carbon associated with the coal's combustion because:

- the BLM does not have information regarding the facilities that may burn the coal (in order to produce electricity); and since power plant facilities have vast variations in structure and emission-control devices (which would, in turn, greatly affect the emissions associated with burning the coal); it is beyond the scope of the analysis; and

- most coal-fired power plants contain emission control devices (such as baghouses and cyclone separators) that would greatly reduce black carbon emissions; therefore it is highly unlikely that black carbon emissions from coal-fired power plants would be a significant issue, as those emissions would likely be deminimus (in accordance with the Clean Air Act).

Climate Change

According to the U.S. Global Change Research Program (2009), global warming is unequivocal, and the global warming that has occurred over the past 50 years is primarily human-caused. Standardized protocols designed to measure factors that may contribute to climate change, and to quantify climatic impacts, are presently unavailable. As a consequence, impact assessment of specific impacts related to anthropogenic activities on global climate change cannot be accurately estimated. Moreover, specific levels of significance have not yet been established by regulatory agencies. Therefore, climate change analysis for the purpose of this environmental assessment is limited to accounting for GHG emissions changes that would contribute incrementally to climate change. Qualitative and quantitative evaluations of potential contributing factors are included where appropriate and practicable.

- ❖ Methane associated with coal seams and the surrounding rock would be liberated during the mining process, as well as during the subsequent fracturing of the overburden, which occurs as the gob area (the portion of coal panels that have already been mined) is allowed to collapse. In order to protect the health and safety of miners working underground, explosive gases would be removed from the mine via a ventilation system as well as through GVBs drilled into the gob area. GVBs would be drilled to about 10 to 50 feet above the target coal seam about 1 year before mining operations begin. As the

longwall mining passes under the GVB, the strata around the GVB would fracture and liberate methane. GVBs would actively pump mine atmosphere (including methane) to the surface. The GVB pumps are fueled by methane from the gob. The process of fracturing and liberation of methane would continue as the mined area collapses behind the mining operation, and the GVBs continue to pump methane from the gob. Both the ventilation system and the GVBs would release methane directly into the atmosphere. This would result in varying levels of methane release, based upon the relative concentration of methane in the mine air.

Rates of methane liberation and emission are expected to be consistent with rates observed during mining operations between 2004 and 2006 (**Table 5**). Because methane emission rates are roughly correlated with coal production rates, and because coal production from the ECET is expected to be consistent with current production rates, the rate of methane emission is not expected to differ greatly from current emission rates, which range between 5.1 and 7.4 million cubic feet per day.

Approximately 10.5 percent of U.S. emissions of methane come from underground coal mining activities (EPA 2008). Historically, methane emissions from the Elk Creek Mine are roughly correlated with production levels. Data regarding past methane output from the Elk Creek Mine are available from the EPA (EPA 2008), and are described in **Table 5**.

Table 5 Coal Production and Methane Liberation at the Elk Creek Mine 2002-2006*

	2002	2003	2004	2005	2006
Coal Production (million short tons/year)	0.6	4.6	6.6	6.5	5.1
Total Methane Liberation (million cubic feet [cf]/day)	0.1	1.1	5.1	5.5	7.4
Ventilation Emissions (VAM)	0.1	1.1	3.8	4.1	5.6
Drainage (Degasification) Emissions	-	-	1.3	1.4	1.9
Specific Emissions (cf methane per ton mined coal)	33	91	282	308	530
Total Annual GHGs in CO_2 Equivalent (mm tons)	-	-	-	-	1.2

*Data from EPA 2008.

Based upon the "Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2008" (EPA Publication 430-R-10-006), April 15,2010, total coal mining related methane emissions in 2008 were 6.76 tg (teragrams=one million metric tons), and total GHG emissions were 6,956.8 tg CO2 equivalent. Estimated total methane emissions for the Proposed Action Alternative are 1.0 mm tons of CO2 equivalent (1.2 to 6,957) or 0.017 percent of the total calculated CO2 equivalent emissions for the U.S. in 2008. Based upon this analysis (limited to GHG emissions), the calculated GHG emissions associated with the Proposed Action Alternative are negligible relative to any potential impacts on the global scale. If the calculated GHG emissions were compared with the global figures (2005 CO2 equivalent emissions of 26,544tg, "World Development Report 2010: Development and Climate Change, World Bank, 2010), the relative significance of the impact to the global climate would further decrease.

The implementation of the Proposed Action Alternative is estimated to contribute 1.2 mm tons of GHG equivalent annually, with that being about 0.017 percent of total U.S. contribution. Regardless of the accuracy of emission estimates, predicting the degree of impact any single

emitter of GHGs may have on global climate change, or on the changes to biotic and abiotic systems that accompany climate change, is not possible at this time. As such, the controversy is to what extent GHG emissions resulting from continued mining may contribute to global climate change, as well as the accompanying changes to natural systems cannot be quantified or predicted. The degree to which any observable changes can, or would be, attributable to the Proposed Action Alternative cannot be reasonably predicted at this time.

Mitigation Measures -- Within 1 year after the lease is approved, OMLLC would submit a report to the BLM outlining the technical and economic feasibility of mitigating, capturing, or using the CMM being vented from the ECET. Thereafter, OMLLC will update that original report annually.

No Action Alternative

Under the No Action Alternative, mining of the ECET would not be permitted. Current levels of methane liberation, and emissions associated with the existing mine plan, would continue until mining is completed. Methane emission associated with proposed mining of the ECET would not occur.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

The BLM uses the ACEC designation to highlight areas of public lands where special management attention is required in order to protect and prevent irreparable damage to important historical, cultural, and scenic values; fish or wildlife resources; or other natural systems or processes. The ACEC designation may also be used in order to protect human life and safety from natural hazards. The BLM identifies, evaluates, and designates ACECs through its resource management planning process. Allowable management practices and uses, mitigation, and use limitations, if any, are described in the planning document. There are no ACECs in the vicinity of the proposed project. The closest ACEC to the proposed lease is the Needle Rock ACEC, which is located over 15 miles to the southwest; therefore, ACECs will not be evaluated further.

WILDERNESS

National Wilderness Areas, designated by Congress, are defined by the Wilderness Act of 1964 as places "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." Designation is aimed at ensuring that these lands are preserved and protected in their natural condition. Wilderness Areas, which are generally 5,000 acres or more in size, offer outstanding opportunities for solitude or a primitive and unconfined type of recreation. These areas may also contain ecological, geological, or other features that have scientific, scenic, or historical value.

There are no designated Wilderness Areas within, or adjacent to, the Proposed lease. The closest Wilderness Area to the proposed lease is the West Elk Wilderness, which is located over 7 miles to the south-southeast of the proposed lease. The Raggeds, Maroon Bells-Snowmass, Hunter Fryingpan, Holy Cross, Eagles Nest, and Flattop Wilderness Areas are within 30 miles, to the north of the proposed lease. The Great Sand Dunes National Park, La Garita, Powderhorn, Uncompahgre, and Weminuche Wilderness Areas are to the south and east of the proposed lease

In relation to air quality, the air quality analysis indicated that the emission of ozone is very rare in permitted facilities. The State rarely regulates ozone in permits, but instead looks at the precursors to ozone, such as NOx emissions and VOCs. The State regulates NOx at the Elk

Creek Mine. VOCs are not addressed in the permit, suggesting that VOC calculations were shown to be below the reportable limits. The CAA "declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas from manmade air pollution" [42 USC 7491(a) (1).25]. In accordance with BLM regulations and guidelines, BLM-managed public lands, including Wilderness Areas not designated as Class I, are managed as Class II, which provides that moderate deterioration of air quality associated with industrial and population growth may occur. The analysis supports the requirements under the CAA and BLM regulations and guidelines.

LANDS WITH WILDERNESS CHARACTERISTICS

BLM-managed public lands within the proposed lease are not considered to have Wilderness characteristics because one, or more, of the following criteria is not met:

- the parcel of land is equal to, or greater than, 5,000 acres, or is of sufficient size as to make practicable its preservation and use in an unimpaired condition;
- the parcel of land does not have extensive surface disturbance and/or is roadless;
- the parcel of land is not within, or adjacent to, an area that has been proposed for Wilderness by a non-governmental entity;
- the parcel of land is not contiguous with lands that have been formally determined to have Wilderness or Wilderness potential values [these include, but are not limited to, designated Wilderness Areas, BLM WSAs, U.S. Fish and Wildlife Service (USFWS) areas proposed for Wilderness designation; USFS WSAs or areas recommended for Wilderness; and National Park Service (NPS) areas recommended or proposed for designation].

Lands with Wilderness characteristics will not be evaluated further.

WILD AND SCENIC RIVERS

There are no designated Wild and Scenic Rivers (WSRs) river and/or stream segments within the vicinity of, or affected by, the proposed lease that have been identified as having Outstanding Remarkable Values (ORVs) that would qualify them as eligible for inclusion in the National Wild and Scenic River System; therefore, WSRs not be evaluated further.

CULTURAL RESOURCES

Affected Environment

A Class III Cultural Resource Inventory was conducted for a block clearance area (which included the proposed lease) in order to identify any cultural resources present. The Cultural Resource Inventory included a file search and field visits to the area, as well as a search for relevant traditional cultural properties [Grand River Institute (GRI) 2005].

The Cultural Resources Inventory identified, and documented, 9 isolated finds and 1 site within the study area. No traditional cultural properties were found within the proposed lease (GRI 2005). None of the isolated finds were recommended to be eligible for the National Register of Historic Places (NRHP). The identified site, which is a prehistoric open campsite comprising several lithic tools (including a diagnostic projectile point, a unique "chopper," and a crescent-shaped tool), was evaluated as needing data (especially subsurface testing) before eligibility for the NRHP can be determined.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

With mitigation, as discussed below, activities associated with the Proposed Action Alternative would result in no impacts to cultural resources. Subsidence associated with the Proposed Action Alternative is expected to be minimal to negligible, and would generally affect the area immediately overlying those areas that are mined (see Geology and Minerals); therefore, there would be no impacts to cultural resources resulting from subsidence. (Subsidence is the motion of a surface, usually, the Earth's surface, as it shifts downward relative to a datum, such as sea-level.)

Mitigation Measures -- Roads and drill pads associated with GVB drilling would avoid areas where cultural resources have been identified. In addition, if any cultural resources are located during construction of the pads or roads, construction would stop and the BLM would be notified.

No Action Alternative

Under the No Action Alternative, there would be no impacts to cultural resources in the ECET.

NATIVE AMERICAN RELIGIOUS CONCERNS

Affected Environment

Native American religious concerns are associated with cultural practices or beliefs of a living community rooted in the history or religion of that community, and are important in maintaining the continuing cultural or religious identity of the community. The Class III Cultural Resource Inventory conducted by GRI (2005) did not identify any Native American religious concerns or potential traditional cultural properties within the proposed lease; therefore, Native American religious concerns will not be evaluated further.

Environmental Consequences/Mitigation

Proposed Action Alternative

No Native American religious concerns (including traditional cultural properties) have been identified within the proposed lease; therefore, there would be no impacts to this resource under the Proposed Action Alternative.

No Action Alternative

No Native American religious concerns (including traditional cultural properties) have been identified within the proposed lease; therefore there would be no impacts to Native American religious concerns under the No Action Alternative.

FARMLANDS, PRIME AND UNIQUE

Prime Farmland, as defined by the Natural Resource Conservation Service (NRCS), is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Prime Farmland is also available for such uses as: cropland, pastureland, rangeland, forest land, or other land; however, it is not available for urban development or water. Unique Farmland is land other than Prime Farmland that is used for the production of specific high-value food and fiber crops. No Prime or Unique Farmlands have been identified within the Proposed lease [Natural Resources Conservation Service (NRCS) 2008]; therefore, Prime or Unique Farmlands will not be evaluated further.

SOILS

Affected Environment

Data regarding soils within the Proposed lease were obtained from a custom Soil Resource Report generated using the NRCS Web Soil Survey, which was based upon soil survey data compiled in 1981 (NRCS 2008). This information was consistent with the discussion in the North Fork Land Health Assessment (LHA) (BLM 2007). The North Fork LHA evaluated the general area as meeting Standard 1 for soils. Some potential soil protection issues related to low plant basal cover were noted.

There are 2 soil types present within the proposed lease: 1) Fughes-Curecanti stony loams, 10 percent to 40 percent slopes; and 2) Torriorthents-Rock outcrop, sandstone complex. The latter soil type is the predominant soil within the proposed lease, covering 62.9 percent of the surface, compared to 37.1 percent of the surface for the Fughes-Curecanti soil type (**Table 6**).

The Fughes-Curecanti stony loams is a deep, well drained soil derived from alluvium, glacial outwash or landslide deposits. The Curecanti component of this soil type has a moderate erodibility hazard for roads and off-road travel, while the Fughes component has a moderate hazard for off-road travel, but a severe hazard for on-road travel. The rutting hazard of the Fughes-Curecanti stony loams is also moderate (**Table 6**).

Table 6 Summary of Soil Resources within the Proposed lease

Soil Type	Acres in the Proposed lease	Percent of the Proposed lease	Hazard of Erosion on Roads and Trails	Rutting Hazard
Fughes-Curecanti stony loams, 10 to 40 percent slopes	291.7	37.1	Moderate to Severe	Moderate
Torriorthents-Rock outcrop, sandstone, complex	493.0	62.9	Severe	Slight

The Torriorthents component of the Torriorthents-Rock outcrop, sandstone complex, is derived from rockfall deposits. It is a well drained, stony soil of varying (but typically shallow) depth. The Rock outcrop component of this soil type consists of exposed sandstone outcrops with slopes of 35 percent to 70 percent. The Torriorthents component has a moderate erodibility hazard for off-road travel, but a severe hazard for on-road travel. The Rock outcrop component has a very severe to severe erodibility hazard for off- and on-road travel, respectively. The rutting hazard for the Torriorthents-Rock outcrop, sandstone complex is slight (**Table 6**).

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

The Proposed Action Alternative would result in approximately 5.63 acres of new direct disturbance to soils within the proposed lease. This disturbance would come from 9 GVB well pads (2.15 acres), 0.25 miles of new light-use roads to these pads, and 2.05 miles of reopened reclaimed exploration roads. Drilling and partial reclamation would occur over a period of several weeks. Topsoil from the portions of GVB drill pads to be reclaimed would be stockpiled separately from other soil horizons and used to reclaim portions of the drill pads. (Topsoil salvage helps to retain microbial communities that can accelerate revegetation of disturbed areas.)

The potential direct impacts resulting from GVB drilling activities would be:

- physical removal, mixing, or burying of surface soils;
- damage including compaction or destruction of soil properties in place;
- mixing of drilling wastes into the pad subsoil materials; and
- localized losses or decreases in vegetation cover and plant litter.

The immediate short-term direct impacts of the drilling would be the removal of vegetation and topsoil over an 80 by 130 foot area (0.24 acre for each pad). This area would be partially reclaimed after drilling, and completely reclaimed after the GVBs are no longer needed (2 to 3 years).

Project activities have the potential to result in short-term indirect impacts to soil through increased water and wind erosion. This could result in a loss of surface soil, potentially impacting the viability of vegetation communities. Soil loss during project activities would be mitigated by seeding the soil stockpiles.

All new roads, as well as reopened exploration roads, would be reclaimed after mining is complete and ventilation is no longer needed. The period of active use of the roads for drilling would be from a few days to a few weeks, depending upon the number of drill pads a road would access. During operation of the GVBs, the roads would be closed to public use; however, they would be used for access for maintenance of the GVBs. Reclamation would include returning disturbed areas to original contours and revegetation using a BLM-approved native seed mix. Reclamation of the disturbed areas would be monitored annually until considered successful. (Reclamation would be considered "successful" when evidence of surface erosion is no greater than in adjacent undisturbed areas and when natural, perennial plant cover has achieved a density of 75 percent of the pre-disturbance plant cover.)

Some subsidence is expected to occur as a result of underground activities. Some fracturing or loosening of the soil profile may occur in areas where the surface shows tensile subsidence fractures from the irregular pattern of subsidence and, to a lesser degree, some compression may result in, and near, the areas of maximum subsidence. These modifications to the soil profile could result in increased percolation of water in areas that are fractured and reduced percolation in areas that are compressed. These slight modifications to the soil profile are not expected to result in appreciable changes to the characteristics or properties of the soils.

Mitigation Measures -- Soil stockpiles will be seeded with a BLM-approved seed mix (**Table 2**).

Finding on the Public Land Health Standard for Upland Soils

The existing soil conditions generally meet the criteria established in the Public Land Health Standard for upland soils. The Proposed lease generally meets LHA Standard 1 for soils (BLM 2007); however, there are some issues with low plant basal cover. Currently, there are no serious problems with poorly located and maintained roads; however, care needs to be taken in order to maintain this situation in this steep terrain. Based upon the limited disturbance, and required site reclamation, the Proposed Action Alternative would not change the existing conditions for upland soils in the proposed lease, and natural soil functions would be maintained.

No Action Alternative

Under the No Action Alternative, there would be no impacts to soils within the proposed lease

VEGETATION

Affected Environment

The vegetation types within the proposed lease were characterized using data from the Colorado Vegetation Classification Project (CVCP) [Colorado Division of Wildlife (CDOW) 2003]. Similar vegetation types mapped in the CVCP dataset were grouped together in this analysis because several of the minor vegetation types have similar community compositions, blend into one another at ecotones, and serve similar ecological roles as habitat for wildlife. The dominant vegetative cover-type across the proposed lease is Gambel's oak-mountain shrubs (*Quercus gambelii*) mixed with piñon-juniper (*Pinus edulis* and *Juniperus* spp.), sagebrush (*Artemesia* spp.), and mountain mahogany (*Cercocarpus montanus*). Gambel's oak is interspersed with several stands of Douglas-fir (*Pseudotsuga menzesii*) on the west side of the proposed lease, and a few stands of quaking aspen (*Populus tremuloides*) on the east side (**Table 7**).

Table 7 Vegetative Cover-types Present within the Proposed lease

	Total Acres	Percent of Proposed lease
Gambel's Oak/Mountain Shrub/Piñon-Juniper	679.1	86.6
Douglas-fir	60.4	7.7
Quaking Aspen	22.7	2.9
Riparian Vegetation	15.0	1.9
Unvegetated (Rock Outcrop)	7.5	0.9

Data from CDOW 2003

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Construction and use of light-use roads, as well as activities associated with the drilling of GVBs, would result in localized, short-term disturbance to vegetation. Plants would be disturbed, crushed, or removed during the construction and use of the routes, as well as during drilling. Approximately 5.63 acres of vegetation would be disturbed by project activities. Drill pads and new or reopened light-use roads would be reseeded with native vegetation using BLM-approved seed mixes. Revegetation of areas where trees or shrubs would be disturbed would take longer than areas where only grasses and forbs would be disturbed. All areas of disturbance would be reclaimed, and there would be no long-term impacts.

Underground activities are not expected to impact vegetation within the proposed lease. There would be no permanent loss of vegetation as a result of the Proposed Action Alternative; however, there would be a short-term shift in species composition until native trees and shrubs become reestablished.

Finding on the Public Land Health Standard for Plant and Animal Communities (partial, see also Wildlife, Aquatic; Wildlife, Terrestrial; and Invasive, Non-native Species)

Currently, vegetation within the proposed lease meets Public Land Health Standard 3 for native plant and animal communities (BLM 2007), and would continue to meet the Standard after implementation of the Proposed Action. The Sanborn Creek area was mapped in the LHA as low in cool season perennial grasses, and there are exotic invasive species in the area; however, the problems were not identified as serious.

No Action Alternative

Under the No Action Alternative, there would be no additional surface disturbance and, consequently, no additional impacts to vegetation.

INVASIVE, NON-NATIVE SPECIES

Affected Environment

Gunnison County maintains a list of invasive, non-native (noxious) weeds most likely to occur in the area, and that pose the biggest threat to land quality and habitat degradation. Noxious weed species that are on the list, and that may occur within the Proposed lease, include: Canada thistle (*Cirsium arvense*), knapweed species (*Centaurea* spp, possibly including *C. solstitialis*), houndstongue (*Cynoglossum officinale*), leafy spurge (*Euphorbia esula*), hoary cress (*Cardaria draba*), cheatgrass brome (*Bromus tectorum*), oxeye daisy (*Chrysanthemum leucanthemum*), sulfur cinquefoil (*Potentilla recta*), and yellow toadflax (*Linaria vulgaris*). Yellow starthistle (*Centaurea solstitialis*) has been identified on a reclaimed mine site in the general area, and may need to be considered by the BLM for treatment.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Under the Proposed Action Alternative, light-use roads and drill pads associated with GVB drilling would entail surface disturbance. Access routes would involve scratch-grading or surface preparation that could result in surface disturbance and expose areas to the establishment of noxious weeds. Where soils are disturbed and native vegetation is lost, there is a potential for invasive and non-native plant species to establish. Reclamation of roads, as well as of each drill pad site, would include grading, scarifying, and seeding using a BLM-approved seed mixture and application rate. Seeding would occur both as an interim control measure after construction activities are completed and as part of final reclamation, and would occur at a time when opportunities are greatest for establishment (including late summer, fall, or early spring) in order to improve germination rates.

Mitigation Measures -- Noxious weed control would be required under the Proposed Action Alternative along access routes and at drill sites, in accordance with the Colorado Noxious Weed Act. Mitigation measures would include both preventive measures designed to avoid the introduction of noxious weeds and control measures if invasive species are identified in, or directly adjacent to, the proposed lease In addition, mitigation measures would include:

- Complete an inventory for noxious weeds within the proposed lease before construction begins in order to determine whether there is a need for pre-treatments (with results of the inventory shared with the BLM-UFO weed specialist).
- As a safeguard to avoid the introduction of noxious weeds, drill rigs and vehicles would be required to have all dirt and debris that could contain weed seeds removed; vehicles would also be washed prior to entering the Proposed lease in areas where wash-out material can be contained. Inspection of vehicles would be required, or proof of cleaning vehicles could be remitted.
- If the drill rigs or other vehicles are taken over areas infested with noxious weeds, each vehicle would be cleaned with high-pressure water spray equipment before moving to another area in order to reduce the likelihood of spreading noxious weed seeds.
- Appropriate herbicides and non-ionic surfactants would be applied to disturbed areas, topsoil stockpiles, and reclaimed areas in order to prevent invasion by noxious weeds. Care would be taken to avoid drift onto desirable species.
- Other mechanical or biological means of weed control (such as disking, shoveling, or insects) may also be employed on disturbed areas where appropriate, and where prior consultation with the BLM has occurred.
- OMLLC would maintain records of location, type, and date of all weed control, and a Pesticide Use Proposal (PUP) number would be obtained from the BLM prior to any herbicide application. A Pesticide Application Record would be turned into the BLM within 15 days after application.
- If outbreaks of noxious weeds are identified within the proposed lease, control measures would be implemented, in consultation with the BLM.

- All new and upgraded roads within the proposed lease, and associated pads, would be monitored for noxious weeds by a qualified contractor or trained Oxbow employee. Applicant would be responsible for treating all noxious weeds in areas of project disturbance. Applicant would not be responsible for existing roads that have not been modified for the project. A monitoring report would be required by the BLM once a year, in early summer.
- All herbicide application would be done in accordance with the label, at the appropriate time of year, with the appropriate chemical for the targeted noxious weed species, and would be applied by a certified applicator.

The CDRMS mining permit also contains a noxious weed control plan.

Finding on the Public Land Health Standard for Plant and Animal Communities (partial, see also Wildlife, Aquatic; Wildlife, Terrestrial; and Vegetation)

The Proposed lease meets Public Land Health Standard 3 for healthy native communities; however, some exotic invasive plant species are known to exist within the area. Precautions need to be maintained in order to minimize incursions of invasive non-native species. The project would not impact the viability of plant populations or communities; however, vegetation within the proposed lease, including invasive non-native species, would continue to meet the Standard after implementation of the Proposed Action Alternative.

No Action Alternative

Under the No Action Alternative, there would be no increase in the current establishment and occurrence of noxious or invasive weeds within the proposed lease

THREATENED, ENDANGERED, AND SENSITIVE

Affected Environment

Table 8 lists threatened, endangered or candidate species, as well as BLM sensitive species that may occur in Delta or Gunnison Counties (USFWS 2008a). **Table 9** lists the BLM sensitive species with the potential to occur within the general Proposed lease. Those species known to occur near the Proposed lease, or that may be impacted, were determined during block clearance surveys conducted for the Proposed lease and surrounding area through consultation with the BLM (Monarch & Associates and Michael Ward Outdoors 2005).

Table 8 Federal Threatened, Endangered or Candidate Species in Gunnison and Delta Counties (USFWS 2008a)

Common Name	Scientific Name	Status	Presence in the Analysis Area	Discussed in EA
Bald eagle[1]	*Haliaeetus leucocephalus*	T	Winter resident. No known nests, communal roosts, or concentration areas on the license tract. There is a winter concentration area along the North Fork just southwest of the license tract.	Yes
Black-footed ferret	*Mustela nigripes*	E	No suitable habitat on the license tract; no prairie dogs present.	No

Table 8 Federal Threatened, Endangered or Candidate Species in Gunnison and Delta Counties (USFWS 2008a)

Common Name	Scientific Name	Status	Presence in the Analysis Area	Discussed in EA
Bonytail	*Gila elegans*	E	Not present on the license tract; however, downstream habitat may be impacted (see Affected Environment).	Yes
Canada lynx	*Lynx canadensis*	T	Present on Grand Mesa; however, there have been no reports of lynx within Proposed lease There is no suitable habitat within the Proposed lease	Yes
Clay-loving wild buckwheat	*Eriogonum pelinophilum*	E	Not present; no suitable habitat within the Proposed lease	No
Colorado pikeminnow	*Ptychocheilus lucius*	E	Not present on the license tract; however, downstream habitat may be impacted (see Affected Environment).	Yes
Gunnison sage-grouse[2]	*Centrocercus minimus*	C	Not present; no suitable habitat within the Proposed lease	No
Humpback chub	*Gila cypha*	E	Not present on the license tract; however, downstream habitat may be impacted (see Affected Environment).	Yes
Razorback sucker	*Xyrauchen texanus*	E	Not present on the license tract; howerver, downstream habitat may be impacted (see Affected Environment).	Yes
Uinta Basin hookless cactus	*Sclerocactus glaucus*	T	Not present; no suitable habitat within the Proposed lease	No
Uncompahgre fritillary butterfly	*Boloria acrocnema*	E	Not present; no suitable habitat within the Proposed lease	No
Yellow-billed cuckoo	*Coccyzus americanus*	C	Not present; no suitable habitat, and no nesting documented by the Breeding Bird Atlas (Kingery, ed. 1998).	Yes

Status: T - Threatened; E - Endangered; C - Candidate

[1] On June 28, 2007, Secretary of the Interior Dirk Kempthorne announced the removal of the bald eagle from the list of threatened and endangered species. Remains protected under the Bald Eagle Protection Act and the Migratory Bird Treaty Act.

[2] This species still appears on the U.S. Fish and Wildlife Service web site as a candidate species, however, on April 18, 2006 a finding that listing of this species was not warranted was published in the Federal Register, and the candidate classification was dropped at that time.

Table 9 BLM Sensitive Species that May be Present in or near the Proposed lease

Common Name	Scientific Name	Presence in the Analysis Area	Discussed in EA
Invertebrate			
Butterfly, Great Basin silverspot	*Speyeria okomis nokomis*	No known populations within the Proposed lease	No
Amphibian			
Frog, Northern leopard	*Rana pipiens**	No suitable habitat within the Proposed lease	No
Treefrog, Canyon	*Hyla arenicolor*	No suitable habitat within the Proposed lease	No
Reptile			
Lizard, longnose leopard	*Gambelia wislizenii*	No suitable habitat within the Proposed lease	No
Rattlesnake, Midget Faded	*Crotalus viridis concolor*	No suitable habitat within the Proposed lease	No
Fish			
Chub, Roundtail	*Gila robusta*	Not present within the Proposed lease;	No

Table 9 BLM Sensitive Species that May be Present in or near the Proposed lease

Common Name	Scientific Name	Presence in the Analysis Area	Discussed in EA
Sucker, bluehead	*Catostomus discobolus*	however, may be impacted (see Affected Environment for Colorado River fish).	No
Sucker, flannelmouth	*Catostomas latipinnis*		No
Trout, Colorado River cutthroat	*Oncorhynchus clarki pleuriticus*	No known populations of pure strain cutthroats on public lands managed by UFO.	Yes
Trout, Greenback cutthroat	*Oncorhynchus clarki stomias*	No known populations of pure strain cutthroats on public lands managed by UFO	Yes
Bird			
Curlew, Long-billed	*Numenius americanus*	Migratory; no suitable habitat within the Proposed lease.	No
Goshawk, northern	*Accipter gentilis*	No suitable habitat within the Proposed lease.	Yes
Grouse, Gunnison sage	*Centrocercus minimus*	No suitable habitat within the Proposed lease. No known leks within the Proposed lease.	No
Grouse, Sharp-tailed	*Tympanuchus phasianellus columbian*	No suitable habitat within the Proposed lease.	No
Hawk, ferruginous	*Buteo regalis*	Migratory; no suitable habitat within the Proposed lease.	No
Ibis, white-faced	*Plegadis chihi*	Migratory; no suitable habitat within the Proposed lease.	No
Tern, black	*Chlidonias niger*	No suitable habitat within the Proposed lease.	No
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	No suitable habitat within the Proposed lease. No confirmed breeding on UFO.	Yes
Mammal			
Bat, Allen's (Mexican) big-eared	*Idionycteris phyllotis*	Outside of expected range.	No
Bat, big free-tailed	*Nyctinomops macrotis*	Outside of expected range.	No
Bat, spotted	*Euderma maculatum*	No Roosting and Foraging habitat present. No known roosts.	No
Bat, Townsend's big-eared	*Corynorhinus townsendii*	No Roosting and Foraging habitat present. No known roosts.	No
Fox, Kit	*Vulpes macrotis*	No suitable habitat within the Proposed lease.	No
Myotis, fringed	*Myotis thysanodes*	No Roosting and Foraging habitat present. No known roosts.	No
Myotis, Yuma	*Myotis yumanensis*	No Roosting and Foraging habitat present. No known roosts. Northeastern edge of expected range.	No
Prairie Dog, Gunnison[1]	*Cynomys gunnisoni*	No suitable habitat within the Proposed lease Not within the Montane population, as defined by USFWS.	No
Otter, River	*Lutra canadensis*	No suitable habitat within the Proposed lease.	No
Sensitive Plants			
Grand Junction milkvetch	*Astragalus linifolius*	No suitable habitat within the Proposed lease.	No
Naturita milkvetch	*Astragalus naturitensis*	No suitable habitat within the Proposed lease.	No
San Rafael milkvetch	*Astragalus rafaelensis*	No suitable habitat within the Proposed lease.	No

Table 9 BLM Sensitive Species that May be Present in or near the Proposed lease

Common Name	Scientific Name	Presence in the Analysis Area	Discussed in EA
Sandstone milkvetch	*Astragalus sesquiflorus*	No suitable habitat within the Proposed lease.	No
Rocky Mountain thistle	*Cirsium perplexans*	May be present. Population known in Jumbo Mountain area.	Yes
Kachina daisy	*Erigeron kachinensis*	No suitable habitat within the Proposed lease.	No
Montrose bladderpod	*Lesquerella vicina*	No suitable habitat within the Proposed lease.	No
Colorado desert parsley	*Lomatium concinnum*	May be present.	Yes
Paradox Valley lupine	*Lupinus crassus*	No suitable habitat within the Proposed lease.	No
Dolores skeleton plant	*Lygodesmia doloresensis*	No suitable habitat within the Proposed lease.	No
Eastwood monkey-flower	*Mimulus eastwoodiae*	No suitable habitat within the Proposed lease.	No
Paradox breadroot	*Pediomelum aromaticum*	No suitable habitat within the Proposed lease.	No

[1] Gunnison's prairie dog is not currently classified as sensitive by the BLM. However, specific population segments in Colorado are currently under consideration by the USFWS for listing as threatened.

Canada Lynx: The Proposed Action Alternative would not take place within a Lynx Analysis Unit (LAU), and the proposed lease is not considered suitable lynx denning, wintering, or other habitat. The CDOW shows an area of Potential Lynx Habitat within the Proposed lease (CDOW 2009). However, no lynx has been formally documented within 10 miles of the proposed lease (Monarch & Associates and Michael Ward Outdoors 2005).

Colorado River Fishes: The federally endangered bonytail, Colorado pikeminnow, humpback chub, and razorback sucker are all found downstream of the proposed lease in portions of the Colorado River system. No suitable habitat for these species is found within the proposed lease. Designated critical habitat for these species is also found downstream of the proposed lease.

The BLM sensitive Colorado River and Greenback cutthroat trout are additional Colorado River fish that could potentially be impacted by project activities. The closest known occurrence of Colorado River cutthroat trout is in upper portions of Hubbard Creek, approximately 3.4 miles northwest of the proposed lease. The species is also known to occur downstream of the Proposed lease in portions of the Colorado River system. Suitable habitat for the Colorado River cutthroat does not exist within the proposed lease (Monarch & Associates and Michael Ward Outdoors 2005). The closest known occurrence of Green-backed cutthroat trout is in Deep Creek, approximately 5 miles northeast and upstream of the Elk Creek Mine Proposed lease.

Yellow-billed Cuckoo: Marginally suitable habitat for the yellow-billed Cuckoo does exist in the vicinity of the proposed lease in the form of cottonwood (*Populus spp.*) stands. The stands are, however, of limited size and quality and are unlikely to host resident cuckoos. The potential for occurrence of this species within the proposed lease is extremely low. Wildlife surveys conducted in 2005, 2006, and 2008 did not document any occurrences of this species within or around the proposed lease (Monarch & Associates and Michael Ward Outdoors 2005, 2006, 2008). However, cuckoos were detected during the 2008 breeding season on private land near Paonia (RMBO 2008).

Northern Goshawk: Large tracts of closed-canopy mature coniferous forest, which comprise suitable northern goshawk nesting habitat, are not found within the proposed lease. The Proposed lease does contain several small patches of Douglas-fir that could potentially be used for foraging activities. However, northern goshawks have not been observed within the proposed lease (Monarch & Associates and Michael Ward Outdoors 2005, 2006, 2008).

Rocky Mountain Thistle: Rocky Mountain thistle is typically found in disturbed areas in clays derived from the Mancos Shale formation. Suitable habitat for Rocky Mountain thistle has been observed in the vicinity of the proposed lease in locations associated with Mancos Shale (Monarch & Associates and Michael Ward Outdoors 2005). This geologic formation is not found on the surface within the Proposed lease (see Soils section, and Geology and Minerals section). The probability for occurrence of this species within the proposed lease is low.

Colorado (Adobe) Desert Parsley: Colorado desert parsley is typically found in shrub communities on rocky soils derived from the Mancos Shale formation. This species has been observed in Delta County west of the ECET. Habitat suitable for this species was not specifically noted for the Elk Creek Mine (Monarch & Associates and Michael Ward Outdoors 2005), but may occur near habitat suitable for Rocky Mountain thistle. As noted above, Mancos Shale does not occur on the surface in the ECET, and the probability for occurrence of this species in the proposed lease is low.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

There is no designated critical habitat for listed species within the proposed lease. There are no anticipated direct impacts to any designated critical habitat, or to any threatened, endangered, or sensitive species as a result of the Proposed Action Alternative.

The proposed GVB drilling activities would not impact any lynx denning habitat, suitable reproductive habitat, summer or winter foraging habitat, or migration habitat. In addition, surface-disturbing activities would be limited in extent; would not impact local habitat components or stands equivalent to areas of lynx habitat; and would not cause lynx to avoid using the area. The Proposed Action Alternative, therefore, would not impact lynx.

Marginally suitable habitat for the Yellow-billed Cuckoo does exist in small cottonwood stands in the general vicinity of the proposed lease. However, these stands are of limited size and quality and are unlikely to host cuckoos. The Proposed Action Alternative, therefore, would not impact the Yellow-billed Cuckoo.

The endangered Colorado River fish are not present on site; however, the Colorado pikeminnow, razorback sucker, and their critical habitat in the lower Gunnison River area, could be indirectly impacted by the Proposed Action Alternative. The bonytail chub and humpback chub, and their critical habitat in the Colorado River area, could also be indirectly impacted by the Proposed Action Alternative.

The Proposed Action Alternative would prolong a currently permitted depletion of surface flows in the Upper Colorado River, which the USFWS has determined would jeopardize the continued existence of the Colorado pikeminnow, razorback sucker, and bonytail and humpback chub. 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 endangered fishes by depletions from the Upper Colorado River Basin. Included in the Recovery Program was a requirement that the depletion fee ($16.30 per acre foot in 2005) be paid to help support the Recovery Program. In May, 2005, OMLLC and the town of Somerset consulted on annual depletions of 242 acre feet of depletions resulting from mining operations. The USFWS issued a Biological Opinion (BO) (**Appendix B**) that addressed a request for a 40-year water service contract with the Bureau of Reclamation (BOR), and concluded that the requested average annual new depletion of 242 acre-feet (af) would be well below the sufficient progress threshold of 4,500 af for the Recovery Program.

Water consumption associated with the Proposed Action Alternative would continue, under consultation, and the adoption of the reasonable and prudent alternative to avoid a "jeopardy" determination. No new consultation with the USFWS would be required unless the amount or extent of incidental take is exceeded; new information reveals impacts to listed species or critical habitat in a manner, or to an extent, not considered in the BO; the action is modified in a manner that results in impacts to listed species not considered in the BO; or a new species is listed or critical habitat designated that may be impacted. Because the Recovery Program mitigation is used in order to benefit downstream habitat within the Colorado River system, this would also avoid impacts to the BLM sensitive Colorado River and Greenback cutthroat trout.

Due to the lack of suitable habitat, the low potential for occurrence, as well as the minimal nature of proposed surface disturbance, the Proposed Action Alternative would result in no impacts to either the yellow-billed cuckoo or to the northern goshawk.

Although Rocky Mountain thistle has not been reported within the Proposed lease, and it is unlikely that it occurs within the Proposed lease, the species' affinity for disturbed areas could result in occasional occurrences where disturbance occurs both from project-related activities as well as from other causes (especially in clay dominated soil types). There is a very low probability that individuals of this species may be disturbed during the drilling of GVBs and associated activities; however, this impact, if it occurs, would be minimal from a population standpoint and would not result in a loss of viability or a trend towards Federal listing.

Mitigation Measures -- Site-specific surveys for sensitive plants would be conducted onsite prior to the development of any surface facilities or to other soil-disturbance activities. In addition,

- there would be no surface occupancy or soil-disturbing activities within a 100-foot radius of sensitive plant locations; and
- care would be taken in the application of herbicides, surfactants, and other weed control measures in order to avoid overspray or drift onto desirable species or sensitive plants.

Finding on the Public Land Health Standard for Threatened and Endangered Species

The North Fork LHA (BLM 2007) identified the proposed lease as meeting Public Land Health Standard 4 for special status species, including threatened and endangered species. Special status, threatened and endangered species (Federal and State), other plants and animals, and their habitats, officially designated by the BLM would continue to be maintained after the completion

of the project. The Standard with regard to threatened and endangered species, therefore, would be met.

No Action Alternative

Under the No Action Alternative, there would be no impacts to threatened, endangered, or sensitive species.

MIGRATORY BIRDS

Affected Environment

The Migratory Bird Treaty Act (916 U.S.C. 703-711) identifies numerous bird species of the southwestern U.S. that are assigned a migratory status. The USFWS Birds of Conservation Concern (BCC) lists 27 species that are of the highest priority for the Southern Rockies/Colorado Plateau, Bird Conservation Region 16 (USFWS 2008b). The purpose of the BCC list is to identify those species in the greatest need of conservation action, outside of those species already listed by the USFWS as threatened or endangered.

Biological surveys conducted in 2005, 2006, and 2008 recorded 70 species of birds present within the proposed lease, many of which are listed as migratory species subject to protection by the USFWS. Three of these species are on the BCC list for the Southern Rockies/Colorado Plateau Bird Conservation Region: Peregrine Falcon (*Falco peregrinus*), Golden Eagle (*Aquila chrysaetos*), and Cassin's Finch (*Carpodacus cassinii*) (Monarch & Associates and Michael Ward Outdoors 2008). These studies described avian species assemblages as typical, given habitat types present within the proposed lease. Avian population densities were described as relatively low (which was likely due to the paucity of riparian habitat within the area). The bald eagle is present as a winter resident along the North Fork of the Gunnison River. The river and adjacent habitats are designated as Bald Eagle Winter Forage Range by CDOW (2009). Monarch & Associates and Michael Ward Outdoors (2005, 2008) indicate that bald eagle activity has been observed along the North Fork Valley, but that no bald eagles have been sighted in the mine area, or in areas near the mine, for several years.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

There is potential for disturbance to migratory birds during drilling, access, and site reclamation activities associated with GVB drilling. This includes direct impacts to unidentified active nests, potential mortalities and injuries to birds and eggs in unidentified nests, and disturbance to suitable nesting habitat potentially resulting in incidental "take" of migratory birds. Indirect impacts could include disturbance to birds during breeding season, as the result of nearby drilling or traffic, and the displacement or abandonment of nests, also as the result of nearby activity. Winter roost habitat for the bald eagle is not present in the mine area. The Proposed Action Alternative would not impact any known bald eagle nest or reproductive sites.

Mitigation Measures – Mitigation measures for migratory birds and nesting raptors would include:

- Conduct surveys for migratory birds and nesting raptors within one-half mile of drill pads and access roads prior to development.
- If active migratory bird nests are identified during project implementation, appropriate measures would be taken in order to reduce impacts to these species, including relocating overland access routes and drill hole locations and implementing disturbance-free buffer zones and timing limitations for active raptor nests.
- If other (non-migratory) raptor nests are identified, no surface activities would be allowed within a one-half mile radius of active nest sites between the dates of February 1 and August 15, unless authorized by the BLM on a site-specific basis.

Mitigation measures or bald or golden eagle nests that may be established within the proposed lease would include:

- No new permanent surface facilities or disturbances would be located within a one-quarter mile radius buffer zone around each bald or golden eagle nest site.
- No above-ground activities would be allowed within a one-half mile radius buffer zone around each active eagle nest site from November 15 to July 30 for bald eagles, and around each active golden eagle nest site from February 1 to July 15.
- Any proposed surface facilities, disturbances, or activities in, or adjacent to, these buffer zones would require approval from the BLM on a site-specific basis, after consultation with the USFWS.

Mitigation measures for bald eagle winter roost sites or concentration areas that may be established within the proposed lease would include:

- No above-ground activities would be allowed within a one-quarter mile radius of winter roosts between November 15 and March 15; development may be permitted at other periods.
- If periodic visits are required within the buffer zone after development, activity would be restricted to the hours of 10 a.m. and 2 p.m. from November 15 through March 15.

Underground activities would have no impacts on migratory bird populations.

Finding on the Public Land Health Standard for Threatened and Endangered Species

The Land Health Assessment (BLM 2007) identified this area as meeting Public Land Health Standard 4 for special status species, including threatened and endangered species and migratory birds. The area was mapped as being at the margins of bald eagle winter range. This winter range is mapped predominantly on the slopes overlooking the river valley. The mitigation measures listed above for bald eagle winter roost areas would ensure minimal impact to wintering bald eagles and would maintain this Standard over the life of mine.

No Action Alternative

Under the No Action Alternative, there would be no impacts to migratory birds.

WILDLIFE, TERRESTRIAL

Affected Environment

The Proposed lease occurs within the CDOW Game Management Unit 521. (Game Management Units are the fundamental scale at which game populations are monitored and hunting is controlled.) Habitat within the proposed lease is known to support elk, mule deer, black bear, and mountain lion (Monarch & Associates and Michael Ward Outdoors 2008). Portions of the proposed lease are mapped as potential Elk Severe Winter Range, Potential Lynx Habitat, and Bald Eagle Winter Forage Range (CDOW 2009). These are potential habitat designations from general vegetation maps and possible sightings, and may not be ground-truthed. Lynx and bald eagle are addressed above, in the Threatened, Endangered, and Sensitive Species section, as well as in the Migratory Birds section. Other wildlife species potentially occurring within the proposed lease include coyote, red fox, long-tailed weasel, badger, striped skunk, bobcat, and American martin.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Activities associated with drilling GVBs may result in some temporary disturbance, and in the displacement of local wildlife species from habitats near surface activities, in response to increased human presence and activity (noise). The disturbance and displacement would result in short-term impacts to individuals; however, due to the limited duration of activities and the availability of other unaffected suitable habitats in the vicinity of the proposed lease, these impacts would not be detrimental to population status and health.

There would be a short-term loss of approximately 5.63 acres of wildlife habitat resulting from the construction of drill pads and new access roads associated with the GVBs. These impacts would not be long-term because the drill pads and access roads would be reclaimed after mining. In the long-term, reclamation would return the habitat to its pre-mining condition. Underground activities would not have an impact on terrestrial wildlife.

Finding on the Public Land Health Standard for Plant and Animal Communities (partial, see also Vegetation; Invasive, Non-native Species; and Wildlife, Aquatic)

The area meets Public Land Health Standard 3 for healthy native communities (BLM 2007). Under the Proposed Action Alternative, viable wildlife populations and communities would be maintained. The public lands within the proposed lease would continue to meet the standards for healthy plant and animal communities after implementation of the Proposed Action Alternative. The south-facing slopes are mapped as elk severe winter range. The Proposed Action Alternative would result in little impact to these areas.

No Action Alternative

Under the No Action Alternative, there would be no impacts to terrestrial wildlife.

WILDLIFE, AQUATIC

Affected Environment

Two primary drainages cross through the proposed lease: Elk Creek and Sanborn Creek. No suitable aquatic habitats are associated with either of these creeks. Sanborn Creek is an ephemeral waterway with no permanent flow that could support a viable fishery or other aquatic wildlife community. Elk Creek is a relatively permanent surface water feature; however, summer flows are low and sometimes non-existent, and, as such, the creek supports minimal aquatic wildlife (primarily aquatic macroinvertebrates) and does not support a fishery.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

No impacts to local perennial streams or aquatic wildlife are expected as a result of the implementation of the Proposed Action Alternative. The depletions of surface flows discussed above in the Threatened, Endangered, and Sensitive Species section would impact the North Fork of the Gunnison River, but not its tributary streams. There is no suitable habitat for aquatic wildlife within the proposed lease, and surface-disturbing activities associated with GVB drilling would avoid wetland and riparian areas. Subsidence resulting from underground mining activities could result in minor alterations to surface-water flow patterns. However, due to the large amount of material above the coal seam, the amount of surface subsidence is expected to be minimal to negligible. There would be no expected adverse impacts to aquatic invertebrates or to BLM sensitive aquatic species.

Finding on the Public Land Health Standard for Plant and Animal Communities (partial, see also Vegetation; Wildlife, Terrestrial; and Invasive, Non-native Species)

The Proposed lease is identified as meeting Public Land Health Standard 5 for water quality (BLM 2007). Elk Creek is an intermittent drainage with no areas of potential aquatic wildlife habitat. Sanborn Creek is an ephemeral drainage, and also has no areas of potential aquatic wildlife habitat. The majority of the project surface activities are well above the two drainages. Three of the drill pads would be near Elk Creek. Final locations for the drill pads along Elk Creek have not been identified, but would be at least 0.2 miles from any delineated wetland or riparian area. The public lands within the proposed lease would continue to meet the Standards for healthy aquatic plant and animal communities after implementation of the Proposed Action Alternative.

No Action Alternative

Under the No Action Alternative, there would be no new project-related impacts to aquatic wildlife.

WETLANDS AND RIPARIAN ZONES

Affected Environment

No wetlands, as defined in Section 404 of the Clean Water Act, have been identified within the proposed lease. Approximately 1 mile of riparian habitat has been delineated along Elk Creek (the entire length of the creek through the proposed lease). This riparian habitat contains limited populations of cottonwood and willow that may be beginning to die out. During field surveys conducted in 2005, very little regeneration of either of these species was observed (Monarch & Associates and Michael Ward Outdoors 2005). Sanborn Creek supports virtually no riparian habitat (Monarch & Associates and Michael Ward Outdoors 2005). Both Elk Creek and Sanborn Creek would likely qualify as jurisdictional Waters of the U.S. (WUS); however, a jurisdictional determination has not been completed for either drainage.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Surface-disturbing activities associated with methane gob vents would be located so as to avoid impacts to riparian zones and WUS, including wetlands associated with Elk Creek and Sanborn Creek. The nearest road construction activities to creeks within the Proposed lease would be those associated with the reopening of previously reclaimed exploration roads, and would take place approximately 0.4 miles from Elk Creek and approximately 0.1 mile from Sanborn Creek (**Figure 2**). The existing road along Elk Creek would not be modified. Installation of proper sediment controls (see Mitigation Measures below) during road construction, combined with the distance of operations from streams, would prevent sedimentation to area streams. Six of the GVB drill pads would be located on the high flats between Elk Creek and Sanborn Creek; three would be accessed from the existing road that follows Elk Creek. Final locations for the drill pads along Elk Creek have not been identified; however, they would be at least 0.2 miles from any delineated wetlands or riparian area.

Existing roads through the proposed lease that would be used for GVB construction and operation occur immediately adjacent to and, in several locations, cross both Elk Creek and Sanborn Creek. The operation of vehicles on these roads may slightly increase the rate of sedimentation into the stretches of streams closest to the roads. With the mitigation measures, shown below, the amount of sedimentation from these activities is expected to be minimal and short-term. Existing low-water crossings of Elk Creek or Sanborn Creek that would be used for access would be hardened with a culvert or other control feature in order to prevent channel damage and downstream sedimentation. (For a discussion of potential impacts to streams from subsidence, please see the Geology and Minerals section.)

Mitigation Measures – Mitigation measures for wetlands and riparian zones would include:

- Ground disturbance would be located away from drainages and wetlands to the extent possible.
- Dust control measures, such as wetting and surfactants, would be applied to exposed surfaces and soil stockpiles.

- Proper sediment controls would be used during drill pad and road preparation. These would include sediment barriers, such as silt fences or straw bale sediment barriers, equipment matting, prompt revegetation, etc.
- Drainage crossings along existing roads would be hardened with culverts or other control features.
- The drill pads, along with any associated disturbance, would be located at least 0.2 miles from any delineated wetlands or riparian areas.
- No new access off the existing road would occur in wetlands or riparian areas.
- Roads would be limited to a single crossing of Elk Creek.

Finding on the Public Land Health Standard for Riparian Systems

The Proposed lease is identified as meeting Public Land Health Standard 5 for water quality (BLM 2007). Elk Creek is an intermittent drainage with areas of riparian habitat. Based upon the lack of disturbance to wetlands and riparian zones within the proposed lease, the criteria for this Standard would be met.

No Action Alternative

Under the No Action Alternative, there would be no impacts to wetlands and riparian zones. There would be no impacts to WUS or wetlands under the Proposed Action; therefore, no permit from the U.S. Army Corps of Engineers would be required.

FLOODPLAINS

Affected Environment

A 100-year floodplain is defined by the Federal Emergency Management Administration (FEMA) as the area adjacent to a watercourse that has a 1 percent chance of becoming wet in any single year (FEMA 1989). Floodplain maps have been prepared by FEMA that cover the proposed lease; no floodplains have been mapped within the proposed lease boundaries (FEMA 1989). Elk Creek and Sanborn Creek are too small to be depicted at the scale of FEMA floodplain maps. However, these streams do not have any significant reaches that are likely to be regularly inundated by flows that overtop their channel banks to the extent that they would leave areas of overbank deposition. Potential subsidence from coal extraction beneath these creeks could result in minor local shifts in channel morphology and gradient; however, these would not be considered floodplain alterations.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

There would be no project-related disturbances within, or near, mapped floodplains.
No Action Alternative
Under the No Action Alternative, there would be no impacts to floodplains.

WATER QUALITY, SURFACE AND GROUND

Affected Environment

Surface Water

Two north-south running drainages occur within the proposed lease: Elk Creek and Sanborn Creek, both of which are tributaries of the North Fork of the Gunnison River. Elk Creek is a relatively permanent water body, while Sanborn Creek is an ephemeral drainage (seeing flow only during times of highest run-off).

Creeks in the region are recharged mainly through precipitation and snowmelt, and are not recharged by groundwater resources. Some amount of seepage from surface water to groundwater may occur, especially in locations where fracturing has occurred either as a result of natural processes or subsidence associated with past mining activities.

Current mine activities have little impact on surface waters within the area. Relatively low amounts of groundwater move through areas where underground mining activity occurs. This, combined with a lack of a significant connection between groundwater and surface water, reduces the impact of underground activities on surface waters. OMLLC does not discharge any water used or recovered from mining activities into any surface waters.

Water used in the mine is drawn from a well placed in alluvial deposits near the North Fork of the Gunnison River, which is part of the Upper Colorado River Basin. In times of low water availability, water is purchased (from the Blue Mesa Reservoir in the winter and from the Fire Mountain Canal in the summer). As part of OMLLC's incidental take permit (see Threatened, Endangered, and Sensitive Species section), a depletion fee is paid. The amount of the fee is based upon the amount of water withdrawn from the Colorado River system (which includes the North Fork of the Gunnison River). This depletion fee serves to mitigate any consumptive use of surface waters.

Ground Water

Groundwater resources within the area are primarily associated with alluvial deposits, and the direction of flow follows local topography. Generally, this groundwater resource is of good quality, and is used for both human consumption and agricultural purposes.

There is some groundwater associated with bedrock formations; specifically, Mancos and Mesa Verde Formations. This analysis focuses on the Mesa Verde Formation because this is the formation in which mining activity would occur. Groundwater resources associated with this formation are minimal to moderate, and are primarily associated with sandstones members of the formation. Groundwater flow typically follows the dip (5 degrees) of the bed, which trends to the northeast. Groundwater quantities are higher down-bed and lower near outcrops.

Historically, the Elk Creek Mine has encountered very little water in its D-Seam workings (the area where mining is currently taking place). This is due, in part, to the mine's proximity to the formation's outcrop. Groundwater that has been encountered has been within perched water bearing zones associated with sandstones, and has been of limited extent (OMLLC 2007).

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Surface Water

Surface-disturbing activities associated with the drilling of GVBs would result in no direct impacts to surface waters; however, activities could indirectly result in increased amounts of sediment being deposited into surface waters due to increased erosion resulting from clearing and grading of well pads, and the construction and use of access roads. These impacts would be mitigated by best management practices (BMPs) employed during construction of pads and roads (such as sediment control barriers and dust abatement). Impacts would be mainly short-term, as roads and portions of well pads would be reclaimed after construction.

Subsidence would occur in areas above, and adjacent to, longwall mining. The amount of subsidence would depend upon many factors, including mine plans, coal seam thickness, geologic strata, and overburden depth. Within the lease area, overburden depth is greater than 1,000 feet, but less than 2,300 feet, and the maximum subsidence would be expected to be about 6 feet (see Geology and Minerals section). Subsidence would be most noticeable on ridges and steeper slopes. Tension cracks may appear in bedrock outcrops, on steep slopes, and at the edges of subsidence. These cracks would result from shifts in the relative position of surface materials, and would have no connection to the fracture zone above the gob. Tension cracks could be comparatively deep and conspicuous in bedrock; however, they would not extend deeply below the surface. Tension cracks would not result in any potential drainage of surface water to the gob or contamination of surface water.

Subsidence from mining could alter surface water hydrology by altering surface water drainage patterns. As discussed above, there is little connection between groundwater flow regimes and surface water hydrology within this area, and no indirect impacts are anticipated. Subsidence under surface-water drainages could result in minor changes in channel morphology and gradient, thereby temporarily impacting water quality by inducing minor cutting, pooling, soil erosion, and sedimentation. Surface-tension cracks have the potential to develop within the surrounding surface drainages, which would result in an initial period of erosion and sedimentation after initial periods of run-off after subsidence occurs. Surface-tension cracks would be small and discontinuous, and would not result in any extensive rechanneling or draining of the stream channels. The potential for larger surface fractures to develop in drainages where unconsolidated materials occur would be partially mitigated by the ductile nature of the unconsolidated alluvium and colluvium. Settling and tension cracking of the surface would not impact surface water quantity, and would result in only local and short-term impacts to water quality. Coal mining beneath Bear Creek west of the proposed lease in the 1970s, and again in 2003 and 2004, has not resulted in any observed temporary or permanent impact on stream flow or water quality. It is not expected that the results would differ within the proposed lease.

Water discharge from the mine into surface streams could impact the quality of water in the receiving streams. Mine effluent would be regulated, and any discharge to receiving streams would have to meet permitted effluent requirements. Concentrations of total dissolved solids (TDS), iron, manganese, and sulfate could be constituents likely to increase. Currently, water from the mine sump is transferred to historic B- and C-Seam workings. This mine sump has an

overflow discharge outfall point that would flow into Elk Creek. This outflow, however, has never discharged, and is not expected to discharge. The Colorado Department of Public Health and Environment (CDPS) Discharge Permit includes this outfall.

Groundwater

Groundwater resources within the mined area are sparse and minor; therefore, impacts to groundwater quality and quantity are expected to be minor. Perched groundwater encountered during mine activities would be drained from the active mine area and transferred into historic B-Seam workings below the Elk Creek Mine. Only minor amounts of groundwater are expected to be encountered. Water quality data from around the proposed lease and the Elk Creek Mine area does not indicate that any connection between the B-Seam water-storage area and other groundwater or surface water resources exists. Additionally, the mine's outfall (which would flow into Elk Creek) has never discharged (OMLLC 2007).

Shallow groundwater aquifers could potentially be impacted from accidental spills of hazardous materials. The impact of such spills would be minor because of the unlikely events of released materials, small volumes if releases occurred, localized extent of such spills, and greater depths to aquifers.

Finding on the Public Land Health Standard for Water Quality

Water quality in the stream segments within the proposed lease is expected to meet the criteria established in the Standard; however, the status of water quality in the State of Colorado will determine whether this Standard is met. The Proposed lease is identified as meeting Public Land Health Standard 5 for water quality (BLM 2007). Implementation of the Proposed Action, along with the associated conservation measures, would meet current surface water quality standards and would not alter water quality.

No Action Alternative

Under the No Action Alternative, there would be no new impacts to groundwater or surface water resources.

WASTES, HAZARDOUS OR SOLID

Affected Environment

The equipment and materials needed under the Proposed Action Alternative have low potential for accidental spill of regulated or hazardous waste substance release. These materials include motor fuel and drilling fluids (bentonite and benign soaps). The lessee would maintain all of the appropriate Material Safety Data Sheets (MSDS) for all chemicals, compounds, and substances to be used during project activities.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Impacts to the environment resulting from the release of hazardous or solid waste are not expected. The potential for impacts resulting from substance release would depend upon the responsible use of chemicals, and the immediate containment and adequate clean-up in the event of unintentional releases. The potential for exposure to hazardous or solid wastes would be low and short-term during drilling activities. Spill kits would be located onsite, which would be used in the case of an accidental spill in order to assist in rapid clean-up. Additionally, appropriate secondary containment would be utilized for all hazardous chemicals.

No Action Alternative

Under the No Action Alternative, there would be no impacts associated with hazardous or solid wastes.

ENVIRONMENTAL JUSTICE

Affected Environment

Executive Order No. 12898 on Environmental Justice, regarding how Federal actions may impact minority and low-income populations, was issued on February 11, 1994. The purpose of the order is to identify and address, as appropriate, disproportionately high and adverse human health and environmental impacts resulting from programs, policies, or activities on minority or low-income populations. U.S. Census Bureau summary data for Gunnison and Delta Counties (U.S. Census Bureau 2008a and 2008b), and 2000 Census data for Census Tract 9639 in Gunnison County (U.S. Census Bureau 2009), do not indicate that there are ethnic groups or communities or low-income populations within the upper drainage of the North Fork of the Gunnison River area, or in adjacent portions of Delta County that may be impacted by changes in employment at the mine. There are no low-income or minority populations that could be disproportionately impacted by the Proposed Action Alternative.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

There are no environmental consequences associated with Environmental Justice under the Proposed Action Alternative, as operations in the lease area would be continued as currently being conducted at the Elk Creek Mine.

No Action Alternative

Under the No Action Alternative, there would be no disproportionate negative impacts to minority and low-income populations.

OTHER ELEMENTS

In the analysis for this EA, the following elements are considered (**Table 10**); those that could be impacted are brought forward for analysis.

Table 10

Other Elements	Not Applicable or Not Present	Present, but No Impact	Applicable and Present; Brought Forward for Analysis
Access			X
Transportation			X
Cadastral Survey	X		
Realty Authorizations	X		
Range Management		X	
Forest Management		X	
Wildfire			X
Hydrology/Water Rights		X	
Noise		X	
Recreation			X
Visual Resources			X
Geology and Minerals			X
Paleontology			X
Law Enforcement	X		
Socio-Economics			X

Resources that are present, but that would not be impacted, and, therefore, are not brought forward for analysis include: Range Management, Forest Management, Hydrology and Water Rights, and Noise. In terms of Range Management, there are no managed grazing leases within the proposed lease. In terms of Forest Management, the area is not managed as forest. Potential impacts to surface water are discussed in Water Quality. These potential impacts would not include hydrology or water rights. The Proposed Action Alternative would include drilling of GVBs on a ridgetop approximately 1.5 miles north, and 2,000 feet above, State Highway 133 and the Town of Somerset. There would be no impacts associated with noise at this distance, and there are no intervening receptors. Drilling activity would be brief. If drilling occurs during hunting season, it would temporarily displace game movements in a lightly used area.

ACCESS AND TRANSPORTATION

Affected Environment

Access to the proposed lease is by one unsurfaced road that takes off Colorado highway 133 on private land, proceeds up Coal Gulch on to BLM land then terminates at an All Terrain Vehicle (ATV) track near the BLM-USFS boundary on the northeast side of the proposed lease. Current traffic volume on the ATV track through the proposed lease is low consisting primarily of hunters on ATV's during the late summer and fall months. Possible interruptions to traffic during GVBH drilling operations would occur for only brief periods for each drill pad. Several roads constructed for past coal exploration activities had existed within the proposed lease. These roads have been reclaimed and do not currently serve as access routes into the proposed lease, but would be re-opened to serve the project as access to GVBH sites. Gates would be placed on

these temporary roads to prevent public access, and reclamation would be accomplished when the GVBH sites are no longer needed.

Transportation of mined coal would occur entirely underground on the proposed lease. As underground mining advances, conveyor belt lines would be extended to the working faces serving as an extension of the existing coal conveyance system. The coal would arrive at the surface to be handled by the existing coal handling facilities at the Elk Creek Mine and loaded primarily on trains for delivery.

A very small quantity of coal would be hauled by truck locally in the North Fork Valley. The Elk Creek Coal Lease Tract in 2000 (See Final Environmental Impact Statement Iron Point Exploration License; Iron Point Coal Lease Tract; Elk Creek Coal Lease Tract Delta and Gunnison Counties, Colorado, USFS and BLM 2000) under the analysis of "Transportation" found in Chapter 3.14. The Elk Creek Coal Lease Tract EIS did a comprehensive analysis of the truck and train transportation in association with the operations of the mining activities. The preferred alternative and the Record of Decision allowed for a maximum of 5 trains per day to transport the coal once it is mined and removed from the mine. Transportation of the coal to the rail system is by a conveyor system. This EA is tiered to the analysis in the Elk Creek Coal Lease Tract EIS.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

The Proposed Action Alternative is expected to result in only a minor and temporary impact on access to the proposed lease. GVB activities would result in the reopening of 2.05 miles of reclaimed access roads and the construction of 0.25 miles of new access road on BLM public lands. These roads would remain open during the mining operations for access by light-duty trucks for regular inspections and maintenance of the GVBs. Both the new access road and the reopened exploration road would be reclaimed after mining activities are completed. Roads constructed or reopened for GVB drilling would be kept closed to the public during GVB drilling and operation, and appropriate signage would be used. Existing BLM roads through the proposed lease would remain open to the public during construction and operation. These activities would not alter current patterns of access for passenger vehicles or OHVs. Activities associated with the Proposed Action Alternative would not impact access to the proposed lease.

The Proposed Action Alternative impacts from train transportation in association with the operations of the mining activities is expected to be within the impacts evaluated in the Elk Creek Coal Lease Tract EIS (2000). The preferred alternative and the Record of Decision (Elk Creek Coal Lease Tract EIS, 2000) allowed for a maximum of 5 trains per day to transport the coal once it is mined and removed from the mine.

This evaluation concluded that the Proposed Action Alternative would not result in significant effects outside the range of effects already analyzed. The proposed transportation of the coal product was analyzed within the Elk Creek Coal Lease Tract EIS (2000), and presents no significant change to the federal action within that analysis.

No Action Alternative

Under the No Action Alternative, there would be no new road construction and no reopening of existing reclaimed roads; therefore, there would be no impacts on access and transportation within the proposed lease.

WILDFIRE

Affected Environment

Warm, dry summers experienced in the proposed lease contribute to a moderate to high risk of wildfire, depending upon specific meteorological conditions. There are no known recent wildfires within the proposed lease or immediate vicinity.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Potential wildfire hazards resulting from the implementation of the Proposed Action Alternative would be low to moderate. Drilling crews would be equipped with appropriate fire-suppression devices designed to respond to project-related fire starts. Equipment would only be operated on roads and drill pads, which would reduce the risk of fire ignition resulting from vehicle use. Drilling crews would have access to telephones to facilitate calls to Montrose Fire Dispatch in order to report naturally occurring wildfires.

No Action Alternative

Under the No Action Alternative, there would be no project-related impacts to the risk of wildfire.

GEOLOGY AND MINERALS

Affected Environment

General Geology

The Elk Creek East Lease tract lies within the Paonia-Somerset coal field. Coal resources within the proposed lease are located within the Cretaceous-age Mesa Verde Formation, and generally dip approximately 5 degrees to the north-northeast. The Mesa Verde Formation is overlain by the Tertiary-age Wasatch Formation and Quaternary-age alluvial deposits, and underlain by the Cretaceous Mancos Shale. **Table 11** provides brief descriptions of the geologic resources within the proposed lease. In addition to the geologic units described below, isolated igneous intrusions, which compromise the quality of adjacent coals, are present in the vicinity of the proposed lease (USFS and BLM 2000). No faults are known within the proposed lease, but could be present.

Table 11 Proposed lease Stratigraphy

Geologic Unit		Geologic Period	Description
Alluvium and Colluvium		Quaternary	Unconsolidated soil and rock formed by mass wasting processes or by weathering of intact bedrock.
Wasatch Formation		Tertiary	Red and buff sandstones, and mudstones deposited in alluvial floodplains and stream channels (this formation contains abundant vertebrate fossils and outcrops commonly found throughout the region).
Mesa Verde Group	Ohio Creek Member	Cretaceous	Fluvial conglomerate often used as a local stratigraphic datum.
	Barren Member		Up to 2,300 feet of interbedded sandstones, shales, siltstones, and coals deposited during the final regression of the Western Interior Seaway. Mesa Verde sandstones are common natural gas reservoirs targeted for production to the northwest in Mesa and Garfield Counties. Coal Seams A, B, and C are found near the base of the Lower Coal Member; the D- and E-Seams are found in the base of the Upper Coal Member; the F-Seam is located at the top of the Upper Coal Member. Portions of the Mesa Verde Formation, including coal seams, do outcrop within the Proposed lease.
	Upper Coal Member		
	Lower Coal Member		
	Rollins Sandstone		
Mancos Formation			Up to 4,000 feet of marine shales (this formation does not outcrop within the Proposed lease, but is exposed west of Somerset along the North Fork of the Gunnison River).

Within the Proposed lease, the D-Seam is the primary mineable coal. The A- and E-Seams are considered too thin to be economically mined. Historically, the B-Seam has been mined immediately to the south of, but not within, the proposed lease (being at the margin of mineable depth). Overburden above the D-Seam is greater than 500 feet and, in the area to be mined, is generally less than 2,300 feet thick.

Geologic Hazards

Generally, potential geologic hazards include landslides, frost heaves, and seismic activity related to known or suspected active faults. Landslides and rockfall represent the most significant geologic hazards within the proposed lease. Some landslides have occurred within the proposed lease during the past 30 years (mainly as a result of higher-than-average precipitation during the 1980's). Some of these landslides occurred as reactivations of previously disturbed slopes, and some were new movements. Rockfall-prone areas occur in the western portion of the study area, as do less-extensive areas of unstable slopes.

Other Geologic Resources

The Proposed lease is situated on the southern margin of the gas-producing Piceance Basin. Exploration in the vicinity of the Proposed lease is limited to 2 abandoned locations approximately 1.5 miles east of the Proposed lease that were most likely proposed coal-bed methane wells. Methane is found in coal and is released to the mine atmosphere during mining, and released to the surface through GVBs and the mine ventilation system.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

This analysis of subsidence is tiered to the North Fork Coal EIS (BLM 2000) in Appendix K "Subsidence Evaluation", and in Chapter 3.2 under the analysis of Typography/Physiography. That EIS document addresses the adjacent Elk Creek Coal Lease Tract and provides guidance in assessing potential subsidence in the proposed lease. Longwall panel design, and yield and gate road pillar design and configuration, are similar to those used in the Elk Creek Tract. None of the underlying coal seams have been mined within the proposed lease; therefore, subsidence amounts are reported for mining in undisturbed ground.

Roof rocks primarily consisting of strong, thick sandstones of the Mesa Verde Group would cave into the mine in larger blocks than would shale roof rocks, and would reduce the height of caving above the mine workings. These sandstones would generally reduce the amount of subsidence compared to shales. Sandstones at the surface would have larger displacements, and may form cracks up to 1 foot wide and 25 to 50 feet deep on steep slopes. Formation of joints and fractures on steep slopes may contribute to slope instability and susceptibility to landslides and rockfalls.

At overburden depths greater than 1,000 to 1,500 feet, gate road pillars would yield to the level of recompacted, caved, and broken rock in the longwall panel. This range of depths would be common within the proposed lease.

The values reported in **Table 12** are calculated for undisturbed areas and an average D-Seam mining thickness of 12 feet and a panel width of 800 feet. On average, the maximum amount of subsidence is projected to be approximately 0.6 times the mining thickness.

Table 12 Anticipated Subsidence Values within the Proposed lease

Maximum Subsidence Parameters				
Overburden Depth (ft)	**Vertical Displacement (ft)**	**Maximum Tilt (percent)**	**Horizontal Tensile Strain (percent)**	**Horizontal Compressive Strain (percent)**
100-250	7.2	21.6 – 8.6	7.2 – 2.9	7.2 – 2.9
250-500	7.2	8.6 – 4.3	2.9 – 1.4	2.6 – 1.3
500-1,000	7.2 – 6.0	4.3 – 1.8	1.4 – 0.6	1.3 – 0.7
1,000-1,500	6.0 – 4.1	1.8 – 0.8	0.6 – 0.3	0.7 – 0.5
1,500-2,000	4.1 – 2.4	0.8 – 0.4	0.3 – 0.15	0.5 – 0.3
2,000-2,500	2.4 – 1.6	0.4 – 0.2	0.15 – 0.1	0.3 – 0.15

Note: Modified from USFS and BLM 2000

Coal mining beneath Bear Creek to the west of the proposed lease in the 1970s, and again in 2003 and 2004, did not result in any observed temporary or permanent impact on stream flow.

No Action Alternative

Under the No Action Alternative, there would be no project-related impacts to the geology of the area from subsidence, and the coal in the lease tract would remain in place.

PALEONTOLOGY

Affected Environment

Exposed bedrock within the proposed lease consists predominantly of the Cretaceous Mesa Verde Group. Residuum and colluvium of the Tertiary-age Wasatch Formation is also present. Both of these formations are ranked as Class 5 formations (very high potential to yield scientifically significant fossils) under the BLM's Potential Fossil Yield Classification (PFYC) System (DOE and BLM 2008). Mammalian taxa are most common in the Wasatch Formation of the southern Piceance Basin, and include representatives of the following fossil orders: Pantodonta, Condylarthra, Primata, Taeniodontia, Multituberculata, Rodentia, Tillodontia, and Perissodactyla (Lucas 1998). Reptiles, amphibians, invertebrate, and plant fossils are also found in the Wasatch Formation. The Mesa Verde Group contains dinosaur, mammal, reptile, crocodile, turtle, invertebrate, and plant fossils (BLM 2005).

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Under the Proposed Action Alternative, scientifically significant paleontological resources could be destroyed during road and pad construction, as well as during GVB drilling. Coal, although the remains of ancient vegetation, is not considered a scientifically significant fossil.

Mitigation Measures -- Mitigation measures for paleontology resources would include:

- If any paleontological resources are located during construction of the pads or roads, construction would stop and the BLM would be notified immediately.

No Action Alternative

Under the No Action Alternative, there would be no project-related impacts to paleontological resources.

SOCIOECONOMICS

Affected Environment

The area of influence for the social and economic elements of this EA includes both Delta and Gunnison Counties in west central Colorado.

Delta County comprises 1,142 square miles, with 25.7 people per square mile and a total population of 29,352 people. Delta County's population grew by almost 33 percent between 1990 and 2000. The median age in Delta County is 41.6 years, with 22.1 percent of the population being under the age of 18 and almost 20 percent being 65 years or older (U.S. Census Bureau 2008a).

Gunnison County comprises 3,260 square miles, with 4 people per square mile and a total population of 13,956 people in 2000. Gunnison County's population grew by almost 36 percent between 1990 and 2000, slightly more than 3.1 percent rate of increase of the State's population.

The population centers closest to the mine are in Gunnison County. The median age in Gunnison County is 30.4 years, with 24.0 percent of the population being under the age of 20 and 7 percent being 65 years or older. Over 94 percent of the people age 25 and older in Gunnison County have graduated from High School, and just over 76 percent have graduated from college (U.S. Census Bureau 2008b). Somerset, where the Elk Creek Mine is located, is an unincorporated town with a population that was estimated at 190 in 2000, and estimated at 201 in 2005.

Delta County is the county of residence for most of the mining personnel, and supports most of the indirect employment that provides supplies and services to mine workers and their families. Gunnison County is included in the area of influence because the Elk Creek Mine is in Gunnison County, and the county receives royalty and tax revenues from the mine. Gunnison County receives approximately $1.1 million annually in tax revenues from the Elk Creek Mine. Mining companies are the largest property tax revenue sources for Gunnison County. Gunnison County has identified the areas surrounding the coal mines as the *North Fork Valley Coal Resource Special Area.*

As of spring 2008, the Elk Creek Mine employed approximately 325 full and part-time employees, with an annual payroll of approximately $32 million. The North Fork mines spent up to $100 million in 2006 locally for materials, supplies, and services; and royalty and tax payments for Elk Creek Mine totaled approximately $35 million. Total direct economic benefits associated with the North Fork Mines exceed $60 million annually.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Under the Proposed Action Alternative, existing employment opportunities at the Elk Creek Mine would continue. No additional demand for housing or municipal services would be anticipated. Mining operations would be extended throughout the period required to mine the additional recoverable coal reserves in the ECET. The extension of mining operations would also extend the annual payroll, local expenditures, and taxes and royalty payments. The direct economic benefits associated with continued mining at the Elk Creek Mine would equal approximately $1.1 million per month, which equates to approximately $13 million for the 12 months it would take to recover the coal in the ECET. [NOTE: Royalty payments are 8 percent of the value of the coal removed from an underground mine (43 CFR 3473). Of royalties from the Federal coal, 50 percent returns to the Federal treasury in the General Fund, and 50 percent is returned to the State where the coal was mined, with a portion of that percentage being returned to the county where the coal was mined. In Colorado, those funds are managed by the State Department of Local Affairs in the Energy Impact Fund. These monies are distributed on a grant-like basis to counties affected by energy resource development.]

No Action Alternative

Under the No Action Alternative, the primary impact would be that the recoverable coal would not be mined. Mining of the reserves at the Elk Creek Mine would continue at existing rates until

the available coal reserves are depleted. Job and associated salaries, local expenditures, royalty and tax payments would not be realized after the reserves are depleted. This alternative would limit the opportunity to realize economic benefits associated with the Proposed Action Alternative.

RECREATION

Affected Environment

The vicinity of the proposed lease provides dispersed, unstructured recreational use and opportunities. There are no developed recreational facilities (such as campgrounds) in the vicinity. The BLM permits year-round motorized and non-motorized recreational activities.

Primary recreational activities available to the public within the proposed lease include big game hunting, camping, and other dispersed recreation. Big game and mountain lion hunting is a seasonal activity, with calendar-specific hunting periods for mountain lion, deer, elk, and bear.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Under the Proposed Action Alternative, dispersed recreation activities would likely be impacted during the proposed construction period. The general disturbance of the proposed lease would likely temporarily lessen the potential for recreational use within the proposed lease and the immediate surroundings. Recreational use of lands within active operational portions of the proposed lease would temporarily be displaced until completion of activities.

Adverse indirect impacts on recreational experience near the proposed lease, including hunting, hiking, camping, biking, and birding, would possibly be caused by elevated noise levels and a general increase in human activity and traffic stemming from construction activity. Elevated noise levels during construction would be temporary and would diminish with distance from the construction sites. As a whole, impacts to recreation would be localized and short-term.

No Action Alternative

Under the No Action Alternative, there would be no project-related impacts to recreation resources.

VISUAL RESOURCE MANAGEMENT

Affected Environment

The characteristic landscape of the ECET consists of low rolling hills and steep-sided creek drainages vegetated with low-growing piñon, juniper, oak brush, sagebrush, and grasses. Most of the landscape within the proposed lease appears natural and undeveloped in character, and is composed primarily of scenery that is common for the region. The only visible existing mine facilities within, or near, the proposed lease are located in Somerset, and consist of the rail

loadout and other surface facilities. These are readily visible within foreground views (less than 3 miles from viewpoint) of Somerset residents and motorists on State Highway 133.

The primary sensitive viewing area is State Highway 133 and the community of Somerset. Some motorists exposed to the landscapes would have a concern for scenic quality, and would be sensitive to modifications to the landscape. With the exception of dispersed recreation activities (primarily hunting and camping), the public does not visit other areas within, or near, the Proposed lease. Most of the ECET is on upper slopes and relatively level terraces that are more than 1,000 feet higher in elevation than Somerset and the highway, and are not within viewsheds.

The BLM has inventoried visual resources within the area with the VRM system. The ECET is in BLM's Management Area 7. The Uncompahgre RMP does not provide management direction for Management Area 7, which is managed primarily for coal development.

Environmental Consequences/Mitigation Measures

Proposed Action Alternative

Short-term impacts to the visual character of the landscape would result from drill pad construction, GVB drilling, and associated construction of ancillary facilities (such as access roads). These impacts would be temporary, and would not occur within the viewshed of sensitive viewpoints. The dust from construction activities, and the sight of vehicles on access roads used for the transport of equipment and workers, would be visible until construction activities are completed.

Long-term impacts associated with the implementation of the Proposed Action Alternative would result from the addition of temporary wellhead structures to the landscape, and from the operation of ventilation pumps. The surface disturbance and above-ground facilities associated with the project would be located on flat terraces or on drainage slopes that do not face towards the highway or toward Somerset. All surface facilities would be higher in elevation than the viewpoints, with a very low profile that would not intrude into viewsheds. Access to most of the drill pads would be on existing access roads. The new access road would not be visible from any viewpoint. It is anticipated that there would be minimal to no cut-and-fill slopes at drill pads that would face towards sensitive viewing areas.

No Action Alternative

Under the No Action Alternative, there would be no project-related impacts to visual resources.

CUMULATIVE IMPACTS

Cumulative impacts are the environmental impacts that could result from the implementation of the Proposed Action Alternative, when added to the impacts from all other past, present, and reasonably foreseeable activities, regardless of who is conducting such activities. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

The primary existing disturbances within the proposed lease are associated with mining. Mining activities over the past century include the:

- Hawks Nest Mine (historic);
- Oliver Mine No. 1 and No. 2 (both historic);
- Bear Mine No. 1, No. 2, and No. 3 (all 3 historic);
- West Elk Mine (historic and current);
- Edwards Mine (historic);
- U.S.S. Steel Mine (historic);
- Blue Ribbon Mine (historic);
- King Mine (historic);
- Farmers Mine (historic);
- Bowie Mine No. 1 (historic and current, but idle) and Bowie No. 2 (historic and current); and the
- Oxbow Sanborn Creek (historic), and Elk Creek Mine (current).

Three of these mines, Bowie No. 2, West Elk, and Elk Creek, are currently active. In addition, Bowie No. 1 is permitted, but idle. Bowie No. 1 is permitted for a production rate of 1.5 million tons per year. When active, it operated as a room-and-pillar mine and hauled its coal to the Bowie No. 1 loadout near Paonia. Bowie No. 2 was previously a room-and-pillar mine, but has added a longwall system. Bowie No. 2 hauls its coal to the Bowie No. 1 loadout northeast of Paonia. The Elk Creek Mine is a longwall operation north of Somerset, operated by Oxbow, with a loadout immediately north of Somerset. The West Elk Mine is a longwall operation located south and east of Somerset, and is operated by Mountain Coal Company. Currently, the BLM lists local coal production from these mines at 5 million, 6 million, and 6.4 million tons per year, respectively. The North Fork Branch of the Union Pacific Railroad operates exclusively to serve these coal mines. This line branches from the main line in Grand Junction and passes through Delta, Hotchkiss, Paonia, and Somerset.

It is reasonably foreseeable that underground coal mining would continue in the North Fork Valley. Coal lease modification applications related to both the Elk Creek Mine and the West Elk Mine are in process and a coal lease modification was recently issued for the Bowie No. 2 Mine. The coal lease modification application COC61357 on the USFS is spatially removed, and if issued, could occur independently of the ECET. Additional actions including coal lease modifications and new coal lease applications could be expected in the North Fork Valley. These factors may affect how long mining would continue in this area; however, it is likely that mining would continue for another decade, if not more. Cumulatively, impacts from the proposed mine could include small increases in deposition of sediment or pollutants into surface waters, increased subsidence within the North Fork Valley, low increase in cumulative emission of GHGs from mine ventilation, and a slight increase in water withdrawal from the Colorado River system that may potentially impact several federally listed species of fish in downstream portions of the North Fork and Gunnison Rivers. None of these impacts are expected to be major (see specific resource sections above).

Mining has been going on for over a century in this area, and there has been noticeable subsidence in a number of areas above the historic mines. However, there has been no known damage to overlying resources or to structures attributable to this subsidence. Subsidence may

have aggravated or contributed to some landslide movements, but this is difficult to identify given the pre-mining instability of many areas of the valley.

Other past, present, and reasonably foreseeable development activities within the proposed lease and vicinity include fruit orchards and vineyards, ranching, water storage and irrigation, transmission lines, residential developments, recreation and forest treatments (controlled burning and logging). Historically, fruit orchards along the valley floor and low mesas have been important to the local Paonia economy. More recently, vineyards have expanded into the area. Sheep and cattle are grazed in pastureland around Paonia, and also at higher elevations near the mining operations during the summer. There are a number of water storage reservoirs and canals around the North Fork Valley to serve agriculture and domestic uses. Western Area Power Administration (WAPA) operates the Curecanti-Rifle 230/345 kV transmission line that parallels Terror Creek. In recent years, the area around the communities of Paonia, Hotchkiss, Crawford, and Delta has been growing in population, with many new houses being built. Most of this development has been down-valley from the coal mines in broader portions of the North Fork Valley. This development has increased the traffic load and demand for maintenance on State Highway 133. There is little developed recreation in the area; however, the area is widely used for dispersed recreational activities, such as hunting, four-wheeling, hiking, picnicking, horseback riding, snowmobiling, and sight-seeing. Timber sales have been fairly limited in the area.

Impacts resulting from the proposed mine could add incrementally to impacts from the other activities discussed above, resulting in a low-level increase in noise, human presence, soil erosion, invasive weeds, vegetation loss or conversion, and in a slight temporary decrease in access. These impacts are discussed in the sections below. Cumulative impacts associated with coal mining activities in the area were analyzed in greater detail in the Uncompahgre Basin RMP Environmental Impact Statement (BLM 1988), as well as in the North Fork Coal EIS (USFS and BLM 2000).

The mining, processing, and shipping of coal from the coal lease would contribute to GHG emissions through carbon fuels used in mining and processing, including those consumed by heavy equipment and stationary equipment, electricity used on site, methane release from mined coal, and rail transport of the coal. Use of the coal would also contribute to GHG emissions. Currently, GHG emissions are not regulated.

Emissions of GHG's have been identified as a potential concern, given evidence that GHG may trap heat in the atmosphere, preventing radiation losses, and resulting in increasing global temperatures. Changes in global temperatures and climate vary significantly with time, and are subject to a wide range of driving factors and complex interrelationships. Generally, the level of GHG emissions can be quantified and compared to overall estimates in order to provide some measures of the level and significance of any potential impacts.

Coal will be developed and produced as part of the proposed action and subsequently utilized to produce electricity using current, conventional coal combustion and emission technologies. The potential GHG impacts associated with the utilization of the coal as boiler fuel for the generation of electricity would be addressed in the environmental analysis for the coal generation facilities. Coal mine methane delivery to natural gas markets, and difficulties in implementing the current technology development were considered but dropped from further analysis.

For the 2006 calendar year, the combined production of the North Fork coal mines was 15.5 million tons of coal, while the combined daily methane emissions was an estimated 27.6 million cubic feet (EPA 2008). The methane emissions resulted in an annual CO2 gas equivalent of 4.48 million tons or approximately 0.06 percent of the total emissions for the U.S. in 2008. At this time, there are no reliable tools to ascribe an incremental impact to climate from this level of CO2 equivalent emissions.

Topography and Physiography

Continued underground mining in the Elk Creek Mine area would result in minor impacts to topography and physiography. During the time that surface facilities are active, the facilities, coal storage piles, soil stockpiles, and waste disposal areas would impact topography and physiography. After mining is complete, these areas would be reclaimed. General pre-mining topography and physiography would be approximated. Cumulative impacts would be minor.

The impacts resulting from underground mining would also include subsidence over the mined areas. Subsidence would be expected to be relatively uniform over large areas. The impacts of subsidence may include lowering elevations over subsided areas. There may be small areas that would require mitigation measures in order to restore surface drainage patterns; however, the overall impacts of subsidence to topography and physiography would be minor and would recover.

Dispersed residential and other development activities would result in localized impacts to topography and physiography, due to the construction of buildings, roads, and infrastructure. It is expected that this development would remain dispersed, and that cumulative impacts would be minor.

Geology, Mineral Resources, and Paleontology
The cumulative impacts resulting from the continued underground mining in the Elk Creek Mine Area would primarily be due to the removal of large amounts of coal. Other geologic features, mineral resources, and paleontology in the overburden of the coal would subside in place and remain largely intact. Cumulative impacts to these resources would be minor.
Dispersed residential and other development activities would result in very localized impacts to geology, mineral resources, and paleontology. The overall cumulative impacts of these developments would be minor.

Air Quality

The cumulative impacts to air quality in the Elk Creek Mine Area would primarily result in emissions of particulate matter, NOx, and SO_2 from current and future mining of coal. Mining activities are permitted by the Air Pollution Control Division of the CDPHE. The State imposes permitting limits and control measures in order to limit emissions of NAAQS. The State develops air quality attainment and maintenance plans in order to keep Colorado in compliance with the Federal NAAQS. Therefore, cumulative impacts are not anticipated to exceed NAAQS, or to push the region into non-attainment for any NAAQS, and would result in no net change. Furthermore, a detailed air quality assessment, including modeling, of the original mine was conducted as part of the environmental analysis for the Elk Creek Coal Lease Tract in 2000. (See Final Environmental Impact Statement Iron Point Exploration License; Iron Point Coal Lease

Tract; Elk Creek Coal Lease Tract, Delta and Gunnison Counties, Colorado, USFS and BLM 2000.)

The air quality analysis conducted for the original mine included an emissions inventory and modeling analysis. That emissions inventory quantifies PM_{10}, NOx, and SO_2 emissions. The modeling analysis also includes a visibility impacts assessment in the West Elk Wilderness Area as well as an atmospheric deposition impacts assessment. Emissions that were calculated and modeled included tailpipe emissions from mining equipment, haul trucks, and locomotives (railway emissions). The results of that detailed impact assessment predicted no significant impacts to air quality as a result of authorizing the Oxbow mine.

The proposed expansion of the mine is for 3.96 million tons of coal annually, and the emissions-generating equipment used will be less than levels analyzed for the Elk Creek Coal Lease Tract in 2000. Therefore, the air quality impacts associated with the proposed mine expansion can be presumed to be equal to, or less than, impacts predicted in the original air quality impact assessment.

Climate Change

Continued mining, operation of mine surface facilities, and associated vehicle traffic, would result in minor cumulative contributions to the release of GHGs into the atmosphere. The mining, processing, and shipping of coal from the Elk Creek, and from other mines in the area, would contribute to GHG emissions through carbon fuels used in mining (including fuel consumed by heavy equipment and stationary machinery), electricity used on site, methane released from mined coal, and rail transport of the coal. The use of the coal after it is mined has not been determined at this time; however, almost all of the coal that would be mined in the Elk Creek Mine area would be used by coal-fired power plants in order to generate electricity. This also results in the production of GHGs.

The ECET would make an additional area of the coal seam that is being mined available for mining, and would extend the Life of Mine by approximately 12 months. Coal production would be consistent with current production rates. Release of GHGs would remain about the same as current rates.

The development of dispersed residential and other activities, including buildings, houses, roads, infrastructure, residential traffic, and controlled burns, would introduce fugitive dust and GHG emissions. This would be more dispersed, but also more sustained, than the emissions from the surface facilities and traffic associated with coal mining.

Water Resources

Under the Proposed Action Alternative, there would be minor cumulative impacts to identified water resources from continued mining, and from other rural development, in the Elk Creek Mine area. Underground mines would result in limited disturbance on the surface; however, the subsidence-related impacts to water resources, as identified under the Proposed Action Alternative, would be additive for other areas of development. Permit requirements would mitigate these potential impacts. Residential and other developments would also have additive impacts due to surface disturbance and use of groundwater for domestic purposes. Uses of water

from mining and other developments could impact the quantity and quality available to downstream users in the primary downstream drainages.

Soils

Under the Proposed Action Alternative, the cumulative impacts of continued underground mining to soils in the Elk Creek Mine area would primarily be the disturbance effects of GVB surface facilities. Reclamation after closure of the surface roads and pads would include replacement of subsoil and topsoil that had been stockpiled. Reclamation would replace soil materials in the areas of disturbance; however, the recovery of the natural soil structure would require a longer period of time.

The land over the mined areas would subside in place and remain largely intact. There could be local areas of erosion; however, the overall impacts to soils would be minor.

Dispersed residential and other developments would result in localized impacts to soils; however, the overall cumulative impacts of these developments would be minor.

Vegetation

Other than minor subsidence impacts, continuing mining operations in the Elk Creek Mine area would not greatly impact vegetation communities. Sustainable grazing is anticipated to continue, as practiced, and vegetation communities are not expected to be significantly altered by this practice. There may be local displacement of vegetation communities as a result of continued dispersed residential and forest management activities. Overall, cumulative impacts to vegetation are expected to be minor, and mining operations would negligibly contribute to these impacts.

The cumulative impacts of continued mining to wetlands in the Elk Creek Mine area would be minimal, due to subsidence in the mine area. Continued grazing, if allowed to become environmentally unsustainable, could impact the structure and water quality of those wetlands impacted. Dispersed residential development is expected to continue in the mine area. This development could remove or alter local wetlands, and their present vegetation communities, in the area. Federal regulations under Section 404 of the Clean Water Act, as well as regulations set by the U.S. Army Corp of Engineers over jurisdictional waters, would reduce the potential for developments to remove or impact wetlands in the area.

Wildlife

Other than what has already been analyzed, prolonged mining would result in negligible impacts to wildlife habitat and population dynamics. Continued sustainable cattle grazing may result in some localized competition for habitat and food resources; however, this is not expected to change as compared to the competition that already exists between cattle and wildlife in the area. Dispersed residential development is expected to continue in the area. This development could cause wildlife sensitive to human activity to seek habitat outside the area of development. The increased presence of houses, other buildings, fences, roads, and traffic would also alter the movement of big game animals, and would restrict hunting and other recreational opportunities. Wildlife and their habitats would still be present in the area; however, but they would likely be altered or reduced.

Threatened, Endangered, and Special Status Species

There would be negligible cumulative impacts to identify threatened, endangered or special status species or habitats from continued mining and other development activities in the Elk Creek Mine area. Underground mines would not disturb the surface, and any impacts to water resources would be mitigated. Residential or other development would also result in minimal surface disturbance on habitats in the area.

Ownership and Use of Land

Continued underground coal mining would not result in a long-term cumulative impact to the ownership and use of land in the general area. However, dispersed residential and other development activities would break up land ownership, and would remove areas of rangeland from use for livestock grazing. For the foreseeable future, it is expected that livestock grazing would continue to be important in the Elk Creek Mine area, although portions of the land could be developed for dispersed private residences.

Cultural Resources

Few cultural resources have been documented within the Elk Creek Mine area. Cultural resources on steep slopes, and in areas of rock outcrops, could be impacted by subsidence resulting from underground mining. Dispersed residential and other development activities could also impact cultural resources. Currently, there is no requirement for systematic cultural resource surveys for other developments within the proposed lease.

Visual Resources

The Elk Creek GVB facilities would result in short-term impacts to the visual character of the natural landscape during mining operations. When mining is complete, the roads and pads would be reclaimed. In the long-term, these areas would be returned to pre-mining visual landscape. Some small areas may have less topographic diversity than before mining. Dispersed residential and other development activities would also impact visual resources. The houses, roads, and utility infrastructure would alter the visual character of the landscape. These developments are not regulated in terms of visual impacts.

Noise

The principal noise sources related to the continued mining operation of the surface facilities include the ventilation fans, trucks, conveyors, loadout equipment, and trains. The Elk Creek surface facilities are located in the community of Somerset, and noise control measures include maintenance of existing equipment and screening to contain, or deflect, noise. Dispersed residential development and other activities would also impact background noise levels, due to the increased human presents in the area.

Transportation Facilities and Access

Future mining operations and other development activities would maintain and, potentially, open new related infrastructure for traffic access. The tax revenue generated from mining and other development would contribute to the maintenance of public roads. The railroad traffic related to mining would not impact other traffic with the continuation of mining activities. There are no at-grade crossings in high vehicle traffic areas.

Continued mining would produce additional quantities of hazardous and solid waste. These materials would continue to be managed and controlled under current regulations and BMPs. Cumulative impacts would be kept within State and Federal guidelines, and would be minor. Development of residential and other activities would also generate hazardous and solid wastes. It is expected that the private landowners would contract with private waste management specialists, and the cumulative impacts would be minor.

Socioeconomics

The cumulative socioeconomic impacts of continued mining would include a constant level of employment and tax revenues during the operation of the mine, and the removal of that source of income when the mine is closed. Residential and other development activities would increase the local population and infrastructure in the area. There is no evidence that continued mining would result in a negative impact to local or State tourism.

Environmental Justice

There would be no cumulative environmental justice impacts resulting from continued mining and other rural development in the Elk Creek Mine area.

PERSONS / AGENCIES CONSULTED

Public comments were solicited via a letter, dated August 20, 2008, that was mailed to the Office of Surface Mining specific interested parties, and to the general public. This letter was also posted on the BLM UFO website. The EA was made available for public review from August 11, to September 25, 2009, by legal notices published in the *Federal Register* and in the *Delta County Independent*. In addition, there were announcements of the availability of the EA in *The Daily Sentinel* in Grand Junction. A public hearing was held on September 9, 2009, at the Paonia Town Hall, in Paonia, Colorado. Public comments were received through September 29, 2009. Public comments included the following issues:

- The economic value of coal within the ECET;
- jobs created by the Elk Creek Mine;
- past environmental analysis in the area;
- surface impacts associated with GVB drilling;
- impacts to climate change from methane liberation; and
- OHV-use within the proposed lease.
- black carbon impacts from the combustion of coal from operations at mine sites

On April 22, 2011, a draft EA was posted for a 14-day public comment period. Public comments included the following additional issues:

- Global Climate Change as part of the environmental setting
- Climate tipping points
- NEPA document must discuss end use or life cycle impacts
- Future NEPA for LBA must asses cumulative impacts on climate change
- Because impacts of Lease on Climate Change is Significant, BLM must issue an EIS
- Tiering to 2000 FEIS for Iron Point Coal Lease is inadequate
- BLM must consider all reasonable alternatives under (a) NEPA and (b) CEQ and EPA guidance
- Insufficient analysis of methane capture
- The EA fails to include a complete discussion of mitigation measures
- The EA must disclose cumulative actions of leases because they are reasonably foreseeable future actions

Issues raised during scoping are addressed in more detail in the Scoping and Identified Issues section.

INTERDISCIPLINARY REVIEW

The following BLM personnel have contributed to, and have reviewed, this EA:

Name	Title	Area of Responsibility
Alan Kraus	Hazmat Specialist	Solid and Hazardous Wastes
Aaron Worstell	Air Quality Specialist	Air Quality, Climate
Linda Reed	Realty Specialist	Access
Desty Dyer	Mining Engineer	Solid Mineral Leasing
Robert Ernst	Geologist	Geology
Dennis Murphy	Hydrologist	Soil, Water
Lynae Rogers	Range Specialist	Invasive Species
Julie Jackson	Outdoor Recreation Planner	VRM, Recreation, Wilderness, Transportation
Bruce Krickbaum	NEPA Coordinator	
Amanda Clements	Ecologist	Vegetation, Soils, Wetland and Riparian
Melissa Siders	Biological Staff Supervisor	Migratory Birds, Threatened, Endangered & Sensitive Species, Terrestrial and Aquatic Wildlife
Glade Hadden	Archaeologist	Cultural Resources
Ken Holsinger	Fuels Specialist	Fire

REFERENCES

Bassett, Robert A., James A. Holtkamp, and Rebecca Ryon. 2009. U.S. Laws and Policies Regarding Capturing Methane Gas. Paper presented at the 2009 U.S. Coal Mine Methane Conference, Boulder, Colorado. 23 pages. [Web page] located at http://www.hollandhart.com/articles/Capturing_Methane_Gas_White_Paper.pdf. Accessed 12/01/2009.

Bureau of Land Management (BLM). 1988. Uncompahgre Basin Proposed Resource Management Plan and Final Environmental Impact Statement, September 1988. 196 pages.

BLM. 2005. Little Snake Resource Management Plan, Analysis of the Management Situation. April 2005.

BLM. 2007. North Fork Land Health Assessment, 2006-2007. Bureau of Land Management, Uncompahgre Field Office, Montrose, Colorado. 110 pages.

BLM. 2009. Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources. Instructional Handbook 2009-011. 19 pages.

BLM. 2009b. Red Cliff Mine Draft Environmental Impact Statement. [Web Page]. Located at: http://www.blm.gov/co/st/en/BLM_Programs/land_use_planning/rmp/red_cliff_mine/documents.html. Last accessed May 14, 2009.

Colorado Department of Public Health and Environment (CDPHE). 2008. Colorado Air Quality Control Commission Report to the Public 2007-2008. 60 pages.

Colorado Division of Wildlife (CDOW). 2003. Colorado Vegetation Classification Project. Located at: http://ndis.nrel.colostate.edu/ftp/index.html Last accessed 1/27/2009.

Colorado Division of Wildlife (CDOW). 2009. Natural Diversity Information Source. [Web Page]. Located at: http://ndis.nrel.colostate.edu/ftp/data/sam/meta/lynx.html. Last accessed: April 10, 2009.

Environmental Protection Agency (EPA). 2009. NAAQS, [Web Page] Located at: http://epa.gov/air/criteria.html. Accessed December 11, 2009.

Environmental Protection Agency (EPA). 2010. "Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2008" (EPA Publication 430-R-10-006), April 15,2010)

Environmental Protection Agency (EPA) 2008 "Identifying Opportunities for Methane Recovery at U.S. Coal Mines: Profiles of Selected Gassy Underground Coal Mines 2002 – 2006" revised January 2009.

Federal Emergency Management Agency (FEMA). 1989. Flood Insurance Rate Map, Gunnison County, Colorado (Unincorporated Areas). Community Panel Numbers 080078 275 B, 080078 125 B, and 080078 235 B. September 29, 2008.

Grand River Institute (GRI). 2005. Class III Cultural Resource Inventory of the Block Clearance Area for the Oxbow Mining LLC Project in Delta and Gunnison Counties, Colorado. August 26, 2005. 27 pages.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: Synthesis Report. Adopted at the IPCC Plenary XXVII, Valencia, Spain, 12-17 November, 2007. 52 pages.

Kingery, Hugh E., ed. 1998. Colorado Breeding Bird Atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife, Denver. 636 pages.

Lucas, S.G. 1998. Fossil Mammals and the Paleocene/Eocene Series Boundary in Europe, North America, and Asia. *In* Late Paleocene-Early Eocene Climatic and Biotic Events in the Marine and Terrestrial Records, Marie-Pierre Aubry, M-P., Lucas, S.G., and Berggren, W.A., (eds.). Columbia University Press, New York.

Monarch & Associates and Michael Ward Outdoors. 2005. Oxbow Mining, LLC, Elk Creek Mine Block Clearance Project. August, 2005. 38 pages.

Monarch & Associates and Michael Ward Outdoors. 2006. Oxbow Mining, LLC, Elk Creek Mine Habitat and wildlife Studies. June, 2006.

Monarch & Associates and Michael Ward Outdoors. 2008. Oxbow Mining, LLC, Elk Creek Mine 2008 Exploration Project Habitat and Wildlife Studies. June, 2008. 22 pages.

Natural Resources Conservation Service (NRCS). 2008. Custom Soil Resource Report for Paonia Area, Colorado, Parts of Delta, Gunnison and Montrose Counties: Oxbow ECET EA. Accessed from NRCS Web Soil Survey on December 11, 2008. Available at http://websoilsurvey.nrcs.usda.gov

Oxbow Mining, LLC. (OMLLC). 2007. 2007 Annual Hydrology Report. Prepared for CDRMS Permit C-81-022.

Ritter Jr. B. 2007. Colorado Climate Action Plan: A strategy to Address Global Warming. November, 2007. 35 pages.

Rocky Mountain Bird Observatory (RMBO). 2008. Surveys for Western Yellow-billed Cuckoos on Lands Managed by the Uncompahgre Field Office of the Bureau of Land Management in Western Colorado. Rocky Mountain Bird Observatory, Tech. Report #R-YBCU-BLM-08-1, Brighton, Colorado. October, 2008. 21 pages.

Saunders, S., C. Montgomery, T. Easley and T. Spencer. 2008. Hotter and Drier: The West's Changed Climate. Natural Resources Defense Council and The Rocky Mountain Climate Organization. March, 2008. 64 pages.

Singer, S. Fred, de. 2008. Nature, Not Human Activity, Rules the Climate: Summary for Policymakers of the Report of the Nongovernmental International Panel on Climate Change, Chicago, IL. The Heartland Institute.

United States Census Bureau. 2008a. Fact Sheet: Delta County, Colorado. Available at: http://factfinder.census.gov/servlet/ACSSAFFFacts?_event=Search&geo_id=05000US08029&_geoContext=01000US%7C04000US08%7C05000US08029&_street=&_county=delta+county&_cityTown=delta+county&_state=04000US08&_zip=&_lang=en&_sse=on&ActiveGeoDiv=geoSelect&_useEV=&pctxt=fph&pgsl=050&_submenuId=factsheet_1&ds_name=ACS_2007_3YR_SAFF&_ci_nbr=null&qr_name=null&reg=null%3Anull&_keyword=&_industry= Last accessed: 1/27/2009.

United States Census Bureau. 2008b. Fact Sheet: Gunnison County, Colorado. Available at: http://factfinder.census.gov/servlet/SAFFFacts?_event=Search&geo_id=05000US08029&_geoContext=01000US%7C04000US08%7C05000US08029&_street=&_county=gunnison+county&_cityTown=gunnison+county&_state=04000US08&_zip=&_lang=en&_sse=on&ActiveGeoDiv=geoSelect&_useEV=&pctxt=fph&pgsl=050&_submenuId=factsheet_1&ds_name=ACS_2007_3YR_SAFF&_ci_nbr=null&qr_name=null&reg=null%3Anull&_keyword=&_industry=&show_2003_tab=&redirect=Y Last accessed: 1/27/2009.

United States Census Bureau. 2009. U.S. Census Bureau American Fact Finder Web Site, Data Sets, Quick Tables, Census Tract 9639, Gunnison County, Colorado. [Web Page]. http://factfinder.census.gov. Accessed April 9, 2009.

United States Department of Energy (DOE) and BLM. 2008. Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States (DOE/EIS-0386). Appendix N: Potential Fossil Yield Classifications (PFYC) for Geologic Formations Intersecting Proposed Corridors under the Proposed Action by State. November 2008.

United States Environmental Protection Agency (EPA). 2008. Identifying Opportunities for Methane Recovery at U.S. Coal Mines: Profiles of Selected Gassy Underground Coal Mines 2002-2006. September, 2008. EPA 430-K-04-003. 207 pages.

United States Forest Service (USFS). 2008. Environmental Assessment, Federal Coal Lease COC-61357 Modification, Tract 4, Paonia Ranger District, Grand Mesa, Uncompahgre and Gunnison National Forests, Gunnison County, Colorado. August 2008. 108 pages.

United States Forest Service (USFS) and BLM. 2000. Final Environmental Impact Statement, Iron Point Exploration License, Iron Point Coal Lease Tract, Elk Creek Coal Lease Tract, Delta and Gunnison Counties, Colorado, February 2000.

United States Fish and Wildlife Service (USFWS). 2005. Final Biological Opinion for the Oxbow Mining Company and Town of Somerset Water Augmentation Project, Delta County, Colorado. May 12, 2005.

USFWS. 2008a. Endangered, Threatened, Proposed and Candidate Species, Colorado Counties, February 2008. 14 pages.

USFWS. 2008b. Birds of Conservation Concern 2008. Division of Migratory Bird Management, Arlington, Virginia. 87 pages. [Online version available at http://www.fws.gov/migratorybirds/reports/BCC2008/BCC2008m.pdf; accessed]

United States Global Change Research Program. 2009. Reports and Assessments, USGCRP Scientific Assessments, Key Findings. [Web Page] located at: http://globalchange.gov/publications/reports/scientific-assessments/us-impacts/key-findings. Accessed 6/22/2009.

Zimmerman, G., C. O'Brady and B. Hurlbutt. 2006. Climate Change: Modeling a Waremer Rockies and Assessing the Implications. *In* The 2006 Colorado College State of the Rockies Report Card. April, 2006. 136 pages.

Added References

Climate Analysis Indicators Tool (CAIT-US). 2011. Version 4.0. World Resources Institute, Washington, DC. Accessed on March 28, 2011 from < http://cait.wri.org/>

Intergovernmental Panel on Climate Change (IPCC). 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 – Energy. Table 2.2 Default Emission Factors for Stationary Combustion in the Energy Industries. ISBN 4-88788-032-4. Accessed on March 28, 2011 from < http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>

U.S. Energy Information Administration. 2009. Annual Energy Review 2009. Table 7.3 Coal Consumption by Sector, Selected Years, 1949-2009. DOE/EIA-0384(2009). August 2009. Accessed on March 28, 2011 from < http://www.eia.doe.gov/aer/>

APPENDIX A

Unsuitability Criteria

Analysis of the Unsuitability Criteria

The following sections provide a detailed analysis of unsuitability criteria for the OMLLC, Elk Creek East Tract (lease application). This analysis considers the Proposed Action within the context of BLM Unsuitability Criteria for coal leasing projects. The analysis also examined the applicability of exemptions and exceptions to the criteria, as detailed in regulation (34 CFR 3461 *et seq.*). Exemptions to the criteria are not described, as no exemptions were determined to apply. Exceptions to the criteria are described, where applicable.

CRITERION 1

All Federal lands included in the following land systems or categories shall be considered unsuitable: National Park System, National Wildlife Refuge System, National System of Trails, National Wilderness Preservation System, National Wild and Scenic Rivers System, National Recreation Areas, lands acquired with money derived from the Land and Water Conservation Fund, National Forests, and federal lands in incorporated cities, towns, and villages.

Analysis

The area included in the lease application does not meet this unsuitability criterion. The lands described in this lease application are not a part of any of the systems or categories listed above as unsuitable for leasing.

CRITERION 2

Federal lands that are within rights-of-way (ROW) or easements, or within surface leases for residential, commercial, industrial, or other public purposes, on federally owned surface shall be considered unsuitable.

Analysis

The area included in the lease application does not meet this unsuitability criterion. There are no ROWs, easements, or surface leases for residential, commercial, industrial, or other public purposes within the lease application area.

CRITERION 3

Federal lands affected by Section 522(e)(4) and (5) of the Surface Mining Control and Reclamation Act of 1977 shall be considered unsuitable. This includes lands within 100 feet of the outside line of the ROW of a public road, or within 100 feet of a cemetery, or within 300 feet of any public building, school, church, community or institutional building or public park, or within 300 feet of an occupied dwelling.

Analysis

The area included in the lease application does not meet this unsuitability criterion. No public roads, cemeteries, occupied dwellings, public buildings, schools, churches, community or

institutional buildings exist within the lease application area or within the specified distances of the lease application area.

CRITERION 4

Federal lands designated as Wilderness Study Areas (WSAs) shall be considered unsuitable while under review by the Administration and Congress for possible Wilderness designation. For any Federal land that is to be leased or mined prior to completion of the Wilderness inventory by the surface management agency, the EA or EIS on the lease sale or mine plan shall consider whether the land possesses the characteristics of a WSA. If the finding is affirmative, the land shall be considered unsuitable, unless issuance of non-competitive coal leases and mining on leases is authorized under the Wilderness Act and the Federal Land Policy and Management Act of 1976.

Analysis

The area included in the lease application does not meet this unsuitability criterion. No lands within the lease application area are designated as WSAs. The current Resource Management Plan (RMP) manages the lease application lands primarily for coal leasing. These lands did not meet the criteria for Wilderness characteristics.

CRITERION 5

Scenic Federal lands designated by Visual Resource Management (VRM) analysis as Class I (an area of outstanding scenic quality or high visual sensitivity) but not currently on the National Register of Natural Landmarks shall be considered unsuitable. A lease may be issued if the surface management agency determines that surface coal mining operations will not significantly diminish or adversely impact the scenic quality of the designated area.

Analysis

The area included in the lease application does not meet this unsuitability criterion. No lands within the lease application area are designated as VRM Class I Areas.

CRITERION 6

Federal lands under permit by the surface management agency, and being used for scientific studies involving food or fiber production, natural resources, or technology demonstrations and experiments shall be considered unsuitable for the duration of the study, demonstration, or experiment, except where mining could be conducted in such a way as to enhance or not jeopardize the purposes of the study, as determined by the surface management agency, or where the principal scientific use or agency give written concurrence to all or certain methods of mining.

Analysis

The area included in the lease application does not meet this unsuitability criterion. No lands within the lease application area are under permit for scientific study.

CRITERION 7

All publicly-owned places on Federal lands that are included in the National Register of Historic Places (NRHP) shall be considered unsuitable. This shall include any areas that the surface management agency determines, after consultation with the Advisory Council on Historic Preservation (ACHP) and the State Historic Preservation Office (SHPO), are necessary in order to protect the inherent values of the property that made it eligible for listing in the National Register.

Analysis

The area included in the lease application does not meet this unsuitability criterion. No publicly-owned places on Federal or fee lands within the lease application area are included in the NRHP.

CRITERION 8

Federal lands designated as natural areas or as National Natural Landmarks shall be considered unsuitable.

Analysis

The area included in the lease application does not meet this unsuitability criterion. No lands within the lease application area are designated as Natural Areas or as National Natural Landmarks.

CRITERION 9

Federally designated critical habitat for listed threatened or endangered plant and animal species, and habitat proposed to be designated as critical for listed threatened or endangered plant and animal species or species proposed for listing, and habitat for Federal threatened or endangered species that is determined by the U.S. Fish and Wildlife Service (USFWS) and the surface management agency to be of essential value, and where the presence of threatened or endangered species has been scientifically documented, shall be considered unsuitable.

Exceptions

A lease may be issued and mining operations approved if, after consultation with the USFWS, it is determined that the proposed activity is not likely to jeopardize the continued existence of the listed species and/or its critical habitat.

Analysis

No lands within the Proposed lease are designated as critical habitat, proposed to be designated as critical habitat, or determined to be essential habitat for any federally listed threatened or endangered plant or animal species, or species proposed for listing (*Federal Register*, various dates). Habitat does not exist in the immediate lease application area for any of the listed or proposed species (see Threatened, Endangered and Sensitive Species section of the EA Document).

The Proposed Action would prolong a currently permitted depletion of surface flows in the Upper Colorado River that the USFWS has determined that, in the absence of appropriate mitigation measures, would jeopardize the continued existence of the Colorado pikeminnow, razorback sucker, bonytail and humpback chub. 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 endangered fishes by depletions from the Upper Colorado River Basin. Included in the Recovery Program was a requirement that the depletion fee ($16.30 per acre foot in 2005) would be paid to help support the Recovery Program. In May of 2005, OMLLC and the town of Somerset negotiated an agreement to allow for annual depletions of 242 acre feet of water during periods where other water sources are not adequate to support mining operations. Water consumption associated with the Proposed Action Alternative would continue under this consultation, as would compliance with the terms of the Recovery Program in order to avoid a "jeopardy" determination. OMLLC has consulted with the USFWS and adopted the reasonable and prudent alternatives under the Recovery Plan in order to avoid jeopardizing the continued existence of the Colorado River fishes; therefore, the Exception can be applied to this criterion.

CRITERION 10

Federal lands containing habitat determined to be critical or essential for plant or animal species listed by a State, pursuant to State law, as endangered or threatened shall be considered unsuitable.

Analysis

The area included in the lease application does not meet this unsuitability criterion. There is no suitable habitat within the lease modification area for any State threatened or endangered species.

CRITERION 11

A bald or golden eagle nest site on Federal lands that is determined to be active, and an appropriate buffer zone of land around the nest, site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones. Buffer zones shall be determined in consultation with the USFWS.

Analysis

The area included in the lease application does not meet this unsuitability criterion. There are no known golden eagle or bald eagle nests, or roost sites, within the lease application area.

CRITERION 12

Bald and golden eagle roost and concentration areas on Federal lands used during migration and wintering shall be considered unsuitable.

Exception

A lease may be issued if the surface management agency determines that all or certain stipulated methods of coal mining can be conducted in such a way, and during such periods of time, to ensure that eagles shall not be adversely disturbed.

Analysis

No bald or golden eagle roost sites or concentrations areas are known to exist on Federal lands within the lease application area. Portions of the Proposed lease are designated as Bald Eagle Winter Forage area. No construction activities will be conducted during winter months, and surface disturbance would be minimal and temporary in nature. All GVB drill pads and roads would be reclaimed once mining operations cease. Therefore, for the reasons stated above, the Exception can apply to this criterion.

CRITERION 13

Federal lands containing a falcon (excluding kestrel) cliff nesting site with an active nest and buffer zone of Federal land around the nest site shall be considered unsuitable.

Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones. Buffer zones shall be determined in consultation with the USFWS.

Analysis

The area included in the lease application does not meet this unsuitability criterion. There are no known peregrine or prairie falcon nest sites in the lease application area. Surveys conducted in 2005, 2006, and 2007 (Monarch & Associates and Michael Ward Outdoors 2005, 2006, 2008) did not identify any active falcon nests within the Proposed lease.

CRITERION 14

Federal lands that are high priority habitat for migratory bird species of high Federal interest on a regional or national basis, as determined jointly by the surface management agency and the USFWS, shall be considered unsuitable.

Exception

A lease may be issued where the surface management agency, after consultation with the USFWS, determines that all or certain stipulated methods of coal mining will not adversely impact the migratory bird habitat during the periods when such habitat is used by the species.

Analysis

Biological surveys conducted in 2005, 2006, and 2008 recorded 70 species of birds present within the Proposed lease, many of which are listed as migratory species subject to protection by the USFWS (Monarch & Associates and Michael Ward Outdoors 2008). Three of these species

are on the Birds of Conservation Concern list for the Southern Rockies/Colorado Plateau Bird Conservation Region (USFWS 2008): Peregrine Falcon (*Falco peregrinus*), Golden Eagle (*Aquila chrysaetos*), and Cassin's Finch (*Carpodacus cassinii*).

Only minimal surface facilities would be constructed for mining under this lease application area, including GVB drill pads and roads. These facilities are not located near any known nest locations of migratory birds. If the nest of a migratory bird is located during construction, activity in the vicinity of the nest would stop until the nest is no longer active. Therefore, for the reasons stated above, the Exception can apply to this criterion.

CRITERION 15

Federal lands that the surface management agency and the State jointly agree are habitat for resident species of fish, wildlife, and plants of high interest to the State, and that are essential for maintaining these priority wildlife and plant species, shall be considered unsuitable. Examples of lands that serve a critical function for the species involved include: (i) active dancing and strutting grounds for sage grouse, sharptailed grouse, and prairie chicken, (ii) winter ranges crucial for deer, antelope, and elk, (iii) migration corridor for elk, and (iv) extremes of range for plant species.

Exception

A lease may be issued if, after consultation with the State, the surface management agency determines that all or certain stipulated methods of coal mining will not have a significant long-term impact on the species being protected.

Analysis

Portions of the lease application area are designated by the Colorado Division of Wildlife (CDOW) as Elk Severe Winter Range. Impacts to this habitat would be minimal and temporary. All surface facilities would be reclaimed once mining operations are complete. No construction would be conducted during the winter months. Therefore, for the reasons stated above, the Exception can apply to this criterion.

CRITERION 16

Federal lands in riverine, coastal, and special floodplains (100-year recurrence interval) on which the surface management agency determines that mining could not be undertaken without substantial threat of loss of life or property shall be considered unsuitable for all or certain stipulated methods of coal mining.

Analysis

The area included in the lease application does not meet this unsuitability criterion. The lease application area is not within a riverine, coastal, or special floodplain.

CRITERION 17

Federal lands that have been committed by the surface management agency to use as municipal watersheds shall be considered unsuitable.

Analysis

The area included in the lease application does not meet this unsuitability criterion. None of the lands in the lease application area are within a municipal watershed.

CRITERION 18

Federal lands with National Resource Waters, as identified by States in their water quality management plans, and a buffer zone of Federal lands ¼-mile from the outer edge of the far banks of the water, shall be unsuitable.

Analysis

The area included in the lease application does not meet this unsuitability criterion. None of the lands in the lease application area are identified as a National Resource Water.

CRITERION 19

Federal lands identified by the surface management agency, in consultation with the State in which they are located, as alluvial valley floors according to the definition in Subpart 3400.0-5(a) of this Title, the standards of 30 CFR Part 822, the final alluvial floor guidelines of the Office of Surface Mining Reclamation and Enforcement when published, and approved State programs under the Surface Mining Control and Reclamation Act of 1977, where mining would interrupt, discontinue, or preclude farming, shall be considered unsuitable. Additionally, when mining Federal land outside an alluvial valley floor would materially damage the quantity or quality of water in surface or underground water systems that would supply alluvial valley floors, the land shall be considered unsuitable.

Analysis

The area included in the lease application does not meet this unsuitability criterion. The lease application area is not within an alluvial valley floor; however, leased lands drain into the North Fork Gunnison River, along which both surface irrigated and potentially irrigable sites exist.

Changes in ground slope and creation of tension cracks resulting from subsidence can alter surface hydrology and soil erosion processes. Impacts to stream channels may include: 1) increase in lengths of cascades and, to a lesser extent, glides; 2) increase in stream incision in areas of increased slope; 3) increase in pool length, numbers, and volumes; 4) increase in median particle diameter of bed sediment in pools; and 5) some constriction in channel geometry. The magnitude of these impacts would vary depending upon the amount and location of subsidence. Increased sediment delivery may impact water quality in Elk Creek (such as increased sediment load). This section of Elk Creek already receives large amounts of sediment from the erosive

soils in the vicinity during normal precipitation and run-off, so impacts related to increased sedimentation may not be significantly increased above baseline levels.

Subsidence is predicted to occur within Elk Creek and Sanborn Creek. With overburden thicknesses of 500 feet to 1,000 feet in the thalweg of Elk Creek above the D-Seam, maximum subsidence could be from 6.0 to 7.2 feet. Increased surface erosion, changes to stream morphology, and possible disruption of stream flows could occur as a result. Disruption of stream flow is also a possibility. However, minimal subsidence caused by mining at shallower depths under the Bear Creek drainage west of the Proposed lease produced no observed alterations of stream flow or alluvium (USFS and BLM 1999). Cracks in bedrock and colluvium were observed at the surface along the slopes of the Bear Creek drainage; however, none were observed in the Bear Creek alluvium. It is possible that the mechanical properties of the alluvium allowed for stretching and/or healing of cracks during subsidence.

Material damage to the quality and quantity of water arising on, or flowing over, the lease application area is possible; however, due to the reasons listed above, this is not anticipated. Such changes would be difficult to separate from natural processes that currently exist.

Criterion 20

Federal lands in a State to which is applicable a criterion (i) proposed by the State or Native American tribe located in the planning area, and (ii) adopted by rulemaking by the Secretary, shall be considered unsuitable.

Analysis

The area included in the lease application does not meet this unsuitability criterion. This criterion is not presently in effect in the State of Colorado.

APPENDIX B

USFWS Biological Opinion Concerning the Impact of Water Depletion to Listed Species

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6
ES
ES/GJ-6-CO-04-F-016

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Blvd.
Lakewood, Colorado 80228-1807

MAY 12 2005

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MAY 18 2005
ECOLOGICAL SERVICES
GRAND JUNCTION, CO

Memorandum

To: Resource Division Manager, Bureau of Reclamation, Western Colorado Area Office, Grand Junction, Colorado

From: ACTING Regional Director, Region 6
U.S. Fish and Wildlife Service
Denver, Colorado

Subject: Final Biological Opinion for the Oxbow Mining Company and Town of Somerset Water Augmentation Project, Delta County, Colorado

In accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.), and the Interagency Cooperation Regulations (50 CFR 402), this document transmits the U.S. Fish and Wildlife Service's (USFWS) biological opinion based on our review of the proposed Oxbow Mining Company (OMC) and Town of Somerset Water Augmentation Project (Project) located in Delta County, Colorado, and its effects on the endangered Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*) and their critical habitats. Your November 19, 2004, correspondence requesting initiation of formal consultation was received on November 22, 2004.

This biological opinion is based primarily on our review of the information in your request letter regarding the proposed actions and the estimated average annual water depletion. A complete administrative record of this consultation is on file at the USFWS's Grand Junction Field Office. Copies of this opinion should be provided to the applicant because the USFWS has incorporated reasonable and prudent alternatives that should be included as conditions of any authorization issued by the Bureau of Reclamation (Bureau) for this Project.

With respect to critical habitat, this biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis.

APPENDIX B

USFWS Biological Opinion Concerning the Effect of Water Depletion to Listed Species

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The OMC is requesting a 40-year Water Service Contract with the Bureau for the purchase of up to 242 acre-feet (af) of water annually from Blue Mesa Reservoir in the Aspinall Unit. The purpose of the contract is to provide water for a Substitute Water Supply Plan (SWSP). A SWSP is a plan approved by the Colorado State Engineer in place of a court-approved plan for augmentation, whereby a water user can use water for beneficial uses without injury or impairment to senior water rights. The OMC SWSP would replace out of priority water depletions for OMC's Elk Creek mining operations and the Town of Somerset residential use from November through June when a senior water right is calling for water. The proposed action will result in a 242 af-water depletion from the North Fork of the Gunnison River. The releases are to satisfy Colorado water law and are not related to instream flows for endangered fishes.

The water depletion is located on the North Fork of the Gunnison River near the town of Somerset. The contract with the Bureau would satisfy Colorado water law, and water would be released from Blue Mesa Reservoir (which is on the Gunnison River upstream from its confluence with the North Fork) when there is a call on the Gunnison River. Water depletions from OMC would result in continuous depletions from the Gunnison River. The SWSP would only provide releases from Blue Mesa Reservoir when there is not enough water in the Gunnison River to satisfy senior water rights.

Our regulations define the action area as all areas directly or indirectly affected by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The subject Project water depletion would result in a loss of water from the point of diversion on the North Fork of the Gunnison River (SESW of section 9, T. 13 S., R. 90 W.) and continuing downstream to the confluence of the mainstem of the Gunnison River to the confluence with the Colorado River down to Lake Powell. Therefore, the action area designation begins at two sites—one at the water diversion site as described above and the Blue Mesa Reservoir water release site down to Lake Powell.

STATUS OF THE SPECIES AND CRITICAL HABITAT

COLORADO PIKEMINNOW

Species Description

The Colorado pikeminnow is the largest cyprinid fish (minnow family) native to North America and evolved as the main predator in the Colorado River system. It is an elongated pike-like fish that during predevelopment times may have grown as large as 6 feet in length and weighed nearly 100 pounds (Behnke and Benson 1983). Today, Colorado pikeminnow rarely exceed 3 feet in length or weigh more than 18 pounds; such fish are estimated to be 45 to 55 years old (Osmundson et al. 1997). The mouth of this species is large and nearly horizontal with long slender pharyngeal teeth (located in the throat), adapted for grasping and holding prey. The diet of Colorado pikeminnow longer than 3 or 4 inches consists almost entirely of other fishes (Vanicek and Kramer 1969). Males become sexually mature earlier and at a smaller size than do

females, though all are mature by about age 7 and 20 inches in length (Vanicek and Kramer 1969; Seethaler 1978; Hamman 1981). Adults are strongly countershaded with a dark, olive back, and a white belly. Young are silvery and usually have a dark, wedge-shaped spot at the base of the caudal fin.

Status and Distribution

Based on early fish collection records, archaeological finds, and other observations, the Colorado pikeminnow was once found throughout warmwater reaches of the entire Colorado River Basin down to the Gulf of California, and including reaches of the upper Colorado River and its major tributaries, the Green River and its major tributaries, and the Gila River system in Arizona (Seethaler 1978).. Colorado pikeminnow apparently were never found in colder, headwater areas. Seethaler (1978) indicated that the species was abundant in suitable habitat throughout the entire Colorado River Basin prior to the 1850s. No historic records exist that would indicate how far upstream Colorado pikeminnow once occurred in the Colorado River. The only reliable account of the species occurring upstream of the Price Stubb Dam near Palisade, Colorado, is from a USFWS biologist who reports having captured Colorado pikeminnow in Plateau Creek approximately 2-3 miles upstream from the Colorado River confluence while angling there around 1960 (Osmundson 2001).

By the 1970s, Colorado pikeminnow were extirpated from the entire lower basin (downstream of Glen Canyon Dam) and from portions of the upper basin of the Colorado River as a result of major alterations to the riverine environment. Having lost 75 to 80 percent of its former range(Miller 1961; Moyle 1976; Tyus 1991; Osmundson and Burnham 1998), the Colorado pikeminnow was federally listed as an endangered species in 1967 (32 FR 4001).

Colorado pikeminnow are presently restricted to the Upper Colorado River Basin and inhabit warmwater reaches of the Colorado, Green, and San Juan Rivers and associated tributaries. The species inhabits about 350 miles of the mainstem Green River from its confluence with the Colorado River upstream to the mouth of the Yampa River. In the Yampa River, its range extends upstream an additional 160 miles. Colorado pikeminnow also occur in the lowermost 104 miles of the White River, another tributary to the Green River. In the mainstem Colorado River, distribution of the species extends 201 miles upstream from the upper end of Lake Powell to Palisade, Colorado (Tyus 1982).

Colorado pikeminnow are found in the Gunnison River as far upstream as the Hartland Diversion Dam, which is a barrier to upstream fish passage, located approximately 57 miles upstream of the Redlands Diversion Dam (Burdick 1995). Colorado pikeminnow use most of the Gunnsion River between the Redlands Diversion and the Hartland Diversion (Burdick 1995). A suspected spawning area was located between river mile 32 and 33 (Burdick 1995; McAda 2003).

Colorado pikeminnow larvae were collected in the Gunnison River in 1995 and 1996 (Anderson 1999). Collection of larval fish provides evidence of spawning, but does not locate specific spawning locations.

Osmundson and Burnham (1998) summarized the status and trend of the Colorado River population of Colorado pikeminnow. They found that numbers were low but new individuals were actively recruiting to the adult population, and recruitment largely occurs in pulses from infrequent strong year classes. These investigators concluded that low adult numbers and infrequent pulsed recruitment make this population vulnerable to extirpation over time from both natural fluctuations in numbers as well as from continued changes in habitat.

Threats

Major declines in Colorado pikeminnow populations occurred during the dam-building era of the 1930s through the 1960s. Behnke and Benson (1983) summarized the decline of the natural ecosystem, pointing out that dams, impoundments, and water use practices drastically modified the river's natural hydrology and channel characteristics throughout the Colorado River Basin. Dams on the mainstem broke the natural continuum of the river ecosystem into a series of disjunct segments, blocking native fish migrations, reducing temperatures downstream of dams, creating lacustrine habitat, and providing conditions that allowed competitive and predatory nonnative fishes to thrive both within the impounded reservoirs and in the modified river segments that connect them. The highly modified flow regime in the lower basin coupled with the introduction of nonnative fishes decimated populations of native fish.

Major declines of native fishes first occurred in the lower basin where large dams were constructed from the 1930s through the 1960s. In the upper basin, the following major dams were not constructed until the 1960s--Glen Canyon Dam on the mainstem Colorado River, Flaming Gorge Dam on the Green River, Navajo Dam on the San Juan River, and the Aspinall Unit Dams on the Gunnison River. To date, some native fish populations in the Upper Basin have managed to persist, while others have become nearly extirpated. River segments where native fish have declined more slowly than in other areas are those where the hydrologic regime most closely resembles the natural condition, where adequate habitat for all life phases still exists, and where migration corridors are unblocked and allow connectivity among life phases.

The Redlands Diversion Dam restricted upstream travel of Colorado pikeminnow in the lower Gunnison River between 1917 and 1996. A small remnant population persisted upstream of the dam. Five adult Colorado pikeminnow were captured in the Gunnison River between 1992 and 1994 (Burdick 1995). Earlier studies captured four adult Colorado pikeminnow in the Gunnison River between river mile 22.1 and 31.4 (Valdez et al. 1982a). In 1996 the fish ladder was constructed around the Redlands Diversion Dam, and 62 Colorado pikeminnow have ascended the fish ladder. In addition, 1,050 Colorado pikeminnow (150-300 mm long) were stocked in the Gunnison River at Delta in 2003.

In the mainstem Colorado River, the magnitude of spring flows has declined by 30 to 45 percent since the early part of the century (Osmundson and Kaeding 1991; Van Steeter 1996; Pitlick et al. 1999). Such flow reduction negatively affects Colorado pikeminnow in four ways--1) reducing the river's ability to build and clean cobble bars for spawning; 2) reducing the dilution effect for waterborne contaminants from urban and agricultural sources that may interfere with reproductive success; 3) reducing the connectivity of main-channel and bottomland habitats needed for habitat diversity and productivity; and 4) providing a more benign environment for nonnative fish and invasive nonnative, bank-stabilizing shrubs (salt

cedar) to persist and flourish (Osmundson and Burnham 1998). In general, the existing habitat has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

Nonnative fishes compete with native fishes in several ways. The capacity of a particular area to support aquatic life is limited by physical habitat conditions. Increasing the number of species in an area usually results in a smaller population of most species. The size of each species population is controlled by the ability of each life stage to compete for space and food resources and to avoid predation. Some nonnative fishes' life stages appear to have a greater ability to compete for space and food and to avoid predation in the existing altered habitat than do some native fishes' life stages.

Nonnative fishes are often stocked in and enter rivers from off-channel impoundments. The periodic introduction of these nonnative fishes into a river allows them to bypass limitations to reproduction, growth, or survival that they might encounter in the river. Consequently, populations of nonnative fishes in the river are enhanced. Endangered and other native species in the river experience greater competition and predation as a result.

Life History

The life-history phases that appear to be most critical for the Colorado pikeminnow include spawning, egg hatching, development of larvae, and the first year of life. These phases of Colorado pikeminnow development are tied closely to specific habitat requirements. Natural spawning of Colorado pikeminnow is initiated on the descending limb of the annual hydrograph as water temperatures approach or exceed 20°C (Vanicek and Kramer 1969; Hamman 1981; Haynes et al. 1984; Tyus 1990; McAda and Kaeding 1991). Temperature at initiation of spawning varies somewhat by river--in the Green River, spawning begins as temperatures exceed 20-23°C; in the Yampa River, 16-23°C (Bestgen et al. 1998); in the Colorado River, 18-22°C (McAda and Kaeding 1991). Spawning, both in the hatchery and under natural riverine conditions, generally occurs in a 2-month timeframe between late June and late August. However, in the natural system, sustained high flows during wet years may suppress river temperatures and extend spawning into September (McAda and Kaeding 1991). Conversely, during low flow years, when the water warms earlier, spawning may commence in mid-June.

Temperature has an effect on egg development and hatching success. In the laboratory, egg development was tested at five temperatures and hatching success was found to be highest at 20°C, lower at 25°C, and mortality was 100 percent at 5, 10, 15, and 30°C. In addition, larval abnormalities were twice as high at 25°C than at 20°C (Marsh 1985).

Experimental tests of temperature preference of yearling (Black and Bulkley 1985a) and adult (Bulkley et al. 1981) Colorado pikeminnow indicated that 25°C was the most preferred temperature for both life phases. Additional experiments indicated that optimum growth of yearling Colorado pikeminnow also occurs at temperatures near 25°C (Black and Bulkley 1985b). Although no such tests were conducted using adults, the tests with yearlings supported the conclusions of Jobling (1981) that the final thermal preferendum provides a good indication of optimum growth temperature, i.e., 25°C.

Most information on Colorado pikeminnow reproduction was gathered from spawning sites on the lower 20 miles of the Yampa River and in Gray Canyon on the Green River (Tyus and McAda 1984; Tyus 1985; Wick et al. 1985; Tyus 1990). Colorado pikeminnow spawn after peak runoff subsides and is probably triggered by several interacting variables such as photoperiod, temperature, flow level, and perhaps substrate characteristics. Spawning generally occurs from late June to mid-August with peak activity occurring when water temperatures are between 18 and 23°C (Haynes et al. 1984; Archer et al. 1985; Tyus 1990; Bestgen et al. 1998).

Spawning has been confirmed in the Colorado River by the presence of Colorado pikeminnow larvae in all years sampled. Larvae are distributed throughout the river although most have been found downstream of Grand Junction (McAda and Kaeding 1991; Osmundson and Burnham 1998). Aggregations of ripe adults have been found near Clifton and Grand Junction, Colorado, and near the Colorado-Utah State line (Osmundson and Kaeding 1989; McAda and Kaeding 1991; USFWS unpublished data). Suitable spawning habitat (defined below) in the Colorado River near Cataract Canyon, Professor Valley, and upstream from the Dolores River confluence indicates spawning may occur in or near these areas as well (Archer et al. 1985; Valdez 1990).

Known spawning sites in the Yampa River are characterized by riffles or shallow runs with well-washed coarse substrate (cobble containing relatively deep interstitial voids (for egg deposition) in association with deep pools or areas of slow laminar flow used as staging areas by adults (Lamarra et al. 1985; Tyus 1990). Recent investigations at a spawning site in the San Juan River by Bliesner and Lamarra (1995) and at one in the upper Colorado River (USFWS unpublished data) indicate a similar association of habitats. The most unique feature at the sites actually used for spawning, in comparison with otherwise similar sites nearby, is the degree of looseness of the cobble substrate and the depth to which the rocks are devoid of fine sediments; this appears consistent at the sites in all three rivers (Lamarra et al. 1985; Bliesner and Lamarra 1995).

Habitat Use and Preferences

Clean cobble substrates that provide interstitial spaces for eggs are necessary for spawning and egg incubation (Tyus and Karp 1989). Several studies on the cobble cleaning process have been conducted at a known spawning location in Yampa Canyon. O'Brien (1984) studied the hydraulic and sediment transport dynamics of the cobble bar within the Yampa River spawning site and duplicated some of its characteristics in a laboratory flume study. O'Brien (1984) concluded that incipient motion of the cobble bed is required to clean cobbles for spawning and estimated that this takes discharges of about 21,500 cfs. However, Harvey et al. (1993) concluded that because flows required for incipient motion of bed material are rare (20-year return period event) and spawning occurs annually, another process must be cleaning the cobbles. Their study found that in Yampa Canyon recessional flows routinely dissect gravel bars and thereby produce tertiary bars of clean cobble at the base of the riffles. These tertiary bars are used by Colorado pikeminnow for spawning. The importance of high magnitude, low frequency discharges is in forming and maintaining the midchannel bars. Dissection of bars without redeposition by high magnitude flows would lead to conditions where spawning habitat is no longer available (Harvey et al. 1993).

It is unknown whether tertiary bars similar to those used for Colorado pikeminnow spawning in Yampa Canyon are available in the 15-mile reach of the Colorado River. There, significant motion of bed material occurs at near bankfull discharge of 22,000 cfs (Van Steeter 1996). These flows occur on average once in 4 years. Van Steeter (1996) concluded that flows of this magnitude are important because they generally remove fine sediment from the gravel matrix which maintains the invertebrate community and cleans spawning substrate.

Although the location of spawning areas in the Colorado River is not as defined as in the Yampa River, the annual presence of larvae and young-of-the-year downstream of the Walker Wildlife Area, in the Loma to Black Rocks reach and near the confluence of the Dolores River, demonstrates that spawning occurs every year. Osmundson and Kaeding (1989, 1991) reported that water temperatures in the Grand Junction area were suitable for Colorado pikeminnow spawning. In 1986, a year of high runoff, suitable temperatures for spawning (20°C) occurred in mid-August; in 1989, a year of low runoff, the mean temperature reached 20°C during the last week of June. Tyus (1990) demonstrated that Colorado pikeminnow often migrate considerable distances to spawn in the Green and Yampa Rivers, and similar though more limited movement has been noted in the mainstem Colorado River (McAda and Kaeding 1991).

Collections of larvae and young-of-the-year downstream of known spawning sites in the Green and Yampa Rivers indicate that downstream drift of larval Colorado pikeminnow occurs following hatching (Haynes et al. 1984; Nesler et al. 1988; Tyus 1990, Tyus and Haines 1991). During their first year of life, Colorado pikeminnow prefer warm, turbid, relatively deep (averaging 1.3 feet) backwater areas of zero velocity (Tyus and Haines 1991). After about 1 year, young are rarely found in such habitats, though juveniles and subadults are often located in large deep backwaters during spring runoff (USFWS, unpublished data; Osmundson and Burnham 1998).

Larval Colorado pikeminnow have been collected in the Gunnison River upstream and downstream of the Redlands Diversion Dam (Anderson 1999; Osmundson and Burnham 1998). Burdick (1997) reports that the capture of larval Colorado pikeminnow in 1995 and 1996 upstream of the Redlands Diversion Dam coupled with aggregations of radio-tagged adult fish during the spawning season confirms that spawning occurs upstream of the dam.

Information on radio-tagged adult Colorado pikeminnow during fall suggests that fish seek out deep water areas in the Colorado River (Miller et al. 1982; Osmundson and Kaeding 1989), as do many other riverine species. River pools, runs, and other deep water areas, especially in upstream reaches, are important winter habitats for Colorado pikeminnow (Osmundson et al. 1995).

Very little information is available on the influence of turbidity on the endangered Colorado River fishes. Osmundson and Kaeding (1989) found that turbidity allows use of relatively shallow habitats ostensibly by providing adults with needed cover; this allows foraging and resting in areas otherwise exposed to avian or land predators. Tyus and Haines (1991) found that young Colorado pikeminnow in the Green River preferred backwaters that were turbid. Clear conditions in these shallow waters might expose young fish to predation from wading birds or introduced sight-feeding, piscivorous fish. It is unknown whether the river was as turbid in the

past as it is today. For now, it is assumed that these endemic fishes evolved under natural conditions of high turbidity; therefore, the retention of these highly turbid conditions is probably an important factor in maintaining the ability of these fish to compete with nonnatives that may not have evolved under similar conditions.

Population Dynamics

Osmundson (2002) investigated population dynamics of Colorado pikeminnow from 1991 to 2000. These years were divided into two study periods--1991 to 1994 and 1998 to 2000. The results of the investigation found that annual estimates of whole-river (the Colorado River from the confluence with the Green River upstream to the Price-Stubb Dam, including the lower 2.3 miles of the Gunnison River downstream of the Redlands Diversion Dam) population size (all fish $\geq$ 250 mm) averaged 582 fish during the earlier study period and 742 fish during the more recent study period. This represents a 27 percent increase based on these estimates. Estimates of adult fish ($\geq$ 500 mm) averaged 362 during the earlier study period and 490 during the more recent study period, representing a 35 percent increase in adult fish.

Colorado pikeminnow reproduce each year; however, strong year classes that recruit fish to the adult population are relatively rare (Osmundson and Burnham 1998). A distinct increase of subadult fish was found below Moab in 1991 and within a few years these fish were distributed throughout the Colorado River. Osmundson and Burnham (1998) concluded that these fish were the result of one or more strong year classes produced during the mid-1980s. McAda and Ryel (1999) have identified another strong year class that occurred in 1996. In both cases, the common hydrologic conditions that led to successful reproduction and first year survival was a spring and summer of moderately high flows following a year of exceptionally high-flood flows (McAda and Ryel 1999).

Critical Habitat

Critical habitat for the Colorado pikeminnow was designated in 1994 within the 100-year floodplain of the Colorado pikeminnow's historical range in the following area of the upper Colorado River (59 FR 13374). Colorado pikeminnow now only occur in the upper Colorado River basin (upstream of Lee Ferry just below the Glen Canyon Dam). Most of Lake Powell is not suitable habitat for Colorado pikeminnow and is not designated critical habitat. The total designated miles is 1,148 and represents 29 percent of the historical habitat for the species:

> Moffat County, Colorado. The Yampa River and its 100-year floodplain from the State Highway 394 bridge in T. 6 N., R. 91 W., section 1 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).
>
> Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties, Utah; and Moffat County, Colorado. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (Salt Lake Meridian).

Rio Blanco County, Colorado; and Uintah County, Utah. The White River and its 100-year floodplain from Rio Blanco Lake Dam in T. 1 N., R. 96 W., section 6 (6th Principal Meridian) to the confluence with the Green River in T. 9 S., R. 20 E., section 4 (Salt Lake Meridian).

Delta and Mesa Counties, Colorado. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).

Mesa and Garfield Counties, Colorado; and Grand, San Juan, Wayne, and Garfield Counties, Utah. The Colorado River and its 100-year floodplain from the Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to North Wash, including the Dirty Devil arm of Lake Powell up to the full pool elevation, in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

San Juan County, New Mexico; and San Juan County, Utah. The San Juan River and its 100-year floodplain from the State Route 371 Bridge in T. 29 N., R. 13 W., section 17 (New Mexico Meridian) to Neskahai Canyon in the San Juan arm of Lake Powell in T. 41 S., R. 11 E., section 26 (Salt Lake Meridian) up to the full pool elevation.

The final critical habitat rule identified water, physical habitat, and the biological environment as the Primary Constituent Elements (PCEs) of critical habitat. The water PCE was further described as including 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. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable by fish for use in spawning, nursery, feeding, and rearing, or serve as 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 floodplain, which when inundated provide access to spawning, nursery, feeding, and rearing habitats. The biological environment PCE includes food supply predation, and competition. 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.

PRIMARY CONSTITUENT ELEMENT - WATER

The status of water quantity includes all historical depletions in the Upper Basin, depletions resulting from projects, which have previously undergone section 7 consultation, and depletions resulting from projects contemporaneous with this consultation. Since 1988, the USFWS has consulted on 152 projects with a potential to deplete a total of 1,729,060 af in the entire Upper Colorado River Basin, of which 1,507,202 af are historic depletions. According to the Colorado River Compact of 1922, the total flow from the Upper Colorado River Basin is approximately 16 million af in an average year. Therefore, withdrawals of approximately 11 percent of the average flow has been covered in previous biological opinions.

The status of water quality in critical habitat includes concerns regarding the following contaminants--heavy metals, selenium, salts, PAHs, and pesticides. Selenium is of particular concern because of its documented effects on fish (and wildlife) reproduction. Many chemical, physical, and biological factors affect the toxicity of environmental contaminants to biological organisms. Chemical and physical factors include contaminant type, chemical species or form, pH, water temperature, dissolved oxygen, hardness, salinity, and multiple-chemical exposure (antagonism and synergism). Duration of exposure, quantity of contaminant, and exposure pathways from the environment to the organism also affect toxicity. Some trace elements are beneficial to organisms at low concentrations but may be toxic at higher concentrations. Biological and physiological factors affecting toxicity include species, age, sex, and health of the organism.

Selenium concentrations can be elevated in areas where irrigation occurs on soils which are derived from or which overlie Upper Cretaceous marine sediments. Percolation of irrigation water through these soils and sediments leaches selenium into receiving waters. Other sources of selenium include power plant fly ash and oil refineries. Water depletions, by reducing dilution effects, have increased the concentrations of selenium and other contaminants. In 1995, Colorado's Water Quality Control Commission reduced the chronic selenium standard from 17 µg/L to 5 µg/L. The USFWS recommended the level be lowered to 2 µg/L.

PRIMARY CONSTITUENT ELEMENT - PHYSICAL HABITAT

Physical habitat of the Colorado River in the action area has been greatly altered by changes in the timing and volume of flows, bank stabilization, diking, and diversion dams. Barriers to fish movement have been identified as a factor in the decline of the endangered fishes because they block migration routes and prevent fish from reaching spawning grounds and other important habitat. As an example, the Redlands Diversion Dam has been in place since 1918 and completely blocked upstream fish movement until 1996 when a fish ladder was installed. Large quantities of water are diverted into the Redlands Water and Power Company's Canal for power production and irrigation. Large diversions are known to divert many species of fish into canals, including the Colorado River endangered fishes (Burdick 2003). Once fish enter the Redlands Canal, they likely enter the power turbines and are injured or killed. Fish also could be lost in the electric pumps, during canal dewatering, or transported through ditches to irrigated fields. Fish have likely been lost in the Redlands Water and Power Company's Canal since 1918.

In addition to blocking native fish migrations, dams have reduced downstream temperatures and created lacustrine habitats that provided conditions that allowed competitive and predatory nonnative fishes to thrive both within the impounded reservoirs and in the modified river segments that connect them. The highly modified flow regimes coupled with the introduction of nonnative fishes decimated populations of native fish.

Water depletions, by affecting the quantity and timing of flows, have reduced the ability of the river to create and maintain habitats and have reduced the frequency and duration of availability of certain habitats.

The formation of a variety of channel habitats, including gravel/cobble bars and substrates used by Colorado pikeminnow for spawning, is essential to ensure the availability of the range of habitats required by all endangered fish life stages to fulfill daily requirements (foraging, resting, spawning, avoiding predation, etc.) under various flow conditions. The number and distribution of these channel habitats can be described as channel habitat complexity, diversity, or heterogeneity. Osmundson and Kaeding (1991) found that adult Colorado pikeminnow in the Grand Valley prefer river segments with a complex morphometry to those that are simple. Some important physical habitats, such as inundated floodplain depressions, are located outside the channel. Floodplain depressions are principally derived from abandoned main channels, side-channels, backwaters, and meander cutoffs.

The creation of complex channel habitat and the formation and eventual abandonment of channel features from which floodplain depressions are formed occur primarily during spring runoff when flows are of sufficient size and duration to cause major changes in channel morphology through significant erosion and deposition of bed and bank materials. The reduction in the magnitude, duration, and frequency of high spring flows has slowed the rate at which channel morphology changes. Consequently, the creation of complex channel habitat and floodplain depressions has slowed. The placement of riprap and other bank stabilization measures and the construction of dikes and levees impede changes in channel morphology and contribute to the slowed creation of complex channel habitat. In addition, the construction of dikes and levees reduces existing channel habitat complexity by causing channelization of the river. Dikes and levees also isolate existing floodplain depressions from the channel during high flows. The slowed creation of complex channel habitats and new floodplain depressions, the reduction of existing channel habitat complexity, and the isolation of existing floodplain depressions have acted to reduce the quantity and quality of important habitat for endangered fishes.

Backwaters, a habitat component of the physical habitat PCE, are essential for various life stages of endangered fish. Backwaters are damaged by the deposition of fine sediments which reduces their depth and consequently their duration and frequency of inundation. Gravel and cobble substrates, used by pikeminnow for spawning, are damaged by the infiltration of fine sediments. The establishment of vegetation on backwater sediments and on bars further reduces the value of these habitats for endangered fishes. Furthermore, higher flows are required to flush sediments from vegetated backwaters than from unvegetated ones. Osmundson and Kaeding (1991) reported observations that, on the 15-mile reach during the drought years of 1988 to 1990, backwaters were filling in with silt and spring flows were not sufficient to flush out the fine sediment. Also, they reported that tamarisk colonized sand and cobble bars. Therefore, the lower frequency of high water years decreases the frequency at which silt and sand is flushed from backwaters, fine sediments are flushed from gravel/cobble substrates, and vegetation is scoured from backwaters and bars. Flow recommendations recently developed for the Gunnison River (McAda 2003) are intended to restore and maintain in-channel critical habitats used by all life stages--1) spawning areas for adults; 2) spring, summer, autumn, and winter habitats used by subadults and adults; and 3) nursery areas used by larvae, young-of-year, and juveniles.

Summer (August-October) Habitats--Osmundson et al. (1995) reported that, in the 15-mile reach, availability of habitats did not differ significantly between periods of moderate flows and low flows. Though absolute area of habitat decreases with declining flows, relative area or percent

composition of habitat types changes little. However, pikeminnow habitat use patterns did change. The fish used a greater variety of habitats during moderate flows than during low flows. During moderate flows, the fish used primarily backwaters, eddies, and pools. During low flows, the fish used slow and fast runs almost exclusively. The change in habitat use without a corresponding change in relative habitat availability indicates that other factors also influence habitat selection. These factors could include changes in quality of physical habitat features such as diversity, depth, dissolved oxygen, etc., or changes in biotic interactions. Osmundson et al. (1995) interpreted the pikeminnow behavioral changes as reflective of suboptimal conditions; the behavioral changes demonstrate the ability of the species to modify their habitat use patterns to temporarily cope with adverse conditions and do not demonstrate habitat preferences under optimum conditions.

Winter (November-March) Habitats--Osmundson et al. (1995) reported that, in the 15-mile reach, flows during the winter are usually moderate because no water is diverted for irrigation and because additional water is released through upstream dams to increase reservoir storage capacity in anticipation of spring runoff. The relative availability of slow runs and riffles during the winter was very similar to their availability during summer. As in the summer, backwaters, eddies, and pools were the preferred types of habitat in the winter. However, whereas eddies were most preferred in summer, pools were most preferred in winter. Adult pikeminnow used fewer habitat types overall during winter than during summer. Although fast runs and riffles were used during the summer, they were not used during the winter. The colder water temperatures in winter which cause lower metabolic rates may account for the avoidance of high velocity sites. Absolute area of pools increases as flows decrease and slow runs lose velocity. Because Osmundson et al. (1995) did not sample low flows in the winter, they could not determine if pools would still be preferred in the winter at lower flows.

Spring (April-July) Habitats--Osmundson and Kaeding (1989) reported that pikeminnow use of low velocity habitats such as backwaters and flooded gravel pits is greatest during the spring runoff. It is believed that pikeminnow use these habitats during the runoff to escape the high velocity, low temperature flows of the main channel. Because backwaters, flooded gravel pits, and other low velocity habitats are considerably warmer than the main channel during the runoff, these habitats allow pikeminnow to extend their growing season substantially. The earlier warming of these habitats also may be important in enabling pikeminnow to reach spawning condition by the time flow and temperature in the main channel are optimum for spawning. Osmundson et al. (1995) reported that, in the 15-mile reach, the numbers of backwaters and flooded gravel pits increases with increasing spring flows. (Although the number of backwaters eventually decreases as increasing flows convert backwaters to side channels, the number of other low velocity habitats likely increases as increasing flows inundate additional bottomlands.) The decrease in the magnitude, duration, and frequency of high spring flows, then, decreases the quantity and the duration and frequency of availability of important low velocity, higher temperature habitat in the spring. These changes could be affecting pikeminnow growth and spawning success.

PRIMARY CONSTITUENT ELEMENT - BIOLOGICAL ENVIRONMENT

This PCE includes food supply and predation. As described in the species section above, predation and competition from nonnative fishes have been clearly implicated in the population reductions or elimination of native fishes in the Colorado River Basin (Dill 1944; Minckley and Deacon 1968; Joseph et al. 1977; Lanigan and Berry 1979; Behnke 1980; Meffe 1985; Osmundson and Kaeding 1989; Propst and Bestgen 1991; Rinne 1991). The modification of flow regimes, water temperatures, sediment levels, and other habitat conditions caused by water depletions has contributed to the establishment of nonnative fishes. During low water years, nonnative minnows capable of preying on or competing with larval endangered fishes greatly increase in numbers (Osmundson and Kaeding 1991). Thus, the biological environment PCE has been adversely affected by nonnative fishes.

Species/Critical Habitat Likely to be Affected

The Colorado pikeminnow and its critical habitat in the action area are likely to be adversely affected. The critical habitat includes the Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian) and continuing down from this point of the Colorado River and its 100-year floodplain to North Wash, including the Dirty Devil arm of Lake Powell up to the full pool elevation, in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

RAZORBACK SUCKER

Species Description

The razorback sucker, an endemic species unique to the Colorado River Basin, was historically abundant and widely distributed within warmwater reaches throughout the Colorado River Basin. The razorback sucker is the only sucker with an abrupt sharp-edged dorsal keel behind its head. It has a large fleshy subterminal mouth that is typical of most suckers. Adults often exceed 6 pounds in weight and 2 feet in length.

Historically, razorback suckers were found in the mainstem Colorado River and major tributaries in Arizona, California, Colorado, Nevada, New Mexico, Utah, Wyoming, and in Mexico (Ellis 1914; Minckley 1983). Bestgen (1990) reported that this species was once so numerous that it was commonly used as food by early settlers and, further, that commercially marketable quantities were caught in Arizona as recently as 1949. In the Upper Basin, razorback suckers were reported in the Green River to be very abundant near Green River, Utah, in the late 1800s (Jordan 1891). An account in Osmundson and Kaeding (1989) reported that residents living along the Colorado River near Clifton, Colorado, observed several thousand razorback suckers during spring runoff in the 1930s and early 1940s. In the San Juan River drainage, Platania and Young (1989) relayed historical accounts of razorback suckers ascending the Animas River to Durango, Colorado, around the turn of the century.

Status and Distribution

The current distribution and abundance of the razorback sucker have been significantly reduced throughout the Colorado River system, due to lack of recruitment to the adult population (Holden and Stalnaker 1975; McAda and Wydoski 1980; Minckley 1983; McAda 1987; Tyus 1987; Marsh and Minckley 1989). The only substantial population exists in Lake Mohave with an estimated population of 5,000 adult razorback suckers in 2005 (Burke 2005) down from an earlier estimate of 25,000 in 1995 (Minckley 1995) and 60,000 in 1991 (Minckley et al. 1991). They do not appear to be successfully recruiting. While limited numbers of razorback suckers persist in other locations in the lower Colorado River, they are considered rare or incidental and may be continuing to decline.

In the Upper Basin, above Glen Canyon Dam, razorback suckers are found in limited numbers in both lentic and lotic environments. The largest population of razorback suckers in the Upper Basin is found in the upper Green River and lower Yampa River (Tyus 1987). Lanigan and Tyus (1989) estimated that from 758 to 1,138 razorback suckers inhabit the upper Green River. Modde et al. (1996) report no significant decrease in the population between 1982 and 1992, and the continued presence of fish smaller than 480 mm during the study period suggest some level of recruitment. In the Colorado River, most razorback suckers occur in the Grand Valley area near Grand Junction, Colorado; however, they are increasingly rare. Osmundson and Kaeding (1991) report that the number of razorback sucker captures in the Grand Junction area has declined dramatically since 1974. In 1991 and 1992, 28 adult razorback suckers were collected from isolated ponds adjacent to the Colorado River near De Beque, Colorado (Burdick 1992). The last wild razorback sucker was caught in the Grand Valley area in 1995; however, stocked razorback suckers are now captured on a regular basis in the Grand Valley area during ongoing survey efforts (C. McAda, pers. comm. 2005). The existing habitat has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

Anecdotal information indicates razorback sucker were once common in the Gunnison River (Kidd 1977; Quartrone 1993), and two specimens from the 1940s are in the University of Michigan Museum of Zoology (Wiltzius 1978). One razorback sucker was collected near Delta in 1975 (Wilzius 1978) and three were collected in the vicinity in 1981 (Holden et al. 1981). No razorback suckers were collected during sampling by Valdez et al. (1982a) or Burdick (1995).

A stocking program was initiated by the Recovery Program and between April 1994 and October 2001, 18,423 juvenile, sub-adult, and adult razorback suckers were stocked in the Gunnison River and 31,531 juvenile, sub-adult, and adult razorback suckers were stocked in the Colorado River (Burdick 2001a). Razorback suckers were not stocked in the Gunnison River in 2002 or 2003 due to the low water conditions, which increase the chance of fish being lost in the unscreened Redlands Canal. The goal of the stocking program is to establish a self-sustaining population of 600 individuals between Hartland Diversion and Redlands Diversion. In 2001 and 2002, six razorback suckers used the Redlands fish ladder. Razorback suckers did not use the Redlands fish ladder in 2003. In 2002, eight larval razorback suckers were collected in the Gunnison River (Osmundson 2002b). These are the first larval razorbacks suckers collected from the Colorado or Gunnison Rivers and confirm that spawning is taking place in the Gunnison River.

A marked decline in populations of razorback suckers can be attributed to construction of dams and reservoirs, introduction of nonnative fishes, and removal of large quantities of water from the Colorado River system. Dams on the mainstem Colorado River and its major tributaries have segmented the river system, blocking migration routes. Dams also have drastically altered flows, temperatures, and channel geomorphology. These changes have modified habitats in many areas so that they are no longer suitable for breeding, feeding, or sheltering. Major changes in species composition have occurred due to the introduction of numerous nonnative fishes, many of which have thrived due to man-induced changes to the natural riverine system.

Razorback suckers are in imminent danger of extirpation in the wild. The razorback sucker was listed as endangered October 23, 1991 (56 FR 54957). As Bestgen (1990) pointed out:

> "Reasons for decline of most native fishes in the Colorado River Basin have been attributed to habitat loss due to construction of mainstream dams and subsequent interruption or alteration of natural flow and physio-chemical regimes, inundation of river reaches by reservoirs, channelization, water quality degradation, introduction of nonnative fish species and resulting competitive interactions or predation, and other man-induced disturbances (Miller 1961; Joseph et al. 1977; Behnke and Benson 1983; Carlson and Muth 1989; Tyus and Karp 1989). These factors are almost certainly not mutually exclusive; therefore it is often difficult to determine exact cause and effect relationships."

The virtual absence of any recruitment suggests a combination of biological, physical, and/or chemical factors that may be affecting the survival and recruitment of early life stages of razorback suckers. Within the Upper Basin, recovery efforts endorsed by the Recovery Program include the capture and removal of razorback suckers from all known locations for genetic analyses and development of discrete brood stocks if necessary. These measures have been undertaken to develop refugia populations of the razorback sucker from the same genetic parentage as their wild counterparts such that, if these fish are genetically unique by subbasin or individual population, then separate stocks will be available for future augmentation. Such augmentation may be a necessary step to prevent the extinction of razorback suckers in the Upper Basin.

Life History

McAda and Wydoski (1980) and Tyus (1987) reported springtime aggregations of razorback suckers in off-channel habitats and tributaries; such aggregations are believed to be associated with reproductive activities. Tyus and Karp (1990) and Osmundson and Kaeding (1991) reported off-channel habitats to be much warmer than the mainstem river and that razorback suckers presumably moved to these areas for feeding, resting, sexual maturation, spawning, and other activities associated with their reproductive cycle. Prior to construction of large mainstem dams and the suppression of spring-peak flows, low velocity, off-channel habitats (seasonally flooded bottomlands and shorelines) were commonly available throughout the Upper Basin (Tyus and Karp 1989; Osmundson and Kaeding 1991). Dams changed riverine ecosystems into lakes by impounding water, which eliminated these off-channel habitats in reservoirs. Reduction in spring-peak flows eliminates or reduces the frequency of inundation of off-channel habitats. The absence of these seasonally flooded riverine habitats is believed to be a limiting factor in the

successful recruitment of razorback suckers in their native environment (Tyus and Karp 1989; Osmundson and Kaeding 1991). Wydoski and Wick (1998) identified starvation of larval razorback suckers due to low zooplankton densities in the main channel and loss of floodplain habitats which provide adequate zooplankton densities for larval food as one of the most important factors limiting recruitment.

While razorback suckers have never been directly observed spawning in turbid riverine environments within the Upper Basin, captures of ripe specimens, both males and females, have been recorded (Valdez et al. 1982b; McAda and Wydoski 1980; Tyus 1987; Osmundson and Kaeding 1989; Tyus and Karp 1989; Tyus and Karp 1990; Platania 1990; Osmundson and Kaeding 1991) in the Yampa, Green, Colorado, and San Juan Rivers. Sexually mature razorback suckers are generally collected on the ascending limb of the hydrograph from mid-April through June and are associated with coarse gravel substrates (depending on the specific location).

The quantity and frequency of availability of inundated floodplain depressions used by razorback suckers for spawning is dependent on the magnitude and frequency of spring flows necessary to inundate these areas. The decrease in the magnitude and frequency of spring flows necessary to inundate floodplain depressions is believed to be largely responsible for poor razorback sucker spawning success.

Outside of the spawning season, adult razorback suckers occupy a variety of shoreline and main channel habitats including slow runs, shallow to deep pools, backwaters, eddies, and other relatively slow velocity areas associated with sand substrates (Tyus 1987; Tyus and Karp 1989; Osmundson and Kaeding 1989; Valdez and Masslich 1989; Tyus and Karp 1990; Osmundson and Kaeding 1991).

Habitat requirements of young and juvenile razorback suckers in the wild are not well known, particularly in native riverine environments. Prior to 1991, the last confirmed documentation of a razorback sucker juvenile in the Upper Basin was a capture in the Colorado River near Moab, Utah (Taba et al. 1965). In 1991, two early juvenile (36.6 and 39.3 mm TL) razorback suckers were collected in the lower Green River near Hell Roaring Canyon (Gutermuth et al. 1994). Juvenile razorback suckers have been collected in recent years from Old Charley Wash, a wetland adjacent to the Green River (Modde 1996). Between 1992 and 1995 larval razorback suckers were collected in the middle and lower Green River and within the Colorado River inflow to Lake Powell (Muth 1995). No young razorback suckers have been collected in recent times in the Colorado River.

Population Dynamics

Captures of razorback suckers in the upper Colorado River have been so low in recent years that estimating population size is not possible. Presumably, the numbers are very low due to the low capture rates and the extensive habitat modification described above.

Critical Habitat

Critical habitat was designated in 1994 within the 100-year floodplain of the razorback sucker's historical range in the following area of the upper Colorado River (59 FR 13374). The PCEs are the same as critical habitat for Colorado pikeminnow described previously, as is the status of the PCEs. We designated 15 reaches of the Colorado River system as critical habitat for the razorback sucker. These reaches total 1,724 miles as measured along the center line of the river within the subject reaches. The designation represents approximately 49 percent of the historical habitat for the species and includes reaches of the Green, Yampa, Duchesne, Colorado, White, Gunnison. and San Juan Rivers:

Moffat County, Colorado. The Yampa River and its 100-year floodplain from the mouth of Cross Mountain Canyon in T. 6 N., R. 98 W., section 23 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).

Uintah County, Utah; and Moffat County, Colorado. The Green River and its 100-year floodplain from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to Sand Wash in T. 11 S., R. 18 E., section 20 (6th Principal Meridian).

Uintah, Carbon, Grand, Emery, Wayne, and San Juan Counties, Utah. The Green River and its 100-year floodplain from Sand Wash at river mile 96 at T. 11 S., R. 18 E., section 20 (6th Principal Meridian) to the confluence with the Colorado River in T. 30 S., R. 19 E., section 7 (6th Principal Meridian).

Uintah County, Utah. The White River and its 100-year floodplain from the boundary of the Uintah and Ouray Indian Reservation at river mile 18 in T. 9 S., R. 22 E., section 21 (Salt Lake Meridian) to the confluence with the Green River in T. 9 S., R 20 E., section 4 (Salt Lake Meridian).

Uintah County, Utah. The Duchesne River and its 100-year floodplain from river mile 2.5 in T. 4 S., R. 3 E., section 30 (Salt Lake Meridian) to the confluence with the Green River in T. 5 S., R. 3 E., section 5 (Uintah Meridian).

Delta and Mesa Counties, Colorado. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian).

Mesa and Garfield Counties, Colorado. The Colorado River and its 100-year floodplain from Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) including the Gunnison River and its 100-year floodplain from the Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).

Grand, San Juan, Wayne, and Garfield Counties, Utah. The Colorado River and its 100-year floodplain from Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) to full pool elevation, upstream of North Wash, and including the Dirty Devil arm of Lake Powell in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

San Juan County; and Utah, San Juan County, New Mexico. The San Juan River and its 100-year floodplain from the Hogback Diversion in T. 29 N., R. 16 W., section 9 (New Mexico Meridian) to the full pool elevation at the mouth of Neskahai Canyon on the San Juan arm of Lake Powell in T. 41 S., R. 11 E., section 26 (Salt Lake Meridian).

SPECIES/CRITICAL HABITAT LIKELY TO BE AFFECTED

The razor back sucker and its critical habitat, as described below, are likely to be adversely affected by the subject Project:

Mesa and Garfield Counties, Colorado. The Colorado River and its 100-year floodplain from Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) including the Gunnison River and its 100-year floodplain from the Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).

Delta and Mesa Counties, Colorado. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian). The subject Project occurs within this reach of critical habitat.

Grand, San Juan, Wayne, and Garfield Counties, Utah. The Colorado River and its 100-year floodplain from Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) to full pool elevation, upstream of North Wash, and including the Dirty Devil arm of Lake Powell in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

HUMPBACK CHUB

Species Description

The humpback chub is a medium-sized freshwater fish (less than 500 mm) of the minnow family. The adults have a pronounced dorsal hump, a narrow flattened head, a fleshy snout with an inferior-subterminal mouth, and small eyes. It has silvery sides with a brown or olive colored back.

The humpback chub is endemic to the Colorado River Basin and is part of a native fish fauna traced to the Miocene epoch in fossil records (Miller 1946; Minckley et al. 1986). Humpback chub remains have been dated to about 4000 B.C., but the fish was not described as a species until the 1940s (Miller 1946), presumably because of its restricted distribution in remote white water canyons (USFWS 1990b). Because of this, its original distribution is not known. The humpback chub was listed as endangered on March 11, 1967.

Status and Distribution

Until the 1950s, the humpback chub was known only from Grand Canyon. During surveys in the 1950s and 1960s humpback chub were found in the upper Green River including specimens from Echo Park, Island Park, and Swallow Canyon (Smith 1960; Vanicek et al. 1970). Individuals also were reported from the lower Yampa River (Holden and Stalnaker 1975), the White River in Utah (Sigler and Miller 1963), Desolation Canyon of the Green River (Holden and Stalnaker 1970), and the Colorado River near Moab (Sigler and Miller 1963).

Today the largest populations of this species occur in the Little Colorado and Colorado Rivers in the Grand Canyon, and in Black Rocks and Westwater Canyon in the upper Colorado River. Other populations have been reported in De Beque Canyon of the Colorado River, Desolation and Gray Canyons of the Green River, Yampa and Whirlpool Canyons in Dinosaur National Monument (USFWS 1990b). One individual was recently captured in the Gunnison River in a canyon-bound reach at river mile 22 (Burdick 1995).

In general, the existing habitat has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

Life History

Humpback chubs spawn soon after the highest spring flows when water temperatures approach 20°F (Kaeding et al. 1990; Karp and Tyus 1990; USFWS 1990b). The collection of ripe and spent fish indicated that spawning occurred in Black Rocks during June 2-15, 1980, at water temperatures of 11.5 to 16°C; in 1981, spawning occurred May 15-25, at water temperatures of 16 to 16.3°C (Valdez et al. 1982b). Humpback chub spawned in Black Rocks on the Colorado River in 1983 when maximum daily water temperatures were 12.6 to 17°C (Archer et al. 1985). In the Grand Canyon, humpback chub spawn in the spring between March and May in the Little Colorado River when water temperatures are between 16 and 22°C. Swimming abilities of young-of-the-year humpback chub were determined to be significantly reduced when laboratory water temperatures were reduced from 20 to 14°C. Many young-of-year humpback chub are displaced from the Little Colorado River into the mainstem by monsoonal floods from July through September (Valdez and Ryel 1995). Young humpback chub are found in low velocity shorelines and backwaters. Survival rates are extremely low and believed to be less than 1 in 1,000 to 2 years of age. Low water temperatures and predation are believed to be the primary factors. Valdez and Ryel (1995) estimated that 250,000 young humpback chub are consumed annually by brown trout, rainbow trout, and channel catfish.

Backwaters, eddies, and runs have been reported as common capture locations for young-of-year humpback chub (Valdez and Clemmer 1982). These data indicate that in Black Rocks and Westwater Canyon, young utilize shallow areas. Habitat suitability index curves developed by Valdez et al. (1990) indicate young-of-year prefer average depths of 2.1 feet with a maximum of 5.1 feet. Average velocities were reported at 0.2 feet per second.

Population Dynamics

The number of humpback in the Gunnison River is so low that it is not possible to do a population estimate.

Critical Habitat

Critical habitat was designated in 1994 within humpback chub historical range in the following sections of the upper Colorado River (59 FR 13374). The PCEs are the same as those described for the Colorado pikeminnow, as is the status of the PCEs. We designated seven reaches of the Colorado River system for a total of 379 miles as measured along the center line of the subject reaches. The designation represents approximately 28 percent of the historical habitat of the species and includes reaches in the Colorado, Green, and Yampa Rivers in the Upper Basin:

> Moffat County, Colorado. The Yampa River from the boundary of Dinosaur National Monument in T. 6 N., R. 99 W., section 27 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).
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> Uintah County; and Colorado, Moffat County, Utah. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the southern boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).
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> Uintah and Grand Counties, Utah. The Green River (Desolation and Gray Canyons) from Sumner's Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).
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> Grand County; and Colorado, Mesa County, Utah. The Colorado River from Black Rocks in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).
>
> Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

SPECIES/CRITICAL HABITAT LIKELY TO BE AFFECTED

The humpback chub and its critical habitat, as described below, are likely to be adversely affected by the subject Project. Although the Project depletion does not occur within the designated critical habitat for the humpback chub, the depletion would adversely affect critical habitat by reducing the amount of water flowing into designated critical habitat:

> Grand County, Utah; and Mesa County, Colorado. The Colorado River from Black Rocks in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).
>
> Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

BONYTAIL

Species Description
Bonytail are medium-sized (less than 600 mm) fish in the minnow family. Adult bonytail are gray or olive colored on the back with silvery sides and a white belly. The adult bonytail has an elongated body with a long, thin caudal peduncle.

Status and Distribution
The bonytail is the rarest native fish in the Colorado River. It was listed as endangered on April 23, 1980. Formerly reported as widespread and abundant in mainstem rivers (Jordan and Evermann 1896), its populations have been greatly reduced. The fish is presently represented in the wild by a low number of old adult fish in Lake Mohave and perhaps other lower basin reservoirs (USFWS 1990a). The last known riverine area where bonytail were common was the Green River in Dinosaur National Monument, where Vanicek (1967) and Holden and Stalnaker (1970) collected 91 specimens during 1962-1966. From 1977 to 1983, no bonytail were collected from the Colorado or Gunnison Rivers in Colorado or Utah (Wick et al. 1979, 1981; Valdez et al. 1982b; Miller et al. 1984). However, in 1984, a single bonytail was collected from Black Rocks on the Colorado River (Kaeding et al. 1986). Several suspected bonytail were captured in Cataract Canyon in 1985-1987 (Valdez 1990). In 2003 one formerly stocked bonytail was captured in the Redlands fish ladder and released upstream. This is the first record of a bonytail in the Gunnison River.

The existing habitat has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

Life History
The bonytail is considered a species that is adapted to mainstem rivers, where it has been observed in pools and eddies (Vanicek 1967; Minckley 1973). Spawning of bonytail has never been observed in a river, but ripe fish were collected in Dinosaur National Monument during late June and early July suggesting that spawning occurred at water temperatures of about 18°C (Vanicek and Kramer 1969).

Population Dynamics
The number of bonytail in the upper Colorado River and its tributaries is so low that it is not possible to do a population estimate.

Critical Habitat

Critical habitat was designated in 1994 within the bonytail's historical range in the following sections of the upper Colorado River (59 FR 13374). The PCEs are the same as those described for the Colorado pikeminnow, as is the status of the PCEs. We designated seven reaches of the Colorado River system as critical habitat for the bonytail chub. These reaches total 312 miles as measured along the center line of the subject reaches, representing approximately 14 percent of the historical habitat of the species. Critical habitat includes portions of the Colorado, Green, and Yampa Rivers in the Upper Basin:

Moffat County, Colorado. The Yampa River from the boundary of Dinosaur National Monument in T. 6 N., R. 99 W., section 27 (6th Principal Meridian) to the confluence with the Green River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian).

Uintah County; and Colorado, Moffat County, Utah. The Green River from the confluence with the Yampa River in T. 7 N., R. 103 W., section 28 (6th Principal Meridian) to the boundary of Dinosaur National Monument in T. 6 N., R. 24 E., section 30 (Salt Lake Meridian).

Uintah and Grand Counties, Utah. The Green River (Desolation and Gray Canyons) from Sumner's Amphitheater in T. 12 S., R. 18 E., section 5 (Salt Lake Meridian) to Swasey's Rapid (river mile 12) in T. 20 S., R. 16 E., section 3 (Salt Lake Meridian).

Grand County, Utah; and Mesa County, Colorado. The Colorado River from Black Rocks (river mile 137) in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).

Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

SPECIES/CRITICAL HABITAT LIKELY TO BE AFFECTED

The bonytail and its critical habitat, as described below, are likely to be adversely affected by the subject Project. Although the Project depletion does not occur within the designated critical habitat for the bonytail, the depletion would adversely affect critical habitat by reducing the amount of water flowing into designated critical habitat.

Grand County, Utah; and Mesa County, Colorado. The Colorado River from Black Rocks (river mile 137) in T. 10 S., R. 104 W., section 25 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).

Garfield and San Juan Counties, Utah. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

ENVIRONMENTAL BASELINE

The environmental baseline includes the past and present impacts of all Federal, State, and private actions and other human activities in the action area; the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal section 7 consultation; and the impact of State or private actions contemporaneous with the consultation process.

In formulating this opinion, the USFWS considered adverse and beneficial effects likely to result from cumulative effects of future State and private activities that are reasonably certain to occur within the Project area, along with the direct and indirect effects of the Project and impacts from actions that are part of the environmental baseline (50 CFR 402.02 and 402.14 (g)(3)).

Because of the widespread effects of the Project on downstream areas and the large size of the action area, the environmental baseline for the four listed fish is roughly the same as the status as described above. Therefore, we are not repeating that information in this section.

FACTORS AFFECTING THE SPECIES ENVIRONMENT WITHIN THE ACTION AREA

The action area includes critical habitat for Colorado pikeminnow and razorback sucker on the Gunnison River from the confluence of the Uncompahgre River to the confluence of the Colorado River and downstream from the confluence on the Colorado River to Lake Powell. Several segments of the Colorado River in Ruby Canyon (Black Rocks) and Westwater Canyon are critical habitat for humpback chub and bonytail.

Critical Habitat - Gunnison River

Critical habitat on the Gunnison River historically experienced high spring turbid flows and low flows throughout the rest of the year. High spring flows create and maintain the braided channels that provide a variety of important habitats (Osmundson and Kaeding 1989; Osmundson and Kaeding 1991). Water depletions began in the Gunnison River basin with private irrigation in the 1880s (Maddux et al. 1993). The Redlands Diversion Dam was built on the lower Gunnison River 3 miles upstream of the Colorado River in 1918 and blocked upstream fish movement until a fish ladder was constructed in 1996. The dam can divert up to 750 cfs and can dry up the Gunnison River below the dam during extremely low-flow periods. Major water projects upstream of critical habitat include the Gunnison Tunnel, Taylor Park Reservoir, Ridgeway Reservoir, Crawford Reservoir, Paonia Reservoir, Fruitgrowers Reservoir, and the Aspinall Unit (Blue Mesa Reservoir, Morrow Point Reservoir, and Crystal Reservoir). Releases from Crystal Reservoir control majority of the flows on the Gunnison River through critical habitat.

The Gunnison River in critical habitat flows mostly through sedimentary canyons. Floodplains occur in approximately 25 percent of the critical habitat reach (Maddux et al. 1993). The most extensive floodplains occur near the City of Delta downstream to Roubideau Creek. This reach has the greatest number of complex channel habitats. Numerous braided channels and several large vegetated islands with riffles, runs and backwaters occur in this reach. In the canyon reaches floodplains are limited and several historical floodplains are now fruit orchards and gravel pits.

Primary Constituent Element - Water

The quantity of water in the Gunnison River has been reduced by water development projects. Flows regimes have been alter significantly, especially by the Aspinall Unit which stores water during high spring flows and releases water during low flow periods. Water temperatures have been reduced from historic temperatures by a maximum of 4°F in critical habitat, which may affect maturation of adult fish or spawning success (McAda and Kaeding 1991).

Elevated selenium concentrations associated with irrigation drainwater were found in the Gunnison River during National Irrigation Water Quality Program (NIWQP) investigations (Butler et al. 1991, 1994, 1996; Butler and Osmundson 2000). These elevated selenium concentrations still occur in water, sediment, and biota, and continue to pose a risk to fish (including endangered fish) and aquatic dependent wildlife. The Gunnison River between Delta and Grand Junction, plus associated tributaries appear on the State of Colorado's 303(d) list of impaired waters because of selenium.

Primary Constituent Element - Physical Habitat

The Gunnison River provides a variety of habitats (floodplains, side channels, secondary channels, and backwaters) important for Colorado pikeminnow and razorback sucker spawning, nursery habitat, feeding, and rearing (Maddux et al. 1993). Current flow regimes are not adequate to maintain or restore these habitats. The USFWS has developed flow recommendations to benefit endangered fish in the Gunnison and Colorado Rivers (McAda 2003). Recommendations will be implemented by re-operation of the Aspinall Unit. The Bureau is currently preparing an Environmental Impact Statement to operate the Aspinall Unit to provide flows for endangered fishes and their critical habitats.

Primary Constituent Element - Biological Environment

The large-bodied fish community in the Gunnison River is comprised predominantly of native fishes compared to the Colorado River fish community, which is predominantly nonnative fishes (Burdick 1995). The Redlands Diversion Dam has blocked migration of nonnative fishes from the Colorado River into the Gunnison River. In 2 years of extensive sampling, only one channel catfish was captured in the Gunnison River (Burdick 1995). Northern pike are known to occur in two upstream reservoirs (Paonia and Crawford) and were occasionally captured on the Gunnison River (Burdick 1995), but the population has been reduced in the Gunnison River with mechanical removal (McAda 1997). The small-bodied fish community in the Gunnison River is comprised predominantly of nonnative fishes (e.g., red shiners, sand shiners, fathead minnows) (Burdick 1995).

Critical Habitat - Colorado River from Gunnison River Confluence to Lake Powell

Historically, the Colorado River produced high spring turbid flows that maintained critical habitat by inundating floodplains, maintaining side channels, and creating backwaters. The Colorado River below the confluence with the Gunnison River flows approximately 18 miles through the Grand Valley. In the Grand Valley reach, numerous gravel pit ponds occupy the

floodplain and many of the river banks have been armored with riprap. The river channel is braided around vegetated gravel islands and the habitat consists of runs, riffles, eddies, backwaters, and side channels.

The Colorado River downstream of the Grand Valley flows through 29 miles of Horsethief and Ruby Canyons with limited floodplain areas and shear sandstone walls. Black Rocks is a mile-long reach of river that flows through a geologic upthrust of metamorphic gneiss that confines the river creating a deep channel with strong eddies and turbulent currents. Five miles downstream, the river flows through Westwater Canyon for 14 miles. Westwater Canyon also is formed by an upthrust of black rock that creates unique habitat conditions similar to Black Rocks but with significant whitewater rapids. This reach encompasses critical habitat for humpback chub and bonytail from upstream of Black Rocks to below Westwater Canyon. Below Westwater Canyon the river flows through shallow canyons and open valleys and then through steep sandstone canyons above and below Moab.

Habitats are comprised of deep runs and pools with several rapids formed by side canyons. Many backwaters with sand/silt substrate occur between Moab and the confluence with the Green River during low flow periods (Valdez et al. 1982b). Between the confluence with the Green River and Lake Powell the Colorado River flows through Cataract Canyon where the river has deep swift runs, major rapids, large eddies, and pools. Lake Powell now inundates the lower end of Cataract Canyon where there is a transition zone between riverine and lacustrine habitat.

Primary Constituent Element - Water

Like the Gunnison River, the quantity of water in the Colorado River has been reduced by water development projects. Any water depletions in the Gunnison River will adversely affect the Colorado River critical habitat below the confluence. Flows regimes have been altered significantly in the Colorado River, in addition to the alteration caused by the Aspinall Unit, flow in the Colorado River has been altered by numerous upstream reservoirs and water projects, many of which transport large volumes of water out of the Colorado River basin.

Elevated selenium concentrations associated with irrigation drainwater were found in the Colorado River during NIWQP investigations (Butler et al. 1994, 1996; Butler and Osmundson 2000). These elevated selenium concentrations still occur in water, sediment, and biota, and continue to pose a risk to this PCE. The Colorado River below the confluence with the Gunnison to the State line and associated tributaries appear on the State of Colorado's 303(d) list of impaired waters because of selenium. Studies show that selenium concentrations in water and fish tissue are related to flows; the lower the flows the higher the selenium concentrations (Osmundson et al. 2000).

Primary Constituent Element - Physical Habitat

Westwater and Cataract canyons provide movement and migration corridors between the other relatively flat water habitats. Floodplain habitats between the canyons provide warm water, low velocity, feeding and nursery habitats. Many backwaters between Westwater Canyon and Lake Powell provide nursery habitat. The USFWS has developed flow recommendations for the

Colorado River below the confluence with the Gunnison River (Mcada 2003) designed to maintain spawning and backwater habitat. Under current conditions these flows occur only in naturally wet years.

PRIMARY CONSTITUENT ELEMENT - BIOLOGICAL ENVIRONMENT

This PCE is impaired by the presence of nonnative fishes common in this reach of the Colorado River. Nonnative fishes occupy the same backwaters that are very important for young Colorado pikeminnow and razorback sucker. Largemouth bass (*Micropterus salmoides*) and green sunfish (*Lepomis cyanella*) are the most common large-bodied fishes that occupy backwater habitats year-round (Osmundson 2003). The three most common small-bodies fishes found in backwaters are fathead minnow, sand shiner, and red shiner, comprising 80 to 100 percent of the fish found in Colorado River backwaters (McAda).

The critical habitat units with in the action area (the Gunnison River from the City of Delta to the confluence with the Colorado River and the Colorado River below the Gunnison River confluence to Lake Powell) have been identified in the recovery goals for each of the four endangered fish species (USFWS 2002 a, b, c, d) as essential for the conservation of the species. Critical habitat in the action area represents approximately 25 percent of the total critical habitat for Colorado pikeminnow. Colorado pikeminnow is a wide ranging species sometimes migrating extensive distances to carry out life history functions. The action area also encompasses a large area of razorback sucker critical habitat. Natural reproduction of razorback sucker is very rare, but it has been documented within critical habitat on the Gunnison River. Critical habitat for humpback chub and bonytail are limited to shorter reaches of the Colorado River within critical habitat for Colorado pikeminnow and razorback sucker. These shorter reaches include unique habitats required for humpback chub and bonytail that are found in only a few other places in the Colorado River basin.

EFFECTS OF THE ACTION

Effects to Endangered Species

The Project would adversely affect Colorado pikeminnow, razorback sucker, bonytail, and humpback chub by reducing the amount of water in the river system upon which they depend by up to 242 af/year. The effects to all four species primarily result from the effects of the action upon their habitats. In general, the proposed action would adversely affect the four listed fish by reducing the amount of water available to them, increasing the likelihood of water quality issues, increasing their vulnerability to predation, and reducing their breeding opportunities by shrinking the amount of breeding habitat within their range.

Removing 242 af of water per year from the Gunnison and Colorado Rivers would change the natural hydrological regime that creates and maintains important fish habitats, such as spawning habitats, and reduces the frequency and duration of availability of these habitats of the four endangered fish. The reduction of available habitats will directly affect individuals of all four species by decreasing reproductive potential and foraging and sheltering opportunities. Many of the habitats required for breeding become severely diminished when flows are reduced. As a result, individual fish within the action area may not be able to find a place to breed, or will

deposit eggs in less than optimal habitats more prone to failure or predation. In addition, reduction in flow rates lessens the ability of the river to inundate bottomland, a source of nutrient supply for fish productivity. Water depletions also exacerbate competition and predation by nonnative fishes by altering flow and temperature regimes that favor nonnatives.

The proposed depletion would affect the water quality in the action area by increasing concentrations of heavy metals, selenium, salts, pesticides, and other contaminants. Increases in water depletions will cause associated reductions in assimilative capacity and dilution potential for any contaminants that enter the Gunnison and Colorado Rivers. The Project's depletion would cause a proportionate decrease in dilution, which in turn would cause a proportionate increase in heavy metal, selenium, salts, pesticides, and other contaminant concentrations in the North Fork and Gunnison Rivers, as well as the Colorado River to Lake Powell. An increase in contaminant concentrations in the river would likely result in an increase in the bioaccumulation of these contaminants in the food chain which could adversely affect the endangered fishes, particularly the predatory Colorado pikeminnow. Selenium is of particular concern due to its effects on fish reproduction and its tendency to concentrate in low velocity areas that are important habitats for Colorado pikeminnow and razorback suckers.

The proposed Project would adversely affect the four listed fish by resulting in a reduction of water and concomitant effects to habitat. This reduction would contribute to the cumulative reduction in high spring flows, which are essential for creating and maintaining complex channel geomorphology and suitable spawning substrates, creating and providing access to off-channel habitats, and possibly stimulating Colorado pikeminnow spawning migrations. Adequate summer and winter flows are important for providing a sufficient quantity of preferred habitats for a duration and at a frequency necessary to support all life stages of viable populations of all endangered fishes. To the extent that the Project will reduce flows, the ability of the river to provide these functions will be reduced. This reduction of water affects habitat availability and habitat quality.

To the extent that it would reduce flows and contribute to further habitat alteration, the Project would contribute to an increase in nonnative fish populations. The modification of flow regimes, water temperatures, sediment levels, and other habitat conditions caused by water depletions has contributed to the establishment of nonnative fishes. Endangered fishes within the action area would experience increased competition and predation as a result.

Effects to Critical Habitat

All four of the listed Colorado River fish require the same PCEs essential for their survival. Therefore, we are combining our analysis of all four species into one section. Because the amount of designated critical habitat varies for each of the four species, the amount of habitat will vary; however, the effects would be the same for all critical habitat within the action area.

Water, physical habitat, and the biological environment are the PCEs of critical habitat. This includes a quantity of water of sufficient quality that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in spawning and feeding, as a nursery, or serve as corridors between these

areas. In addition, oxbows, backwaters, and other areas in the 100-year floodplain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats. Food supply, predation, and competition are important elements of the biological environment.

PRIMARY CONSTITUENT ELEMENT - WATER

The Project would deplete up to 242 af of water per year from the Colorado River Basin. Removing water from the river system changes the natural hydrological regime that creates and maintains important fish habitats, such as spawning habitats, and reduces the frequency and duration of availability of these habitats of the four endangered fish. In addition, reduction in flow rates lessens the ability of the river to inundate bottomland, a source of nutrient supply for fish productivity and important nursery habitat for razorback sucker. Water depletions change flow and temperature regimes that favor nonnative fish adding to competition and predation by these nonnative fishes as discussed above.

Changes in water quantity would affect water quality, which is a PCE of critical habitat. Contaminants enter the Colorado River from various point and non-point sources, resulting in increased concentrations of heavy metals, selenium, salts, pesticides, and other contaminants. Increases in water depletions will cause associated reductions in assimilative capacity and dilution potential for any contaminants that enter critical habitat in the Gunnison and Colorado Rivers.

The Project's depletion would cause a proportionate decrease in dilution, which in turn would cause a proportionate increase in heavy metal, selenium, salts, pesticides, and other contaminant concentrations in the North Fork and Gunnison Rivers, as well as the Colorado River to Lake Powell. An increase in contaminant concentrations in the river would likely result in an increase in the bioaccumulation of these contaminants in the food chain which could adversely affect the endangered fishes, particularly the predatory Colorado pikeminnow. Selenium is of particular concern due to its effects on fish reproduction and its tendency to concentrate in low velocity areas that are important habitats for Colorado pikeminnow and razorback suckers.

PRIMARY CONSTITUENT ELEMENT - PHYSICAL HABITAT

The proposed Project would affect the physical condition of habitat for the four listed fish by resulting in a reduction of water. This reduction would contribute to the cumulative reduction in high spring flows, which are essential for creating and maintaining complex channel geomorphology and suitable spawning substrates, creating and providing access to off-channel habitats, and possibly stimulating Colorado pikeminnow spawning migrations. Adequate summer and winter flows are important for providing a sufficient quantity of preferred habitats for a duration and at a frequency necessary to support all life stages of viable populations of all endangered fishes. To the extent that the Project will reduce flows, the ability of the river to provide these functions will be reduced. This reduction of water affects habitat availability and habitat quality.

PRIMARY CONSTITUENT ELEMENT - BIOLOGICAL ENVIRONMENT

To the extent that it would reduce flows and contribute to further habitat alteration, the Project would contribute to an increase in nonnative fish populations. The modification of flow regimes, water temperatures, sediment levels, and other habitat conditions caused by water depletions has contributed to the establishment of nonnative fishes. Endangered fishes within the action area would experience increased competition and predation as a result.

CUMMULATIVE EFFECTS

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The USFWS is not aware of any future non-Federal actions not included in this action under consultation that are reasonably certain to occur in the action area.

CONCLUSION

Based upon the best scientific and commercial information that is currently available, it is the USFWS's biological opinion that the water depletions associated with OMC operations and the Town of Somerset residential use, as described herein, are likely to jeopardize the continued existence of the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker because the listed fish are harmed from the reduction of water in their habitats resulting from the Project in the following manner:

1) individuals using habitats diminished by the proposed water depletions could be more susceptible to predation and competition from non-native fish;

2) individuals may be unable to breed because reduced flows would impact habitat formulation and maintenance.

Based upon the best scientific and commercial information that is currently available, it is the USFWS's biological opinion that the water depletions associated with OMC operations and the Town of Somerset residential use, as described herein, are likely to result in adverse modification of critical habitat for the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker because the PCEs and the functioning of the critical habitat units would be altered in the following manner:

1) Water, a PCE, would be affected by further reducing the flows in critical habitat that are needed for endangered fishes breeding, feeding and sheltering. Reduction in flows also would affect water quality by reducing dilution of contaminants.

2) Physical habitat, a PCE, would be affected by reduction in flows by reducing important habitat such as spawning bars, backwaters, and inundated floodplains.

3) Biological environment, a PCE, would be affected by the increase in nonnative fishes due to altered flow regimes.

The USFWS has developed a reasonable and prudent alternative to avoid the likelihood of jeopardy to the endangered fishes and destruction or adverse modification of their critical habitat.

REASONABLE AND PRUDENT ALTERNATIVE

Regulations (50 CFR 402.02) implementing section 7 of the ESA define reasonable and prudent alternatives as alternative actions, identified during formal consultation, that--1) can be implemented in a manner consistent with the intended purpose of the action; 2) can be implemented consistent with the scope of the action agency's legal authority and jurisdiction; 3) are economically and technologically feasible; and 4) would, the USFWS believes, avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.

On January 21-22, 1988, the Secretary of the Department of the Interior; the Governors of Wyoming, Colorado, and Utah; and the Administrator of the Western Area Power Administration were cosigners of a Cooperative Agreement to implement the "Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin" (USFWS 1987). In 2001, the Recovery Program was extended until September 30, 2013. An objective of the Recovery Program was to recover the listed species while providing for new water development in the Upper Basin.

In order to further define and clarify processes outlined in sections 4.1.5, 4.1.6, and 5.3.4 of the Recovery Program, a section 7 Agreement (Agreement) and a Recovery Implementation Program Recovery Action Plan (Plan) was developed (USFWS 1993). The Agreement establishes a framework for conducting all future section 7 consultations on depletion impacts related to new projects and all impacts associated with historic projects in the Upper Basin. Procedures outlined in the Agreement will be used to determine if sufficient progress is being accomplished in the recovery of the endangered fishes to enable the Recovery Program to serve as a reasonable and prudent alternative to avoid jeopardy. The Plan was finalized on October 15, 1993, and has been reviewed and updated annually.

In accordance with the Agreement, the USFWS assesses the impacts of projects that require section 7 consultation and determine if progress toward recovery has been sufficient for the Recovery Program to serve as a reasonable and prudent alternative. If sufficient progress is being achieved, biological opinions are written to identify activities and accomplishments of the Recovery Program that support it as a reasonable and prudent alternative. If sufficient progress in the recovery of the endangered fishes has not been achieved by the Recovery Program, actions from the Plan are identified which must be completed to avoid jeopardy to the endangered fishes. For historic projects, these actions serve as the reasonable and prudent alternative as long as they are completed according to the schedule identified in the Plan. For new projects, these actions serve as the reasonable and prudent alternative so long as they are completed before the impact of the Project occurs.

In determining if sufficient progress has been achieved, the USFWS considers--a) actions which result in a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction; b) status of fish populations; c) adequacy of flows; and, d) magnitude of the Project impact. In addition, the USFWS considers support activities (funding, research, information, and education, etc.) of the Recovery Program if they help achieve a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction. The USFWS evaluates progress separately for the Colorado River and Green River subbasins; however, it gives due consideration to progress throughout the Upper Basin in evaluating progress toward recovery.

The following excerpts summarize portions of the Recovery Program that address depletion impacts, section 7 consultation, and Project proponent responsibilities:

> "All future section 7 consultations completed after approval and implementation of this program (establishment of the Implementation Committee, provision of congressional funding, and initiation of the elements) will result in a one-time contribution to be paid to the Service by water project proponents in the amount of $10.00 per acre-foot based on the average annual depletion of the project . . . This figure will be adjusted annually for inflation [the current figure is $16.30 per acre-foot] . . . Concurrently with the completion of the Federal action which initiated the consultation, e.g., . . . issuance of a 404 permit, 10 percent of the total contribution will be provided. The balance . . . will be . . . due at the time the construction commences . . . ."

It is important to note that these provisions of the Recovery Program were based on appropriate legal protection of the instream flow needs of the endangered Colorado River fishes. The Recovery Program further states:

> ". . . it is necessary to protect and manage sufficient habitat to support self-sustaining populations of these species. One way to accomplish this is to provide long term protection of the habitat by acquiring or appropriating water rights to ensure instream flows. Since this program sets in place a mechanism and a commitment to assure that the instream flows are protected under State law, the Service will consider these elements under section 7 consultation as offsetting project depletion impacts."

Thus, the USFWS has determined that depletion impacts, which the USFWS has consistently maintained are likely to jeopardize the listed fishes, can be offset by--a) the water Project proponent's one-time contribution to the Recovery Program in the amount of $16.30 per acre-foot of the Project's average annual depletion; b) appropriate legal protection of instream flows pursuant to State law; and, c) accomplishment of activities necessary to recover the endangered fishes as specified under the Plan. The USFWS believes it is essential that protection of instream flows proceed expeditiously, before significant additional water depletions occur.

New Depletion

The USFWS has determined that, because the Project's average annual new depletion of 242 af is below the current sufficient progress threshold of 4,500 af, and because sufficient progress is being achieved, the Recovery Program can serve as the reasonable and prudent alternative to avoid jeopardy to the Colorado pikeminnow, razorback sucker, humpback chub, and bonytail and destruction or adverse modification of critical habitat caused by the Project's new depletion.

With respect to the depletion charge described above, the proposed water contract from Blue Mesa Reservoir is a Bureau Project, and the Bureau has agreed to contribute $1.5 million annually to the Recovery Program. Because of this ongoing contribution and the commitment by the Upper Colorado River Region of the Bureau to operate upper basin projects under its control to provide instream flows for the endangered fishes as identified by the Recovery Program, no contribution for existing or future Bureau projects will be collected as part of the section 7 consultation process. Therefore, no contribution is necessary for the 242 af depletion resulting from the proposed action

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury of listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the USFWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7 (o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Colorado pikeminnow, humpback chub, bonytail, and razorback sucker are harmed from the reduction of water in their habitats resulting from the Project in the following manner--
1) individuals using habitats diminished by the proposed water depletions could be more susceptible to predation and competition from non-native fish; 2) habitat conditions may be rendered unsuitable for breeding because reduced flows would impact habitat formulation and maintenance as described in the biological opinion.

Estimating the number of individuals of these species that would be taken as a result of water depletions is difficult to quantify for the following reasons--(1) determining whether an individual forwent breeding as a result of water depletions versus natural causes would be extremely difficult to determine; (2) finding a dead or injured listed fish would be difficult, due to the large size of the Project area and because carcasses are subject to scavenging; (3) natural fluctuations in river flows and species abundance may mask Project effects, and (4) effects that

reduce fecundity are difficult to quantify. Estimating the number of individuals of the four listed fishes that could be taken by the water depletions addressed in this biological opinion is not possible. However, the implementation of the Recovery Program is intended to minimize impacts of water depletions and, therefore, the reasonable and prudent alternatives outlined in the biological opinion will also serve as reasonable and prudent measures for minimizing the take that results from the 242 af/year water depletion. Any amount of water withdrawal above this level would exceed the anticipated level of incidental take.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if--1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

Thank you for your cooperation in the formulation of this biological opinion and your interest in conserving endangered species.

Elliott Sveta