
San Juan Power Plant
San Juan River
Morgan Lake
Four Corners Power Plant
Navajo Nation
Chaco River

Appendix G

APPENDIX G

Biological Assessment and Evaluation

BIOLOGICAL ASSESSMENT

FOR THE PROPOSED

DESERT ROCK ENERGY PROJECT

PREPARED FOR:

BUREAU OF INDIAN AFFAIRS
NAVAJO AREA OFFICE
GALLUP, NEW MEXICO

AND

U.S. FISH AND WILDLIFE SERVICE
ALBUQUERQUE ECOLOGICAL SERVICES FIELD OFFICE
ALBUQUERQUE, NEW MEXICO

PREPARED BY:

ECOSPHERE ENVIRONMENTAL SERVICES
4801 N. BUTLER SUITE 15101
FARMINGTON, NEW MEXICO 87401
2257 MAIN AVE., PATIO LEVEL
DURANGO, COLORADO 81301

APRIL 2007

TABLE OF CONTENTS

1.0 **Introduction** 1
2.0 Description of Proposed Action 1
2.1 Power Plant 1
2.2 Access Road 4
2.3 Transmission Lines 4
2.4 Water Well Field 5
3.0 General Mitigation Measures 6
4.0 **Description of the Analysis Area** 8
4.1 Physical Characteristics of the Analysis Area 8
4.1.1 Climate 8
4.1.2 Topography 9
4.1.3 Geology 9
4.1.4 Soils 9
4.1.5 Water Resources 9
4.2 Biological Characteristics of the Analysis Area 11
4.2.1 Vegetation 11
4.2.2 Wildlife 13
5.0 **Description of Listed Species and Designated Critical Habitats** 13
5.1 ESA Listed Species With Potential to Occur in the Analysis Area 14
5.2 ESA Listed Species Eliminated From Detailed Evaluation 14
5.3 Designated Critical Habitat in the Analysis Area 15
5.3.1 Colorado Pikeminnow 15
5.3.2 Razorback Sucker 15
6.0 **Effects of the Proposed Action** 16
6.1 Evaluating Risk of Particulates to Plants, Soil Invertebrates and Wildlife 16
6.1.1 Screening 17
6.1.2 Risk-based Assessment 17
6.1.3 Risk Estimates 20
6.1.4 Risk Estimate Results 21
6.2 Air Quality Effects 22
6.3 Water Quality Effects 27
6.3.1 Surface Water Quality 27
6.3.2 Ground Water Effects 31
6.4 Infrastructure Related Effects 32
6.5 Effects to Raptors and Migratory Birds 35
6.6 Federally Listed Species Effects 36
7.0 Summary of Determinations of Effect 52
7.1 Determinations of Effects for ESA Listed Species 52
7.2 Cumulative Effects 53
9**.0 Literature Cited and References** 57

APPENDICES

Appendix A Regulatory Agency Correspondence
USFWS Communications……....A-1
NNHP Communications…….……..A-2

Appendix B Biological Evaluation……..……..B-1

Appendix C Ecological Risk Assessment (excerpt)……..C-1

LIST OF TABLES

Table 3-1. Maximum Projected Disturbance in Acres to Vegetation Communities for the Proposed Action. Desert Rock Energy Project 2007. 12

Table 4-1. Species listed by the USFWS under the authority of the ESA with Potential to Occur in San Juan County, New Mexico, but Eliminated from Further Analysis. 14

Table 5-1 Risk Estimate Results in Hazard Quotients (HQs) for Plants and Soil Invertebrates. Desert Rock Energy Project. 21

Table 5-2 Risk Estimate Results in Hazard Quotients (HQs) for Plants and Soil Invertebrates. Desert Rock Energy Project. 21

Table 5-3. Summary of Maximum Potential Criteria Pollutant Emissions in Tons Per Year (typ) from Proposed Desert Rock Energy Project Power Plant (URS 2007) 24

Table 5-4. Estimated Emission Rates in Pounds per Ton (lb/ton) and Grams per Second (g/s) for Selected Air Toxics from the Proposed Desert Rock Energy Project Power Plant. (URS 2007). 25

Table 5-5. Modeled Concentrations and Deposition Rates for Selected Air Toxics (2003) (URS 2007) 28

Table 6-1. Summary of the Preliminary Determinations of Effect on Federally Listed Species. 52

LIST OF FIGURES

Figure 1. Desert Rock Energy Project proposed action. 3
Figure 2. Transmission Line proposed San Juan River crossing, looking across U.S. Highway 64 onto the floodplain. 10

1.0 Introduction

The purpose of this Biological Assessment (BA) is to provide information about the potential environmental effects that development of the Desert Rock Energy, LLC proposed Desert Rock Energy Project would have on federally endangered, threatened, and candidate species. Threatened and endangered (T&E) species are managed under the authority of the Endangered Species Act (ESA) of 1973 (PL 93-205, as amended). The ESA requires federal agencies to ensure that all actions which they authorize, fund, or carry out are not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of their critical habitat.

This BA is the means to review, analyze, and document the direct, indirect, interrelated, interdependent and cumulative effects on federally listed endangered, threatened, or candidate species, and critical habitats thereof as a result of development of the proposed Desert Rock Energy Project.

This BA is intended to review the proposed action in sufficient detail to evaluate whether implementation of the proposed action would affect any species that are listed under the ESA, their critical habitats or any species proposed for listing. To achieve this objective, this BA reviews the proposed action in sufficient detail to identity the level of effect that would occur to each species evaluated. One of three possible determinations will be chosen for listed species based on the best available scientific literature, a thorough analysis of the potential effects of the project, and the professional judgment of the wildlife and fisheries biologists and ecologists who completed the evaluation. The three possible determinations are as follows:

- "No effect" – where no effect is expected;
- "May affect, not likely to adversely affect" – where effects are expected to beneficial, insignificant (immeasurable) or discountable (extremely unlikely); and
- "May affect, likely to adversely affect" – where effects are expected to be adverse or detrimental.

2.0 Description of Proposed Action

Desert Rock Energy, LLC is proposing to construct and operate a coal-fired power plant that would produce up to 1,500 MW gross (1,366 MW net) of electricity. The proposed facilities include up to two 750-MW generation units, as well as a plant-cooling system, coal-handling facilities, power transmission interconnection facilities, a water-supply system, access to the plant site, waste-management operations and other ancillary facilities. The proposed action is summarized below in terms of the required facilities. The proposed power plant is located approximately 30 miles southwest of Farmington in San Juan County, New Mexico and is entirely within the boundaries of the Navajo Nation. More detailed information on the proposed action, including details on project construction, plant operation, maintenance, and decommissioning is provided in the DEIS (URS 2007). A map of the project area including the proposed action and alternatives is provided as Figure 1.

2.1 Power Plant

The power plant site would be located within a 592-acre parcel immediately adjacent to and west of the existing BHP Navajo Coal Company (BNCC) lease area. Within the parcel, the footprint of the facilities would require approximately 160 acres. Facilities within the power plant site (i.e. administration building/control center, turbine hall, air-emission control equipment and facilities, maintenance shop, etc.) and operation of the plant are described in more detail in the DEIS (URS 2007). Up to 1.2 million tons of earth material is anticipated to be removed for the construction of the plant. The cut-and-fill activities, conducted using scrapers or excavators, would be balanced over the site such that soil would

not need to be imported or exported. The plant site would be surrounded by fencing for security and safety purposes and regular access to the plant would be through a primary gate with security controls. The power plant would have a 50-year design life without major capital improvements.

The power plant, proposed as a mine mouth operation, would be fueled by sub-bituminous coal provided by the adjacent resources of the BNCC Lease Area. Operation of the power plant would require up to 6.2 million tons of coal per year. The coal would be delivered from the BNCC Lease Area to the power plant via conveyor.

State-of-the-art emission controls would be used to minimize emissions of potential air pollutants. Air pollution controls for the pulverized coal-fired boilers would consist of the following:

- Low nitrogen oxide (NO_x) burners and selective catalytic reduction to control NO_x emissions;
- Low sulfur coal and wet flue gas desulfurization to control sulfur dioxide (SO_2) emissions;
- Wet flue gas desulfurization and a wet stack to control acid gas emissions, including sulfuric acid mist;
- Wet flue gas desulfurization to control mercury (Hg) emissions. Activated carbon and hydrated quicklime injection to be installed before the fabric filter baghouse if needed for additional reductions, with secondary reductions in sulfur dioxide (SO_2) emissions and sulfuric acid (H_2SO_4) mist;
- A fabric filter to control particulate emissions; and
- High efficiency combustion to control carbon monoxide (CO) and volatile organic compound emissions.

Highly efficient supercritical boilers would operate at high temperatures (net heat rate of 8,792 Btu [British thermal unit] per kilowatt hour) and pressure to make steam to turn a steam turbine connected to a generator that would produce the electricity. Steam exhausted from the turbine would be cooled by a Heller natural-draft cooling system. This type of cooling system uses 80 percent less water than conventional mechanical-draft cooling systems. No cooling pond would be required.

The power plant would have a 50-year design life without major capital improvements. At the end of its useful life, the power plant and all associated facilities would be decommissioned. All structures and equipment at the site would be dismantled and removed. All wells would be decommissioned and abandoned in accordance with Navajo Nation procedures and regulations. Following removal and abandonment of facilities, any areas disturbed would be rehabilitated as near as possible to their original condition including all areas of the BNCC Lease Area disturbed by mining activities. All mining areas associated with Desert Rock will be reclaimed per the terms and conditions of BNCC's Surface Mining Control and Reclamation Act (SMCRA) permit as administered by Office of Surface Mining (OSM).

Coal from the BNCC mine lease would transported via conveyor belt to a coal processing plant located within the BNCC mine lease area IV North. The proposed coal preparation facilities would require approximately 16.4 acres within a 101 acre parcel.

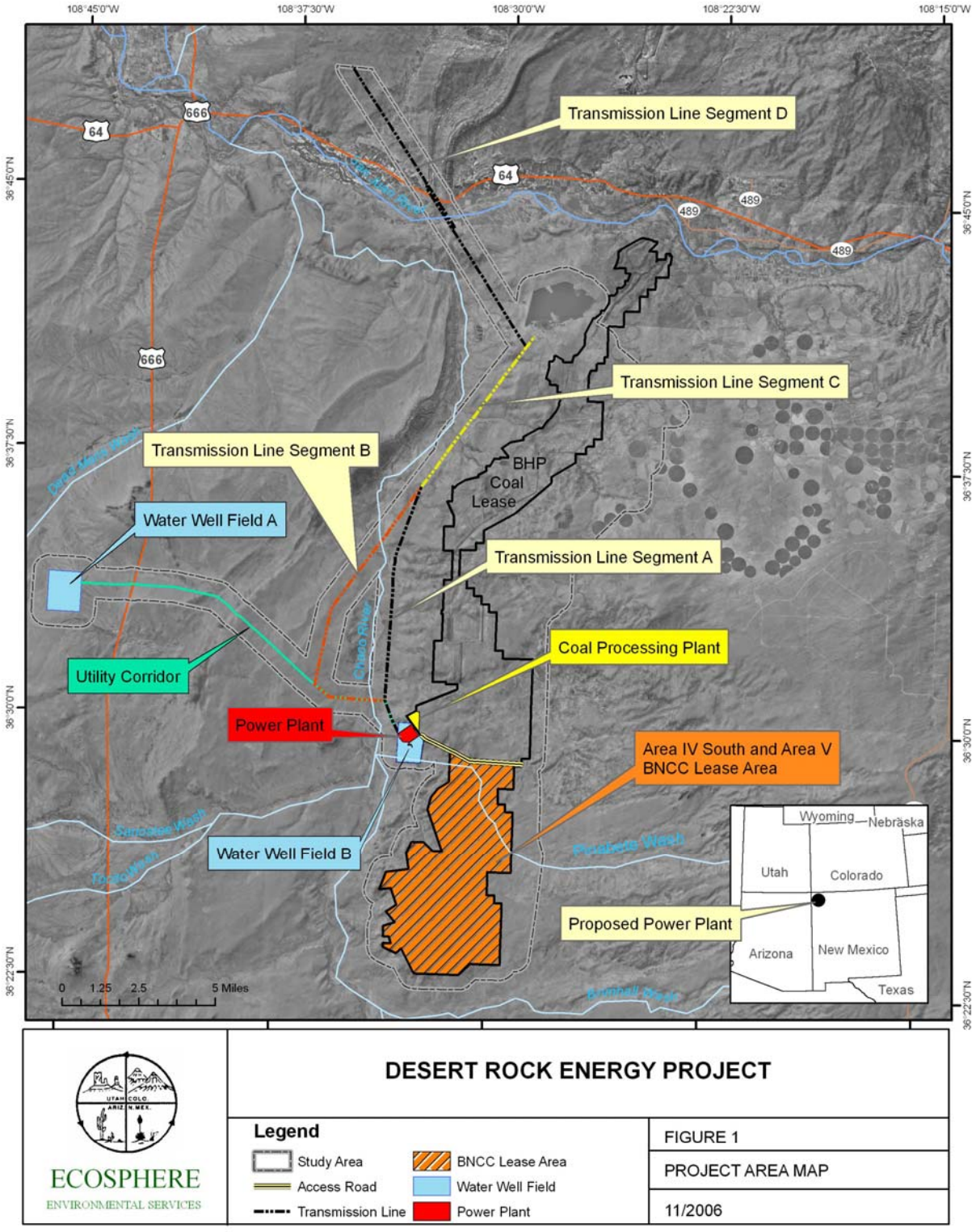

Figure 1. Preferred Alternative including sub-alternatives for the proposed Desert Rock Energy Project.

2.2 Access Road

Although existing access roads and 2-tracks are available within the project area and along proposed utility and transmission corridor alignments, a new permanent access road to the proposed plant site is proposed. The proposed road alignment is approximately 3.5 miles in length, requiring 32 acres of new ground disturbance. This access road would spur off of the existing Burnham Road that currently crosses, in a north-south direction, Areas V and IV of the BNCC mine lease.

2.3 Transmission Lines

The proposed transmission lines would extend from the proposed plant site to the existing Arizona Public Service (APS) Four Corners Generating Station (Segments A or B and Segment C). After leaving the Four Corners Generating Station, the proposed transmission alignment would continue northward (Segment D) crossing the San Juan River and interconnecting with the proposed Navajo Transmission Project (NTP). There are two sub-alternative corridors being considered in the DEIS for the southernmost portion of the transmission alignment: Segments A and B (described below). With the exception of Segment D, which is proposed within a 250 ft-wide right-of-way (ROW), all other alternative transmission corridors would be within a 500-ft wide ROW.

Segment A, the preferred alternative, would leave the plant site and would parallel the eastern side of the Chaco River, connecting with Segment C after 8.3 miles. The ROW for this sub-alternative would require 503 acres. Sub-alternative Segment B would leave the plant site to the west, cross the Chaco River then parallel the western side of the Chaco River continuing northward and crossing the Chaco River again before connecting into Segment C after 11.1 miles. The ROW for this alternative would require approximately 672 acres. Segment C would be 6.2 miles in length requiring a 375 acre ROW, whereas Segment D is 10.8 miles in length and would require a 372 acre ROW. This segment would cross the San Juan River and continue northward to tie into the currently proposed NTP. There are no sub-alternatives considered for transmission Segments C and D.

Segments A or B would consist of 2 single-circuit 500kV transmission lines. Segment C would consist of 1 single-circuit 500kV transmission line, which would parallel an existing 230kV line. Segment D would also consist of 1 single-circuit 500kV transmission line paralleling an existing 230kV line. All transmission line segments would be self-supporting, four-legged, steel-lattice tower structures approximately 135 feet in height with 1,200-1,600 feet of spacing between individual structures.

At each tower site, leveled areas, or pads, approximately 30 feet by 40 feet would be needed to facilitate the safe operation of construction equipment, such as cranes. At each structure site, a work area of approximately 200 by 200 feet would be required for the location of structure footings, assembly of the tower, and equipment maneuvers. The work area would be cleared of vegetation only to the extent needed. After construction, disturbed area not needed for normal maintenance of the transmission line would be graded to blend as near as possible with the natural contours, and revegetated with indigenous plant species. Areas would be reseeded prior to the season(s) when precipitation is normally received.

Pilot lines would be pulled (strung) from structure to structure by helicopter and threaded through the stringing sheaves at each tower. Following the pilot lines, a larger diameter, stronger line would be attached to conductors to pull them through. Conductors and ground wires would be strung using powered pulling equipment at one end and powered tensioning equipment at the other end of a conductor segment. Sites for tensioning equipment and pulling equipment would be approximately 3 miles apart. The tensioning site would be an area approximately 200 by 200 feet. The pulling site would require approximately half the area of the tension site.

During pre-design project development activities, a series of preexisting roads were field verified and mapped for access to proposed transmission tower sites resulting in selection of routes that avoided disturbance of culturally and biologically sensitive areas. Existing roads will be used to the greatest extent possible; however some overland access on undisturbed areas would be required. It is expected that all biological and cultural resources of importance along or within all roads used for the project will be inventoried and monitored by a professional biologist or archaeologist prior to construction related activities and that these resources will be avoided during long term maintenance activities of the project.

2.4 Water Well Field

The average annual water consumption demand of the Desert Rock Energy Project is estimated to be 4,500 acre-feet (ac/ft) per year, or 2,795 gallons per minute (gpm), of continuous flow for a period of 40 consecutive years. An additional 450 acre-feet per year would be available to meet Navajo municipal demand for a total of 4,950 ac/ft per year. The proposed and alternative water sources would be groundwater from the Morrison aquifer. Based on evaluations of the hydrogeologic characteristics of the Morrison aquifer, it was estimated that 10 to 20 new production wells could meet this anticipated water demand (URS 2007). Water from the Morrison aquifer was identified as suitable for industrial use through a study by URS in September 2005 and amended in September 2006. Data for the study came from previous studies, well data from Navajo Department of Water Resources and water quality field tests.

Two sub-alternate water well field locations are being evaluated in the DEIS and in this BA. The preferred alternative Water Well Field B would include 13 wells located within the 592-acre power plant facility site, as well as an additional 7 wells spaced at 1-mile intervals along Segment A of the proposed transmission line corridor. Each well would be networked to the water-transmission pipeline mains that would deliver the water to the onsite 2.5-million gallon water-storage tank. Each well would be equipped with a submersible pump powered by an electric motor. The wells would be controlled via telemetry by the water level in the regulating/storage reservoir. The telemetry system would likely be connected by fiber optic cable buried in the pipeline trench. The sub-alternative Water Well Field A would also be comprised of 20 water wells, all within an approximately 2 square mile area. Water Well Field A would also require the construction of a 12.4 mile utility corridor/water line.

Each water production well and associated facilities would be enclosed within an 8-foot-high chain-link fence surrounding the well yard, requiring a 100 ft by 100 ft area (approximately 2 acres). The well head would be enclosed in a masonry-block structure, or pump house, located within the fenced well yard (as needed to protect and secure the well equipment) and meeting the current Uniform Building Code. Within the pump house would be the well pump and motor, as well as associated well equipment, such as the shut-off valve, check valve, flow meter, air-release valve, electrical equipment, telemetry, and above ground piping. The foundation of the pump house would be constructed slightly above surrounding grade to minimize flooding potential.

Individual wells would be connected by collector pipelines to the main utility line, which would extend from the Water Well Field to the proposed power plant site. Due to the topographic conditions, the pipelines would be pressurized only by the well pumps; no booster-pump station would be required. Overhead distribution power lines would be constructed to supply electricity to the wells and would be constructed in the same ROW paralleling the main water utility pipeline and collector pipelines. Access to the production wells would be needed for construction, operation, and maintenance. Access roads would be approximately 15-feet wide and would be gravel roads constructed in accordance with BIA and/or Navajo Nation standards. The utility corridor for Water Well Field B would be approximately 12.4 miles

in length and constructed within a 100-foot wide ROW requiring a 149.7 acres. Following construction the utility corridor would have a permanent 10-foot wide ROW.

3.5 BNCC Mine Lease

The power plant would be constructed immediately adjacent to and west of the existing BHP Navajo Coal Company (BNCC) lease area which encompasses approximately 13,051 acres. The coal fuel supply would be produced and conveyed by a conveyor belt from coal reserve Area IV South, and Area V of the BNCC lease area to proposed coal preparation facility located next to the power plant in Area IV North of the BNCC lease area. The production phase in Area IV South will last through approximately 2044. At that time, the mining operations within the BNCC Lease Area will transition to Area V of the mine lease.

BNCC holds Surface Permit Number 2838 issued by the New Mexico Office of the State Engineer in October 1958. This permit provides BNCC a total diversionary right of 51,600 acre-feet annually, with a consumptive right of 39,000 acre-feet annually, for waters drawn from the San Juan River. The additional consumption associated with the expansion of the surface mining operations at the Navajo Mine required to supply coal to the Desert Rock Energy Project is estimated to be approximately 600 acre-feet annually. The additional consumption is within the existing consumptive right and will cause no depletions to the San Juan River beyond those authorized under the current water right permit.

A single public road, referred to as the Burnham Road Realignment, will be re-routed to suit the needs of mining operation on the BNCC Lease Area. This road requires re-alignment over its extent within Areas III and IV North of the lease to suit the needs of the current BNCC Lease Area operations, regardless of the disposition of the Desert Rock Energy Project. Navajo Mine staff have developed a preferred alignment and have entered preliminary approval discussions with the Bureau of Indian Affairs (BIA), the regulatory authority over the roads in the project area.

Detailed information concerning the construction and operation of the Desert Rock power plant and associated components including the BNCC mine lease are contained within the DEIS (URS 2007).

3.0 GENERAL MITIGATION MEASURES

The following section discusses mitigation measures that would occur prior to, during, and after construction of the proposed action. Measures listed below are in addition to those described under individual species that may be affected by the action alternative. General mitigation measures would serve to minimize or avoid impacts to federally listed species. Species specific mitigation measures are provided in the detailed analysis of impacts in Section 6.0.

Prior to Construction

- An Oil and Hazardous Materials Spill Prevention, Control, and Countermeasure Plan shall be prepared to address hazardous materials storage and spill prevention.
- A Storm Water Pollution Prevention Plan shall be prepared and implemented for construction activities to control surface runoff, reduce erosion, and prevent sedimentation from entering waterbodies during construction.
- An Environmental and/or Biological Resource Compliance Monitoring Plan shall be prepared for all construction projects to ensure implementation of mitigation measures described in pertinent resource sections of the DEIS (URS 2007). The plan shall identify the frequency and type of monitoring required by qualified natural/biological resources personnel. The plan shall be submitted for NNDFW approval prior to any construction.

- All construction personnel shall attend an environmental protection briefing prior to working on any construction site in the project area. This briefing is designed to familiarize workers with statutory and contractual environmental requirements and the recognition of and protection measures for sensitive vegetation community and wildlife habitats.
- Protective barriers shall be placed around specified sensitive vegetation community and wildlife habitats as identified by the NNDFW. Barriers shall be installed prior to construction and field inspected by NNDFW personnel to verify proper placement.
- Aboveground structures (i.e. transmission towers) shall be sited and designed in order to minimize disturbance to sensitive wildlife habitats and to minimize adverse effects to landscape features such as topography and vegetation.
- Imported soils, fills, or aggregates shall be free of deleterious materials (i.e. trash, construction debris, noxious weeds). Sources of imported materials shall be submitted for Navajo Nation approval prior to construction.
- A Non-native Species Management Plan shall be prepared prior to the commencement of any ground-disturbing activities that specifies the locations and methods for removing non-native species, prescriptions for monitoring activities after construction, and reporting requirements. The plan shall be submitted for NNDFW approval prior to ground-disturbing activities.
- A Revegetation Plan shall be prepared for approval by the NNDFW prior to the commencement of any ground-disturbing activities that prescribes plant salvage, revegetation, and post-construction monitoring activities.
- Preconstruction surveys shall be conducted, as specified by the NNDWF by a qualified biologist to identify the number, type, and location of special-status species potentially occur within the project area.
- A construction work schedule shall be prepared for all construction projects that minimizes noise and human activity effects on wildlife in adjacent habitats.
- If any grading, clearing, brushing, or construction occurs during the bird breeding season (approximately February 15 through August 31), a qualified biologist shall conduct a survey of the habitat to determine whether there are active bird nests in the area, including raptors and ground nesting birds. The survey would begin not more than three days prior the beginning of work. If an active nest is observed, a minimum 300-foot buffer (500 feet for raptors) would be established using temporary fencing. The buffer would be in effect as long as work is occurring and until the nest is no longer active.

During Construction

- All construction contractors shall implement and comply with requirements of the Oil and Hazardous Materials Spill Prevention, Control, and Countermeasure Plan prepared for all construction projects.
- All construction contractors shall implement and comply with operational compliance requirements of the Storm Water Pollution Prevention Plan.
- Construction activities shall be monitored by qualified natural resources personnel as outlined in the Environmental and/or Biological Resource Compliance Monitoring Plan.
- All project construction contractors shall implement and comply with the Non-native Species Management Plan prepared for each project component.
- Vegetation salvage, seed collection, and revegetation shall be implemented as defined in the Revegetation Plan. Topsoil shall be salvaged, segregated during storage, and reused in the proper location and depth as specified by the NNDFW.
- All construction activities will be completely confined to the areas of potential ground disturbance for each project component as described in in the Desert Rock Energy Project DEIS

under the Preferred Alternative (URS 2006) Clearing of vegetation and ground disturbance shall be minimized to the greatest extent possible.

- Stationary noise sources shall be located as far as possible from sensitive wildlife habitat areas. On-site work for transmission corridor construction that generates noise levels above 76 decibels shall be done between 7:00 a.m. and 7:00 p.m.
- Excavation sites must be monitored or covered to avoid trapping wildlife, and routes of escape for wildlife should be maintained. The construction site shall be inspected daily for appropriate covering and flagging of excavation sites. Each morning the project area shall be inspected for wildlife trapped in excavation pits. A qualified biologist shall be available to inspect excavations before refilling occurs.
- Proposed electrical transmission and distribution lines will be designed and constructed utilizing "raptor-safe" design. The most complete manual on this work is: ″ Suggested Practices For Raptor Protection On Power Lines: The State of the Art in 1996″. (APLIC 1996)

Post-Construction

- All tools, equipment, barricades, signs, surplus materials, debris, and rubbish shall be removed from the project work limits upon project completion.
- The success of revegetation efforts shall be monitored. Plant materials used for revegetation shall remain alive and in a healthy, vigorous condition for a period of one year after final acceptance of planting. The project site shall be monitored in accordance with the Nonnative Species Management Plan and Revegetation Plan. All plants determined to be in an unhealthy condition shall be replaced.

4.0 Description of the Analysis Area

This section describes components of the environmental setting of the area with potential to be impacted by the proposed action. Because a detailed description of the physical and biological characteristics of the analysis area is provided in the DEIS (URS 2007), this BA focuses on the physical and biological characteristics of the analysis area that have a direct relevance to plant and wildlife species that are listed under the ESA.

To account for factors that may affect ESA listed species, such as emissions, noise and human and vehicle presence, the analysis area is defined by a 31-mile (50-km) radius from the proposed Desert Rock Energy Project plant site. The 31-mile (50-km) buffer was chosen to be consistent with air quality analyses required for major source air quality permitting (U.S. Environmental Protection Agency [USEPA] 2005).

4.1 Physical Characteristics of the Analysis Area

4.1.1 Climate

The climate of the analysis area is classified as arid Continental (BLM 2003). Because of its relatively high elevations, San Juan County, New Mexico experiences warm dry summers and cool dry winters (Western Regional Climate Center 2006). Average annual temperatures in and near the project area are in the low to mid 50's (degrees Fahrenheit), summer temperatures range from the mid 60's to the low 90's and winter temperatures range from the low 20's to the low 40's (Western Regional Climate Center 2006). The mean annual precipitation in Shiprock, New Mexico is 7.07 inches (Western Regional Climate Center 2006).

4.1.2 Topography

Topography in the analysis area consists of relatively flat to gently rolling hills that slope to the west toward the Chaco River. The slopes have a sand- and gravel-covered surface with sparse vegetation. Outcrops of resistant rock dip gently to the east, forming west-facing steep-sided escarpments or cuestas, and eroded knobs typically less than 50 feet high. The escarpments are cut by washes that have developed a west-flowing drainage pattern that meets the meandering channel of the north-flowing Chaco River. The topography along the proposed transmission line is comparable until it crosses the San Juan River through the water gap in steeply dipping sedimentary rocks of the Hogback monocline. Two well-developed washes meander across the BNCC mine leasehold, including Pinabete Arroyo, which crosses Area IV South from southeast to northwest and north; and an unnamed wash that crosses the northern part of Area V from southeast to northwest. Elevations in the project area range from approximately 5,000 feet to 5,675 feet. The project area is surrounded by several high elevation areas, including the Chuska Mountains in northwest Arizona, Ute Mesa in Colorado and New Mexico, and the San Juan Mountains in southwest Colorado and north-central New Mexico.

4.1.3 Geology

This BA discusses only those geological formations with relevance to ESA listed species; however, detailed description of geological formations present in the project area are provided in the DEIS (URS 2007). In the context of ESA listed plant and wildlife species, the project area contains 3 significant geological formations: Point Lookout Sandstone, Mancos Shale and the Fruitland Formation. Point Lookout Sandstone is a member of the Mesa Verde group and is coastal marine sandstone that overlies Mancos Shale (URS 2007). Point Lookout Sandstone provides necessary habitat for Mancos milkvetch (*Astragalus humillimus*), a plant species that is listed as Endangered under ESA. Mancos Shale is a thick dark grey carbonaceous marine shale with thin interbeds of limestone, siltstone and fine-grained sandstone (URS 2007). The Fruitland Formation is the primary coal-bearing formation in the project area. This formation contains interbedded sandy shale, carbonaceous shale, sandstone and multiple coal layers deposited by rivers (URS 2007). Mancos Shale and the Fruitland Formation provide essential habitat for the Mesa Verde cactus (*Sclerocactus mesae-verdae)*, an ESA listed Threatened species.

4.1.4 Soils

The project area contains 2 primary soil survey areas that are divided by the Chaco River. The primary soil mapping unit east of the Chaco River is the Sheppard-Huerfano-Notal unit, which is found in nearly level to gently sloping areas on valley bottoms and nearly level to steep soils on mesas and plateaus (SCS 1980). The primary soil mapping unit west of the Chaco River is the Major Land Resource Area (MLRA) 37, that is present along the San Juan River Valley, as well as on mesa tops and plateaus within the project area (NRCS 1992). The DEIS provides a more comprehensive description of soils that are present in the project area (URS 2007). None of the ESA listed plant and wildlife species with potential to occur in the project area is dependent on or limited by specific soil types, but rather are limited by other physical or biological resources.

4.1.5 Water Resources

The project area lies within the Chaco watershed drainage, that expands through San Juan, McKinley, Sandoval, and Rio Arriba counties of New Mexico and Apache County of Colorado. The project area contains 3 major bodies of water, the Chaco River, the San Juan River and Morgan Lake. The Chaco River is an ephemeral stream with waters flowing in a northwesterly direction towards the San Juan River during precipitation events. Precipitation occurs during late summer and early fall with annual averages

reaching about 7 inches in Shiprock, yet streamflow varies from year to year due to the streams ephemeral qualities (URS 2007).

The San Juan River originates at the mouth of Navajo Dam in northwest New Mexico and flows southwest into Lake Powell. The San Juan River traverses the northern portion of the Desert Rock project area and as proposed, Segment D of the transmission line would cross the river. Figure 2 below shows the location of the San Juan River crossing The San Juan River is the only natural perennial water source in the project area. There are jurisdictional wetlands associated with the San Juan River and its floodplain.

Figure 2. Transmission Line proposed San Juan River crossing, looking south across U.S. Highway 64 onto the floodplain.

The project area contains a single lake, Morgan Lake. Morgan Lake is a man-made lake situated adjacent to the Four Corners Generating Station, which utilizes water in the lake to cool its generating units. The southwestern corner of Morgan Lake is located within a 1-mile corridor of the southern end of Segment D of the proposed transmission line alignment. Jurisdictional wetlands are also present along the margins of Morgan Lake (Ecosphere 2006a).

In addition to these large water bodies, the project area also contains scattered wetlands that are fed by springs and/or collection of surface water (i.e. stockponds). During the 2006 field season, Ecosphere Environmental Services conducted wetland delineations of all potential Waters of the U.S. within all project component ROWs and footprints. These surveys identified 2 areas that were characterized as wetlands; one near the proposed power plant access road, southeast of the proposed power plant location and the other near the Water Well Field (Ecosphere 2006a). There are no jurisdictional wetlands within the proposed action area of disturbance.

4.2 Biological Characteristics of the Analysis Area

4.2.1 Vegetation

Vegetation in the Desert Rock Energy Project analysis area is dominated by Great Basin desert-scrub habitats (Dick-Peddie 1993). Great Basin desert-scrub is a cold desert ecosystem dominated by shrubs with a sparse understory of forbs and grasses; bare ground occurs in poor, alkaline soils (Fitzgerald et a. 1994, Dick-Peddie 1993). Vegetative communities within the study area were identified using the Provisional Digital Land Cover Map for the southwestern United States (USGS National GAP Analysis Program 2006). There are 18 cover types occurring within the analysis area, including two non-vegetative cover classes, Open Water and Recently Mined or Quarried (Table 4-1). The vegetative communities with the greatest relevance to ESA listed species are semi-desert grasslands, salt desert scrublands, and semi-desert shrublands, as well as riparian habitats. The Provisional Digital Land Cover Map for the southwestern United States identified areas that have been recently mined or quarried (USGS National GAP Analysis Program 2006). Portions of BNCC Permit Areas I, II and have been reclaimed. To more accurately describe the study area, data from BNCC's reclamation efforts were extrapolated to characterize reclaimed areas and then categorize into GAP Analysis classifications (BHP Billiton 2004).

Semi-desert grasslands, salt desert scrublands, and semi-desert shrublands are similar in that they overlap somewhat in species composition, but vary by physical structure and vegetative density. For example, semi-desert grasslands are often dominated by alkalai sacaton (*Sporobolus airoides*), galleta (*Hilaria jamesii*) and Indian ricegrass (*Stipa hymenoides*), but also include scattered shrubs such as saltbush (*Atriplex* spp.), shadscale (*Atriplex confertifolia*), and greasewood (*Sarcobatus vermiculatus*). Salt desert scrublands are generally dominated by various species of saltbush or greasewood but also include many of the same understory grasses and herbaceous forbs as grassland communities. Semi-desert shrublands include vegetative communities dominated by shrub species such as rabbitbrush (*Chrysothamnus spp.)*, sagebrush (*Artemisia* spp.), broom snakeweed (*Gutierrezia sarothrae*), or ephedra (*Ephedra* spp.)

Riparian habitats within the analysis area include native, exotic, and mixed native-exotic riparian woodlands occurring along perennial and intermittent water sources throughout the region. Native riparian woodlands are dominated by cottonwoods (*Populus* spp.) and willows (*Salix* spp.), whereas riparian exotics include saltcedar (*Tamarix chinensis*) and Russian olive (*Elaeagnus angustifolia*). These riparian communities are associated with the primary water sources in the project area, the Chaco River, the San Juan River and Morgan Lake.

Table 4-1. Maximum Projected Surface Disturbance in Acres to Vegetation Communities for the Proposed Action. Desert Rock Energy Project 2007.

Habitat Type	Power Plant	Coal Processing Plant	Transmission Line A	Transmission Line B	Transmission Line C and D	Access Road	Water Well Field A	Water Well Field A Utility Corridor	Water Well Field B	BNCC Lease Areas
Colorado Plateau Mixed Bedrock Canyon and Tableland	1.56	0.00	2.22	0.00	45.81	0.44	2.22	1.60	9.56	5.12
Inter-Mountain Basins Shale Badland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Colorado Plateau Piñon-Juniper Woodland	0.00	0.00	1.11	0.00	15.35	1.11	0.00	0.00	10.67	6.00
Inter-Mountain Basins Big Sagebrush Shrubland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11
Colorado Plateau Mixed Low Sagebrush Shrubland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Colorado Plateau Blackbrush-Mormon-tea Shrubland	0.00	0.00	0.00	0.00	21.35	0.00	0.00	0.00	0.00	0.00
Inter-Mountain Basins Mixed Salt Desert Scrub	24.69	10.01	307.13	338.33	235.29	4.45	47.59	61.50	447.68	1332.37
Inter-Mountain Basins Semi-Desert Shrub Steppe	46.93	18.01	22.02	30.30	24.69	2.45	3.34	3.18	102.97	475.70
Inter-Mountain Basins Semi-Desert Grassland	75.84	70.94	166.80	274.31	298.01	11.34	0.00	31.07	302.90	5893.46
Rocky Mountain Lower Montane Riparian Woodland/Shrubland	0.00	0.00	0.00	1.60	2.22	0.00	0.00	0.00	0.00	4.89
Inter-Mountain Basins Greasewood Flat	0.00	1.78	3.34	24.30	23.80	0.44	836.2	52.40	16.46	379.18
Southern Colorado Plateau Sand Shrubland	0.00	0.00	0.00	0.00	4.67	0.00	0.00	0.00	0.00	0.00
Open Water	0.00	0.00	0.00	0.00	3.34	0.00	0.00	0.00	0.00	3.78
Barren Lands, Non-specific	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agriculture	0.00	0.00	0.00	0.00	10.90	0.00	0.00	0.00	0.00	0.00
Recently Mined or Quarried	0.00	0.00	0.00	0.00	14.90	0.00	0.00	0.00	0.00	0.00
Invasive Southwest Riparian Woodland and Shrubland	0.00	0.00	0.00	0.00	4.67	0.00	0.00	0.00	0.00	0.00
Invasive Annual and Biennial Forbland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**149**	**101**	**503**	**669**	**705**	**20**	**889**	**150**	**890**	**13,051**

Source: USGS National GAP Analysis Program 2006. Acreages are approximate based on polygon calculations.

4.2.2 Wildlife

The analysis area supports a variety of natural vegetation communities and landscape features that offer a diversity of wildlife habitat types, including habitat for an assortment of mammals, birds, reptiles, amphibians, fish and invertebrates. While these habitat types correspond with the vegetation community types discussed above, they also are defined by a number of distinct landscape features such as washes and gullies, rock outcrops and hillsides, cliffs and taluses, and caves. All contribute to the diversity and abundance of wildlife in the area as they generally provide a microhabitat for wildlife uniquely adapted to or dependent on these features.

Most wildlife species within the study area are adapted to drought conditions, including sparse vegetative cover and limited sources of permanent water. However, perennial sources of water in the study area support a relatively high concentration of vegetation and cover that contribute to increased wildlife diversity in these areas. While many species of wildlife commonly occur in upland habitats, they also depend on riparian-wetland habitat for breeding and cover. The riparian-wetland habitats generally have more structured and complex vegetative assemblages, along with higher wildlife diversity than the surrounding upland areas. These areas effectively function as movement corridors for mammals and serve as congregation and feeding areas for a variety of bird species. Although many of the wildlife species present in the project area are habitat generalists, the project area does not support any species for which ESA listed plant or wildlife species are obligatorily dependent.

5.0 Description of Listed Species and Designated Critical Habitats

The U.S. Fish and Wildlife Service (USFWS) was contacted to request a species list for the Desert Rock Energy Project in March 2006. Ecosphere Environmental Services (Ecosphere) was instructed by the USFWS to obtain a listing of federally listed, proposed, candidate and species of concern, as well as critical habitat present within San Juan County, New Mexico on the USFWS New Mexico Ecological Services website. This list contains several Navajo Nation listed species of concern that are also federally listed that were identified by the Navajo Nation Department of Fish and Wildlife (NNDFW) in a consultation letter received in December 2005. Both the USFWS and NNDFW project initiation consultation letters are provided in Appendix A.

Threatened and endangered species, as well as candidates for listing under ESA are included in Section 4.1. USFWS Species of Concern, New Mexico State listed species and species included on the Navajo Endangered Species List that are not also federally listed are addressed in the project Biological Evaluation (BE) provided in Appendix B.

Information used to compile this section was also gathered from data collected during field-based evaluations conducted in between 2004-2006. A review of existing data sources was conducted prior to field work. A volume of baseline data has been prepared for the BNCC mine lease area and the proposed power plant site. Intensive biological investigations, including species-specific surveys for federally listed and special status flora and fauna were conducted during between the 2004 and 2006 field seasons by biologists and botanists from Ecosphere. In addition to surveys completed specific to the proposed action, biologists and botanists from Ecosphere have conducted numerous biological and botanical investigations within and adjacent to the boundaries of Navajo Mine, the Four Corners Generating Station, Shiprock and Nenanhazad Chapters, and along the eastern end of the Navajo Transmission Project, all areas within or immediately adjacent to the analysis area. Surveys were conducted according to USFWS survey protocols or for those species for which no federal survey protocol has been established, by using other commonly accepted survey methods. The USFWS conducts annual monitoring of fish species in support of the San Juan Recovery Implementation Plan. As adequate

baseline data exists for the fish species, species-specific surveys were not conducted for these aquatic species for the Desert Rock Energy Project.

5.1 ESA Listed Species With Potential to Occur in the Analysis Area

There are 9 threatened (T) and endangered (E) species with potential to occur in San Juan County. The list includes one mammal, three birds, two fish, and three plants. The federally threatened and endangered species considered in this BA include:

- Black-footed ferret (*Mustela nigripes*), E
- Bald eagle (*Haliaeetus leucocephalus*), T
- Mexican spotted owl (*Strix occidentalis lucida*), T
- Southwestern willow flycatcher (*Empidonax traillii extimus*), E
- Colorado pikeminnow (*Ptychocheilus lucius*), E
- Razorback sucker (*Xyrauchen texanus*), E
- Knowlton's cactus (*Pediocactus knowltonii*), E
- Mancos milkvetch (*Astragalus humillimus*), E
- Mesa Verde cactus (*Sclerocactus mesaeverdae*), T

There is one candidate species listed by USFWS with potential to occur in the analysis area. Potential project effects to the yellow-billed cuckoo (*Coccyzus americanus occidentalis*) are also considered in this BA.

5.2 ESA Listed Species Eliminated From Detailed Evaluation

Due to the absence of suitable habitat or listed species within the analysis area, 3 of the 10 federally listed species are eliminated from detailed evaluation in this BA. Species eliminated from further analysis are the black-footed ferret, Mexican spotted owl, and Knowlton's cactus. Table 5-1 provides the reasoning for eliminating each species from further evaluation.

Table 5-1. Species listed by the USFWS under the authority of the ESA with Potential to Occur in San Juan County, New Mexico, but Eliminated from Further Analysis.

SPECIES	STATUS	HABITAT ASSOCIATIONS	POTENTIAL TO OCCUR IN THE ANALYSIS AREA
MAMMALS			
Black-footed ferret (*Mustela nigripes*)	E	Open grasslands with year-round prairie dog colonies. The Navajo Nation Department of Fish and Wildlife (NNDFW) defines potential habitat as occupied p-dog colonies 80 hectares or larger.	The analysis area does not contain any prairie dog colonies that exceed 80 hectares.
BIRDS			
Mexican spotted owl (*Strix occidentalis lucida*)	T	Nests in caves, cliffs, or trees in steep-walled canyons of mixed conifer forests.	There is no mixed conifer forest, or steep-walled canyon habitat types in the analysis area.

SPECIES	STATUS	HABITAT ASSOCIATIONS	POTENTIAL TO OCCUR IN THE ANALYSIS AREA
PLANTS			
Knowlton's cactus (*Pediocactus knowltonii*)	E	Alluvial deposits that form rolling, gravelly hills in pinyon-juniper and sagebrush communities (6,200-6,400 ft.).	The analysisarea does not contain any gravelly hills in pinyon-juniper and sagebrush communities. Further, the project area is more than 80 miles from the only known population of Knowlton's cactus.

Source: USFWS Southwest Region Ecological Services Endangered Species Lists (http://ifw2es.fws.gov/EndangeredSpecies/lists/default.cfm; accessed February 2006).
FWS ESA: Federal Endangered Species Act of 1973; 12-28-73, P.L. 93-205 87 Stat. 884, as amended. Administered by U.S. Fish and Wildlife Service, Department of Interior. List is published as 50 CFR 17.11 and 17.12.
E = ENDANGERED: "... any species which is in danger of extinction throughout all or a significant portion of its range ...". A final rule has been published in the Federal Register.
T = THREATENED: "... any species which is likely to become an endangered species within the foreseeable future throughout

5.3 Designated Critical Habitat in the Analysis Area

Designated critical habitat for the Colorado pikeminnow and razorback sucker occur within the San Juan River through the northern portion of the analysis area (Federal Register 1994). The project area does not contain critical habitat for any other ESA listed species.

In March 1994, the Department of the Interior designated 1,980 miles of the Colorado River as "critical habitat" for Colorado pikeminnow and razorback sucker. These fish have similar habitat requirements and historically lived in the same rivers. In Colorado and Utah, critical habitat covers the Colorado River from Rifle, Colorado, to Lake Powell; the Gunnison River from Delta, Colorado, to Grand Junction; the Yampa River from Craig, Colorado, to the Green River; the White River from Rio Blanco Dam to the Green River; and the Green River from Dinosaur National Monument to Lake Powell. The critical habitat also includes a 100-year flood plain of the Gunnison River from its confluence with the Colorado River and upstream to the confluence with the Uncompahgre River. There are no proposed critical habitats in Wyoming or California. Legal coordinates of critical habitats for these species within the project area are described below.

5.3.1 Colorado Pikeminnow

Critical habitat for the Colorado pikeminnow includes the San Juan River and its 100-year flood plain from the State Route 371 Bridge in Township 29 North, Range 13 W, Section 17 (New Mexico Meridian) to Neskahai Canyon in the San Juan arm of Lake Powell in Township 41 South, Range 11 East, Section. 26 (Salt Lake Meridian) up to the full pool elevation. In the project area, critical habitat for the Colorado pikeminnow is limited to the San Juan River from State Route (SR) 371 bridge (near Farmington, New Mexico) downstream to Neskahai Canyon in the San Juan arm of Lake Powell.

5.3.2 Razorback Sucker

Critical habitat for the razorback sucker includes the San Juan River and its 100-year flood plain from the Hogback Diversion in Township 29 North, Range 16 West, Section 9 (New Mexico Principal Meridian) to the full pool elevation at the mouth of Neskahai Canyon on the San Juan arm of Lake Powell in

Township 41 South, Range 11 East, Section 26 (Salt Lake Meridian). Thus, the entire stretch of the San Juan River that crosses the project area is included in the critical habitat designation.

6.0 Effects of the Proposed Action

This section addresses the predicted or anticipated impacts on biological resources that are attributable to the proposed project, including the following sources: air quality, water quality, noise pollution, infrastructure related disturbance and human related disturbance. Information used to compile this section was gathered from the DEIS (URS 2007) and the project *Risk Analysis for Toxics* prepared by URS, as well as from data collected during field based evaluations and a literature review. The complete *Risk Analysis for Toxics* prepared for the Desert Rock Energy Project is contained with the DEIS, however the ecological risk assessment portion of the document is included in Appendix C.

6.1 Evaluating Risk of Particulates to Plants, Soil Invertebrates and Wildlife

Potential risks to ecological receptors (plants, soil invertebrates and wildlife) from the proposed plant's chemical emissions were evaluated in combination with the concentrations of these chemicals already present in the environment, to the extent that existing conditions are known. The risk analysis generally followed risk assessment procedures developed by USEPA (1992 and 1998). The ecological risk evaluation prepared by URS is provided in Appendix C. The ecological assessment includes a **screening** process where chemicals of potential ecological concern (COPECs) are selected and the subsequent **risk-based assessment** where site-specific risks and impacts are evaluated.

Soil and vegetation samples were collected for chemical analysis of metals. Results were used as baseline concentrations in the risk-based assessment of impacts from airborne dispersal and deposition of particulates on soils and plants, and ultimately, on wildlife and humans. By collecting soil and vegetation metals data, site-specific uptake rates could be generated for use in estimating metals concentrations in plants after 50 years of operation. Details of the soil and vegetation sampling are provided in Appendix C.

Twenty-four sampling locations within a 25-km radius air impact area (1,962 km^2) were sampled in June 2006. At each location, samples of four media were collected for metals analysis:

- Surface soil (0-2 cm)
- Subsurface soil (2 cm down to the root zone [typically less than 40 cm])
- Vegetation leaves and stems
- Vegetation roots or tubers

ENSR modeled particulate (chemical emissions) deposition rates (wet, dry, and total) of the proposed Desert Rock power plant boilers using CALPUF and three years of meteorological data (2001-2003) (URS 2007). Wet deposition dominated the total deposition rates in all three years. For the risk based assessment, the area of wet deposition was sampled along with areas in the two down-wind/dry deposition directions.

The plant species collected (one species per location) included the following:

- Shadscale (*Atriplex confertifolia*)
- Alkali saccaton (*Sporobolus airoides*)
- New Mexico saltbush (*Atriplex obovata*)
- Four-winged saltbush (*Atriplex canescens*)
- Torrey's ephedra (*Ephedra torreyana*)
- Broom snake weed (*Gutierrezia sarothrae*)

Each soil and plant sample was analyzed for the eight naturally occurring Resource Conservation and Recovery Act (RCRA) metals most likely to represent a health concern for either human or ecological receptors – arsenic (As), cadmium (Cd), chromium (Cr), lead (Pb), mercury (Hg), selenium (Se). Six of these metals (excluding barium and silver) are also listed as hazardous air pollutants (HAPs) that could be deposited on soil and plants in the air impact area.

The soil summaries are based on the higher of surface or subsurface soil concentrations at each sampling location. Concentrations of metals in surface soils were found to not be substantially different from area to area. A similar pattern of metals concentrations among areas was seen in the subsurface soils. Differences among metal uptake rates in the various plants (subsurface soils to upper plant parts) and in the exposure areas also were examined (URS 2007).

Because different plants were sampled in the three exposure areas, uptake rates varied among areas and among plants, and uptake rates were different for each metal, the overall combined 90th percentile uptake rates for each plant part (upper or lower) and each metal are used in the subsequent analyses. All uptake rates are based on dry-weight metals concentrations.

6.1.1 Screening

The ecological screening phase is a conservative evaluation used to select COPECs (chemicals of potential ecological concern). The goal of the screening process is not to provide an indication of potential for risk, but rather to identify chemicals that may warrant further evaluation using more detailed procedures. Sources for soil (terrestrial) ecological screening levels (ESLs) for metals include: 1) USEPA's *Ecological Soil Screening Levels* (2005a), and 2) the Los Alamos National Laboratory (LANL) Ecorisk Database Release 2.2 (2005).

Two metals (mercury and selenium) have estimated 50-year concentrations in soil that exceed ESLs and are therefore considered COPECs. Estimated concentrations of the COPECs, which include deposition plus baseline (existing concentrations), in both the 0-2 and 0-10 cm soil depth profiles exceed the respective ESLs. The higher of these two soil estimates for each metal are used as exposure point concentrations (EPCs) as these two metals are carried forward into the risk-based assessment. The mercury EPC is 2.41E-02, and the selenium EPC is 3.20E+00.

The estimated concentration of bis(2-ethylhexyl)phthalate in soil (2.5E-02) after 50 years of plant operation also exceeds a conservative ESL from LANL (2005) for birds (2.0E-02). It does not exceed the ESL for mammals (5.9E-01). Bis(2-ethylhexyl)phthalate is not carried forward into the risk-based assessment because the modeled soil concentration does not take into account the several conservative factors that act preferentially to reduce organic compound concentrations.

6.1.2 Risk-based Assessment

The risk-based assessment includes six steps: Problem Formulation, Exposure Analysis, Ecological Effects of Chemicals, Risk Estimates, Risk Descriptions, and Uncertainty.

Problem Formulation

Three key aspects of the Problem Formulation are identifying assessment endpoints, and associated testable hypotheses and measurement endpoints (measures of effect) to determine whether a potential risk to the assessment endpoint exists.

Assessment endpoints are explicit expressions of the actual ecological value that is to be protected, typically this defined by an ecological entity and its attributes. Two elements are required to form an

assessment endpoint. The first is the identification of the specific valued ecological entity. This can be a species (e.g., red-tailed hawk), a group of species (e.g., avian herbivores), a community (e.g., soil invertebrates), an ecosystem function or characteristic, or a specific habitat. The second is the characteristics or attributes about the entity of concern that is important to protect and potentially is at risk. Therefore, it is necessary to define what is important for avian herbivores (e.g., survival growth and reproduction) or a plant community (e.g., viability and function. Together "viability and function of the plant community" form the assessment endpoint.

In this risk-based assessment, testable hypotheses are specific risk questions that are based on the ecological values to be protected (e.g., assessment endpoints such as avian herbivores) and what responses those ecological values may show when they are exposed to a stressor. In this evaluation the stressors are the chemicals of potential ecological concern (COPECs) mercury and selenium.

Measurement endpoints (measures of effect) are measurable or quantifiable changes in an attribute of an assessment endpoint in response to a stressor to which it is exposed.

A summary of assessment endpoints (in bold type) and associated testable hypotheses and measurement endpoints is presented below. The testable hypotheses are based on concentrations on estimated COPECs concentrations after 50 years of Desert Rock power plant operation. All of the wildlife species listed as receptors (ecological entity exposed to the stressor) are known to occur in the Desert Rock site area.

The general strategies used to evaluate ecological risks in the risk-based assessment are: 1) comparisons of the exposure concentration in soil with a toxicity reference value (TRV) for plants or soil invertebrates, or 2) comparisons of the dietary dose for a wildlife receptor with a dietary TRV. In the evaluation, TRVs are selected based on both no effect (e.g., no adverse observed effect level [NOAEL]), and low effect (e.g., lowest observed adverse effect level [LOAEL]) concentrations or doses to provide a range in the potential for effects.

Viability and Function of the Plant Community

Testable Hypothesis 1 – Are the concentrations of COPECs in soils sufficient to impair the viability and function of the plant community?

Measurement Endpoint 1 –Conservative exposure concentrations of COPECs in soil are compared with TRV concentrations available for screening and risk assessment.

Viability and Function of the Soil Invertebrate Community

Testable Hypothesis 2 – Are the concentrations of COPECs in soils sufficient to impair the viability and function of the soil invertebrate community?

Measurement Endpoint 2 – Conservative exposure concentrations of COPECs in soil are compared with invertebrate TRV concentrations available for screening and risk assessment.

Survival, Growth, and Reproduction of Birds and Mammals (Herbivores)

Testable Hypothesis 3 – Are the concentrations of COPECs in the upper portions of plants sufficient to impair the survival, growth, and reproduction of birds and mammals described as herbivores?

Measurement Endpoint 3 – To evaluate this assessment endpoint in the evaluation, the dietary dose that a wildlife receptor receives from plants and soils is compared with TRVs from the literature. TRVs for each soil COPEC representing no observed adverse effect level (NOAEL) and lowest observed adverse effect level (LOAEL) doses are selected or developed to provide a range in potential effects in the evaluation.

The herbivorous receptors used in the assessment are the horned lark (*Eremophila alpestris*) and the black-tailed jackrabbit (*Lepus californicus*). Both receptors are assumed to ingest upper portions of plants.

Survival, Growth, and Reproduction of Birds and Mammals (Insectivores)

Testable Hypothesis 4 – Are the concentrations of COPECs in soils sufficient to impair the survival, growth, and reproduction of birds and mammals described as insectivores (a subset of carnivores)?

Measurement Endpoint 4 – To evaluate this assessment endpoint in the evaluation, the dietary dose that a receptor receives from soils and soil invertebrates is compared with TRVs from the literature. TRVs for each soil COPEC representing NOAEL and LOAEL doses are selected from the literature to provide a range in potential effects. The insectivorous receptors used in the assessment are the western meadowlark (*Sturnella neglecta*) and the deer mouse (*Peromyscus maniculatus*). It is assumed that the deer mouse eats primarily insects, although it also reportedly eats seeds and some green vegetation (USEPA 1993).

Survival, Growth, and Reproduction of Birds and Mammals (Carnivores)

Testable Hypothesis 5 – Are the concentrations of COPECs in soils sufficient to impair the survival, growth, and reproduction of higher tropic level carnivorous birds and mammals?

Measurement Endpoint 5 – To evaluate this assessment endpoint in the evaluation, the dietary dose that a receptor receives from soil and from small mammalian prey is compared with TRVs from the literature. For the assessment, TRVs for each COPEC representing a NOAEL and LOAEL are selected from the literature. The carnivorous receptors used in the assessment are the red-tailed hawk (*Buteo jamaicensis*) and the kit fox (*Vulpes macrotis*).

Exposure Analysis

Exposure of receptors can be through direct contact (i.e., direct exposure) or through the ingestion pathway. For both types of exposure, the EPC of each COPEC must be estimated. Metals concentrations from the 0-2 cm soil depth assumed mixing depth profile are used as EPCs. The principal release mechanism of emissions from the Desert Rock power plant is Deposition – Wet, Dry, and in the direction of the Prevailing Winds. Exposure pathways expected to be complete (and evaluated) are shown with a "C" under each receptor. Plants and soil invertebrates are in direct contact with COPECs in soils. Ingestion-pathway exposures of the vertebrate receptors are estimated as average daily doses (ADDs) using the approach outlined in USEPA (1993) as follows:
For food and soil:

$$ADD = [(IR_f * C_f) + (IR_s * C_s)] * BA * AUF / bw$$

where:

IR_f	=	Ingestion rate of food (kg/day)
IR_s	=	Ingestion rate (incidental) of soil/sediment (kg/day)
C_f	=	Concentration of COPEC in food (mg/kg)
C_s	=	Concentration of COPEC in soil (mg/kg)
BA	=	Bioavailability of COPEC in soil and food (assumed to be 1.0)
AUF	=	Area use factor (assumed to be 1.0)
bw	=	Body weight of the receptor (kg)

Concentrations of COPECs in plants or prey organisms ingested by terrestrial wildlife in 2056 (following 50 years of plant operation) are estimated by the application of a bioconcentration factor (BCF) or bioaccumulation factor (BAF) to the calculated soil EPC for the COPEC:

$C_f = BCF * C_s$ or

$C_f = BAF * C_s$

As described above, BCFs for plants and the six metals of interest were calculated from site-specific data for subsurface soil and plant upper portions (leaves and stems). These site-specific BCFs were then applied to 50-year soil column (0-10 cm) concentrations to estimate metals concentrations in plants after 50 years when projected soil concentrations reach anticipated maximums due to aerial deposition of particulates. BCFs from the literature are used with 50-year soil (0-10 cm) concentrations to estimate metals concentrations in soil invertebrates. BAFs are used with 50-year surface soil (0-2 cm) concentrations to estimate concentrations in small birds or mammals (prey organisms).

Ecological Impacts of Contaminants

The effects of contaminants on ecological receptors can be based on direct comparisons of toxicological reference values (TRVs) with measured concentrations in the abiotic exposure media expressed as mg/kg or mg/L, or effects can be based on comparisons of the reference doses with estimated doses that a wildlife receptor receives from the environment. Doses are expressed as mg/kg-body weight/day.

To evaluate potential risks to plants and soil invertebrates, comparisons of EPCs were made with 10 x ESLs, used to represent lowest observed effect concentrations (LOECs).

In accordance with assessment endpoints involving survival, reproduction, development, and/or growth for the terrestrial-feeding wildlife, appropriate dietary toxicological endpoints (i.e., doses) for COPECs were reviewed for application in the evaluation. Both LOAEL and NOAEL values are applied in the evaluation to provide a range of risk assessment results for wildlife. The primary source for all ingestion pathway TRVs is the LANL (2005).

6.1.3 Risk Estimates

Risk estimates, expressed in terms of hazard quotients (HQs), based on both NOAELs and LOAELs or equivalent benchmarks to provide a range of predicted outcomes, and were calculated for each appropriate receptor group for the site.

HQ = EPC or Dose / TRV

HQs are interpreted as follows:

- $HQ_{NOAEL} < 1$ suggests no risk.
- $HQ_{NOAEL} > 1$ but $HQ_{LOAEL} < 1$ suggests potential risks, and the uncertainty associated with this conclusion must be evaluated further.
- $HQ_{LOAEL} > 1$ suggests potential risks.

Although the HQ is not a definitive measure, it can be used to estimate the potential level at which the measured or predicted exposure (EPC or Dose) relates to known levels at which adverse effects have been observed in laboratory toxicological studies or found not to be statistically significant (the LOAEL and NOAEL, respectively). Nevertheless, these HQs contribute to the "line-of-evidence" for interpreting the

potential for ecological risks. However, the LOAEL dose is the appropriate TRV for evaluating risk at the population level for common species that serve as wildlife receptors.

6.1.4 Risk Estimate Results

Results of the risk estimation process in terms of HQs are provided in the following tables. These results are discussed further in the vegetation and wildlife sections below and in Ecological Risk Assessment in Appendix C.

Table 6-1 Risk Estimate Results in Hazard Quotients (HQs) for Plants and Soil Invertebrates. Desert Rock Energy Project.

Analyte	Concentration in Soil After 50 Years of Deposition (mg/kg)	Plant Surrogate LOEC (mg/kg)	Plant HQ	Soil Invertebrate Surrogate LOEC (mg/kg)	Soil Invertebrate HQ
Surface Soil (0-2 cm)					
Mercury	2.41E-02	340	7.09E-05	0.5	4.82E-02
Selenium	3.20E+00	1	**3.20E+00**	77	4.16E-02
Soil Column (0-10 cm)					
Mercury	2.15E-02	340	6.32E-05	0.5	4.30E-02
Selenium	9.98E-01	1	9.98E-01	77	1.30E-02

Source: URS 2007
Hazard Quotients exceeding 1.0 are shown in bold.

cm = centimeters

ESL = Ecological Screening Level. See LANL (2005) in Table 4.1-1

HQ = hazard quotient; concentration in soil/ESL

LANL = Los Alamos National Laboratory

LOEC = lowest observed effect concentration; estimated at 10 X ESL

mg/kg = milligrams per kilogram

SSL = Soil Screening Level

Table 6-2 Risk Estimate Results in Hazard Quotients (HQs) for Plants and Soil Invertebrates. Desert Rock Energy Project.

	Avian Herbivore Horned Lark		Avian Carnivore Red-tailed Hawk		Avian Insectivore Western Meadowlark	
COPECs	**NOAEL**	**LOAEL**	**NOAEL**	**LOAEL**	**NOAEL**	**LOAEL**
Mercury	**2.0E+00**	2.0E-01	2.7E-02	2.7E-03	1.0E-01	1.0E-02
Selenium	**2.8E+00**	8.3E-01	7.1E-03	2.1E-03	6.0E-02	1.8E-02
	Mammalian Herbivore Black-tailed Jackrabbit		**Mammalian Insectivore Deer Mouse**		**Mammalian Carnivore Kit Fox**	
COPECs	**NOAEL**	**LOAEL**	**NOAEL**	**LOAEL**	**NOAEL**	**LOAEL**
Mercury	5.5E-03	5.5E-04	7.0E-03	7.0E-04	3.1E-04	3.1E-05
Selenium	**1.3E+00**	8.0E-01	6.0E-01	3.6E-01	3.9E-02	2.4E-02

Source: URS 2007
Hazard Quotients exceeding 1.0 are shown in bold.

COPECs = chemicals of potential ecological concern

LOAEL = lowest observed adverse effects level

NOAEL = no observed adverse effects level

6.2 Air Quality Effects

Estimated emissions of chemical air pollutants and toxicants associated with the Desert Rock Energy Project were extracted from the air quality permit application prepared by ENSR for Desert Rock Energy, LLC and submitted to the U.S. Environmental Protection Agency (EPA) Region 9. In addition, ENSR performed dispersion modeling to evaluate air quality impacts of the power plant on local and regional air quality, including the deposition of particulate matter, sulfates, nitrates, dioxin and six metals; arsenic, cadmium, chromium, lead, mercury, and selenium. Based on results of these studies, the primary air pollutants associated with the Desert Rock Energy Project are expected to be fugitive dust associated with construction and mining activities, as well as emissions of chemical air pollutants and toxics associated with operation of the power plant and exhaust emissions from vehicles and other equipment (URS 2007).

6.2.1 Fugitive Dust

Earthmoving activity associated with construction projects typically cause emissions of particulate matter, in the form of fugitive dust.

Power Plant Site. URS conservatively assumed that up to 120 acres of ground surface would undergo active earthmoving activity at any one time on the power plant site. Maximum controlled PM_{10} emissions from plant site construction are estimated to be 13.2 tons/month. Based on a 36-month construction schedule, it is estimated that a maximum of 475.20 tons of PM_{10} will be emitted during plant site construction.

Water Well Field and Water Supply Pipeline. URS conservatively assumed that twenty production wells would be installed within the well fields for either sub-alternative well field area B (proposed) or A. In addition, based on the anticipated geospatial arrangement of the wells, up to fifteen miles of well field interconnection piping trenches and fifteen miles of two-track roadways to access the work areas within the well field may be required. A total of 109.3 acres of work area was estimated for the well field associated with each sub-alternative. Maximum controlled PM_{10} emissions from the well field under either preferred sub-alternative B or sub-alternative A are estimated to be 45.9 tons/month. Based on a six-month construction schedule, it is estimated that a maximum of 275.4 tons of PM_{10} would be emitted during construction of the well field under either sub-alternative. Under sub-alternative A, an additional twelve miles of water supply pipeline would be constructed along the utility corridor to bring the water to the plant site. Maximum controlled PM_{10} emissions from installation of the water supply pipeline, within the utility corridor under sub-alternative A are estimated to be 62.9 tons/month. Based on a twelve-month construction schedule, it is estimated that an additional 377.4 tons of PM_{10} will be emitted during installation of the water supply pipeline under sub-alternative A.

Transmission Lines. Based on a nine-month construction schedule, it is estimated that a maximum of 115.7 tons of PM_{10} would be emitted during construction of Segments A, C and D. An alternate transmission line route would replace of Segment A with a longer Segment B. Segment B is 11.1 miles long. Maximum controlled PM_{10} emissions from construction of Segment B are estimated to be 7.6 tons/month. Based on a nine-month construction schedule, it is estimated that a maximum of 172.8 tons of PM_{10} will be emitted during construction of Segments B, C and D (a net increase of 57.1 tons over the proposed transmission line).

Access Roads. Maximum controlled PM_{10} emissions from construction of the road are estimated to be 8.4 tons/month. Based on a 12-month construction schedule, it is estimated that a maximum of 100.8 tons of PM_{10} would be emitted during construction of the plant access road.

For the proposed alternatives, the total maximum controlled PM_{10} emissions from construction of the plant site, well fields, transmission lines and access road are estimated to be 147.7 tons/month. Since these emissions are generated by earthmoving activity and occur at ground level, it is unlikely that the PM_{10} would be transported more than one or two kilometers, except on unusually windy days (see Mitigation section for dust control measures during periods of high wind). In addition, the PM_{10} emissions will be spatially distributed over a large area and spread out over construction schedules ranging from 6 to 36 months. Furthermore, the locations of active work areas will be transient, with work activities typically moving to a new location every few days. Finally, the PM_{10} emissions from earthmoving activity will be temporary, ceasing as each phase of the project is completed.

Apart from screening out sunlight, PM_{10} in the form of fugitive dust that is deposited on leaves of plants blocks their conductance of CO_2, thus reducing photosynthetic capacity. Impacts may include low viability of annual species or reduced growth rates during periods when fugitive dust is particularly high. Fugitive dust has the potential to impair respiratory functions of wildlife; however, there are few published studies that address the short or long-term implications of dust pollution on wildlife health. At high levels, fugitive dust can impair visibility, limiting the ability of predators to spot prey and, conversely, reduce the ability of prey to evade predators.

In the project area, the impact of dust pollution on vegetation and wildlife is expected to be of localized importance near construction areas. Likewise, because intensive construction is only expected to occur for less than 36 months, dust pollution that results from construction activities is expected to have only short-term impacts on vegetation and wildlife and would be limited to the time of construction disturbance. Impacts from fugitive dust resulting from mine operations would be low, localized and long term.

6.2.2 Emissions

During construction, gasoline and diesel fueled vehicles and equipment will generate gaseous and particulate exhaust emissions, including volatile organic compounds (VOCs), carbon monoxide (CO), nitrogen oxides (NO_x) and PM_{10}. In the DEIS, annual emissions for all diesel-fueled vehicles and equipment were calculated based on average engine horsepower for each type of vehicles and equipment, and an operating schedule of 10 hours/day, 6 days/week and 52 weeks/year. Annual emissions for gasoline-fueled pickup trucks and crew cabs were calculated based on a traveling distance of 10 miles/day during Power Plant construction, 25 miles/day during Access Road construction, and 50 miles/day during transmission line and water conveyance system construction, all with an operating schedule of 6 days/week and 52 weeks/year (URS 2007). Maximum annual tailpipe emissions from plant employees commuting to the project site would be 13.5 tons VOC, 132.0 tons CO, 6.9 tons NO_x, 2.7 tons PM_{10} and 0.3 tons of SO_2. These emissions would be mobile and distributed across a large rural area; therefore, the ambient air quality impacts would be considered negligible.

In the project area, the impact of vehicle emissions on vegetation and wildlife is expected to be of localized importance near construction areas. Intensive construction is only expected to occur for less than 36 months, emissions from construction activities are expected to have only short-term impacts on vegetation and wildlife and would be limited to the time of construction disturbance. Impacts from vehicle emissions resulting from mine operations would be low, localized and long term.

Criteria air pollutant emission rates were obtained from the Prevention of Significant Deterioration (PSD) permit application. Table 6-3 presents a summary of maximum potential-to-emit (PTE) criteria air pollutant emission rates from the proposed power plant. These emission rates are based on the conservative assumption that both generating units of the plant will operate for 8,760 hours each year, at

full-load operation. Based on these PTE values, the proposed power plant will be a major source, as defined under federal New Source Review and Prevention of Significant Deterioration (NSR/PSD) regulations, codified at 40 CFR §51.166, for PM_{10}, NOx, SO_2, CO, Ozone (NOx and VOC emissions) and lead (URS 2007).

Table 6-3. Summary of Maximum Potential Criteria Pollutant Emissions in Tons Per Year (typ) from Proposed Desert Rock Energy Project Power Plant (URS 2007)

Pollutant	PC Boilers (tpy)	Auxiliary Boilers (tpy)	Emergency Generators (tpy)	Fire Water Pumps (tpy)	Material Handling (tpy)	Storage Tanks (tpy)	Project PTE (tpy)
CO	5,526	2.55	0.17	0.031	n/a	n/a	5,529
NOx	3,315	7.13	2.26	0.41	n/a	n/a	3,325
SO_2	3,315	3.61	0.068	0.012	n/a	n/a	3,319
PM	553	1.02	0.083	0.015	22.3	n/a	576
PM_{10}	1,105	1.68	0.077	0.014	18.4	n/a	1,125
VOC	166	0.17	0.11	0.019	n/a	0.14	166
Lead	0.1	0.00064	0.000012	0.0000022	n/a	n/a	0.1
Fluorides	13.3	neg	neg	neg	n/a	n/a	13.3
H_2SO_4	221	0.062	0.002	0.0004	n/a	n/a	221
Mercury	0.057	0.00021	neg	neg	n/a	n/a	0.057
Hydrogen Sulfide	neg	neg	neg	neg	n/a	n/a	neg
Total Reduced Sulfur	neg	neg	neg	neg	n/a	n/a	neg
Reduced Sulfur Compounds	neg	neg	neg	neg	n/a	n/a	neg

SOURCE: ENSR/AECOM Desert Rock Updated Class I Modeling Report January 2006 In URS 2006
n/a – not applicable, neg. – negligible

The DEIS (2007) for the Desert Rock Energy Project specifies that approximately 7,000 tons of coal will be combusted in the power plant facility each year. This will result in the emission of several chemical pollutants and toxicants including volatile organic compounds (VOCs), carbon monoxide (CO), nitrogen oxide (NO_x) and PM_{10}, as well as sulphur dioxide (SO_2). Table 6-3 displays the maximum predicted air quality impacts from the proposed action. The DEIS estimates that the Desert Rock Energy Project will result in generation of 166 tons/year of VOCs, which is an increase of 21.5% over existing emissions in the Four Corners Region. It is estimated that CO emissions will be approximately 5,529 tons/year, an increase of 46.5% over existing conditions. NO_x emissions are estimated to be 3,325 tons/year, an increase of 2.3% over existing conditions. PM_{10} emissions associated with operation of the power plant facility are estimated to be 1,125 tons/year, an increase of 13.5% over existing conditions. SO_2 emissions are expected to be approximately 3,319 tons/year, an increase of 2.8% over existing conditions.

Maximum predicted air quality impacts from the proposed project are detailed in the DEIS; however, computer-based modeling analyses indicate that maximum predicted ambient concentrations of NO_x (annual), SO_2 (annual), and CO (1 hr and 8 hr) will be below the significant impact levels for these pollutants within 1 km of the proposed power plant site (URS 2007). In contrast, maximum annual predicted ambient concentrations of PM_{10} (24 hr and annual) and SO_2 (3 hr and 24 hr) will be above significant impact limits for these pollutants within 1 km of the power plant facility. The model predicted air concentrations of the criteria pollutants decrease with greater distance from the proposed site. This analysis indicates that the predicted plant emissions are not expected to increase air concentrations of any of the criteria pollutants to concentrations exceeding the National Ambient Air Quality Standards (NAAQS) criteria, at any location from the power plant fence line out.

Six metals, two dioxins and monomethyl hydrazine were selected for human health and ecological risk assessment analysis. Using AP-42 emission factors for hazardous air pollutants (HAPs) from coal combustion and the maximum coal combustion rates for the proposed power plant, HAP emission rates were calculated. Table 6-4 summarizes the coal combustion emission factors and calculated maximum emission rates, in pound per hour (lb/hour) and grams per second (g/sec) for these nine air toxics. The emission rates in g/sec were used to extrapolate predicted ambient concentrations and deposition rates, based on ENSR's modeling results for a hypothetical toxic emitted at 1 g/sec (URS 2007).

Table 6-4. Estimated Emission Rates in Pounds per Ton (lb/ton) and Grams per Second (g/s) for Selected Air Toxics from the Proposed Desert Rock Energy Project Power Plant. (URS 2007)

Contaminant	[1] AP-42 Emission Factor (lb/ton)	Emissions	
		(lb/yr)	(g/s)
Arsenic	4.1E-04	9.06E-02	1.30E-06
Cadmium and compounds	5.1E-05	1.13E-02	1.62E-07
Chromium VI	7.9E-05	5.55E+02	7.98E-03
Lead	4.2E-04	9.28E-02	1.34E-06
Mercury (elemental)	8.3E-05	1.83E-02	2.64E-07
Selenium	1.3E-03	9.13E+03	1.31E-01
2,3,7,8-TCDD (dioxin)	1.43E-11	3.16E-09	4.55E-14
Total PCDD (dioxins)	6.66E-09	1.47E-06	2.12E-11

TCDD = Tetrachlorodibenzo-P-Dioxin

PCDD = Polychlorinated Dibenzo-P-Dioxins

[1] From AP-42 for External Combustion Sources - Bituminous and Sub-bituminous Coal Combustion 9/98 (Emission Factors for controlled coal combustion) – Tables 1.1-18 (Trace Metals) and 1.1-12 (Dioxins)

Chemical air pollution is often manifested in two general forms: phytochemical smog and acid rain, both of which can significantly impact vegetation. Photochemical smog is the product of chemical reactions driven by sunlight and involving NO_x of urban and industrial origin and VOCs from either vegetation (biogenic hydrocarbons) or human activities (anthropogenic hydrocarbons). Ozone (O_3) and peroxyacetylnitrate (PAN) produced in these complex reactions can become injurious to plants and other life forms, depending on concentration and duration of exposure. Generally, concentrations of SO_2 and NO_x in air that exceed 0.5 mL L^{-1} are known to inhibit plant growth (Zeiger et al. 2002). Plants are capable of a number of innate enzymatic processes that effectively detoxify chemical pollutants. However, when the concentration of chemical pollutants in plant tissue exceeds their innate detoxification mechanisms, processes including photosynthesis, water regulation and respiration are impaired, reducing growth and development (Brace et al. 1999). In addition, accumulation of chemical pollutants in plant tissue can result in harmful genetic mutations, which can greatly reduce the fitness of the organism and its offspring (Zeiger et al. 2002).

The concentrations of chemical air pollutants that plants in the project area will be exposed are expected to be variable and depend on location, wind direction, rainfall, and sunlight. The response of plants to chemical pollutants are also expected to be affected by other ambient conditions, such as light, humidity, temperature, and the supply of water and minerals. In general, chemical pollution that interferes with the ability of plants to photosynthesize may be indicated by changes in the physical appearance. For example, damaged caused by SO_2 is first noticeable on leaves of plants; leaves in mid-growth are the most vulnerable, whereas older and younger leaves are more resistant (Zeiger et al. 2002). Alternatively, O_3 is often responsible for oxidative damage to cell membranes, limiting photosynthetic capacity, which can result in reduced growth and may increase the severity and susceptibility of plants to fungal diseases (Zeiger et al. 2002). Therefore, chemical air pollution has the potential to limit and/or reduce growth of

vegetation. Likewise, chemical air pollution may increase susceptibility of plants to fungal disease, as well as infection with parasitic, viral and bacterial pathogens (Curtis 1996).

Wildlife can be exposed to air pollutants via inhalation of gases or small particles, consumption of particles in food or water, and/or via absorption of gasses through the skin. In general, only soft-bodied invertebrates or amphibians are affected by the absorption of air pollutants. An individual's response to a pollutant varies greatly and depends on the type of pollutant involved, the duration and time of exposure, and the amount taken up by the animal (USEPA 2006). The individual's age, sex, health, and reproductive condition also play a role in its response (USEPA 2006).

Impacts of chemical pollution, including phytochemical smog and acid rain, on wildlife have the potential to be more widespread than that caused by fugitive dust, and has potential to impact wildlife further from the pollution source. Similar to atmospheric dust, compounds including O_3, SO_2 and NO_2 have particularly negative impacts on the respiratory systems of animals. Compared to other groups of animals, birds may be most susceptible to illness or injury related to airborne chemical pollutants, due to their relatively higher respiratory rates (Kimball 2006). In addition to causing respiratory problems, chemical pollutants may accumulate in the tissues of both plants and wildlife, which can lead to tissue damage, genetic mutations and other negative impacts. The accumulation of chemical pollutants in the tissues of wildlife can also have additive impacts among successively higher trophic levels, as compounds that accumulate in vegetation are consumed by herbivores, which are in turn consumed by predators. This tendency for pollutants to reach progressively higher concentrations among higher levels in food webs is referred to as "biomagnification" (Kimball 2006).

The concentrations of chemical air pollutants that wildlife in the project area will be exposed are expected to be variable and depend on location, wind direction and rainfall. Chemical pollution that results in tissue damage or mutation may be indicated by reductions in reproductive success, reduced longevity or death among individuals or cohorts of individuals in the project area and vicinity. In addition, changes in the physical appearance and/or behavior of wildlife may also be an indicator of the negative impacts of chemical air pollution.

Potential risks to ecological receptors (soil invertebrates, vegetation and wildlife) from the proposed plant's chemical emissions were evaluated in combination with the concentrations of these chemicals already present in the environment, to the extent that existing conditions are known. The risk analysis followed risk assessment procedures developed by USEPA. The ecological risk assessment includes a screening process where chemicals of potential ecological concern (COPECs) are selected and the subsequent risk-based assessment where site-specific risks and impacts are evaluated. A more detailed discussion of the ecological risk assessment is provided above in Section 5.1. Toxicity Reference Values (TRVs) for each soil COPEC representing NOAEL (no observed adverse effect level) and LOAEL (lowest observed adverse effect level) doses were selected or developed to provide a range in potential effects in the evaluation. The HQ (hazard quotient) tool as applied in the evaluation should not be construed as an accurate "measure" of risk, but rather as an "indication" of the potential for risk.

Based on the results shown in these tables for the COPECs of mercury and selenium, maximum selenium concentrations in soil after 50 years present a possible risk (HQ = 3.2) to plants (Table 6-1).

According to the ecological risk assessment prepared by URS, the calculated HQ for plants exposed to selenium is overly conservative due to conservative estimates of exposure and toxicological benchmarks. The selenium HQ of 3.2 is based on estimated surface soil (0-2 cm) concentrations; however, soil column (0-10 cm) concentrations in contact with plant root zones do not exceed the plant lowest observed effect concentrations (LOEC), and the LOAEL HQ is lower than 1.0. Also, the ESL (ecological screening

level) for plants exposed to selenium (0.1 mg/kg) in LANL (2005) is overly conservative compared with screening benchmark from Efroymson et al. (1997). Therefore, the ecological risk assessment concludes that plants likely are not at risk from selenium deposited on the soils over the 50 years of power plant operation (URS 2007).

According to the ecological risk assessment, based on LOAELs, none of the wildlife species, which represent herbivores, insectivores, and carnivores, are at risk from mercury or selenium deposited on soils (Table 6-2). HQs (LOAEL-based) for wildlife range from 3.1E-05 to 8.3E-01. The highest HQs are for the horned lark (avian herbivore) and the black-tailed jackrabbit (mammalian herbivore) exposed to selenium. The sensitivity of these two receptors to selenium (and to mercury) is seen in the NOAEL-based HQs that are greater than 1.0.

The calculated HQs for the horned lark and the black-tailed jackrabbit are, by design, very conservative, because the majority of uncertainties discussed in Appendix C contribute to an overestimate of exposure and risk (see Section 4.2.5 in Appendix C). The only HQs exceeding 1.0 are based on NOAEL dose TRVs (toxicity reference values). In the context of assessing risk to common species, LOAELs are the more appropriate TRVs because an impact at the population level is the threshold for significance. The HQs calculated using LOAEL TRVs are all lower than 1.0. The ecological risk assessment concludes that, the LOAEL-based HQs indicate unlikely potential risk for adverse effects to the survival, growth, or reproduction of terrestrial herbivorous birds or mammalian herbivores at the population level by the year 2056 in areas of greatest deposition (URS 2007).

Models predicting ozone concentrations were not evaluated because is not required under the PSD permitting procedures and the modeled ambient concentrations of ozone precursor compounds (NOx and VOC) were deemed insignificant (per the PSD criteria).

6.3 Water Quality Effects

6.3.1 Surface Water Quality

Over a period of 7 years in the 1990s, aquatic plants, aquatic macroinvertebrates and fish tissues were sampled from the San Juan River by the U.S. Fish and Wildlife Service (USFWS 1999). Tissues were analyzed for 21 trace elements (metals) as well as hydrocarbons (primarily fossil fuels). Four trace elements (arsenic, copper, selenium and zinc) and hydrocarbons were identified as contaminants of concern in the San Juan River. The report tentatively concluded that concentrations of aluminum, iron, nickel, vanadium, chromium, lead, magnesium, boron and arsenic were from the ambient geochemical environment, rather than from point-sources of pollution. Sources of other pollutants were unknown or may have been from the ambient, geochemical environment and/or point sources of pollution.

According to the report, both mercury and selenium are of concern to endangered fish species and to fish eating birds along the San Juan River. Twenty-two percent (22%) of fish samples, mostly from upstream reaches, exceeded the 0.1 µg/g wet weight of the mercury recommended threshold to protect sensitive species of fish eating birds. The document thus concluded that such birds could be at risk for mercury toxicity. Potential dietary items for Colorado pikeminnow (small fish, speckled dace, and red shiners) were found to exceed the selenium dietary criterion of 3.0µg/g. Invertebrates sampled from the San Juan River were found to exceed the dietary toxicity threshold for larval razorback suckers and one (1) plant sample, 45% of invertebrate samples and 76% of fish samples (including one razorback sucker) had selenium concentrations above thresholds of concern. Reproductive failure was expected to occur with a low-to-moderate occurrence in endangered fish species given selenium concentrations found in tissues and diets.

In 2003, the USGS (Gray et. al 2004) conducted a study on Narraguinnep Reservoir, located in Cortez, Colorado to identify potential sources of mercury contamination in reservoir fish species. As there are no point sources of significant mercury contamination to this reservoir or its supply waters, the USGS evaluated potential historical mercury sources and deposition of mercury to Narraguinnep Reservoir by measuring mercury concentrations in sediment cores collected from the reservoir. The cores were dated by the 137Cs method and these dates were further refined by relating water supply basin hydrological records with core sedimentology. Rates of historical mercury flux were calculated (ng/cm2/a) based on the mercury concentrations in the cores, sediment bulk densities, and sedimentation rates. The flux of mercury found in Narraguinnep Reservoir increased by approximately a factor of 2 after about 1970. The three most likely sources of mercury to Narraguinnep Reservoir are surrounding bedrocks, upstream inactive gold-silver mines, and several coal-fired electric power plants in the Four Corners region. Patterns of mercury flux do not support dominant mercury derivation from surrounding bedrocks or upstream mining sources. There are fourteen (14) coal-fired power plants within 320 km of Narraguinnep Reservoir that produce over 80 x 10^6 MWH of power and about 1640 kg-Hg/a are released through stack emissions, contributing significant mercury to the surrounding environment. Two of the largest power plants (Four Corners Power Plant and the San Juan Generating Station), located within 80 km of the reservoir, emit about 950 kg-Hg/a. Spatial and temporal patterns of mercury fluxes for sediment cores collected from Narraguinnep Reservoir suggest that the most likely source of mercury to this reservoir is from atmospheric emissions from the coal-fired electric power plants, the largest of which began operation in this region in the late-1960s and early 1970s.

Air emissions from the proposed power plant, in particular small quantities of mercury and selenium, would be introduced into the San Juan River. Deposition of toxic chemicals in waterways from the proposed action would incrementally add to existing levels. Based on model output files, ENSR prepared a table of predicted deposition rates for air toxics emitted by the proposed Desert Rock power plant over a three year period (2001-2003) using meteorological conditions during those years. Predicted surface soil concentrations were highest if the 2003 meteorological conditions are constant for 50 years; however, the predicted 50-year concentration does not vary much between the three years. Table 6-5 presents the maximum predicted concentrations and deposition rates (wet, dry and total) of the selected air toxics, for the 2003 calendar year (URS 2007).

Table 6-5. Modeled Concentrations and Deposition Rates for Selected Air Toxics (2003 Meteorological Conditions) (URS 2007)

Contaminant	Max Concentration [1]		Max Wet Deposition Flux [2]		Max Dry Deposition Flux [2]		Total Deposition Max Rate [2]	
	24-hour Avg. (micro g/m^3)	Annual Avg. (micro g/m^3)	24-hour Avg. (mg/m^2 day)	Annual Avg. (mg/m^2 yr)	24-hour Avg. (mg/m^2 day)	Annual Avg. (mg/m^2 yr)	24-hour Avg. (mg/m^2 day)	Annual Avg. (mg/m^2 yr)
Arsenic	4.20E-03	1.41E-04	5.06E-02	1.68E-01	3.32E-08	4.08E-04	5.06E-05	1.68E-01
Cadmium and compounds	5.22E-04	1.76E-05	6.29E-03	2.09E-02	4.13E-09	5.07E-05	6.29E-06	2.10E-02
Chromium VI	8.09E-04	2.73E-05	9.75E-03	3.24E-02	6.40E-09	7.86E-05	9.75E-06	3.25E-02
Lead	4.30E-03	1.45E-04	5.18E-02	1.72E-01	3.40E-08	4.18E-04	5.18E-05	1.73E-01
Mercury (elemental)	8.50E-04	2.86E-05	1.02E-02	3.41E-02	6.72E-09	8.26E-05	1.02E-05	3.41E-02
Selenium	1.33E-02	4.49E-04	1.60E-01	5.34E-01	1.05E-07	1.29E-03	1.60E-04	5.34E-01
2,3,7,8-TCDD (dioxin)	1.46E-10	4.93E-12	1.76E-09	5.87E-09	1.16E-15	1.42E-11	1.76E-12	5.88E-09
Total PCDD/PCDF	1.80E-08	6.07E-10	2.17E-07	7.22E-07	1.43E-13	1.75E-09	2.17E-10	7.23E-07

Based on Modeled Concentrations and Deposition Rates for Hypothetical Pollutant Emitted at 1 µg/m^3 provided by ENSR in URS 2007, PCDD = Polychlorinated Dibenzo-P-Dioxins; PCDF = Polychlorinated Dibenzofurans. [1] Max Concentration = the highest predicted concentration at any receptor for a 24-hour or annual average. [2] Max Deposition Flux = Maximum predicted deposition rate per unit of soil area, at any receptor, over a daily or annual averaging period

Chemical pollutants can accumulate in waterways, adversely impacting aquatic and riparian vegetation. Similar to the impacts of chemical air pollutants, chemical water pollutants can inhibit processes including photosynthesis, water regulation and respiration, which can reduce growth and development of plants. Chemical pollution deposited in waterways can also directly impact wildlife, including aquatic species and those species that depend on aquatic species; however, the concentrations of chemical water pollutants that wildlife in the project area will be exposed to are expected to be variable and depend on location and rainfall. Chemical pollutants deposited in or near waterways may also indirectly affect a number of wildlife species, particularly those who depend on riparian vegetation for foraging, nesting or breeding habitat.

Aquatic wildlife could be affected by the deposition of particulates or by runoff from areas impacted by deposition. However, most streams in the vicinity of the proposed power plant, including the Chaco River, are ephemeral. The closest permanent water bodies are Morgan Lake (approximately 22 km) northwest of the proposed power plant and the San Juan River (approximately 28 km) north of the proposed power plant.

Based on the results of air toxics modeling, it is estimated that the Desert Rock power plant could release up to 161 pounds of mercury per year through air emissions. The annual emission rate for mercury (161 pounds per year) was derived from coal analysis data provided by BHP Billiton (URS 2007). A total of 71 coal samples, taken from the coal seam designated for the proposed project in Areas IV South and V, were analyzed for mercury content. As a conservative approach, all values reported as "non-detect" were assumed to have the numerical magnitude of the analysis methods detection threshold of 0.05 ppm, resulting in a mean mercury concentration of 0.065 ppm. BHP Billiton is currently conducting additional coal sampling and analysis to verify the mean mercury content of the coal in Areas IV South and V.

The following comments are important considerations regarding the estimation of mercury emissions and deposition rates. 1) It was assumed that 80 percent of the mercury generated by the combustion process is of an oxidized, particulate form, and that the remaining 20 percent consists of elemental mercury vapor. The control efficiency of the baghouse and wet scrubber, with respect to oxidized particulate mercury, will be no less than 95 percent, thus a maximum of 4 percent of the amount initially generated will be emitted, or approximately 26.8 pounds per year. Consequently, the balance of the total emissions (approximately 134.2 pounds per year) will be comprised of elemental mercury vapor (which is not removed by the control equipment); hence the total mercury removal efficiency of the control equipment is approximately 80 percent. 2) Deposition of a majority of the residual oxidized particulate mercury (about 26.8 pounds per year) will occur within about 25 kilometers from the proposed power plant. Due to its gaseous properties, only a small percentage of the elemental mercury vapor will settle out within 25 kilometers from the plant (URS 2007).

If, after operations commence, emissions testing indicates that total mercury removal is less than 80 percent (which would be attributed to an actual ratio of oxidized to elemental mercury below 80/20), Sithe has committed to supplemental mercury control involving injection of activated carbon into the flue gas stream upstream of the control equipment. Elemental mercury will adsorb onto the surface of the carbon particles which are then captured (at a minimum 95 percent efficiency) in the control equipment (URS 2007).

Mercury is an extremely mobile pollutant and is emitted from natural and anthropogenic sources, occurring in several different chemical states in the environment (USEPA 2005b). Mercury emissions may persist in vapor form in the atmosphere and travel large distances to be deposited, or may be deposited near the proposed plant site. Deposited mercury in water courses may be re-emitted to air, remain suspended or dissolve in the water, be deposited in sediments or absorbed or ingested by aquatic

plants and wildlife (USFW 2005). A portion of mercury in water or sediment can be converted into methylmercury, which is easily absorbed by aquatic organisms and accumulates in aquatic vegetation, phytoplankton and invertebrates. The emitted mercury would consist of both particulates and vapors. The highest level of mercury emissions would occur within 0.36-km and 0.27-km from the stack (at an annual rate of 9.47E-03 mg/m2/yr) and most of that would be wet deposition. A small percentage of the total mercury coming out of the stack (0.2%) would be dry and the maximum deposition for this form of mercury (at an annual rate of 1.45E-07 mg/m2/yr) would occur about 5.3 km from the stack.

For mercury, annual average deposition at Morgan Lake would be 1.36E-04 mg/m2/yr and the annual average deposition at the San Juan River where the proposed transmission line would cross the waterway would be 1.38E-04 mg/m2/yr. Currently, the maximum reported total mercury concentration in the San Juan River of 1.6 µg/L (microgram/liter) is below the Federal MCL (maximum contaminant level) for mercury of 2 µg/L, and the maximum dissolved mercury concentration in the San Juan River of 0.3 µg/L is below the chronic AWQC (ambient water quality criterion) of 0.7 µg/L. The average existing dissolved mercury concentrations in the San Juan River at Shiprock Bridge during the period 1994-2001 was 0.1 µg/L. For the protection of aquatic wildlife, the federal chronic AWQC for dissolved mercury is 0.77 µg/L (USEPA 2006).

Based on the results of air toxics modeling, it is estimated that the proposed power plant would release a maximum of 161 pounds of mercury per year through air emissions. The emitted mercury would consist of both particulates and vapors. Some particulate mercury could be deposited both near to and far from the proposed plant site. Some portion of the mercury would be carried away by the atmosphere and would not be deposited in the region at all. It is estimated that about 19 pounds of mercury would be deposited within 25 km of the plant. The San Juan River is about 28 km from the power plant site. The actual quantity of mercury deposition that could eventually enter the San Juan River system or Morgan Lake directly or via runoff is difficult to quantify due to the high number of variables affecting deposition.

Selenium is an essential element for both aquatic and terrestrial wildlife. However, it also has the narrowest range of what is beneficial and what is detrimental. Selenium has been shown to mitigate the toxic effects of mercury and other heavy metals in some organisms. There is also evidence that it may reduce the uptake of mercury in some aquatic organisms while increasing the mercury uptake in different organisms. Aquatic wildlife is exposed to selenium through ingesting food containing selenium and not through direct exposure to the chemical in water. Selenium is a bioaccumulative pollutant, meaning it accumulates in the tissues of aquatic wildlife. However, unlike mercury, concentrations of selenium do not increase significantly (biomagnify) in animals at each level of the food chain going from prey to predator (USEPA 2004).

The AWQC for total selenium is 5.0 µg/L, and the mean concentration of total selenium in the San Juan River during the period of 1994–2001 is only 0.73 µg/L – 15 percent of the criterion. According to the USFWS (2005), selenium concentrations in fish from Morgan Lake may pose health risks to people and wildlife that consume a large amount of fish from the lake. However, the average dissolved selenium concentration measured in Morgan Lake was 1.0 µg/L which is substantially lower than the USEPA (2006) chronic water quality criterion (5.0 µg/L [total]) and the Navajo Nation Aquatic Habitat Criterion (2.0 µg/L) (USFWS (2005).

Based on the results of air toxics modeling, it is estimated that the Desert Rock power plant could release up to 9,133 pounds of selenium per year through air emissions. The maximum deposition point for selenium also would be within .36 and .27 km from the stack, at a rate of 3.38E+00 mg/m2/yr. The annual average deposition at Morgan Lake would be 2.97E-02 mg/m2/yr and the annual average deposition at the San Juan River would be 3.01E-02 mg/m2/yr. The actual quantity of mercury deposition

that could eventually enter the San Juan River system or Morgan Lake directly or via runoff is difficult to quantify based on the number of variables associated with depositon.

The proposed power plant would result in the deposition of incremental quantities of mercury and selenium in the San Juan River and Morgan Lake and would incrementally add to existing concentrations. Heavy metal concentrations are likely to vary depending on location, prevailing winds and rainfall and a number of other factors. How this incremental increase in mercury and selenium would potentially affect different aquatic species, or those species which primarily feed on aquatic wildlife or vegetation, is difficult to quantify. Species would differ in the amount and pathway of heavy metals ingested, the rate of tissue bioaccumulation, and in what, if any, potential effects to growth, reproduction or longevity may occur. This would depend on many site specific and species specific factors. The ecological effects of mercury and selenium to aquatic wildlife remain greatly unknown and require additional study to fully understand (USFW 2005). Potential adverse impacts to area aquatic resources from incremental increases in mercury and selenium concentrations would be minor and long term. These impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing.

Sediment deposited into waterways can negatively impact aquatic plants in a number of ways. Sediment in water reduces light penetration, which can reduce the ability of plants to photosynthesize (USGS 2006). Reduction in the ability of plants to photosynthesize can slow their growth and development. Sediment deposited in waterways can directly impact wildlife. For example, sedimentary particles can suffocate fish by clogging their gills and can also reduce respiratory efficiency of amphibians by adhering to their skin. Indirectly, sedimentation of waterways can reduce vegetation available as forage for wildlife when photosynthesis is impaired.

Ground disturbance associated with construction and mining has the potential to increase sediments reaching the San Juan River. The power plant construction and BNCC mining operations must comply with Clean Water Act (CWA) regulations which require that surface-water runoff from constructed surfaces be controlled such as to "prevent, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow, or runoff outside the permit area." The CWA requires that discharges to streams meet all applicable water quality standards. Office of Surface Mining (OSM) approval procedures for controlling sediment transport include berms, terraces, sediment ponds, and other energy dissipative channel structures that allow water to pond and sediment to accumulate. Additionally, accidental fuel, lubrication or other hazardous material spills in the construction zone, depending upon the size, has potential to reach the San Juan River and adversely impact localized fisheries and/or downstream habitats such as nursery backwaters.

Potential impacts to water quality from sedimentation or hazardous material spills would be mitigated by implementation of the construction *Stormwater Management Plan* and by the project *Hazardous Materials Handling and Response Plan*. Following implementation of these plans, potential impacts to water quality from increased sedimentation would be minor

6.3.2 Ground Water Effects

Groundwater will be pumped from the Morrison aquifer to supply water for the Desert Rock Power Plant cooling processes. The average annual water consumption demand of the proposed Desert Rock Power Plant is estimated at 4,950 ac/ft per year, or 3,070 gallons per minute (gpm), of continuous flow for a period of 40 consecutive years. This is the volume used in well impact modeling simulations for the water well field location (URS 2007).

A groundwater predictive computer model (Miller Brooks 2007), using the program MODFLOW, was constructed to evaluate the various combinations of well locations under Alternative B. The model

boundaries were constructed as a rectangle, from near Morgan Lake south to Burnham and from Shiprock east to Fruitland. The source aquifer was the Morrison Formation, assumed to be confined and at a constant thickness of 600 feet. Hydraulic conductivity for the Morrison Formation was estimated at 0.075 to 0.175 ft/day. Simulations were run for 20 years and for 40 years. Drawdown contour lines of ten feet or greater were mapped onto the model surface. At the center of the northern portion of the proposed well field, drawdowns were 1,885 feet for the 20-year simulation and 2,010 feet for 40 years. The southern portion of the proposed well field incurred drawdowns of 1,920 feet for 20 years of pumping and 2,020 feet for 40 years of pumping. If both well field locations are used, the maximum drawdown would be experienced at the southern center, and would total 960 feet for 20 years of pumping and 1,020 feet over 40 years.

After 40 years of pumping, a large cone of depression in the potentiometric surface of the Morrison Formation would be experienced at the project site. This cone would decrease radially from the center of the wellfield and approach zero feet of drawdown at about 10 miles.

6.3.3 Stream Flow Effects

Given the distance, greater than 10 miles, between the water well field and San Juan River no effects to streamflows are expected from the extraction of 4,950 ac/ft per year from the Morrison Aquifer (URS 2007).

For mining operations, BNCC will utilize approximately 600 ac/ft per year of consumptive water rights from the San Juan River, which will be stored in Morgan Lake. BNCC use of existing San Juan River water rights and the effects on stream flow in the San Juan River have been analyzed and documented in the Final Environmental Impact Statement Navajo Reservoir Operations Navajo Unit - San Juan River New Mexico, Colorado, Utah (USDI Bureau of Reclamation 2006). Therefore, there would be no additional effects to stream flows in the San Juan River resulting from the proposed action.

6.4 Infrastructure Related Effects

6.4.1 General Habitat Effects

Construction and operation of project components including the power plant facility, access roads, transmission lines and water well field will result in temporary ground disturbance, as well as the development of permanent structures that alter habitat for vegetation and wildlife in the analysis area. Table 4-1 in Section 4.2.1 above displays the disturbance per project component.

Construction and operation of the power plant site is expected to disturb 149 acres of primarily grasslands (50%) and shrublands (49%). Construction and operation of the preferred transmission line alignment (Segments A, C and D) would disturb approximately 1,205 acres of primarily shrublands (49%) and grasslands (39%). Segment D contains portions of canyonlands (13%) and blackbrush-ephedra-greasewood shrublands (13%). The sub-alternative transmission line (Segments B, C and D) would result in a total of approximately 1,373 acres of disturbance; 168 more acres than the preferred alternative that includes transmission line Segment A (503 acres). Construction and operation of the alternative transmission line Segment B would directly impact mostly inter-mountain basin mixed salt desert scrub lands and (50%) inter-mountain basin semi-desert grasslands (43%).

Access road construction would permanently remove approximately 21 acres inter-mountain basin semi-desert grasslands (57%) and inter-mountain basin mixed salt desert scrub lands and (22%).

The water well field Alternative A would encompass about 890 acres, almost all of which is inter-mountain basin greasewood flats (93%). Vegetation would be removed from maximum of 45 acres within the water well field for construction, drilling and operation of 20 water wells, the construction of collector pipelines and an access road. This alternative would necessitate construction of a 12.4 mile utility corridor/water pipeline which would directly impact 150 acres of vegetation. The dominant vegetation communities that occur along the utility corridor/water pipeline are inter-mountain basin mixed salt desert scrub lands (42%), inter-mountain basin semi-desert grasslands (21%), and inter-mountain basin greasewood flats (34%). Total acreage for water well field Alternative B would be 890 acres; the vegetation community in this area is co-dominated by inter-mountain basin semi-desert grasslands (33%) and inter-mountain basin mixed salt desert scrub (50%). Approximately 10.5 acres of piñon-juniper woodland occurs within the proposed water well field.

Wildlife habitat within the BNCC Lease Areas IV and V would gradually be impacted on an ongoing basis as mining activities expand over time. A maximum of 13,051 acres would be removed and altered over the life of the lease areas, primarily grassland (68%), shrublands (27%), and blackbrush-ephedra-greasewood shrublands (5%).

Disturbance and removal of soil has potential to directly and indirectly impact vegetation in the project area. Temporary soil disturbance and permanent soil removal will likely kill live individuals, and may negatively impact seed sources if dead individuals are damaged or removed. Likewise, creation of man-made structures including large buildings, roads, and mines may alter natural seed dispersal patterns, which could impact recruitment of plant species from living and dead stock. The density and diversity of vegetation species would be modified in areas reclaimed following construction. Disturbance of natural plant communities can lead to invasion of exotic species, which may be more likely to outcompete natives.

Construction and operation of the power plant facility, access roads, transmission lines and water wells is likely to impact wildlife via two primary mechanisms: 1) through removal of habitat, and 2) by altering normal movement routes. Disturbance and removal of soil and vegetation will directly and indirectly impact wildlife by removing habitat that is used for foraging, burrowing/nesting, and breeding. In addition to direct physical removal of habitats, construction of power plant facilities, transmission lines, access roads and water well facilities is likely to impede normal wildlife movement patterns. Because of the size of the physical structures themselves, wildlife movement corridors may be disrupted. This may result in localized clumping and restricted dispersal among sub-populations. Over time, restricted movement and dispersal could reduce genetic diversity in the population as a whole, or could limit the ability of individual sub-populations to recolonize following random demographic or environmental events, for example disease epidemics or extreme drought.

6.4.2 Noise Effects

Unwanted and excessive noise generated from the proposed action has the potential to adversely impact wildlife, particularly if the noise creates disruption within their nesting, foraging or breeding habitats.

Noise is generally defined as unwanted sound that is associated with human activity or human-created infrastructure that disrupts normal activity patterns. The effect of noise on wildlife has only recently been considered a potential threat to animal health and long-term survival. Assessing the impact of noise on wildlife is complicated by the variations between different species and between individuals within a single population. In addition, variation can arise depending on the characteristics of the noise and its duration, the life history characteristics of the species, habitat type, season, activity at the time of exposure, sex and age of the individual, level of previous exposure, and whether other physical stresses such as drought are occurring around the time of exposure (Busnel 1978). Despite these inherent sources

of variation, the general consensus among acoustic ecologists is that noise can affect an animal's physiology and behavior, and if it becomes a chronic stress, noise can be injurious to an animal's energy budget, reproductive success and long-term survival.

Long-term studies have shown that depending on the characteristics of the noise and the species, the reaction of the animal to noise can range from mild annoyance to panic and escape behavior (Fletcher 1980). Mild annoyance may cause wildlife to avoid or temporarily evacuate an area until the source of the noise abates. Panic or escape behavior may result in accidental injury, as animals could fall, run into objects or become trampled in panic. More specifically, studies have documented a short-term increase in heart rate among ungulates (Larkin 1996), reduced ability of small mammals to detect predators (Immel 1995), and alteration of nesting and roosting sites among raptors (Larkin 1996).

Noise is expected to be generated during construction of the proposed project components, including the power plant facilities, transmission line, access roads and water well field. The construction phase of the proposed project is projected to continue for at least 36 months. Conventional construction activities in the project area would result in a short-term increase in the ambient noise level resulting from the operation of construction equipment. The increase in noise levels would be primarily restricted to the areas surrounding construction zones and the magnitude of noise generated would depend on the type of construction activity, equipment used, duration of the activity, and distance between the noise source and the receiver. The DEIS provides detailed information on the maximum noise levels generated by typical construction equipment; however, the average sound level generated by construction equipment is 89 dBA at 50 feet from the source (URS 2007). Because construction noise is expected to be below the 90 dBA hourly levels recommended by the Federal Transit Administration, general impacts from noise are expected to be low.

Once construction is completed, operation of the project components is expected to result in the ongoing generation of noise and vibrations throughout the project area for the lifetime of the project. According to the DEIS, operation of the power plant facility is expected to generate less than 30 dBAL at nearby sound receptors, which is below residential land use requirements. Vibrations resulting from operation of the power plant are also expected to have negligible impacts, as the equipment used in the power plant facility is designed to produce very low vibration levels and are designed to shut down automatically if an unforeseen imbalance develops.

6.4.3 Human Activity Effects

Construction and operation of the Desert Rock Energy project will necessitate a substantial increase in human presence above existing levels. For example, the DEIS projects that vehicles will travel 10 miles per day during the 36-month construction of the power plant, 25 miles per day during the 12 month construction of access roads, and 50 miles per day during the 6 month construction of the transmission lines, all with an operating schedule of 10 hours per day, 6 days per week, 52 weeks per year (URS 2007). The DEIS also specifies that an estimated 200 employees on rotating shifts will be required for construction and normal operations and maintenance of the power plant and associated facilities (URS 2007). Thus, the proposed project will result in a considerable increase in human presence in the project area, which is likely to impact both vegetation and wildlife.

Human presence has the potential to disturb vegetation in the project area, particularly in areas where humans travel beyond the boundaries of established roads, walkways or structures. Vegetation could be directly impacted by humans trampling or damaging individual plants or plant communities and could be indirectly impacted by humans disrupting soils outside of established travel routes. Disruption and degradation of soil can lead to increased wind and water erosion, making it difficult for vegetation to become or remain established. Cryptogamic soil crusts, if encountered, are particularly vulnerable to

human disturbance, as these crusts can be disrupted by very few passes with a vehicle or human footprint (Belnap and Gillette 1997).

In general, wildlife tend to avoid contact or confrontation with humans. As such, wildlife in the Desert Rock analysis area may temporarily avoid areas where human disturbances are occurring, or may permanently emigrate from areas where human presence is more constant. This may result in alterations of nesting, foraging and breeding behavior in species that are particularly sensitive to human presence (Stillman et al. 2002). Wildlife may be more sensitive to human presence during significant periods of their annual cycles, including the breeding season. Construction and operation of the proposed project will require extensive vehicle travel which may increase the likelihood of collisions with wildlife. Vehicle strikes have the potential to adversely impact a variety of wildlife species, including rabbits, coyotes, fox, birds, and deer.

Depending upon the activity occurring, the proximity of the activity to wildlife and the species encountered, human activity impacts would range from negligible to major. A major impact would be attributable to harm caused to wildlife, either accidentally or intentionally from human activity in the area, that could result in serious injury or death.

6.5 Effects to Raptors and Migratory Birds

Vegetation clearing and development of electrical transmission and distribution lines may all have a negative effect on raptors and migratory birds by causing direct mortality and disrupting breeding, nesting, and foraging behaviors. In addition, nests may be disturbed during the construction phase, and less area will be available for or desirable for nesting as a result of the proposed project.

Power poles provide attractive perch, nest, and roost sites, especially in relatively flat and treeless areas, a positive impact of powerline construction for raptors. However, the size of some birds makes it possible for them to simultaneously contact two charged objects (phases or conductors) or one charged object and a ground wire. Most problems occur on distribution lines 69kV or less, particularly at junction poles and transformers. Raptors and large birds are electrocuted through phase to phase and phase to ground contacts, while small birds can be electrocuted from bushings and transformers and other pole hardware. Studies have shown that golden and bald eagles suffer some of the highest mortalities; one study based on ten years of data collected from 13 western states and Canada found that out of 1,450 confirmed raptor electrocutions, 272 were golden eagles.

In the project area, raptors (i.e. golden eagles and ferruginous hawks) and corvids (i.e. crows, ravens and magpies) are most likely to be affected by electrocution due to their relatively wide wingspans and tendency to use poles as nesting platforms and perches from which they survey for prey (Lehmann 2001).

Raptor collisions are documented most frequently on transmission lines greater than 69 kV. Collisions occur when birds cross transmission lines in daily use areas (i.e. moving from roosting to foraging habitat); when birds migrate through an area; and when rain, fog, night and other low visibility conditions can contribute to collision risk. Other factors that contribute to birds colliding with transmission lines are the body size of the bird, maneuverability, and the height that birds commonly fly. Few studies on bird flight diverters have been completed, but most found they reduced collision rates (Crowder and Rhodes 1999).

Other potential effects on raptors and migratory birds include proximity to noise and human activity (discussed above) to breeding and foraging areas. As with other area wildlife, increases in area noise and human activity would impact area raptors and migratory birds.

6.6 Federally Listed Species Effects

The project area provides potential habitat for six federally listed species and one candidate species: bald eagle, southwestern willow flycatcher, yellow-billed cuckoo, Colorado pikeminnow, razorback sucker, Mancos milkvetch, and Mesa Verde cactus. Effects to these species are described in detail in this section. Species accounts include their federal status, known distribution and habitat requirements, presence/absence or potential to occur in the project area, and potential effects to each species.

Also included in this section are recommended conservation and/or mitigation measures to minimize or eliminate potential impacts to federally listed flora and fauna species with potential to occur in the project area.

6.6.1 Bald Eagle (*Haliaeetus leucocephalus*)

Status: Federally Threatened

Distribution and Habitat: Bald eagles are associated with aquatic habitats with forested shorelines or cliffs throughout North America. Breeding populations of bald eagles in the Rocky Mountain region are increasing (Buehler 2000); however, there are no verified nesting pairs along the San Juan River in northwestern New Mexico. The southwestern U.S. (including northwestern New Mexico) does, however, support healthy populations of wintering bald eagles. Wintering habitats are typically associated with aquatic areas with some open water for foraging; however, eagles wintering in the southwestern U.S. may occupy arid habitats (Buehler 2000).

Winter habitat suitability is defined by food availability, presence of roost sites that provide protection from inclement weather, and absence of human disturbance (Buehler 2000). Wintering bald eagles are opportunistic foragers and winter diets may vary greatly across its range depending on food availability (Stalmaster 1987, Brown 1993). Forage may include a mix of live prey and carrion (Brown 1993) and consists of birds, mammals, or fish. Bald eagles prefer roost trees that are large and open (Keister and Anthony 1983, Chester et al. 1990, Buehler et al. 1991); in the western U.S., most roost trees are conifers (Keister and Anthony 1983, Buehler 2000) except in riparian areas where cottonwoods are typically used. While some wintering areas are absent of human activity, bald eagles will tolerate some human activity in areas of high prey availability (Buehler 2000).

Potential to Occur in the Project Area: In San Juan County, bald eagles are most common during the winter months and there are no verified nesting pairs along the San Juan River. The nearest known nesting sites occur approximately 40 miles northeast of the proposed project area in southern Colorado. On the Navajo Nation, bald eagles are considered winter migrants and are generally only present from November to March. However, the San Juan River corridor does provide potential nesting habitat and nesting may occur in the future (Dave Mikesic, NNDFW, pers. comm.).

Within the analysis area, the San Juan River provides quality foraging habitat for wintering bald eagles, as this perennially flowing river provides a plentiful source of fish, a primary component of the bald eagle diet. In addition, cottonwood trees which occur along and near the San Juan River provide wintering bald eagles with perching and roosting sites. Bald eagles are likely to utilize the open shrublands, extending up to 5 miles beyond the San Juan River, to forage for small mammals and scavenge for carrion. Limited roosting and nesting opportunities also exist in scattered patches of cottonwoods and/or lone trees along the Chaco River and, to a less extent, along the margins of Morgan Lake. While bald eagles may incidentally occur anywhere in the project analysis area, and at any time of the year, they would most commonly be expected to occur along the San Juan River corridor.

Ecosphere biologists conducted bald eagle roosting/nesting surveys within a 1/4-mile radius of the proposed transmission line crossing of the San Juan River on 28 February 2006 and 1 March 2006. Surveys were conducted according to USFWS accepted methodologies that consisted of dawn and dusk ocular surveys for eagles for 2 successive days during the winter. There were no winter roosting or nest sites detected in the vicinity of the San Juan River transmission line crossing. Additionally, while it is common to observe bald eagles traveling the San Juan River corridor during winter months, no bald eagles were observed during the 2006 surveys. However, in August 2004, one juvenile bald eagle was spotted in the west-central portion of the study area and another juvenile was identified near the northern boundary of the study area (Ecosphere unpublished data).

Project Effects to Bald Eagle: There would be no direct loss of suitable roosting or nesting habitat due to the removal of cottonwood trees across the San Juan River floodplain. While no nest or roost trees occur within the proposed right-of-way, there are tree nesting and roosting opportunities both up and down stream from the proposed transmission line crossing of the San Juan River. Several opportunities exist within ¼-mile of the proposed right-of-way.

During construction of the proposed transmission corridor across the San Juan River, eagles could be affected by noise and human activity disturbances due to proximity of the crossing to suitable nesting and roosting habitat. Bald eagles appear to be particularly sensitive to noise and human activity during the breeding season with distance to noise source as the primary factor of human activity determining bald eagle response (Grubb et al. 1992). Similarly, human activity can impact bald eagle distribution, causing bald eagles to avoid inhabiting developed areas (Buehler et al. 1991). Potential effects to bald eagle would be temporary avoidance of the river corridor during construction activities.

The project component with the greatest potential to impact bald eagles in the project area is the proposed transmission line span of the San Juan River. The proposed transmission line will be placed adjacent and parallel to an existing power line. While this span would not directly impact individual roost or nest trees, the addition of electrical transmission towers and lines would increase the potential for eagle line strikes/collisions and electrocution from perching on or near tower conductors. Raptor collisions are documented most frequently on transmission lines greater than 69 kV. The addition of electrical transmission towers and lines would increase the long term potential for bald eagle line strikes/collisions and electrocution from perching on or near tower conductors.

Recommended Conservation / Mitigation Measures:

- Timing restrictions for construction and maintenance of transmission towers within and above the San Juan River floodplain (i.e. all towers within ¼-mile of the San Juan River) and similar restrictions on timing for stringing conduit across the San Juan River. Work should not be conducted between November 1 and March 31 to avoid disturbance to over-wintering bald eagles.

- Should a bald eagle(s) be observed perched within ¼-mile of the transmission line crossing of the San Juan River, or of tower placements near the Chaco River, no construction activities should commence until the eagle leaves the area of its own accord.

- Hospital-grade mufflers should be installed on all permanent project components that generate noise above acceptable levels in areas that are likely to be utilized by bald eagles for roosting or foraging.

- Proposed electrical transmission and distribution lines will be designed and constructed utilizing "raptor-safe" design. The most complete manual on this work is *"* Suggested Practices For Raptor Protection On Power Lines: The State of the Art in 1996*" (*APLIC 1996).

- Although few studies on bird flight diverters have been completed most found they reduced collision rates (Crowder and Rhodes 1999), therefore diverters will be installed on all lines at the river crossing, per recommended specifications.

- Spacing of phase-to-phase and phase-to-ground wire should be sufficient to allow passage for large winged birds (Manville 2006). To minimize electrocutions that may occur while eagles are perching, installation of cross-arm braces on steel distribution poles or installation of artificial perches on wooden distribution poles is recommended (Manville 2006).

Determination of Effect: The proposed action may affect, is likely to adversely affect bald eagle.

6.6.2 Southwestern willow flycatcher (*Empidonax traillii extimus*)

Status: Federally Endangered with Designated Critical Habitat

Distribution and Habitat: Southwestern willow flycatchers are neotropical migrants that occur in dense riparian habitats along streams, rivers, and other wetlands where cottonwood, willow, boxelder, tamarisk, Russian olive, buttonbush, and arrowweed are present (USFWS 2002). Nests are found in thickets of trees and shrubs primarily 13 to 23 feet in height, among dense and homogenous foliage (USFWS 2002). Habitat occurs at elevations below 8,500 feet (USFWS 2002). This species breeds locally along the Colorado River in the Grand Canyon near the mouth of the Little Colorado River, and south of Yuma; at the Little Colorado River headwaters near Greer and Eagar; very locally along the middle Gila, Salt, and Verde rivers; middle to lower San Pedro River; and upper San Francisco River near Alpine (USFWS 2002). In addition to being protected under ESA, this species also is protected by the Migratory Bird Treaty Act (MTBA).

Potential to Occur in the Project Area: The breeding range of southwestern willow flycatcher extends into the Navajo Nation, and breeding has been documented along the San Juan River. Despite the presence of suitable habitat, no breeding southwestern willow flycatchers are known to occur in the project area. There is only one known historic breeding territory for southwestern willow flycatchers in San Juan County; this location occurs along the San Juan River at a location that is northwest of the proposed project area on the Navajo Nation. Migrants have been commonly recorded along the San Juan River during Bureau of Land Management Farmington Field office (BLM/FFO) surveys. The BLM has no documented occurrences of breeding southwestern willow flycatchers (Barney Wegener BLM/FFO, pers. comm. 2006).

Migrants have the potential to occur in the project area from May to August and are most likely to occur along the San Juan River and at Morgan Lake. Within the project area, breeding habitat for this species is present along the San Juan River crossing and at Morgan Lake. These habitats consist of dense riparian vegetation and active wetlands, backwaters and sloughs. Because water only occurs in the Chaco River seasonally and given the absence of dense vegetation, it is not considered potential breeding habitat. Sections of vegetation along the Chaco River do provide potential migratory stopover habitat for southwestern willow flycatchers.

USFWS protocol surveys conducted in the project area in 1998 and 1999 indicated the presence of southwestern willow flycatchers in the 2nd and 1st survey periods, respectively, but flycatchers were not

detected during the 3rd survey period in either year (USDI 2001). In surveys conducted in the project area in 2004 by Ecosphere, six southwestern willow flycatchers were detected during the first survey period at Morgan Lake and no individuals were documented near the San Juan River. No detections were documented beyond the first survey period in 2004 at either Morgan Lake or near the San Juan River. In the most recent protocol surveys of the project area, conducted in June 2006 by Ecosphere, one willow flycatcher was detected near the transmission line crossing along the San Juan River during the 1st survey period. During the 2nd and 3rd survey periods no individuals were detected, which according to USFWS guidelines suggests that the flycatcher detected during the 1st survey period was a migrant, rather than a resident breeder. No flycatchers were detected near Morgan Lake in 2006 during any survey period. Preliminary surveys conducted by Ecosphere along the Chaco River in 2006 revealed that this area provided limited habitat for southwestern willow flycatcher and it was determined that this species is not likely to occur near the Chaco River.

Project Effects to Southwestern Willow Flycatcher: There would be no direct removal of suitable nesting habitat for this species in any of these three habitat areas; San Juan River, Morgan Lake, and Chaco River. Currently, there is an approximately 50-foot wide fringe of previously disturbed tamarisk extending for approximately 200-feet south of the San Juan River along the west edge of the Transmission Line Segment D. At the time of the 2006 presence/absence surveys (negative results) in this area, this tamarisk fringe did not represent good nesting substrate due to its relatively short height (less than 6-ft). However, in 5 years or more, these tamarisk patches have potential to mature into suitable breeding habitats for the southwestern willow flycatcher. Should this tamarisk fringe require cutting or mowing in order to place transmission towers, it is recommended that the clearing occur outside the willow flycatcher breeding period from May 1 through Aug 30 and prior to the patch maturing to potential suitable breeding habitat status.

If the tamarisk patch described above can be avoided, construction of transmission towers within the San Juan River floodplain has the potential to impact southwestern willow flycatcher as a result of increases in noise and human activity in the immediate area of suitable migratory and breeding habitats. These potential impacts would consist of temporary avoidance of the area during construction and would be avoided or minimized if construction of these towers is accomplished outside of the breeding period.

The proposed action would not impact southwestern willow flycatchers that may be present around the perimeter of Morgan Lake as these habitats are more than ½ mile away from the proposed Transmission Line Segment D and shielded from line-of-sight by topography.

Minor impacts in the form of temporary avoidance due to noise and human activities are possible during construction of Transmission Line Segment B where tower placements and line stringing activities are within ¼-mile of the Chaco River and occur during the breeding season. This potential impact assumes that willow flycatcher may, in the future, utilize the Chaco River at a minimum as migratory stopover habitat. To date there are no records of flycatchers along the Chaco River; however, only limited surveys have been completed in this drainage. Avoidance of construction activities during the breeding season within ¼-mile of the Chaco River would minimize or eliminate the potential of impacting willow flycatchers. These impacts to southwestern willow flycatcher would be insignificant and discountable.

Construction of the proposed power plant and associated infrastructure, water well field and mining operations would have no effect to southwestern willow flycatchers or potential habitats.

Recommended Conservation / Mitigation Measures:

- Timing restrictions for construction of transmission towers and stringing of conduit lines, as well as other construction and maintenance activities within and above the San Juan River floodplain

and within ¼ mile of the Chaco River. Work should not be conducted between May 1 and August 30 to avoid disturbance to migrant or potential breeding flycatchers.

- Should clearing of riparian vegetation in areas of suitable flycatcher habitat be necessary, Desert Rock Energy LLC in coordination with the Navajo Natural Heritage Program and the USFWS, will develop a compensatory mitigation plan to offset the potential loss of habitat.

- Because southwestern willow flycatcher habitat along the Chaco River was not subject to protocol surveys in 2006 in all survey periods, the Chaco River should be resurveyed for willow flycatchers if habitat conditions change over the course of project development and construction.

Determination of Effect: The proposed action may affect, is not likely to adversely affect southwestern willow flycatcher.

6.6.4 Colorado pikeminnow (*Ptychocheilus lucius*)

Status: Federally Endangered with Designated Critical Habitat

Distribution and Habitat: The Colorado pikeminnow is a cyprinid fish species endemic to the Colorado River Basin. The species was once distributed throughout the major rivers and tributaries of the basin in Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada, and California. This species is the largest cyprinid native to North America. The American Fisheries Society changed the common name for the Colorado squawfish to Colorado pikeminnow in 1998 (Nelson et al. 1998). Adults attain a maximum size of about 1.8 meters (m) total length (TL) and weigh 36 kilograms (kg).

The Colorado pikeminnow was first included in the List of Endangered Species issued by the Office of Endangered Species on March 11, 1967 (32 FR 4001) and was considered endangered under provisions of the Endangered Species Conservation Act of 1969 (16 U.S.C. 668aa). The Colorado squawfish (pikeminnow) was included in the United States List of Endangered Native Fish and Wildlife issued on June 4, 1973 (38 FR No. 106; i.e., the red book, and it received protection as endangered under Section 4(c)(3) of the original ESA of 1973. A revised Colorado Squawfish (pikeminnow) Recovery Plan was approved on August 6, 1991 (USFWS 1991), and critical habitat was designated on March 21, 1994 (59 FR 13374). A total of 1,148 miles (1,848 kilometers (km) of critical habitat have been designated for the Colorado pikeminnow in the Upper Colorado River Basin. There is no critical habitat designated in the Lower Basin. The Colorado pikeminnow recovery plan was further amended and supplemented in 2002 (USFWS 2002b). In 2003, an augmentation plan for Colorado pikeminnow in the San Juan River was approved by the USFWS (Ryden 2003).

Adult fish inhabit large to medium rivers and are found in turbid, deep pools with a strong current and rocky or sand substrate. Juvenile fish use backwater and side channel habitats with silt and sand substrates and largely consume insects and crustaceans. Pikeminnow spawn when water temperatures approach 18º centigrade (C) in July or August. Preferred spawning sites are riffles with gravel or cobble substrates (Lamara et al. 1985). The Colorado pikeminnow have been collected over 150 mile section of the San Juan River from Lake Powell to near Farmington, New Mexico (Ryden 2000).

Potential to Occur in the Project Area: On the Navajo Nation, the Colorado pikeminnow has been documented throughout the San Juan River from Shiprock to Lake Powell. The majority of adults use the stretch of the San Juan River about 11 km downstream of Shiprock to just downstream of Four Corners. Irrigation canals that feed into the San Juan River may also provide potential habitat. Because Colorado

pikeminnow require perennial bodies of water, they are not expected to occur within the Chaco River which is an intermittent stream.

Wild Colorado pikeminnow were generally believed to have been extirpated from the San Juan River after the closure of Navajo dam in 1965, however, two adult pikeminnow were collected in 1987 from the San Juan River between Shiprock and the Four Corners area confirming the species was still present (Platania 1990). Subsequent mark/recapture studies estimated that a total of 19 wild Colorado pikeminnow inhabited the San Juan River (Ryden 2000). These adult fish were found to use habitats primarily between river miles (RM) 109 to RM 142, generally between Shiprock, New Mexico and south of Aneth, Utah. Spawning has been documented to occur within a region of high channel complexity between RM 133.4 to RM 129.8, near the Four Corners Region (Ryden 2000). It is estimated that spawning occurs from July 8 to August 12 in the San Juan River (Platania 2000). Larval and juvenile pikeminnow have been collected from low velocity habitats downstream of RM 130 and Shiprock to the confluence of Lake Powell (Ryden 2000).

Experimental stocking of Colorado pikeminnow in the San Juan River was initiated in 1996. From 1996 through 2000, approximately 832,000 larval pikeminnow were stocked in the San Juan River within designated critical habitat. The relative success of these efforts was high with an over winter retention rate of about 62%. Due to the success of this initial stocking effort, a seven year pikeminnow stocking plan was initiated in 2002 which committed to the stocking of 300,000 juvenile pikeminnow at RM 180.2 and RM 158.6, between Farmington and Shiprock (Ryden and McAda 2003).

In addition, the San Juan River Recovery Program released flow recommendations for the San Juan River in 1999 that was believed to be needed to allow for the natural recovery of the Colorado pikeminnow (Holden 1999). These flow recommendations essentially described flows that would mimic the natural hydrograph to include operating Navajo Reservoir in such a manner to enhance flow conditions throughout designated critical habitat.

Other pikeminnow recovery activities have been focused on allowing this species to more freely access upstream portions of the San Juan River. To facilitate this, the Cudei Diversion (RM 140), south of Shiprock, was removed and the Hogback Diversion structure was made freely passable in 2001. Also, in 2003, a selective fish passageway was completed at the Public Service Company of New Mexico (PNM) weir in Kirtland (RM 150) to allow for native fish, including Colorado pikeminnow, species to access the San Juan River above the weir. In addition, non-native fish removal from the San Juan River, focusing primarily on channel catfish, has also been successful resulting in reduced predation from this species on juvenile Colorado pikeminnow (Dale Ryden USFWS, pers, comm. 2006).

In 2004, six Colorado pikeminnow were collected from the lower 5 miles of the Animas River during the course of a fishery survey not directly tied to the San Juan Recovery Program indicating that the range of the Colorado pikeminnow may be expanding. This was the first fully documented occurrence of this species occurring in the Animas River (Zimmerman 2005).

During the course of 2006 fall monitoring studies conducted in the San Juan River, 175 Colorado pikeminnow were collected during the first five days of sampling which extended from Farmington (RM 180) to the Four Corners area (RM 120). No wild Colorado pikeminnow were collected during the course of this survey and it's hypothesized that none remain in the system (Dale Ryden USFWS, pers. comm. 2006).

Critical habitat for this species occurs in the San Juan River across the northern portion of the project area. Colorado pikeminnow is expected to be present at certain times of the year, particularly during the summer months, within the San Juan River corridor portion of the proposed action area.

Project Effects to Colorado Pikeminnow: The proposed Transmission Line Segment D would span Colorado pikeminnow critical habitat. Construction of the proposed alignment may result in 2 tower sites being placed within the 100-year floodplain of the San Juan River resulting in permanent disturbance to approximately 1.8-acres of upland habitats. The 100-year floodplain is considered part of the critical habitat designation. Primary constituent elements are physical and biological attributes that essential to species conservation and include but are not limited to:

- Water – this includes a quantity of water of sufficient quality,
- 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 corridors between these areas, and
- Biological Environment – food supply, predation and competition (Federal Register 1991).

Construction of the Transmission Line Segment D would not result in adverse modification to primary constituent elements within designated critical habitat following the implementation of mitigation measures. No construction activities would occur within or adjacent to the San Juan River stream channel for the proposed action.

Ground disturbance associated with construction within the floodplain has the potential to increase sediments reaching the San Juan River. Additionally, accidental fuel, lubrication or other hazardous material spills in the construction zone, depending upon the size, has potential to reach the San Juan River and adversely impact localized fisheries and/or downstream habitats such as nursery backwaters.

The average annual water consumption demand of the proposed Desert Rock Power Plant is estimated at 4,950 ac/ft per year, or 3,070 gallons per minute (gpm), of continuous flow for a period of 40 consecutive years. Groundwater is proposed to be pumped from the Morrison aquifer to meet this need (URS 2007). At the center of the northern portion of the proposed well field, drawdowns were 1,885 feet for the 20-year simulation and 2,010 feet for 40 years. The southern portion of the proposed well field incurred drawdowns of 1,920 feet for 20 years of pumping and 2,020 feet for 40 years of pumping. If both well field locations are used, the maximum drawdown would be experienced at the southern center, and would total 960 feet for 20 years of pumping and 1,020 feet over 40 years.

After 40 years of pumping, a large cone of depression in the potentiometric surface of the Morrison Formation would be experienced at the project site. This cone would decrease radially from the center of the wellfield and approach zero feet of drawdown at about 10 miles (Brooks and Miller 2007). Given the distance between the water well field and San Juan River, and the depth of the Morrison aquifer, no effects to streamflows are expected from the extraction of 4,950 ac/ft per year from the Morrison Aquifer (URS 2007).

For mining operations, BNCC will utilize approximately 600 ac/ft per year of existing water rights from the San Juan River. Effects from water depletion to Colorado pikeminnow under BNCC's consumptive San Juan River water rights have been evaluated and documented in the Final Environmental Impact Statement (FEIS) Navajo Reservoir Operations Navajo Unit - San Juan River New Mexico, Colorado, Utah (USBR 2006). Therefore, there would be no additional effects from stream flow depletion to Colorado pikeminnow resulting from the proposed action beyond those previously disclosed and analyzed in the Navajo Reservoir Operations Navajo Unit - San Juan River New Mexico, Colorado, Utah FEIS.

The power plant would result in the deposition of incremental quantities mercury and selenium in the San Juan River. Pollutant concentrations are likely to vary depending on location, prevailing winds and rainfall and other factors. A more detailed discussion is provided in Section 6.3.1 under Surface Water

Quality Effects. The additive effect of mercury and selenium deposition to existing concentrations in the San Juan River will result in minor impacts to surface water quality. However, these impacts are not expected to exceed AWQC standards for the protection aquatic wildlife. Existing selenium concentrations in the San Juan River and Morgan Lake have been linked to a low to moderate occurrence of reproductive failure in endangered fish species given selenium concentrations found in tissues and diets (USFWS 2005). The cumulative impact to surface water quality from the deposition of mercury and selenium may result in adverse effects to the reproductive success of this species.

Recommended Conservation / Mitigation Measures:

- Implementation of a Storm Water Pollution Prevention Plan for all construction activities with potential to discharge of sediment into the San Juan River. This includes project components that are adjacent to the San Juan River, as well as those components constructed away from the San Juan River, but with potential for runoff to flow into the San Juan River.

- A Hazardous Materials Handling and Response Plan would be developed and implemented for all proposed project components.

Determination of Effect: The proposed action may affect, is likely to adversely affect Colorado pikeminnow.

6.6.5 Razorback sucker (*Xyrauchen texanus*)

Status: Federal Endangered with Designated Critical Habitat

Distribution and Habitat: This species is found in backwaters, flooded bottomlands, pools, side channels and other slower moving river habitats below 6,000 feet elevation. Razor back suckers have historically been found in large rivers near strong currents and once inhabited the Colorado, Gila, Salt, Verde, and San Pedro rivers. Razorback suckers spawn prior to spring run-off in late March or early April over sand or gravel substrates (BISONM 2006).

Potential to Occur in the Project Area: On the Navajo Nation, this species has potential to occur within the San Juan River, upstream from Lake Powell. However, the only occurrences of wild razorback sucker from the San Juan River are from Bluff, Utah (RM 85) and occurred in 1978 and the late 1980's Razorback sucker has never been documented from and is not expected to occur in the Chaco River, as this species requires perennial bodies of water.

The razorback sucker can be found in the San Juan River from Farmington to Lake Powell. Adult razorback suckers typically occur in deep areas of the river such as pool habitats and also large backwaters. Razorbacks feed primarily on algae, plant debris and a variety of invertebrates. Initiated in 1994, razorbacks were reintroduced from rearing facilities to the San Juan River. It has continued annually through 2006. The reintroduced populations are reproducing based on the belief there are no more wild razorback suckers left in the system collections of larval and juvenile razorback suckers from the river as recent as 2006 (Brandenberg et al. 2002, Dale Ryden, USFWS, pers. comm. 2006). Razorback spawning has been documented near Aneth, Utah at RM 100.2 and near RM 152.2 (Dale Ryden, USFWS, pers. comm. 2006). During fall 2006 electrofishing surveys conducted on the San Juan River 110 razorbacks were collected from Farmington to the Four Corners area (Dale Ryden, USFWS, pers comm. 2006). As stated above, it is hypothesized that the survivability of these stocked fish can be attributed to the success non-native catfish removal has had in reducing predation on native fishes including larval and juvenile razorback suckers.

Stocked razorback suckers use a variety of habitats. During the winter, they tend to occupy highly diverse aquatic habitats while in the early summer they're more commonly found in areas of inundated vegetation. During the summer and extending into the fall they are found most often in fast run habitats.

Similar to what was described above under the Colorado pikeminnow section, efforts were initiated to augment populations of razorback suckers in the San Juan River through stocking practices first initiated in 1999. This augmentation program has been extended through 2011 (Ryden and McAda 2003). The goal of this program is to establish an adult population of 5,800 razorback sucker in the San Juan River. Several "grow out" ponds near the San Juan River have been established to meet the stocking needs. As described above under the Colorado pikeminnow, additional recovery efforts include mimicking the natural hydrograph through the designated critical habitat reach, monitoring stocking success, control of non-native fish, habitat monitoring and removal of fish passage barriers.

As discussed above, removal of the Cudei Diversion, construction of free passage at the Hogback Diversion and construction of a selective fish passage at the PNM weir have already been completed. Razorback suckers were documented using the Nenahezad fish passage at the PNM weir in 2003 (Lapahie 2004).

Critical habitat for the razorback sucker has been designated from Neskahai Canyon (RM 10) to the Hogback Diversion (RM 160). The entire stretch of the San Juan River that crosses the project area is included in the razorback sucker critical habitat designation. Razorback sucker is expected to be present within this section of river to include the section of river within the project area.

Project Effects to Razorback Sucker: The proposed Transmission Line Segment D would span razorback sucker critical habitat. Construction of the proposed alignment may result in 2 tower sites being placed within the 100-year floodplain of the San Juan River resulting in permanent disturbance to approximately 1.8-acres of upland habitats. The 100-year floodplain is considered part of the critical habitat designation. Construction of the Transmission Line Segment D would not result in adverse effects to primary constituent elements within designated critical habitat following the implementation of mitigation measures. No construction activities would occur within or adjacent to the San Juan River stream channel for the proposed action.

Ground disturbance associated with construction within the floodplain has the potential to increase sediments reaching the San Juan River. Additionally, accidental fuel, lubrication or other hazardous material spills in the construction zone, depending upon the size, has potential to reach the San Juan River and adversely impact localized fisheries and/or downstream habitats such as nursery backwaters.

Water depletion for the operation of the proposed power plant and associated infrastructure and mining operations would have no effect to razorback sucker or critical habitat. The average annual water consumption demand of the proposed Desert Rock Power Plant is estimated at 4,950 ac/ft per year, or 3,070 gallons per minute (gpm), of continuous flow for a period of 40 consecutive years. Groundwater is proposed to be pumped from the Morrison aquifer to meet this need (URS 2007). Given the distance between the water well field and San Juan River no effects to stream flows are expected from the extraction of 4,950 ac/ft per year from the Morrison Aquifer (Brooks and Miller 2007).

Effects from water depletion to razorback sucker under BNCC's consumptive San Juan River water rights have been evaluated and documented in the Final Environmental Impact Statement Navajo Reservoir Operations Navajo Unit - San Juan River New Mexico, Colorado, Utah (USBR 2006). Therefore, there would be no additional effects from stream flow depletion to razorback sucker resulting from the

proposed action beyond those previously disclosed and analyzed in the Navajo Reservoir Operations Navajo Unit - San Juan River New Mexico, Colorado, Utah FEIS.

The power plant would result in the deposition of incremental quantities mercury and selenium in the San Juan River. Pollutant concentrations are likely to vary depending on location, prevailing winds and rainfall and other factors. A more detailed discussion is provided in Section 6.3.1 under Surface Water Quality Effects. The additive effect of mercury and selenium deposition to existing concentrations in the San Juan River will result in minor impacts to surface water quality. However, these impacts are not expected to exceed AWQC standards for the protection aquatic wildlife. Existing selenium concentrations in the San Juan River and Morgan Lake have been linked to a low to moderate occurrence of reproductive failure in endangered fish species given selenium concentrations found in tissues and diets (USFWS 2005). The cumulative impact to surface water quality from the deposition of mercury and selenium may result in adverse effects to the reproductive success of this species.

Recommended Conservation / Mitigation Measures:

- Implementation of a Storm Water Pollution Prevention Plan for all construction activities with potential to discharge of sediment into the San Juan River. This includes project components that are adjacent to the San Juan River, as well as those components constructed away from the San Juan River, but with potential for runoff to flow into the San Juan River.

- A Hazardous Materials Handling and Response Plan would be developed and implemented for all proposed project components.

Determination of Effect: The proposed action may affect, is likely to adversely affect razorback sucker.

6.6.6 Mancos milkvetch (*Astragalus humillimus*)

Status: Federally Endangered

Distribution and Habitat: Mancos milkvetch (*Astragalus humillimus)* is a diminutive, tufted perennial with leaves that have spines along the central veins. The plant flowers in late April to early May producing pale lavender to dark purple blooms. This species occurs at elevations ranging from 5,000 to 6,000 ft, within cracks or eroded depressions in sandstone ledges and mesa tops in the Point Lookout sandstone. It is currently limited to 10 populations in New Mexico and 3 populations in Colorado. The sites range from San Juan County, New Mexico to Montezuma County in Colorado and from Mancos Canyon, Colorado southward just past the San Juan River in San Juan County, New Mexico. Plants often found associated with Mancos milkvetch include mountain mahogany, cliff rose, Fendler's bladderpod, and Cottam's milkvetch.

Potential to Occur in the Project Area: On the Navajo Nation, Mancos milkvetch populations are known to extend eastward from Palmer Mesa to the Hogback area and south of the San Juan River, to the Hogback east of Little Water. Known populations of Mancos milkvetch occur about 10 miles southwest of Area IV North (approximately 15 miles southwest of Farmington, New Mexico) outside the project area.

There are historical records of Mancos milkvetch occuring at the Hogback exposure just south of Navajo Route 13 where the Transmission Line approaches within 500 feet. Potential Mancos milkvetch habitat is present along the proposed transmission line corridor just north of U.S. Highway 64 along the Hogback. Marginal potential habitat occurs along the proposed corridor where it crosses the Hogback (Ecosphere

2005a). Potential habitat was also recorded along the proposed Desert Rock Energy Project Alternative Water Well Field and Utility Corridor (URS 2007). No Mancos milkvetch populations were located within the proposed action area.

Project Effects to Mancos Milkvetch: The action area offers potential, but unoccupied habitat for this species. This species was not observed within the proposed action area during surveys (Ecosphere 2005a). However, prolonged drought conditions in the area may have precluded germination over the past several years.

Human presence has the potential to disturb vegetation in the action area, particularly in areas where humans travel beyond the boundaries of established roads, corridors, rights-of-way, or facilities. Potential effects would be from suitable habitat loss and modification. Dormant seedbeds may be adversely impacted by construction activities. These potential impacts would be insignificant and discountable.

Recommended Conservation / Mitigation Measures:

- Implementation of a Storm Water Pollution Prevention Plan for all construction activities with potential to discharge sediment in areas of suitable Mancos milkvetch habitat. This should include even small-scale projects.

- In areas of potential Mancos milkvetch habitat, pre-construction surveys are recommended for all potentially disruptive activities and for all ground disturbing activities. This includes all construction and maintenance activities, or any activity requiring human presence outside of developed. Surveys should include a minimum of a 200-ft buffer around the areas that have potential to be disturbed. The recommended survey period is during the flowering period (April to early May); however, surveys can be conducted by experienced botanists year-round. If individuals are encountered during surveys, construction plans should be altered to minimize or eliminate disturbance.

- Human activity in portions of the project area where Mancos milkvetch have potential to occur should be minimized. Workers associated with the Desert Rock project would limit their activities to established construction and maintenance areas, roads and walkways.

Determination of Effect: The proposed action may affect, is not likely to adversely affect Mancos milkvetch.

6.6.7 Mesa Verde cactus (*Sclerocactus mesae-verdae*)

Status: Federally Threatened

Distribution and Habitat: Mesa Verde cactus is distinguished from other cacti of the *Sclerocactus* genus by an almost total lack of central spines. This species has gray-green to pale green stems that are depressed-globose to oval in shape (Heil and Porter 1994) and typically produces yellowish-cream flowers from late April to early May, although extreme southern populations tend to produce pink flowers. Mesa Verde cactus is typically is found on or near clay hills at elevations ranging from 4,900-5,500 feet associated with the Fruitland and Mancos Shale geological formations (Heil and Porter 1994). The western extent of the Mancos and Fruitland Formations are located in western San Juan County, New Mexico and southwestern Montezuma County, Colorado. The range of Mesa Verde cactus is roughly defined on the northern boundary by Cortez, Colorado, Sheep Springs, New Mexico on the southern boundary, the Chuska and Carrizo Mountains in New Mexico along the western border, and Kirtland,

New Mexico and the Chaco River along the eastern boundary. Plants often found associated with Mesa Verde cactus often include mat saltbush, prickly pear cactus, shadscale, and frankenia (Heil and Porter 1994).

Potential to Occur in the Project Area: This species occurs along Transmission Line D north of San Juan River, where approximately 1000-1200 acres of good habitat occurs along the existing power transmission line. The proposed action area contains one general population of Mesa Verde cactus north of the San Juan River, west of the Hogback and south of the proposed NTP utility line. This population lies in close proximity to Segment D of the preferred transmission line alignment. In surveys conducted during the summer of 2006, this population was reported to contain 78 dead individuals and 42 live individuals (Ecosphere unpublished data).

Because of recent drought conditions and concurrent pressures of insect herbivory within the range of Mesa Verde cactus, many known populations have suffered significant reductions, and in some cases possible extirpation of individual populations. Because of the slow growth rates and cryptic habits of seedlings, the results of these effects on Mesa Verde cacti will not become evident for several years after better climatic conditions return. It is likely that seeds of the Mesa Verde cacti survive in the seed bank present in many of these sites, awaiting the return of more favorable conditions. As unoccupied but potential habitat may host ecologically important seed banks, appropriate conservation measures should be applied to these areas as well.

Project Effects to Mesa Verde Cactus: This species occurs along the proposed transmission line alignment north of the San Juan River in close proximity to Segment D. During construction of tower structures, wire-pulling and wire-splicing, human and vehicular activity within the proposed transmission line alignment would potentially result in cacti damage or mortality where the populations occur within the proposed right-of-way or access roads. Blading and leveling of tower sites could potentially kill or severely damage plants at those locations either by vehicle compression, soil removal, or plants buried under spoils. Vehicles and heavy equipment traveling along the proposed corridor or access roads could crush plants.

Human or vehicular activity outside the proposed right-of-way or access roads may trample individuals or disrupt soils. Though potential impacts would be greatest during construction, human or vehicular activity during transmission line maintenance would potentially trample individuals or disrupt soils.

Temporary soil disturbance may negatively impact seed sources if dead individuals are damaged or removed. Seedbed disturbance in population areas, and areas that may not currently support live individuals, could potentially result in a loss of seed viability and decrease the success of recolonization.

Disturbed soils would be subject to greater erosion which could impact individuals by exposing roots or by smothering stems. Construction activities would disturb and alter potential habitat, which may affect the ability of the species to colonize those areas. During revegetation efforts, further disturbance to soil structure could accelerate erosion processes, which could impact the species by uprooting of individuals during storm events.

The enlargement of the existing transmission line right-of-way with the addition of the proposed action could encourage increased public use of the corridor which would result in further disruption of soils and the potential for plant mortality within or areas adjacent to the right-of-way.

Restrictive fencing or flagging of existing populations for extended periods could attract the public and result in illegal collection of specimens.

Recommended Conservation / Mitigation Measures:

Because of the potential impacts to this species as a result of the proposed project, specific conservation and mitigation measures for Mesa Verde cactus have been developed with the assistance of USFWS, the NNDFW, and other appropriate agencies. Recommended conservation measures are intended to closely conform with those developed for the NTP alignment during the course of Section 7 consultations completed for that project. The goal of these measures is to avoid or minimize all types of disturbance, direct or indirect, to Mesa Verde cactus and habitat.

The conservation/mitigation measures described below apply to all areas where Mesa Verde cacti are known to occur and individual plants or populations have been observed. Also included are measures to protect suitable but unoccupied habitats for this cactus. Desert Rock Energy LLC and their contractors will strictly comply with all stipulations of the grant of easement issued by the BIA for the project throughout the term of the grant, as well as the procedures and stipulations identified in the project plan of development (POD).

- Intensive pedestrian surveys for Mesa Verde cacti were performed in May of 2006. All Mesa Verde cacti and associated habitat that could potentially be affected by construction, operation, or maintenance of the transmission line was documented. All areas that may be affected (directly or indirectly) by construction, operation, or maintenance of the line or access roads, within the 250-foot right-of-way and access roads outside the right-of-way will be resurveyed prior to construction activities to develop a pre-engineering map which will include all cacti locations from previous surveys. Unoccupied habitat will be classified in terms of quality based on substrate suitability, the degree to which suitable substrate is fragmented or isolated, previous presence of cacti (based on NNHP records and the 2006 surveys), and proximity to occupied habitat.

- Based on the results of the 2006 surveys and pre-engineering surveys, a detailed *Mesa Verde Cactus Construction Plan* will be developed for the purposes of avoiding cacti and minimizing disturbance of habitat to the greatest extent practicable. The construction plan will include a map of all cacti identified through the Spring 2006 surveys, pre-engineering surveys, habitat classification by quality, and all construction work areas. The construction plan will be submitted to the USFWS, NNDFW, and the Bureau of Indian Affairs for review. In order to discourage the illegal harvesting of cacti, the locations of cacti will be kept confidential and no universal transverse mercator coordinates will be included in the final reports. Project Construction Inspectors and biological monitor(s) will be the only individuals with detailed cacti location information. All agency comments will be addressed and incorporated into the plan, as appropriate, prior to construction. The plan, without the maps of specific cacti locations, will be included in the project POD and adherence to the recommendations included therein will be a requirement of the construction contractor.

- Construction areas, including tower sites and spur roads, will be located in coordination with project engineers and resource specialists so as to avoid individual cacti and habitat identified during the surveys. Wire-pulling and wire-splicing sites and materials staging areas will be evaluated for the presence of individual cacti prior to the clearing of any vegetation necessary in order to store equipment on site. Placement of these areas will be within, or will be as near as practicable, to existing roadways and/or heavily used areas. The siting of these areas also will take into consideration indirect effects from operation and maintenance (e.g., long-term utilization of access roads in areas where cacti are known to occur) as well as effects related to

potential increase of access by off-road/highway vehicles. The pre-engineering surveys will determine the level of impact on cacti or their habitat in areas of conventional access.

- To the extent practicable, the placement of access roads will minimize disturbance to Mesa Verde cactus habitat. The approximate locations of overland spur access roads will be included as part of the detailed maps included in the POD. The locations of access roads will be further refined once final engineering has been completed and the exact locations of the tower sites are determined. The edges of the access roads will be flagged in the field and to the extent practicable, will take advantage of existing disturbance, slope, and topography. Access roads will not be proposed in any area known to contain individual Mesa Verde cacti based on the results of both the 2006 surveys and pre-construction surveys. To the extent possible, access roads will be sited no closer than 50 feet from a known individual cactus location.

- Overland spurs will not be bladed and construction personnel will be advised to follow existing tire tracks within the designated area and minimize their trips along these spurs to the extent possible in order to reduce disturbance. When construction is complete, all tower sites and spur roads will be hand-raked to remove tire tracks. An emphasis will be placed on obscuring access points at intersections with paved and improved dirt roads and re-creating the topography and natural barriers (e.g., washes). Reclamation techniques will be specifically designed to address site-specific soil properties and the potential for long-term erosion.

- Pre-construction surveys for Mesa Verde cacti will be conducted in the spring of the year preceding the initiation of construction to identify any new areas of cacti. The locations of any additional cacti identified during pre-construction surveys will be added to the project maps developed for the POD. Appropriate mitigation will be developed and reviewed with the Bureau of Indian Affairs, and other applicable agencies, and included in the POD.

- A worker education and awareness program for Mesa Verde cacti will be developed and presented to all personnel that will be on site during pre-construction surveying and construction. The program will include information on the legal and biological status of Mesa Verde cactus, the importance of habitat, the occurrence of cactus and unoccupied habitat in the study area, conservation measures, fines and penalties for damaging or removing cacti, and reporting procedures to be used if cacti not previously identified are discovered or disturbed cacti are discovered. A simple pamphlet or card summarizing critical information for avoiding cactus and minimizing effects on habitat will be provided to all field personnel.

- Qualified biologists will be on site to monitor avoidance of cacti and habitat during all construction-related activities, including the initial delineation of construction exclusion areas (e.g., fenced and flagged areas). All sites where Mesa Verde cacti are present will be monitored daily. Construction activity within 200 feet of a cactus site will be monitored continuously during construction activity. Any disturbance to cactus or habitat outside the construction zone will be reported immediately by the biological monitor to the Construction Inspection Contractor who will report to the BIA and the NNFWD. A written account including a map, the extent of the disturbance, the number of cacti and/or quantity of habitat disturbed, and the circumstances surrounding the disturbance will be submitted to the Bureau of Indian Affairs within 48 hours. The incident reporting procedures for all construction activity is part of the project POD.

- Access roads and tower sites in areas where Mesa Verde cacti are present will be enclosed with construction fencing. Fencing along access roads will extend 200 feet in both directions beyond the limits of areas that contain cacti or designated suitable habitat. Any cacti located within the

right-of-way will be enclosed with construction fencing including, where possible, a buffer radius of 50 feet around the cacti. All project personnel will be instructed that their activities must be confined to the designated construction area. All construction fencing will be inspected daily by the on-site biologist and maintained in a functional capacity by the contractor.

- All traffic will be restricted to the right-of-way, designated work areas, and authorized access roads. Overland spur roads will be used in areas to minimize surface disturbance and will be staked or flagged in the field. Cross-country travel will be strictly prohibited.

- The pneumatic cleaning of construction equipment will be required before it is permitted on the right-of-way, as well as when equipment is moved from an area where noxious plant species are known to be present. Water shall not be used to clean equipment since it may provide moisture for germination of noxious weed seed that may be present.

- Because of the delicate nature of soil structure in areas that support Mesa Verde cacti, no post-construction reseeding will be implemented. Such soils are typically fine-grained, possess a low cohesion and in-place density, and are highly subject to erosion. Disturbance to soil structure during revegetation efforts conducted in these types of soils can accelerate erosion processes, which are known to be detrimental to Mesa Verde cacti. Reseeding would establish plants in Mesa Verde cactus habitat, in some instances where there is currently minimal vegetation that would compete with the cacti for water and other resources. A restoration plan for all areas of disturbance will be included in the POD.

- Routine post-construction inspections of the line in Mesa Verde cactus habitat will be performed using aircraft. For minor maintenance or repair of structures or line that may be required, access will be accomplished by helicopter. If extensive repairs are required, all stipulations governing the placement and restoration of access routes covered in this document will be required. Surveys for Mesa Verde cactus will be required prior to any ground disturbing activities for maintenance. Surveys performed will be valid for three years.

- Individual Mesa Verde cacti that cannot be avoided during the construction process will be transplanted in cooperation with the NNDFW. Transplanted cacti will be monitored for a minimum of 5 years. Desert Rock Energy LLC will provide funding for the annual monitoring and monitoring report.

- Desert Rock Energy LLC will monitor the Mesa Verde cactus population for a five year period in the vicinity of where the DREP connects to the Navajo Transmission Project.

- Locked gates will be installed at strategic locations to restrict unauthorized vehicle access to protect Mesa Verde cacti along the right-of-way. Strategic locations are those areas where a gate can be placed into a topographic feature that cannot be crossed by vehicles. Signs will be placed at intersections of the access road with other roads to discourage vehicular traffic along the right-of-way. They will alert people to the sensitivity of the area.

- Desert Rock LLC will develop a comprehensive weed management plan that addresses the management of exotic species for a period of time post construction (preferably at least 5 years).

Determination of Effect: The proposed action may affect, is likely to adversely affect Mesa Verde cactus.

6.6.3 Yellow-billed cuckoo (*Coccyzus americanus occidentalis*)

Status: Federal Candidate

Distribution and Habitat: Yellow-billed cuckoos are neo-tropical migrants that winter primarily in South America. Suitable habitat for yellow-billed cuckoo is limited to narrow, and often widely separated, riparian cottonwood-willow galleries, as well as salt cedar (USFWS 2001). Dense understory foliage appears to be an important factor in nest site selection, whereas cottonwood trees are an important foraging habitat for the yellow-billed cuckoo. The species is usually found at elevations below 6,600 feet and has been documented in southern and central and extreme northeast Arizona (USFWS 2001). Historically, the yellow-billed cuckoo has been documented as occurring along the San Juan River from Navajo Reservoir to the Arizona state line (Travis 2002).

Potential to Occur in the Project Area: Breeding habitat is typically characterized by riparian vegetation that has a dense overstory of mature cottonwood trees. As such, potential breeding habitat for yellow-billed cuckoo is present at the Transmission Line Segment D crossing along the San Juan River**,** and along the northern margin of Morgan Lake. Although the Chaco River supports riparian vegetation, preliminary examination of this habitat by Ecosphere in 2006 indicated that the density and extent of this habitat was not likely to support yellow-billed cuckoo.

BLM/FFO surveys between 2002 and 2003 recorded this species at five river tracts between the Hogback and Bloomfield, New Mexico. In 2002, a yellow-billed cuckoo was recorded at the BLM Bradshaw Tract approximately 2 miles east of the proposed Transmission Line San Juan River crossing. A yellow-billed cuckoo was recorded during 2003 surveys of the BLM Wheeler Tract located approximately ¾ mile from the proposed Transmission Line river crossing. The BLM/FFO has not conducted formal surveys for this species since 2004 (Wegener BLM/FFO, pers. comm. 2006). There are no documented occurrences of yellow-billed cuckoo nesting on the San Juan River.

In June and August 2006, species specific surveys were conducted for yellow-billed cuckoo along the San Juan River in the project area using draft USGS guidelines (Ecosphere unpublished). No individuals were detected during these surveys.

Project Effects to Yellow-billed cuckoo: Potential habitat for the yellow-billed cuckoo is limited to small patches of native riparian (cottonwood and willow) and mixed native-exotic (Russian olive/tamarisk, cottonwood and willow) adjacent to the Transmission Line Segment D crossing of the San Juan River, along the northern margin of Morgan Lake and in very small scattered patches where overstory cottonwoods are present along the Chaco River. There would be no removal of potential habitat in these areas for the proposed action.

Potential impacts to this species would be limited to noise and human activity in proximity to occupied habitats. Increases in noise and human activity would likely result in short-term temporary dispersal or avoidance of the area. No construction activities within ¼-mile of suitable habitats during breeding season, May through August, would minimize or eliminate this potential impact. These impacts would be insignificant and discountable.

Operation of the proposed power plant and associated infrastructure, water well field and mining operations would have no effect to yellow-billed cuckoos or potential habitats.

Recommended Conservation / Mitigation Measures:

- Timing restrictions for construction of transmission towers and stringing of conduit lines, as well as other construction and maintenance activities within and above the San Juan River floodplain and within ¼ mile of the Chaco River. Work should not be conducted between May 1 and August 30 to avoid disturbance.

- Should clearing of riparian vegetation in areas of suitable cuckoo habitat be necessary, Desert Rock Energy LLC in coordination with the Navajo Natural Heritage Program and the USFWS, will develop a compensatory mitigation plan to offset the potential loss of habitat.

- Because yellow-billed cuckoo habitat along the Chaco River was not subject to protocol surveys in 2006 in all survey periods, the Chaco River should be resurveyed for cuckoo if habitat conditions change over the course of project development and construction.

7.0 Summary of Determinations of Effect

This section summarizes the effect determination for each of the ESA listed species with potential to occur in the project area. Also addressed in this section are the potential cumulative effects that may result from the proposed action, as well as interrelated projects and reasonable foreseeable developments that may occur in or near the Desert Rock project area.

7.1 Determinations of Effects for ESA Listed Species

Determinations of effect of have been assigned for all species 9 federally listed under ESA with potential to occur in the Desert Rock Energy Project area and critical habitat present in the analysis area. Determinations of effect were based on evaluating the potential impacts of the proposed action if the recommended conservation and mitigation measures are followed. Table 7-1 summarizes the effect determination of the proposed action on federally listed threatened and endangered candidate species.

Table 7-1. Summary of the Determinations of Effect on Federally Listed Species.

SPECIES	STATUS	DETERMINATION OF EFFECT
MAMMALS		
Black-footed ferret	E	No Effect
BIRDS		
Bald eagle	T	May Affect, Likely to Adversely Affect
Mexican spotted owl	T	No Effect
Southwestern willow flycatcher	E	May Affect, Not Likely to Adversely Affect
FISH		
Colorado pikeminnow	E	May Affect, Likely to Adversely Affect

Colorado pikeminnow critical habitat		No adverse modification
Razorback sucker	E	May Affect, Likely to Adversely Affect
Razorback sucker critical habitat		No adverse modification
PLANTS		
Knowlton's cactus	E	No Effect
Mancos milkvetch	E	May Affect, Not Likely to Adversely Affect
Mesa Verde cactus	T	May Affect, Likely to Adversely Affect

7.2 Cumulative Effects

Ongoing and future activities on lands within the analysis area may include agricultural development including farming and ranching by members of the Navajo Nation. In addition, Navajo Agricultural Products Industry (NAPI), which is located immediately southwest of the proposed project area, will continue to develop and operate for the foreseeable future. Agricultural development has the potential to exacerbate air and water pollution in the project area and vicinity through the use of conventional pesticides and herbicides, as well as from repeated ground disturbances that contribute to generation of airborne particulates. In addition, livestock can contribute to ground disturbance by compacting soil and damaging cryptogamic soil crusts.

As proposed, the Desert Rock Power Plant site would be constructed in close proximity to two existing power plants, the Arizona Public Service Four Corners Generating Station and the San Juan Power Plant. Addition of the Desert Rock Power Plant has the potential to increase all sources of disturbance discussed in previous sections of this documents. Dine Power Authority, an enterprise of the Navajo Nation, would be the developer of the NTP. The NTP would add 470 miles of 500kV alternating current transmission capability from the Four Corners area to the Las Vegas area, with an interconnection point north of Flagstaff to allow access to the metropolitan Phoenix market.

Although there are no oil or natural gas wells in the proposed project area, the surrounding areas are subject to extensive oil and natural gas production. In 2003, it was estimated that there were over 18,000 gas wells within the New Mexico portion of the San Juan Basin, which accounted for over two-thirds of the total gas production for the State of New Mexico (USDI Bureau of Land Management 2003). Operation of natural gas wells and refineries represent a notable source of air pollution in the project area and vicinity, which may exacerbate the impacts of air pollutants generated by the proposed Desert Rock project. Western Oil and Gas has proposed approximately 600 natural gas wells in eastern Burnham Chapter extending north into Upper Fruitland and Nenahnezad/San Juan Chapters. An EIS is currently being prepared for the Phoenix Expansion Project, which would expand the Transwestern Pipeline Company's natural gas pipeline system by approximately 260 miles from its mainline in Yavapai, County, Arizona to delivery points in the Phoenix metropolitan area market. As part of the overall project, Transwestern plans to build approximately 25 miles of pipeline looping parallel to its existing San Juan Lateral, in San Juan County. The San Juan Lateral extends from San Juan County, New Mexico, to connect with Transwestern's mainline in McKinley County, New Mexico, and is located approximately 15 miles or further from the analysis area.

Development of the existing and future projects would result in continued loss and alteration of wildlife habitat, including fragmentation; intentional and unintentional harassment of wildlife; invasion of non-

native vegetation; intentional and unintentional mortalities of wildlife from exposure to contaminants, depletion of water resources, collisions with vehicles, increases in legal or illegal harvest of game and non-game species, electrocution/collusion with overhead electrical transmission lines; increases in air and water pollution that directly and indirectly effect plants and animals. Further, increases in human activity to previously undisturbed habitats inevitably results in adverse impacts to vegetative communities and wildlife. The cumulative effects of these incursions are difficult to accurately quantify as the ultimate effects are dependant upon the species potentially present in the area, the timing of the human activity, the nature of the activity, the duration of the activity, and what is happening in adjacent habitats at the time of proposed disturbance.

Further, some species of wildlife are more suited to adapt to rapid environmental change, while other species may be seasonally or permanently displaced from otherwise favorable habitat. Residential and industrial development in the San Juan Basin may have already influenced the occurrence, distribution, and abundance of wildlife within and near the proposed DREP analysis area. The degree and magnitude of wildlife impacts that could be cumulative as a result of developing the proposed action is generally considered a minor cumulative effect. The cumulative loss of habitat from the proposed project is not a significant loss of habitat because of the abundance of similar habitat in the region and across the Navajo Nation. However, increases in traffic along existing regional and planned local road networks cumulatively would have a moderate or likely noticeable, adverse cumulative impact on wildlife as a result of road killed animals in the San Juan Basin. According to the cumulative Class I increment air modeling analysis included in Section 4.5 of the ENSR Report Desert Rock Energy Facility Application for Prevention of Significant Deterioration Permit – Class I Area Modeling Update, January 2006, cumulative air quality impacts of the proposed project will be negative (overall lower emissions in the Four Corners region) due to increased emission controls occurring at the Four Corners Power Plant and at the San Juan Generating Station. If this is indeed the case, then biological resources would not be subject to cumulatively significant adverse impacts.

There would be a minor loss of available habitat for bald eagle with the addition of a transmission corridor across the San Juan River that would periodically inhibit eagle foraging and travel flight patterns along the river corridor. This impact is considered small as the proposed transmission would parallel an existing transmission line, thereby widening an existing obstruction to eagle flight along the river. It is not known whether the addition of a second transmission line would serve to assist eagles, raptors or other birds avoid collusions with the lines due to increased visibility. An unknown number of Mesa Verde cactus may also be damaged or killed with the construction and maintenance of Segment D of the proposed transmission line and the Navajo Transmission Project (NTP). A mitigation plan has been prepared for NTP to minimize impacts on the Mesa Verde cactus. Construction and maintenance of transmission access roads and the construction footprint of tower locations would result in some permanent loss of potentially viable habitat and/or seed bank for Mesa Verde cactus.

Wildlife exposed to mercury via their diet may be subject to reproductive failure, immune system impairment, behavioral aberrations, motor dysfunctions, or even direct toxicity. Most at risk are those animals at upper trophic levels that feed on fish, or on other animals that feed on fish. While little reliable information is available, there are no known instances of mercury intoxication of wildlife in New Mexico. Assessment of the impact of mercury on wildlife is difficult however, since some of the symptoms associated with chronic mercury poisoning may not be immediately apparent, resulting in reduced functionality, inappropriate breeding behavior, or early mortality by some other mechanism, e.g. impaired predator evasion. Minor increases in mercury and selenium, and other potentially toxic elements, reaching the San Juan River from air pollution deposition may contribute to adversely impacting razorback sucker and Colorado pikeminnow reproductive success and recovery efforts. In addition, mercury that is sorbed to sediment is still available to methylating bacteria when carried into the anoxic zones of river beds and reservoirs where methylation occurs.

Depending on the mitigation measures applied and the degree that measures are enforced under the jurisdictional authority of projects currently being implemented, and for those proposed in the future, the magnitude of cumulative adverse impacts can only be incrementally minimized.

7.3 Reasonable Foreseeable Developments

As designed, the preferred alternative for the proposed access road would spur off of the existing Burnham Road. However, feasibility of this alternative is dependent on re-routing Burnham Road. While this road construction would be permitted under BHP's existing mine lease, it would require substantial new ground disturbance that has not been addressed in detail by this Biological Assessment or by the DEIS prepared for the Desert Rock project.

8.0 Biological Assessment Preparers

Joey Herring	B.S. Environmental Biology
Erin Powell, Wildlife Biologist	M.S., Ph.D. – Wildlife Ecology
Lynn Wickersham, Wildlife Biologist	M.S. – Biology
Mike Fitzgerald, Environmental Scientist	B.A. – Environmental Studies
Sandy Friedley, Botanist	M.S. - Botany

9.0 Literature Cited and References

APLIC. Avian Power Line Interaction Committee. Suggested Practices For Raptor Protection On Power Lines: The State of the Art in 1996. Edison Electric Institute and Raptor Research Foundation.

_____. Avian Power Line Interaction Committee. 2005. Avian Protection Plan Guidelines. The Edison Electric Institute's Avian Power Line Interaction Committee *and* U.S. Fish and Wildlife Service.

Belnap, J. and D. A. Gillette. 1997. Disturbance of biological soil crusts: impacts on potential wind erodibility of sandy desert soils in southeastern Utah. National Biological Service, 2282 S. Resource Blvd., Moab, UT

BISONM (Biotic Information System of New Mexico). 2006. Species Reports. Available online at: http://www.bison-m.org/

BHP Billiton. 2004. Navajo Coal Company Navajo Mine Proposal for Phase II Release on 1,034 Acres: Report of Vegetation Sampling and Data Analysis Plus Sedimentation Studies for Phase II Bond Release Areas. BHP Billiton Navajo Coal Company: Fruitland, New Mexico.

Brace, S.; Peterson, D.L.; Horner, D. 1999. A guide to ozone injury in vascular plants of the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-446. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 63 p.

Brandenberg W., M. Farrington and S. Gottlieb. 2004. Razorback larval fish survey in the San Juan River during 1999-2002. Division of Fishes, Museum of Southwestern Biology, Department of Biology, University of New Mexico, Albuquerque, New Mexico.

Brown, B. T. 1993. Winter foraging ecology of Bald Eagles in Arizona. Condor 95: 132–138.

Buehler, D. A., T. J. Mersmann, J. D. Fraser, and J. K. D. Seegar. 1991. Nonbreeding Bald Eagle communal and solitary roosting behavior and habitat use on the northern Chesapeake Bay. J. Wildl. Manage. 55: 273–281.

Buehler, D. A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). In The Birds of North America, No. 506 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

BLM. Bureau of Land Management, Farmington Field Office. 2003. Farmington Proposed Resource Management Plan and Final Environmental Impact Statement BLN0NM-PL-03-014-1610.

Burt, W. H. and R. P. Grossenheider. 1976. Peterson field guides: Mammals. 3rd Edition. Houghton Mifflin Company: New York. Pp. 289.

Busnel,R.G. and John Fletcher (eds.). 1978. Effects of Noise on Wildlife. New York: Academic Press.

Chester, D. N., D. F. Stauffer, T. J. Smith, D. R. Luukkonen, and J. D. Fraser. 1990. Habitat use by nonbreeding Bald Eagles in North Carolina. J. Wildl. Manage. 54: 223–234.

Cornell University. 1993. Available online at www.naturesstandard.combioaccum.html 1993

Crooks, K.R. 2002. Relative sensitivities of mammalian carnivores to habitat fragmentation. Conservation Biology 16:488-502.

Crowder, M. R. and O.E. Rhodes. 2001. Avian collisions with power lines: A review. *In* Avian Interactions with Utility and Communication Structures. Workshop Proceedings . Charleston, S.C. EPRI Technical Report No. 1006907. R. Carlton, Project Manager.

Curtis, P.S. 1996. A meta-analysis of leaf gas exchange and nitrogen in trees grown under elevated carbon dioxide. Plant, cell and environment. 19: 127-137.

Dick-Peddie, William A. 1993. New Mexico Vegetation: Past Present and Future. The University of New Mexico Press, Albuquerque, New Mexico.

Dodd, Jr. C.K., W.J. Barichivich, and L.L. Smith. Effectiveness of a barrier wall and culverts in reducing wildlife mortality on a heavily traveled highway in Florida. Biological Conservation 118: 619-631.

Ecosphere. 2004a. Floristic Survey and Ecological Study of BHP Area IV, San Juan County, New Mexico. Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2005a. Floristic Survey and Ethnobotanical Report for the Formerly Proposed Cottonwood Energy Center (CEC). Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2005b. Wildlife Report for the Formerly Proposed Cottonwood Energy Center (CEC). Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2005c. Botanical Reconnaissance Survey Desert rock Energy Project. Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2005d. Floristic Survey and Ecology Study of BHP Area V, San Juan County, New Mexico. Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2005e. Threatened, Endangered and Sensitive (TES) Flora Survey Report. BHP Billiton – Navajo Mine: Area IV North. Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2006a. *Interim* Waters of the U.S. Mapping Report for the Desert Rock Energy Project, San Juan County, New Mexico. Ecosphere Environmental Services: Farmington, New Mexico.

Efroymson, R.A., M.E. Will, G.W. Suter II and A.C. Wooten. 1997. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision*. Prepared for the Department of Energy by Lockheed Martin Energy Systems, Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-85/R3. November.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook. Simon & Schuster Inc., New York, NY.

Federal Register. 1991. Endangered and Threatened Wildlife and Plants: Final rule determination of critical habitat for the Colorado River Endangered Fishes: Razorback sucker, Colorado squawfish, humpback chub and bonytail chub. 50 CFR 17, RIN 1018-AB91. March 21, 1994. 59 (54): 13374-13400.

Fisher, C., D. Pattie, and T. Hartson. 2000. Mammals of the Rocky Mountains. Lone Pine Publishing, Vancouver, BC.

Fitzgerald, J. P., C.A. Meaney, and D.M. Armstrong. 1994. Mammals of Colorado. Denver Museum Life History and University Press of Colorado. 407 p.

Fletcher, J.L., 1980. Effects of noise on wildlife: a review of relevant literature 1971-1978. Pages 611-620 in J.V. Tobias, G. Jansen, and W.D. Ward, eds. Proceedings of the Third International Congress on Noise as a Public Health Problem. Am. Speech-Language-Hearing Assoc., Rockville, MD.

Fraser, J.D. 1985. The impact of human disturbance on Bald Eagle populations – a review. Pages 68-84 in Proceedings of Bald Eagle Days, 1983. Edited by J.M Gerrard and T.N. Ingram. The Eagle Foundation, Apple River, Illinois.

Gray, John E, David L. Fey, Charles W. Holmes, Brenda K. Lasorsa. 2004. Historical deposition and fluxes of mercury in Narraguinnep Reservoir, southwestern Colorado, USA. US Geological Survey, P.O. Box 25046, Federal Center, MS 973, Denver, CO.

Grubb, T. G., W. W. Bowerman, J. P. Giesy, and G. A. Dawson. 1992. Responses of breeding bald eagles, *Haliaeetus leucocephalus*, to human activities in northcentral Michigan. Canadian Field Naturalist 106: 443–453.

Hansen, A. J., M. V. Stalmaster, J. R. Newman. 1980. Habitat characteristics, function, and destruction of Bald Eagle communal roosts in western Washington. Pp. 221–229 *in* Proceedings of the Washington Bald Eagle symposium (R. L. Knight, G. T. Allen, M. V. Stalmaster, and C. W. Servheen, eds.). The Nature Conservancy, Seattle, WA.

Hawks Aloft. 2005. 2004 Wildlife Surveys BHP Navajo Coal Company, Navajo Mine, New Mexico. Prepared for BHP Navajo Coal Company. Hawks Aloft: Albuquerque, New Mexico.

Heil, K.D. and J. M. Porter. 1994. Sclerocactus (Cactaceae): A Revision. Yearbook of the Cactus and Succulent Society of America. Haseltonia No. 2, pp. 20-45.

Holden, P.B. (Ed.). 1999. Flow recommendations for the San Juan River, San Juan River Basin Recovery Implementation Program, USFWS, Albuquerque, New Mexico

Hughes, J. M. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*). *In* The Birds of North America, No. 418 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Immel, Richard. 1995. "Shhh...Those Peculiar People Are Listening." Smithsonian. 26(1):151- 160.

Keister, G. P., and R. G. Anthony. 1983. Characteristics of Bald Eagle communal roosts in the Klamath Basin, Oregon, and California. J. Wildl. Manage. 47: 1,072–1,079.

Kimball, J.W. 2006. Biomagnification: How DDT becomes concentrated as it passes through a food chain. Biopages.

Kunkel, K. E., R.A. Pielke, S. A. Changnon. 1999. Temporal fluctuations in weather and climate extremes that cause economic and human health impacts: A review. Bulletin of the American Meteorological Society. 80: 1077-1098.

Los Alamos National Laboratory (LANL). 2005. Ecorisk Database (Release 2.2). Prepared by Environmental Health Associates, Inc. Albuquerque, NM. September.

Lamara, V., M. Lamarra and J.G. Carter. 1985. Ecological investigation of a suspected spawning site of Colorado squawfish on the Yampa River, Utah. Great Basin Nat. 45127-140.

Lapahie, A. 2004. June through November monthly fish passage report, Nenahezad fish passage. PDF document accessed from the San Juan River Basin Recovery Implementation Program Website (SJRIP). Available online at http://www.fws.gov/southwest/sjrip/

Larkin, Ronald. 1996. "Effects of Military Noise on Wildlife: A Literature Review." USA CERL Technical Report.

Lee, R. D. 1999. New Mexico's Invasive Weeds. New Mexico State University: College of Agriculture and Home Economics Cooperative Extension Service. Las Cruces, New Mexico.

Lehman, R. N. 2001. Raptor Electrocution on Power Lines: Current Issues and Outlook. Wildlife Society Bulletin 29(3): 804-813.

Manville, Albert M., II. 2006. Bird Strikes and Electrocutions at Power Lines, Communication Towers and Wind Turbines: State of the Art and State of the Science-Next Steps Toward Mitigation. U.S. Fish and Wildlife Service Publication.

Miller Brooks Environmental, Inc. 2007. Final Well Impact Report: Desert Rock Energy Project.

Natural Heritage New Mexico (NHNM). 2006. Natural heritage New Mexico database. Natural Heritage New Mexico, University of New Mexico Biology Department, Albuquerque, NM. Available at http://nmnhp.unm.edu/query_bcd/query.html.

New Mexico Bureau of Geology and Mineral Resources. 2003. *Geologic Map of New Mexico*. New Mexico Bureau of Geology and Mineral Resources. Map by P.A. Scholle. 1:500,000.

Nelson, J. S., E. J. Crossman, H. Espinosa-Perez, C. R. Gilbert, R. N. Lea, and J. D. Williams. 1998. Recommended changes in common fish names: pikeminnow to replace squawfish (Ptychocheilus spp.). Fisheries 23(9): 37.

Noss, R.F., H.B. Quigley, M.G. Hornocker, T. Merrill, and P.C. Paquet. 1996. Conservation biology and carnivore conservation in the Rocky Mountains. Conservation Biology. 10: 949-963.

NRCS. (Natural Resource Conservation Service) 1992. Soil Survey of Shiprock Area, Parts of San Juan County, New Mexico and Apache County, Arizona. Natural Resource Conservation Service in cooperation with the U.S. Department of Interior, Bureau of Indian Affairs; the Navajo Nation; and the New Mexico and Arizona Agricultural Experiment Stations.

Page, L. M. and B. M. Burr. 1991. A field guide to freshwater fishes. Houghton Mifflin Company, Boston, MA.

Platania, S. P. 1990. Biological summary of the 1987 to 1989 New Mexico-Utah ichthyofaunal study of the San Juan River. Report to the New Mexico Department of Game and Fish, Santa Fe, and the U. S. Bureau of Reclamation, Salt Lake City, UT. 143 pp.

Reeves, T. and A. Nelson. 1996. Birds of Morgan Lake: A Guide to Common Species. Arizona Public Service/Four Corners Power Plant. Waterflow, New Mexico.

Root, J. J., K. R. Wilson, C. H. Calisher, K. D. Wagoner, K. D. Abbot, T. L. Yates, A. J. Keunzi, M. L. Morrison, J. N. Mills, B. J. Beaty. 2005. Spatial clustering of murid rodents infected with hantaviruses: Implications from meta-analyses. Ecological Applications. 15: 565-574.

Ryden, D. and C. McAda. 2003. Stocking of fingerling Colorado pikeminnow in the San Juan River. US Fish and Wildlife Service. Grand Junction, Colorado. PDF document accessed from the San Juan River Basin Recovery Implementation Program Website.

Ryden, D. 2006. Fisheries Biologist. U.S. Fish and Wildlife Service. Grand Junction, Colorado. Personal Communication in October 2006. Concerning Colorado pikeminnow and razorback sucker current distributions based on recent unpublished surveys.

Ryden, D. 2000. Adult fish community monitoring on the San Juan river, 1991-1997: Final report. U.S. fish and Wildlife Service, Grand Junction, Colorado. PDF document accessed from the San Juan River Basin Recovery Implementation Program Website (SJRIP).

____. 2003. Augmentation Plan for Colorado Pikeminnow in the San Juan River. Final Report. U. S. Fish and Wildlife Service. Grand Junction, Colorado.

Sample, B.E., D.M. Opresko and G.W. Suter. 1996. *Toxicological Benchmarks for Wildlife: 1996 Revision*. Oak Ridge National Laboratory. Prepared for the Department of Energy by Lockheed Martin Energy Systems, Inc. ES/ER/TM-86/R3. June.

Schneider, M.F. 2001. Habitat loss, fragmentation and predator impact: Spatial implications for prey conservation. Journal of Applied Ecology 38: 720-735.

Sogge, M. K., and R. M. Marshall. 2000. A survey of current breeding habitats. Ch. 9 In D. Finch and S. Stoleson, eds. Status, ecology, and conservation of the southwestern willow flycatcher. USDA Forest Service, Rocky Mountain Research Station, Albuquerque, NM.

Soil Conservation Service (SCS). 1980. Soil Survey of San Juan County, New Mexico - Eastern Part. U.S. Department of Agriculture, Soil Conservation Service in Cooperation with the U.S. Department of the Interior, Bureau of Indian Affairs and Bureau of Reclamation and the New Mexico Agricultural Experiment Station.

Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado rare plant field guide. Prepared for the Bureau of Land Management, the U.S. Forest Service and the U.S. Fish and Wildlife Service by the Colorado Natural Heritage Program.

Stalmaster, M. V. 1987. The Bald Eagle. Universe Books, New York, NY.

Steenhof, K. 1976. The ecology of wintering Bald Eagles in southeastern South Dakota. Master's thesis, Univ. of Missouri, Columbia.

Stillman RA, Goss-Custard JD. 2002. Seasonal changes in the response of oystercatchers to human disturbance. Journal of Avian Biology. 33: 358-365.

Stone, W. J., F. Lyford, P. Frenzel, N. Mizell and E. Padgett. 1983. Hydrogeology and Water Resources of San Juan Basin, New Mexico. Hydrologic Report #6. New Mexico Bureau of Mines and Mineral Resources, a Division of New Mexico Institute of Mining and Technology.

Travis, James R. 2002. Yellow-billed Cuckoo: Life History Synopsis. Rivers and Birds. Unpublished document.

Trombulak, S.C. and C.A. Frissel. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14: 18-30.

URS. 2007. Draft Environmental Impact Statement for the Desert Rock Energy Project. URS Corporation. Phoenix, Arizona.

USBR. 2006. U.S. Bureau of Reclamation. Final Environmental Impact Statement Navajo Reservoir Operations. Navajo Unit – San Juan River: New Mexico, Colorado, Utah. Upper Colorado Region, Western Colorado Area Office: Grand Junction, Durango, Colorado.

USDI. (U.S. Department of Interior) 2001. Southwestern Willow Flycatcher and San Juan River Habitat Evaluation and Conservation Management Strategies. Final Report. Central Utah Project Completion Act. Provo, Utah.

USEPA (U.S. Environmental Protection Agency). 1992. *"Framework for Ecological Risk Assessment"* EPA/630/R-92/001. Risk Assessment Forum, Washington, D.C.

_____. 1993. *Wildlife Exposure Factors Handbook*. Volumes I and II. Office of Research and Development. Washington, D.C. EPA/600/R-93/187.

_____. 1998. *Guidelines for Ecological Risk Assessment*. Federal Register Vol. 63, No. 93. 26845-26924. May 14.

_____. 2004. Draft Aquatic Life Water Quality Criteria for Selenium. Office of Water and Office of Science and Technology. Washington, D.C. EPA-822-D-04-001.

____. 2005a. *Ecological Soil Screening Levels (Eco SSLs).* Office of Solid Waste and Emergency Response. Available at: http://www.epa.gov/ecotox/ecossl/ Last updated May.

_____. 2005b. Regulatory Impact Analysis of the Final Clean Air Mercury Rule. EPA-425-R-05-003.

_____. 2005c. Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper. Office of Air Quality Planning and Standards. EPA-452/R-05-005. June 2005.

_____. 2006. Acute Exposure Guideline Levels (AEGLs). Available online at: http://www.epa.gov/opptintr/aegl/

_____. 2006b. Measuring Acid Rain. Available online at http://www.epa.gov/airmarkets/acidrain/measure/index.html

_____. 2006c . Technical Support Document: Methodology Used to Generate Deposition, Fish Tissue Methylmercury Concentrations, and Exposure for Determining Effectiveness of Utility Emission Controls. Posted to the EPA Technology Transfer Network (TTN), http://www.epa.gov/ttn/atw/utility/deposition_fish_tissue_mehg_exposure_oar-2002-0056-6186.pdf. March 16.

USFWS (US Fish and Wildlife Service). 1991. Colorado Pikeminnow (*Ptychocheilus lucius*) Recovery Goals Amendment and Supplement to the Colorado Squawfish Recovery Plan. Rocky Mountain Region: Denver, Colorado.

_____. 1995. U. S. Fish and Wildlife Service (USFWS). Recovery plan for the Mexican spotted owl: Vol. I. Albuquerque, New Mexico. 172 pp.

_____. 1998. Black-footed ferret (*Mustela nigripes*) fact sheet. http://endangered.fws.gov/i/A07.html.

_____. 1999. Environmental Contaminants In Aquatic Plants, Invertebrates, And Fishes Of The San Juan River Mainstem, 1990-1996 Prepared For The San Juan River Recovery Implementation Program By Zachary R. Simpson And Joel D. Lusk. U. S. Fish And Wildlife Service New Mexico Ecological Services Field Office Environmental Contaminants Program.

_____. 2001. Endangered and Threatened Wildlife and Plants; 12-Month Finding for a Petition to List the Yellow-billed Cuckoo (*Coccyzus americanus*) in the Western Continental United States. Federal Register 66(143):38611-38626.

_____. 2002. Final Recovery Plan Southwestern Willow Flycatcher (*Empidonax traillii extimus*). Prepared for the USFWS Region 2 Albuquerque, New Mexico by the Southwestern Willow Flycatcher Recovery Team Technical Subgroup.

_____. 2002b. Colorado pikeminnow (*Ptychocheilus lucius*) recovery goals: amendment and supplement to the Colorado pikeminnow recovery plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

_____. 2005. Methylmercury and Other Environmental Contaminants in Water and Fish Collected from Four Recreational Fishing Lakes on the Navajo Nation, 2004. New Mexico Ecological Services. Albuquerque, New Mexico.

USGS. 2006. U.S Geological Survey: National GAP Analysis Program National Biological Information Infrastructure. Available online at http://gapanalysis.nbii.gov/portal/server.pt?open=512&objID=200&PageID=0&parentname=MyPage&parentid=0&cached=true&mode=2&userID=2

Vorhies, C. T. and W. P. Taylor. 1999. The life histories and ecology of jack rabbits, *Lepus alleni and Lepus californicus*, in relation to grazing in Arizona. Technical Bulletin 49. Tucson, AZ. University of Arizona, Agricultural Experiment Station. 117 Pp.

Wegener, Barney. 2006. Riparian Specialist, Bureau of Land Management Farmington Field Office. Personal communication on 10/30/06. Concerning documented species occurrences.

Western Regional Climate Center. 2006. Available online at http://www.wrcc.dri.edu/.

Zeiger, E., Talbott, L. D., Frechilla, S., Srivastava, A., and Zhu, J. (2002) The guard cell chloroplast: a perspective for the twenty-first century. *New Phytologist* 153: 415–424.

Zimmerman, B. 2005. 2004 fish studies on the Animas River. Southern Ute Indian Tribe/Wildlife Division.

Appendix A

Regulatory Agency Correspondence

THE NAVAJO NATION
P.O. BOX 9000 • WINDOW ROCK, ARIZONA • 86515

PRESIDENT
JOE SHIRLEY, JR.
VICE PRESIDENT
FRANK J. DAYISH, JR.

September 12, 2006

Mike Fitzgerald, Program Manager/Owner
Ecosphere Environmental Services
4801 N Butler Suite 15101
Farmington New Mexico 87401

Dear Mr. Fitzgerald,

Sithe Global Power LLC (Sithe) is proposing to conduct geophysical survey on an area adjacent to Area IV N Navajo Mine by drilling test water well and monitoring well. The proposed project was recently presented to the Bureau of Indian Affairs for a categorical exclusion however BIA has requested a threatened and endangered species clearance from the Navajo Fish & Wildlife Department.

According to the *"subject project areas have been biologically inventoried and evaluated by Ecosphere biologists and botanists in each of the last 3 years"* (Ecosphere letter 8/8/06) and found that the proposed area has the potential habitat existing for the *Aquila chrysaetos* (Golden eagle NESL G3; EPA; MBTA); *Buteo regalis* (Ferruginous hawk NESL G3; MBTA); *Athene cunicularia* (Burrowing owl NESL G4; MBTA); *Dipodomys spectabilis* (Banner-tailed kangaroo rat NESL G4); *Vulpes macrotis* (Kit fox NESL G4). Mitigation measures are proposed to lessen direct or indirect impacts to the five (5) species of concern. The proposed mitigation measures are:

1. Avoid data collection activities during nesting season for golden eagle and ferruginous hawk;
2. Conduct a pre-activity raptor survey to determine presence/absence of courting and/or nesting raptors within one (1) mile if activity will be conducted during nesting season and if occupied raptor territories or nests are identified, develop a monitor plan that would include terminating/delaying data collection activities to lessen impacts to the raptors;
3. Conduct reconnaissance surveys to document whether there are any kit fox burrows, burrowing owl burrows or banner-tailed kangaroo rat mounds within the proposed project area and if any burrows are active, consult with the Navajo Nation Fish & Wildlife Department.

The Navajo Nation Fish & Wildlife Department is issuing a *conditional approval recommendation* for the proposed geotechnical and water development plan project if Sithe will implement the mitigation measures as listed above in their data collection activities.

If you have any question(s), please call me at 928/871-7060.

Sincerely,

Rita Whitehorse-Larsen,
Wildlife Biologist
Natural Heritage Program

CONCURRENCE:

Gloria M. Tom, Department Manager
Navajo Nation Fish & Wildlife Department

9/14/06
Date

Cc: Bureau of Indian Affairs – Harrilene Yazzie
Nathan Plagans, Sithe
Navajo Nation Fish & Wildlife chrono file

Division of Natural Resources • Fish and Wildlife Department • Natural Heritage Program
• PO BOX 1480 • Window Rock • Arizona • 86515
Office: 928/871-6450 Fax: 928/871-7603 Website: www.navajofishandwildlife.org

THE NAVAJO NATION
P.O. BOX 9000 • WINDOW ROCK, ARIZONA • 86515

PRESIDENT
JOE SHIRLEY, JR.
VICE PRESIDENT
FRANK J. DAYISH, JR.

DECEMBER 18, 2006

Mike Fitzgerald
Ecosphere Environmental Services
2257 Main Ave. Patio Level
Durango, CO 81301

Mr. Fitzgerald:

The Department has completed review of the Draft Biological Assessment for the Proposed Desert Rock Energy Project and has forwarded the Compliance form with a copy of this letter to the Bureau of Indian Affairs so that they can process the document.

We have come up with one additional mitigation measure for the project. This measure is to monitor the Mesa Verde cactus population for a five year period in the vicinity of where the Desert Rock Project connects to the Navajo Transmission Project.

If you have any questions, please feel free to contact Botanist, Daniela Roth at (928) 523-8445.

Sincerely,

Gloria M. Tom, Director
Department of Fish and Wildlife

cc. BIA, EQ

NNDF&WL Review No. 12-18-06-1

BIOLOGICAL RESOURCES COMPLIANCE FORM
NAVAJO NATION DEPARTMENT OF FISH AND WILDLIFE
P.O. BOX 1480, WINDOW ROCK, ARIZONA 86515-1480

COMPLIANCE	☒
CONDITIONAL COMPLIANCE	☐

It is the Department's opinion the project described below, with applicable conditions, is in compliance with Tribal and Federal laws protecting biological resources including the Navajo Endangered Species and Environmental Policy Codes, U.S. Endangered Species, Migratory Bird Treaty, Eagle Protection and National Environmental Policy Acts. This form does not preclude or replace consultation with the U.S. Fish and Wildlife Service if a Federally-listed species is affected.

PROJECT NAME & NO.: Desert Rock Draft Biological Assessment

DESCRIPTION: Power Plant, well field, rights of way for utilities and roads

LOCATION: San Juan County, New Mexico

REPRESENTATIVE: Ecosphere Environmental

ACTION AGENCY: BIA

B.R. REPORT TITLE / DATE / PREPARER: Draft BA for Proposed Desert Rock Energy Project

SIGNIFICANT BIOLOGICAL RESOURCES FOUND: Mesa Verde Cactus

POTENTIAL IMPACTS

TRIBAL ENDANGERED SPECIES (G2 & G3) TAKEN: Mesa Verde Cactus

FEDERALLY-LISTED SPECIES AFFECTED: Mesa Verde Cactus

OTHER SIGNIFICANT IMPACTS TO BIOLOGICAL RESOURCES: Bald Eagle

AVOIDANCE / MITIGATION MEASURES: As per the BA with one addition that the Mesa Verde Cactus population in the vacinity of where the Desert Rock Project connects with the Navajo Transmission Project be monitored for a five year period.

CONDITIONS OF COMPLIANCE*: NA

FORM PREPARED BY / DATE: J. Cole 12-15-06

COPIES TO: (add categories as necessary)

- ☐ Navajo Environmental Protection Agency
- ☐ U.S. Fish and Wildlife Service, NM Field Office
- ☐ U.S. Fish and Wildlife Service, AZ Field Office
- ☒ BIA Navajo Region, Environmental Services
- ☐ U.S. Fish and Wildlife Service, UT Field Office
- ☒ (Other)

2 NTC § 164 Recommendation:
- ☒ Approval
- ☐ Conditional Approval (with memo)
- ☐ Disapproval (with memo)
- ☐ None (with memo)

Signature: Date: 12/18/06

Gloria M. Tom, Director, Navajo Nation Department of Fish and Wildlife

*I understand and accept the conditions of compliance, and acknowledge that lack of signature may be grounds for the Department not recommending the above described project for approval to the Tribal Decision-maker.

Representative's signature Date

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, New Mexico 87113
Phone: (505) 346-2525 Fax: (505) 346-2542

December 9, 2004

Cons. # 2-22-04-I-0356

Danny Rakestraw, Senior Biologist
URS Corporation
7180 Pollock Drive, Suite 200
Las Vegas, Nevada 89119

Dear Mr. Rakestraw:

Thank you for your November 24, 2004, letter requesting input on the Sithe Global Power, LLC Desert Rock Project. The proposed project is located approximately 30 miles south of Farmington, San Juan County, New Mexico.

We have enclosed a current list of federally endangered, threatened, proposed, and candidate species, and species of concern that may be found in San Juan County, New Mexico.[1] Under the Endangered Species Act, as amended, it is the responsibility of the Federal action agency or its designated representative to determine if a proposed action "may affect" endangered, threatened, or proposed species, or designated critical habitat, and if so, to consult with us further. If your action area has suitable habitat for any of these species, we recommend that species-specific surveys be conducted during the flowering season for plants and at the appropriate time for wildlife to evaluate any possible project-related impacts. Please keep in mind that the scope of federally listed species compliance also includes any interrelated or interdependent project activities (e.g., equipment staging areas, or utility relocations) and any indirect or cumulative effects.

Candidates and species of concern have no legal protection under the Act and are included in this document for planning purposes only. We monitor the status of these species. If significant declines are detected, these species could potentially be listed as endangered or threatened. Therefore, actions that may contribute to their decline should be avoided. We recommend that candidates and species of concern be included in your surveys.

Under Executive Orders 11988 and 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and floodplains, and preserve and enhance their natural and beneficial values. We recommend you contact the U.S. Army Corps of Engineers for permitting requirements under section 404 of the Clean Water Act if your proposed action could

[1] Additional information about these species is available on the Internet at <http://nmrareplants.unm.edu>, <http://nmnhp.unm.edu/bisonm/bisonquery.php>, and <http://ifw2es.fws.gov/endangeredspecies>.

impact floodplains or wetlands. These habitats should be conserved through avoidance, or mitigated to ensure no net loss of wetlands function and value.

The Migratory Bird Treaty Act (MBTA) prohibits the taking of migratory birds, nests, and eggs, except as permitted by the U.S. Fish and Wildlife Service. To minimize the likelihood of adverse impacts to all birds protected under the MBTA, we recommend construction activities occur outside the general migratory bird nesting season of March through August, or that areas proposed for construction during the nesting season be surveyed, and when occupied, avoided until nesting is complete.

We suggest you contact the New Mexico Department of Game and Fish, and the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division for information regarding fish, wildlife, and plants of State concern.

Thank you for your concern for endangered and threatened species and New Mexico's wildlife habitats. In future correspondence regarding this project, please refer to consultation # 2-22-04-I-0356. If you have any questions about the information in this letter, please contact Santiago R. Gonzales at the letterhead address or at (505) 761-4755.

Sincerely,

Brian Hanson

for Susan MacMullin
Field Supervisor

Enclosure

cc: (w/o enc)
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, New Mexico

Rev: November 2004

FEDERAL ENDANGERED, THREATENED,
PROPOSED, AND CANDIDATE SPECIES
AND SPECIES OF CONCERN WITHIN COUNTIES IN NEW MEXICO
Consultation Number 2-22-04-I-0356
December 9, 2004

San Juan County

ENDANGERED

- Black-footed ferret (*Mustela nigripes*)**
- Southwestern willow flycatcher (*Empidonax traillii extimus*)
- Colorado pikeminnow (*Ptychocheilus lucius*), with critical habitat
- Razorback sucker (*Xyrauchen texanus*), with critical habitat
- Knowlton cactus (*Pediocactus knowltonii*)
- Mancos milk-vetch (*Astragalus humillimus*)

THREATENED

- Bald eagle (*Haliaeetus leucocephalus*)
- Mexican spotted owl (*Strix occidentalis lucida*) with critical habitat
- Mesa Verde cactus (*Sclerocactus mesae-verdae*)

CANDIDATE

- Yellow-billed cuckoo (*Coccyzus americanus*)

SPECIES OF CONCERN

- Townsend's big-eared bat (*Corynorhinus townsendii*)
- American peregrine falcon (*Falco peregrinus anatum*)
- Arctic peregrine falcon (*Falco peregrinus tundrius*)
- Baird's sparrow (*Ammodramus bairdii*)
- Black tern (*Chlidonias niger*)
- Mountain plover (*Charadrius montanus*)
- Northern goshawk (*Accipiter gentilis*)
- Western burrowing owl (*Athene cunicularia hypugea*)
- Roundtail chub (*Gila robusta*)
- New Mexico silverspot butterfly (*Speyeria nokomis nitocris*)
- San Juan checkerspot butterfly (*Euphydryas anicia chuskae*)
- San Juan tiger beetle (*Cicindela lengi jordai*)
- Beautiful gilia (*Gilia formosa*)
- Bisti fleabane (*Erigeron bistiensis*)
- Brack's fishhook cactus (*Sclerocactus cloveriae* var. *brackii*)
- Goodding's onion (*Allium gooddingii*)
- Parish's alkali grass (*Puccinellia parishii*)
- Santa Fe cholla (*Opuntia viridiflora*)

Index

Endangered	=	Any species which is in danger of extinction throughout all or a significant portion of its range.
Threatened	=	Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Candidate	=	Candidate Species (taxa for which the Service has sufficient information to propose that they be added to list of endangered and threatened species, but the listing action has been precluded by other higher priority listing activities).
Proposed	=	any species of fish, wildlife or plant that is proposed in the Federal Register to be listed under section 4 of the Act.
Species of Concern	=	Taxa for which further biological research and field study are needed to resolve their conservation status OR are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, State wildlife agencies, other Federal agencies, or professional/academic scientific societies. Species of Concern are included for planning purposes only.
*	=	Introduced population
**	=	Survey should be conducted if project involves impacts to prairie dog towns or complexes of 200-acres or more for the Gunnison's prairie dog (*Cynomys gunnisoni*) and/or 80-acres or more for any subspecies of Black-tailed prairie dog (*Cynomys ludovicianus*). A complex consists of two or more neighboring prairie dog towns within 4.3 miles (7 kilometers) of each other.
***	=	Extirpated in this county
†	=	May occur in this county from re-introductions in Colorado.

THE NAVAJO NATION
P.O. Box 9000 • Window Rock, Arizona • 86515

PRESIDENT
Joe SHIRLEY, Jr.
VICE PRESIDENT
Frank J. DAYISH, Jr.

File#04URS02

29 December 2004

Danny Rakestraw, Senior Biologist
URS Corporation
7180 Pollock Drive
Suite 200
Las Vegas, NV 89119

SUBJECT: SITHE GLOBAL POWER, LLC DESERT ROCK ENERGY PROJECT
NAVAJO NATION

Mr. Rakestraw:

The following information on species of concern[1] is provided in response to your 24 November 2004 request concerning the subject project, which consists of the proposed Desert Rock Energy Project. The project will be built on a 600-acre parcel immediately adjacent to the existing BHP Billiton Navajo Mine, which would provide low sulfur coal for generating the power. The site is approximately 30 miles south of Farmington in San Juan County in northwestern New Mexico. The proposed project consists of the construction, operation and maintenance of a coal-fired power plant and associated facilities. The project includes the following components:

- Two 750-MW coal-fired generation units and associated facilities including plant cooling system, fuel supply system, waste management operations and safety systems, such as lighting and fire protection.
- Water intake structures, distribution pipelines and evaporation ponds
- Transportation access roads.
- Power transmission interconnection facilities
- Construction staging areas.

Each 7.5-minute quadrangle containing project boundaries is addressed separately below. For potentially occurring species these species lists are quadrangle-specific rather than project-specific. Potential for species has been determined primarily on quadrangle-wide coarse habitat characteristics and species range information. Your project biologist should determine habitat suitability at the project site(s).

A total of nineteen (19) species both known and/or potential are included in this response. They are:

[1] "Species of concern" include protected, candidate, and other rare or otherwise sensitive species, including certain native species and species of economic or cultural significance. For each species, the following tribal and federal statuses are indicated: Navajo Endangered Species List (NESL), federal Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), and Eagle Protection Act (EPA). No legal protection is afforded species with only ESA candidate or NESL group 4 status; please be aware of these species during surveys and inform the NFWD of observations. Documentation that these species are more numerous or widespread than currently known, and addressing these species in project planning and management is important for conservation and may contribute to ensuring they will not be uplisted in the future. Species without ESA or NESL legal protection (e.g., NESL group 4 species) are only included in responses on a regular basis and may not be included in this response. Please refer to the NESL for a list of group 4 species; contact me if you need a copy.

1. Antilocapra americana (Pronghorn); NESL group 3.
2. Aquila chrysaetos (Golden Eagle); NESL group 3; MBTA; EPA.
3. Buteo regalis (Ferruginous Hawk); NESL group 3; MBTA.
4. Catostomus discobolus (Bluehead Sucker); NESL group 4.
5. Charadrius montanus (Mountain Plover); NESL group 4; ESA proposed threatened; MBTA.
6. Cottus bairdi (Mottled Sculpin); NESL group 4.
7. Empidonax traillii extimus (Southwestern Willow Flycatcher); NESL group 2; ESA endangered; MBTA.
8. Falco mexicanus (Prairie Falcon); MBTA.
9. Falco peregrinus (Peregrine Falcon); NESL group 4: MBTA.
10. Gila robusta (Roundtail Chub); NESL group 2.
11. Haliaeetus leucocephalus (Bald Eagle); ESA threatened; MBTA; EPA.
12. Mustela nigripes (Black-footed Ferret); NESL group 2; ESA endangered.
13. Ptychocheilus lucius (Colorado Pikeminnow); NESL group 2; ESA threatened.
14. Rana pipiens (Northern Leopard Frog); NESL group 2.
15. Waterfowl and shorebirds.
16. Xyrauchen texanus (Razorback Sucker); NESL group 2; ESA endangered.
17. Astragalus humillimus (Mancos Milk-vetch); NESL group 2; ESA endangered.
18. Astragalus monumentalis (Monument Valley milk-vetch).
19. Sclerocactus mesae-verdae (Mesa Verde Cactus); NESL group 3; ESSA threatened.

CHIMNEY ROCK, NM 7.5-MINUTE QUADRANGLE

Known to occur within three miles of the project site:

1. Sclerocactus mesae-verdae

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Antilocapra americana
2. Aquila chrysaetos
3. Buteo regalis
4. Catostomus discobolus
5. Charadrius montanus
6. Cottus bairdi
7. Empidonax traillii extimus
8. Falco peregrinus
9. Gila robusta
10. Haliaeetus leucocephalus
11. Mustela nigripes
12. Ptychocheilus lucius
13. Rana pipiens
14. Waterfowl and shorebirds.
15. Xyrauchen texanus
16. Astragalus humillimus
17. Astragalus monumentalis

WATERFLOW, NM 7.5-MINUTE QUADRANGLE

Known to occur within three miles of the project site:

1. Sclerocactus mesae-verdae

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Aquila chrysaetos
2. Catostomus discobolus
3. Charadrius montanus
4. Cottus bairdi
5. Empidonax traillii extimus
6. Falco peregrinus
7. Gila robusta
8. Haliaeetus leucocephalus
9. Mustela nigripes
10. Ptychocheilus lucius
11. Rana pipiens
12. Waterfowl and shorebirds.
13. Xyrauchen texanus
14. Astragalus humillimus
15. Astragalus monumentalis

SHIPROCK, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Empidonax traillii extimus

Known to occur within one mile of the project site:

1. Rana pipiens
2. Sclerocactus mesae-verdae

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Antilocapra americana
2. Aquila chrysaetos
3. Catostomus discobolus
4. Charadrius montanus
5. Cottus bairdi
6. Falco peregrinus
7. Gila robusta
8. Haliaeetus leucocephalus
9. Mustela nigripes
10. Ptychocheilus lucius
11. Waterfowl and shorebirds.
12. Xyrauchen texanus

KIRTLAND SE, NM 7.5-MINUTE QUADRANGLE

Although the Navajo Fish and Wildlife Department (NFWD) has no record of species of concern occurring on or near the project site(s) at this time, the potential for certain species of concern to occur needs to be evaluated.

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Antilocapra americana
2. Aquila chrysaetos
3. Buteo regalis
4. Charadrius montanus
5. Mustela nigripes

LITTLE WATER, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Aquila chrysaetos; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.
2. Astragalus humillimus

Known to occur within three miles of the project site:

1. Sclerocactus mesae-verdae

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Buteo regalis
2. Charadrius montanus
3. Falco peregrinus
4. Mustela nigripes

THE HOGBACK SOUTH, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Buteo regalis; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.

Known to occur within three miles of the project site:

1. Aquila chrysaetos

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Charadrius montanus
2. Empidonax traillii extimus
3. Falco peregrinus
4. Mustela nigripes
5. Astragalus humillimus
6. Sclerocactus mesae-verdae

FRUITLAND, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Cottus bairdi
2. Buteo regalis; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.
3. Empidonax traillii extimus

Known to occur within three miles of the project site:

1. Astragalus naturitensis
2. Falco peregrinus

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Aquila chrysaetos
2. Catostomus discobolus
3. Charadrius montanus
4. Gila robusta
5. Haliaeetus leucocephalus
6. Mustela nigripes
7. Porzana carolina.
8. Ptychocheilus lucius
9. Rana pipiens
10. Waterfowl and shorebirds.
11. Xyrauchen texanus

TABLE MESA, NM 7.5-MINUTE QUADRANGLE

Known to occur within three miles of the project site:

1. Aquila chrysaetos

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Buteo regalis
2. Charadrius montanus
3. Mustela nigripes
4. Astragalus humillimus
5. Sclerocactus mesae-verdae

NEWCOMB NE, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Aquila chrysaetos; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.

Known to occur within three miles of the project site:

1. Buteo regalis

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Charadrius montanus
2. Empidonax traillii extimus
3. Mustela nigripes
4. Sclerocactus mesae-verdae

THE HOGBACK NORTH, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Buteo regalis; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.

2. Aquila chrysaetos ; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.

Known to occur within three miles of the project site:
1. Astragalus naturitensis
2. Astragalus humillimus

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:
1. Catostomus discobolus
2. Charadrius montanus
3. Cottus bairdi
4. Empidonax traillii extimus
5. Falco peregrinus
6. Gila robusta
7. Haliaeetus leucocephalus
8. Mustela nigripes
9. Ptychocheilus lucius
10. Rana pipiens
11. Waterfowl and shorebirds.
12. Xyrauchen texanus
13. Sclerocactus mesae-verdae

KIRTLAND SW, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:
1. Buteo regalis; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:
1. Antilocapra americana
2. Aquila chrysaetos
3. Charadrius montanus
4. Mustela nigripes

Potential for the black-footed ferret should be evaluated if prairie-dog towns of sufficient size (per NFWD guidelines) occur in the project area.

Potential for Puccinellia parishii should be evaluated if wetland conditions exists that contain white alkaline crusts.

Biological surveys need to be conducted during the appropriate season to ensure they are complete and accurate please refer to NN Species Accounts.[4] Further questions pertaining to surveys should be referred to Species Account. Surveyors on the Navajo Nation must b**permitted** by the Director, NFWD. Contact Jeff Cole at (928) 871-7068 for permitting procedures. Questions pertaining to surveys should be directed to the NFWD Zoologist (David Mikesic) for animals at 871-7070, and Botanist (Daniela Roth) for plants at

[4] Available upon request free of charge by contacting Data Manager at 871-6489

(928)523-8445. Questions regarding biological evaluation should be directed to Rita Whitehorse-Larsen (Environmental Reviewer) at 871-7060.

Potential impacts to **wetlands** should also be evaluated. The U.S. Fish & Wildlife Service's National Wetlands Inventory (NWI) maps should be examined to determine whether areas classified as wetlands are located close enough to the project site(s) to be impacted. In cases where the maps are inconclusive (e.g., due to their small scale), field surveys must be completed. For field surveys, wetlands identification and delineation methodology contained in the "Corps of Engineers Wetlands Delineation Manual" (Technical Report Y-87-1) should be used. When wetlands are present, potential impacts must be addressed in an environmental assessment and the Army Corps of Engineers, Phoenix office, must be contacted. NWI maps are available for examination at the NFWD's Natural Heritage Program (NHP) office, or may be purchased through the U.S. Geological Survey (order forms are available through the NHP). The NHP has complete coverage of the Navajo Nation, excluding Utah, at 1:100,000 scale; and coverage at 1:24,000 scale in the southwestern portion of the Navajo Nation.

The information in this report was identified by the NFWD's biologists and computerized database, and is based on data available at the time of this response. If project planning takes more than two (02) years from the date of this response, verification of the information provided herein is strongly recommended. It should not be regarded as the final statement on the occurrence of any species, nor should it substitute for on-site surveys. Also, because the NFWD's information is continually updated, any given information response is only wholly appropriate for its respective request.

An invoice for this information is attached.

If you have any questions I may be reached at (928) 871-6472.

Sonja Detsoi, Wildlife Tech.
Natural Heritage Program
Department of Fish and Wildlife

CONCURRENCE

Gloria M. Tom, Director
Department of Fish & Wildlife
Division of Natural Resources

xc: file/chrono

THE
NAVAJO
NATION
P.O. Box 9000 • Window Rock, Arizona • 86515

President
Joe Shirley, Jr.
Vice President
Frank J. Dayish, Jr.

08 March 2005

Mr. Danny Rakestraw, Senior Biologist
URS Corporation
7180 Pollock Drive, Suite 200
Las Vegas, NV 89119

Mr. Rakestraw,

URS Corporation is the third party National Environmental Policy Act (NEPA) contractor supporting the Bureau of Indian Affairs in their development of an Environmental Impact Statement and associated documents for the proposed Sithe Global Power, LLC, Desert Rock Energy Project in San Juan County, New Mexico. To minimize impacts to biological resources on the Navajo Nation, the Department of Fish and Wildlife's Natural Heritage Program has been cooperating with you, and others, to provide all necessary avoidance measures for alignment of various aspects of this project. We have been provided a map of the proposed project area, and as per your 26 January 2005 letter, received a request for detailed location information on Threatened and Endangered species occurring on or near the project. In response, this letter details known plant and animal species of concern, and provides specific locations of those resources.

A review of our database and maps of the project area was completed to derive a list of species occurring within approximately one mile of the proposed project alignments. We found a total of 69 occurrences of Navajo Endangered Species List (NESL) species within this area. They include the following nine species:

Golden Eagle (*Aquila chrysaetos* – AQCH) -- NESL Group 3
Mancos Milk-vetch (*Astragalus humillimus* – ASHU) -- NESL Group 2, Fed. Endangered
Naturita Milk-vetch (*Astragalus naturitensis* – ASNA) -- NESL Group 4,
Burrowing Owl (*Athene cunicularia* – ATCU) -- NESL Group 4 in 2005 revision
Ferruginous Hawk (*Buteo regalis* - BURE) -- NESL Group 3
Townsend's Big-eared Bat (*Corynorhinus townsendii* – COTO) -- NESL Group 4
Southwestern Willow Flycatcher (*Empindox traillii extimus* – EMTREX) -- NESL Group 2, Fed. Endangered
Bald Eagle (*Haliaeetus leucocephalus* – HALE) -- Pending Fed. delisting
Mesa Verde Cactus (*Sclerocactus mesae-verdae* – SCMEVE) -- NESL Group 3, Fed.Threatened, uplisted to Group 2 in 2005 revision

The specific location information included in Appendix A was derived by several methods. For most occurrences, UTM coordinates were estimated to the nearest 100 meters from the element's mapped location on our 1:24,000 quad. maps. Most Ferruginous Hawks nest locations, however, were gathered with a GPS unit during helicopter surveys and are therefore more precise. All data provided should be regarded as collected with UTM, zone 12 projection with NAD27 CONUS Datum. Also, all locations were projected using ArcView software to ensure accuracy. To maintain this accuracy, you may contact me to e-mail the Access Database for direct input to ArcView with your project.

The Navajo Nation Department of Fish and Wildlife expects avoidance of species at all locations provided in this letter, in accordance with the Natural Heritage Program's Species Accounts. The Department's newly-developed and implemented Ferruginous Hawk Nest Protection Policy is included in Appendix 2, and supersedes the previous recommendations in the Species Account. As per our previous discussions, additional surveys will be necessary for these and other NESL species throughout the project area, and avoidance of all additional occurrences are expected. However, we will adhere to a half-mile avoidance distance around all active Ferruginous Hawk nests for survey activities (considered 'Brief Activities' in the Policy). The Navajo Natural Heritage Program will provide active nest information to consultants performing field surveys as needed during the progression of the hawk breeding season.

We appreciate that URS fully understands the sensitive nature of this data, and will treat the data in the secure manner in which you treat all endangered species and cultural resource data. Protection of data includes: marking data in your data management system requiring approval of a designated individual prior to access; not using these data for any other projects, nor forwarding to other agencies, contractors, or other organizations without Navajo Nation Department of Fish and Wildlife written consent; and the data will not be published in any documents made available to the public without the Department of Fish and Wildlife's consent.

If you have any questions or desire more technical assistance from the Department, feel free to contact me at 928-871-7070, or dmikesic@hotmail.com

Sincerely,

David Mikesic

David Mikesic, Zoologist
Navajo Natural Heritage Program
Department of Fish and Wildlife

xc: file, chrono
Richard Knox, Project Manager, URS Corp., 7720 N. 16th Street, Suite 100, Phoenix, AZ 85020
Barb Garrison, 333 East Wetmore, Suite 611, Tuscon, AZ 85705
Rita Whitehorse-Larsen, Wildlife Biologist, Navajo Nation Department of Fish and Wildlife

Attachments: 2 appendices

Appendix B

Biological Evaluation

Biological Evaluation
For the Proposed
Desert Rock Energy Project

PREPARED FOR:

BUREAU OF INDIAN AFFAIRS
NAVAJO AREA OFFICE
GALLUP, NEW MEXICO

AND

NAVAJO NATION DEPARTMENT OF FISH AND WILDLIFE
WINDOW ROCK, ARIZONA

PREPARED BY:

ECOSPHERE ENVIRONMENTAL SERVICES
4801 N. BUTLER SUITE 15101
FARMINGTON, NEW MEXICO 87401

APRIL 2007

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY 1
2.0 DESCRIPTION OF THE PROPOSED ACTION 1
2.1 Power Plant 2
2.2 Access Roads 3
2.3 Transmission Lines 5
2.4 Water Well Fields 6
2.5 BNCC Mine Lease 6
3.0 DESCRIPTION OF THE ANALYSIS 7
3.1 Affected Environment 7
4.0 SURVEY METHODS 10
4.1 Field Survey Preparation 10
4.2 Field Surveys 10
5.0 SPECIAL STATUS SPECIES 10
6.0 EFFECTS OF THE PROPOSED ACTION 15
6.1 Ecological Risk Assessment 15
6.2 Air Quality Effects 15
6.3 Water Quality Effects 16
6.3.1 Surface Water Quality 16
6.3.2 Ground Water Quality 18
6.3.3 Streamflow Effects 19
6.4 Infrastructure Related Effects 19
6.5 Human Activity Effects 21
7.0 GENERAL MITIGATION MEASURES 21
8.0 SPECIAL STATUS SPECIES IMPACTS 23
8.1 San Juan milkweed (Asclepias sanjuanensis) 23
8.2 Cottam's milkvetch (Astragalus cottamii) 23
8.3 Naturita milkvetch (Astragalus naturitensis) 24
8.4 Mancos saltplant (Proatriplex pleiantha) 24
8.5 Parish's alkali grass (Puccinellia parishii) 25
8.6 Banner-tail kangaroo rat (Dipodomys spectabilis) 25
8.7 Kit fox (Vulpes macrotis) 25
8.7 Spotted bat (Euderma maculatum) 26
8.8 Brown pelican (Pelecanus occidentalis carolinensis) 26
8.9 Mountain plover (Charadrius montanus) 26
8.10 Golden eagle (Aquila chrysaetos) 27
8.11 Western burrowing owl (Athene cunicularia hypugea) 27
8.12 Ferruginous hawk (Buteo regalis) 28
8.13 American peregrine falcon (Falco peregrinus) 29
8.14 Sora (Porzana carolina) 29
8.15 Roundtail Chub (Gila robusta) 29
8.16 Mottled sculpin (Cottus bairdi) 30
8.17 Bluehead sucker (Catostomus discobolus) 30
8.18 Northern leopard frog (Rana pipiens) 31
8.19 Summary of Potential Impacts to Special Status Species 31
9.0 BIOLOGICAL ASSESSMENT PREPARERS 33
10.0 CONSULTATION AND COORDINATION 33
11.0 REFERENCES CITED 34

LIST OF FIGURES AND TABLES

Table 2-1. Maximum Projected Ground Disturbance for Individual Project Components. 2

Figure 1: Desert Rock Energy Project Proposed Action Including Sub-Alternatives. 4

Table 3-1. Maximum Projected Disturbance to Vegetation Communities Per Action Alternative. Desert Rock Energy Project 2007. ..... Error! Bookmark not defined.

Table 5-1. Summary of Potential Impacts to Special Status Species Listed by the Navajo Nation Natural Heritage Program and the State of New Mexico With Potential to Occur in the Desert Rock Energy Project Analysis Area. 11

ATTACHMENTS

ATTACHMENT A — NAVAJO NATION NATURAL HERITAGE PROGRAM CONSULTATION LETTERS

ATTACHMENT B — GOLDEN EAGLE AND FERRUGINOUS HAWK NEST PROTECTION POLICY

BIOLOGICAL EVALUATION
DESERT ROCK ENERGY PROJECT

1.0 EXECUTIVE SUMMARY

The purpose of this Biological Evaluation (BE) is to provide information about the potential environmental effects that development of the Desert Rock Energy, LLC proposed Desert Rock Energy Project would have on species listed as threatened, endangered or sensitive by the Navajo Nation Department of Fish and Wildlife (NNDFW) and the State of New Mexico. The proposed Desert Rock Energy Project would be located on Navajo Nation lands in San Juan County, New Mexico. The purpose of this survey was to adhere to the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), and the Navajo Nation code requirement for species of concern (17NNC507) administered by the Natural Heritage Program (NHP) of the NNDFW. State listed species are protected under the New Mexico Wildlife Conservation Act of 1978. (N.M. Stat. § 17-2-37) and the Endangered Plant Species Act (N.M. Stat. 1978 § 75-6-1).

Potential impacts as a result of the proposed action to species listed by U.S. Fish and Wildlife Service (UFWS) as federally endangered, threatened, and/or candidate species, and proposed or designated critical habitat, are addressed in detail in the Biological Assessment (BA) (Ecosphere 2007). A draft environmental impact statement (DEIS) is being prepared in compliance with the National Environmental Policy Act (NEPA) to analyze and disclose probable effects of the proposed Desert Rock Energy Project.

2.0 DESCRIPTION OF THE PROPOSED ACTION

Desert Rock Energy, LLC is proposing to construct and operate a coal-fired power plant, that would produce up to 1,500 MW (megawatt) gross (1,366 MW net) of electricity. The proposed facilities include up to two 750-MW generation units, as well as a plant-cooling system, coal-handling facilities, power transmission interconnection facilities, a water-supply system, access to the plant site, waste-management operations and other ancillary facilities. The proposed action is summarized below in Table 2.1 in terms of the required facilities and the maximum ground disturbance per component. The proposed power plant is located approximately 30 miles southwest of Farmington in San Juan County, New Mexico and is entirely on the Navajo Nation (refer to Figure 1). More detailed information on the proposed action, including details on project construction, plant operation, maintenance and decommissioning is provided in the DEIS (URS 2007).

Table 2-1. Maximum Projected Ground Disturbance for Individual Project Components. Desert Rock Energy Project 2007.

Project Component	Alternative	Maximum Anticipated Disturbance in Acres
Power Plant Facility	N/A	149
Transmission Line	Segment A	503
	Segment B	672
	Segment C	375
	Segment D	327
	Total if Sub-alternative A Selected	1,205
	Total if Sub-alternative B Selected	1,373
Access Road	N/A	21
Water Well Field	Sub-alternative A	942
	Sub-alternative B	890
BNCC Lease Area	N/A	13,051

2.1 Power Plant

The power plant site would be located within a 592-acre area parcel immediately adjacent to and west of the existing BHP Navajo Coal Company (BNCC) lease area. Within the parcel, the footprint of the facilities would require approximately 149 acres. Ancillary facilities within the power plant site (i.e. administration building/control center, turbine hall, air-emission control equipment and facilities, maintenance shop, etc.) and operation of the plant are described in more detail in the DEIS (URS 2007). Up to 1.2 million tons of earth material is anticipated to be removed for the construction of the plant. The cut-and-fill activities, conducted using scrapers or excavators, would be balanced over the site such that soil would not need to be imported or exported. The plant site would be surrounded by fencing for security and safety purposes and normal access to the plant would be through a primary gate with security controls.

The power plant, proposed as a mine mouth operation, would be fueled by sub-bituminous coal provided by the adjacent resources of the BNCC Lease Area. Operation of the power plant would require up to 6.2 million tons of coal per year. The coal would be delivered from the BNCC Lease Area to the power plant via conveyor belt.

State-of-the-art emission controls would be used to minimize emissions of potential air pollutants. Air pollution controls for the pulverized coal-fired boilers would consist of the following:

- Low nitrogen oxide (NO_x) burners and selective catalytic reduction to control NO_x emissions;
- Low sulfur coal and wet flue gas desulfurization to control sulfur dioxide (SO_2) emissions;
- Wet flue gas desulfurization and a wet stack to control acid gas emissions, including sulfuric acid mist;
- Wet flue gas desulfurization to control mercury (Hg) emissions. Activated carbon and hydrated quicklime injection to be installed before the fabric filter baghouse if needed for additional

reductions, with secondary reductions in sulfur dioxide (SO_2) emissions and sulfuric acid (H_2SO_4) mist;

- A fabric filter to control particulate emissions; and
- High efficiency combustion to control carbon monoxide (CO) and volatile organic compound emissions.

Highly efficient supercritical boilers would operate at high temperatures (net heat rate of 8,792 Btu [British thermal unit] per kilowatt hour) and pressure to make steam to turn a steam turbine connected to a generator that would produce the electricity. Steam exhausted from the turbine would be cooled by a Heller natural-draft cooling system. This type of cooling system uses 80 percent less water than conventional mechanical-draft cooling systems. No cooling pond would be required.

The power plant would have a 50-year design life without major capital improvements. At the end of its useful life, the power plant and all associated facilities would be decommissioned. All structures and equipment at the site would be dismantled and removed. All water wells would be decommissioned and abandoned in accordance with Navajo Nation procedures and regulations. Following removal and abandonment of facilities, any areas disturbed would be rehabilitated as near as possible to their original condition including all areas of the BNCC lease area disturbed by mining activities. All mining areas associated with Desert Rock will be reclaimed per the terms and conditions of BNCC's Surface Mining Control and Reclamation Act (SMCRA) permit as administered by Office of Surface Mining (OSM).

2.2 Access Roads

Although existing access roads and two-tracks are available within the project area and along proposed utility and transmission corridor alignments, a new permanent access road to the proposed plant site is proposed. The proposed road alignment is approximately 2.24 miles in length requiring 21 acres of new ground disturbance. This access road would spur off of the existing Burnham Road that currently crosses, in a north-south direction, Areas V and IV of the BNCC lease.

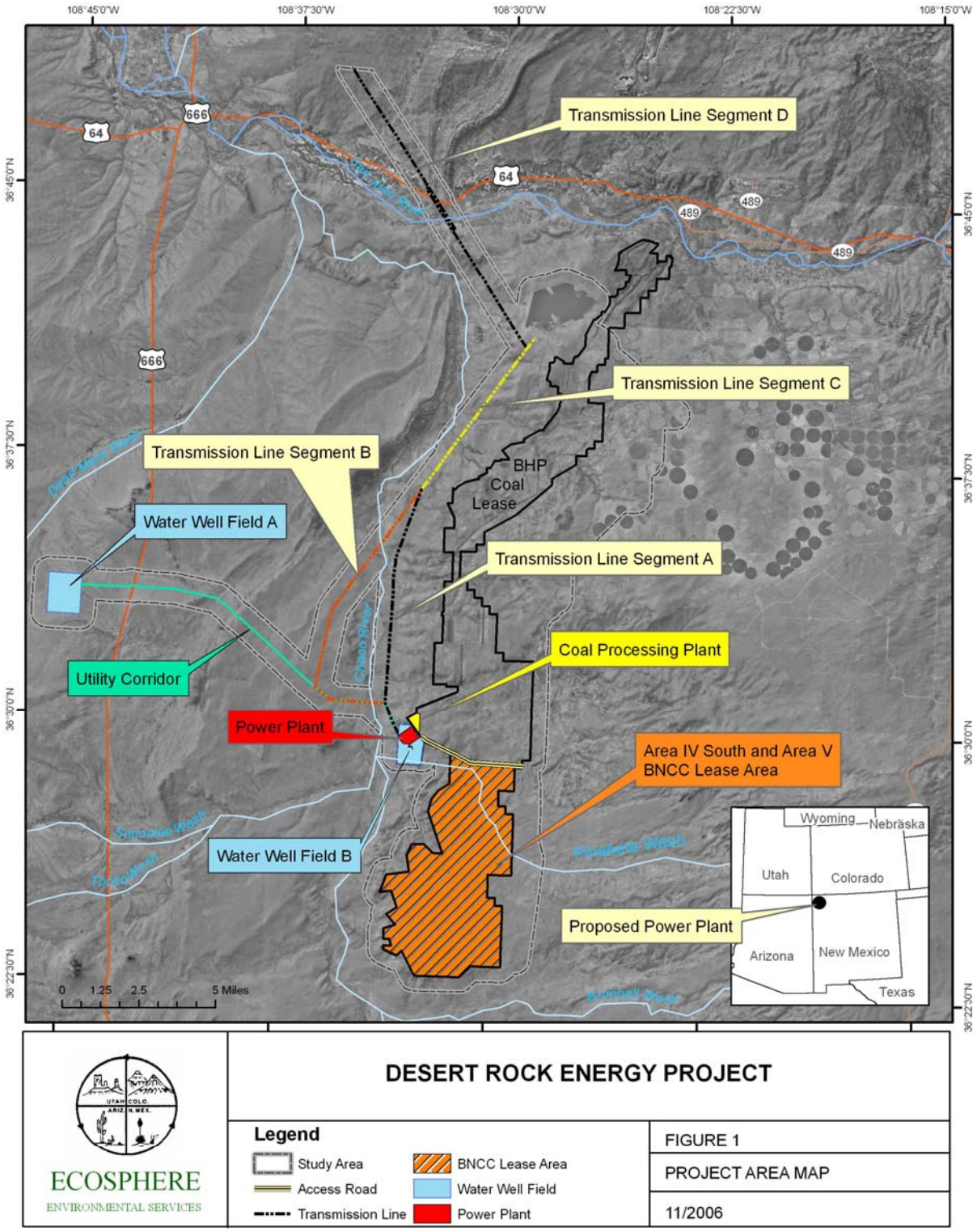

Figure 1: Proposed Desert Rock Energy Project Preferred Alternative Including Sub-Alternatives.

2.3 Transmission Lines

The proposed transmission lines would extend from the proposed plant site to the existing Arizona Public Service (APS) Four Corners Generating Station (Segments A or B and Segment C). After leaving the Four Corners Generating Station, the proposed transmission alignment would continue northward (Segment D) crossing the San Juan River and interconnecting with the proposed Navajo Transmission Project (NTP). There are two sub-alternative corridors being considered in the DEIS for the southernmost portion of the transmission alignment: Segments A and B (described below). With the exception of Segment D, which is proposed within a 250 feet-wide right-of-way (ROW), all other alternative transmission corridors would be within a 500-feet wide ROW.

Segment A, the preferred alternative, would leave the plant site and would parallel the eastern side of the Chaco River, connecting with Segment C after 8.3 miles. The ROW for this sub-alternative would require 503 acres. Sub-alternative Segment B would leave the plant site to the west, cross the Chaco River then parallel the western side of the Chaco River continuing northward and crossing the Chaco River again before connecting into Segment C after 11.1 miles. The ROW for this alternative would require approximately 672 acres. Segment C would be 6.2 miles in length requiring a 375 acre ROW, while Segment D is 10.8 miles in length and would require a 372 acre ROW. Segment D would cross the San Juan River and continue northward to tie into the currently proposed NTP. There are no sub-alternatives considered for transmission Segments C and D.

Segments A or B would consist of 2 single-circuit 500kV transmission lines. Segment C would consist of 1 single-circuit 500kV transmission line, which would parallel an existing 230kV line. Segment D would also consist of 1 single-circuit 500kV transmission line paralleling an existing 230kV line. All transmission line segments would be self-supporting, four-legged, steel-lattice tower structures approximately 135 feet in height with 1,200-1,600 feet of spacing between individual structures.

At each tower site, leveled areas, or pads, approximately 30 feet by 40 feet would be needed to facilitate the safe operation of construction equipment, such as cranes. At each structure site, a work area of approximately 200 by 200 feet would be required for the location of structure footings, assembly of the tower, and equipment maneuvers. The work area would be cleared of vegetation only to the extent needed. After construction, disturbed areas not needed for normal maintenance of the transmission line would be graded to blend as near as possible with the natural contours, and revegetated with indigenous plant species. Areas would be reseeded prior to the season(s) when precipitation is normally received.

Pilot lines would be pulled (strung) from structure to structure by helicopter and threaded through the stringing sheaves at each tower. Following the pilot lines, a larger diameter, stronger line would be attached to conductors to pull them through. Conductors and ground wires would be strung using powered pulling equipment at one end and powered tensioning equipment at the other end of a conductor segment. Sites for tensioning equipment and pulling equipment would be approximately 3 miles apart. The tensioning site would be an area approximately 200 by 200 feet. The pulling site would require approximately half the area of the tension site.

During pre-design project development activities, a series of preexisting roads were field verified and mapped for access to proposed transmission tower sites resulting in selection of routes of which avoided disturbance of cultural and biologically sensitive areas. Existing roads will be used to the greatest extent possible; however some overland access on undisturbed areas would be required. It is expected that all biological and cultural resources of importance along or within all roads used for the project will be inventoried and monitored by a qualified biologist or archaeologist prior to construction related activities and that these resources will be avoided during long term maintenance activities of the project.

2.4 Water Well Fields

The average annual water consumption demand of the Desert Rock Energy Project is estimated to be 4,500 acre-feet per year (af/yr), or 2,795 gallons per minute (gpm), of continuous flow for a period of 40 consecutive years. An additional 450 ac/ft per year would be available to meet Navajo municipal demand for a total of 4,950 ac/ft per year. The proposed and alternative water sources would be groundwater from the Morrison aquifer. Based on evaluations of the hydrogeologic characteristics of the Morrison aquifer, it was estimated that 10 to 20 new production wells could meet this anticipated water demand (URS 2005). Water from the Morrison aquifer was identified as suitable for industrial use through a study by URS in September 2005 and amended in September 2006. Data for the study came from previous studies, well data from Navajo Department of Water Resources, and water quality field tests.

Two alternate water well field locations are being evaluated in the DEIS and in this BE. The preferred alternative Water Well Field B would include 13 wells located within the 592-acre power plant facility site, as well as an additional 7 wells spaced at 1-mile intervals along Segment A of the proposed transmission line corridor. The sub-alternative Water Well Field A would also be comprised of 20 water wells, all within an approximately 2 square mile area. Water Well Field A would also require the construction of a 12.4 mile utility corridor/water line.

Each water production well and associated facilities would be enclosed within an 8-foot-high chain-link fence surrounding the well yard, requiring a 100 foot by 100 foot area (approximately 2 acres). Individual wells would be connected by collector pipelines to the main utility line, which would extend from the water well field to the proposed power plant site. Due to the topographic conditions, the pipelines would be pressurized only by the well pumps; no booster-pump station would be required. Overhead distribution power lines would be constructed to supply electricity to the wells and would be constructed in the same ROW paralleling the main water utility pipeline and collector pipelines. Access to the production wells would be needed for construction, operation, and maintenance. Access roads would be approximately 15-feet wide and would be gravel roads constructed in accordance with Bureau of Indian Affairs (BIA) and/or Navajo Nation standards. The utility corridor for Water Well Field B would be approximately 12.4 miles in length and constructed within a 100-foot wide ROW requiring a 149.7 acres. Following construction the utility corridor would have a permanent 10-foot wide ROW.

2.5 BNCC Mine Lease

The power plant would be constructed on a 592-acre parcel immediately adjacent to and west of the existing BNCC lease area. The coal fuel supply would be produced and conveyed by a conveyor belt from coal reserve Area IV South, and Area V of the BNCC lease area to proposed coal preparation facility located next to the power plant in Area IV North of the BNCC lease area. The production phase in Area IV South will last through approximately 2044. At that time, the mining operations within the BNCC Lease Area will transition to Area V of the mine lease.

BNCC holds Surface Permit Number 2838 issued by the New Mexico Office of the State Engineer in October 1958. This permit provides BNCC a total diversionary right of 51,600 acre-feet annually, with a consumptive right of 39,000 acre-feet annually, for waters drawn from the San Juan River. The additional consumption associated with the expansion of the surface mining operations at the Navajo Mine required to supply coal to the Desert Rock Energy Project is estimated to be approximately 600 acre-feet annually. The additional consumption is within BNCC's existing consumptive right and will cause no depletions to the San Juan River beyond those authorized under the current water right permit.

A single public road, referred to as the Burnham Road Realignment, will be re-routed to suit the needs of mining operation on the BNCC lease area. This road requires re-alignment over its extent within Areas III and IV North of the lease to suit the needs of the current BNCC lease area operations, regardless of the disposition of the Desert Rock Energy Project. Navajo Mine staff have developed a preferred alignment

and have entered preliminary approval discussions with the BIA, the regulatory authority over the roads in the project area.

3.0 DESCRIPTION OF THE ANALYSIS AREA

This section describes components of the environmental setting of the area with potential to be impacted by the proposed action. Because a detailed description of the physical and biological characteristics of the analysis area is provided in the DEIS (URS 2007), this evaluation focuses on the physical and biological characteristics of the analysis area that have a direct relevance to special status plant and wildlife species protected by the NNDFW and the State of New Mexico.

To account for factors that may affect special status species, such as emissions, noise and human and vehicle presence, the analysis area is defined by a 31-mile (50-km) radius from the proposed Desert Rock Energy Project power plant site. The 31-mile (50-km) buffer was chosen to be consistent with air quality analyses required for major source air quality permitting (U.S. Environmental Protection Agency [USEPA] 2005).

3.1 Affected Environment

The climate of the analysis area is classified as arid continental (BLM 2003). Because of its relatively high elevations, San Juan County, New Mexico experiences warm dry summers and cool dry winters (Western Regional Climate Center 2006). Average annual temperatures in and near the project area are in the low to mid 50's, summer temperatures range from the mid 60's to the low 90's and winter temperatures range from the low 20's to the low 40's (Western Regional Climate Center 2006). The mean annual precipitation in Shiprock, New Mexico is 7.07 inches (Western Regional Climate Center 2006).

Topographically, the proposed action is characterized by alternating series of rolling hills, broad alluvial terrain, and bottomed washes with eroded sandstone and clay mesas and ridges. The project site is located in relatively flat to gently rolling terrain that is interspersed with areas of extreme topographic relief, including steep ridges and buttes. Major topographic features in the analysis area include the Hogback Monocline and Shiprock Peak. Elevations in the analysis range from approximately 5,000 ft to 5,675 ft. The project area is surrounded by several high elevation areas, including the Chuska Mountains in northwest Arizona, Sleeping Ute in Colorado and New Mexico, and the San Juan Mountains in southwest Colorado and north-central New Mexico.

The action area is geologically located within the Cretaceous and Quaternary deposits derived from Mancos Shale (Upper Cretaceous), Menefee formation, Cliff House Sandstone of the Mesaverde Group (Upper Cretaceous), Pictured Cliff Sandstone (Upper Cretaceous), Fruitland formation, (Upper Cretaceous), Lower Shale member, Eolian sand (Holocene and Pleistocene), Naha and Tsegi Alluvium, undifferentiated (Holocene), and Channel and flood-plain alluvium (Holocene) (Hunt 1978).

There are about 10 named washes in the site area that will likely intersect or be proximal to infrastructure associated with the Desert Rock Energy Project. All of these washes are intermittent or ephemeral. Most of the washes discharge into the Chaco River, which is an intermittent water source in the analysis area. The Chaco River flows north into the San Juan River. Originating in the San Juan Mountains of southwest Colorado, the San Juan flows southward into New Mexico and then generally westward into Utah where it eventually becomes a tributary to the Colorado. The project area contains a single lake, Morgan Lake. Morgan Lake is a man-made lake situated adjacent to the Four Corners Generating Station, which utilizes water in the lake to cool its generating units.

In addition to these large water bodies, the project area also contains scattered wetlands that are fed by springs and/or collection of surface water (i.e. stockponds). During the 2006 field season, Ecosphere Environmental Services (Ecosphere) conducted jurisdictional wetland delineations of all potential Waters of the U.S. within all project component ROWs and footprints. These surveys identified 2 areas that were

characterized as wetlands; one near the proposed power plant access road, southeast of the proposed power plant location and the other near the Water Well Field B (Ecosphere 2006). The southwestern corner of Morgan Lake is located within a 1-mile corridor of the southern end of the proposed Segment D transmission line alignment. Jurisdictional wetlands are also present along the margins of Morgan Lake (Ecosphere 2006). There are no jurisdictional wetlands within the proposed action area of disturbance.

The primary source of groundwater in the San Juan Basin is derived from wells completed within surficial valley-fill deposits of Quaternary age and sandstones of Tertiary, Cretaceous, Jurassic, and Triassic age (Stone et. al 1983). Groundwater in the sandstone sequences generally is under confined conditions, resulting in an artesian flow from wells completed in these units.

Vegetation in the Desert Rock Energy Project analysis area is dominated by Great Basin desert-scrub habitats (Dick-Peddie 1993). Great Basin desert-scrub is a cold desert ecosystem dominated by shrubs with a sparse understory of forbs and grasses; bare ground occurs in poor, alkaline soils (Fitzgerald et a. 1994, Dick-Peddie 1993). Vegetative communities within the study area were identified using the Provisional Digital Land Cover Map for the southwestern United States (USGS National GAP Analysis Program 2004). There are 18 cover types occurring within the analysis area, including two non-vegetative cover classes, Open Water and Recently Mined or Quarried (Table 3.1). The Provisional Digital Land Cover Map for the southwestern United States identified areas that have been recently mined or quarried (USGS National GAP Analysis Program 2004). Portions of BNCC Permit Areas I, II and III have been reclaimed. To more accurately describe the study area, data from BNCC's reclamation efforts were extrapolated to characterize reclaimed areas and then categorize into GAP Analysis classifications (BHP Billiton 2004). The maximum projected disturbance to vegetation communities per project component are provided in Table 3.1.

Table 4-1. Maximum Projected Surface Disturbance in Acres to Vegetation Communities for the Proposed Action. Desert Rock Energy Project 2007.

Habitat Type	Power Plant	Coal Processing Plant	Transmission Line A	Transmission Line B	Transmission Line C and D	Access Road	Water Well Field A	Water Well Field A Utility Corridor	Water Well Field B	BNCC Lease Areas
Colorado Plateau Mixed Bedrock Canyon and Tableland	1.56	0.00	2.22	0.00	45.81	0.44	2.22	1.60	9.56	5.12
Inter-Mountain Basins Shale Badland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Colorado Plateau Piñon-Juniper Woodland	0.00	0.00	1.11	0.00	15.35	1.11	0.00	0.00	10.67	6.00
Inter-Mountain Basins Big Sagebrush Shrubland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11
Colorado Plateau Mixed Low Sagebrush Shrubland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Colorado Plateau Blackbrush-Mormon-tea Shrubland	0.00	0.00	0.00	0.00	21.35	0.00	0.00	0.00	0.00	0.00
Inter-Mountain Basins Mixed Salt Desert Scrub	24.69	10.01	307.13	338.33	235.29	4.45	47.59	61.50	447.68	1332.37
Inter-Mountain Basins Semi-Desert Shrub Steppe	46.93	18.01	22.02	30.30	24.69	2.45	3.34	3.18	102.97	475.70

Inter-Mountain Basins Semi-Desert Grassland	75.84	70.94	166.80	274.31	298.01	11.34	0.00	31.07	302.90	5893.46
Rocky Mountain Lower Montane Riparian Woodland/Shrubland	0.00	0.00	0.00	1.60	2.22	0.00	0.00	0.00	0.00	4.89
Inter-Mountain Basins Greasewood Flat	0.00	1.78	3.34	24.30	23.80	0.44	836.20	52.40	16.46	379.18
Southern Colorado Plateau Sand Shrubland	0.00	0.00	0.00	0.00	4.67	0.00	0.00	0.00	0.00	0.00
Open Water	0.00	0.00	0.00	0.00	3.34	0.00	0.00	0.00	0.00	3.78
Barren Lands, Non-specific	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Agriculture	0.00	0.00	0.00	0.00	10.90	0.00	0.00	0.00	0.00	0.00
Recently Mined or Quarried	0.00	0.00	0.00	0.00	14.90	0.00	0.00	0.00	0.00	0.00
Invasive Southwest Riparian Woodland and Shrubland	0.00	0.00	0.00	0.00	4.67	0.00	0.00	0.00	0.00	0.00
Invasive Annual and Biennial Forbland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**149**	**101**	**503**	**669**	**705**	**20**	**889**	**150**	**890**	**13,051**

Source: USGS National GAP Analysis Program 2006. Acreages are approximate based on polygon calculations.

Semi-desert grasslands, salt desert scrublands, and semi-desert shrublands are similar in that they overlap somewhat in species composition, but vary by physical structure and vegetative density. For example, semi-desert grasslands are often dominated by alkalai saccaton (*Sporobolus airoides*), galleta (*Hilaria jamesii*) and Indian ricegrass (*Stipa hymenoides*), but also include scattered shrubs such as saltbush (*Atriplex* spp.), shadscale (*Atriplex confertifolia*), and greasewood (*Sarcobatus vermiculatus*). Salt desert scrublands are generally dominated by various species of saltbush or greasewood but also include many of the same understory grasses and herbaceous forbs as grassland communities. Semi-desert shrublands include vegetative communities dominated by shrub species such as rabbitbrush (*Chrysothamnus spp.)*, sagebrush (*Artemisia* spp.), broom snakeweed (*Gutierrezia sarothrae*), or ephedra (*Ephedra* spp.)

Riparian habitats within the analysis area include native, exotic, and mixed native-exotic riparian woodlands occurring along perennial and intermittent water sources. Native riparian woodlands are dominated by cottonwoods (*Populus* spp.) and willows (*Salix* spp.), whereas riparian exotics include saltcedar (*Tamarix chinensis*) and Russian olive (*Elaeagnus angustifolia*). These riparian communities are associated with the primary water sources in the project area, the Chaco River, the San Juan River and Morgan Lake.

The analysis area supports a variety of natural vegetation communities and landscape features that offer a diversity of wildlife habitat types, including habitat for an assortment of mammals, birds, reptiles, amphibians, fish and invertebrates. While these habitat types correspond with the vegetation community types discussed above, they also are defined by a number of distinct landscape features such as washes and gullies, rock outcrops and hillsides, cliffs and taluses, and caves. All contribute to the diversity and abundance of wildlife in the area as they generally provide a microhabitat for wildlife uniquely adapted to or dependent on these features.

Most wildlife species within the study area are adapted to drought conditions, including sparse vegetative cover and limited sources of permanent water. However, perennial sources of water in the study area support a relatively high concentration of vegetation and cover that contribute to increased wildlife diversity in these areas. While many species of wildlife commonly feed in upland habitats, they also

depend on riparian-wetland habitat for breeding and cover. The riparian-wetland habitats generally have more structured and complex vegetative assemblages, along with higher wildlife diversity than the surrounding upland areas. These areas effectively function as movement corridors for mammals and serve as congregation and feeding areas for a variety of bird species.

4.0 SURVEY METHODS

4.1 Field Survey Preparation

Information used to compile this section was gathered from data collected during field-based evaluations conducted in 2004-2006, from reviews of published literature, and from the project *Ecological Risk Assessment* contained in the DEIS (URS 2007). Prior to conducting fieldwork, a list of Navajo Nation species of concern was obtained through consultation with the NHP. Species of concern include protected, candidate, and other rare or otherwise sensitive species. Consultation letters from the NHP are provided in Attachment A. New Mexico State listed species were retrieved from the New Mexico Natural Heritage Program (NMNHP) Biological and Conservation Data System (NMNHP 2006) and the New Mexico Rare Plant Technical Council (NMRPTC 2006). Federally listed species are addressed in the BA (Ecosphere 2007). A review of existing data sources was conducted prior to field work. A volume of baseline data has been prepared for the BNCC mine lease area and the proposed power plant site.

4.2 Field Surveys

Intensive biological investigations, including species-specific surveys for federally listed and special status flora and fauna were conducted during between the 2004 and 2006 field seasons by biologists and botanists from Ecosphere. In addition to surveys completed specific to the proposed action, biologists and botanists from Ecosphere have conducted numerous biological and botanical investigations within and adjacent to the boundaries of Navajo Mine, the Four Corners Generating Station, Shiprock and Nenanhazad Chapters, and along the eastern end of the Navajo Transmission Project, all areas within or immediately adjacent to the analysis area. As adequate baseline data exists for the fish species, species-specific surveys were not conducted for these aquatic species. Surveys were conducted according to U.S. Fish and Wildlife Service (USFWS) survey protocols or for those species for which no federal survey protocol has been established, by using other commonly accepted scientific survey methods.

5.0 SPECIAL STATUS SPECIES

Special status species habitat requirements and potential to occur in the proposed project area were evaluated based upon project-specific habitat analyses. Table 5.1 lists the special status species, their conservation status, habitat associations, and potential impacts resulting from the proposed project.

Table 5-1. Summary of Potential Impacts to Special Status Species Listed by the Navajo Nation Natural Heritage Program and the State of New Mexico With Potential to Occur in the Desert Rock Energy Project Analysis Area.

Species Name	New Mexico Status	Navajo Nation Status	Habitat Associations	Potential Impacts
Bolack's sand verbena (*Abronia bolackii)*	Species of concern	None	Gypsiferous clay of the Ojo Alamo Formation, often on very steep hillsides at 5,250-5,750 ft.	No Impact This species was not found in the proposed construction area boundaries. Limited potential habitat occurs in the analysis area.
San Juan false carrot (*Aletes macdougalii ssp. breviradiatus)*	Species of concern	None	Sandstone slabs and canyon walls, usually growing in crevices (rarely on deeper sandy soil) in piñon-juniper woodland at 5,800-8,200 ft.	No impact. There is no potential canyon woodland habitat for this species in the proposed construction area boundaries.
Aztec gilia (*Aliciella formosa)*	Endangered	None	Salt desert scrub communities in soils of the Nacimiento Formation between 5,000-6,000 ft.	No impact. This geologic formation does not occur in the proposed project construction boundaries.
San Juan milkweed *(Asclepias sanjuanensis)*	Species of concern	G4	Sandy loam soils in juniper savanna and Great Basin desert scrub at 5,000-5,500 ft.	**May impact** This species occurs within the proposed construction area boundaries.
Chuska milkvetch *(Astragalus chuskanus)*	Species of concern	None	Degraded Chuska sandstone in openings in montane coniferous forest above 5,500 ft.	No impact. No Chuska sandstone or coniferous forests occur in the project area.
Cottam's milkvetch *(Astragalus cottamii)*	Species of concern	None	Found in rimrock habitats often within weathered depressions and crevices in sandstone substrates of Cretaceous origin in piñon-juniper woodland at 5,000-6,000 ft.	**May impact.** This species was not found in the proposed construction area boundaries. Limited suitable habitat occurs in the project area
Chaco milkvetch *(Astragalus micromerius)*	Species of concern	None	Gypseous or limey sandstones in piñon-juniper woodland or Great Basin desert scrub at 6,600-7,300 ft. Usually associated with outcrops of sandstone that are blended with Todilto gypsum or limestone.	No impact. Todilto gypsum or limestone is not found in the analysis area. The species was not found in the project area.

Species Name	New Mexico Status	Navajo Nation Status	Habitat Associations	Potential Impacts
Naturita milkvetch *(Astragalus naturitensis)*	Species of concern	G4	Southwest Colorado and south of Coyote Canyon on rimrocks and slickrocks in piñon-juniper woodlands.	**May impact.** This species was not found in the proposed construction area boundaries. Limited suitable habitat occurs in the project area
Arboles milkvetch *(Astragalus oocalycis)*	Species of concern	None	Seleniferous clay soils with sagebrush, piñon-juniper woodland, and transitional areas between piñon-juniper woodland and ponderosa pine forest.	No impact. No potential habitat occurs within the analysis area. This species has a relatively limited distribution centered on Navajo Reservoir.
Zuni fleabane *(Erigeron rhizomatus)*	Endangered	G2	Nearly barren detrital clay hillsides with soils derived from shales of the Chinle or Baca formations; usually on north or east-facing slopes in open piñon-juniper woodlands at 7,300-8,000 ft.	No impact There are no Chinle or Baca derived soils in the analysis area. Elevation within the analyis area ranges from 5,000 to 5,675 ft.
Navajo mountain phlox *(Phlox cluteana)*	Species of concern	None	Light to heavy shade on sandy soils in ponderosa pine forest between 6,000-10,000 ft.	No impact There are no ponderosa pine forests within the proposed construction area boundaries.
Mancos saltplant *(Proatriplex pleiantha)*	Species of concern	None	Desert badlands of Colorado Plateau on saline clay soils of the Mancos and Fruitland shale formations 5,000-5,500 ft.	**May impact.** This species is known to occur within 2 miles of the project area. Potential habitat occurs within the project area.
Parish's alkali grass *(Puccinellia parishii)*	Endangered	G3	Great Basin Desert and Chihuahuan Desert Scrub communities in alkaline springs, seeps, and cienegas.	**May Impact.** This species was not found in the proposed construction area boundaries. Limited potential habitat occurs in the project area.
Brack's hardwall cactus *(Sclerocactus cloveriae ssp. brackii)*	Endangered	None	Sandy clay of the Nacimiento Formation in sparse shadscale scrub between 5,000-6,000 ft.	No impact. This geologic formation does not occur in the proposed project construction boundaries.
Pronghorn (*Antilocapra americana)*	None	G3	Grasslands or desert-scrub with rolling or dissected hills or small mesas.	No Impact Not known to occur in the project area. There were no signs of this species utilizing the project area.
Banner-tail kangaroo rat (*Dipodomys spectabilis)*	None	G4	Great Basin desert grassland or desert scrub. Presence of grasses is necessary.	**May impact.** This species occurs within the project area.

Species Name	New Mexico Status	Navajo Nation Status	Habitat Associations	Potential Impacts
Kit fox (*Vulpes macrotis*)	None	G4	Desert scrub or desert grassland with soft, alluvial or silty-clay soils, with sparse vegetation cover.	**May impact.** This species occurs within the project area.
Spotted bat (*Euderma maculatum*)	Threatened	None	Found in ponderosa pine forests, piñon-juniper woodlands, and open semidesert shrublands. Rocky cliffs are necessary for roosting, as is access to water.	**May impact.** This rare species was not observed in the project area. However, there is potential habitat for this species.
Baird's sparrow (*Ammodramus bairdii)*	Threatened	None	Winters in southwest United States and northern Mexico. Local in native long grass prairies.	No impact. May incidentally migrate through the analysis area. However, the area does not provide potential wintering habitat.
Common blackhawk (*Buteogallus anthracinus anthracinus*)	Threatened	None	In New Mexico an uncommon summer resident that is largely restricted to well-developed riparian habitats in the San Francisco, Gila, and Mimbres drainages.	No impact. Rarely seen in San Juan County. This species unlikely to occur in the analysis area.
Gray vireo (*Vireo vicinior*)	Threatened	None	Closely associated with piñon/juniper woodlands with a variety of canopy covers.	No impact. Piñon/juniper woodlands in the construction area boundaries are not extensive enough to offer potential habitat.
Brown pelican (*Pelecanus occidentalis carolinensis)*	Threatened	None	Usually found in marine habitats in warmer waters in North America; except for the lower Colorado Basin and vicinity. It only rarely occurs inland.	**May impact.** May incidentally migrate through the analysis area (Morgan Lake). However, the area does not provide potential nesting habitat.
Mountain plover (*Charadrius montanus)*	None	G3	Breeds in short sparse vegetation in disturbed-prairies or semideserts with less than a two-degree slope.	**May impact.** This species has been recorded as breeding within the BNCC mine lease area.
Golden eagle (*Aquila chrysaetos)*	None	G3	Open habitats in mountainous, canyon terrain. Nests primarily on steep cliffs and occasionally large trees.	**May Impact** Known to nest in the analysis area. However, the proposed area of disturbance contains only potential foraging habitat.

Species Name	New Mexico Status	Navajo Nation Status	Habitat Associations	Potential Impacts
Western burrowing owl (*Athene cunicularia hypugea)*	None	G4	Nests in ground burrows (often deserted prairie dog burrows) in dry open grasslands or desert scrub.	**May Impact** This species occurs and nests within the proposed area of disturbance.
Ferruginous hawk *Buteo regalis*)	None	G3	Nests in badlands, flat or rolling grasslands and desert scrub.	**May Impact** The proposed area of disturbance contains potential nesting and foraging habitat.
American peregrine falcon (*Falco peregrinus)*	Threatened	G3	Cliffs that generally exceed 200 feet in height near permanent surface water	**May Impact** Potential nesting habitat occurs along the San Juan River corridor.
Sora (*Porzana carolina)*	None	G4	Nests in wetlands with shallow to intermediate-depth water with fine leaved emergent vegetation.	**May impact.** May incidentally migrate through the analysis area (Morgan Lake). However, the area does not provide potential nesting habitat.
Roundtail Chub (*Gila robusta)*	Endangered	G2	Pools, creeks, rivers; rare in water impoundments	**May Impact** Known to occur from Shiprock to Lake Powell in the San Juan River.
Mottled sculpin (*Cottus bairdi*)	None	G4	Found in rubble and gravel riffles, less often in sand-gravel runs, of headwaters, creeks, and small rivers	**May Impact** Known to occur in the San Juan River.
Bluehead sucker (*Catostomus discobolus)*	None	G4	Occupies a wide range of water condition within river/stream habitats.	**May Impact** Known to occur in the San Juan River.
Milk snake (*Lampropeltis triangulum*)	None	G4	Found in high foothill grasslands and coniferous forest using rocks, logs, stumps and other objects as cover.	No Impact Potential habitat for this species does not occur within the proposed disturbance area.
Northern leopard frog (*Rana pipiens*)	None	G2	Breeds in wetlands usually with permanent water and aquatic vegetation ranging from irrigation ditches to small streams, rivers, ponds and marshes.	**May Impact** Potential habitat occurs along the San Juan River corridor and at Morgan Lake.

Sources: Natural Heritage New Mexico and Navajo Nation Natural Heritage Program.

NOTES: E = Endangered species; T = Threatened species; G2 = Group 2 species on the Navajo Endangered Species List (NESL); G3 = Group 3 species on the NESL; G4 = Group 4 species on the NESL

6.0 EFFECTS OF THE PROPOSED ACTION

6.1 Ecological Risk Assessment

Potential risks to ecological receptors from the proposed power plant chemical emissions were evaluated in combination with the concentrations of these chemicals already present in the environment, to the extent that existing conditions are known. The risk analysis generally followed risk assessment procedures developed by U.S. Environmental Protection Agency (USEPA). Details of the ecological risk evaluation are presented in the DEIS (URS 2007). The ecological assessment includes a screening process where chemicals of potential ecological concern (COPECs) are selected and the subsequent risk-based assessment where site-specific risks and impacts are evaluated.

Results of the risk estimation process in terms of hazard quotients (HQs) on vegetation are provided in the Ecological Risk Assessment in the DEIS (URS 2007). Results of the ecological risk evaluation indicates that emissions of selenium or mercury or other metals from the proposed Desert Rock Power Plant are not expected to result in adverse affects to wildlife.

6.2 Air Quality Effects

Estimated emissions of chemical air toxics associated with the Desert Rock Energy Project were extracted from the air quality permit application prepared by ENSR for Desert Rock Energy, LLC and submitted to the USEPA Region 9. In addition, ENSR performed dispersion modeling to evaluate air quality impacts of the power plant on local and regional air quality, including the deposition of particulate matter (PM_{10}), sulfates, nitrates, dioxin and six metals; arsenic, cadmium, chromium, lead, mercury, and selenium. Based on results of these studies, the primary air pollutants associated with the Desert Rock Energy Project are expected to be fugitive dust associated with construction and mining activities, as well as emissions of chemical air pollutants and toxics associated with operation of the power plant and exhaust emissions from vehicles and other equipment (URS 2007). Models predicting ozone concentrations were not evaluated because is not required under the Prevention of Significant Deterioration (PSD) permitting procedures and the modeled ambient concentrations of ozone precursor compounds (NOx and VOC) were deemed insignificant (per the PSD criteria).

For the proposed alternatives, the total maximum controlled PM_{10} (particulate matter/fugitive dust) emissions from construction of the plant site, well fields, transmission lines and access road are estimated to be 147.7 tons/month. In the project area, the impact of dust pollution on vegetation and wildlife is expected to be of localized importance near construction areas. Likewise, because intensive construction is only expected to occur for less than 36 months, dust pollution that results from construction activities is expected to have only short-term impacts on vegetation and wildlife and would be limited to the time of construction disturbance. Impacts from fugitive dust resulting from mine operations would be low, localized and long term.

During construction, gasoline and diesel fueled vehicles and equipment will generate gaseous and particulate exhaust emissions, including volatile organic compounds (VOCs), carbon monoxide (CO), nitrogen oxides (NO_x) and PM_{10}. In the DEIS, annual emissions for all diesel-fueled vehicles and equipment were calculated based on average engine horsepower for each type of vehicles and equipment, and an operating schedule of 10 hours/day, 6 days/week and 52 weeks/year. Annual emissions for gasoline-fueled pickup trucks and crew cabs were calculated based on a traveling distance of 10 miles/day during power plant construction, 25 miles/day during access road construction, and 50 miles/day during transmission line and water conveyance system construction, all with an operating schedule of 6 days/week and 52 weeks/year (URS 2007). Maximum annual tailpipe emissions from plant employees commuting to the project site would be 13.5 tons VOC, 132.0 tons CO, 6.9 tons NO_x, 2.7 tons PM_{10} and 0.3 tons of SO_2. These emissions would be mobile and distributed across a large rural area; therefore, the ambient air quality impacts would be considered negligible. Impacts from vehicle emissions resulting from mine operations would be low, localized and long term.

The DEIS (2007) for the Desert Rock Energy Project specifies that approximately 7,000 tons of coal will be combusted in the power plant facility each year. This will result in the emission of several chemical pollutants and toxicants including volatile organic compounds (VOCs), carbon monoxide (CO), nitrogen oxide (NO_x) and PM_{10}, as well as sulphur dioxide (SO_2). Computer-based modeling analyses indicate that maximum predicted ambient concentrations of NO_x (annual), SO_2 (annual), and CO (1 hr and 8 hr) will be below the significant impact levels for these pollutants within 1 km of the proposed power plant site (URS 2007). In contrast, maximum annual predicted ambient concentrations of PM_{10} (24 hr and annual) and SO_2 (3 hr and 24 hr) will be above significant impact limits for these pollutants within 1 km of the power plant facility. The model predicted air concentrations of the criteria pollutants decrease with greater distance from the proposed site. This analysis indicates that the predicted plant emissions are not expected to increase air concentrations of any of the criteria pollutants to concentrations exceeding the National Ambient Air Quality Standards (NAAQS) criteria, at any location from the power plant fence line out.

The concentrations of chemical air pollutants that plants and wildlife in the project area will be exposed are expected to be variable and depend on location, wind direction, rainfall, and sunlight. Potential risks to ecological receptors (soil invertebrates, vegetation and wildlife) from the proposed plant's chemical emissions were evaluated in combination with the concentrations of these chemicals already present in the environment, to the extent that existing conditions are known (URS 2007). Results of the ecological risk evaluation indicates that emissions of selenium or mercury or other metals from the proposed Desert Rock Power Plant are not expected to result in adverse affects to wildlife (URS 2007).

6.3 Water Quality Effects

6.3.1 Surface Water Quality

Based on the results of air toxics modeling, it is estimated that the Desert Rock power plant could release up to 161 pounds of mercury per year through air emissions. The emitted mercury would consist of both particulates and vapors. The highest level of mercury emissions would occur within 0.36-km and 0.27-km from the stack (at an annual rate of 9.47E-03 mg/m2/yr) and most of that would be wet deposition. A small percentage of the total mercury coming out of the stack (0.2%) would be dry and the maximum deposition for this form of mercury (at an annual rate of 1.45E-07 mg/m2/yr) would occur about 5.3 km from the stack. For mercury, annual average deposition at Morgan Lake would be 1.36E-04 mg/m2/yr and the annual average deposition at the San Juan River where the proposed transmission line would cross the waterway would be 1.38E-04 mg/m2/yr.

Mercury is an extremely mobile pollutant and is emitted from natural and anthropogenic sources, occurring in several different chemical states in the environment (USEPA 2005b). Mercury emissions may persist in vapor form in the atmosphere and travel large distances to be deposited, or may be deposited near the proposed plant site. Deposited mercury in water courses may be re-emitted to air, remain suspended or dissolve in the water, be deposited in sediments or absorbed or ingested by aquatic plants and wildlife (USFW 2005). A portion of mercury in water or sediment can be converted into methylmercury, which is easily absorbed by aquatic organisms and accumulates in aquatic vegetation, phytoplankton and invertebrates.

The maximum reported total mercury concentration in the San Juan River of 1.6 µg/L (microgram/liter) is below the Federal MCL (maximum contaminant level) for mercury of 2 µg/L, and the maximum dissolved mercury concentration in the San Juan River of 0.3 µg/L is below the chronic AWQC (ambient water quality criterion) of 0.7 µg/L. The average existing dissolved mercury concentrations in the San Juan River at Shiprock Bridge during the period 1994-2001 was 0.1 µg/L. For the protection of aquatic wildlife, the federal chronic AWQC for dissolved mercury is 0.77 µg/L (USEPA 2006). It is estimated

that the Desert Rock power plant could release up to 114 pounds of mercury per year (which accounts for 80% control of mercury) through air emissions.

Mercury is an extremely mobile pollutant and is emitted from natural and anthropogenic sources, occurring in several different chemical states in the environment (USEPA 2005b). Mercury emissions may persist in vapor form in the atmosphere and travel large distances to be deposited, or may be deposited near the proposed plant site. Deposited mercury in water courses may be re-emitted to air, remain suspended or dissolve in the water, be deposited in sediments or absorbed or ingested by aquatic plants and wildlife (USFW 2005). A portion of mercury in water or sediment can be converted into methylmercury, which is easily absorbed by aquatic organisms and accumulates in aquatic vegetation, phytoplankton and invertebrates. The emitted mercury would consist of both particulates and vapors. The highest level of mercury emissions would occur within 0.36-km and 0.27-km from the stack (at an annual rate of 9.47E-03 mg/m2/yr) and most of that would be wet deposition. A small percentage of the total mercury coming out of the stack (0.2%) would be dry and the maximum deposition for this form of mercury (at an annual rate of 1.45E-07 mg/m2/yr) would occur about 5.3 km from the stack.

For mercury, annual average deposition at Morgan Lake would be 1.36E-04 mg/m2/yr and the annual average deposition at the San Juan River where the proposed transmission line would cross the waterway would be 1.38E-04 mg/m2/yr. Currently, the maximum reported total mercury concentration in the San Juan River of 1.6 μg/L (microgram/liter) is below the Federal MCL (maximum contaminant level) for mercury of 2 μg/L, and the maximum dissolved mercury concentration in the San Juan River of 0.3 μg/L is below the chronic AWQC (ambient water quality criterion) of 0.7 μg/L. The average existing dissolved mercury concentrations in the San Juan River at Shiprock Bridge during the period 1994-2001 was 0.1 μg/L. For the protection of aquatic wildlife, the federal chronic AWQC for dissolved mercury is 0.77 μg/L (USEPA 2006).

It is estimated that about 19 pounds of mercury would be deposited within 25 km of the plant. The San Juan River is about 28 km from the power plant site. The actual quantity of mercury deposition that could eventually enter the San Juan River system or Morgan Lake directly or via runoff is difficult to quantify.

Selenium is an essential element for both aquatic and terrestrial wildlife. However, it also has the narrowest range of what is beneficial and what is detrimental. Selenium has been shown to mitigate the toxic effects of mercury and other heavy metals in some organisms. There is also evidence that it may reduce the uptake of mercury in some aquatic organisms while increasing the mercury uptake in different organisms. Aquatic wildlife is exposed to selenium through ingesting food containing selenium and not through direct exposure to the chemical in water. Selenium is a bioaccumulative pollutant, meaning it accumulates in the tissues of aquatic wildlife. However, unlike mercury, concentrations of selenium do not increase significantly (biomagnify) in animals at each level of the food chain going from prey to predator (USEPA 2004).

The AWQC for total selenium is 5.0 μg/L, and the mean concentration of total selenium in the San Juan River during the period of 1994–2001 is only 0.73 μg/L – 15% of the criterion. According to the USFWS (2005), selenium concentrations in fish from Morgan Lake may pose health risks to people and wildlife that consume a large amount of fish from the lake. However, the average dissolved selenium concentration measured in Morgan Lake was 1.0 μg/L which is substantially lower than the USEPA (2006) chronic water quality criterion (5.0 μg/L [total]) and the Navajo Nation Aquatic Habitat Criterion (2.0 μg/L) (USFWS (2005).

Based on the results of air toxics modeling, it is estimated that the Desert Rock power plant could release up to 9,133 pounds of selenium per year through air emissions. The maximum deposition point for selenium also would be within .36 and .27 km from the stack, at a rate of 3.38E+00 mg/m2/yr. The

annual average deposition at Morgan Lake would be 2.97E-02 mg/m2/yr and the annual average deposition at the San Juan River would be 3.01E-02 mg/m2/yr. The actual quantity of selenium deposition that could eventually enter the San Juan River system or Morgan Lake directly or via runoff is difficult to quantify.

The proposed power plant would result in the deposition of mercury and selenium in the San Juan River and Morgan Lake and would incrementally add to existing concentrations. Heavy metal concentrations are likely to vary depending on location, prevailing winds and rainfall and a number of other factors. How this incremental increase in mercury and selenium would potentially affect different aquatic species, or those species which primarily feed on aquatic wildlife or vegetation, is difficult to quantify. Species would differ in the amount and pathway of heavy metals ingested, the rate of tissue bioaccumulation, and in what, if any, potential effects to growth, reproduction or longevity may occur. This would depend on many site specific and species specific factors. The ecological effects of mercury and selenium to aquatic wildlife remain greatly unknown and require additional study to fully understand (USFW 2005). Potential adverse impacts to area aquatic resources from incremental increases in mercury and selenium concentrations would be minor and long term. These impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing.

Sediment deposited into waterways can negatively impact aquatic plants in a number of ways. Sediment in water reduces light penetration, which can reduce the ability of plants to photosynthesize (USGS 2006). Reduction in the ability of plants to photosynthesize can slow their growth and development. Sediment deposited in waterways can directly impact wildlife. For example, sedimentary particles can suffocate fish by clogging their gills and can also reduce respiratory efficiency of amphibians by adhering to their skin. Indirectly, sedimentation of waterways can reduce vegetation available as forage for wildlife when photosynthesis is impaired.

Ground disturbance associated with construction and mining has the potential to increase sediments reaching the San Juan River. The power plant construction and BNCC mining operations must comply with Clean Water Act (CWA) regulations which require that surface-water runoff from constructed surfaces be controlled such as to "prevent, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow, or runoff outside the permit area." The CWA requires that discharges to streams meet all applicable water quality standards. Office of Surface Mining (OSM) approval procedures for controlling sediment transport include berms, terraces, sediment ponds, and other energy dissipative channel structures that allow water to pond and sediment to accumulate. Additionally, accidental fuel, lubrication or other hazardous material spills in the construction zone, depending upon the size, has potential to reach the San Juan River and adversely impact localized fisheries and/or downstream habitats such as nursery backwaters.

Potential impacts to water quality from sedimentation or hazardous material spills would be mitigated by implementation of the construction *Stormwater Management Plan* and by the project *Hazardous Materials Handling and Response Plan*. Following implementation of these plans, potential impacts to water quality from increased sedimentation would be minor.

6.3.2 Ground Water Quality

Groundwater will be pumped from the Morrison aquifer to supply water for the Desert Rock Power Plant cooling processes. The average annual water consumption demand of the proposed Desert Rock Power Plant is estimated at 4,950 ac/ft per year, or 3,070 gallons per minute (gpm), of continuous flow for a period of 40 consecutive years. This is the volume used in well impact modeling simulations for the water well field location (URS 2007).

A groundwater predictive computer model (Miller Brooks 2007), using the program MODFLOW, was constructed to evaluate the various combinations of well locations under Alternative B. The model

boundaries were constructed as a rectangle, from near Morgan Lake south to Burnham and from Shiprock east to Fruitland. The source aquifer was the Morrison Formation, assumed to be confined and at a constant thickness of 600 feet. Hydraulic conductivity for the Morrison Formation was estimated at 0.075 to 0.175 ft/day. Simulations were run for 20 years and for 40 years. Drawdown contour lines of ten feet or greater were mapped onto the model surface. At the center of the northern portion of the proposed well field, drawdowns were 1,885 feet for the 20-year simulation and 2,010 feet for 40 years. The southern portion of the proposed well field incurred drawdowns of 1,920 feet for 20 years of pumping and 2,020 feet for 40 years of pumping. If both well field locations are used, the maximum drawdown would be experienced at the southern center, and would total 960 feet for 20 years of pumping and 1,020 feet over 40 years.

After 40 years of pumping, a large cone of depression in the potentiometric surface of the Morrison Formation would be experienced at the project site. This cone would decrease radially from the center of the wellfield and approach zero feet of drawdown at about 10 miles.

6.3.3 Streamflow Effects

Given the distance, greater than 10 miles, between the water well field and San Juan River no effects to streamflows are expected from the extraction of 4,950 ac/ft per year from the Morrison Aquifer (URS 2007).

For mining operations, BNCC will utilize approximately 600 ac/ft per year of consumptive water rights from the San Juan River. BNCC use of existing San Juan River water rights and the effects on stream flow in the San Juan River have been previously analyzed and documented in the Final Environmental Impact Statement Navajo Reservoir Operations Navajo Unit - San Juan River New Mexico, Colorado, Utah (USDI Bureau of Reclamation 2006). Therefore, there would be no additional effects to stream flows in the San Juan River resulting from the proposed action.

6.4 Infrastructure Related Effects

Construction and operation of project components including the power plant facility, access roads, transmission lines and water well field will result in temporary ground disturbance, as well as the development of permanent structures that alter habitat for vegetation and wildlife in the analysis area. Table 2-1 in Section 2.0 above displays the disturbance per project component.

Construction and operation of the power plant site is expected to disturb 149 acres of primarily grasslands (50%) and shrublands (49%). Construction and operation of the preferred transmission line alignment (Segments A, C and D) would disturb approximately 1,205 acres of primarily shrublands (49%) and grasslands (39%). Segment D contains portions of canyonlands (13%) and blackbrush-ephedra-greasewood shrublands (13%). The sub-alternative transmission line (Segments B, C and D) would result in a total of approximately 1,373 acres of disturbance; 168 more acres than the preferred alternative that includes transmission line Segment A (503 acres). Construction and operation of the alternative transmission line Segment B would directly impact mostly inter-mountain basin mixed salt desert scrub lands and (50%) inter-mountain basin semi-desert grasslands (43%).

Access road construction would permanently remove approximately 21 acres inter-mountain basin semi-desert grasslands (57%) and inter-mountain basin mixed salt desert scrub lands and (22%).

The water well field sub-alternative A would encompass about 890 acres, almost all of which is inter-mountain basin greasewood flats (93%). Vegetation would be removed from maximum of 45 acres within the water well field for construction, drilling and operation of 20 water wells, the construction of collector pipelines and an access road. This sub-alternative would necessitate construction of a 12.4 mile utility corridor/water pipeline which would directly impact 150 acres of vegetation. The dominant vegetation communities that occur along the utility corridor/water pipeline are inter-mountain basin

mixed salt desert scrub lands (42%), inter-mountain basin semi-desert grasslands (21%), and inter-mountain basin greasewood flats (34%). Total acreage for water well field sub-alternative B would be 890 acres; the vegetation community in this area is co-dominated by inter-mountain basin semi-desert grasslands (33%) and inter-mountain basin mixed salt desert scrub (50%). Approximately 10.5 acres of piñon-juniper woodland occurs within the proposed water well field.

Wildlife habitat within the BNCC Lease Areas IV and V would gradually be impacted on an ongoing basis as mining activities expand over time. A maximum of 13,051 acres would be removed and altered over the life of the lease areas, primarily grassland (68%), shrublands (27%), and blackbrush-ephedra-greasewood shrublands (5%).

Disturbance and removal of soil has potential to directly and indirectly impact vegetation in the project area. Temporary soil disturbance and permanent soil removal will likely kill live individuals, and may negatively impact seed sources. Likewise, creation of man-made structures including large buildings, roads, and mines may alter natural seed dispersal patterns, which could impact recruitment of plant species from living and dead stock. The density and diversity of vegetation species would be modified in areas reclaimed following construction. Disturbance of natural plant communities can lead to invasion of exotic species, which may be more likely to outcompete natives.

Construction and operation of the power plant facility, access roads, transmission lines and water wells is likely to impact wildlife via two primary mechanisms: 1) through removal of habitat, and 2) by altering normal movement routes. Disturbance and removal of soil and vegetation will directly and indirectly impact wildlife by removing habitat that is used for foraging, burrowing/nesting, and breeding. In addition to direct physical removal of habitats, construction of power plant facilities, transmission lines, access roads and water well facilities is likely to impede normal wildlife movement patterns. Because of the size of the physical structures themselves, wildlife movement corridors may be disrupted. This may result in localized clumping and restricted dispersal among sub-populations. Over time, restricted movement and dispersal could reduce genetic diversity in the population as a whole, or could limit the ability of individual sub-populations to recolonize following random demographic or environmental events, for example disease epidemics or extreme drought.

Noise is expected to be generated during construction of the proposed project components, including the power plant facilities, transmission line, access roads and water well field. The construction phase of the proposed project is projected to continue for at least 36 months. Conventional construction activities in the project area would result in a short-term increase in the ambient noise level resulting from the operation of construction equipment. The increase in noise levels would be primarily restricted to the areas surrounding construction zones and the magnitude of noise generated would depend on the type of construction activity, equipment used, duration of the activity, and distance between the noise source and the receiver. The DEIS provides detailed information on the maximum noise levels generated by typical construction equipment; however, the average sound level generated by construction equipment is 89 dBA at 50 feet from the source (URS 2007). Because construction noise is expected to be below the 90 dBA hourly levels recommended by the Federal Transit Administration, general impacts from noise are expected to be low.

Once construction is completed, operation of the project components is expected to result in the ongoing generation of noise and vibrations throughout the project area for the lifetime of the project. According to the DEIS, operation of the power plant facility is expected to generate less than 30 dBAL at nearby sound receptors, which is below residential land use requirements. Vibrations resulting from operation of the power plant are also expected to have negligible impacts, as the equipment used in the power plant facility is designed to produce very low vibration levels and are designed to shut down automatically if an unforeseen imbalance develops.

6.5 Human Activity Effects

Construction and operation of the Desert Rock Energy project will necessitate a substantial increase in human presence above existing levels. Human presence has the potential to disturb vegetation in the project area, particularly in areas where humans travel beyond the boundaries of established roads, walkways or structures. Vegetation could be directly impacted by humans trampling or damaging individual plants or plant communities and could be indirectly impacted by humans disrupting soils outside of established travel routes. Disruption and degradation of soil can lead to increased wind and water erosion, making it difficult for vegetation to become or remain established. Cryptogamic soil crusts, if encountered, are particularly vulnerable to human disturbance, as these crusts can be disrupted by very few passes with a vehicle or human footprint (Belnap and Gillette 1997).

In general, wildlife tend to avoid contact or confrontation with humans. As such, wildlife in the Desert Rock analysis area may temporarily avoid areas where human disturbances are occurring, or may permanently emigrate from areas where human presence is more constant. This may result in alterations of nesting, foraging and breeding behavior in species that are particularly sensitive to human presence (Stillman et al. 2006). Wildlife may be especially sensitive to human presence during significant periods of their annual cycles, including the breeding season. Construction and operation of the proposed project will require extensive vehicle travel which may increase the likelihood of collisions with wildlife. Vehicle strikes have the potential to adversely impact a variety of wildlife species, including rabbits, coyotes, fox, birds, and deer.

7.0 GENERAL MITIGATION MEASURES

The following section discusses mitigation measures that would occur prior to, during, and after construction of the proposed action. Measures listed below are in addition to those described under individual special status species that may be impacted by the action alternative. General mitigation measures would serve to minimize or avoid impacts to special status species. Species specific mitigation measures are provided in the detailed analysis of impacts in Section 8.0.

Prior to Construction

- An Oil and Hazardous Materials Spill Prevention, Control, and Countermeasure Plan shall be prepared to address hazardous materials storage and spill prevention.
- A Storm Water Pollution Prevention Plan shall be prepared and implemented for construction activities to control surface runoff, reduce erosion, and prevent sedimentation from entering waterbodies during construction.
- An Environmental and/or Biological Resource Compliance Monitoring Plan shall be prepared for all construction projects to ensure implementation of mitigation measures described in pertinent resource sections of the DEIS (URS 2007). The plan shall identify the frequency and type of monitoring required by qualified natural/biological resources personnel. The plan shall be submitted for NNDFW approval prior to any construction.
- All construction personnel shall attend an environmental protection briefing prior to working on any construction site in the project area. This briefing is designed to familiarize workers with statutory and contractual environmental requirements and the recognition of and protection measures for sensitive vegetation community and wildlife habitats.
- Protective barriers shall be placed around specified sensitive vegetation community and wildlife habitats as identified by the NNDFW. Barriers shall be installed prior to construction and field inspected by NNDFW personnel to verify proper placement.
- Aboveground structures (i.e. transmission towers) shall be sited and designed in order to minimize disturbance to sensitive wildlife habitats and to minimize adverse effects to landscape features such as topography and vegetation.

- Imported soils, fills, or aggregates shall be free of deleterious materials (i.e. trash, construction debris, noxious weeds). Sources of imported materials shall be submitted for Navajo Nation approval prior to construction.
- A Non-native Species Management Plan shall be prepared prior to the commencement of any ground-disturbing activities that specifies the locations and methods for removing non-native species, prescriptions for monitoring activities after construction, and reporting requirements. The plan shall be submitted for NNDFW approval prior to ground-disturbing activities.
- A Revegetation Plan shall be prepared for approval by the NNDFW prior to the commencement of any ground-disturbing activities that prescribes plant salvage, revegetation, and post-construction monitoring activities.
- Preconstruction surveys shall be conducted, as specified by the NNDWF by a qualified biologist to identify the number, type, and location of special-status species potentially occur within the project area.
- A construction work schedule shall be prepared for all construction projects that minimizes noise and human activity effects on wildlife in adjacent habitats.
- If any grading, clearing, brushing, or construction occurs during the bird breeding season (approximately February 15 through August 31), a qualified biologist shall conduct a survey of the habitat to determine whether there are active bird nests in the area, including raptors and ground nesting birds. The survey would begin not more than three days prior the beginning of work. If an active nest is observed, a minimum 300-foot buffer (500 feet for raptors) would be established using temporary fencing. The buffer would be in effect as long as work is occurring and until the nest is no longer active.

During Construction

- All construction contractors shall implement and comply with requirements of the Oil and Hazardous Materials Spill Prevention, Control, and Countermeasure Plan prepared for all construction projects.
- All construction contractors shall implement and comply with operational compliance requirements of the Storm Water Pollution Prevention Plan.
- Construction activities shall be monitored by qualified natural resources personnel as outlined in the Environmental and/or Biological Resource Compliance Monitoring Plan.
- All project construction contractors shall implement and comply with the Non-native Species Management Plan prepared for each project component.
- All construction equipment entering the project area shall be cleaned by means of pressure washing and/or steam cleaning so as to arrive on site free of mud or seed-bearing material.
- Vegetation salvage, seed collection, and revegetation shall be implemented as defined in the Revegetation Plan. Topsoil shall be salvaged, segregated during storage, and reused in the proper location and depth as specified by the NNDFW.
- All construction activities will be completely confined to the areas of potential ground disturbance for each project component as described in in the Desert Rock Energy Project DEIS under the Preferred Alternative (URS 2006) Clearing of vegetation and ground disturbance shall be minimized to the greatest extent possible.
- Stationary noise sources shall be located as far as possible from sensitive wildlife habitat areas. All on-site work that generates noise levels above 76 decibels at the site boundary shall be done between 7:00 a.m. and 7:00 p.m.
- Excavation sites must be monitored or covered to avoid trapping wildlife, and routes of escape for wildlife should be maintained. The construction site shall be inspected daily for appropriate covering and flagging of excavation sites. Each morning the project area shall be inspected for wildlife trapped in excavation pits. A qualified biologist shall be available to inspect excavations before refilling occurs.

- Proposed electrical transmission and distribution lines will be designed and constructed utilizing "raptor-safe" design. The most complete manual on this work is: ″ Suggested Practices For Raptor Protection On Power Lines: The State of the Art in 1996″ (APLIC 1996).

Post-Construction

- All tools, equipment, barricades, signs, surplus materials, debris, and rubbish shall be removed from the project work limits upon project completion.
- The success of revegetation efforts shall be monitored. Plant materials used for revegetation shall remain alive and in a healthy, vigorous condition for a period of one year after final acceptance of planting. The project site shall be monitored in accordance with the Nonnative Species Management Plan and Revegetation Plan. All plants determined to be in an unhealthy condition shall be replaced.

8.0 SPECIAL STATUS SPECIES IMPACTS

Detailed species evaluations of species that have the potential to be impacted by the proposed action alternatives are provided below. Specific mitigation measures for these species are also addressed.

*8.1 San Juan milkweed (*Asclepias sanjuanensis*)*

Populations of this species were located at three (3) dispersed areas in Area V of the BNCC mine lease area (Ecosphere 2005d). Four (4) widely dispersed locations were recorded within Area VI of the BNCC mine lease (Ecosphere 2004a, 2005e). Several scattered populations are located within the proposed power plant site (Ecosphere 2005a). No populations were found along the proposed transmission corridors, access road, water well fields or the utility corridor/water line (Ecosphere 2005c). This species may be more abundant than previously thought (pers. comm. Daniela Roth 2004).

Impacts to this species would occur during soil removal and disturbance from mining activities and power plant construction that would result in plant mortality. Temporary and permanent soil disturbance may negatively impact seed sources. The seedbed in stored topsoils could potentially result in a loss of seed viability and decrease the success of recolonization during reclamation. Human presence has the potential to disturb vegetation in the project area, particularly in areas where humans travel beyond the boundaries of established roads, corridors, rights-of-way, or facilities. Vegetation could be directly impacted by humans trampling or damaging individual plants or plant communities and could be indirectly impacted by humans disrupting soils outside of established travel routes or construction areas.

Impacts would be low to moderate and long term. Impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing.

Specific Mitigation Measures: Following the completion of preconstruction surveys, if it is determined that special status plant species occur within the project area, the NNDFW will be consulted in accordance with the project Environmental and/or Biological Resource Compliance Monitoring Plan to develop strategies to minimize or avoid impacts to identified species.

*8.2 Cottam's milkvetch (*Astragalus cottamii*)*

The action area offers potential, but unoccupied habitat for this species. Potential habitat occurs within the piñon-juniper woodlands encompassing 2 acres on the proposed access road, 2 acres on transmission line Segment A, 13 acres on transmission line Segment C, 4 acres on transmission line Segment D, 11 acres in water well field sub-alternative B, and 24 acres within the BNCC mine lease area. This species was not observed within the proposed action area during surveys (Ecosphere 2004a, 2005a, 2005c, 2005d, 2005e). However, prolonged drought conditions in the area may have precluded germination over the past several years.

Human presence has the potential to disturb vegetation in the action area, particularly in areas where humans travel beyond the boundaries of established roads, corridors, rights-of-way, or facilities. Potential impacts would be from suitable habitat loss and modification. Dormant seedbeds may be adversely impacted by construction activities or long-term topsoil storage. Following the implementation of mitigation measures, impacts to potential, but currently unoccupied habitat would be low and long term.

Specific Mitigation Measures: Following the completion of preconstruction surveys, if it is determined that special status plant species occur within the project area the NNDFW will be consulted in accordance with the project Environmental and/or Biological Resource Compliance Monitoring Plan to develop strategies to minimize or avoid impacts to identified species.

*8.3 Naturita milkvetch (*Astragalus naturitensis*)*

The action area offers potential, but unoccupied habitat for this species. Potential habitat occurs within the piñon-juniper woodlands encompassing; 2 acres on the proposed access road, 2 acres on transmission line Segment A, 13 acres on transmission line Segment C, 4 acres on transmission line Segment D, 11 acres in water well field sub-alternative B and 24 acres within the BNCC mine lease area. This species was not observed within the proposed action area during surveys (Ecosphere 2004a, 2005a, 2005c, 2005d, 2005e). However, prolonged drought conditions in the area may have precluded germination over the past several years.

Human presence has the potential to disturb vegetation in the action area, particularly in areas where humans travel beyond the boundaries of established roads, corridors, rights-of-way, or facilities. Potential impacts would be from suitable habitat loss and modification. Dormant seedbeds may be adversely impacted by construction activities or long-term topsoil storage. Following the implementation of mitigation measures, impacts to potential, but currently unoccupied habitat would be low and long term.

Specific Mitigation Measures: Following the completion of preconstruction surveys, if it is determined that special status plant species occur within the project area the NNDFW will be consulted in accordance with the project Environmental and/or Biological Resource Compliance Monitoring Plan to develop strategies to minimize or avoid impacts to identified species.

*8.4 Mancos saltplant (*Proatriplex pleiantha*)*

The action area offers potential, but unoccupied habitat for this species. Potential habitat occurs within the mine lease area and power plant site. This species was not observed within the proposed action area during surveys (Ecosphere 2004a, 2005a, 2005c, 2005d, 2005e). This species has been recorded within the BNCC mine lease area in the past (Marron et al. 1991) However, prolonged drought conditions in the area may have precluded germination over the past several years. The occurrence and abundance of Mancos saltplant is strongly influenced by climatic conditions. Seeds may remain viable in the soil for up to 10 years. In unfavorable years the species may be rarely observed, but can be locally abundant in favorable years (NMRPTC 1999).

Human presence has the potential to disturb vegetation in the action area, particularly in areas where humans travel beyond the boundaries of established roads, corridors, rights-of-way, or facilities. Potential impacts would be from suitable habitat loss and modification. Dormant seedbeds may be adversely impacted by construction activities or long-term topsoil storage. Following the implementation of mitigation measures, impacts to potential, but currently unoccupied habitat would be low and long term.

Specific Mitigation Measures: Following the completion of preconstruction surveys, if it is determined that special status plant species occur within the project area the NNDFW will be consulted in accordance with the project Environmental and/or Biological Resource Compliance Monitoring Plan to develop strategies to minimize or avoid impacts to identified species.

*8.5 Parish's alkali grass (*Puccinellia parishii*)*

The action area offers potential, but unoccupied habitat for this species. Potential habitat is limited to small patches of native riparian and mixed native-exotic adjacent to the transmission line Segment D crossing of the San Juan River, along the northern margin of Morgan Lake and along the Chaco River. This species was not observed within the proposed action area during surveys (Ecosphere 2004a, 2005a, 2005c, 2005d, 2005e). However, prolonged drought conditions in the area may have precluded germination over the past several years.

Human presence has the potential to disturb vegetation in the action area, particularly in areas where humans travel beyond the boundaries of established roads, corridors, rights-of-way, or facilities. Potential impacts would be from suitable habitat loss and modification. Dormant seedbeds may be adversely impacted by construction activities or long-term topsoil storage. Following the implementation of mitigation measures, impacts to potential, but currently unoccupied habitat would be low and long term.

Specific Mitigation Measures: Following the completion of preconstruction surveys, if it is determined that special status plant species occur within the project area the NNDFW will be consulted in accordance with the project Environmental and/or Biological Resource Compliance Monitoring Plan to develop strategies to minimize or avoid impacts to identified species.

*8.6 Banner-tail kangaroo rat (*Dipodomys spectabilis*)*

This species has been documented (i.e. trapped) in the BNCC mine lease area and the power plant site (Ecosphere 2005b, Ecosphere unpublished data). Construction and operation of the power plant, access road, transmission lines and water well fields and mining activities would directly and indirectly banner-tail kangaroo rat through habitat loss and modification. Increased human activity during construction and operation would result in avoidance of the area. Some individuals would be displaced to adjacent, undisturbed habitat with similar vegetation structure while some may permanently emigrate from the area. Species movement and dispersal in the area would be adversely impacted by the presence of human activity and increased noise. This may result in alterations of foraging and breeding behavior. This impact would be greater during significant periods of wildlife annual cycles, including the breeding season. Some incidental mortalities may occur during construction activities since this species less regularly uses burrows and is less mobile than larger mammals. Potential vehicle-wildlife collisions would also adversely impact this species.

Impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing. Impacts would be low and long term following the implementation of recommended mitigation measures.

Specific Mitigation Measures: Prior to any ground disturbing activities, conduct reconnaissance surveys to document whether there are any banner-tail kangaroo rat mounds along or within ¼-mile of proposed disturbance areas. Should active burrows be detected, consult with the NNDFW to determine impact minimization or avoidance measures.

*8.7 Kit fox (*Vulpes macrotis*)*

The action area provides potential habitat for this species. The species has been recorded as occurring in the mine lease area and power plant site (Ecosphere 2005b, Ecosphere unpublished data). Construction and operation of the power plant, access road, transmission lines and water well fields and mining activities would directly and indirectly kit fox through habitat loss and modification. Increased human activity during construction and operation would result in avoidance of the area. Some individuals would be displaced to adjacent, undisturbed habitat with similar vegetation structure while some may permanently emigrate from the area. Movement and dispersal in the area would be adversely impacted by the presence of human activity and increased noise. This may result in alterations of foraging and breeding behavior. This impact would be greater during significant periods of wildlife annual cycles,

including the breeding season. Some incidental mortalities may occur during construction activities since this species less regularly uses burrows and is less mobile than larger mammals. Potential vehicle-wildlife collisions would also impact this species. Habitat loss and fragmentation may result in a decreased prey base for this species. Additionally, young and nursing adult females may be harmed during construction activities if natal burrows are destroyed.

Impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing. Recommended mitigation measures would minimize impacts to kit fox. Potential impacts would be low and long term.

Specific Mitigation Measures: Prior to any ground disturbing activities, conduct reconnaissance surveys to document whether there are any kit fox burrows along or within ¼-mile of proposed disturbance areas. Should active burrows be detected, consult with the NNDFW to determine impact minimization or avoidance measures.

*8.7 Spotted bat (*Euderma maculatum*)*

Potential habitat for this species occurs along the San Juan River corridor where Transmission Line D crosses the San Juan River and within areas of the BNCC mine lease area and power plant site. The species has not been recorded in action area (Ecosphere 2005b, Ecosphere unpublished data).

Potential impacts would be from suitable habitat loss and modification. Bats foraging or migrating through the area would likely avoid the area due to increased human activity during construction and operation. Impacts would be low and long term following the implementation of general mitigation measures.

*8.8 Brown pelican (*Pelecanus occidentalis carolinensis*)*

There is one record of this species occurring during migration at Morgan Lake (BISONM 2006). This species would likely occur as an incidental migrant along the San Juan River corridor within the transmission line Segment D alignment or at Morgan Lake. Potential nesting habitat does not occur within the transmission line Segment D alignment. Impacts to this species would be limited to temporary avoidance of the river corridor and Morgan Lake during construction of transmission line D. These impacts would be negligible and short term

*8.9 Mountain plover (*Charadrius montanus*)*

This species has been recorded as breeding with the BNCC lease area (Ecosphere unpublished data). Construction and operation of the power plant, access road, transmission lines and water well fields and mining activities would directly and indirectly this species through habitat loss and modification. Increased human activity during construction and operation would result in avoidance of the area. Some individuals would be displaced to adjacent, undisturbed habitat with similar vegetation structure while some may permanently emigrate from the area. Movement and dispersal in the area would be adversely impacted by the presence of human activity and increased noise. This may result in alterations of foraging and breeding behavior. Disturbance or construction during breeding season could result in unsuccessful mating, nest abandonment, or an unsuccessful reproductive effort.

Impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing. Implementing mitigation measures would minimize potential impacts which are expected to be low and long term.

Specific Mitigation Measures: A pre-construction survey to determine presence/absence and no ground disturbance activities within occupied habitat during the period between April 1 and July 15 would minimize impacts to mountain plover.

*8.10 Golden eagle (*Aquila chrysaetos*)*

There is no potential nesting habitat for this species within the action area; however, the power plant site, mine lease area, access road, transmission line alignments and water well fields do provide potential foraging habitat for this raptor. This species is known to nest within 1-3 miles of the action area (Ecosphere unpublished data, Hawks Aloft 2005). Construction and operation of the power plant, access road, transmission lines and water well fields and mining activities would directly and indirectly impact golden eagle through habitat loss and modification. Habitat loss and fragmentation may indirectly result in a decreased prey base for this species. Increased human activity during construction and operation would result in avoidance of the area. Some individuals would be displaced to adjacent, undisturbed habitat with similar vegetation structure while some may permanently emigrate from the area. Species movement and dispersal in the area would be adversely impacted by the presence of human activity and increased noise. This may result in alterations of foraging and breeding behavior. In addition, electrical transmission and distribution lines may negatively impact golden eagles by causing direct mortality and disrupting breeding, nesting, and foraging behaviors.

Impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing. Following the implementation of mitigation measures outlined below, potential impacts would be low and long term.

Specific Mitigation Measures: If possible, construction will be timed to avoid activities within specified buffers (TBD by the NNDWF), of known raptor breeding areas until after young have fledged. If construction must occur within the specified protection zone for a given nest, NNDFW will prescribe additional mitigation (e.g., screening the nest from construction activity, monitoring the nest during construction) to protect the nest from disturbance, to be determined on a case-by-case basis.

Mitigation measures approved by the NNDFW should be employed to avoid disturbing any current or future potential area golden eagle nesting sites. The following are recommended conservation/coordination measures that will, at a minimum, be implemented:

- Avoid conducting construction or other disruptive human activities between January 15th and May 30th to avoid sensitive nesting time periods for golden eagle;
- If these time periods cannot be avoided, conduct a pre-activity raptor survey to determine the presence/absence of courting and/or nesting raptors within a 1 mile radius of proposed activities;
- If occupied raptor territories or nests are identified, develop a *Monitoring Plan* in coordination with the NNDFW to monitor raptor behavior during any NNDFW approved activities. This *Monitoring Plan* would include procedures for terminating/delaying activities if raptors are being impacted by the activities.

*8.11 Western burrowing owl (*Athene cunicularia hypugea*)*

This species has been recorded as breeding within the BNCC mine lease area and along the transmission line Segment B alignment (Ecosphere 2004a, Ecosphere unpublished data). Construction and operation of the power plant, access road, transmission lines and water well fields and mining activities would directly and indirectly western burrowing owl through habitat loss and modification. Increased human activity during construction and operation would result in wildlife avoidance of the area. Some individuals would be displaced to adjacent, undisturbed habitat with similar vegetation structure while some may permanently emigrate from the area. Species movement and dispersal in the area would be adversely impacted by the presence of human activity and increased noise. This may result in alterations of foraging and breeding behavior. Disturbance or construction during breeding season could result in unsuccessful mating, nest abandonment, or an unsuccessful reproductive effort.

Though individuals would be impacted by the proposed action alternatives, the population as a whole would not. Mitigation measures for burrowing owl are provided below. Potential impacts would be low and long term following the implementation of mitigation measures.

Specific Mitigation Measures: To avoid direct impact to any burrowing owl or nest, conduct a pre-construction survey no more than 30 days prior to construction according to the Burrowing Owl Survey Protocol and Mitigation Guidelines (California Burrowing Owl Consortium 1993). If owls are found to be using the site and avoidance is not feasible, a passive relocation effort (displacing the owls from the site) may be conducted, subject to the approval of the NNDFW.

If construction activities occur during the owl breeding season, and if burrowing owls are observed on or within 250 feet of a project site during preconstruction surveys, a 250-foot protective buffer will be established with the placement of a barrier fence. The fence will remain in place for the duration of the breeding season. The fence integrity will be monitored by a qualified biologist.

*8.12 Ferruginous hawk (*Buteo regalis*)*

There is potential nesting habitat for this species within BNCC mine lease area and there is potential foraging habitat within the proposed plant site, transmission corridors, access roads and water well fields. The species is known to nest within 1-3 miles of the action area (Ecosphere unpublished data, Hawks Aloft 2005). Construction and operation of the power plant, access road, transmission lines and water well fields and mining activities would directly and indirectly ferruginous hawk through habitat loss and modification. Increased human activity during construction and operation would result in avoidance of the area. Some individuals would be displaced to adjacent, undisturbed habitat with similar vegetation structure while some may permanently emigrate from the area. Species movement and dispersal in the area would be adversely impacted by the presence of human activity and increased noise. This may result in alterations of foraging and breeding behavior. In addition, electrical transmission and distribution lines may negatively impact ferruginous hawks by causing direct mortality and disrupting breeding, nesting, and foraging behaviors. Habitat loss and fragmentation may result in a decreased prey base for this species.

Impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing. Following the implementation of mitigation measures outlined below, potential impacts would be low and long term.

Specific Mitigation Measures: The proposed action would adhere to the NNDFW newly developed and implemented Ferruginous Hawk Nest Protection Policy provided in Attachment B.

If possible, construction will be timed to avoid activities within specified buffers (TBD by the NNDWF), of known raptor breeding areas until after young have fledged. If construction must occur within the specified protection zone for a given nest, NNDFW will prescribe additional mitigation (e.g., screening the nest from construction activity, monitoring the nest during construction) to protect the nest from disturbance, to be determined on a case-by-case basis.

Mitigation measures approved by the NNDFW should be employed to avoid disturbing any current or future potential area ferruginous hawk nesting sites. The following are recommended conservation/coordination measures that will, at a minimum be implemented:

- Avoid conducting construction or other disruptive human activities between January 15th and May 30th to avoid sensitive nesting time periods for ferruginous hawk;
- If these time periods cannot be avoided, conduct a pre-activity raptor survey to determine the presence/absence of courting and/or nesting raptors within a 1 mile radius of proposed activities;

- If occupied raptor territories or nests are identified, develop a *Monitoring Plan* in coordination with the NNDFW to monitor raptor behavior during any NNDFW approved activities. This *Monitoring Plan* would include procedures for terminating/delaying activities if raptors are being impacted by the activities.

*8.13 American peregrine falcon (*Falco peregrinus*)*

There is no potential nesting habitat for this species within the action area; however, the site does provide potential foraging habitat for this raptor species. Outside the action area, the San Juan River corridor offers potential nesting habitat. Species movement and dispersal in the area would be adversely impacted by the presence of human activity and increased noise. This may result in alterations of foraging behavior. Electrical transmission and distribution lines may negatively impact this species by causing direct mortality and disrupting breeding, nesting, and foraging behaviors.

Mitigation measures outlined below would minimize or avoid impacts to this species. Potential impacts would be low and long term following the implementation of mitigation measures.

Specific Mitigation Measures: A pre-construction survey to determine presence/absence and no ground disturbance activities within occupied habitat during the period between April 1 and July 15 would minimize impacts.

*8.14 Sora (*Porzana carolina*)*

This species has been recorded as a transient at Morgan Lake. This species would likely occur within the San Juan River corridor within the transmission line Segment D alignment or at Morgan Lake. Potential nesting habitat does not occur within the transmission line alignment, which is located approximately ½ mile from the Morgan Lake, nor is there potential nesting habitat where the proposed transmission line crosses the San Juan river. Impacts to this species would be limited to temporary avoidance of the river corridor and Morgan Lake during construction. These impacts would be negligible and short term

*8.15 Roundtail Chub (*Gila robusta*)*

Currently, roundtail chub is occasionally found in the San Juan River near the mouths of the Mancos and Animas rivers (Carman 2006). The power plant would result in the deposition of small quantities of mercury and selenium in the San Juan River. Pollutant concentrations are likely to vary depending on location, prevailing winds and rainfall and other factors. A more detailed discussion is provided in Section 6.3.1 under Surface Water Quality Effects. The additive effect of mercury and selenium deposition to existing concentrations in the San Juan River will result in minor impacts to surface water quality. However, these impacts are not expected to exceed AWQC standards for the protection aquatic wildlife. Potential adverse impacts to area aquatic resources from incremental increases in mercury and selenium concentrations would be minor and long term. These impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing.

Impacts to this aquatic species would be potential impacts occurring during transmission line construction activities that result in discharge of sediment into the San Juan River. Human activity during construction in portions of the San Juan River that these species are known to frequent has the potential to directly impact these species by causing temporary dispersal. Additionally, accidental fuel, lubrication or other hazardous material spills in the construction zone, depending upon the size, has potential to reach the San Juan River and adversely impact localized fisheries and/or downstream habitats such as nursery backwaters.

Following implementation of mitigation measures, potential impacts would be minor and long term.

Specific Mitigation Measures: Potential impacts from sedimentation or hazardous material spills would be mitigated by implementation of the construction *Stormwater Management Plan* and by the project *Hazardous Materials Handling and Response Plan*.

*8.16 Mottled sculpin (*Cottus bairdi*)*

On the Navajo Nation, this species is known only from the New Mexico reach of the San Juan River. The power plant would result in the deposition of small quantities of mercury and selenium in the San Juan River. Pollutant concentrations are likely to vary depending on location, prevailing winds and rainfall and other factors. A more detailed discussion is provided in Section 6.3.1 under Surface Water Quality Effects. The additive effect of mercury and selenium deposition to existing concentrations in the San Juan River will result in minor impacts to surface water quality. However, these impacts are not expected to exceed AWQC standards for the protection aquatic wildlife. Potential adverse impacts to area aquatic resources from incremental increases in mercury and selenium concentrations would be minor and long term. These impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing.

Impacts to this aquatic species would be potential impacts occurring during transmission line construction activities that result in discharge of sediment into the San Juan River. Human activity during construction in portions of the San Juan River that these species are known to frequent has the potential to directly impact these species by causing temporary dispersal. Additionally, accidental fuel, lubrication or other hazardous material spills in the construction zone, depending upon the size, has potential to reach the San Juan River and adversely impact localized fisheries and/or downstream habitats such as nursery backwaters.

Following implementation of mitigation measures, potential impacts would be minor and long term.

Specific Mitigation Measures: Potential impacts from sedimentation or hazardous material spills would be mitigated by implementation of the construction *Stormwater Management Plan* and by the project *Hazardous Materials Handling and Response Plan*.

*8.17 Bluehead sucker (*Catostomus discobolus*)*

Known throughout the San Juan River and its tributaries. The power plant would result in the deposition of small quantities of mercury and selenium in the San Juan River. Pollutant concentrations are likely to vary depending on location, prevailing winds and rainfall and other factors. A more detailed discussion is provided in Section 6.3.1 under Surface Water Quality Effects. The additive effect of mercury and selenium deposition to existing concentrations in the San Juan River will result in minor impacts to surface water quality. However, these impacts are not expected to exceed AWQC standards for the protection aquatic wildlife. Potential adverse impacts to area aquatic resources from incremental increases in mercury and selenium concentrations would be minor and long term. These impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing.

Human activity during construction in portions of the San Juan River that these species are known to frequent has the potential to directly impact these species by causing temporary dispersal. Additionally, accidental fuel, lubrication or other hazardous material spills in the construction zone, depending upon the size, has potential to reach the San Juan River and adversely impact localized fisheries and/or downstream habitats such as nursery backwaters.

Following implementation of mitigation measures, potential impacts would be minor and long term.

Specific Mitigation Measures: Potential impacts from sedimentation or hazardous material spills would be mitigated by implementation of the construction *Stormwater Management Plan* and by the project *Hazardous Materials Handling and Response Plan*.

*8.18 Northern leopard frog (*Rana pipiens*)*

This species has not been recorded in the action area. Potential habitat for this species is limited to riparian areas adjacent to the San Juan River and at Morgan Lake. Removal of approximately 1.8 acres shrub riparian and upland habitat within the floodplain of the San Juan River would result in a minimal short term disturbance to potential habitat. Impacts to this species would be short term occurring during transmission line construction activities that result in discharge of sediment into the San Juan River. Additionally, accidental fuel, lubrication or other hazardous material spills in the construction zone, depending upon the size, has potential to reach the San Juan River and adversely affect potential habitat.

Following implementation of mitigation measures, potential impacts would be negligible.

Specific Mitigation Measures: Potential impacts from sedimentation or hazardous material spills would be mitigated by implementation of the construction *Stormwater Management Plan* and by the project *Hazardous Materials Handling and Response Plan*.

8.19 Summary of Potential Impacts to Special Status Species

The proposed project would result in the permanent removal of approximately 450 acres of vegetation and wildlife habitat for construction of the power plant, access road and water well field. Since specific designs have not been completed, construction of the transmission lines would remove or modify an undetermined acreage within the proposed ROWs; 1,205 acres for sub-alternative A and 1,373 acres for sub-alternative B. The actual disturbance within the ROWs would result from temporary overland access, tower sites, and staging sites and would be much less than the permitted acreage. The BNCC mine lease would modify the largest amount of acreage by contemporaneous mining of 13,051 acres over the expected 50 year life of the project. The impact to habitats in the mine lease area would be moderate to major as some aspects of these habitats will be irretrievably lost (such as natural rock outcrops) while these habitats will be reclaimed in accordance with SMRCA standards of reestablishing pre-mining species compositions and community densities and production.

Impacts to special status species would be minimized by the implementation of general mitigation measures and species specific mitigation measures such as pre-construction presence/absence surveys prior to breeding season. Potential impacts are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing.

Approximately seven isolated populations of San Juan milkweed would likely be destroyed by construction of the proposed project. The seedbed would likely be adversely affected through soil removal and or stock piling. The proposed project would result in the removal of generally small isolated areas of potential, but unoccupied habitat for Cottam's milkvetch, Naturita milkvetch, Mancos saltplant, and Parish's alkali grass.

Impacts to brown pelican and sora would generally be limited to temporary dispersal during construction activities. There would be no loss of potential nesting habitat for these waterfowl.

Potential, but unoccupied habitat for spotted bat would be modified or removed by the proposed action. Occupied habitat for kit fox and banner-tail kangaroo rat would be modified or removed by the proposed project resulting in displacement to adjacent suitable habitat. These two species may also experience some mortality due to construction activities and/or vehicular collisions.

Mountain plover and western burrowing owl have been previously recorded as breeding within the analysis area with the largest expanses of occupied and potential but unoccupied habitat occurring within the BNCC mine lease area and the water well field sub-alternative A. Due to the removal or modification

of potential nesting habitat, these species would likely be displaced to suitable adjacent habitat. Impacts to golden eagle would be limited to removal or modification of foraging habitat and temporary avoidance of areas where increased human and vehicular activities occur. The removal of ferruginous hawk potential, but unoccupied nesting habitat within the BNCC lease area would result in long term impacts. There would also be a decrease in available foraging habitat for this species and a likely change in movement and dispersal. The addition of transmission lines would increase the likelihood of potential golden eagle, ferruginous hawk and American peregrine falcon collisions/electrocutions.

Wildlife exposed to mercury via their diet may be subject to reproductive failure, immune system impairment, behavioral aberrations, motor dysfunctions, or even direct toxicity. Most at risk are those animals at upper trophic levels that feed on fish, or on other animals that feed on fish. While little reliable information is available, there are no known instances of mercury intoxication of wildlife in New Mexico. Assessment of the impact of mercury on wildlife is difficult however, since some of the symptoms associated with chronic mercury poisoning may not be immediately apparent, resulting in reduced functionality, inappropriate breeding behavior, or early mortality by some other mechanism, e.g. impaired predator evasion. Minor increases in mercury and selenium, and other potentially toxic elements, reaching the San Juan River from air pollution deposition may contribute to adversely impacting aquatic species' reproductive success. In addition, mercury that is sorbed to sediment is still available to methylating bacteria when carried into the anoxic zones of river beds and reservoirs where methylation occurs. These impacts would be minor and long term and are not likely to result in a loss of species viability range-wide, nor cause a trend to federal listing.

9.0 BIOLOGICAL ASSESSMENT PREPARERS

Joey Herring	B.S. Environmental Biology
Jennifer Zahratka	M.S. Zoology
John Dodge	B.S. Environmental Biology

10.0 CONSULTATION AND COORDINATION

Sonja Detsoi, Rita Whitehorse-Larson
Natural Heritage Program
Navajo Fish and Wildlife Department
P.O. Box 1480
Window Rock, AZ 86515

Daniela Roth
Natural Heritage Program
Navajo Fish and Wildlife Department
P.O. Box 1480
Window Rock, AZ 86515

David Mikesic
Natural Heritage Program
Navajo Fish and Wildlife Department
P.O. Box 1480
Window Rock, AZ 86515

11.0 REFERENCES CITED

APLIC. Avian Power Line Interaction Committee. Suggested Practices For Raptor Protection On Power Lines: The State of the Art in 1996. Edison Electric Institute and Raptor Research Foundation.

_____. Avian Power Line Interaction Committee. 2005. Avian Protection Plan Guidelines. The Edison Electric Institute's Avian Power Line Interaction Committee *and* U.S. Fish and Wildlife Service.

Belnap, J. and D. A. Gillette. 1997. Disturbance of biological soil crusts: impacts on potential wind erodibility of sandy desert soils in southeastern Utah. National Biological Service, 2282 S. Resource Blvd., Moab, UT

BISONM (Biotic Information System of New Mexico). 2006. Species Reports. Available online at: http://www.bison-m.org/

Bureau of Land Management (BLM). 1998. Endangered, threatened and sensitive plant field guide. U.S. Department of the Interior. Bureau of Land Management. Farmington Field Office, Farmington, NM.

Busnel,R.G. and John Fletcher (eds.). 1978. Effects of Noise on Wildlife. New York: Academic Press.

California Burrowing Owl Consortium. 1993. Burrowing owl survey protocol and mitigation guidelines. Available online at: http://www.dfg.ca.gov/hcpb/species/stds_gdl/bird_sg/boconsortium.pdf

Carman, Stephanie. 2006. Colorado River Basins: Roundtail Chub *Gila robusta,* Gila Chub *Gila intermedia,* Headwater Chub *Gila nigra.* Recover Plan. Conservation Services Division: New Mexico Department of Game and Fish. Santa Fe, New Mexico

Crooks, K.R. 2002. Relative sensitivities of mammalian carnivores to habitat fragmentation. Conservation Biology 16:488-502.

Crowder, M. R. and O.E. Rhodes. 2001. Avian collisions with power lines: A review. *In* Avian Interactions with Utility and Communication Structures. Workshop Proceedings . Charleston, S.C. EPRI Technical Report No. 1006907. R. Carlton, Project Manager.

Curtis, P.S. 1996. A meta-analysis of leaf gas exchange and nitrogen in trees grown under elevated carbon dioxide. Plant, cell and environment. 19: 127-137.

Dick-Peddie, William A. 1993. New Mexico Vegetation: Past Present and Future. The University of New Mexico Press, Albuquerque, New Mexico.

Ecosphere. 2004a. Floristic Wildlife Baseline Report BHP Billiton – Navajo Mine. Unpublished document. Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2005a. Floristic Survey and Ethnobotanical Report for the Formerly Proposed Cottonwood Energy Center (CEC). Unpublished document. Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2005b. Wildlife Report for the Formerly Proposed Cottonwood Energy Center (CEC). Unpublished document. Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2005c. Botanical Reconnaissance Survey Desert rock Energy Project. Unpublished document. Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2005d. Floristic Survey and Ecology Study of BHP Area V, San Juan County, New Mexico. Unpublished document. Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2005e. Threatened, Endangered and Sensitive (TES) Flora Survey Report. BHP Billiton – Navajo Mine: Area IV North. Unpublished document. Ecosphere Environmental Services, Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2007. Draft Biological Assessment for the Desert Rock Energy Project. Ecosphere Environmental Services: Farmington, New Mexico/Durango, Colorado.

Ecosphere. 2006a. *Interim* Waters of the U.S. Mapping Report for the Desert Rock Energy Project, San Juan County, New Mexico. Ecosphere Environmental Services: Farmington, New Mexico.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The birder's handbook. Simon and Schuster Inc., New York, NY.

Fisher, C., D. Pattie, and T. Hartson. 2000. Mammals of the Rocky Mountains. Lone Pine Publishing, Vancouver, BC.

Fitzgerald, J. P., C.A. Meaney, and D.M. Armstrong. 1994. Mammals of Colorado. Denver Museum Life History and University Press of Colorado. 407 p.

Fletcher, J.L., 1980. Effects of noise on wildlife: a review of relevant literature 1971-1978. Pages 611-620 in J.V. Tobias, G. Jansen, and W.D. Ward, eds. Proceedings of the Third International Congress on Noise as a Public Health Problem. Am. Speech-Language-Hearing Assoc., Rockville, MD.

Hawks Aloft. 2005. 2004 Wildlife Surveys BHP Navajo Coal Company, Navajo Mine, New Mexico. Prepared for BHP Navajo Coal Company. Hawks Aloft: Albuquerque, New Mexico.

Hunt, C.B. 1978. Surficial geology of northwest New Mexico. Geologic Map 43. New Mexico Institute of Mining and Technology, New Mexico Bureau of Mines and Mineral Resources

Kochert, M.N., K. Steenhoff, C.L. McIntyre, and E.H. Craig. 2002. Golden Eagle (*Aquila chrysaetos*). In: Poole, A., and F. Gill (eds.). The birds of North America. No. 684. The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Larkin, Ronald. 1996. "Effects of Military Noise on Wildlife: A Literature Review." USA CERL Technical Report.

Lehman, R. N. 2001. Raptor Electrocution on Power Lines: Current Issues and Outlook. Wildlife Society Bulletin 29(3): 804-813.

Manville, Albert M., II. 2006. Bird Strikes and Electrocutions at Power Lines, Communication Towers and Wind Turbines: State of the Art and State of the Science-Next Steps Toward Mitigation. U.S. Fish and Wildlife Service Publication.

Marron, Tascheck, Kinght, Inc. and Ecosphere Environmental Services. 1991. Unpublished document.

Mikesic, D., J. Nystedt and D. Roth. 2005. Navajo Nation endangered species list: Species accounts. Navajo Natural Heritage Program, Navajo Department of Fish and Wildlife, Window Rock, AZ.

New Mexico Natural Heritage Program. 2004. Department of Biology, University of New Mexico, Albuquerque, NM. Online at http://nmnhp.unm.edu/query_bcd/query.html.

NMRPTC. New Mexico Rare Plant Technical Council. 1999. New Mexico Rare Plants. Albuquerque, NM: New Mexico Rare Plants Home Page. http://nmrareplants.unm.edu (Latest update: 18 January 2006).

NRCS. (Natural Resource Conservation Service) 1992. Soil Survey of Shiprock Area, Parts of San Juan County, New Mexico and Apache County, Arizona. Natural Resource Conservation Service in cooperation with the U.S. Department of Interior, Bureau of Indian Affairs; the Navajo Nation; and the New Mexico and Arizona Agricultural Experiment Stations.

Page, L.M. and B.M. Burr. 1991. A field guide to freshwater fishes. Houghton Mifflin Company, Boston, MA.

Ramakka, J.M. and R.T. Woyewodzic 1993. Nesting ecology of Ferruginous Hawk in northwestern New Mexico. J. Raptor Res. 27:97-101.

Reeves, T. and A. Nelson. 1996. Birds of Morgan Lake: A Guide to Common Species. Arizona Public Service/Four Corners Power Plant. Waterflow, New Mexico.

Root, J. J., K. R. Wilson, C. H. Calisher, K. D. Wagoner, K. D. Abbot, T. L. Yates, A. J. Keunzi, M. L. Morrison, J. N. Mills, B. J. Beaty. 2005. Spatial clustering of murid rodents infected with hantaviruses: Implications from meta-analyses. Ecological Applications. 15: 565-574.

Soil Conservation Service (SCS). 1980. Soil Survey of San Juan County, New Mexico - Eastern Part. U.S. Department of Agriculture, Soil Conservation Service in Cooperation with the U.S. Department of the Interior, Bureau of Indian Affairs and Bureau of Reclamation and the New Mexico Agricultural Experiment Station.

Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado rare plant field guide. Prepared for the Bureau of Land Management, the U.S. Forest Service and the U.S. Fish and Wildlife Service by the Colorado Natural Heritage Program.

Stillman RA, Goss-Custard JD. 2002. Seasonal changes in the response of oystercatchers to human disturbance. Journal of Avian Biology. 33: 358-365.

Stone, W. J., F. Lyford, P. Frenzel, N. Mizell and E. Padgett. 1983. Hydrogeology and Water Resources of San Juan Basin, New Mexico. Hydrologic Report #6. New Mexico Bureau of Mines and Mineral Resources, a Division of New Mexico Institute of Mining and Technology.

USBR. 2006. U.S. Bureau of Reclamation. Final Environmental Impact Statement Navajo Reservoir Operations. Navajo Unit – San Juan River: New Mexico, Colorado, Utah. Upper Colorado Region, Western Colorado Area Office: Grand Junction, Durango, Colorado.

U.S. Environmental Protection Agency (USEPA). 2006. Acute Exposure Guideline Levels (AEGLs). Available online at: http://www.epa.gov/oppt/aegl/chemlist.htm

_____. 2006b . Technical Support Document: Methodology Used to Generate Deposition, Fish Tissue Methylmercury Concentrations, and Exposure for Determining Effectiveness of Utility Emission

Controls. Posted to the EPA Technology Transfer Network (TTN), http://www.epa.gov/ttn/atw/utility/deposition_fish_tissue_mehg_exposure_oar-2002-0056-6186.pdf. March 16.

_____. (U.S. Environmental Protection Agency). 2005. Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper. Office of Air Quality Planning and Standards. EPA-452/R-05-005. June 2005.

_____. 2005. Regulatory Impact Analysis of the Final Clean Air Mercury Rule. EPA-425-R-05-003.

_____. 2004. Draft Aquatic Life Water Quality Criteria for Selenium. Office of Water and Office of Science and Technology. Washington, D.C. EPA-822-D-04-001.

_____. 1998. *Guidelines for Ecological Risk Assessment*. Federal Register Vol. 63, No. 93. 26845-26924. May 14.

_____. 1993. *Wildlife Exposure Factors Handbook*. Volumes I and II. Office of Research and Development, Washington, D.C. EPA/600/R-93/187.

_____. 1992. *"Framework for Ecological Risk Assessment"* EPA/630/R-92/001. Risk Assessment Forum, Washington, D.C.

U.S. Fish and Wildlife Service (USFWS). 2006. USFWS Southwest Region Ecological Services endangered species lists. Online at http://ifw2es.fws.gov/EndangeredSpecies/lists/ListSpecies.cfm.

_____. 2005. Methylmercury and Other Environmental Contaminants in Water and Fish Collected from Four Recreational Fishing Lakes on the Navajo Nation, 2004. New Mexico Ecological Services. Albuquerque, New Mexico.

URS. 2007. Draft Environmental Impact Statement for the Desert Rock Energy Project. URS Corporation. Phoenix, Arizona.

Western Regional Climate Center. 2006. Available online at http://www.wrcc.dri.edu/.

Wheeler, B.K. 2003. Raptors of western North America. Princeton University Press. Princeton, NJ.

ATTACHMENT A

NAVAJO NATION NATURAL HERITAGE PROGRAM CONSULTATION LETTERS

THE NAVAJO NATION
P.O. BOX 9000 • WINDOW ROCK, ARIZONA • 86515

PRESIDENT
JOE SHIRLEY, JR.
VICE PRESIDENT
FRANK J. DAYISH, JR.

September 12, 2006

Mike Fitzgerald, Program Manager/Owner
Ecosphere Environmental Services
4801 N Butler Suite 15101
Farmington New Mexico 87401

Dear Mr. Fitzgerald,

Sithe Global Power LLC (Sithe) is proposing to conduct geophysical survey on an area adjacent to Area IV N Navajo Mine by drilling test water well and monitoring well. The proposed project was recently presented to the Bureau of Indian Affairs for a categorical exclusion however BIA has requested a threatened and endangered species clearance from the Navajo Fish & Wildlife Department.

According to the *"subject project areas have been biologically inventoried and evaluated by Ecosphere biologists and botanists in each of the last 3 years"* (Ecosphere letter 8/8/06) and found that the proposed area has the potential habitat existing for the *Aquila chrysaetos* (Golden eagle NESL G3; EPA; MBTA); *Buteo regalis* (Ferruginous hawk NESL G3; MBTA); *Athene cunicularia* (Burrowing owl NESL G4; MBTA); *Dipodomys spectabilis* (Banner-tailed kangaroo rat NESL G4); *Vulpes macrotis* (Kit fox NESL G4). Mitigation measures are proposed to lessen direct or indirect impacts to the five (5) species of concern. The proposed mitigation measures are:

1. Avoid data collection activities during nesting season for golden eagle and ferruginous hawk;
2. Conduct a pre-activity raptor survey to determine presence/absence of courting and/or nesting raptors within one (1) mile if activity will be conducted during nesting season and if occupied raptor territories or nests are identified, develop a monitor plan that would include terminating/delaying data collection activities to lessen impacts to the raptors;
3. Conduct reconnaissance surveys to document whether there are any kit fox burrows, burrowing owl burrows or banner-tailed kangaroo rat mounds within the proposed project area and if any burrows are active, consult with the Navajo Nation Fish & Wildlife Department.

The Navajo Nation Fish & Wildlife Department is issuing a *conditional approval recommendation* for the proposed geotechnical and water development plan project if Sithe will implement the mitigation measures as listed above in their data collection activities.

If you have any question(s), please call me at 928/871-7060.

Sincerely,

Rita Whitehorse-Larsen,
Wildlife Biologist
Natural Heritage Program

CONCURRENCE:

Gloria M. Tom, Department Manager
Navajo Nation Fish & Wildlife Department

9/14/06
Date

Cc: Bureau of Indian Affairs – Harrilene Yazzie
Nathan Plagans, Sithe
Navajo Nation Fish & Wildlife chrono file

Division of Natural Resources • Fish and Wildlife Department • Natural Heritage Program
• PO BOX 1480 • Window Rock • Arizona • 86515
Office: 928/871-6450 Fax: 928/871-7603 Website: www.navajofishandwildlife.org

THE NAVAJO NATION
P.O. BOX 9000 • WINDOW ROCK, ARIZONA • 86515

PRESIDENT
JOE SHIRLEY, JR.
VICE PRESIDENT
FRANK J. DAYISH, JR.

DECEMBER 18, 2006

Mike Fitzgerald
Ecosphere Environmental Services
2257 Main Ave. Patio Level
Durango, CO 81301

Mr. Fitzgerald:

The Department has completed review of the Draft Biological Assessment for the Proposed Desert Rock Energy Project and has forwarded the Compliance form with a copy of this letter to the Bureau of Indian Affairs so that they can process the document.

We have come up with one additional mitigation measure for the project. This measure is to monitor the Mesa Verde cactus population for a five year period in the vicinity of where the Desert Rock Project connects to the Navajo Transmission Project.

If you have any questions, please feel free to contact Botanist, Daniela Roth at (928) 523-8445.

Sincerely,

Gloria M. Tom, Director
Department of Fish and Wildlife

cc. BIA, EQ

NNDF&WL Review No. 12-18-06-1

BIOLOGICAL RESOURCES COMPLIANCE FORM
NAVAJO NATION DEPARTMENT OF FISH AND WILDLIFE
P.O. BOX 1480, WINDOW ROCK, ARIZONA 86515-1480

COMPLIANCE	☒
CONDITIONAL COMPLIANCE	☐

It is the Department's opinion the project described below, with applicable conditions, is in compliance with Tribal and Federal laws protecting biological resources including the Navajo Endangered Species and Environmental Policy Codes, U.S. Endangered Species, Migratory Bird Treaty, Eagle Protection and National Environmental Policy Acts. This form does not preclude or replace consultation with the U.S. Fish and Wildlife Service if a Federally-listed species is affected.

PROJECT NAME & NO.: Desert Rock Draft Biological Assessment

DESCRIPTION: Power Plant, well field, rights of way for utilities and roads

LOCATION: San Juan County, New Mexico

REPRESENTATIVE: Ecosphere Environmental

ACTION AGENCY: BIA

B.R. REPORT TITLE / DATE / PREPARER: Draft BA for Proposed Desert Rock Energy Project

SIGNIFICANT BIOLOGICAL RESOURCES FOUND: Mesa Verde Cactus

POTENTIAL IMPACTS

TRIBAL ENDANGERED SPECIES (G2 & G3) TAKEN: Mesa Verde Cactus

FEDERALLY-LISTED SPECIES AFFECTED: Mesa Verde Cactus

OTHER SIGNIFICANT IMPACTS TO BIOLOGICAL RESOURCES: Bald Eagle

AVOIDANCE / MITIGATION MEASURES: As per the BA with one addition that the Mesa Verde Cactus population in the vacinity of where the Desert Rock Project connects with the Navajo Transmission Project be monitored for a five year period.

CONDITIONS OF COMPLIANCE*: NA

FORM PREPARED BY / DATE: J. Cole 12-15-06

COPIES TO: (add categories as necessary)

- ☐ Navajo Environmental Protection Agency
- ☐ U.S. Fish and Wildlife Service, NM Field Office
- ☐ U.S. Fish and Wildlife Service, AZ Field Office
- ☒ BIA Navajo Region, Environmental Services
- ☐ U.S. Fish and Wildlife Service, UT Field Office
- ☒ (Other)

2 NTC § 164 Recommendation:
- ☒ Approval
- ☐ Conditional Approval (with memo)
- ☐ Disapproval (with memo)
- ☐ None (with memo)

Signature: Date: 12/18/06

Gloria M. Tom, Director, Navajo Nation Department of Fish and Wildlife

*I understand and accept the conditions of compliance, and acknowledge that lack of signature may be grounds for the Department not recommending the above described project for approval to the Tribal Decision-maker.

Representative's signature Date

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, New Mexico 87113
Phone: (505) 346-2525 Fax: (505) 346-2542

December 9, 2004

Cons. # 2-22-04-I-0356

Danny Rakestraw, Senior Biologist
URS Corporation
7180 Pollock Drive, Suite 200
Las Vegas, Nevada 89119

Dear Mr. Rakestraw:

Thank you for your November 24, 2004, letter requesting input on the Sithe Global Power, LLC Desert Rock Project. The proposed project is located approximately 30 miles south of Farmington, San Juan County, New Mexico.

We have enclosed a current list of federally endangered, threatened, proposed, and candidate species, and species of concern that may be found in San Juan County, New Mexico.[1] Under the Endangered Species Act, as amended, it is the responsibility of the Federal action agency or its designated representative to determine if a proposed action "may affect" endangered, threatened, or proposed species, or designated critical habitat, and if so, to consult with us further. If your action area has suitable habitat for any of these species, we recommend that species-specific surveys be conducted during the flowering season for plants and at the appropriate time for wildlife to evaluate any possible project-related impacts. Please keep in mind that the scope of federally listed species compliance also includes any interrelated or interdependent project activities (e.g., equipment staging areas, or utility relocations) and any indirect or cumulative effects.

Candidates and species of concern have no legal protection under the Act and are included in this document for planning purposes only. We monitor the status of these species. If significant declines are detected, these species could potentially be listed as endangered or threatened. Therefore, actions that may contribute to their decline should be avoided. We recommend that candidates and species of concern be included in your surveys.

Under Executive Orders 11988 and 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and floodplains, and preserve and enhance their natural and beneficial values. We recommend you contact the U.S. Army Corps of Engineers for permitting requirements under section 404 of the Clean Water Act if your proposed action could

[1] Additional information about these species is available on the Internet at <http://nmrareplants.unm.edu>, <http://nmnhp.unm.edu/bisonm/bisonquery.php>, and <http://ifw2es.fws.gov/endangeredspecies>.

impact floodplains or wetlands. These habitats should be conserved through avoidance, or mitigated to ensure no net loss of wetlands function and value.

The Migratory Bird Treaty Act (MBTA) prohibits the taking of migratory birds, nests, and eggs, except as permitted by the U.S. Fish and Wildlife Service. To minimize the likelihood of adverse impacts to all birds protected under the MBTA, we recommend construction activities occur outside the general migratory bird nesting season of March through August, or that areas proposed for construction during the nesting season be surveyed, and when occupied, avoided until nesting is complete.

We suggest you contact the New Mexico Department of Game and Fish, and the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division for information regarding fish, wildlife, and plants of State concern.

Thank you for your concern for endangered and threatened species and New Mexico's wildlife habitats. In future correspondence regarding this project, please refer to consultation # 2-22-04-I-0356. If you have any questions about the information in this letter, please contact Santiago R. Gonzales at the letterhead address or at (505) 761-4755.

Sincerely,

Brian Hanson

for Susan MacMullin
Field Supervisor

Enclosure

cc: (w/o enc)
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, New Mexico

Rev: November 2004

FEDERAL ENDANGERED, THREATENED,
PROPOSED, AND CANDIDATE SPECIES
AND SPECIES OF CONCERN WITHIN COUNTIES IN NEW MEXICO
Consultation Number 2-22-04-I-0356
December 9, 2004

San Juan County

ENDANGERED

- Black-footed ferret (*Mustela nigripes*)**
- Southwestern willow flycatcher (*Empidonax traillii extimus*)
- Colorado pikeminnow (*Ptychocheilus lucius*), with critical habitat
- Razorback sucker (*Xyrauchen texanus*), with critical habitat
- Knowlton cactus (*Pediocactus knowltonii*)
- Mancos milk-vetch (*Astragalus humillimus*)

THREATENED

- Bald eagle (*Haliaeetus leucocephalus*)
- Mexican spotted owl (*Strix occidentalis lucida*) with critical habitat
- Mesa Verde cactus (*Sclerocactus mesae-verdae*)

CANDIDATE

- Yellow-billed cuckoo (*Coccyzus americanus*)

SPECIES OF CONCERN

- Townsend's big-eared bat (*Corynorhinus townsendii*)
- American peregrine falcon (*Falco peregrinus anatum*)
- Arctic peregrine falcon (*Falco peregrinus tundrius*)
- Baird's sparrow (*Ammodramus bairdii*)
- Black tern (*Chlidonias niger*)
- Mountain plover (*Charadrius montanus*)
- Northern goshawk (*Accipiter gentilis*)
- Western burrowing owl (*Athene cunicularia hypugea*)
- Roundtail chub (*Gila robusta*)
- New Mexico silverspot butterfly (*Speyeria nokomis nitocris*)
- San Juan checkerspot butterfly (*Euphydryas anicia chuskae*)
- San Juan tiger beetle (*Cicindela lengi jordai*)
- Beautiful gilia (*Gilia formosa*)
- Bisti fleabane (*Erigeron bistiensis*)
- Brack's fishhook cactus (*Sclerocactus cloveriae* var. *brackii*)
- Goodding's onion (*Allium gooddingii*)
- Parish's alkali grass (*Puccinellia parishii*)
- Santa Fe cholla (*Opuntia viridiflora*)

Index

Endangered	=	Any species which is in danger of extinction throughout all or a significant portion of its range.
Threatened	=	Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Candidate	=	Candidate Species (taxa for which the Service has sufficient information to propose that they be added to list of endangered and threatened species, but the listing action has been precluded by other higher priority listing activities).
Proposed	=	any species of fish, wildlife or plant that is proposed in the Federal Register to be listed under section 4 of the Act.
Species of Concern	=	Taxa for which further biological research and field study are needed to resolve their conservation status OR are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, State wildlife agencies, other Federal agencies, or professional/academic scientific societies. Species of Concern are included for planning purposes only.
*	=	Introduced population
**	=	Survey should be conducted if project involves impacts to prairie dog towns or complexes of 200-acres or more for the Gunnison's prairie dog (*Cynomys gunnisoni*) and/or 80-acres or more for any subspecies of Black-tailed prairie dog (*Cynomys ludovicianus*). A complex consists of two or more neighboring prairie dog towns within 4.3 miles (7 kilometers) of each other.
***	=	Extirpated in this county
†	=	May occur in this county from re-introductions in Colorado.

THE NAVAJO NATION
P.O. Box 9000 • Window Rock, Arizona • 86515

PRESIDENT
Joe SHIRLEY, Jr.
VICE PRESIDENT
Frank J. DAYISH, Jr.

File#04URS02

29 December 2004

Danny Rakestraw, Senior Biologist
URS Corporation
7180 Pollock Drive
Suite 200
Las Vegas, NV 89119

SUBJECT: SITHE GLOBAL POWER, LLC DESERT ROCK ENERGY PROJECT
NAVAJO NATION

Mr. Rakestraw:

The following information on species of concern[1] is provided in response to your 24 November 2004 request concerning the subject project, which consists of the proposed Desert Rock Energy Project. The project will be built on a 600-acre parcel immediately adjacent to the existing BHP Billiton Navajo Mine, which would provide low sulfur coal for generating the power. The site is approximately 30 miles south of Farmington in San Juan County in northwestern New Mexico. The proposed project consists of the construction, operation and maintenance of a coal-fired power plant and associated facilities. The project includes the following components:

- Two 750-MW coal-fired generation units and associated facilities including plant cooling system, fuel supply system, waste management operations and safety systems, such as lighting and fire protection.
- Water intake structures, distribution pipelines and evaporation ponds
- Transportation access roads.
- Power transmission interconnection facilities
- Construction staging areas.

Each 7.5-minute quadrangle containing project boundaries is addressed separately below. For potentially occurring species these species lists are quadrangle-specific rather than project-specific. Potential for species has been determined primarily on quadrangle-wide coarse habitat characteristics and species range information. Your project biologist should determine habitat suitability at the project site(s).

A total of nineteen (19) species both known and/or potential are included in this response. They are:

[1] "Species of concern" include protected, candidate, and other rare or otherwise sensitive species, including certain native species and species of economic or cultural significance. For each species, the following tribal and federal statuses are indicated: Navajo Endangered Species List (NESL), federal Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), and Eagle Protection Act (EPA). No legal protection is afforded species with only ESA candidate or NESL group 4 status; please be aware of these species during surveys and inform the NFWD of observations. Documentation that these species are more numerous or widespread than currently known, and addressing these species in project planning and management is important for conservation and may contribute to ensuring they will not be uplisted in the future. Species without ESA or NESL legal protection (e.g., NESL group 4 species) are only included in responses on a regular basis and may not be included in this response. Please refer to the NESL for a list of group 4 species; contact me if you need a copy.

1. Antilocapra americana (Pronghorn); NESL group 3.
2. Aquila chrysaetos (Golden Eagle); NESL group 3; MBTA; EPA.
3. Buteo regalis (Ferruginous Hawk); NESL group 3; MBTA.
4. Catostomus discobolus (Bluehead Sucker); NESL group 4.
5. Charadrius montanus (Mountain Plover); NESL group 4; ESA proposed threatened; MBTA.
6. Cottus bairdi (Mottled Sculpin); NESL group 4.
7. Empidonax traillii extimus (Southwestern Willow Flycatcher); NESL group 2; ESA endangered; MBTA.
8. Falco mexicanus (Prairie Falcon); MBTA.
9. Falco peregrinus (Peregrine Falcon); NESL group 4: MBTA.
10. Gila robusta (Roundtail Chub); NESL group 2.
11. Haliaeetus leucocephalus (Bald Eagle); ESA threatened; MBTA; EPA.
12. Mustela nigripes (Black-footed Ferret); NESL group 2; ESA endangered.
13. Ptychocheilus lucius (Colorado Pikeminnow); NESL group 2; ESA threatened.
14. Rana pipiens (Northern Leopard Frog); NESL group 2.
15. Waterfowl and shorebirds.
16. Xyrauchen texanus (Razorback Sucker); NESL group 2; ESA endangered.
17. Astragalus humillimus (Mancos Milk-vetch); NESL group 2; ESA endangered.
18. Astragalus monumentalis (Monument Valley milk-vetch).
19. Sclerocactus mesae-verdae (Mesa Verde Cactus); NESL group 3; ESSA threatened.

CHIMNEY ROCK, NM 7.5-MINUTE QUADRANGLE

Known to occur within three miles of the project site:

1. Sclerocactus mesae-verdae

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Antilocapra americana
2. Aquila chrysaetos
3. Buteo regalis
4. Catostomus discobolus
5. Charadrius montanus
6. Cottus bairdi
7. Empidonax traillii extimus
8. Falco peregrinus
9. Gila robusta
10. Haliaeetus leucocephalus
11. Mustela nigripes
12. Ptychocheilus lucius
13. Rana pipiens
14. Waterfowl and shorebirds.
15. Xyrauchen texanus
16. Astragalus humillimus
17. Astragalus monumentalis

WATERFLOW, NM 7.5-MINUTE QUADRANGLE

Known to occur within three miles of the project site:

1. Sclerocactus mesae-verdae

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Aquila chrysaetos
2. Catostomus discobolus
3. Charadrius montanus
4. Cottus bairdi
5. Empidonax traillii extimus
6. Falco peregrinus
7. Gila robusta
8. Haliaeetus leucocephalus
9. Mustela nigripes
10. Ptychocheilus lucius
11. Rana pipiens
12. Waterfowl and shorebirds.
13. Xyrauchen texanus
14. Astragalus humillimus
15. Astragalus monumentalis

SHIPROCK, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Empidonax traillii extimus

Known to occur within one mile of the project site:

1. Rana pipiens
2. Sclerocactus mesae-verdae

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Antilocapra americana
2. Aquila chrysaetos
3. Catostomus discobolus
4. Charadrius montanus
5. Cottus bairdi
6. Falco peregrinus
7. Gila robusta
8. Haliaeetus leucocephalus
9. Mustela nigripes
10. Ptychocheilus lucius
11. Waterfowl and shorebirds.
12. Xyrauchen texanus

KIRTLAND SE, NM 7.5-MINUTE QUADRANGLE

Although the Navajo Fish and Wildlife Department (NFWD) has no record of species of concern occurring on or near the project site(s) at this time, the potential for certain species of concern to occur needs to be evaluated.

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Antilocapra americana
2. Aquila chrysaetos
3. Buteo regalis
4. Charadrius montanus
5. Mustela nigripes

LITTLE WATER, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Aquila chrysaetos; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.
2. Astragalus humillimus

Known to occur within three miles of the project site:

1. Sclerocactus mesae-verdae

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Buteo regalis
2. Charadrius montanus
3. Falco peregrinus
4. Mustela nigripes

THE HOGBACK SOUTH, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Buteo regalis; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.

Known to occur within three miles of the project site:

1. Aquila chrysaetos

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Charadrius montanus
2. Empidonax traillii extimus
3. Falco peregrinus
4. Mustela nigripes
5. Astragalus humillimus
6. Sclerocactus mesae-verdae

FRUITLAND, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Cottus bairdi
2. Buteo regalis; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.
3. Empidonax traillii extimus

Known to occur within three miles of the project site:

1. Astragalus naturitensis
2. Falco peregrinus

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Aquila chrysaetos
2. Catostomus discobolus
3. Charadrius montanus
4. Gila robusta
5. Haliaeetus leucocephalus
6. Mustela nigripes
7. Porzana carolina.
8. Ptychocheilus lucius
9. Rana pipiens
10. Waterfowl and shorebirds.
11. Xyrauchen texanus

TABLE MESA, NM 7.5-MINUTE QUADRANGLE

Known to occur within three miles of the project site:

1. Aquila chrysaetos

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Buteo regalis
2. Charadrius montanus
3. Mustela nigripes
4. Astragalus humillimus
5. Sclerocactus mesae-verdae

NEWCOMB NE, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Aquila chrysaetos; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.

Known to occur within three miles of the project site:

1. Buteo regalis

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:

1. Charadrius montanus
2. Empidonax traillii extimus
3. Mustela nigripes
4. Sclerocactus mesae-verdae

THE HOGBACK NORTH, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:

1. Buteo regalis; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.

2. Aquila chrysaetos ; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.

Known to occur within three miles of the project site:
1. Astragalus naturitensis
2. Astragalus humillimus

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:
1. Catostomus discobolus
2. Charadrius montanus
3. Cottus bairdi
4. Empidonax traillii extimus
5. Falco peregrinus
6. Gila robusta
7. Haliaeetus leucocephalus
8. Mustela nigripes
9. Ptychocheilus lucius
10. Rana pipiens
11. Waterfowl and shorebirds.
12. Xyrauchen texanus
13. Sclerocactus mesae-verdae

KIRTLAND SW, NM 7.5-MINUTE QUADRANGLE

Known to occur within one mile of the project site:
1. Buteo regalis; For more information contact David Mikesic, NFWD Zoologist, at (928) 871-7070.

Species of concern with **potential** to occur on the 7.5-minute quadrangle(s) containing the project boundaries include the following:
1. Antilocapra americana
2. Aquila chrysaetos
3. Charadrius montanus
4. Mustela nigripes

Potential for the black-footed ferret should be evaluated if prairie-dog towns of sufficient size (per NFWD guidelines) occur in the project area.

Potential for Puccinellia parishii should be evaluated if wetland conditions exists that contain white alkaline crusts.

Biological surveys need to be conducted during the appropriate season to ensure they are complete and accurate please refer to NN Species Accounts.[4] Further questions pertaining to surveys should be referred to Species Account. Surveyors on the Navajo Nation must b**permitted** by the Director, NFWD. Contact Jeff Cole at (928) 871-7068 for permitting procedures. Questions pertaining to surveys should be directed to the NFWD Zoologist (David Mikesic) for animals at 871-7070, and Botanist (Daniela Roth) for plants at

[4] Available upon request free of charge by contacting Data Manager at 871-6489

(928)523-8445. Questions regarding biological evaluation should be directed to Rita Whitehorse-Larsen (Environmental Reviewer) at 871-7060.

Potential impacts to **wetlands** should also be evaluated. The U.S. Fish & Wildlife Service's National Wetlands Inventory (NWI) maps should be examined to determine whether areas classified as wetlands are located close enough to the project site(s) to be impacted. In cases where the maps are inconclusive (e.g., due to their small scale), field surveys must be completed. For field surveys, wetlands identification and delineation methodology contained in the "Corps of Engineers Wetlands Delineation Manual" (Technical Report Y-87-1) should be used. When wetlands are present, potential impacts must be addressed in an environmental assessment and the Army Corps of Engineers, Phoenix office, must be contacted. NWI maps are available for examination at the NFWD's Natural Heritage Program (NHP) office, or may be purchased through the U.S. Geological Survey (order forms are available through the NHP). The NHP has complete coverage of the Navajo Nation, excluding Utah, at 1:100,000 scale; and coverage at 1:24,000 scale in the southwestern portion of the Navajo Nation.

The information in this report was identified by the NFWD's biologists and computerized database, and is based on data available at the time of this response. If project planning takes more than two (02) years from the date of this response, verification of the information provided herein is strongly recommended. It should not be regarded as the final statement on the occurrence of any species, nor should it substitute for on-site surveys. Also, because the NFWD's information is continually updated, any given information response is only wholly appropriate for its respective request.

An invoice for this information is attached.

If you have any questions I may be reached at (928) 871-6472.

Sonja Detsoi, Wildlife Tech.
Natural Heritage Program
Department of Fish and Wildlife

CONCURRENCE

Gloria M. Tom, Director
Department of Fish & Wildlife
Division of Natural Resources

xc: file/chrono

THE
NAVAJO
NATION
P.O. Box 9000 • Window Rock, Arizona • 86515

President
Joe Shirley, Jr.
Vice President
Frank J. Dayish, Jr.

08 March 2005

Mr. Danny Rakestraw, Senior Biologist
URS Corporation
7180 Pollock Drive, Suite 200
Las Vegas, NV 89119

Mr. Rakestraw,

URS Corporation is the third party National Environmental Policy Act (NEPA) contractor supporting the Bureau of Indian Affairs in their development of an Environmental Impact Statement and associated documents for the proposed Sithe Global Power, LLC, Desert Rock Energy Project in San Juan County, New Mexico. To minimize impacts to biological resources on the Navajo Nation, the Department of Fish and Wildlife's Natural Heritage Program has been cooperating with you, and others, to provide all necessary avoidance measures for alignment of various aspects of this project. We have been provided a map of the proposed project area, and as per your 26 January 2005 letter, received a request for detailed location information on Threatened and Endangered species occurring on or near the project. In response, this letter details known plant and animal species of concern, and provides specific locations of those resources.

A review of our database and maps of the project area was completed to derive a list of species occurring within approximately one mile of the proposed project alignments. We found a total of 69 occurrences of Navajo Endangered Species List (NESL) species within this area. They include the following nine species:

Golden Eagle (*Aquila chrysaetos* – AQCH) -- NESL Group 3
Mancos Milk-vetch (*Astragalus humillimus* – ASHU) -- NESL Group 2, Fed. Endangered
Naturita Milk-vetch (*Astragalus naturitensis* – ASNA) -- NESL Group 4,
Burrowing Owl (*Athene cunicularia* – ATCU) -- NESL Group 4 in 2005 revision
Ferruginous Hawk (*Buteo regalis* - BURE) -- NESL Group 3
Townsend's Big-eared Bat (*Corynorhinus townsendii* – COTO) -- NESL Group 4
Southwestern Willow Flycatcher (*Empindox traillii extimus* – EMTREX) -- NESL Group 2, Fed. Endangered
Bald Eagle (*Haliaeetus leucocephalus* – HALE) -- Pending Fed. delisting
Mesa Verde Cactus (*Sclerocactus mesae-verdae* – SCMEVE) -- NESL Group 3, Fed.Threatened, uplisted to Group 2 in 2005 revision

The specific location information included in Appendix A was derived by several methods. For most occurrences, UTM coordinates were estimated to the nearest 100 meters from the element's mapped location on our 1:24,000 quad. maps. Most Ferruginous Hawks nest locations, however, were gathered with a GPS unit during helicopter surveys and are therefore more precise. All data provided should be regarded as collected with UTM, zone 12 projection with NAD27 CONUS Datum. Also, all locations were projected using ArcView software to ensure accuracy. To maintain this accuracy, you may contact me to e-mail the Access Database for direct input to ArcView with your project.

The Navajo Nation Department of Fish and Wildlife expects avoidance of species at all locations provided in this letter, in accordance with the Natural Heritage Program's Species Accounts. The Department's newly-developed and implemented Ferruginous Hawk Nest Protection Policy is included in Appendix 2, and supersedes the previous recommendations in the Species Account. As per our previous discussions, additional surveys will be necessary for these and other NESL species throughout the project area, and avoidance of all additional occurrences are expected. However, we will adhere to a half-mile avoidance distance around all active Ferruginous Hawk nests for survey activities (considered 'Brief Activities' in the Policy). The Navajo Natural Heritage Program will provide active nest information to consultants performing field surveys as needed during the progression of the hawk breeding season.

We appreciate that URS fully understands the sensitive nature of this data, and will treat the data in the secure manner in which you treat all endangered species and cultural resource data. Protection of data includes: marking data in your data management system requiring approval of a designated individual prior to access; not using these data for any other projects, nor forwarding to other agencies, contractors, or other organizations without Navajo Nation Department of Fish and Wildlife written consent; and the data will not be published in any documents made available to the public without the Department of Fish and Wildlife's consent.

If you have any questions or desire more technical assistance from the Department, feel free to contact me at 928-871-7070, or dmikesic@hotmail.com

Sincerely,

David Mikesic

David Mikesic, Zoologist
Navajo Natural Heritage Program
Department of Fish and Wildlife

xc: file, chrono
Richard Knox, Project Manager, URS Corp., 7720 N. 16th Street, Suite 100, Phoenix, AZ 85020
Barb Garrison, 333 East Wetmore, Suite 611, Tuscon, AZ 85705
Rita Whitehorse-Larsen, Wildlife Biologist, Navajo Nation Department of Fish and Wildlife

Attachments: 2 appendices

ATTACHMENT B

GOLDEN EAGLE AND FERRUGINOUS HAWK NEST PROTECTION POLICY

APPENDIX B.

NAVAJO NATION DEPARTMENT OF FISH AND WILDLIFE
FERRUGINOUS HAWK NEST PROTECTION POLICY

PURPOSE

Human land-use practices can have a variety of types of impacts to nesting Ferruginous Hawks and their habitats, including:

1. Direct, Indirect, and Cumulative Impacts to nesting success and adult survival;
2. Direct, Indirect, Cumulative Impacts to nesting and foraging habitat and prey densities.

The purpose of this regulation is to conserve breeding Ferruginous Hawks on the Navajo Nation by protecting their nests from human activities that may cause temporary or permanent disturbance.

Conservation of nesting Ferruginous Hawks are important to the Navajo Nation because it is:

1. A species of cultural importance to the Navajo People;
2. An important part of the ecosystem as a predator on small mammals;
3. A native breeding species of the Navajo Nation, but occurs in low numbers as to be considered 'threatened' on the Navajo Endangered Species List (Group 3);
4. Of concern to other land managers throughout much of its range, and therefore listed on numerous 'Species of Concern' lists for the western U.S. and Canada;
5. A species that was once considered for Federal listing under the Endangered Species Act, and may be petitioned for listing again in the near future.

Protection of both occupied and unoccupied nests is important because:

1. Not all adult raptor pairs breed every year;
2. Not all nesting territories are used for breeding each year;
3. Each intact nest within a nesting territory may be used in any given year;
4. Nesting territories may be reoccupied, and nests may be re-built and used, even if left unattended for a number of years.

These regulations are designed to:

1. Avoid disturbance to occupied nests during the breeding season;
2. Avoid or minimize impacts to known or potential nesting habitats, especially in consideration of nesting substrate quality and quantity;
3. Avoid or minimize impacts to foraging habitats around occupied nesting habitat; especially in consideration of prey diversity and densities;
4. Minimize impacts over broad areas of the hawk's range on the Navajo Nation;
5. Mitigate for unavoidable losses of nesting sites or habitat quality.

Navajo Nation Department of Fish and Wildlife's
Ferruginous Hawk Nest Protection Measures:

1. Protect all nesting Ferruginous Hawks on the Navajo Nation during March 1st to July 31st with the following provisions:

    a. Allow no human activity within 0.8 km (0.5 mi) of an OCCUPIED NEST for BRIEF ACTIVITIES.

    b. Allow no human activity within 1.0 km (5/8 mi) of an OCCUPIED NEST for LIGHT ACTIVITIES.

    c. Allow no human activity within 1.2 km (3/4 mi) of an OCCUPIED NEST for HEAVY ACTIVITIES.

    d. Allow no human activity within 1.6 km (1 mi) of an OCCUPIED NEST for LOUD ACTIVITIES.

2. Protect all NESTS from human disturbances associated with PERMANENT STRUCTURES on a year-round basis.

    a. Allow no DAILY-USE PERMANENT STRUCTURES within 1.6 km (1 mi) of a known NEST.

    b. Allow no INFREQUENT-USE PERMANENT STRUCTURES within 1.0 km (5/8 mi) of a known NEST.

3. Follow additional measures during project planning if proposed activity is near known Ferruginous Hawk nesting territories or potential habitat to further minimize impacts.
    a. Place new constructions and human disturbances near previously-disturbed areas whenever possible.

    b. Limit the size of construction to smallest area necessary to meet project needs.

    c. Reclaim disturbed areas and obliterate roads post-construction.

    d. Consider alternative construction sites and/or methods.

4. Mitigate for unavoidable losses of NESTS or occupied or potential habitat, and for potential disturbances to nesting Ferruginous Hawks with measures approved by the Navajo Nation Department of Fish and Wildlife. Installation of artificial nesting structures is usually recommended for losses of NESTS or habitat, while monitoring of nesting success for up to five (5) years at the affected NEST(S) is usually recommended for disturbances to nesting Hawks.
5. At the discretion of a qualified biologist of the Navajo Nation Department of Fish and Wildlife, these regulations may be revised or altered as new information becomes

available; and deviations (esp. in distances and dates) will be allowed on a case-by-case basis and for warranted circumstances, especially for emergency situations.

6. All Ferruginous Hawks NESTS found in the future will be protected under these Protection Measures following verification and documentation by the Navajo Nation Department of Fish and Wildlife.

7. Very old and dilapidated Ferruginous Hawk NESTS may be deleted from these Protection Measures by a qualified biologist of the Navajo Nation Department of Fish and Wildlife Nest if the NEST appears to no longer represent a suitable breeding location for the hawk. Only NESTS known, or suspected, to be unused for at least ten (10) years, composed of unconsolidated sticks with no vertical cohesiveness may be considered for deletion.

8. All NEST locations are to be considered confidential information of The Navajo Nation Department of Fish and Wildlife, and may be divulged only for protection of the NEST and proper land-use planning.

9. Because of BHP Billiton's commitment to monitor raptor nests each year, Ferruginous Hawk NESTS on active sections of Navajo Mine are excluded from these Protection Measures; however, these Measures apply for NESTS occurring on Mine lease-lands after mining operations and land reclamation are completed.

DEFINITIONS:

'BRIEF ACTIVITIES' are those that occur for up to one (1) hour and involve only personnel and passenger or maintenance vehicles.

Examples include: soil surveys, biological surveys, infrequent maintenance of structures.

'LIGHT ACTIVITIES' are those that occur for up to one (1) day in the same general area (i.e. within 1,000 ft of the previous day's action), and involve up to five (5) vehicles (including up to three (3) construction-type vehicles or equipment), and up to ten (10) personnel.

Examples include: residential utilities (power, water and sewer lines), fence building.

'HEAVY ACTIVITIES' are those that exceed at least one of the criteria for Light Construction, or include permanent structures that involve human activity of up to one (1) visit per week.

Examples include: road construction, oil and gas well construction.

'LOUD ACTIVITIES' are those that exceed the normal base level of construction noise, either for brief or extended periods.

Examples include: blasting, jackhammer, rock crusher.

'PERMANENT STRUCTURES' are above-ground facilities resulting that persist for more than two (2) years in the same location.

'DAILY-USE' involves human activity that occurs daily or more than three (3) days a week.

Examples include: home sites, sheep camps, subdivisions, coal mines, new roads, some road improvements, gas plants, large-scale farming, borrow pits.

'INFREQUENT-USE' involves human activity that occurs three (3) or less days a week.

Examples include: maintenance of oil and gas wells or utilities.

'NEST(S)' is a stick structure verified to have built by Ferruginous Hawks, or likely to have been built by Ferruginous Hawks based on its characteristics of composition and placement on the substrate.

'OCCUPIED NESTS' are those nests which are repaired, tended, or used for nesting, in the current year by a pair of Ferruginous Hawks. The presence of Ferruginous Hawks (adults, eggs, or young), evidence of nest repair or nest marking, freshly molted feathers, or current years' mute suggest an Occupied Nesting Territory. All nests within an Occupied Nesting Territory are considered as an "Occupied Nest" during pair-bonding and prior to egg-laying. If a nest is selected and eggs are laid, then only this nest will be considered as "occupied," while the others will then be considered 'unoccupied.' An Occupied Nest retains this status from pair bonding, through egg-laying, incubation of eggs, brooding and fledging of young, and post-fledging dependency of the young.

'UNOCCUPIED NESTS' are those nests not selected by Ferruginous Hawks for breeding in the current year. All nests without eggs or nestlings by May 1st of each year shall be considered as Unoccupied Nests. All nests during the non-breeding season (August 1st to February 28th) shall be considered as Unoccupied Nests.

'OCCUPIED NESTING TERRITORY' is a single nest or group of nests with at least one resident adult Ferruginous Hawk during the nesting season.

Appendix C

Ecological Risk Assessment (excerpt)

[This appendix was excerpted from the Risk Analysis that is included in this Draft EIS, in its entirety, as Appendix J. The excerpt is not reproduced here.]