

# DEVELOPING ADAPTIVE BIOLOGICAL STRATEGIES WITHIN CURRENT MONITORING PLANS TO BENEFIT SENSITIVE SPECIES AND FACILITATE MINING OPERATIONS ON TRIBAL LANDS<sup>1</sup>

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**Abstract:** Activities associated with coal mining can have multiple direct and indirect impacts to sensitive species over the short- and long-term depending on the type, duration, and proximity of the activity. As the natural environment changes with surface disturbance due to coal mining activities, so too will the response of species to their changing environment. In the United States, mining operators must comply with the Endangered Species Act (ESA) of 1973 (7 U.S.C. § 136, 16 U.S.C. § 1531 et seq.) as administered by the US Fish and Wildlife Service (USFWS), the Surface Mining Control and Reclamation Act of 1977 (SMCRA) (30 USC § 1201 et seq) as administered by the Office of Surface Mining Reclamation and Enforcement (OSM), as well as any regulations established by the land management agency administering the mine lease – in our case, the Navajo Nation Department of Fish and Wildlife (NNDFW). This approach typically applies a prescriptive mitigation and monitoring approach, often requiring a halt in mining activities, with results that are not always effective in protecting sensitive species and their habitats. We suggest long-term monitoring coupled with an adaptive and proactive approach using a suite of adaptive biological strategies such as translocation of species, creation of alternative or improved habitats, and encouraging avoidance of habitat subject to immediate disturbance, as well as other measures to minimize mitigation for sensitive species into the planning of mining operations. This approach allows mining activities to continue uninterrupted, while simultaneously protecting sensitive species.

**Additional Key Words:** coal extraction, mining, strategies, tribal

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<sup>1</sup> Poster was presented at the 2009 National Meeting of the American Society of Mining and Reclamation, Billings, MT, *Revitalizing the Environment: Proven Solutions and Innovative Approaches* May 30 – June 5, 2009. R.I. Barnhisel (Ed.) Published by ASMR, 3134 Montavesta Rd., Lexington, KY 40502.

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Proceedings America Society of Mining and Reclamation, 2009 pp 1711-1724

DOI: 10.21000/JASMR09011711

<http://dx.doi.org/10.21000/JASMR09011711>

## **Introduction**

Activities associated with coal mining can have multiple direct and indirect impacts to sensitive species over the short- and long-term depending on the type, duration, and proximity of the activity. As the natural environment changes with surface disturbance due to coal mining activities, so too will the response of species to their changing environment. Further, coal mining activities often occur over decades, in which time the status of sensitive species may change, i.e. species may be added or removed from sensitive species lists. Without long-term monitoring and an understanding of the distribution and abundance of sensitive species on the landscape, appropriate measures to mitigate the effects of mining activities are difficult to establish.

Mining operators are required by 30 CFR 780.16 and 816.97 of the Surface Mining Control and Reclamation Act of 1977 (SMCRA) administered by the Office of Surface Mining Reclamation and Enforcement (OSM) to monitor wildlife and mitigate any foreseeable impacts to wildlife from mining activities. In the United States, mining operators are legally obligated to comply with the Endangered Species Act (ESA) of 1973 (7 U.S.C. § 136, 16 U.S.C. § 1531 et seq.) as administered by the US Fish and Wildlife Service (USFWS). In this case, BHP Navajo Coal Company (BNCC) is also required to follow the Navajo Nation Endangered Species List and associated avoidance and mitigation measures, as well as the Ferruginous Hawk Nest Protection Policy, and Golden and Bald Eagle Nest Protection Policy. These laws and regulations are established to protect sensitive species and manage activities that could impact them. For any mine operator to comply with these regulations, they must know what sensitive species occur on the mine lease area, as well as their distribution and habitat associations. The mine operator can thereby attempt to avoid harming any sensitive species when they are known to occur in direct or close proximity to mining activities. This approach may require a halt in mining operations due to consultation with the USFWS or the land management agency that is not always effective in protecting sensitive species and their habitats or beneficial to the mine operator. Therefore, we suggest long-term monitoring coupled with an adaptive and proactive approach using a suite of measures such as translocation of species, creation of alternative or improved habitats, avoidance of habitat subject to immediate disturbance, as well as other measures to minimize mitigation to sensitive species into the planning of annual mining operations. This approach allows mining operators to predict activities that might affect

sensitive species in advance of the active mining pit, as well as surface disturbance associated with the construction of roads, transmission lines, and coal conveyance, thereby allowing mining activities to continue uninterrupted, while simultaneously protecting sensitive species.

We initiated discussions with the Navajo Nation Department of Fish and Wildlife (NNDFW) to develop a long-term approach to monitor and mitigate the impacts of surface mining on threatened, endangered, and sensitive (TES) upland flora and fauna species listed by the USFWS and Navajo Natural Heritage Program (NNHP) of the NNDFW. The Navajo Nation also adheres to federal regulations related to wildlife (the Endangered Species Act (ESA), the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act and consults with the USFWS through the Bureau of Indian Affairs (BIA) as appropriate. Therefore, both the USFWS and the Navajo Nation oversee BNCC's mining operations and assure that they are in compliance with federal and tribal regulations. BNCC currently implements an annual wildlife-monitoring plan for its permitted surface coal mining operation; the focus of this plan is on raptor activity, particularly ferruginous hawks, and on general wildlife surveys. We developed a plan for BNCC's proposed surface coal mining operation, located on Navajo Nation tribal land, hereafter referenced as the Navajo Mine Extension Project (NMEP). Our intent was to use the results of these previous annual monitoring surveys to develop a more adaptive and proactive approach to anticipate potential impacts to sensitive species from advancing mining activities. Our goals of the plan were to 1) protect and minimize impacts to sensitive species, 2) assist the Navajo Nation with management of sensitive species, and 3) facilitate uninterrupted mining operations.

### **Project Area**

The NMEP permit area comprises approximately 13,000 acres within the Colorado Plateau province, on the west edge of the San Juan Basin, about 20 miles southwest of Farmington. Topography in the area includes flats and tablelands with moderate to considerable relief associated with incised washes and canyons. The project area is within the Chaco Wash watershed, a tributary to the San Juan River, with shallow soils, steep hills, and rock outcrops. Although this area is intersected by two arroyos, the drainages are dry much of the summer. The only standing surface water present within the boundaries of the project area is found in constructed stock ponds scattered throughout the project area. Most precipitation in the area occurs from July through October in localized, short-duration, high-intensity thunderstorms.

The NMEP is described as Great Basin desert-scrub habitat, a cold desert ecosystem dominated by a variety of shrubs with a sparse under story of forbs and grasses, with bare ground dominating in poor, alkaline soils (Fitzgerald et al. 1994, Dick-Peddie 1993). Although many of the more than 160 plant species we identified in this area are present in two or more vegetation communities, we refer to six vegetation communities with a few distinguishing or unique plant species that typically define the vegetation community: dunes, sands, arroyo shrub, alkali wash, thin breaks, and badlands (Ecosphere 2004a and 2008a).

Dunes are vegetation communities typically with deep sands that allow for more consistent water availability. Since only deep-rooted perennial plants can exploit this deep water, dunes have several unique plant associations including San Juan milkweed (*Asclepias sanjuanensis*). Other common species include cryptantha (*Cryptantha crassisepala*), tansy mustard (*Descurania pinnata*), twinpod (*Dimorphocarpa wislizeni*), globemallow (*Sphaeralcea parvifolia*), Indian ricegrass (*Achnatherum hymenoides*), galleta grass (*Pleuraphis jamesii*), and evening primrose (*Oenothera pallida*).

Sands are similar to dunes in that the deeper penetration of rainwater into sandy soil allows for greater water availability and increases plant species diversity. The types of sand in this habitat can vary from saline to calcareous. This habitat often transitions to and can be mixed with the thin breaks vegetation community. In years with high amounts of spring rainfall, the sands community display an abundance of annuals, especially of scorpion weed (*Phacelia crenulata*), annual Townsend daisy (*Townsendia annua*), and cryptantha. Other common species include Russian thistle (*Salsola tragus*), pincushion (*Chaenactis stevioides*), galleta grass, and wire lettuce (*Stephanomeria exigua*).

The arroyo shrub community is most commonly associated with major drainages and washes. Shrubs and perennials characteristic of this habitat include greasewood (*Sarcobatus vermiculatus*), Russian thistle, tansy mustard, alkali sacaton (*Sporobolus airoides*), four-winged saltbush (*Atriplex canescens*), cryptantha, greasewood (*Sarcobatus vermiculatus*), and snakeweed (*Gutierrezia sarothrae*).

The alkali wash community is associated with minor waterways such as washes and drainages as well as at the base of badland communities. These areas are typically broad and level with occasional small, dense patches of galleta grass and alkali sacaton. The terrain in this community is nearly level to moderately sloping, ranging from 0 to 3%. Other plants that are

locally common in alkali wash include tansy mustard, Russian thistle, scorpion weed, mound saltbush (*Atriplex obovata*), alkali sacaton, galleta grass, woolly plantain (*Plantago patagonica*), and annual Townsend daisy.

The thin break community is characterized by rocky areas with loose, occasionally large pieces of rock, typically shale, that are firmly embedded in the ground. This community is typically upland wildlife habitat with surface rock as a unifying feature. Flat, surface rocks allow for greater water run off and accumulate in crevices or fissures between rocks. Plant species that occur in these fissures include Russian thistle, tansy mustard, cryptantha, shadscale saltbush (*Atriplex confertifolia*), alkali sacaton, stickseed (*Lappula occidentalis*), dwarf gilia (*Ipomopsis pumila*), and scorpion weed.

Badlands have the least vegetation of any community in the project area. Powell's saltbush (*Atriplex powelli* var. *powelli*), mound saltbush, annual Townsend daisy, stickseed, woolly plantain, salty buckwheat (*Stenogonum salsuginosum*), Gordon's buckwheat (*Eriogonum gordonii*), scorpion weed, and globemallow are among the more common plants associated with the small relief channels of these barren areas.

### **Methods**

The monitoring and mitigation recommendations presented are based upon the results of previous surveys, our biological expertise, and our knowledge of the project area (Ecosphere 2008a, 2008b, 2004a, 2004b). We appropriately addressed the following USFWS or NNHP listed species that occur in the project area: banner-tailed kangaroo rat (*Dipodomys spectabilis*), kit fox (*Vulpes macrotis*), mountain plover (*Charadrius montanus*), ferruginous hawk, golden eagle (*Aquila chrysaetos*), burrowing owl (*Athene cunicularia*), and pronghorn antelope (*Antilocapra americana*). In 2008, we also mapped habitat for black-footed ferret (*Mustela nigripes*) (USFWS 1989). The project area does not contain potential habitat for any of the three federally listed plants with the potential to occur in San Juan County, New Mexico; however, San Juan milkweed (*Asclepias sanjuanensis*), an NNHP sensitive plant, was found within the NMEP. Therefore, we addressed monitoring and mitigation efforts for these eight sensitive species: banner-tailed kangaroo rat, kit fox, mountain plover, ferruginous hawk, golden eagle, burrowing owl, black-footed ferret, and San Juan milkweed.

We developed monitoring and mitigation measures to address all mining activities related to the NMEP. Mining activities include coal extraction and soil and overburden stripping up to

1,800 ft in front of the active mining pit, construction of roads, transmission lines, and coal conveyance. Monitoring and mitigation measures would be applied to all current and projected mining activities based on BNCC's annual and five-yr mine plan for the NMEP.

### **Results**

We recommended species-specific measures to monitor and mitigate disturbances associated with NMEP within two sub-plans, the Raptor Monitoring and Mitigation Plan and the Sensitive Species Monitoring and Mitigation Plan. We suggested monitoring for these species is conducted in an adaptive approach that applies the most appropriate measures in accordance with standard scientific protocols and NNHP guidelines. Any scenario where a sensitive species may be affected by an activity associated with NMEP that is not outlined within the guidelines presented would be addressed through consultation with NNHP and the USFWS as appropriate. Finally, we suggested USFWS and NNHP species lists are updated annually as species may be added or removed during the course of the NMEP. Any monitoring or mitigation plans for species whose conservation status changes would be modified accordingly.

#### **Raptor Monitoring & Mitigation Plan**

##### **Ferruginous Hawk.**

Monitoring this species using methods similar to those being conducted annually at Navajo Mine and in coordination with NNHP should be continued, including:

- site visits to all known nest locations in April or May when breeding pairs will be nesting following protocols established by Call (1978) and Fuller and Mosher (1981) to minimize disturbance;
- nest visits of breeding pairs late in the nesting season to determine occupancy and productivity;
- surveying suitable habitat to document new or alternate nests concurrently with site visits to known nest locations; and
- providing an annual report with the location and status of all documented nests.

If disturbance is scheduled to occur near an active (occupied) nest of a ferruginous hawk, mitigation adhering to the NNDFW Ferruginous Hawk Nest Protection Policy should be completed, including and in addition to the following measures:

- apply current guidelines of Avian Power Line Interaction Committee (APLIC) for all transmission lines;
- protect active nests from 1 March to 31 July;
- protect active nests from human disturbances associated with permanent structures year-round;
- reduce impacts during construction of transmission lines, especially excessive use of roads, and;
- avoid disturbance activities until 30 days post-fledgling.

Avoiding any activities that would result in the unlawful taking of a ferruginous hawk, its nest, or any eggs should be completed. However, if any mining activity will result in a take, the following should be completed:

- consultation with NNHP prior to any activities that could result in the unlawful taking of a hawk, eggs, or removal or destruction of a nest;
- where nests could be destroyed, constructing artificial nest platforms within the same territory the season prior according to the mine sequence plan. Nest salvage activities should be evaluated as part of this measure;
- monitoring artificial nest platforms during annual surveys to determine use; and
- preparing annual reports evaluating the efficacy of artificial nest platforms and providing recommendations for improvements or changes to mitigation measures as necessary.

#### Golden Eagle.

Monitoring using methods similar to those being conducted annually at Navajo Mine and in coordination with NNHP should be continued, including the following:

- site visits to all of the known nest locations in March when breeding pairs will be nesting
- nest visits of breeding pairs late in the nesting season to determine occupancy and productivity following protocol established by Call (1978) and Fuller and Mosher (1981) to minimize disturbance;
- surveying suitable habitat to document new (alternate) nests concurrently with site visits to known nest locations; and
- annual report with the location and status of all documented nests.

We recommend avoiding any occupied nest from 1 February – 15 July. However, if mining activity will occur near an active nest, the following should be completed (Mikesic et al. 2005);

- follow the current guidelines of APLIC for all transmission lines;
- mitigation adhering to the NNDFW Golden and Bald Eagle Nest Protection Policy should be completed;
- no disturbance within 0.75 miles of nest site for brief and light disturbance and 1.0 miles for long-term or loud disturbance 1 February – 15 July;
- no disturbance within 0.5 miles during nest occupancy 1 February – 1 June or when nestling are  $\leq 20$  days old; and
- creating buffer zones around active nests where no disturbance occurs in consultation with NNHP.

We recommended avoiding any activities that would result in the unlawful taking of a golden eagle, its nest, or any eggs. However, if mining activity will destroy or damage any nest, the following should be completed:

- consulting with NNHP prior to any activities that could result in the removal or destruction of a golden eagle nest;
- relocating eagle nests to maintain an existing pair or encourage a new pair to establish a territory in a particular area (Ferris et al. 1996); and
- monitoring relocated pairs and territories for  $\geq 3$ -yr to determine status.

Because eagles and their nests are protected by the federal BGEPA, special purpose permits must be secured prior to any nest relocation and relocations should be conducted by an experienced biologist utilizing demonstrated techniques in accordance with animal care and use guidelines and in coordination with NNHP.

### Burrowing Owl.

Annual monitoring using methods similar to those being conducted annually at Navajo Mine and in coordination with NNHP should be continued, including the following:

- site visits to all known nest burrows in late March - April when breeding pairs will be nesting;
- where breeding pairs are documented, a follow up visit occur in May - July to document and count nestlings; and



- annual report including the location and number of nest burrows and breeding pairs, and number of nestlings.

If mining activity will occur near an active burrow, mitigation including the following should be completed (Mikesic et al. 2005):

- site specific surveys prior to surface disturbance according to the New Mexico Department of Game and Fish (NMDGF) Guidelines and Recommendations for Burrowing Owl Surveys and Mitigation;
- avoiding disturbance within 0.25 miles of active nest burrows 1 March – 15 August; and
- no habitat alteration within 0.12 miles of active nest burrows.

If mining activity will destroy owls or nest burrows in an area, or stripping activities will occur within 0.12 miles of active nest burrows, the following should be completed:

- conduct surveys November – January to confirm absence of burrowing owls (migratory burrowing owls should be at wintering areas);
- employ passive relocation techniques by removing habitat i.e., destroying burrows or including installation of one-way doors on burrows November - January (Smith et al. 2005) prior to the mining activity and before burrowing owls return from their wintering areas; and
- annual report evaluating the efficacy of mitigation measures and providing recommendations for improvements or changes as necessary.

### Sensitive Species Monitoring & Mitigation Plan

#### Mountain plover.

Monitoring using methods similar to those being conducted annually at Navajo Mine and in coordination with NNHP should be continued, including the following:

- USFWS annual protocol surveys for mountain plover continue in those areas where individuals or pairs have been documented and where suitable habitat occurs (Ecosphere 2008a).

If mining activity will occur near mountain plover habitat, we recommended mitigation include the following (Mikesic et al. 2005):

- no disturbance within 0.12 miles of active nest 1 April – 15 July; and
- no habitat alteration within 0.12 miles of nest.

Where mining activity will occur in mountain plover habitat, we recommend mitigation measures include:

- habitat enhancement of other potential nesting areas, such as prairie dog towns, where mountain plover commonly occur;
- reconnaissance surveys of the NMEP for  $\geq 3$ -yr to determine re-establishment and use by mountain plovers, especially prairie dog towns; and
- annual report providing recommendations for improvements or changes to mitigation measures as necessary.

#### Black-footed ferret.

Surveying prairie dog towns on the NMEP to determine if black-footed ferret surveys are warranted according to NNHP and USFWS requirements should be continued. Surveys of prairie dog towns should include the following:

- annual surveys of all 5 prairie dog towns documented in Areas 4 South and 5 in 2007 to determine the status and size of each town;
- annual reconnaissance surveys to document new prairie dog towns; delineate and map the size of any new towns documented;
- enumerate or estimate burrow densities for each town using methods consistent with previous surveys (USFWS 1989); and
- annual report documenting the size and location of prairie dog towns.

If mining activity will occur near any prairie dog town >10 acres, a complex of towns (i.e., towns within 7 km), or any new prairie dog town >10 acres (i.e. any new town that is documented during annual monitoring surveys), mitigation should include the following (Mikesic et al. 2005):

- nocturnal surveys following NNHP and USFWS guidelines for black-footed ferrets; and
- annual report documenting methods and results of surveys.
- If nocturnal surveys for black-footed ferrets are negative and if surveys covered the entire town or complex, no mitigation for mining activity is required (Mikesic et al. 2005). Negative survey results are valid indefinitely (Mikesic et al. 2005).

### Banner-tailed kangaroo rat.

Monitoring should include coordination with NNHP coupled with the following methods:

- site visits to  $\geq 20$  randomly selected mounds (Ecosphere 2008a) to determine their status; and
- live-trapping ( $8 \times 9 \times 23$  cm; H.B. Sherman Trap Company, Tallahassee, FL) at each active mound for  $\geq 2$  consecutive nights to verify species and presence.

If mining activity will occur near of an active mound, mitigation should include the following (Mikesic et al. 2005):

- no surface disturbance or mining activity within 197 feet of occupied habitat that could destroy an active mound (Mikesic et al. 2005).

If mining activity will destroy any mounds where activity has been historically documented, the following should be completed:

- live-trapping and translocating banner-tailed kangaroo rats to artificial mounds within suitable habitat,;
- monitoring the artificial mounds during annual surveys to determine use and status of individuals translocated; and
- annual reports evaluating the efficacy of translocation effort and providing recommendations for improvements or changes to mitigation measures as necessary.

### Kit fox.

Monitoring should include coordination with NNHP, coupled with spotlighting surveys where kit fox and dens have been observed.

If mining activity will occur near an active den, the following should be completed (Mikesic et al. 2005):

- no surface disturbance within 197 feet of an active den site; and
- no surface disturbance within 0.12 miles of active den 1 December – 31 August.

If mining activity will destroy any an active den, the following should be completed:

- live-trapping and translocating kit fox to an unoccupied den or artificial den created in suitable habitat as near to its home range as possible and in consultation with NNHP;
- monitoring dens of translocated kit fox during annual surveys; and

- annual reports evaluating the efficacy of translocation and providing recommendations for improvements or changes to mitigation measures as necessary.

### Plants.

Monitoring should include presence surveys for NNHP listed sensitive plants every five years in accordance with the planned disturbance associated with mining activities. Based on the NMEP Mine Plan, we estimated that approximately 700 acres of land would be disturbed by mining every 5 years. Therefore, surveys should be focused in areas representing potential habitat for target species and conducted by botanists permitted by NNHP.

If mining activity will occur near sensitive plants that are documented within NMEP, the following measures should be completed:

- transplanting individuals or localized populations;
- seed collection and propagation studies; and
- habitat restoration included during reclamation efforts.

### Discussion

We emphasize the importance of long-term monitoring coupled with an adaptive and proactive approach to mitigating the impacts from coal surface mining on sensitive species. A key component of any successful monitoring and mitigation plan is the need to adapt the original design and approach to reflect information and understanding gained during the execution of the plan and make changes in a timely manner. We will utilize current monitoring methods coupled with BNCC's annual and 5-yr mine plan for the NMEP to anticipate and identify any conflicts between mining activities and areas where sensitive species occur in advance of halting or slowing mining operations. Consequently, the specific mitigation measures implemented by BHP may change annually, depending on the mine plan and the species in conflict. Additionally, if monitoring efforts of one species indicate successful mitigation as evidenced by increased abundance future efforts could allocate resources to mitigation efforts for another species whose mitigation measures have been less successful. This approach presents BHP a broader more adaptive range of options to utilize while emphasizing the protection of sensitive species.

We developed our plan in cooperation with the NNDFW to assist them in their mission to “conserve, protect, enhance, and restore the Navajo Nations’ fish, wildlife, and plants through

aggressive management programs for the spiritual, cultural, and material benefit of present and future generations of the Navajo Nation.” It is beneficial for BNCC to have continued uninterrupted mining activities; however, our plan also serves BHP Billiton’s Sustainable Development Policy goal of “Zero Harm to the Environment.” Further, BNCC is incorporating these recommendations into its SMCRA permit, which will outline BNCC’s wildlife monitoring and mitigation requirements and their commitment to protecting sensitive species.

### **Acknowledgements**

We thank J. Dodge, D. Marco, M. Vivalda, and A. Way for conducting field surveys and collecting data necessary to facilitate these planning documents and discussions. M. Heil provided maps and technical assistance with Geographic Information System (GIS) and ArcMap 9.0. B. Musslewhite provided guidance and technical assistance throughout the field work. We also thank J. Cole, D. Mikesic, and D. Roth for their scientific expertise and support of this effort. Funding for this work was provided by BHP Billiton – BHP Navajo Coal Company.

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