

SECTION 16

FISH AND WILDLIFE

TABLE OF CONTENTS

SECTION	SECTION TITLE	PAGE NUMBER
SECTION 16	FISH AND WILDLIFE	1
16.1	Fish and Wildlife Survey Methods	1
16.1.1	General Wildlife	2
16.1.1.1	Raptors.....	2
16.1.1.2	Breeding Birds.....	2
16.1.1.3	Shorebirds and Waterfowl	3
16.1.1.4	Small Mammals.....	3
16.1.1.5	Lagomorphs	4
16.1.1.6	Sciurids	4
16.1.1.7	Felids	4
16.1.1.8	Canids	5
16.1.1.9	Mustelids	5
16.1.1.10	Bats	5
16.1.1.11	Big Game.....	5
16.1.1.12	Herptiles	6
16.1.1.13	Fish	6
16.1.2	Threatened and Endangered Wildlife Species	6
16.1.2.1	Ferruginous Hawk	6
16.1.2.2	Golden Eagle	7
16.1.2.3	Burrowing Owl.....	7
16.1.2.4	Mountain Plover	7
16.1.2.5	Black-Footed Ferret.....	7
16.1.2.6	Kit Fox.....	8
16.1.2.7	Pronghorn Antelope.....	8
16.2	General Fish and Wildlife Results	8
16.2.1	Raptors.....	8
16.2.2	Avian non-raptor species	9
16.2.3	Mammal Species.....	10
16.2.4	Herptile species	12

SECTION 16

FISH AND WILDLIFE

TABLE OF CONTENTS

SECTION	SECTION TITLE	PAGE NUMBER
16.3	Threatened and Endangered Wildlife Results.....	12
16.3.1	Ferruginous Hawk	12
16.3.2	Golden Eagle	13
16.3.3	Burrowing Owl.....	13
16.3.4	Mountain Plover	13
16.3.5	Black-Footed Ferret.....	13
16.3.6	Kit Fox.....	14
16.3.7	Pronghorn Antelope.....	14
	Personnel	14
	References	14

SECTION 16

FISH AND WILDLIFE

LIST OF TABLES

TABLE

NUMBER TABLE TITLE

<u>16.2-1</u>	U.S. Fish and Wildlife Service (USFWS) and Navajo Natural Heritage Program (NNHP) Listed Species with the Potential to Occur in Area 4 North, Area 4 South and Area 5
<u>16.2-2</u>	List of Species Documented in Area 4 North in 2004, and Area 4 South and Area 5 in 2005 and 2007
<u>16.2-3</u>	Mean Number of Individuals Detected Per 1-km Transect, Species Richness and Index of Species Diversity within Each Habitat Type in Areas 4 South and 5
<u>16.2-4</u>	Relative Abundance of Breeding Birds for the 2007 Survey in Areas 4 South and 5
<u>16.2-5</u>	Waterfowl and Shorebird Sightings within Areas 4 South and 5 in 2007
<u>16.2-6</u>	Total Number of Trap-Nights and Captures (Or Recaptures) Using Two Different Trapping Methods in Six Habitat Types, Area 4 North, 2004
<u>16.2-7</u>	Density Estimates for Two Trapping Webs and One Trapping Grid in Arroyo Shrub Habitat Using Minimum Number Alive (MNA) as a Surrogate for Abundance (<i>N</i>) Due to the Lack of Capture Success, Area 4 North, 2004

SECTION 16

FISH AND WILDLIFE

LIST OF EXHIBITS

EXHIBIT NUMBER	EXHIBIT TITLE
---------------------------	----------------------

16.1-1	Baseline Wildlife Surveys
------------------------	---------------------------

SECTION 16

FISH AND WILDLIFE

LIST OF APPENDICES

APPENDIX

NUMBER APPENDIX TITLE

<u>16.A</u>	Wildlife Baseline Report November 2004
<u>16.B</u>	Wildlife Baseline Surveys August 2008
<u>16.C</u>	Threatened and Endangered Species Surveys April 2008
<u>16.D</u>	2008 Black-footed Ferret Nocturnal Survey Report

SECTION 16

FISH AND WILDLIFE

LIST OF REVISIONS DURING PERMIT TERM

REV.		DATE
NUMBER	REVISION DESCRIPTION	APPROVED

SECTION 16 FISH AND WILDLIFE

Baseline surveys for wildlife have been conducted on and around the Navajo Mine mining lease since 1973 (BNCC 2009). Historical wildlife studies conducted on the mining lease and surrounding area include the following: Westinghouse Electric Corporation (Westinghouse 1975); Battelle (1975); Hinton (1980); Mariah (1983, 1984, 1985, 1986, 1987, and 1989); Woyewodzic (1987), and Dixon Extension (Ecosphere 2001). These surveys were reviewed and compiled as part of the existing BHP Navajo Coal Company (BNCC) Navajo Mine SMCRA permit (OSM Permit No. NM-0003F). Results of recent surveys conducted in Area 4 North in 2004 and Areas 4 South and 5 in 2005 and 2007 have been reviewed and compiled herein to describe more current conditions and summarize species-specific data for the Pinabete Mine Plan permit area (permit area) of BNCC's mining lease.

Ecosphere Environmental Services (Ecosphere) completed baseline surveys in Area 4 North (2004). The baseline surveys characterized the general habitats, regionally common wildlife, and species with special protection or conservation status according to Federal, State, and Navajo Nation management agencies. The survey procedures and methodologies for both general wildlife and sensitive species were developed by qualified biologists using standardized protocols in coordination with species-specific Navajo Natural Heritage Program (NNHP), Navajo Nation Department of Fish and Wildlife (NNDFW) guidelines, or in accordance with scientific standards. A detailed report describing the baseline surveys for wildlife and threatened, endangered, and sensitive (TES) species in Area 4 North is provided in [Appendix 16.A](#).

In 2005 and 2007, Ecosphere also completed baseline surveys in Area 4 South and Area 5 for general wildlife species and TES species, including species of concern (Ecosphere 2008a and Ecosphere 2008b). Results of the 2005 surveys were not submitted to BNCC in a comprehensive report, but the 2005 data was used to supplement the 2007 baseline wildlife surveys. Procedures and methodologies for the 2007 baseline general wildlife and TES species surveys were reviewed and approved by the NNDFW and the Office of Surface Mining Reclamation and Enforcement (OSM) prior to commencing fieldwork. The procedures and methodologies utilized in the 2005 surveys were similar to those approved for the 2007 surveys. Detailed reports describing the baseline wildlife and TES species surveys in Area 4 South and Area 5 are provided in [Appendix 16.B](#) and [Appendix 16.C](#), respectively. The following subsections provide a summary of key wildlife resource information for the permit area.

16.1 Fish and Wildlife Survey Methods

The following sections discuss the survey methods utilized for wildlife baseline surveys in the permit area. Section 16.1.1 provides details on general wildlife surveys while survey methods for federally listed TES species and Navajo Nation sensitive species are discussed in Section 16.1.2.

16.1.1 General Wildlife

General wildlife surveys were conducted in Areas 4 North, 4 South, and 5 following standard scientific protocols and NNDFW guidelines. A detailed discussion of methodologies used for general wildlife baseline surveys is presented in [Appendix 16.A](#) and [Appendix 16.B](#).

16.1.1.1 Raptors

In accordance with the current Surface Mining Control and Reclamation Act (SMCRA) permit, annual raptor surveys of suitable cliff habitat and historic nests are required by OSM for the entire BNCC mining lease boundary plus a 1-mile buffer. On May 7, 2004, a raptor nest survey was conducted in Area 4 North using a fixed-wing aircraft (Cessna 206 airplane). All pinnacles and cliffs identified as potential habitat for raptors were visited by flying systematically across the mining lease boundary and identified nests were checked to determine if they were occupied. Any nests found within a 1-mile radius of Area 4 North were then surveyed with high-powered binoculars and spotting scopes from the ground.

In 2005 and 2007, systematic ground surveys were conducted in Area 4 South and Area 5 plus a 1-mile buffer for all raptor species identified by NNDFW as potentially occurring or known to occur in the area. The surveys were initiated by identifying potential habitat according to U.S. Geologic Survey (USGS) topographic maps and aerial photographs of Areas 4 South and 5, as well as reviewing historic nest locations from previous surveys. All field surveys were conducted using high-powered binoculars and spotting scopes to identify nests or breeding individuals. Additional information on methods used for raptor surveys is provided in [Appendices 16.A](#), [Appendix 16.B](#), and [Appendix 16.C](#).

16.1.1.2 Breeding Birds

A general breeding bird survey was conducted on June 6, 2004 along two miles of Chaco Wash between the confluence of Pinabete and Cottonwood Arroyos, the most suitable avian habitat in Area 4 North. Two individuals conducted pedestrian surveys using high-powered binoculars in the early morning hours.

In 2007 between mid-May and mid-June, random strip-transect surveys for breeding birds were conducted to determine avian species richness, diversity, and relative abundance in Areas 4 South and 5. Baseline vegetation communities were used to randomly establish transects in the various habitats. The vegetation communities sampled for breeding birds included Alkali Wash, Arroyo Shrub, Badlands, Thinbreaks, and Sands. The Dunes vegetation community was not sampled because it was patchily distributed and provided limited habitat for breeding birds. Geographic Information System (GIS) software was used to randomly distribute transects. Two transects, each 2-kilometers in length, were established in each of the five vegetation communities for a total of four kilometers of sample transects per vegetation community ([Exhibit 16.1-1](#)). Random transect bearings were selected using a random numbers table. The Thinbreaks vegetation community was patchily distributed in the permit area and was not large enough to

accommodate multiple 2-kilometer transects. Therefore, one 2-kilometer transect and two 1-kilometer transects were established.

The following information was calculated for each vegetation community: (1) mean number of individuals detected per 1-kilometer transect, (2) species richness, (3) relative abundance, and (4) species diversity. Species richness refers to the total number of different species detected within a vegetation community. Relative abundance is calculated by dividing the number of individuals of each species by the total number of individuals detected – either by auditory or ocular methods. Species diversity considers both the number of species present and the relative abundance or distribution of each species. Species diversity was calculated using Simpson's Index Diversity formula (Simpson 1949; [Appendix 16.B](#)).

16.1.1.3 Shorebirds and Waterfowl

During the summers of 2005 and 2007, temporary ponds in Areas 4 South and 5 were surveyed for waterfowl and shorebirds, as shown on [Exhibit 16.1-1](#). High-powered binoculars and spotting scopes were used to scan the shorelines and water surfaces of temporary ponds; every individual waterfowl and shorebird present on each day was recorded. No specific surveys for shorebirds or waterfowl were conducted in Area 4 North in 2004.

16.1.1.4 Small Mammals

In 2004, small mammal surveys were conducted to determine their presence in six vegetation communities in Area 4 North: Arroyo Shrub, Sands (specifically, saline sands), Thinbreaks, Alkali Wash, Dunes, and Badlands. Trapping webs were established and monitored in the more suitable habitat, such as Arroyo Shrub that has more cover and forage opportunities for small mammals, whereas trapping grids, a less intensive effort, were established in less suitable habitat. Each trapping web covered 3.1 hectares and consisted of twelve 100-meter transects spaced 30° from a central point, similar to the spokes of a wheel. Each web contained 148 Sherman live-traps at 12 trap stations along each radiating spoke. The first four trap stations were at 5-meter intervals, and the remaining eight at 10-meter intervals. Four Sherman traps were placed around the central point ([Appendix 16.A](#)). Each trap was baited and set in the evening and closed again every morning. Each trapping web and grid was run for two consecutive nights. Additionally, two trapping grids were set up in the Arroyo Shrub vegetation community to increase the trapping effort in the most suitable habitat where small mammal burrows had been identified. The number and spacing interval of traps established in a trapping grid can be flexible; consequently, trapping grids are easier to set up than trapping webs and the trap effort can be adjusted based on the desired need. Therefore, a systematic trapping grid was used to sample Badlands because this vegetation community is typically poorly suited as habitat for small mammals (i.e., no vegetative cover or forage potential) and requires less intensive trapping efforts. Trapping grids consisted of four transects of 12 traps, each row ten meters apart and each trap spaced ten meters apart for a size of 0.3 hectares ([Appendix 16.A](#)). Captured animals were identified, sexed, and uniquely marked with a non-toxic permanent marker. Animals were handled by

experienced field biologists according to standardized health procedures and immediately released into the same area they were captured. All mark-recapture data were collected for purposes of density estimation.

Small mammal trapping was also conducted from July through August 2005 and May through June 2007 in Areas 4 South and 5 to document species in the Geomyidae, Heteromyidae, and Muridae families ([Exhibit 16.1-1](#)). In 2005, systematic trapping grids of seven to 10 parallel transects with about 140 traps evenly spaced at 10-meter intervals were randomly located in the Arroyo Shrub and Sands vegetation communities. In 2007, trapping webs consisting of twelve 100-meter transects spaced at 30° from a central point were randomly established identical to methods used in 2004 in the Arroyo Shrub, Alkali Wash, and Sands vegetation communities. No trapping was conducted in Dunes, Thinbreaks, and Badlands communities due to the lack of suitable habitat, including forage and cover for small mammals.

16.1.1.5 Lagomorphs

Surveys for lagomorphs (i.e., black-tailed jack rabbits [*Lepus californicus*] and cottontails [*Sylvilagus audobonii*]) were conducted by visual observation concurrently with other surveys in Areas 4 North, 4 South, and 5 in 2004, 2005, and 2007. Any incidental sightings, as well as lagomorph tracks or scat found during other wildlife or vegetation surveys throughout the summer were recorded on a standardized data sheet, and the locations logged using a handheld GPS unit.

16.1.1.6 Sciurids

Surveys for sciurids (e.g., squirrels [*Spermophilus* spp.], chipmunks [*Tamias* spp.], Gunnison's prairie dogs [*Cynomys gunnisoni*], etc.) were conducted concurrently with other pedestrian and driving surveys in Areas 4 North, 4 South, and 5 in 2004, 2005, and 2007. Any incidental sightings, as well as sciurid tracks or scat, were recorded on a standardized data sheet, and the locations were logged using a handheld GPS unit.

Additionally, Ecosphere revisited the locations in Areas 4 South and 5, where biologists observed prairie dogs earlier that spring, to determine the size of each prairie dog town. The outer-most burrow entrances of each town were identified and recorded with a GPS unit to create a polygon and calculate the size of each town in ArcGIS. Ecosphere enumerated the number of burrows within two prairie dog towns (or polygons) by marking each counted burrow and recording it with a GPS unit to approximate burrow densities for each town.

16.1.1.7 Felids

Surveys for felids, namely bobcats (*Felis rufus*), were conducted concurrently with spotlighting surveys for kit fox (*Vulpes macrotis*) in Areas 4 North, 4 South, and 5 in 2004, 2005 and 2007. Any incidental sightings, as well as felid tracks and scat found during other wildlife or vegetation surveys, were recorded on a standardized data sheet, and the locations logged using a handheld GPS unit.

16.1.1.8 Canids

Surveys for canids, such as coyotes (*Canis latrans*), red foxes (*Vulpes velox*), and gray fox (*Urocyon cinereoargenteus*), were conducted concurrently with spotlighting surveys for kit fox in Areas 4 North, 4 South, and 5 in 2004, 2005, and 2007 ([Exhibit 16.1-1](#)). Incidental sightings, including canid tracks and scat found during other wildlife or vegetation surveys, were recorded on a standardized data sheet, and the locations logged using a handheld GPS unit.

16.1.1.9 Mustelids

Surveys for mustelids, namely badgers (*Taxidea taxus*), were conducted concurrently with spotlighting surveys for kit fox in Areas 4 North, 4 South, and 5 in 2004, 2005, and 2007. Any incidental sightings, including mustelid tracks, scat, and observations made during vegetation or other wildlife surveys – especially those of prairie dogs - were recorded on a standardized data sheet, and the locations logged using a handheld GPS unit.

Survey protocols for black-footed ferrets are described in Section 16.1.2.5.

16.1.1.10 Bats

In 2004, Ecosphere conducted surveys for sensitive bat species in Area 4 North to document the presence of bats listed by the State of New Mexico and federally listed species of concern. Sites within the study area with distinct topographic features were identified and standard 32-foot mist nests were used to capture and identify bats. Shortly before dusk, mist nets were set up between two 20-foot lengths of polyvinyl chloride (PVC) piping supported by rebar. Two to three observers silently waited for bats to become active and inadvertently fly into the mist nets. Upon tangling themselves in the mist net, bats were carefully removed, identified, sexed, and released. Nets were taken down by midnight. Following these methods, four nets were run in a dry wash along the eastern boundary of Area 4 North on June 2, 2004 and two mist nets were run on June 6, 2004 and June 23, 2004 near the stock pond in Area 4 North. No bat surveys were conducted in Areas 4 South or 5.

16.1.1.11 Big Game

Surveys for big game, specifically mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antilocapra americana*), and elk (*Cervus elaphus*), were conducted concurrently with other surveys in Areas 4 North, 4 South, and 5 in 2004, 2005, and 2007. Any incidental sightings made during other wildlife or vegetation surveys throughout the summer and fall were recorded on a standardized data sheet, and the locations logged using a handheld GPS unit. Pronghorn antelope and elk are not known to occur in the mining lease; mule deer are likely only an occasional sighting.

16.1.1.12 Herptiles

Surveys for herptiles (i.e., reptiles and amphibians) were conducted in conjunction with other species-specific and vegetation surveys in Areas 4 North, 4 South, and 5 in 2004, 2005, and 2007. Any incidental sightings made during other wildlife or vegetation surveys were recorded on a standardized data sheet, and the locations logged using a handheld GPS unit.

16.1.1.13 Fish

There are no permanent water bodies with sufficient water levels capable of supporting year-round fish populations within the mining lease.

16.1.2 Threatened and Endangered Wildlife Species

Surveys for threatened and endangered species were conducted in coordination with NNHP species-specific guidelines (Mikesic and Nystedt 2001; NNHP 2005; Mikesic and Roth 2008), U.S. Fish and Wildlife Service (USFWS) protocols, and other accepted scientific standards. Knowledge of the area, biological expertise, and experience with the survey methods for these target species were incorporated into the survey methodologies. Prior to conducting fieldwork, Ecosphere biologists compiled a list of current federal and Navajo Nation listed species and evaluated their habitat requirements to determine their potential to occur in Areas 4 North, 4 South and 5 ([Table 16.2-1](#)). Federally listed species were obtained from the USFWS Southwest Region Endangered Species List (2008). The Navajo Nation listed species were obtained through NNHP consultation and reviewed per the current Navajo Endangered Species List (NESL; Mikesic and Nystedt 2001; NNHP 2005). Consequently, species-specific surveys were conducted to determine the presence of the following target species: kit fox, mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), burrowing owl (*Athene cunicularia*), black-footed ferret (*Mustela nigripes*), and pronghorn antelope. Methods used for the threatened and endangered species surveys are discussed in detail in [Appendix 16.C](#).

16.1.2.1 Ferruginous Hawk

In 2004, surveys for ferruginous hawk were conducted in Area 4 North concurrently with aerial surveys for all suitable raptor habitat and historic nests in accordance with the current SMCRA permit administered by OSM. This survey included the entire mining lease boundary plus a 1-mile buffer.

Ground surveys for ferruginous hawk were completed in 2005 and 2007 in Areas 4 South and 5 by: (1) identifying potential habitat by analyzing USGS topographic maps and aerial photographs of Area 4 South and Area 5 within a 1-mile buffer, (2) consulting with NNHP and NNDFW biologists to identify known or historic territories, (3) reviewing results of past raptor surveys in Areas 4 South and 5, and (4) conducting field surveys beginning in April for nests or breeding individuals utilizing high-powered binoculars and spotting scopes to minimize disturbance. Neither the USFWS nor the NNDFW has endorsed a species-specific survey protocol for this species.

16.1.2.2 Golden Eagle

The survey methodology for golden eagle was similar to that used for ferruginous hawk. In Area 4 North, 2004 surveys were conducted concurrently with annual raptor surveys of the entire mining lease plus a 1-mile buffer, whereas ground surveys were conducted in Areas 4 South and 5 in 2005 and 2007. The ground surveys for golden eagle were conducted in March since courtship, breeding, and nesting are typically initiated in mid- to late February.

16.1.2.3 Burrowing Owl

Burrowing owls typically use burrows made by fossorial mammals, namely prairie dogs, but also ground squirrels or badgers (Henny and Blus 1981). In Area 4 North, burrowing owls were documented by visual observation concurrently with other 2004 surveys, especially vegetation, prairie dog, and mountain plover surveys. In Areas 4 South and 5, surveys for burrowing owl were conducted in 2005 and 2007 by walking parallel 100-foot transects with high-powered binoculars in conjunction with mapping, and describing prairie dog towns. Parallel transects covered the entire prairie dog town and varied depending upon the size of each town.

16.1.2.4 Mountain Plover

In 2004, mountain plover were surveyed in Area 4 North concurrently with general breeding bird surveys. Mountain plover surveys were conducted in all suitable habitats in Areas 4 South and 5 in 2005 and 2007 following the methodology developed by Delbert et al. (1999) for the USFWS.

16.1.2.5 Black-Footed Ferret

In 2004 and 2007, Ecosphere surveyed or mapped active prairie dog towns to determine if they were large enough to support black-footed ferret. In June 2004, Ecosphere observed an active prairie dog town in Area 4 North ([Appendix 16.A](#)) and determined it was too small to warrant protocol surveys for black-footed ferret (USFWS 1989).

Ecosphere also observed several prairie dog towns on several occasions in late spring and early fall 2007 in Areas 4 South and 5 ([Appendix 16.C](#)). The boundaries of these towns were mapped using a handheld GPS unit and approximate burrow densities for individual towns were calculated. Ecosphere enumerated burrows within two prairie dog towns to estimate burrows per hectare. The size and density of prairie dog burrows indicated the potential to support a population of black-footed ferrets; therefore, nocturnal surveys for black-footed ferret were conducted in 2008 following USFWS and NNDFW protocols (USFWS 1988, NNDFW 1985) in Areas 4 South and 5. Prior to conducting field work, prairie dog towns were divided into three survey tracts: towns A and B represented tract one, towns C and D represented tract two, and tract three was comprised solely of town E. Ecosphere conducted surveys with three field crews, consisting

of two biologists in a 4-wheel drive vehicle, assigned to one survey tract. Each field crew spotlighted continuously from dusk until dawn on three separate occasions in July and August 2008 ([Appendix 16.B](#)).

16.1.2.6 Kit Fox

In 2004, nocturnal spotlighting was conducted in Area 4 North using vehicular surveys on passable roads in the study area. Surveys were conducted two to four hours after midnight on three occasions. In addition, scent posts were established in sandy areas where canid tracks were identified. Scent posts were marked with fox urine and beaver castor, and the surrounding area was swept with a household broom to identify the tracks of any visitors. Predator calls were used at the end of each spotlighting session to attract any canids in the area, which could then be identified.

Similarly, in 2007, four biologists, operating in pairs in separate vehicles, conducted nocturnal spotlight surveys on two consecutive nights for two to four hours after midnight on four different occasions in Areas 4 South and 5. Survey routes included passable roads throughout Areas 4 South and 5 ([Exhibit 16.1-1](#)). Predator calls were used during each spotlighting session to attract canids in the area to allow for identification.

16.1.2.7 Pronghorn Antelope

According to NNDFW, pronghorn antelope are not known to occur within the mining lease (Mikesic and Roth 2008). Therefore, no formal or systematic surveys were conducted for pronghorn. Incidental surveys for pronghorn were conducted concurrently with vegetation and wildlife surveys in Areas 4 North, 4 South, and 5 in spring, summer, and fall by searching for individuals, tracks, and scat.

16.2 General Fish and Wildlife Results

Numerous wildlife species were documented during wildlife baseline surveys in Area 4 North in 2004 ([Appendix 16.A](#)). In Areas 4 South and 5 (and 1-mile buffer zone for raptors), a total of 62 different wildlife species were documented during the 2005 and 2007 baseline surveys, including nine raptor species, 29 avian non-raptor species, 14 mammal species, and ten herptile species ([Table 16.2-2](#)). A detailed discussion on the results of the general wildlife surveys in Areas 4 South and 5 are provided in [Appendix 16.B](#).

16.2.1 Raptors

Raptor surveys for the baseline wildlife surveys in Area 4 North ([Appendix 16.A](#)) relied upon aerial raptor surveys conducted annually under the current SMCRA permit for the entire mining lease boundary. These raptor surveys, conducted by Hawks Aloft, documented several raptor species on Navajo Mine, but none were documented in Area 4 North (Hawks Aloft 2005). However, within the mining lease, the following territories have been documented as occupied at least once during 28 years of monitoring: red-tailed hawk

(*Buteo jamaicensis*), ferruginous hawk, golden eagle, American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), great-horned owl, and burrowing owl (Hawks Aloft 2005).

In Area 4 North juvenile bald eagles were identified on two different occasions in Area 4 North: on August 7 and August 14, 2004. Burrowing owls were seen on several occasions within the prairie dog town. A burrowing owl was heard at the stock pond located in Area 4 North on June 5, 2004 while netting for bats and observed in the same area again on June 22, 2004. Gamble's quail (*Callipepla gambelii*) was seen on two occasions in the west-central portion of the study area: July 10 and August 5, 2004. Two American avocets (*Recurvirostra americana*) and several killdeer (*Charadrius vociferus*) were noted at a stock pond on the south boundary of Area 4 North in early June; neither was present in late June.

In 2005, five raptor species were observed in Areas 4 South and 5, including red-tailed hawk, ferruginous hawk, prairie falcon, burrowing owl, and great-horned owl (*Bubo virginianus*). Nine raptor species were observed during the 2007 surveys conducted in Areas 4 South and 5. These species include northern harrier (*Circus cyaneus*), Cooper's hawk (*Accipiter cooperii*), red-tailed hawk, ferruginous hawk, golden eagle, American kestrel, prairie falcon, burrowing owl, and great-horned owl. Detailed results from ferruginous hawk, golden eagle, and burrowing owl surveys are described in Section 16.3.

16.2.2 Avian non-raptor species

In 2004, bird species heard or observed while conducting general breeding bird surveys in Area 4 North include: white-crowned sparrow (*Zonotrichia leucophrys*), sage sparrow (*Amphispiza belli*), song sparrow (*Melospiza melodia*), black-throated sparrow (*Amphispiza bilineata*), Cassin's finch (*Carpodacus cassinii*), horned lark (*Eremophila alpestris*), ash-throated flycatcher (*Myiarchus cinerascens*), Cassin's kingbird (*Tyrannus vociferans*), Say's phoebe (*Sayornis saya*), brown-headed cowbird (*Molothrus ater*), rock wren (*Salpinctes obsoletus*), common nighthawk (*Chordeiles minor*), northern mockingbird (*Mimus polyglottos*), mourning dove (*Zenaida macroura*), and common raven (*Corvus corax*).

A variety of non-raptor birds were documented during 2007 breeding bird surveys in Areas 4 South and 5. Mean number of individuals per 1-kilometer transect, species richness (i.e., number of species detected), and species diversity were calculated for five vegetation communities ([Table 16.2-3](#)). On average, Alkali Wash and Arroyo Shrub communities equally yielded the highest number of individuals (14.8 individuals per 1-kilometer transect), whereas Sands and Thinbreaks communities contained slightly lower numbers (13.8 and 12.8, respectively). Badlands communities were largely devoid of breeding birds. Species richness and diversity were the highest in Arroyo Shrub communities (16 species, 0.8, respectively) followed by Sands and Alkali Wash (7 species, 0.3, and 5 species, 0.2, respectively) ([Table 16.2-3](#)). The lowest species richness and diversity was associated with Badlands and Thinbreaks communities.

Relative abundance of individual species observed during the 2007 survey are summarized by habitat type and for all habitats combined in [Table 16.2-4](#). Horned lark (*Eremophila alpestris*) was the most abundant species in all habitat types. Relative abundance of all other species in all habitat types was less than 0.1, with the exception of mourning dove (*Zenaida macroura*), which was 0.2 in the Arroyo Shrub habitat.

Eleven species of waterfowl and shorebirds were observed at temporary ponds (ponds 1, 2, and 3; [Exhibit 16.1-1](#)) in Area 4 South and Area 5 in 2007 ([Table 16.2-5](#)). Species observed included American coot (*Fulica americana*), cinnamon teal (*Anas cyanoptera*), common merganser (*Mergus merganser*), Eurasian wigeon (*Anas penelope*), and mallard (*Anas platyrhynchos*), American avocet (*Recurvirostra americana*), black-crowned night heron (*Nycticorax nycticorax*), great blue heron (*Ardea herodias*), killdeer (*Charadrius vociferus*), spotted sandpiper (*Actitis macularius*), and Wilson's phalarope (*Phalaropus tricolor*).

16.2.3 Mammal Species

Eleven small mammals were captured in 3,344 trap nights in Area 4 North in 2004 ([Table 16.2-6](#)). All captures of small mammals were in Arroyo Shrub habitat. Seven of those small mammals were captured on one trapping web in Arroyo Shrub habitat: four Ord's kangaroo rats (*Dipodomys ordii*), one deer mouse (*Peromyscus maniculatus*), one pocket mouse (*Perognathus apache*), and one recaptured Ord's kangaroo rat ([Table 16.2-6](#)). One deer mouse and three Ord's kangaroo rats were captured in two separate trapping grids in Arroyo Shrub habitat.

Although abundance (\hat{N}) could not be estimated due to low capture success, density estimates were calculated using minimum number alive (MNA) (Krebs et al. 1986, Slade and Blair 2000) for Arroyo Shrub habitat ([Table 16.2-7](#)). However, this approach does not incorporate the effective area trapped, only the area of trapping web or grid. Density estimation is not simply $\hat{D} = \hat{N}/A$, where A is the area of the trapping grid and \hat{N} is the number of individuals ([Appendix 16.A](#)). Therefore, the density estimates reported in [Table 16.2-7](#) may dramatically overestimate density. Although actual densities are probably much lower, densities in this report do represent numbers for future comparison if field and calculation methods are repeated.

In 2005, three species of small mammals were documented during trap efforts in Areas 4 South and 5. Thirteen individuals were captured 14 times in 1,202 trap nights (number of traps x number of nights x number of replicates), including seven banner-tailed kangaroo rats with one recapture, five grasshopper mice (*Onychomys leucogaster*) and one Ord's kangaroo rat. All captures in 2005 were made in the Sands vegetation community; no small mammals were captured in Arroyo Shrub. In 2007, four species of small mammals were documented from trapping in approximately 2,800 trap nights in Areas 4 South and 5. Twenty individuals were captured 21 times; one juvenile antelope squirrel (*Ammospermophilus leucurus*)

was recaptured. Other captures included 12 deer mice, four Ord's kangaroo rats, two banner-tailed kangaroo rats, and one piñon mouse (*Peromyscus truei*). Seventy-eight percent of small mammals were captured in Arroyo Shrub habitat, and 11 percent were captured each in Alkali Wash and Sands habitats.

Additionally, tunnels of pocket gophers (*Thomomys* spp.) and the mounds of banner-tailed kangaroo rats were frequently observed in sandy soils within the in Areas 4 South and 5 in both the 2005 and 2007 survey years.

In 2004, prairie dogs were observed at the town in Area 4 North in early June; however, no prairie dogs were seen in later summer. The size of the town was estimated at < 1.0 hectare (2.5 acres) in size. In 2005, prairie dogs were commonly observed, but towns were not mapped in Area 5. In 2007, five major Gunnison's prairie dog towns, ranging in size from 75 to 317 acres, were mapped in Area 4 South and Area 5 ([Appendix 16.C](#)). Burrows were enumerated in two prairie dog towns (Towns B and C) and each had burrow densities of 5 burrows per acre ([Appendix 16.C](#)). In 2007, badger tracks were observed next to a prairie dog burrow while mapping prairie dog towns in Area 5.

Black-tailed jackrabbits and desert cottontails were observed in Area 4 North in 2004, especially during spotlight surveys. Black-tailed jackrabbits and desert cottontails, as well as their tracks and scat, were also commonly observed in Areas 4 South and 5 in 2005 and 2007. A white-tailed antelope squirrel and a ground squirrel (*Spermophilus spilosoma*) were observed in rocky draws on two separate occasions within Area 4 North in 2004. Bobcat tracks were also identified in Chaco Wash in Area 4 North in 2004. No bobcats or their sign were observed in Areas 4 South and 5 in 2005 and 2007.

In 2004, mist-netting resulted in the capture of several bat species in Area 4 North: 22 pregnant female and ten male western pipistrelles (*Pipistrellus hesperus*), one pregnant female and six male pallid bats (*Antrozous pallidus*), one non-reproductive female silver-haired bat (*Lasionycteris noctivagans*), and one non-reproductive female hoary bat (*Lasiurus cinereus*). Bats were often observed around dusk, likely *Pipistrellus* species, in Areas 4 South and 5 in 2005 and 2007.

No coyotes were seen or heard during spotlight surveys or any other surveys in Area 4 North in 2004. However, coyote tracks were identified and several scats were found throughout the area. In 2005, during spotlighting surveys for canids, green eyeshine was consistently observed through the night surveys, indicating coyotes and foxes were present throughout Areas 4 South and 5. Scat and tracks of kit fox and red fox (*Vulpes vulpes*) were also documented. Two coyotes, one unidentified canid, four kit foxes and one kit fox den were sighted. One kit fox sighting included two individuals, possibly juveniles. An individual juvenile red fox was observed investigating mounds of banner-tailed kangaroo rats at nearby traps in 2005. Spotlighting efforts for kit fox in 2007 are described in detail in the threatened and endangered species survey report provided in [Appendix 16.C](#).

A few tracks of mule deer were identified, mostly within Chaco Wash, in Area 4 North in 2004. No incidental observations of other big game were made during surveys in Areas 4 South and 5 in 2005 and 2007.

16.2.4 Herptile species

Herptile observations were not reported in Area 4 North in 2004 ([Appendix 16.A](#)). Ten species of herptiles were incidentally observed within Areas 4 South and 5 in 2005 and 2007. Observed species include plateau striped whiptail (*Cnemidophorus velox*), western whiptail (*Cnemidophorus tigris*), gopher snake (*Pituophis melanoceus*), bull snake (*Pituophis melanoceus* sub. *sayi*), short-horned lizard (*Phrynosoma douglasii*), western yellow-bellied racer (*Coluber constrictor* sub. *mormon*), side-blotched lizard (*Uta stansburiana*), lesser earless lizard (*Holbrookia maculata*), prairie rattlesnake (*Crotalus viridis*), and collared lizard (*Crotaphytus collaris*).

16.3 Threatened and Endangered Wildlife Results

The Navajo Nation Biological Evaluation Guidelines (NNDFW 1997) specify that locations of certain species are confidential and are not to be released in a public document. Therefore, BNCC will not report locations or population numbers of threatened, endangered, and sensitive species (TES) in public documents.

The TES species and their potential habitats within the permit area are presented in [Appendix 16.A](#) and [Appendix 16.C](#). Seven species were identified as having suitable habitat within and adjacent to Areas 4 North, 4 South and 5. Species-specific surveys were conducted in Area 4 North ([Appendix 16.A](#)) and Areas 4 South and 5 ([Appendix 16.C](#)) to determine presence of the following target species: kit fox, mountain plover, ferruginous hawk, golden eagle, burrowing owl, black-footed ferret, and pronghorn antelope.

[Appendix 16.C](#) is submitted twice; one which redacts the confidential information for public review; and one containing the confidential information which will be submitted separately and maintained as confidential information.

16.3.1 Ferruginous Hawk

One ferruginous hawk territory consisting of five nests located about seven miles northwest of Area 4 North mining lease boundary was active in 2004 and fledged two young (Hawks Aloft 2005). In 2007, eight historic ferruginous hawk nests were visited in Areas 4 South and 5. One individual was observed but no nests were active. Further discussion on the presence of ferruginous hawks and their nests in Areas 4 South and 5 is presented in [Appendix 16.C](#).

16.3.2 Golden Eagle

The most recently active golden eagle nest (1999) is within the 1-mile buffer from the Area 4 North mining lease boundary. In 1998, a common raven nest located in the middle of the Area 4 North mining lease boundary was occupied by golden eagle; however, the nest has not since been used by golden eagles and was confirmed occupied again by common raven in 2008 (Ecosphere 2009).

In 2007, four historic golden eagle nests were visited in Areas 4 South and 5 and one was found active. Further discussion on the presence of golden eagles and their nests in Areas 4 South and 5 is presented in [Appendix 16.C](#).

16.3.3 Burrowing Owl

Several incidental observations of burrowing owl were made in Area 4 North in 2004: four burrowing owls were seen on several occasions within the prairie dog town centrally located in Area 4 North. A burrowing owl was heard at the stock pond on June 5, 2004 while netting for bats and observed in the same area again on June 22, 2004 (see [Appendix 16.A](#)).

Burrowing owls were documented in 2005 and 2007 while mapping prairie dog towns in Areas 4 South and 5. The presence of burrowing owl was also documented on separate occasions during vegetation and mountain plover surveys in June 2007. Survey results for burrowing owl in Areas 4 South and 5 are presented in [Appendix 16.C](#).

16.3.4 Mountain Plover

No mountain plover were documented in Area 4 North during avian surveys in 2004.

In May 2007, mountain plover were observed during the first of three USFWS protocol surveys near Burnham Road in Area 5 ([Appendix 16.C](#)). Repeat visits to the same location during the second and third surveys failed to document any new sightings. Also in May 2007, two males apparently engaged in a territorial dispute were observed during breeding bird surveys east of Burnham Road in Area 5. Additionally, two adult mountain plovers were observed during vegetation surveys in Area 5 in 2007. Detailed survey results for mountain plovers in Areas 4 South and 5 are presented in [Appendix 16.C](#).

16.3.5 Black-Footed Ferret

No surveys for the presence of black-footed ferrets were conducted in Area 4 North. Preliminary field surveys determined that the prairie dog colony in the area was too small to support black-footed ferrets and, therefore, no further investigations were warranted.

Nocturnal spotlighting surveys following NNDFW and USFWS protocols for black-footed ferrets were conducted in July and August of 2008 in Areas 4 South and 5. No black-footed ferrets or their sign were

observed. Further, there were no incidental observations of black-footed ferrets or their sign during previous wildlife and vegetation surveys. Detailed survey results for black-footed ferrets in Areas 4 South and 5 are presented in [Appendix 16.D](#).

16.3.6 Kit Fox

No kit foxes were spotlighted in Area 4 North in 2004; however, scat and tracks were identified and burrows were common throughout the area. None of the burrows showed current occupation, but several indicated recent use because no spider webs or debris obscured the entrances. Fresh scat and tracks were identified at one burrow. A scent post was set up at this site, but subsequent checks showed no indication of a canid visiting the scent post.

Spotlighting surveys in 2005 and 2007 documented the presence of several individual kit fox and at least two dens within Areas 4 South and 5. Detailed survey results for kit fox in Areas 4 South and 5 are presented in [Appendix 16.C](#).

16.3.7 Pronghorn Antelope

No pronghorn antelope or sign thereof were observed during any surveys in Areas 4 North, 4 South, and 5 in 2004, 2005, or 2007.

Personnel

Persons or organizations responsible for data collection, analysis, and preparation of this permit application package section are listed below:

Kent Applegate	Ecosphere Environmental Services
Vivie Melendez	Farmington, NM
BHP Navajo Coal Company	

References

- Battelle Columbus Laboratories. 1975. Final report on ecology and biology of the WESCO and UII lease areas. Submitted to Transwestern Coal Gasification Company, Pacific Coal Gasification Company, Western Gasification Company, and Utah International by Battelle Columbus Laboratories, Columbus, Ohio. 24 pp. + append.
- BHP Navajo Coal Company (BNCC). 2009. Navajo Mine Permit Application Package. OSM Permit No. NM-0003F. On file at Office of Surface Mining, Reclamation and Enforcement – Western Region Technical Office. Denver, Colorado.
- Delbert, P., L. Hanebury, B. Leachman, and F. Knopf. 1999. Mountain Plover Survey Guidelines. U.S. Fish and Wildlife Service, Washington, D.C.

- Ecosphere Environmental Services (Ecosphere). 2001. A Survey for Threatened, Endangered and Sensitive Species for the Proposed Navajo Mine 654 Acre Dixon Pit Lease Extension Project, San Juan County, New Mexico. Ecosphere Environmental Services, Farmington, New Mexico. 11 pp.
- Ecosphere Environmental Services (Ecosphere). 2004. Floristic Survey and Ecological Study of BHP Area IV, San Juan County, New Mexico. BHP Navajo Coal Company-Navajo Mine Permit NM-0003F Chapter 9, Appendix 9-B.
- Ecosphere Environmental Services (Ecosphere). 2004. Wildlife Baseline Report BHP Billiton Navajo Mine, November 2004. Unpublished report.
- Ecosphere Environmental Services (Ecosphere). 2008a. Threatened and Endangered Species Surveys Navajo Mine Extension Project, August 2008. Unpublished report.
- Ecosphere Environmental Services (Ecosphere). 2008b. Wildlife Baseline for the Navajo Mine Extension Project, August 2008. Unpublished report.
- Ecosphere Environmental Services (Ecosphere). 2009. 2008 Annual Raptor Report. BHP Navajo Coal Company-Navajo Mine. Unpublished report.
- Hawks Aloft 2005. 2004 Raptor Surveys BHP Navajo Coal Company Navajo Mine, New Mexico. Unpublished report.
- Henny, C. J. and L. J. Blus. 1981. Artificial Burrows Provide New Insight Into Burrowing Owl Nesting Biology. Raptor Research. Vol. 15 No. 3: 82-85.
- Hinton, T. 1980. Unique and Endangered Species Survey on the Navajo Mine Leasehold. Utah International Inc. 91 pp. [Permit NM-0003C, Chapter 25, Appendix 25-A]
- Krebs, C.J., S. Boutin, and B.S. Gilbert. 1986. A natural feeding experiment on a declining snowshoe hare population. *Oecologia* 70:194-197.
- Mariah Associates, Inc. 1983. Black-Footed Ferret Survey on the Navajo Mine Area, San Juan County, New Mexico, October 1983. Report to Utah International Inc. by Mariah Association, Inc., Laramie, WY. 19 pp. + appendices. [Permit NM-0003C, Chapter 25, Appendix 25-B]
- Mariah Associates, Inc. 1984. Black-Footed Ferret Survey on the Navajo Mine Area, San Juan County, New Mexico, September 1984. Report to Utah International Inc. by Mariah Associates, Inc., Laramie, WY. 12 pp. + appendices. [Permit NM-0003C, Chapter 25, Appendix 25-C]
- Mariah Associates, Inc. 1985. Black-Footed Ferret Survey on the Navajo Mine Area, San Juan County, New Mexico, June-July 1985. Report to Utah International Inc. by Mariah Associates, Inc., Albuquerque, NM. 14 pp. + appendices. [Permit NM-0003C, Chapter 25, Appendix 25-D]
- Mariah Associates, Inc. 1986. Black-Footed Ferret Survey on the Navajo Mine Area, San Juan County, New Mexico, August 1986. Report to Utah International Inc. by Mariah Association, Inc., Albuquerque, NM. 13 pp + appendices.
- Mariah Associates, Inc. 1987. Black-Footed Ferret Survey on the Navajo Mine Area, San Juan County, New Mexico, June 1987. Report to BHP-Utah International Inc. by Mariah Associations, Inc., Albuquerque, NM. 12 pp + appendices.

- Mariah Associates, Inc. 1989. Black-Footed Ferret Survey on Block B Amendment Area, Navajo Mine, 1989. Report to BHP-Utah International Inc. by Mariah Associates, Inc., Albuquerque, NM. 18 pp + appendices. [Permit NM-0003C, Chapter 17, Appendix 17-F]
- Mikesic, D. G, and J. Nystedt. 2001. Navajo Nation Endangered Species List (NESL). Species Accounts. Navajo Natural Heritage Program, Department of Fish and Wildlife, Window Rock, Arizona 86515.
- Mikesic, D. and D. Roth. 2008. Navajo Nation Endangered Species List (NESL). Species Accounts. Version 2.05. Navajo Natural Heritage Program, Department of Fish and Wildlife. Window Rock, Arizona.
- Navajo Nation Department of Fish and Wildlife (NNDFW). 1985. Black-footed Ferret Guidelines for the Navajo Indian Reservation. Navajo Nation Fish and Wildlife Department, Window Rock, Arizona..
- Navajo Nation Department of Fish and Wildlife (NNDFW). 1997. Navajo Nation Biological Evaluation Guidelines. Navajo Department of Fish and Wildlife, Window Rock, Arizona.
- Navajo Natural Heritage Program (NNHP). 2005. Navajo Nation Endangered Species List. Species Accounts. Version 2.05: Navajo Natural Heritage Program, Department of Fish and Wildlife, Window Rock, Arizona 86515.
- Navajo Natural Heritage Program (NNHP). 2008. Navajo Endangered Species List. (Dated 10 September 2008). http://nnhp.mndfw.org/nnhp_nesl.pdf (Verified March 29, 2012).
- Simpson, E. H. 1949. Measurement of diversity. *Nature* 163:688.
- Slade, N.A., and S.M. Blair. 2000. An empirical test of using counts of individuals captured as indices of population size. *Journal of Mammalogy* 81:1035-1045.
- Tolle, D. A. 1976. A westward extension in the breeding range of the Mountain Plover. *Wilson Bulletin* 88:358-359.
- U.S. Fish and Wildlife Service (USFWS). 1989. Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act. U.S. Fish and Wildlife Service, Denver, Colorado.
- U.S. Fish and Wildlife Service (USFWS). 2008. Southwest Region Endangered Species List. http://www.fws.gov/southwest/es/NewMexico/SBC_intro.cfm (Verified March 29, 2012).
- Westinghouse. 1975. Terrestrial Survey of Navajo Mine Lease Associated with the Four Corners Power Plant. Environmental Systems Department Westinghouse Electric Corporation, Pittsburgh, PA. [Permit NM-0003C, Chapter 17, Appendix 17-A].
- Woyewodzic, R. 1987. Raptor Survey of Utah International's Navajo Mine Leasehold. 20 pp. [Permit NM-0003C, Chapter 17, Appendix 17-E]
- Fasset, J.E., and J.S. Hinds. 1971. Geology and Fuel resources of the Fruitland Formation and Kirtland Shale of the San Juan Basin, New Mexico and Colorado: U.S. Geological Survey Professional Paper 676; U.S Geological Survey, Washington, DC..

Table 16.2-1 U.S. Fish and Wildlife Service (USFWS) and Navajo Natural Heritage Program (NNHP)
Listed Species with the Potential to Occur in Area 4 North, Area 4 South, and Area 5

Species	Status*	Habitat association
Bird species		
Ferruginous hawk (<i>Buteo regalis</i>)	NESL G3	Nests in badlands, flat or rolling grasslands, and desert scrub.
Golden eagle (<i>Aquila chrysaetos</i>)	NESL G3	Open habitats in mountainous, canyon terrain. Nests primarily on steep cliffs and occasionally large trees.
Mountain plover (<i>Charadrius montanus</i>)	NESL G4	Breeds in short sparse vegetation in disturbed prairies or semideserts with less than a 2-degree slope.
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	NESL G2; Federally endangered	Breeds in dense, shrubby riparian habitats, usually in close proximity to surface water or saturated soil.
Western burrowing owl (<i>Athene cunicularia hypugea</i>)	NESL G4	Nests in ground burrows (often deserted prairie dog burrows) in dry open grasslands or desert scrub.
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Federal candidate	Breeds in riparian woodlands with dense understory vegetation.
Mammal species		
Black-footed ferret (<i>Mustela nigripes</i>)	Federally endangered NESL G2	Open grasslands with year-round prairie dog colonies.
Pronghorn antelope (<i>Antilocapra americana</i>)	NESL G3	Grasslands or desert-scrub with rolling or dissected hills or small mesas.
Kit fox (<i>Vulpes macrotis</i>)	NESL G4	Desert scrub or desert grasslands with soft, alluvial or silty clay soils, sparse vegetation
Plant species		
Knowlton's cactus (<i>Pediocactus knowltonii</i>)	Federally endangered	Alluvial deposits that form rolling, gravelly hills in piñon-juniper and sagebrush communities (6,200-6,400 ft).

Table 16.3-1 (Continued)

Species	Status*	Habitat association
Plant species (continued)		
Mancos milkvetch (<i>Astragalus humillimus</i>)	Federally endangered	Cracks of Point Lookout Sandstone of the Mesa Verde series (5,000-6,000 ft).
Mesa Verde cactus (<i>Sclerocactus mesae-verdae</i>)	Federally threatened	Highly alkaline soils in sparse shale or adobe clay badlands of the Mancos and Fruitland formations (4,000-5,550 ft)

*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

¹ The Navajo Endangered Species List (NESL) (10 Sep 2008) lists banner-tail kangaroo rat (*Dipodomys spectabilis*) as a Group 4 species only for populations in Arizona and Utah portions of the Navajo Nation. Populations in the New Mexico portion of the Navajo Nation are not included in the Group 4 designation.

Table 16.2-2 List of Species Documented in Area 4 North in 2004; and Area 4 South and Area 5 in 2005 and 2007

Common name	Scientific name
Northern harrier	(<i>Circus cyaneus</i>)
Cooper's hawk	(<i>Accipiter cooperii</i>)
Red-tailed hawk	(<i>Buteo jamaicensis</i>)
Ferruginous hawk	(<i>Buteo regalis</i>)
Golden eagle	(<i>Aquila chrysaetos</i>)
American kestrel	(<i>Falco sparverius</i>)
Prairie falcon	(<i>Falco mexicanus</i>)
Great-horned owl	(<i>Bubo virginianus</i>)
Burrowing owl	(<i>Athene cunicularia</i>)
*Bald eagle	(<i>Haliaeetus leucocephalus</i>)
American crow	(<i>Corvus brachyrhynchos</i>)
Ash-throated flycatcher	(<i>Myiarchus cinerascens</i>)
Black-throated sparrow	(<i>Amphispiza bilineata</i>)
Blue grosbeak	(<i>Passerina caerulea</i>)
Brown-headed cowbird	(<i>Molothrus ater</i>)
Common raven	(<i>Corvus corax</i>)
Horned lark	(<i>Eremophila alpestris</i>)
House finch	(<i>Carpodacus mexicanus</i>)
Killdeer	(<i>Charadrius vociferus</i>)
Lark sparrow	(<i>Chondestes grammacus</i>)
Loggerhead shrike	(<i>Lanius ludovicianus</i>)
Mountain plover	(<i>Charadrius montanus</i>)
Mourning dove	(<i>Zenaida macroura</i>)
Northern mockingbird	(<i>Mimus polyglottos</i>)
Rock wren	(<i>Salpinctes obsoletus</i>)
Say's phoebe	(<i>Sayornis saya</i>)
Spotted towhee	(<i>Pipilo maculatus</i>)
Western scrub-jay	(<i>Aphelocoma californica</i>)
Yellow warbler	(<i>Dendroica petechia</i>)
American coot	(<i>Fulica americana</i>)
Cinnamon teal	(<i>Anas cyanoptera</i>)
Common merganser	(<i>Mergus merganser</i>)
Eurasian wigeon	(<i>Anas penelope</i>)

Table 16.2-2 (Continued)

Common name	Scientific name
Mallard	<i>(Anas platyrhynchos)</i>
American avocet	<i>(Recurvirostra americana)</i>
Black-crowned night heron	<i>(Nycticorax nycticorax)</i>
Great blue heron	<i>(Ardea herodias)</i>
Spotted sandpiper	<i>(Actitis macularius)</i>
Wilson's phalarope	<i>(Phalaropus tricolor)</i>
*Spotted ground squirrel	<i>(Spermophilus spilosoma)</i>
Antelope squirrel	<i>(Ammospermophilus leucurus)</i>
Deer mouse	<i>(Peromyscus maniculatus)</i>
Ord's kangaroo rats	<i>(Dipodomys ordii)</i>
*Apache pocket mouse	<i>(Perognathus apache)</i>
Banner-tailed kangaroo rat	<i>(Dipodomys spectabilis)</i>
Pocket gopher	<i>(Thomomys spp.)</i>
Piñon mouse	<i>(Peromyscus truei)</i>
Gunnison's prairie dog	<i>(Cynomys gunnisoni)</i>
Kit fox	<i>(Vulpes macrotis)</i>
Red fox	<i>(Vulpes vulpes)</i>
Bat	<i>(Pipistrellus spp.)</i>
*Pallid bat	<i>(Antrozous pallidus)</i>
Desert cottontail	<i>(Sylvilagus audobonii)</i>
Black-tailed jack rabbit	<i>(Lepus californicus)</i>
Coyote	<i>(Canis latrans)</i>
Badger	<i>(Taxidea taxus)</i>
*Mule deer	<i>(Odocoileus hemionus)</i>
Plateau striped whiptail	<i>(Cnemidophorus velox)</i>
Western whiptail	<i>(Cnemidophorus tigris)</i>
Gopher snake	<i>(Pituophis melanoecus)</i>
Bull snake	<i>Pituophis melanoecus sub. sayi)</i>
Short-horned lizard	<i>(Phrynosoma douglassii)</i>
Western yellow-bellied racer	<i>(Coluber constrictor sub. mormon)</i>
Side-blotched lizard	<i>(Uta stansburiana)</i>

Lesser earless lizard	<i>(Holbrookia maculata)</i>
Prairie rattlesnake	<i>(Crotalus viridis)</i>
Collared lizard	<i>(Crotaphytus collaris)</i>

*indicates those species documented in Area 4 North only

Table 16.2-3 Mean Number of Individuals Detected Per 1-km Transect, Species Richness and Index of Species Diversity within Each Habitat Type in Areas 4 South and 5

Summary statistic	Alkali Wash	Arroyo Shrub	Badlands	Sands	Thinbreaks
Mean	14.8	14.8	5.3	13.8	12.8
Species richness	5	16	3	7	4
Species diversity	0.2	0.8	0.2	0.3	0.1

Table 16.2-4 Relative Abundance of Breeding Birds for the 2007 Survey in Areas 4 South and 5

Species	Relative abundance					Total
	Alkali Wash	Arroyo Shrub	Badlands	Sands	Thin-breaks	
American crow (<i>Corvus brachyrhynchos</i>)	-	0.03	-	-	-	0.01
Ash-throated flycatcher (<i>Myiarchus cinerascens</i>)	-	-	-	0.02	-	<0.01
Black-throated sparrow (<i>Amphispiza bilineata</i>)	-	0.03	-	0.02	-	0.01
Blue grosbeak (<i>Passerina caerulea</i>)	-	0.02	-	-	-	<0.01
Brown-headed cowbird (<i>Molothrus ater</i>)	-	0.02	-	-	-	<0.01
Burrowing owl (<i>Athene cunicularia</i>)	0.02	-	-	-	-	<0.01
Common raven (<i>Corvus corax</i>)	0.03	0.02	-	-	0.02	0.02
Ferruginous hawk (<i>Buteo regalis</i>)	-	-	-	-	0.02	<0.01
Horned lark (<i>Eremophila alpestris</i>)	0.88	0.47	0.90	0.82	0.94	0.78
House finch (<i>Carpodacus mexicanus</i>)	-	0.03	-	-	-	0.01
Killdeer (<i>Charadrius vociferus</i>)	-	0.03	-	-	-	0.01
Lark sparrow (<i>Chondestes grammacus</i>)	-	0.02	-	0.05	-	0.02
Loggerhead shrike (<i>Lanius ludovicianus</i>)	-	0.02	-	-	-	<0.01
Mountain plover (<i>Charadrius montanus</i>)	0.03	-	-	-	0.02	0.01
Mourning dove (<i>Zenaida macroura</i>)	-	0.17	0.05	0.04	-	0.05

Table 16.2-4 (Continued)

Species	Relative abundance					Total
	Alkali Wash	Arroyo Shrub	Badlands	Sands	Thin-breaks	
Northern mockingbird (<i>Mimus polyglottos</i>)	-	0.07	-	-	-	0.02
Rock wren (<i>Salpinctes obsoletus</i>)	-	-	-	0.02	-	<0.01
Say's phoebe (<i>Sayornis saya</i>)	0.03	0.02	0.05	0.04	-	0.02
Spotted towhee (<i>Pipilo maculatus</i>)	-	0.02	-	-	-	<0.01
Western scrub-jay (<i>Aphelocoma californica</i>)	-	0.02	-	-	-	<0.01
Yellow warbler (<i>Dendroica petechia</i>)	-	0.02	-	-	-	<0.01

Table 16.2-5 Waterfowl and Shorebird Sightings within Areas 4 South and 5 in 2007

Species	Pond 1	Pond 2	Pond 3
American avocet <i>(Recurvirostra americana)</i>	1	1	
American coot <i>(Fulica americana)</i>			1
Back-crowned night heron <i>(Nycticorax nycticorax)</i>	2		
Cinnamon teal <i>(Anas cyanoptera)</i>	1	4	
Common merganser <i>(Mergus merganser)</i>		1	
Eurasian wigeon <i>(Anas penelope)</i>	4		
Great blue heron <i>(Ardea herodias)</i>		1	
Killdeer <i>(Charadrius vociferus)</i>	3	6	1
Mallard <i>(Anas platyrhynchos)</i>		18	
Spotted sandpiper <i>(Actitis macularius)</i>		2	
Wilson's phalarope <i>(Phalaropus tricolor)</i>		3	
Unidentified		1	
Total	11	37	2

Table 16.2-6 Total Number of Trap-Nights and Captures (or Recaptures) Using Two Different Trapping Methods in Six Habitat Types, Area 4 North, 2004

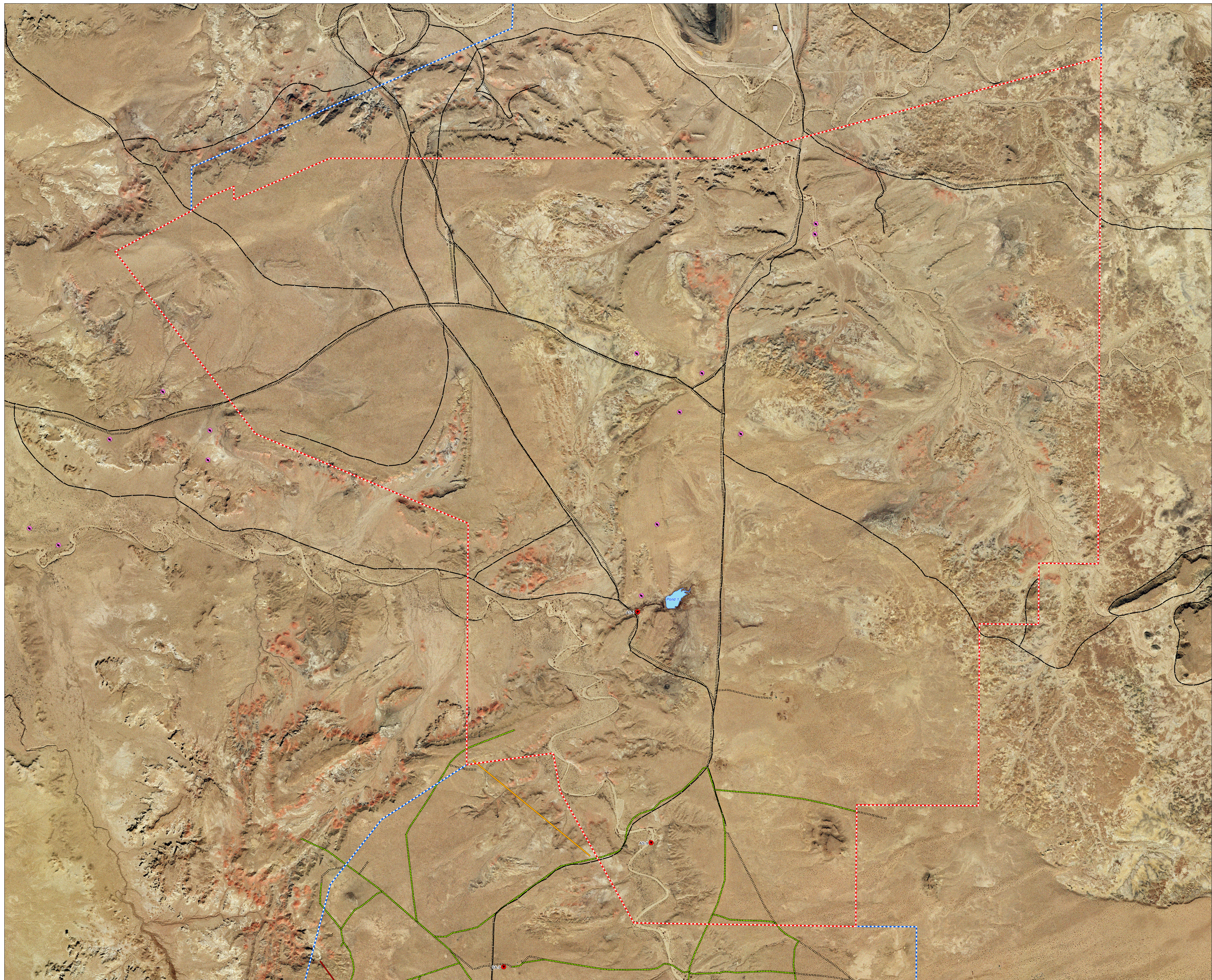
Trapping No.	Trapping Method	Habitat Type	No. Trap Nights*	No. Captures/recaptures
A1	web	Arroyo-shrub	296	1/0
A2	web	Arroyo-shrub	296	6/1
A3	web	Arroyo-shrub	296	0/0
A4	grid	Arroyo-shrub	96	3/0
A5	grid	Arroyo-shrub	96	0/0
SS1	web	Saline sand	296	0/0
SS2	web	Saline sand	296	0/0
TB1	web	Thin break	296	0/0
TB2	web	Thin break	296	0/0
AK1	web	Alkali wash	296	0/0
AK2	web	Alkali wash	296	0/0
D1	web	Dune	296	0/0
BD1	grid	Badland	96	0/0
BD2	grid	Badland	96	0/0
TOTAL			3,344	10/1

*No. trap-nights is the number of traps x the number of nights they were set.

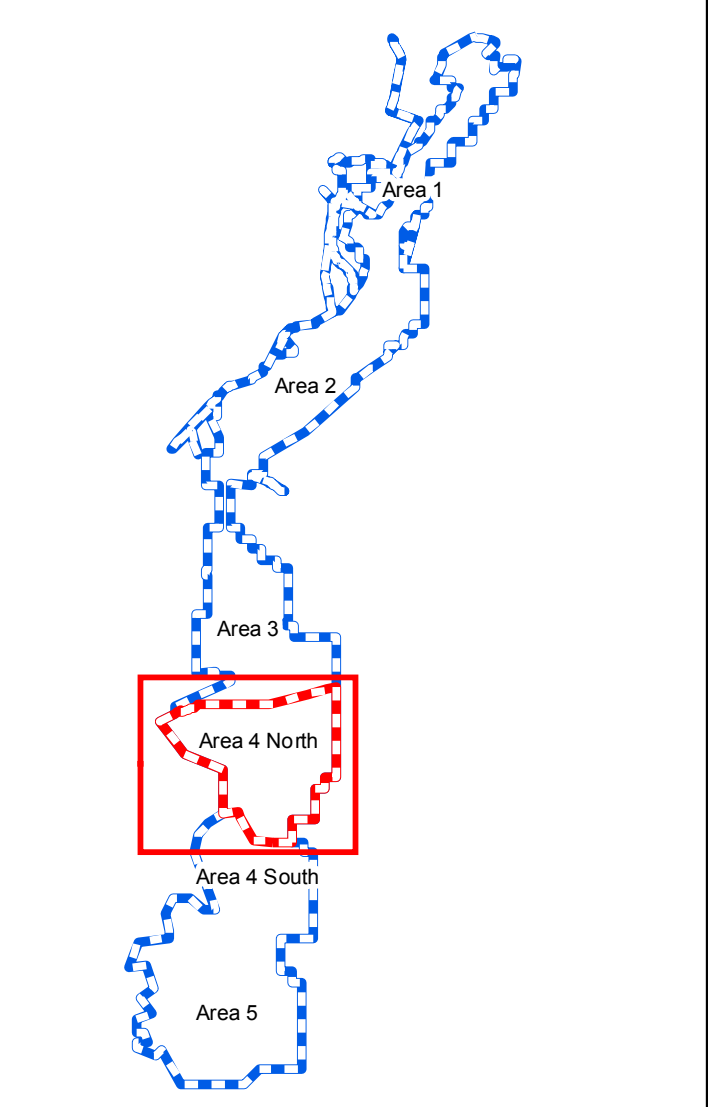
Table 16.2-7 Density Estimates for Two Trapping Webs and One Trapping Grid in Arroyo Shrub Habitat Using Minimum Number Alive (MNA) as a Surrogate for Abundance (*N*) Due to the Lack of Capture Success, Area 4 North, 2004

Trapping No.	Trapping Method	Habitat Type	Area (ha)	MNA*	Density (mammals/ha)
A1	web	Arroyo-shrub	3.14	1	0.3
A2	web	Arroyo-shrub	3.14	6	1.9
A4	grid	Arroyo-shrub	0.33	3	9.1

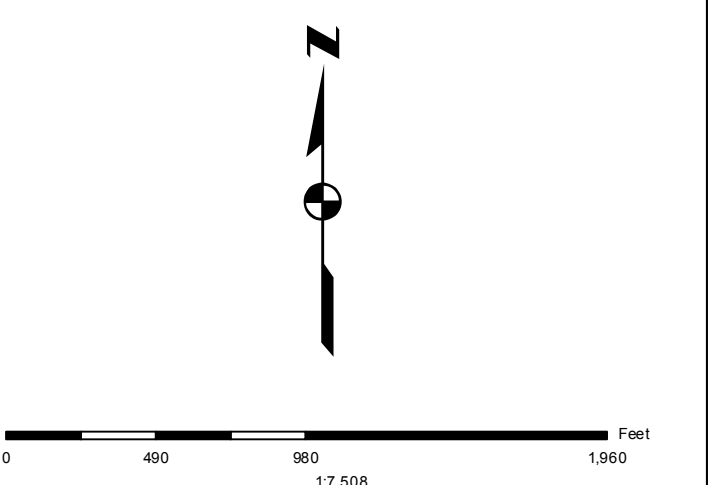
*No variance is associated with MNA.



- Legend
- ⋯ SMCRA Permit Boundary
 - - - BNCC Mining Lease and ROWs
 - Premine Roads
 - Kit Fox Spotlighting Surveys 2004
 - Area 4 North Small Mammal Traps 2004
 - Small Mammal Traps 2006 & 2007
 - Shoreline Bird Survey Ponds
 - Canid Survey Roads
 - Breeding Bird Survey Transects
 - Alkali Wash
 - Arroyo Shrub
 - Badlands
 - Sands
 - Thin Breaks



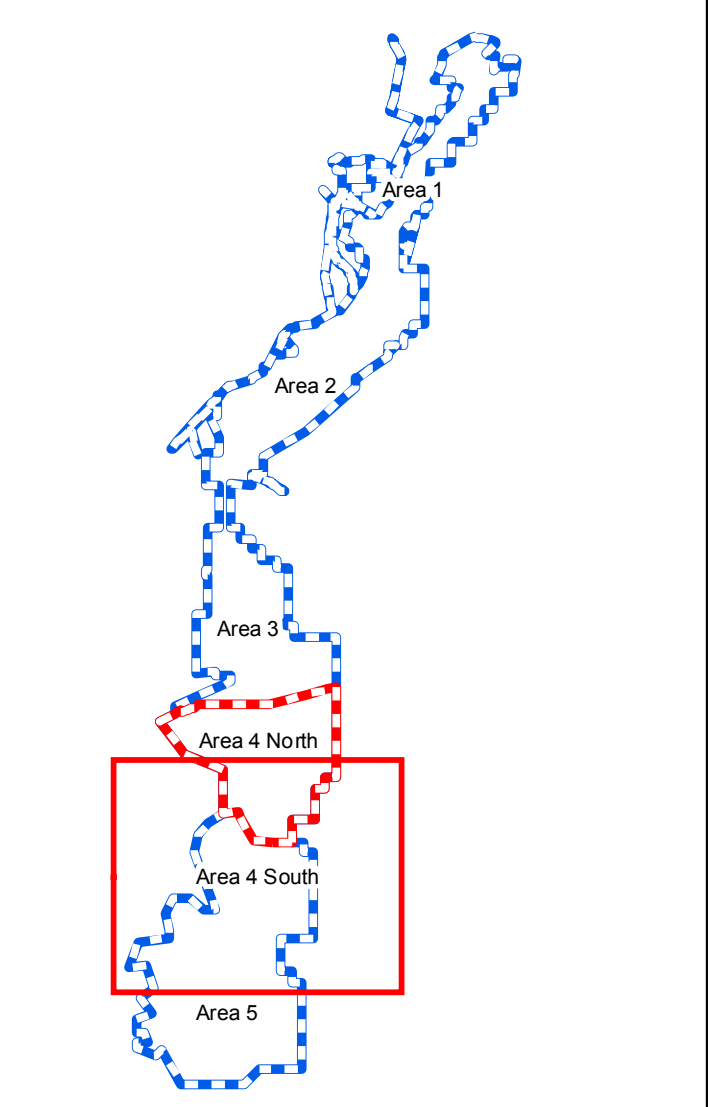
Coordinate System:
 NAD 1983 State Plane New Mexico West FIPS 5003
 Projection: Transverse Mercator
 Datum: North American 1983
 Units: Foot US



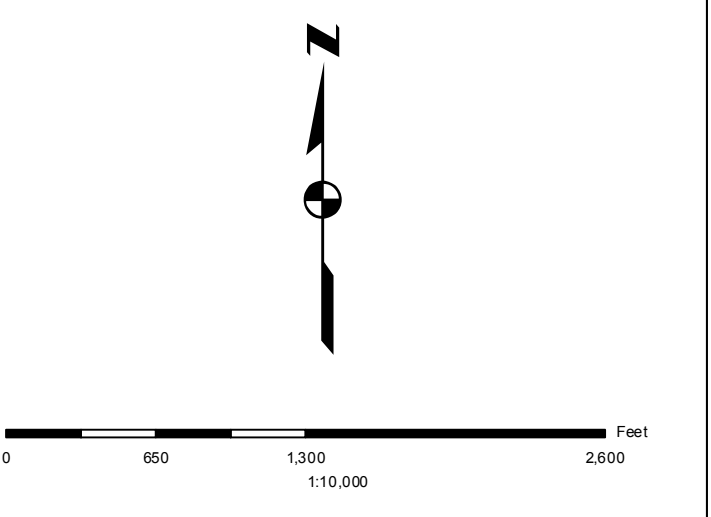
DATE	BY	DESCRIPTION
12/11/12	MPO	Prepared for Submittal to OSM
08/15/12	CKA	Reviewed and Approved



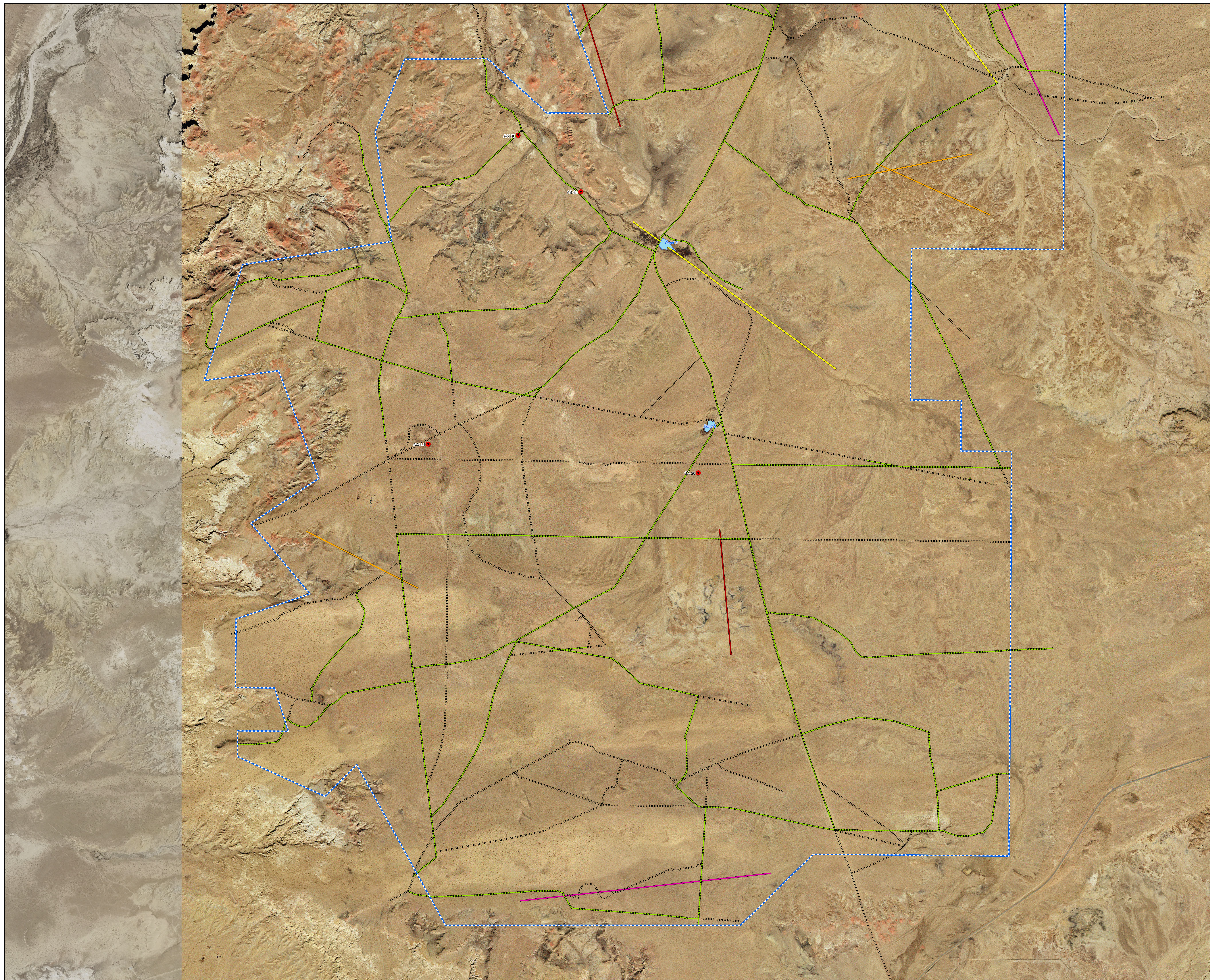
- Legend
- SMCRA Permit Boundary
 - BNCC Mining Lease and ROWs
 - Camid Survey Roads
 - Area 4 North Small Mammal Traps 2004
 - Small Mammal Traps 2005 & 2007
 - Shoreline Bird Survey Ponds
 - Kit Fox Spotlighting Surveys 2004
 - Breeding Bird Survey Transects**
 - Alkali Wash
 - Amoyo Shrub
 - Badlands
 - Sands
 - Thin Breaks



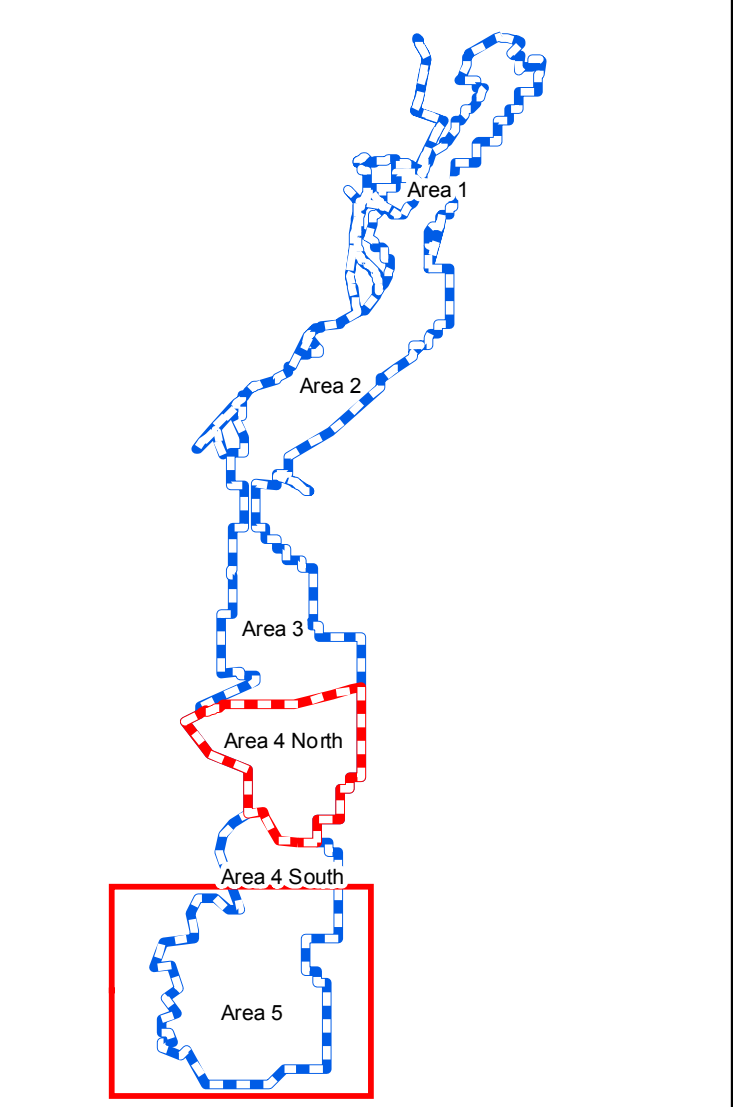
Coordinate System:
 NAD 1983 State Plane New Mexico West FIPS 5003
 Projection: Transverse Mercator
 Datum: North American 1983
 Units: Foot US



DATE	BY	DESCRIPTION
3/16/12	MPO	Prepared for Submittal to OSM
3/16/12	CA	Reviewed for Accuracy
3/16/12	CA	Approved for Release



- Legend
- SMCRA Permit Boundary
 - BNCRC Mining Lease and ROWS
 - Premine Roads
 - Canid Survey Roads
 - Small Mammal Traps 2005 & 2007
 - Shoreline Bird Survey Ponds
 - Breeding Bird Survey Transects
 - Alkali Wash
 - Arroyo Shrub
 - Badlands
 - Sands
 - Thin Breaks



Coordinate System:
 NAD 1983 State Plane New Mexico West FIPS 5003
 Projection: Transverse Mercator
 Datum: North American 1983
 Units: Foot US

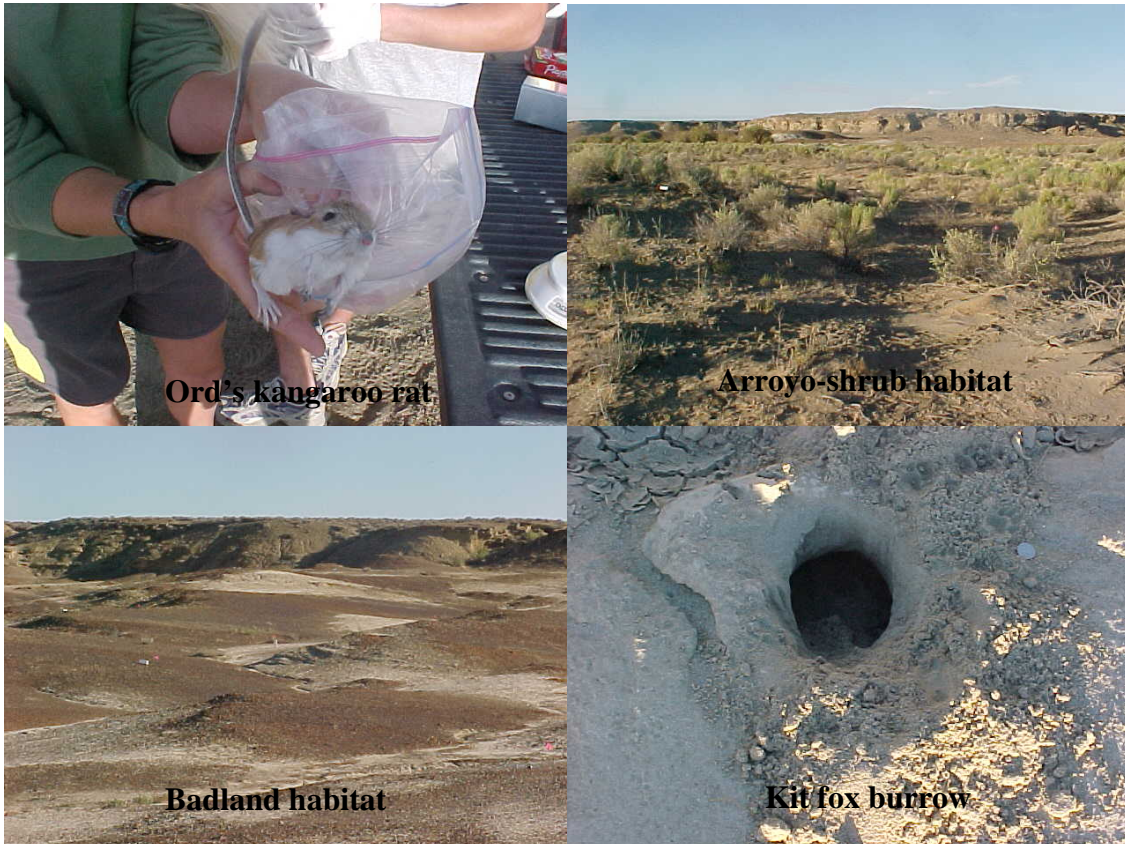
DATE	BY	DESCRIPTION
01/11/12	MFO	Prepared for Submittal to OSM
01/11/12	MFO	Revised to reflect comments
01/11/12	MFO	Final

Appendix 16.A

Wildlife Baseline Report November 2004

WILDLIFE BASELINE REPORT

BHP BILLITON - NAVAJO MINE



Ord's kangaroo rat

Arroyo-shrub habitat

Badland habitat

Kit fox burrow

Prepared By:

ECOSPHERE ENVIRONMENTAL SERVICES

**108 N Behrend, Suite A
Farmington, New Mexico 87401**

**2257 Main Avenue, Patio Level
Durango, Colorado 81301**

November 2004

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	STUDY AREA	1
3.0	OFF-SITE METHODS: T&E WILDLIFE	2
3.1	Threatened, Endangered, and Sensitive Wildlife with Potential to Occur in the Study Area	2
4.0	ON-SITE METHODS: T&E WILDLIFE.....	3
4.1	Chisel-tooth Kangaroo Rat and Banner-tail Kangaroo Rat	3
4.2	Black-footed ferret	4
4.3	Kit Fox	4
4.4	Mountain Plover and Southwestern Willow Flycatcher	5
4.5	Golden Eagle, Bald Eagle, Peregrine Falcon, and Ferruginous Hawk	5
4.6	Small-footed Myotis, Spotted Bat, Townsend’s Big-eared Bat.....	5
4.7	Pronghorn Antelope	6
4.8	Fishes and Amphibians	6
5.0	ON-SITE METHODS: GENERAL WILDLIFE	6
6.0	RESULTS: T&E WILDLIFE	7
6.1	Chisel-tooth Kangaroo Rat and Banner-tail Kangaroo Rat	7
6.2	Black-footed ferret	7
6.3	Kit Fox	7
6.4	Mountain Plover and Southwestern Willow Flycatcher	7
6.5	Golden Eagle, Bald Eagle, Peregrine Falcon, and Ferruginous Hawk	7
6.6	Small-footed Myotis, Spotted Bat, Townsend’s Big-eared Bat.....	8
6.7	Pronghorn Antelope	8
7.0	RESULTS: GENERAL WILDLIFE.....	8
8.0	DISCUSSION: T&E WILDLIFE	10
8.1	Chisel-tooth Kangaroo Rat and Banner-tail Kangaroo Rat	10
8.2	Black-footed ferret	11
8.3	Kit Fox	11
8.4	Mountain Plover and Southwestern Willow Flycatcher	11
8.5	Golden Eagle, Bald Eagle, Peregrine Falcon, and Ferruginous Hawk	11
8.6	Small-footed Myotis, Spotted Bat, Townsend’s Big-eared Bat.....	12
8.7	Pronghorn Antelope	12
9.0	DISCUSSION: GENERAL WILDLIFE	13
10.0	DISCUSSION: POTENTIAL IMPACTS TO THREATENED, ENDANGERED, AND SENSITIVE WILDLIFE	13
	LITERATURE CITED	16
	FIGURES.....	18
	TABLES	23
	APPENDIX A.....	28
	PHOTO GALLERY.....	28
	LIST OF PREPARERS.....	29

1.0 INTRODUCTION

This wildlife resource baseline report has been prepared to update permitting information pertinent to the continuation of coal extraction into Area IV North of Navajo Mine on the Navajo Nation, approximately 15 miles southwest of Farmington, New Mexico. Specifically, this wildlife baseline report addresses the entire existing Area IV North lease area and approximately a 1-mile radius buffer around this portion of the current lease. In total, about 11,100 acres were surveyed and evaluated. This baseline data has been collected to provide the Office of Surface Mining (OSM) with current wildlife data necessary to prepare National Environmental Protection Act (NEPA) documentation for continued coal extraction in Area IV North. The baseline surveys consisted of general characterization of area habitats, regionally common wildlife, and species with special protection or conservation status according to Federal, State, and Navajo Nation wildlife management agencies.

2.0 STUDY AREA

The study area includes Area IV North plus a 1-mile buffer, comprising approximately 11,100 acres of Great Basin desert-scrub habitat (Dick-Peddie 1993) (Figure 1). Great Basin desert-scrub habitat is a cold desert ecosystem dominated by shrubs with a sparse understory and of forbs and grasses; bare ground occurs in poor, alkaline soils (Fitzgerald et al. 1994, Dick-Peddie 1993). Galleta (*Hilaria jamesii*) and dropseeds (*Sporobolus* spp.) are sparsely represented among forbs and shrubby vegetation. Broom snakeweed (*Gutierrezia sarothrae*) is abundant, as is saltbush (*Atriplex* spp.), rabbitbrush (*Chrysothamnus* spp.), sage (*Artemisia* spp.), milkvetch (*Astragalus* spp.), and greasewood (*Sarcobatus* spp.). Salt cedar (*Tamarix* spp.), cottonwood (*Populus* spp.), and Russian olive (*Elaeagnus angustifolia*) are sparse in the study area and occur only within several intermittent drainages. The study area is part of the Colorado Plateau consisting of flats and tablelands with moderate to considerable relief. The study area is within the Chaco Wash watershed with shallow soils, steep hills, and rock outcrops. The project area supports a few strips of riparian vegetation; willows (*Salix* spp.) occur at the confluence of Pinabete Wash and Chaco Wash. Although this area is intersected by several drainages, the drainages are dry during much of summer. A stock pond exists at the southern border of the study area at UTM coordinates 12 E 4040156\N 723257 (NAD 27 CONUS). During peak season, this shallow stock pond is approximately 25 m × 30 m, but by late summer is reduced to

only about 7 m × 5 m. Most precipitation occurs from July through October in localized, short-duration, high-intensity thunderstorms. A small prairie dog (*Cynomys gunnisoni*) town also occurs in the western portion of the study area at UTM coordinates 12 E 4042293/ N 0718518 (NAD 27 CONUS). Area IV North is located about 15 miles (linear distance) southwest of Farmington, New Mexico (Figure 1) and is found on the Hogback S, Kirtland SW, Newcomb NE, and The Pillar NW 7.5-minute USGS Quadrangles (Figure 2).

3.0 OFF-SITE METHODS: T&E WILDLIFE

3.1 Threatened, Endangered, and Sensitive Wildlife with Potential to Occur in the Study Area

Prior to conducting fieldwork, Ecosphere biologists compiled a list of federally listed, New Mexico state listed, Navajo Nation listed, and other sensitive and special management species (i.e. Bureau of Land Management sensitive species) and evaluated the habitat requirements of each species to determine if they were likely to occur in the study area. Federally listed species were obtained from the U.S. Fish and Wildlife Service (<http://ifw2es.fws.gov/EndangeredSpecies/lists/ListSpecies.cfm>) Southwest Region endangered species list. The Navajo Nation listed species were obtained through informal consultation with the Navajo Natural Heritage Program (NNHP). Bureau of Land Management (BLM) sensitive species and New Mexico state listed fauna were compiled from the New Mexico Department of Game and Fish and the New Mexico Natural Heritage Program (<http://nmnhp.unm.edu/bisonm/bisonquery.php>, <http://nmnhp.unm.edu/>).

Fifteen wildlife species listed as threatened, endangered, or sensitive by the Federal, State, or Navajo Nation have the potential to exist in the study area (Table 2). Species-specific surveys were conducted to determine presence or absence of the following species: Chisel-tooth Kangaroo rat (*Dipodomys microps*), banner-tailed kangaroo rat (*Dipodomys spectabilis*) (David Mikesic, Zoologist, Navajo Natural Heritage Program, pers. comm.), kit fox (*Vulpes macrotis*), big free-tailed bat (*Nyctinomops macrotis*), small-footed myotis (*Myotis ciliolabrum*), spotted bat (*Euderma maculatum*), Townsend's big-eared bat (*Plecotus townsendii pallascens*), Mountain Plover (*Charadrius montanus*), Southwestern Willow Flycatcher (*Empidonax traillii extimus*), bald eagle (*Haliaeetus leucocephalus*), Ferruginous hawk (*Buteo regalis*), Golden eagle (*Aquila chrysaetos*), Peregrine falcon (*Falco peregrinus*), Black-footed ferret (*Mustela nigripes*). The protection status of each of these species is included in Table 2. No specific surveys were

conducted for Pronghorn antelope (*Antilocapra americana*). All of these species are listed as threatened or endangered or as a species of concern by either the U.S. Fish and Wildlife Service (USFWS), the State of New Mexico, the Navajo Nation, or are concerned species of concern or sensitive by the BLM New Mexico State Office.

Qualified biologists developed scientific protocols to survey for these target species in coordination with the NNHP species-specific guidelines, or conducted surveys in accordance with scientific standards or guidelines. The results of these surveys were compared to published literature, previous wildlife surveys cited by the New Mexico Natural Heritage Program database of species accounts (<http://nmmnhp.unm.edu/bisonm/bisonquery.php>), and to the most recent edition of the existing Navajo Mine SMCRA permit (1992) that summarizes all field studies conducted on or adjacent to the Navajo Mine since 1973, including Area IV North.

4.0 ON-SITE METHODS: T&E WILDLIFE

4.1 Chisel-tooth Kangaroo Rat and Banner-tail Kangaroo Rat

Small mammal surveys were conducted to determine the presence or absence of the Navajo Nation listed chisel-tooth kangaroo rat (*Dipodomys microps*), and banner-tail kangaroo rat (*Dipodomys spectabilis*). Because small mammal inventories have historically been conducted within portions of the lease area (SMCRA 1992), the Area IV North surveys extended beyond the target species to include a sampling of habitat types present. Six microhabitats within Area IV North were identified and trapped for small mammals: arroyo-shrub, saline sand, thin break, alkali wash, dune, and badland (Figure 3). In the more suitable habitat such as arroyo-shrub areas that provided more cover and forage opportunities, trapping webs were established and monitored. For cost efficiency in less suitable and generally poor small mammal habitat, such as badlands, a simple trapping grid was utilized (Table 1).

Each trapping web covered 3.14 ha and consisted of 12 100-m transects spaced 30° from a central point, similar to the spokes of a wheel. Each web contained 148 Sherman (8 × 9 × 23 cm; H.B. Sherman Trap Company, Tallahassee, FL) at 12 trap stations along each radiating spoke. The first four trap stations were at 5-m intervals and the remaining eight at 10-m intervals. Four Sherman traps were placed around the central point (Figure 4). Each trap was baited with rolled oats, molasses, and raisins; polyester fiberfill was placed inside each trap to provide nesting material and reduce trap-associated deaths. Each trap was baited and set in the evening and closed again every morning. Each trapping web and grid was run for two consecutive

nights. Additionally, two trapping grids were set up in arroyo-shrub habitat to increase the trapping effort in the most suitable habitats where small mammal burrows had been identified. Badland was also identified as a habitat type, but due to its lack of suitability as habitat for small mammals (i.e. no vegetative cover or forage potential), only trapping grids were used to sample this habitat type. Trapping grids consisted of 4 transects of 12 traps, each row 10 m apart and each trap spaced 10 m apart for a size of 0.3 ha (Figure 5). Captured animals were identified, sexed, and uniquely marked with a Sharpie pen. Animals were handled by experienced field biologists according to standardized health procedures (Mills et al. 1995) and immediately released into the same area they were captured. All mark-recapture data were collected for purposes of density estimation.

4.2 Black-footed Ferret

Ecosphere biologists conducting vegetation surveys incidentally passed by the prairie-dog town on several occasions in May 2004 and anecdotally reported the size of the prairie-dog town <4 ha with no prairie-dogs observed. In July 2004 the size of the prairie-dog was confirmed to be <4 ha, the required size to support black-footed ferrets (US Fish and Wildlife Service 1989). Therefore, no further surveys for black-footed ferrets were necessary.

4.3 Kit Fox

Night spotlighting was conducted by 1-2 observers driving slowly in a 4 × 4 vehicle on passable roads in the study area. While one observer operated the vehicle, the other used a 2 million-candlepower spotlight (The Brinkmann Corporation and Dallas Manufacturing Company, Inc, Dallas, Texas, USA) to scan for eye-shine. Surveys were conducted for 2-4 hours after midnight on two occasions in June 2004 and on a third occasion in September 2004. In addition, scent posts were established in sandy areas where canid tracks were identified. Scent posts were marked with fox urine and beaver castor, and the surrounding area was swept with a household broom to identify the tracks of any visitors. Predator calls (Primos® Hunting Calls, Flora, Missouri, USA) were used at the end of each spotlighting session to attract any canids in the area, which could then be identified with spotlights.

4.4 Mountain Plover and Southwestern Willow Flycatcher

A general avian survey was conducted on 6 June 2004 along two miles of Chaco Wash between the confluence of Pinabete Wash and Cottonwood Wash, the most suitable avian habitat in the

study area. Two individuals conducted pedestrian surveys using high-powered binoculars (8 x 42, 6.3°, Pentax, Asahi Optical Company, Japan) from 0545-1030-hr. No FWS protocol surveys were conducted for either of these species due to absence of suitable habitat within the Area IV North lease area.

4.5 Golden Eagle, Bald Eagle, Peregrine Falcon, and Ferruginous Hawk

Surveys for the nests of raptorial species on and within 1 mile of the perimeter of all existing BHP leases north of the proposed project area have been required throughout the life of Navajo Mine. This survey area includes 33,379 acres within the existing mine lease and an additional 23,620 acres around the perimeter (D. Mikesic, pers. comm.). A survey using a fixed-wing aircraft (Hickman 1972, Boeker 1970) for active raptor nests was conducted on the morning of 7 May 2004. Surveys were conducted from a Cessna 206 airplane, at 150-200 feet out and above cliffs. Average airspeed of 110 mph was not as slow as recommended (Boeker 1970) for Golden eagles, but was a compromise that allowed reasonable viewing of cliffs at safe heights, distances, and speed. Rotor-winged aircraft are more suited for smaller species (Fuller and Mosher 1987) but we did not use this method due to high costs and the history of previous coverage of the study area. All rocky points and cliffs identified as potential habitat for raptors were visited by flying systematically across the study area and an area extending 3 miles beyond their boundaries. All muted ledges and stick nests were repeatedly checked until it was ascertained if they were occupied by an incubating or brooding adult raptor or raven. Areas within a 1-mile radius of Area IV North were revisited on the ground on the afternoon of 7 May 2004 and during the course of all other wildlife surveys.

Coordination with BHP Billiton and NNHP personnel was also initiated on 7 May. Because of the sensitivity of nesting raptors, particularly Ferruginous hawks to human disturbance (Grier and Fyfe 1987) ground surveys were limited due to the occupancy of known nest sites in the area. BHP Billiton has contracted with Hawks Aloft, Inc., to annually inventory the Navajo Mine lease for raptors. The results of results of previous surveys, including those conducted in 2004 were not immediately available for inclusion in this report.

4.6 Small-footed Myotis, Spotted Bat, Townsend's Big-eared Bat

Surveys for sensitive bat species were conducted in order to document the presence of State of New Mexico and federally listed species of concern. Bats often navigate using distinct topographic features, such as cliff faces, washes, and roadways. Sites within the study area with

these characteristics were identified and standard 32-ft mist nets (Northeastern Bird Banding Association) were used to capture and identify bats. Shortly before dusk, mist nets were set up between two 20-ft lengths of PVC piping supported by rebar. Two to three observers silently waited at either end of the mist net for bats to become active and inadvertently fly into the mist nets. Upon tangling themselves in the mist net, bats were carefully removed with gloved hands, identified, sexed, and released. When no bats had been captured by midnight, nets were taken down.

Two mist nets were run from sunset to midnight on 6 June 2004 and on 23 June 2004 near the stock pond. On 2 June 2004 four nets were set in a dry wash that runs roughly along the eastern boundary of the study area.

4.7 Pronghorn antelope

No systematic surveys for pronghorn were conducted. Rather the presence/absence for this species was ascertained from on-going area searches for sightings and tracks or scat as part of everyday visits to the study area.

4.8 Fishes and Amphibians

No surveys were conducted for fishes or amphibians due to the lack of perennial water resources or wetlands in the study area.

5.0 METHODS: GENERAL WILDLIFE

Baseline wildlife surveys were conducted during summer 2004; the results are reported in this document. Documentation of wildlife common to desert scrub habitats in the Four Corners Region was conducted during the course of intensive vegetation baseline surveys, raptor surveys and during species-specific surveys conducted for Federal, State and Navajo Nation listed or sensitive species. Because of the magnitude of survey days in the field associated with these targeted surveys, no systematic general wildlife surveys were warranted. Any incidental wildlife observations made within the study area, irrespective of the target species, were recorded. Wildlife documented during the 2004 field season is described in the results section of this report (Table 1).

6.0 RESULTS: T&E WILDLIFE

6.1 Chisel-tooth Kangaroo Rat and Banner-tail Kangaroo Rat

No chisel-tooth kangaroo rats or banner-tail kangaroo rats were captured in 3,344 trap nights.

6.2 Black-footed Ferret

No surveys for the presence of black-footed ferrets were conducted after preliminary field surveys determined that the prairie dog colony in the study area was too small (<4 ha) to support black-footed ferrets and no further investigations were warranted.

6.3 Kit Foxes

Although no kit foxes were spotlighted, scat and tracks were identified in the study area, and burrows were common throughout the study area. None of the burrows showed current occupation; however, several indicated recent use because no spider webs or debris obscured the entrances. A fresh scat, along with fresh tracks, was identified at UTM E 4041570/N 723385 (NAD 27 CONUS). A scent post was set up at this sight; however, subsequent checks showed no indication of a canid visiting the scent post.

6.4 Mountain Plover and Southwestern Willow Flycatcher

No Mountain Plover or Southwestern Willow Flycatcher was documented in our avian surveys.

6.5 Golden Eagle, Bald Eagle, Peregrine Falcon and Ferruginous Hawk

The report on the results of the 2004 breeding season surveys by Hawks Aloft is not completed and is therefore unavailable. Navajo Natural Heritage Program surveys for 2004 found that the one known Golden eagle territory within the study area had no active nests and was not known to be occupied by adult eagles. Ferruginous hawks occupied at least 2 of 5 territories within or near the survey buffer area. One hawk fledged two young; the other hawk produced young but they were apparently killed by a mammalian predator (D. Mikesic, pers. comm.).

In 2003 on the 57,000-acre Navajo Mine raptor monitoring area, one Northern Harrier, two Red-tailed hawks, nine Ferruginous hawk, three American Kestrels, one Prairie Falcon, one Barn Owl, two Great Horned Owl, and four Burrowing owl nest sites were occupied (Hawks Aloft 2004). Of these, three Ferruginous hawks and two Great-horned owl nests successfully

fledged young. The results of cavity and underground nesting attempts of American Kestrels and Burrowing owls were not ascertained.

Within the study area, the following territories have been documented as occupied at least once during 28 years of monitoring: four Red-tailed Hawks, five Ferruginous hawks, one Golden eagle, five American Kestrels, three Prairie falcons, three Great-horned owls, and one Burrowing owl (Hawks Aloft 2004).

Several other important bird observations were made while in the study area by Ecosphere biologists. Two juvenile Bald eagles were identified on two, different occasions: 7 August 2004 in the west-central portion of the study area and 14 August 2004 at the northern boundary of the study area. Four Burrowing Owls (*Athene cunicularia*) were seen on several occasions within the prairie dog town. A Burrowing Owl was heard at the stock pond on 5 June 2004 while netting for bats and observed in the same area again on 22 June 2004. Gambel's Quail (*Callipepla gambelii*) was seen on two occasions in the west-central portion of the study area: 10 July and 5 August 2004. Two American Avocets (*Recurvirostra americana*) and several Killdeer (*Charadrius vociferus*) were noted at a stock pond on the south boundary of the study area in early June; neither was present in late June.

6.6 Small-footed Myotis, Spotted Bat, Townsend's Big-eared Bat

No sensitive bat species were captured in our mist-netting efforts.

6.7 Pronghorn antelope

No individual pronghorn antelope or tracks or scat was sighted while in the study area.

7.0 RESULTS: GENERAL WILDLIFE

Eleven small mammals were captured in 3,344 trap nights (Table 3). All captures of small mammals were in arroyo-shrub habitat. Seven of those small mammals were captured on trapping web A2: four Ord's kangaroo rats (*Dipodomys ordii*), one deer mouse (*Peromyscus maniculatus*), one pocket mouse (*Perognathus apache*), and one recaptured Ord's kangaroo rat (Table 1). One deer mouse was captured on trapping web A1 and 3 Ord's kangaroo rats were captured on trapping grid A4 in arroyo-shrub habitat (Figure 1). No small mammals were captured in any other habitat type; all eleven captures were made in arroyo-shrub habitat (Table 3).

Although estimates of abundance (\hat{N}) could not be estimated due to low capture success, density estimates can be calculated using minimum number alive (MNA) (Krebs et al. 1986, Slade and Blair 2000) in arroyo-shrub habitat (Table 4). However, our approach does not incorporate the effective area trapped, only the area of trapping web or grid. Density estimation is not simply $\hat{D} = \hat{N} / A$, where A is the area of the trapping grid and \hat{N} is the number of individuals (Wilson and Anderson 1985). While demographic closure (no birth, deaths, immigration or emigration) is easily met or approximated in most studies, geographic closure (a physical boundary to the population) is more difficult to attain, unless the study area is a small island or an isolated woodlot (White et al. 1982). Geographic closure is rarely met in trapping-grid studies of snowshoe hares because of edge effect. Small mammals may have home ranges that overlap the trapping grid or lie outside the trapping grid and are attracted to it by bait (Wilson and Anderson 1985); therefore, the actual area trapped is larger than just the area of the trapping grid. Therefore, the density estimates reported in this report (Table 4) may dramatically overestimate density. Although actual densities are probably much lower, densities in this report do represent numbers for future comparison if field and calculation methods are repeated.

Prairie dogs were observed at the town in early June; however, no prairie dogs were seen in later summer. No coyotes (*Canis latrans*) were seen or heard during the spotlight or any other surveys, but tracks were identified and several scats were found. Jackrabbits (*Lepus californicus*) were occasionally seen in desert shrub areas. Several desert cottontails (*Sylvilagus auduboni*) were observed in the study area, especially during the spotlight surveys. A white-tailed antelope squirrel (*Ammospermophilus leucurus*) and a ground squirrel (*Spermophilus pilosoma*) were seen in rocky draws on separate occasions within the west-central portion of the study area. Bobcat (*Lynx rufus*) tracks were also identified in Chaco Wash. The study area apparently supports a small population of mule deer (*Odocoileus hemionus*) as a few tracks were identified, mostly in Chaco Wash.

Livestock grazing occurs in the study area. Six horses roam the area near the stock pond; several cattle graze on the north end of Area IV North near Cottonwood Wash and numerous horse and cow tracks were seen in Chaco Wash. Tracks of domestic dogs and domestic cat were also seen.

Bird species heard or observed while conducting avian surveys were as follows: White-crowned Sparrow (*Zonotrichia leucophrys*), Sage Sparrow (*Amphispiza belli*), Song Sparrow (*Melospiza melodia*), Black-throated Sparrow (*Amphispiza bilineata*), Cassin's Finch (*Carpodacus cassinii*), Horned Lark (*Eremophila alpestris*), Ash-throated Flycatcher (*Myiarchus*

cinerascens), Cassin's Kingbird (*Tyrannus vociferans*), Say's Phoebe (*Sayornis saya*), Brown-headed Cowbird (*Molothrus ater*), Rock Wren (*Salpinctes obsoletus*), Common Nighthawk (*Chordeiles minor*), Northern Mockingbird (*Mimus polyglottos*), Mourning Dove (*Zenaida macroura*), and Common Raven (*Corvus corax*). The Sage Sparrow is the only species noted in the Partners in Flight (PIF) Bird Conservation Plan as a high priority species for the Colorado Plateau.

Mist-netting resulted in the capture of numerous individuals of several bat species: 22 pregnant female and 10 male western pipistrelles (*Pipistrellus hesperus*), one pregnant female and 6 male Pallid bats (*Antrozous pallidus*), one non-reproductive female Silver-haired bat (*Lasionycteris noctivagans*), and one non-reproductive female Hoary bat (*Lasiurus cinereus*).

8.0 DISCUSSION: T&E WILDLIFE

8.1 Chisel-tooth Kangaroo Rat and Banner-tail Kangaroo Rat

Although no sensitive species were captured during our live-trapping surveys, they do have the potential to exist in the study area. Multiple burrows were observed in sandy areas under shrubs in the central portion of the study area (UTM 404118/723450, NAD 27 CONUS) and near the southern boundary at the confluence of Pinabete and Chaco Wash (UTM 4041854/0718825 NAD CONUS 27). However, these burrows were typically no larger than 1 m × 1 m - typical of the burrow of an Ord's kangaroo rat (Fitzgerald et al. 1994). Banner-tail kangaroo rats usually construct larger burrows, as high as 1.2 m above the surrounding terrain and 1.5 to 4.5 m in diameter (Hoffmeister 1986). Chisel-tooth kangaroo rats also construct burrows with similar vegetation as that found in the study area. Although Chisel-tooth kangaroo rats are thought to be absent from the study area (Hoffmeister 1986, D. Mikesic, Zoologist, comm.), they were a common sighting in spotlight surveys for black-footed ferrets in the mid-1980s (SMCRA Report 1992). Previous surveys reported deer mice and silky pocket mice (*Perognathus flavus*) as the most abundant and widespread small mammal species trapped in the study area (SMCRA Report 1992). Further, in 1973 and 1974, on and near the Navajo Mine Lease, 11.31 deer mice and 0.53 silky pocket mice were captured per 100 trap-nights in arroyo-shrub habitat (SMCRA 1992). Although these numbers incorporate a more intense trapping effort throughout the entire Navajo Mine lease, they are significantly greater than the capture rate in Area IV North; we captured 11 small mammals total in 1,080 trap-nights in arroyo-shrub habitat. The lack of abundance and species diversity represented in the small mammal

population in Area IV North (see Results) compared with documented species in similar habitat (Table 1), may have to do with the high amount of disturbance from cattle and sheep grazing. Indeed, Zou et al. (1989) found that habitat disturbance negatively impacted Great Basin pocket mice (*Perognathus parvus*) and deer mice (*Peromyscus maniculatus*) in treatment experiments of their habitat.

8.2 Black-footed Ferrets

Black-footed ferrets, a federally endangered mustelid, typically occupy large prairie dog towns >80 ha with complex burrow systems or ≥ 20 burrows/ha (Mikesic and Hystedt 2001a). Although there are no known black-footed ferrets on the Navajo Nation, there may be prairie dog towns of sufficient size to support ferrets that simply have never been surveyed (Mikesic and Hystedt 2001a).

8.3 Kit foxes

Kit foxes are found throughout most of New Mexico except for the northeastern corner of the state (Findley et al. 1975, unm.edu/bisonm/bisonquery.php). They prefer soft, sandy or alluvial soils where they can dig their dens, often in desert-scrub or desert grassland similar to our study area (Hoffmeister 1986). Kit foxes are known to prey upon Ord's kangaroo rats, cottontails, jackrabbits, and other small mammals (Findley et al. 1975), as well as crickets, grasshoppers, lizards, and birds (Hoffmeister 1986). Kit foxes were previously documented in Area IV North (SMCRA 1992), and while our study also found significant signs of kit fox in the study area, their densities remain unknown.

8.4 Mountain Plover and Southwestern Willow Flycatcher

There is minimal habitat in the study area for either Mountain Plover or Southwestern Willow Flycatcher. In previous breeding bird surveys, Horned Larks were the most abundant species in Area IV N, while Mourning Doves were the second most abundant bird observed (SMCRA 1992).

8.5 Golden Eagle, Bald Eagle, Peregrine Falcon, and Ferruginous Hawk

The study area includes historic and recently active nest sites of seven species of raptorial birds. Two of these, Golden eagle and Ferruginous hawk, are listed on the Navajo Nation Endangered Species list and must be protected against disturbance. One Ferruginous hawk

territory consists of five nests northwest of the Area IV North survey buffer area. The most recently active (1999) Golden eagle nest site is approximately one mile from Area IV North. The federally threatened Bald eagle may migrate through the planning area, although there is limited wintering habitat and virtually no water resources. Ferruginous hawks reportedly used two mesas on the eastern edge of Area IV, especially during the breeding season (SMCRA 1992). The SMCRA (1992) report listed active nests of two Golden eagles, two Great-horned owls (*Bubo virginianus*), two Red-tailed hawks (*Buteo jamaicensis*), one Ferruginous hawk and one Prairie falcon (*Falco mexicanus*) in Area IV, but since more detailed locations of the nests were not provided, direct comparisons are not justified. Burrowing owls were also observed in Area IV North, but apparently were more abundant in previous surveys than the few individuals we observed (SMCRA 1992).

8.6 Small-footed Myotis, Spotted Bat, Townsend's Big-eared Bat

The absence of sensitive bats species in the study area is not surprising

8.7 Pronghorn Antelope

No pronghorn sightings have been recorded in the study area to date (SMCRA Report 1992). In the late 1950's and early 1960's, pronghorns were a common sight on public lands within a 30-40 mile radius of Farmington. They were hunted until 1974 when numbers began to decline in the San Juan Basin. The preferred vegetation type used by antelope in the San Juan Basin is primarily big sagebrush (*Artemisia tridentata*) with varying understory grasses and forbs. The plant communities on the project area may have the wrong species of sage and insufficient grasses to support pronghorns (Donna Howell, independent bat biologist, pers. comm.). Further, in Arizona, pronghorn antelope are not known to occur in Great Basin desert-scrub habitat (Hoffmeister 1986).

9.0 DISCUSSION: GENERAL WILDLIFE

The presence of carnivores (e.g. kit foxes, coyotes, and badgers) indicates a prey base large enough to support them. These carnivores are most likely supported by lagomorphs, kangaroo rats, squirrels and other small mammals, and perhaps an occasional mule deer fawn. The prairie dog town in the study area was <1 ha; black-footed ferrets are usually associated with medium to large prairie dog towns >80 ha. According to the Navajo Nation survey guidelines,

such a small area is not warranted for black-footed ferret surveys (Navajo Fish and Wildlife Department 1985). Although this was determined an active prairie-dog town, prairie dog sightings were rare in June, and no prairie dogs were observed in late summer. It is not uncommon for prairie dogs to severely denude the vegetation around their towns and eventually desert them (Fitzgerald et al. 1994) or to be devastated by the plague. In previous surveys conducted in Area IV North (SMCRA 1992), prairie dogs were the most abundant mammals observed in the study area. Several statewide and San Juan County efforts are underway to establish protection for this mammal

(http://www.nativeecosystems.org/prairiedogs/gunnisons/040223_release.htm).

A petition was filed in February 2004 to list the Gunnison's prairie dog under the federal Endangered Species Act. Badgers, also commonly associated with prairie dog towns, were also previously reported in the SMCRA (1992) report.

The presence of numerous pipistrelles is not surprising; these bats dwell singly or in small groups in shallow cliff crevices, which are numerous throughout the project area. Pallid bats, a colonial species, probably inhabit the few deeper crevices or deeper wind-eroded pockets available in area cliffs. Female pallid bats live apart from males from advanced pregnancy though young-rearing; therefore, the presence of both sexes in the planning area strongly suggests at least two roosting sites. The presence of a silver-haired bat was unexpected because these bats generally occur in small groups in forested habitats, roosting under tree bark or in snags. They are, however, nomadic and migratory, which probably accounts for the capture. Finley (1975) documented one other silver-haired bat specimen from San Juan County in the Chuska Mountains. The hoary bat was also unexpected, although they have been documented in San Juan County (Finley 1975). Hoary bats generally feed along riparian corridors and roost in cottonwoods or other riparian trees. They are, however, strong fliers capable of covering long distances. The captured bat may have come from the San Juan River area.

Occasional mule deer may be transients wandering from the San Juan River corridor but they are not common residents of Great Basin desert-scrub habitat (Hoffmeister 1986). Domestic livestock such as cattle, horses, and sheep occur throughout the study area.

10.0 DISCUSSION: POTENTIAL IMPACTS TO ENDANGERED, THREATENED, AND SENSITIVE WILDLIFE

The continuation of coal extraction in Area IV North of Navajo Mine on the Navajo Nation has the potential to directly impact all wildlife species documented in the area, including three Navajo Nation listed species: Golden eagle, Ferruginous hawk, and kit fox. Coal extraction will result in the loss of thousands of acres of wildlife habitat potentially destroying nesting sites of Golden eagles, Ferruginous hawks and kit fox burrows. Wildlife movement and dispersal in the area would also be affected by the presence of human activity, heavy machinery, and increased road traffic. The removal of arroyo-shrub habitat will have potentially dramatic impacts to small and medium-sized mammal populations indirectly impacting these listed species as well. Of the six microhabitats we surveyed within the study area, all small mammals were captured in arroyo-shrub habitat. These small mammal populations provide a prey base for Golden eagles, Ferruginous hawks, and kit foxes which will undoubtedly be indirectly impacted if these prey resources decline. Avian species are also closely associated with dense vegetative cover found in arroyo-shrub habitat and coal extraction would result in direct habitat loss.

Nesting by Golden eagles, a Navajo Nation Group 3 species (Mikesic and Nystedt 2001*b*) has been documented in the study area and may be directly impacted by habitat destruction, avoidance of the project area, and indirectly by habitat destruction resulting in the loss of small mammal species for food. Most Golden eagle nests on the Navajo Nation are found on steep cliffs > 30 m high, but nests have also been documented in shorter cliffs (~10 m) (Mikesic and Nystedt 2001*b*). Nests are also commonly found adjacent to cottontail and jackrabbit habitat, namely arroyo-shrub habitat in our study area. Golden eagles often use multiple nests within their territory and rotate their use annually (Watson 1997); therefore, nests should be monitored >1-yr to assess their activity status. Golden eagles are sensitive to disturbance by loud, long-term activity, especially during the incubation period beginning in February until the fledglings are 20 days old in early June (Johnsgard 1990). Mitigation measures approved by the Navajo Nations should be employed to avoid disturbing any future area nesting sites.

Ferruginous hawks, also a Navajo Nation Group 3 species (Mikesic and Nystedt 2001*c*), should be provided similar considerations. Nests on the Navajo Nation are typically found on clay or rock pinnacles, small buttes or cliffs <30 m high (Mikesic and Nystedt 2001*c*). Populations of desert cottontails, black-tailed jackrabbits, and ground squirrels are required in habitats surrounding their nest sites; therefore, destruction of habitat by coal extraction would directly reduce this prey base. Further, Ferruginous hawks are especially prone to nest abandonment during the incubation period from mid-March to mid-May (Mikesic and Nystedt

2001*d*). Mitigation measures approved by the Navajo Nations should be employed to avoid disturbing any future area nesting sites.

Kit foxes, listed as a Group 4 species by the Navajo Nation (Mikesic and Nystedt 2001*d*), are a small canid found in north-central New Mexico. Kit foxes are semifossorial and dig their own dens, which usually have several, key-shaped openings. Kit foxes commonly have multiple dens that they use simultaneously, especially throughout the summer when rearing pups (Armstrong et al. 1994). It is important to avoid destruction and disturbance of these dens not only for pup-rearing, but also for protection from predation by coyotes, a high cause of mortality for kit foxes (O'Farrell 1987). Kit foxes rely heavily on cottontails and jack rabbits for food (Armstrong et al. 1994), and their abundance is dependent upon prey availability. Therefore, in order to avoid adversely affecting kit foxes, efforts to maintain their food supply should also be considered. Mortality from motor vehicles has also been documented as a significant source of mortality for kit foxes; therefore, construction of any new roads and the increase in motor vehicle traffic should be minimized (O'Farrell 1987).

The Bald eagle, a federally and New Mexico state listed raptor species may migrate through the study area. Because there is no suitable wintering habitat for bald eagles within the study area, no mitigation measures are warranted.

In conclusion, if coal extraction continues in Area IV North, management and mitigation for protection of the Navajo listed species should be a high priority. BHP Billiton plans to follow reclamation guidelines in order to minimize any negative impacts discussed above. Additionally, reclamation activities by BHP Billiton will include positive impacts to the study area such as restoration and improvement of wildlife habitat.

Literature Cited

- Boeker, E. L. 1970. A method for determining golden eagle nesting activity. *Southwestern Naturalist* 15:136-137.
- 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.
- Dick-Peddie, W.A. 1993. *New Mexico Vegetation: Past, Present and Future*. University of New Mexico Press. Albuquerque, New Mexico.
- Findley, J.S., A.H. Harris, D.E. Wilson, and C. Jones. 1975. *Mammals of New Mexico*. University of New Mexico Press, Albuquerque, New Mexico.
- Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. *Mammals of Colorado*. Denver Museum of Natural History and University Press of Colorado.
- Fuller, M. A., and J. A. Mosher 1987. Raptor survey techniques. Pages 37-66 in B. A. Giron Pendleton, B. A. Millsap, K. W. Cline, and D. M. Bird, eds. *Raptor management techniques manual*. Natl. Wildlife Federation., Washington, D. C.
- Grier, J. W., and R. W. Fyfe. 1987. Preventing research and management disturbance. Pages 173-182 in B. A. Giron Pendleton, B. A. Millsap, K. W. Cline, and D. M. Bird, eds. *Raptor management techniques manual*. Natl. Wildlife Federation., Washington, D. C.
- Hawks Aloft, Inc. 2004. 2003 raptor surveys, BHP Navajo Coal Company, Navajo Mine, New Mexico. HAI, Albuquerque, NM. 26 p + appendices.
- Hickman, G. L. 1972. Aerial determination of golden eagle nesting status. *Journal of Wildlife Management* 36:1289-1292.
- Hoffmeister, D. F. 1986. *Mammals of Arizona*. Univ. Arizona Press and Arizona Game and Fish Dept. 602 pp.
- Johnsgard, P.A. 1990. Golden Eagle. In *Hawks, Eagles, and Falcons of North America*. Smithsonian Institute,
- Krebs, C.J., S. Boutin, and B.S. Gilbert. 1986. A natural feeding experiment on a declining snowshoe hare population. *Oecologia* 70:194-197.
- Mikesic, D. G, and Nystedt. 2001a. Species Account for *Mustela nigripes*. Navajo Natural Heritage Program, P. O. Box 1450, Window Rock, Arizona 86515.
- Mikesic, D. G, and Nystedt. 2001b. Species Account for *Aquila chrysaetos*. Navajo Natural Heritage Program, P. O. Box 1450, Window Rock, Arizona 86515.
- Mikesic, D. G, and Nystedt. 2001c. Species Account for *Buteo regalis*. Navajo Natural Heritage Program, P. O. Box 1450, Window Rock, Arizona 86515.

- Mikesic, D. G, and Nystedt. 2001*d*. Species Account for *Vulpes macrotis*. Navajo Natural Heritage Program, P. O. Box 1450, Window Rock, Arizona 86515.
- Mills J.N., T.L. Yates, J.E. Childs, R.R. Parmenter, T.G. Ksiazek, and P.E. Rollin. 1995. Guidelines for working with rodents potentially infected with hantavirus. *Journal of Mammalogy* 76:716-22.
- O'Farrell, T. 1987. Kit fox. Pages 422-431 *In* Wild furbearer management and conservation in North America (M. Novak, J.A. Baker, M.E. Obbard, and B. Malloch, eds.) Ontario Trappers Association, Toronto, Canada.
- Parmenter C.A., T.L.Yates, R.R. Parmenter, J.N. Mills, J.E. Childs, and M.L. Campbell. 1998. Small mammal survival and trapability in mark-recapture monitoring programs for hanta-virus. *Journal of Wildlife Diseases* 34:1-12.
- SMCRA Report 1992. Surface Mining Control and Reclamation Act of 1977.
- Slade, N.A., and S.M. Blair. 2000. An empirical test of using counts of individuals captured as indices of population size. *Journal of Mammalogy* 81:1035-1045.
- US Fish and Wildlife Service. 1989. Black-footed ferret survey guidelines for compliance with the endangered species act. Denver and Albuquerque.
- Watson, J. 1997. The Golden Eagle. T&AD Poyser Limited. London, England.
- White, G. C., D. R. Anderson, K. P. Burnham, and D. L. Otis. 1982. Capture-recapture and removal methods for sampling closed populations. LA-8787-NERP, UC-11. Los Alamos National Laboratory, Los Alamos, NM, USA.
- Wilson, K. R. and D. R. Anderson. 1985. Evaluation of tow density estimators of small mammal population size. *Journal of Mammalogy* 66:13-21.
- Zou, J., J.T Flinder, H.L. Black, S.G. Whisenant. 1989. Influence of experimental habitat manipulation on a desert rodent population in southern Utah. *Great Basin Naturalist* 49: 435-448.

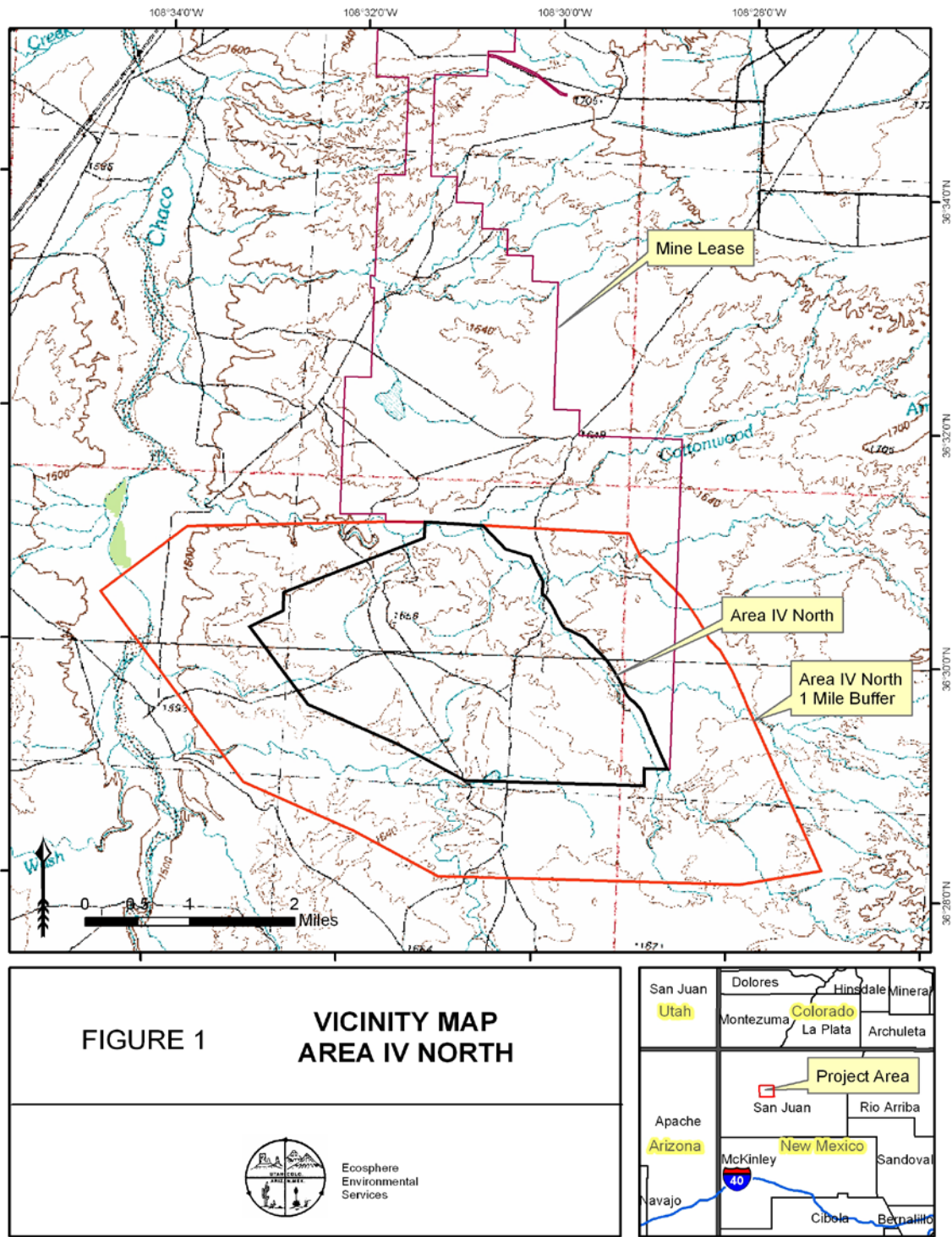


Figure 1. General vicinity map of study area showing Area IV N (within the greater mine lease area) plus a 1-mile buffer, Summer 2004.

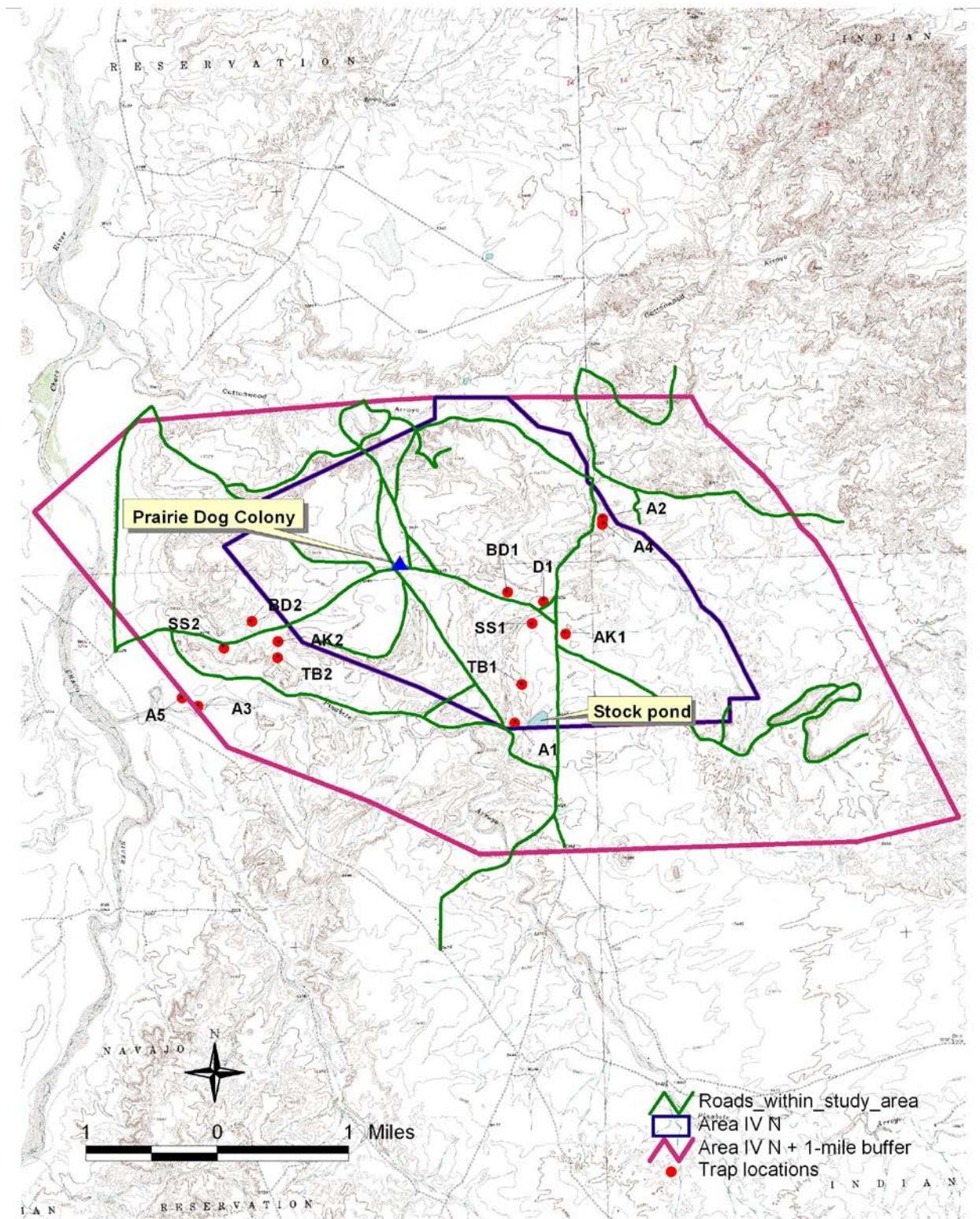


Figure 2. Map of study area of Area IV North plus a 1-mile buffer (rounded), including spotlight routes along drivable roads within the study area, all small mammal trap locations, as well as the location of the stock pond and the prairie dog colony, plotted on the Hogback S, Kirtland SW, Newcomb NE, and The Pillar NW 7.5-minute USGS quadrangles, Summer 2004. (See Table 3 for description of trap locations.)

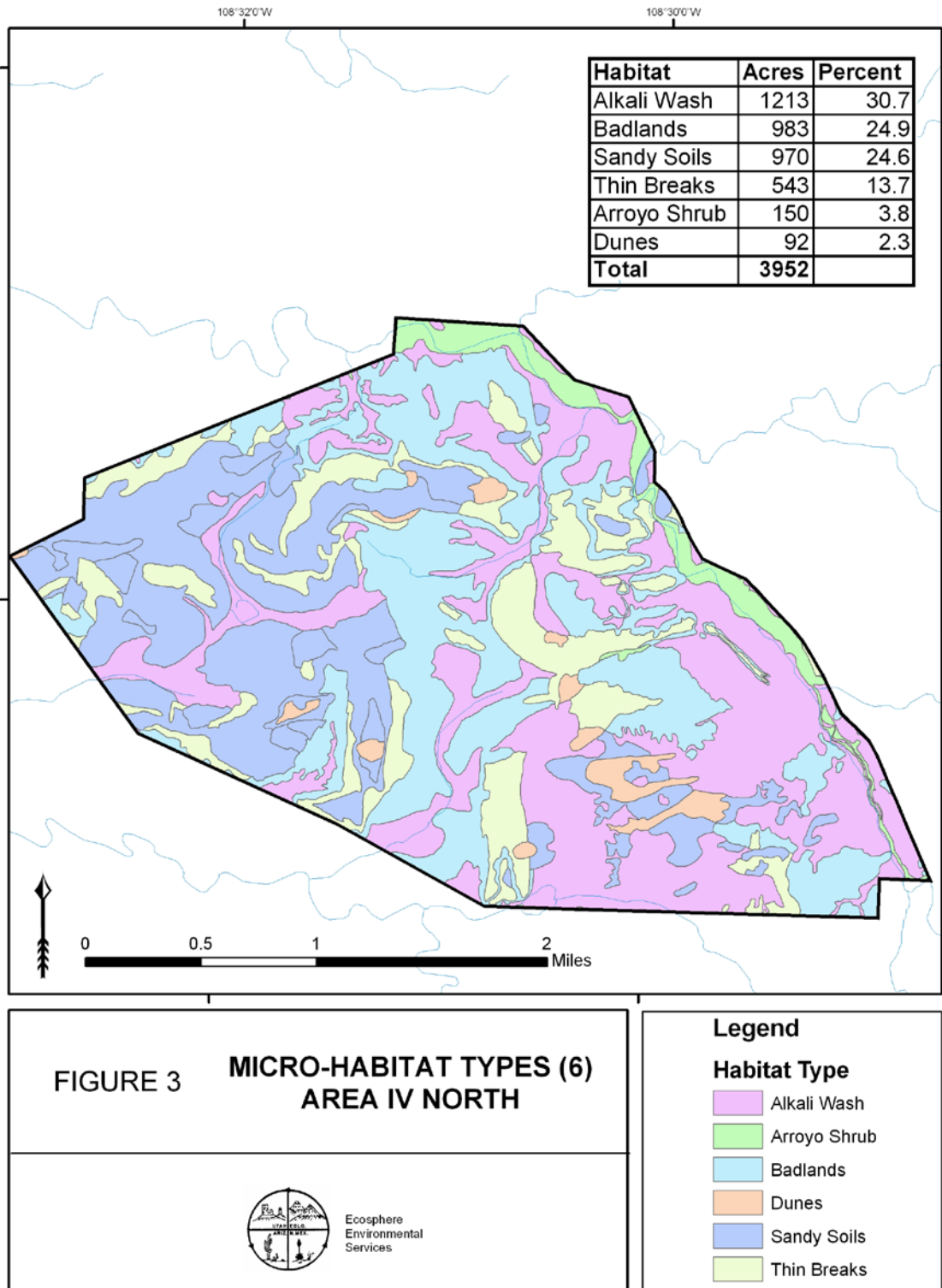


Figure 3. Map of the distribution of the six micro-habitat types found in the Area IV N study area, along with a table of their respective acreage and proportion of total acreage, Summer 2004.

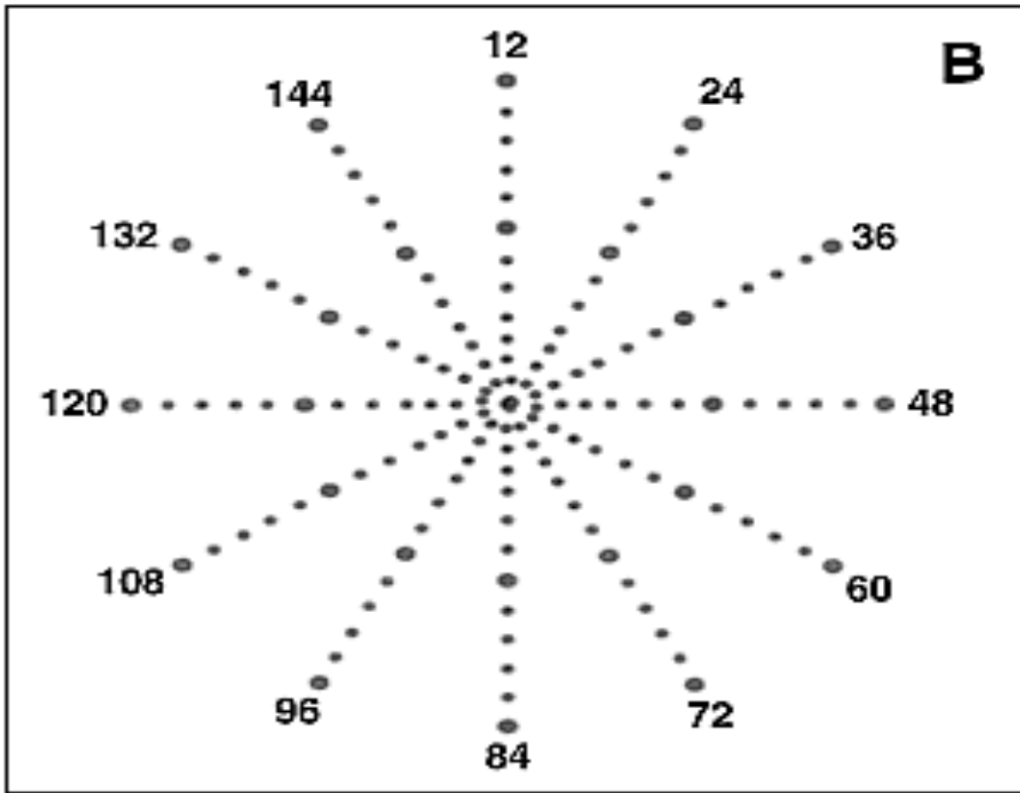


Figure 4. Schematic representation of a trapping web showing 148 trap locations along 12 spokes 30° apart with the first 4 traps spaced 5 m apart and the subsequent 8 traps spaced 10 m apart for a total trapping web size of 3.14 ha (Parmenter et al. 1998).

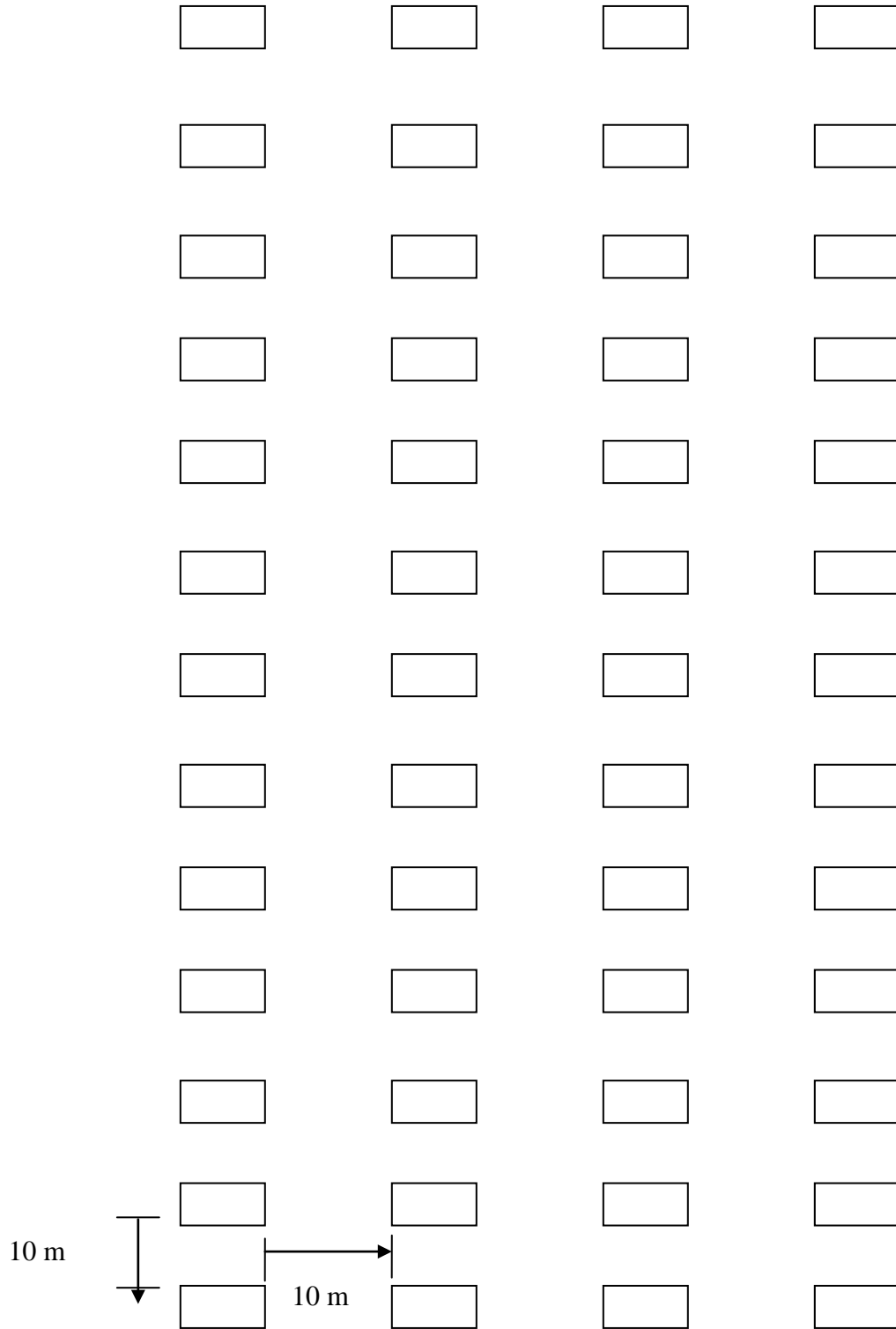



Figure 5. Trapping grid schematic using 4 transects spaced 10 m apart with 12 traps in each transect also 10 meters apart for a total trapping grid area of 0.33 ha. Each  represents a Sherman live-trap, Area IV North, summer 2004.

Table 1. List of all wildlife and raptor species that have been documented to occur in Great Basin desert-scrub habitat, the dominant vegetation community found in the Area IV North study area, summer 2004 (Dick-Peddie 1993, Hoffmeister 1986, Findley et al. 1975). The wildlife species we documented in the study area from this list are indicated by an asterisk (*). Other wildlife species we observed in the study are also indicated below.

<u>Scientific Name</u>	<u>Common Name</u>
<i>Notiosorex crawfordi</i>	desert shrew
<i>Myotis yumanensis</i>	yuma myotis
<i>Myotis californicus</i>	California myotis
<i>Myotis leibii</i>	small-footed myotis
* <i>Pipistrellus hesperus</i>	western pipistrelle
<i>Eptesicus fuscus</i>	big brown bat
<i>Lasiurus cinereus</i>	hoary bat
<i>Plecotus townsendii</i>	Townsend's big-eared bat
* <i>Antrozous pallidus</i>	pallid bat
<i>Tadarida brasiliensis</i>	Brazilian free-tailed bat
* <i>Lepus californicus</i>	black-tailed jackrabbit
* <i>Sylvilagus audobonii</i>	desert cottontail
* <i>Cynomys gunnisoni</i>	Gunnison's prairie dog
* <i>Spermophilus spilosoma</i>	spotted ground squirrel
<i>Spermophilus variegates</i>	rock squirrel
* <i>Ammopermophilus leucurus</i>	white-tailed antelope squirrel
<i>Thomomys bottae</i>	Botta's pocket gopher
<i>Perognathus flavus</i>	silky pocket mouse
<i>Perognathus flavescens</i>	plains pocket mouse
* <i>Perognathus apache</i>	Apache pocket mouse
<i>Dipodomys spectabilis</i>	banner-tailed kangaroo rat
* <i>Dipodomys ordii</i>	Ord's kangaroo rat
<i>Dipodomys microps</i>	chisel-toothed kangaroo rat
<i>Reithrodontomys megalotis</i>	western harvest mouse
<i>Peromyscus eremicus</i>	cactus mouse
* <i>Peromyscus maniculatus</i>	deer mouse
<i>Onychomys leucogaster</i>	northern grasshopper mouse
<i>Neotoma albigula</i>	white-throated woodrat
<i>Neotoma lepida</i>	desert woodrat
<i>Microtus mexicanus</i>	Mexican vole
<i>Erethizon dorsatum</i>	porcupine
* <i>Canis latrans</i>	coyote
* <i>Vulpes macrotis</i>	kit fox
<i>Mustela frenata</i>	long-tailed weasel
* <i>Taxidea taxus</i>	badger
<i>Mustela nigripes</i>	black-footed ferret
<i>Spilogale putorius</i>	western spotted skunk
<i>Mephitis mephitis</i>	striped skunk
<i>Felis concolor</i>	mountain lion
<i>Felis rufus</i>	bobcat
<i>Circus cyaneus</i>	Northern harrier
<i>Buteo jamiacensis</i>	Red-tailed hawk
<i>Buteo regalis</i>	Ferruginous hawk

**Aquila chrysaetos*
Falco sparverius
Falco mexicanus
Tyto alba
Bubo virginianus
**Athene cunicularia*
**Corvus corax*

Golden eagle
American kestrel
Prairie falcon
Barn owl
Great-horned owl
Burrowing owl
Raven

Other wildlife and raptors species observed in the study area:

**Haliaeetus leucocephalus*
**Odocoileus hemionus*

Bald eagle
mule deer

Table 2. Species with special conservation status according to Federal, State of New Mexico, and Navajo Nation with potential to occur in the study area and their habitat associations (Fitzgerald et al. 1994, Hoffmeister 1986, <http://nmnhp.unm.edu/bisonm/bisonquery.php>). Species we documented in the study area are indicated by an asterisk (*).

Species	Federal	State of NM	Navajo Nation	Habitat Association
Raptors				
*Bald eagle (<i>Haliaeetus leucocephalus</i>)	T	T		Forests, river bottoms, or canyon rims with available water source
Ferruginous hawk (<i>Buteo regalis</i>)			Group 3	Badlands, flat or rolling desert-grassland, desert-scrub in clay or rock pinnacles, buttes, or cliffs
*Golden eagle (<i>Aquila chrysaetos</i>)			Group 3	Steep cliffs adjacent to foraging habitat of desert- grassland or desert-scrub
Peregrine falcon (<i>Falco peregrinus</i>)			Group 4	Steep cliffs in scrapes or ledges with nearby forest or wetland habitat
Birds				
Mountain plover (<i>Charadrius montanus</i>)			Group 4	Flat to rolling grassland, semi-desert, or badland habitat with short, sparse vegetation, typically disturbed
Southwestern Willow Flycatcher (<i>Empidonax traillii extimus</i>)	E	E		Dense riparian cover, with surface water or moist soils, with or without canopy
Mammals				
Banner-tailed kangaroo rat (<i>Dipodomys spectabilis</i>)			Proposed Group 4	Desert or semi-desert grasslands with some barren ground
Black-footed ferret (<i>Mustela nigripes</i>)	E		Group 2	Prairie dog towns > 4 ha
Big free-tailed bat (<i>Nyctinomops macrotis</i>)		S	S	Mid-elevation grasslands and desert scrub. Requires tall cliffs for roosting and open water for drinking
Chisel-tooth kangaroo rat (<i>Dipodomys microps</i>)			Group 4	Open, sandy areas in desert scrub habitat with rock or gravel; sensitive to grazing
*Kit fox (<i>Vulpes macrotis</i>)			Group 4	Sandy areas in desert-scrub or desert-grassland habitat with sparse shrubs
Small-footed myotis (<i>Myotis ciliolabrum</i>)		S		Wide variety of habitat types
Spotted bat (<i>Euderma maculatum</i>)	S	T	Group 4	Mostly forested habitat with cliffs, also at lower elevations in semi-desert shrublands
Townsend's big-eared bat (<i>Plecotus townsendii pallescens</i>)		S	Group 4	Closely tied to presence of mine tunnels or caves
Pronghorn antelope (<i>Antilocapra americana</i>)			Group 3	Grassland or desert-scrub habitat with rolling hills or mesas with scattered trees and shrubs

Table 3. The total number of trap-nights and captures using two different trapping methods in five habitat types, Area IV N, Summer 2004. No. trap-nights is the number of traps x the number of nights they were set.

Trap No.	Trapping method	Habitat type	No. trap-nights	No. captures/recaptures
A1	web	Arroyo-shrub	296	1/0
A2	web	Arroyo-shrub	296	6/1
A3	web	Arroyo-shrub	296	0/0
A4	grid	Arroyo-shrub	96	3/0
A5	grid	Arroyo-shrub	96	0/0
SS1	web	Saline sand	296	0/0
SS2	web	Saline sand	296	0/0
TB1	web	Thin break	296	0/0
TB2	web	Thin break	296	0/0
AK1	web	Alkali wash	296	0/0
AK2	web	Alkali wash	296	0/0
D1	web	Dune	296	0/0
BD1	grid	Badland	96	0/0
BD2	grid	Badland	96	0/0
TOTAL			3,344	10/1

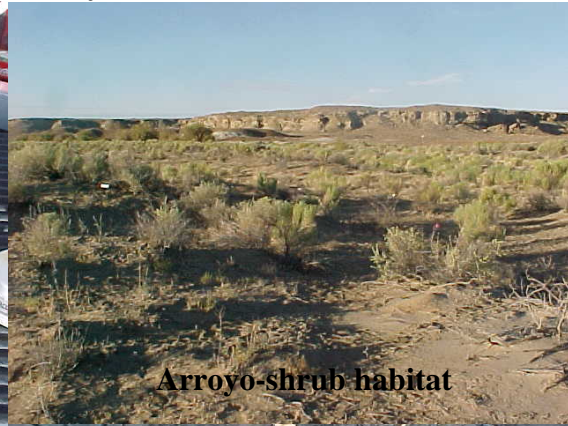
Table 4. Density estimates for two trapping webs and one trapping grid in arroyo-shrub habitat using minimum number alive (MNA) as a surrogate for abundance (*N*) due to the lack of capture success. No variance is associated with MNA.

Trap No.	Trapping method	Habitat type	Area (ha)	MNA	Density (mammals/ha)
A1	web	Arroyo-shrub	3.14	1	0.3
A2	web	Arroyo-shrub	3.14	6	1.9
A4	grid	Arroyo-shrub	0.33	3	9.1

Photo Gallery



Ord's kangaroo rat



Arroyo-shrub habitat



Badland habitat



Kit fox burrow



Ord's kangaroo rat



Deer mouse



Dune habitat with traps and flagging



Cow grazing

LIST OF PREPARERS

Jennifer Zahratka, M.S. Biologist
Ecosphere Environmental Services
108 N Behrend, Suite A
Farmington, NM 87401
(505) 327-3088

Erin Powell, PhD, Biologist
Ecosphere Environmental Services
108 N Behrend, Suite A
Farmington, NM 87401
(505) 327-3088

Catherine Ortega, PhD, Biologist
Department of Biology
1000 Fort Lewis College
Rim Drive
Durango, CO 81301
(970) 799-0901

Donna Howell, PhD, Biologist
HCR 64 Box 4
LeDoux, NM 87732
(505) 387-6853

Dale Stahlecker, M.S. Biologist

Mike Fitzgerald, B.A., Owner/Manager
Ecosphere Environmental Services
2257 Main Avenue, Patio Level
Durango, CO 81301
(970) 382-7256

Appendix 16.B

Wildlife Baseline Surveys

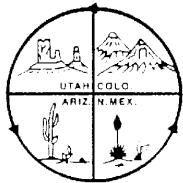
August 2008

WILDLIFE BASELINE SURVEYS
for the
NAVAJO MINE EXTENSION PROJECT

Prepared for
BHP NAVAJO COAL COMPANY



Prepared by



ECOSPHERE ENVIRONMENTAL SERVICES

13 August 2008

Table of Contents

1.0	INTRODUCTION.....	1
2.0	PROJECT AREA.....	1
2.1	Location	1
2.2	Physical Description	2
2.3	Vegetation.....	2
3.0	METHODS	2
3.1.1	Raptors	3
3.1.2	Breeding Birds	3
3.1.3	Shorebirds and Waterfowl	4
3.1.4	Small Mammals	5
3.1.5	Lagomorphs	6
3.1.6	Sciurids	6
3.1.7	Felids.....	7
3.1.8	Canids	7
3.1.9	Mustelids.....	7
3.1.10	Big Game	8
3.1.11	Herptiles.....	8
3.1.12	Fish.....	8
4.0	RESULTS	8
4.1.1	Raptors	8
4.1.2	Avian non-raptor species	9
4.1.3	Mammal species.....	10
4.1.4	Herptile species.....	11
5.0	SUMMARY	12
6.0	LITERATURE CITED AND REFERECNES.....	13
7.0	TABLES.....	14
8.0	FIGURES.....	20
9.0	ATTACHMENTS	26

LIST OF TABLES

Table 1. List of species documented in the project area, Navajo Mine Extension Project, BNCC, 2007.....	15
Table 2. Mean number of individuals detected per 1-km transect, species richness, (i.e. number of species detected), and index of species diversity (Simpson 1949), for strip transects conducted in 5 vegetative communities Areas 4 South and 5 during breeding bird surveys, Navajo Mine Extension Project (NMEP), BHP Navajo Coal Company (BNCC) mine lease area, 2007. Bolding indicates highest value for that statistic.	18
Table 3. Relative abundance of bird species calculated from breeding bird survey data from Areas 4 South and 5, Navajo Mine Extension Project, BNCC Mine lease area, 2007. The highest relative abundance (horned lark) in each vegetative community is in bold text.....	19

LIST OF FIGURES

Figure 1. Vicinity map and project area for 2005 and 2007 Wildlife Baseline Inventories, Navajo Mine Extension Project, BNCC Mine lease area.	21
Figure 2. The locations of transects and ponds for breeding birds surveys, Navajo Mine Extension Project, BNCC Mine lease area.	22
Figure 3. The locations of small mammal trapping webs and grids in 3 habitat types arroyo shrub (AS), alkali wash (AW) and sands (SA), 2007, and in 2 habitat types (AS and SA) in 2005, Navajo Mine Extension Project, BNCC Mine lease area.	23
Figure 4. Prairie dog towns mapped within the project area and their respective size, Navajo Mine Extension Project, BNCC Mine lease area, 2007.	24
Figure 5. Spotlighting survey effort for canids in 2005 and target spotlighting surveys for kit fox in 2007 (Ecosphere 2008a) Navajo Mine Extension Project, BNCC Mine lease area.....	25

LIST OF ATTACHMENTS

Attachment 1. Data sheet for reconnaissance observations, 2005 and 2007, BNCC Mine Lease.	27
Attachment 2. Data sheet for small mammal trapping, 2005 and 2007, BNCC Mine Lease.	28

1.0 INTRODUCTION

Ecosphere Environmental Services (Ecosphere) was contracted by BHP Navajo Coal Company (BNCC) to conduct baseline wildlife surveys for the Navajo Mine Extension Project (NMEP). The NMEP comprises Area 4 South and Area 5 of the BNCC coal lease. The purpose of the wildlife baseline surveys is to ensure compliance with the Surface Mining Control and Reclamation Act of 1977 (SMCRA; 30 CFR 780.16) administered by the Office of Surface Mining Reclamation and Enforcement (OSM). The wildlife baseline surveys include general characterization and location of habitats and regionally common wildlife. We also include results of surveys for general wildlife conducted in Area 5 in 2005, but not compiled into a comprehensive report.

We also conducted surveys for species with special protection or conservation status according to the U.S. Fish and Wildlife Service and the Navajo Nation Department of Fish and Wildlife (NNDFW) Navajo Natural Heritage Program (NNHP) in 2007. We conducted surveys to determine presence or absence of the following target species: banner-tailed kangaroo rat (*Dipodomys spectabilis*), kit fox (*Vulpes macrotis*), mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), burrowing owl (*Athene cunicularia hypogaea*), black-footed ferret (*Mustela nigripes*), and pronghorn antelope (*Antilocapra americana*). The results of those surveys are provided under separate cover (Ecosphere 2008a).

2.0 PROJECT AREA

2.1 Location

The NMEP is located about 20 miles (linear distance) southwest of Farmington, New Mexico and is found on the Hogback S, The Newcomb NE, and The Pillar NW, New Mexico 7.5-minute U.S. Geological Survey (USGS) quadrangles (Figure 1). The NMEP permit area comprises about 13,006 acres in BNCC lease Areas 4 South and 5.

2.2 *Physical Description*

The project area is located within the Colorado Plateau province, on the west edge of the San Juan Basin. 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 River watershed with shallow soils, steep hills, and rock outcrops. Although this area is intersected by Pinabete and No Name Arroyos, the drainages are dry much of summer. The only standing surface water present within the boundaries of the project area is found in stock ponds scattered throughout the project area. Most precipitation in the area occurs from July through October in localized, short-duration, high-intensity thunderstorms.

2.2 *Vegetation*

The project area is comprised of Great Basin desert-scrub habitat (Dick-Peddie 1993). Great Basin desert-scrub habitat is 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 that have been identified in this area are present in 2 or more plant communities, 6 vegetative communities with a few distinguishing or unique plant species typically define the vegetative community: dunes, sands, arroyo shrub, alkali wash, thin breaks, and badlands (Ecosphere 2004 and 2008*b*).

3.0 METHODS

We conducted general wildlife surveys in Areas 4 South and 5 following standard scientific protocols and NNHP guidelines. In 2007, we followed methods described in our study plan and subsequently approved by OSM and NNDFW on 29 May 2007 and 21 June 2007, respectively. We also incorporated our previous experience and knowledge of the area, as well as reviewing previous reports to develop effective survey methodologies. We recorded all wildlife species observed or documented by tracks, scat or other sign to provide a baseline wildlife inventory (Attachment 1). Ecosphere maintains a current NNDFW Special Permit for biological investigations.

3.1.1 Raptors

We systematically conducted surveys of the project area, plus a 1-mile buffer for all raptor species. We initiated raptor surveys by identifying potential habitat according to USGS topographic maps and aerial photographs of the project area, as well as reviewing historic nest locations from previous surveys. We conducted field surveys in spring of 2007 for nests or breeding individuals utilizing high-powered binoculars and spotting scopes to minimize disturbance. Field surveys in 2005 were conducted in July, outside the breeding season for most diurnal raptors; therefore, surveys consisted of identifying suitable nesting habitat, as well as any large stick nests or probable hunting perches that could indicate a raptor breeding territory.

3.1.2 Breeding Birds

We conducted general breeding bird surveys to determine avian species richness, diversity, and relative abundance in 5 vegetative communities within the project area. The sampled vegetative communities include alkali wash, arroyo shrub, badlands, thin breaks, and sands. The dunes vegetative community was not sampled, because it is patchily distributed and provides only limited habitat for breeding birds.

Breeding bird surveys were conducted following a strip-transect survey methodology. We used preliminary vegetation layers created in ArcMap © Version 9.2 (Environmental Systems Research Institute, Inc. [ESRI], Redlands, CA), based upon evaluation of aerial photographs supplied by BNCC, to randomly distribute transects throughout the 5 aforementioned vegetative communities. Transect start points were randomly selected prior to conducting field work in ArcMap using the Hawth's Analysis Tools © Version 3.23. For each start point, we also selected a random bearing for the transect using a random numbers table. We attempted to establish two 2-kilometer (km) transects in each of the 5 habitat types, for a total of 4-km sampled per habitat. The thin breaks vegetative community was patchily distributed in the project area and was not large enough to accommodate multiple 2-km transects. Therefore within the thin breaks community we established one 2-km transect and two 1-km transects totaling 4-km in length.

Breeding bird surveys were conducted during the peak breeding season, between mid-May and mid-June, for species utilizing the associated habitat types in San Juan County. Surveys were conducted between sunrise and 10:00 a.m. For each survey, biologists walked slowly along the length of the transect recording every bird visually or audibly observed within 200-meters (m) of the transect line. The 200-m distance was visually estimated by observers; therefore, some variation may have occurred. In general though, observers are not able to accurately identify most birds beyond 200-m. We identified birds to sex when known. We also recorded the method of detection, either aural, visual, or both aural and visual. Flyovers were recorded as incidental observations and were not included in the strip-transect counts.

We report the following information per habitat type and for all habitats combined: 1) mean number of individuals (per 1-km transect) detected; 2) species richness; 3) species diversity; and 4) relative abundance. Species richness refers to the number of species detected, i.e., it is the total number of different species present in a vegetative community. Species diversity takes into account the number of species as well as the relative abundance of each species. We calculated species diversity using Simpson's Index Diversity formula:

$$D = \frac{\sum n(n-1)}{N(N-1)}$$

Where, n = the total number of organisms of a particular species and N = the total number of organisms of all species (Simpson 1949). The value of Simpson's Index ranges from 0 to 1; as the value increases from 0 to 1, species diversity also increases. Relative abundance was calculated by dividing the number of individuals of each species by the total number of individuals detected.

3.1.3 Shorebirds and Waterfowl

In summers 2005 and 2007, we identified temporary ponds in the project area to survey for waterfowl and shorebirds. In 2007, we visited temporary ponds intermittently from early May through late June, as long as they were inundated with water. Waterfowl and shorebird surveys generally occurred on the same days as raptor, mountain plover, and breeding bird surveys, to maximize our field effort and efficiency. Observations

occurred between sunrise and approximately 11:00 a.m. We used binoculars and spotting scopes to scan the shorelines and water surfaces of temporary ponds, recording every individual waterfowl and shorebird present on each day. We identified individuals to sex, when known, and recorded their general behavior to evaluate the potential for breeding activities.

3.1.4 Small Mammals

We conducted small mammal trapping from July through August 2005 and May through June 2007 in Areas 4 South and 5 (Figure 3) to document species in the Geomyidae, Heteromyidae, and Muridae families (Attachment 2). In 2005, we located trapping grids of about 140 traps in 2 vegetative communities: arroyo shrub and sands (formerly divided into sand dune, desert shrub/shadscale sand dune, and ephedra sand dune in 2005). We used Geographic Information System (GIS) to randomly locate the trapping grids in each vegetative community. We trapped each grid for 2 to 3 consecutive nights with 3 replicates in arroyo shrub and 5 replicates in sands.

In 2007, we established trapping webs in 3 of the 6 vegetative community types: arroyo shrub, alkali wash, and sands. No trapping webs were established in dunes, thin breaks, and badlands communities due to the lack of forage and cover for small mammals. Two sets of criteria were used to randomly select the site of the trapping webs in 2007. The first set of criteria was based upon using a GIS database of coverages made available by BNCC:

1. vegetative communities included were arroyo shrub, alkali wash, and sands (combined alkaline sands, sands, and saline sands in 2007), and
2. 45 random points were generated in each of the 3 habitat types within Areas 4 South and 5. Each point was displayed in ArcMap.

Each potential trapping grid was then visited in the field in a random order, and a second set of criteria was applied. A candidate-trapping web was eliminated based upon the following criteria:

3. if $\geq 40\%$ of the candidate web was dominated by a cover other than the target vegetative community,
4. if it was inaccessible by foot,

5. if grazing was recently evident or cattle were present
6. if it was >500 m from an established, passable road.

Potential sites were visited until 3 replicate trapping grids of the vegetative community met the criteria. Due to the naturally linear occurrence of alkali wash habitat, we used 2 parallel line transects of about 70 traps each in that habitat. We ran 1 trapping web or grid in 3 replicates of each habitat type for 2 to 3 consecutive nights. We used Sherman live-traps and baited traps with sweet feed, apples, and raisins. We also used polyester fiberfill inside each trap to provide nesting material and reduce trap-associated deaths as necessary. We baited and set each trap in the evening and checked and closed traps every morning at dawn. Whenever possible, we recorded the species, sex, and condition of each captured animal and uniquely marked them with a permanent marker. Experienced field biologists handled animals in accordance with standardized health procedures and immediately released individuals into the same area they were captured.

3.1.5 Lagomorphs

We surveyed for lagomorphs (i.e. jack rabbits [*Lepus* spp.] and cottontails [*Sylvilagus* spp.]) by visual observation concurrently with other surveys in 2005 and 2007. We recorded any incidental sightings, as well as lagomorph tracks or scat made during other wildlife or vegetation surveys throughout the summer on a standardized data sheet, including the location using a handheld Garmin® Global Positioning System (GPS) unit or a handheld Trimble GeoXT™ GPS unit and a photograph for unique sightings, i.e. anything other than a black-tailed jack rabbit (*Lepus californicus*) or desert cottontail (*Sylvilagus audubonii*).

3.1.6 Sciurids

We surveyed for sciurids (e.g. squirrels [*Spermophilus* spp.], chipmunks [*Tamias* spp.], prairie dogs [*Cynomys gunnisonii*] etc.) concurrently with other pedestrian and driving surveys in 2005 and 2007. We recorded any incidental sightings, as well as sciurid tracks or scat on a standardized data sheet, including the location using a handheld Garmin® GPS unit or a handheld Trimble GeoXT™ GPS unit. We searched for prairie dogs in spring when they emerge from hibernation. In October and November of 2007, we visited the locations where we observed prairie dogs. At those locations, we

identified the outer-most burrow entrances and recorded them with a GPS unit to create a polygon and determine the size of each town in ArcGIS 9.2. Within 2 prairie dog towns (or polygons), we enumerated the number of burrows, marking each counted burrow and recording it with a GPS unit, to calculate the approximate burrow densities for individual towns. These estimates are approximate and likely underestimate the total density of burrows due to our cursory methods; future efforts should employ standard transects for counting burrows as suggested by Biggins et al. (1993) if more precise estimates are desired. We did not map prairie dog towns in 2005.

3.1.7 Felids

We conducted surveys for felids, namely bobcats (*Felis rufus*), concurrently with spotlighting surveys for kit fox in 2005 and 2007. We recorded any incidental sightings, as well as felid tracks and scat made during other wildlife or vegetation surveys throughout the summer and fall on a standardized data sheet, including the location using a handheld Garmin® GPS unit or a handheld Trimble GeoXT™ GPS unit.

3.1.8 Canids

We conducted surveys for canids such as coyotes (*Canis lupus*) and foxes (*Vulpes* spp.) concurrently with spotlighting surveys for kit fox in 2005 and 2007 (Ecosphere 2008a). We recorded incidental sightings, including canid tracks and scat made during other wildlife or vegetation surveys throughout the summer and fall on a standardized data sheet, including the location using a handheld Garmin® GPS unit or a handheld Trimble GeoXT™ GPS unit.

3.1.9 Mustelids

We conducted surveys for mustelids, namely badgers (*Taxidea taxus*), concurrently with spotlighting surveys for kit fox in 2005 and 2007, and mapping prairie dog towns in 2007. We also documented mustelid tracks and scat during concurrent surveys.

3.1.10 Big Game

We conducted surveys for big game concurrently with other surveys in 2005 and 2007. We recorded any incidental sightings made during other wildlife or vegetation surveys throughout the summer and fall on a standardized data sheet, including the location using a handheld Garmin® GPS unit or a handheld Trimble GeoXT™ GPS unit.

3.1.11 Herptiles

We surveyed for herptiles (i.e. reptiles and amphibians) in conjunction with other species-specific and vegetation surveys in 2005 and 2007. We recorded any incidental sightings made during other wildlife or vegetation surveys throughout the summer and fall on a standardized data sheet, including the location using a handheld Garmin® GPS unit or a handheld Trimble GeoXT™ GPS unit.

3.1.12 Fish

Currently, there are no known permanent waters capable of supporting fish species in the project area.

4.0 RESULTS

We documented a total of 62 different wildlife species during the 2005 and 2007 baseline surveys within the project area (and 1-mile buffer zone for raptors), including 9 raptor species, 29 avian non-raptor species, 14 mammal species, and 10 herptile species (Table 1).

4.1.1 Raptors

In 2005, we observed 5 raptor species including red-tailed hawk (*Buteo jamiacensis*), ferruginous hawk (*Buteo regalis*), prairie falcon (*Falco mexicanus*), burrowing owl (*Athene cunicularia hypogaea*), and great-horned owl (*Bubo virginianus*). Nine raptor species were observed within the project area during the 2007 surveys: northern harrier (*Circus cyaneus*), Cooper's hawk (*Accipiter cooperii*), red-tailed hawk, ferruginous hawk, golden eagle (*Aquila chrysaetos*), American kestrel (*Falco sparverius*), prairie falcon, burrowing owl, and great-horned owl. Ferruginous hawk,

golden eagle, and burrowing owl are described in detail in the threatened and endangered species survey report provided under separate cover (Ecosphere 2008a).

4.1.2 Avian non-raptor species

We documented a variety of non-raptor birds during 2007 breeding bird surveys. We also calculated mean number of individuals per 1-km transect, species richness (i.e. number of individuals detected), and species diversity per habitat type for all habitats (Table 2). Alkaline wash and arroyo shrub communities equally yielded the highest number of individuals (14.8 individuals per 1-km transect each); however, sands and thin break communities followed with only slightly lower numbers (13.8 and 12.8, respectively; Table 2). Data from badland communities showed these habitats were largely devoid of breeding birds (Table 2). Species richness and diversity were by far highest in arroyo shrub communities (16 species, 0.75, respectively) followed by sands and alkaline wash (7 species, 0.33 and 5 species, 0.23, respectively; Table 2). Species richness was lowest in badlands communities (3 species), although richness in thin breaks was only slightly higher (4 species). Conversely, species diversity was lowest in thin breaks (0.12), and only slightly higher in badlands (0.19).

Relative abundance per habitat type and for all habitats is summarized in Table 3. Horned lark (*Eremophila alpestris*) was the most abundant species in each habitat type and for all habitats combined. Relative abundance of all other species was <0.1 for each habitat and all habitats combined, with the exception of mourning dove (*Zenaida macroura*), for which the relative abundance was 0.17 in the arroyo shrub habitat.

We observed 11 species of waterfowl and shorebirds at temporary ponds in Areas 4 South and 5 in 2007 (Figure 2). Waterfowl species observed included American coot (*Fulica americana*), cinnamon teal (*Anas cyanoptera*), common merganser (*Mergus merganser*), Eurasian wigeon (*Anas penelope*), and mallard (*Anas platyrhynchos*). Shorebird species observed included American avocet (*Recurvirostra americana*), black-crowned night heron (*Nycticorax nycticorax*), great blue heron (*Ardea herodias*), killdeer (*Charadrius vociferus*), spotted sandpiper (*Actitis macularius*), and Wilson's phalarope (*Phalaropus tricolor*).

Overall, we observed more species and individuals at Pond 2 than either Pond 1 or Pond 3, and both Ponds 1 and 3 combined (Figure 2). However, most birds at Pond 2 were observed in May, with few observations in June. We did not detect any waterfowl or shorebirds at Pond 1 until 1 June. Pond 3 was absent of birds during all survey days except 5 June. We observed evidence of breeding activities for 2 species, mallard and killdeer. A female mallard was seen with ducklings at Pond 2 on 30 May and 5 June. A pair of killdeer was observed behaving defensively at Pond 2 on 14 and 18 May.

4.1.3 Mammal species

In 2005, we documented 3 species of small mammals during our trap efforts. We captured 13 individuals 14 times in about 1,202 trap nights (number of traps x number of trap nights x number of replicates), including 7 banner-tailed kangaroo rats (with 1 recapture), 5 grasshopper mice (*Onychomys leucogaster*) and 1 Ord's kangaroo rat. All captures in 2005 were made in sands vegetative community; no small mammals were captured in arroyo shrub. In 2007, we documented 4 species of small mammals from trapping in about 2,800 trap nights. We captured 18 individuals 19 times, i.e. 1 individual small mammal, a juvenile antelope squirrel (*Ammospermophilus leucurus*), was recaptured. Other captures included 12 deer mice (*Peromyscus maniculatus*), 4 Ord's kangaroo rats (*Dipodomys ordii*), and 1 piñon mouse (*Peromyscus truei*). We captured 78% of small mammals in arroyo shrub habitat and 11% of small mammals each in alkali wash and saline sand habitats.

Cattle frequently trampled the trapping webs and grids after they were set. In 2007, we found $\geq 50\%$ of traps closed by cattle on multiple occasions, thereby decreasing the actual number of traps we set by an unknown number and dramatically reducing our trap effort (i.e. trap nights). We had similar difficulties in 2005, but cattle regularly closed only about 25% of traps.

Additionally, we observed tunnels of pocket gophers (*Thomomys* spp.) and frequently observed the mounds of banner-tailed kangaroo rats (*Dipodomys spectabilis*) in sandy soils within the project area in both survey years.

In 2007, we mapped 5 major prairie dog towns ranging in size from 75 to 317 acres in Areas 4 South and 5 of the NMEP (Figure 4). In 2005, we commonly observed prairie dogs, but we did not map towns.

We frequently observed black-tailed jack rabbits and desert cottontails throughout the project area, as well as scat and tracks, in both 2005 and 2007. We did not observe any bobcat (*Lynx rufus*) or their sign, or any other felids in the project area in either 2005 or 2007. During spotlighting surveys for canids in 2005 we observed green eyeshine consistently through the night during our efforts, indicating coyotes and foxes present throughout the project area; we also documented scat and tracks of coyote, kit fox, and likely red fox (*Vulpes vulpes*; Figure 5). Specifically, we sighted 2 coyotes, as well as 4 kit foxes and 1 kit fox den. One kit fox sighting included 2 individuals, possibly juveniles. We also sighted 1 unidentified canid. This unidentified sighting was recorded as a pair of light green eyes approximately 1-foot above the ground and moving quickly. And, we observed an individual juvenile red fox investigating mounds of banner-tailed kangaroo rats at our nearby traps in 2005. Spotlighting efforts for kit fox in 2007 are described in detail the threatened and endangered species survey report provided under separate cover (Ecosphere 2008a). In 2007, we observed tracks of a badger (*Taxidea taxus*) next to a prairie dog burrow while mapping prairie dog towns in Area 5. We also often observed bats around dusk, likely *Pipistrellus* species, in 2005 and 2007. We did not make any incidental observations of big game, specifically mule deer or pronghorn antelope, during 2005 or 2007 surveys in the project area.

4.1.4 Herptile species

Ten species of herptiles were incidentally observed within the project area in 2005 and 2007 surveys. The species observed included plateau striped whiptail (*Cnemidophorus velox*), western whiptail (*Cnemidophorus tigris*), gopher snake (*Pituophis melanoceucus*), bull snake (*Pituophis melanoceucus* sub. *sayi*), short-horned lizard (*Phrynosoma douglasii*), western yellow-bellied racer (*Coluber constrictor* sub. *mormon*), side-blotched lizard (*Uta stansburiana*), lesser earless lizard (*Holbrookia maculata*), prairie rattlesnake (*Crotalus viridis*), and collared lizard (*Crotaphytus*

collaris). Anecdotally, we encountered a relatively high number of prairie rattlesnakes in Area 5 during 2005 surveys.

5.0 SUMMARY

The primary goal of monitoring wildlife is to ensure reclaimed areas of NMEP are capable of supporting post-mining land uses of livestock grazing and wildlife habitat. The NMEP provides habitat for a variety of wildlife species, including 9 raptor species, 29 avian non-raptor species, 14 mammal species, and 10 herptile species, some of which are sensitive species. In order to identify the presence of wildlife species and their habitats, including sensitive species, we suggest annual monitoring continue in accordance with SMCRA permitting. Further, we suggest mitigation measures and reclamation efforts be evaluated annually and improvements and adjustments be made accordingly to reduce the impact of mining on wildlife as intended.

6.0 LITERATURE CITED AND REFERECNES

- Biggins, D. B., B. Miller, L. Hanebury, B. Oakleaf, A. Farmer, R. Crete, A. Dood. 1993. A system for evaluating black-footed ferret habitat. In: J. Oldemeyer, D. Biggins, B. Miller, R. Crete, eds. Management of prairie dog complexes for black-footed ferret reintroduction. Washington, DC: U.S. Fish and Wildlife Service Biological Report 13: 73-92.
- Dick-Peddie, W. A. 1993. New Mexico Vegetation, Past, Present, and Future. University of New Mexico Press, Albuquerque, New Mexico.
- Ecosphere 2004. Ecosphere Environmental Services. Wildlife Baseline Report. BHP Billiton – Navajo Coal Company. November 2004. Unpublished report.
- Ecosphere 2005. Ecosphere Environmental Services. Floristic Survey and Ecological Study of BHP Area IV, San Juan County, New Mexico. Farmington, New Mexico. March 2005. Unpublished report.
- Ecosphere 2007. Ecosphere Environmental Services. Study Plan for Baseline Vegetation and Wildlife Inventories BHP Billiton Navajo Coal Company Areas IV South and V. April 2007. Unpublished report.
- Ecosphere 2008a. Ecosphere Environmental Services. Threatened and Endangered Species Surveys. Navajo Mine Extension Project. BHP Navajo Coal Company. May 2008.
- Ecosphere 2008b. Ecosphere Environmental Services. Baseline Vegetation Inventories, Navajo Mine Extension Project. BHP Navajo Coal Company. April 2008.
- Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History and University Press of Colorado.
- Hoogland, J.L.2006. Conservation of the Black-tailed Prairie Dog: Saving North America's Western Grasslands. Island Press, Washington, D.C.
- Navajo Nation. 2005. Navajo Nation Endangered Species List. Species Accounts. Version 2.05: for Navajo Endangered Species List. August 2005.
- Simpson, E. H. 1949. Measurement of diversity. Nature 163: 688.
- U.S. Fish and Wildlife Service (USFWS). 1988. Black-footed ferret recovery plan. Denver.
- Woyewodzic, R. 1987. Raptor Survey of Utah International Navajo Mine, Leasehold. 20 pp.

7.0 TABLES

Table 1. List of species documented in the project area, Navajo Mine Extension Project, BNCC, 2007.

Northern harrier	(<i>Circus cyaneus</i>)
Cooper's hawk	(<i>Accipiter cooperii</i>)
red-tailed hawk	(<i>Buteo jamaicensis</i>)
ferruginous hawk	(<i>Buteo regalis</i>)
golden eagle	(<i>Aquila chrysaetos</i>)
American kestrel	(<i>Falco sparverius</i>)
prairie falcon	(<i>Falco mexicanus</i>)
great-horned owl	(<i>Bubo virginianus</i>)
burrowing owl	(<i>Athene cunicularia</i>)
American crow	(<i>Corvus brachyrhynchos</i>)
ash-throated flycatcher	(<i>Myiarchus cinerascens</i>)
black-throated sparrow	(<i>Amphispiza bilineata</i>)
blue grosbeak	(<i>Passerina caerulea</i>)
brown-headed cowbird	(<i>Molothrus ater</i>)
common raven	(<i>Corvus corax</i>)
horned lark	(<i>Eremophila alpestris</i>)
house finch	(<i>Carpodacus mexicanus</i>)
killdeer	(<i>Charadrius vociferus</i>)
lark sparrow	(<i>Chondestes grammacus</i>)
loggerhead shrike	(<i>Lanius ludovicianus</i>)
mountain plover	(<i>Charadrius montanus</i>)
mourning dove	(<i>Zenaida macroura</i>)
northern mockingbird	(<i>Mimus polyglottos</i>)
rock wren	(<i>Salpinctes obsoletus</i>)
Say's phoebe	(<i>Sayornis saya</i>)
spotted towhee	(<i>Pipilo maculatus</i>)
western scrub-jay	(<i>Aphelocoma californica</i>)
yellow warbler	(<i>Dendroica petechia</i>)
American coot	(<i>Fulica americana</i>)
cinnamon teal	(<i>Anas cyanoptera</i>)
common merganser	(<i>Mergus merganser</i>)
Eurasian wigeon	(<i>Anas penelope</i>)
mallard	(<i>Anas platyrhynchos</i>)
American avocet	(<i>Recurvirostra americana</i>)
black-crowned night heron	(<i>Nycticorax nycticorax</i>)
great blue heron	(<i>Ardea herodias</i>)
spotted sandpiper	(<i>Actitis macularius</i>)
Wilson's phalarope	(<i>Phalaropus tricolor</i>)
antelope squirrel	(<i>Ammospermophilus leucurus</i>)
deer mouse	(<i>Peromyscus maniculatus</i>)
Ord's kangaroo rats	(<i>Dipodomys ordii</i>)
banner-tailed kangaroo rat	(<i>Dipodomys spectabilis</i>)
pocket gopher	(<i>Thomomys spp.</i>)

Table 1. Continued.

piñon mouse	(<i>Peromyscus truei</i>)
Gunnison's prairie dog	(<i>Cynomys gunnisoni</i>)
kit fox	(<i>Vulpes macrotis</i>)
red fox	(<i>Vulpes vulpes</i>)
bat	(<i>Pipistrellus</i> spp.)
desert cottontail	(<i>Sylvilagus audobonii</i>)
black-tailed jack rabbit	(<i>Lepus californicus</i>)
coyote	(<i>Canis latrans</i>)
badger	(<i>Taxidea taxus</i>)
plateau striped whiptail	(<i>Cnemidophorus velox</i>)
western whiptail	(<i>Cnemidophorus tigris</i>)
gopher snake	(<i>Pituophis melanoeucus</i>)
bull snake	(<i>Pituophis melanoeucus</i> sub. <i>sayi</i>)
short-horned lizard	(<i>Phrynosoma douglassii</i>)
western yellow-bellied racer	(<i>Coluber constrictor</i> sub. <i>mormon</i>)
side-blotched lizard	(<i>Uta stansburiana</i>)
lesser earless lizard	(<i>Holbrookia maculata</i>)
prairie rattlesnake	(<i>Crotalus viridis</i>)
collared lizard	(<i>Crotaphytus collaris</i>)

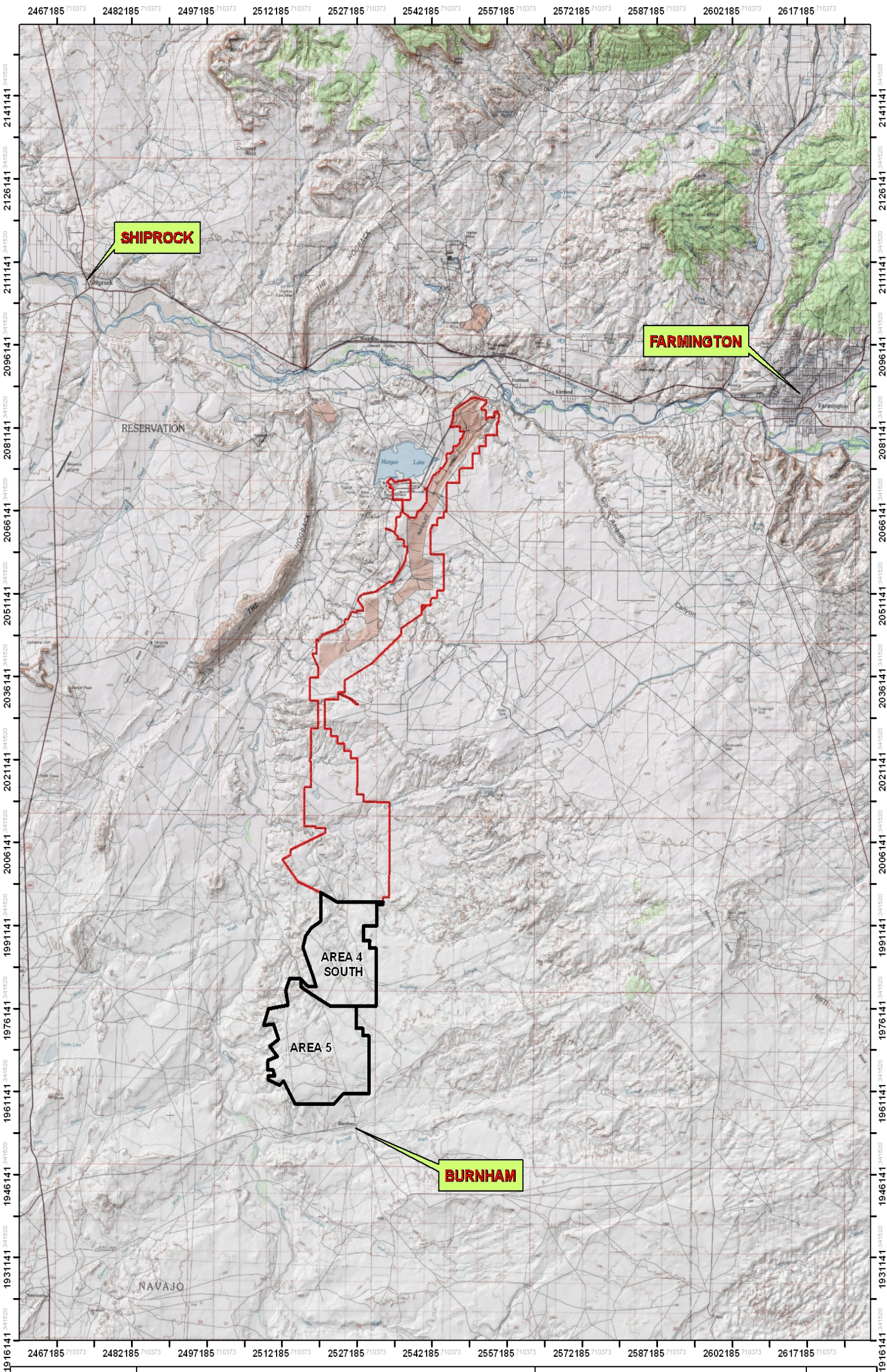
Table 2. Mean number of individuals detected per 1-km transect, species richness, (i.e. number of species detected), and index of species diversity (Simpson 1949), for strip transects conducted in 5 vegetative communities Areas 4 South and 5 during breeding bird surveys, Navajo Mine Extension Project (NMEP), BHP Navajo Coal Company (BNCC) mine lease area, 2007. Bolding indicates highest value for that statistic.

Summary Statistic	Alkali Wash	Arroyo Shrub	Badlands	Sands	Thin Breaks
Mean no. individuals	14.8	14.8	5.3	13.8	12.8
Species richness	5	16	3	7	4
Species diversity	0.23	0.75	0.19	0.33	0.12

Table 3. Relative abundance of bird species calculated from breeding bird survey data from Areas 4 South and 5, Navajo Mine Extension Project, BNCC Mine lease area, 2007. The highest relative abundance (horned lark) in each vegetative community is in bold text.

Species	Relative Abundance					Total
	Alkaline Wash	Arroyo Shrub	Badlands	Sands	Thin Breaks	
American crow (<i>Corvus brachyrhynchos</i>)	-	0.03	-	-	-	0.01
Ash-throated flycatcher (<i>Myiarchus cinerascens</i>)	-	-	-	0.02	-	<0.01
Black-throated sparrow (<i>Amphispiza bilineata</i>)	-	0.03	-	0.02	-	0.01
Blue grosbeak (<i>Passerina caerulea</i>)	-	0.02	-	-	-	<0.01
Brown-headed cowbird (<i>Molothrus ater</i>)	-	0.02	-	-	-	<0.01
Burrowing owl (<i>Athene cunicularia</i>)	0.02	-	-	-	-	<0.01
Common raven (<i>Corvus corax</i>)	0.03	0.02	-	-	0.02	0.02
Ferruginous hawk (<i>Buteo regalis</i>)	-	-	-	-	0.02	<0.01
Horned lark (<i>Eremophila alpestris</i>)	0.88	0.47	0.90	0.82	0.94	0.78
House finch (<i>Carpodacus mexicanus</i>)	-	0.03	-	-	-	0.01
Killdeer (<i>Charadrius vociferus</i>)	-	0.03	-	-	-	0.01
Lark sparrow (<i>Chondestes grammacus</i>)	-	0.02	-	0.05	-	0.02
Loggerhead shrike (<i>Lanius ludovicianus</i>)	-	0.02	-	-	-	<0.01
Mountain plover (<i>Chardrius montanus</i>)	0.03	-	-	-	0.02	0.01
Mourning dove (<i>Zenaida macroura</i>)	-	0.17	0.05	0.04	-	0.05
Northern mockingbird (<i>Mimus polyglottos</i>)	-	0.07	-	-	-	0.02
Rock wren (<i>Salpinctes obsoletus</i>)	-	-	-	0.02	-	<0.01
Say's phoebe (<i>Sayornis saya</i>)	0.03	0.02	0.05	0.04	-	0.02
Spotted towhee (<i>Pipilo maculatus</i>)	-	0.02	-	-	-	<0.01
Western scrub-jay (<i>Aphelocoma californica</i>)	-	0.02	-	-	-	<0.01
Yellow warbler (<i>Dendroica petechia</i>)	-	0.02	-	-	-	<0.01

8.0 FIGURES




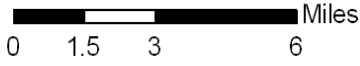



	NAVAJO MINE EXTENSION PROJECT		 0 1.5 3 6 Miles	 1:199,168
	BHP NAVAJO COAL COMPANY		<i>100K MAP SOURCE: TOPO! 4.0, 2007</i>	
	FIGURE 1	AREA 4 SOUTH AND AREA 5	8/1/2008	
	SAN JUAN COUNTY, NEW MEXICO	NAD 83 State Plane New Mexico West (Feet)		
		LEGEND  NMEP Permit Area  BNCC Lease Boundary		

Figure 1. Vicinity map and project area for 2005 and 2007 Wildlife Baseline Inventories, Navajo Mine Extension Project, BNCC Mine lease area.

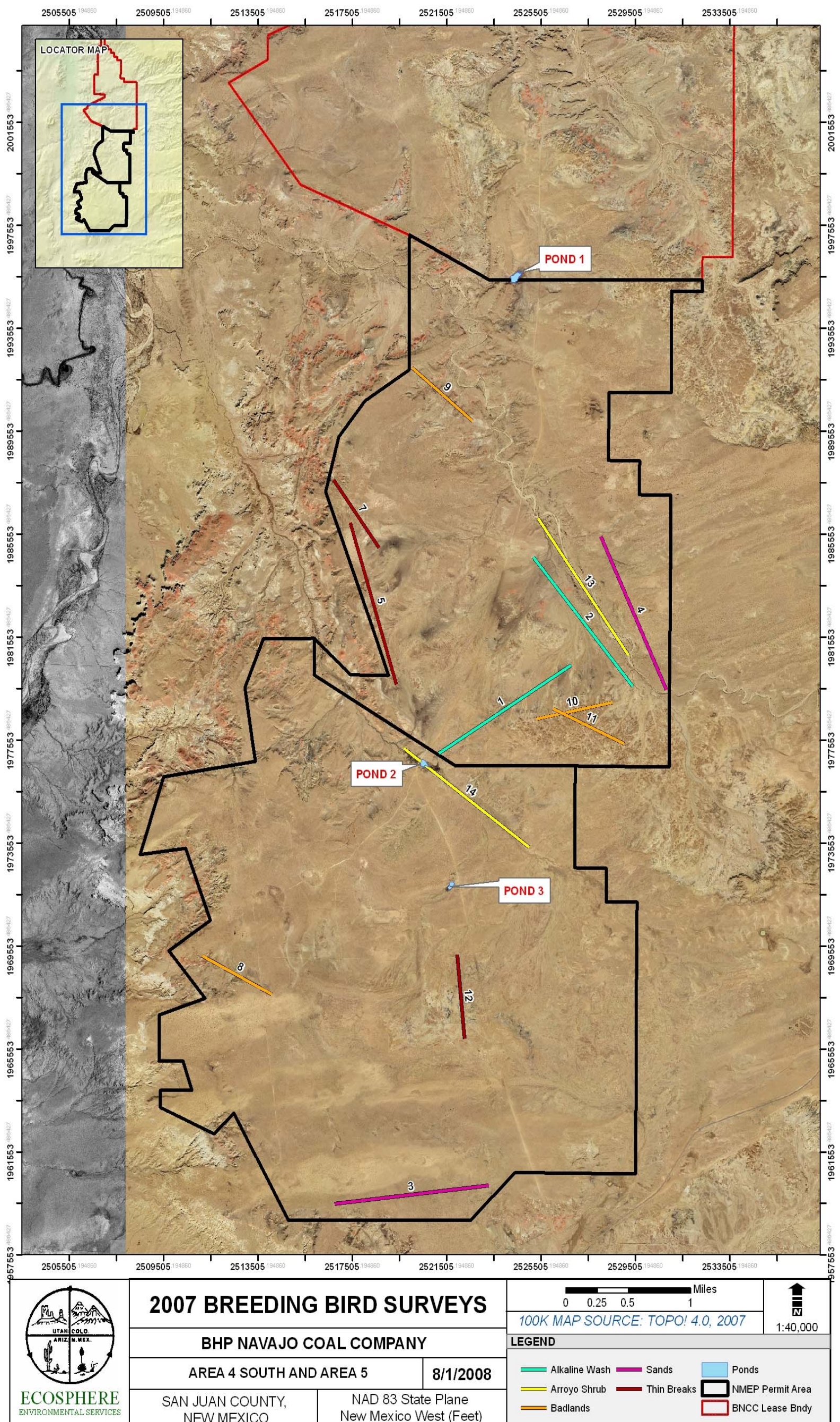


Figure 2. The locations of transects and ponds for breeding birds surveys, Navajo Mine Extension Project, BNCC Mine lease area.

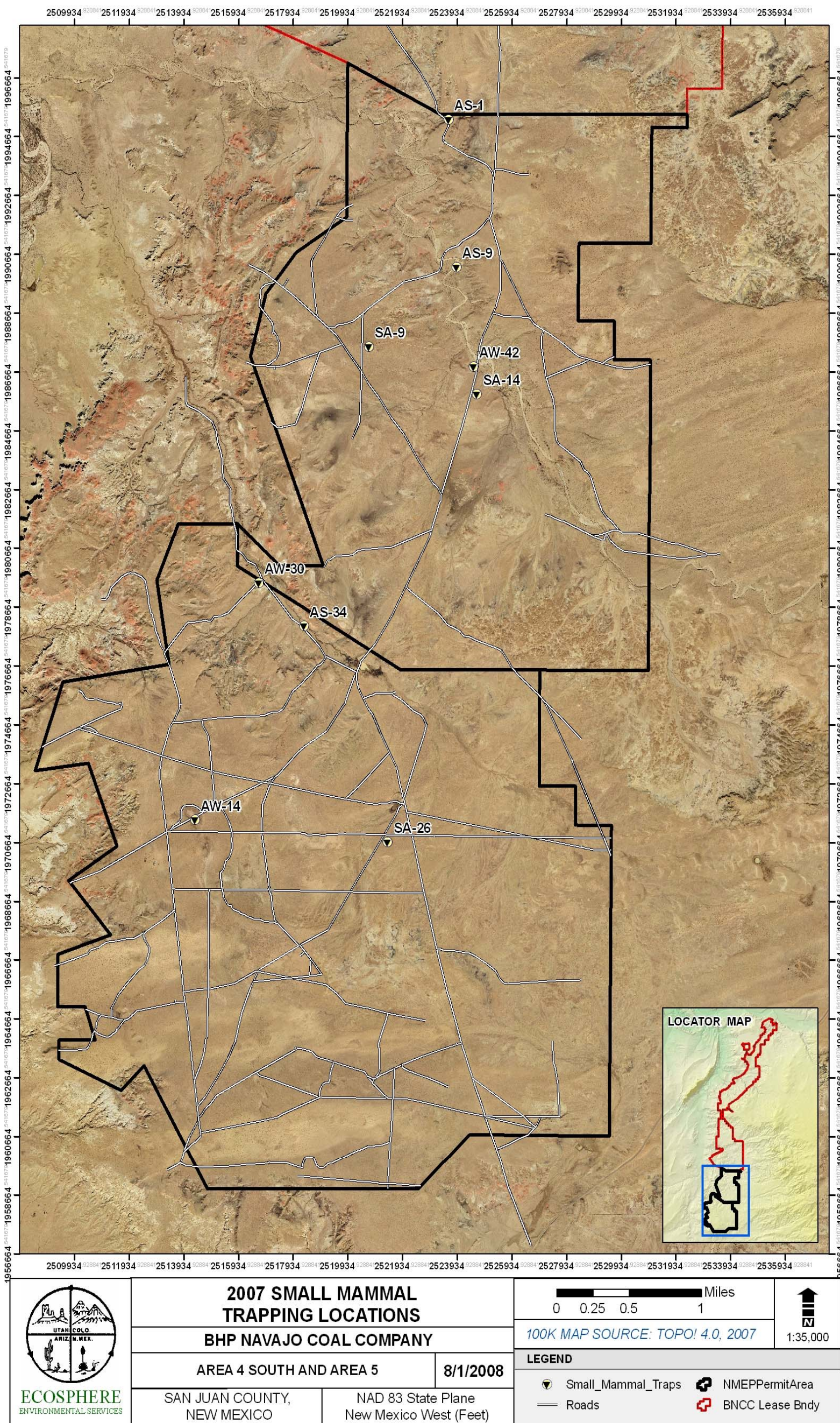


Figure 3. The locations of small mammal trapping webs and grids in 3 habitat types arroyo shrub (AS), alkali wash (AW) and sands (SA), 2007, and in 2 habitat types (AS and SA) in 2005, Navajo Mine Extension Project, BNCC Mine lease area.

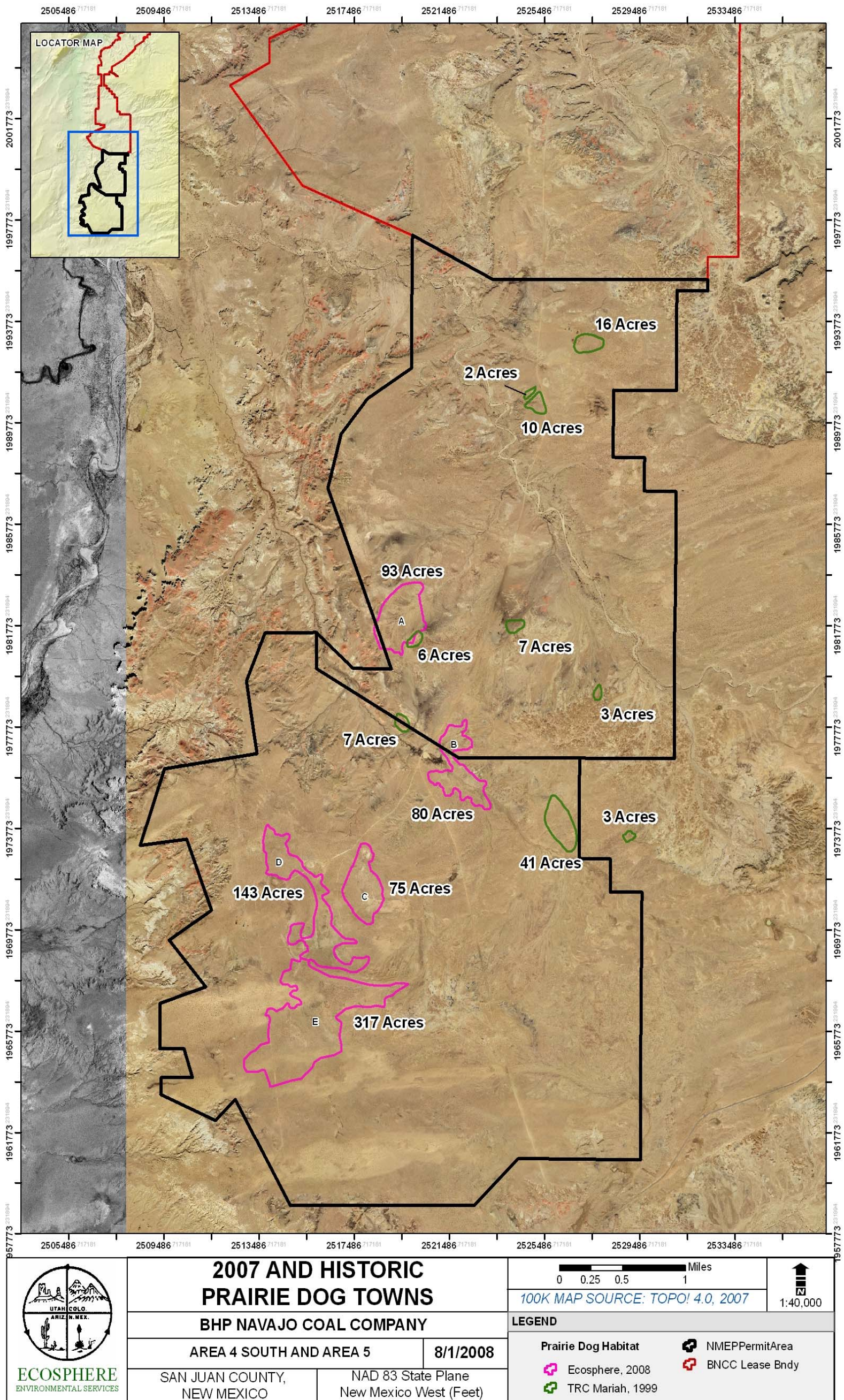


Figure 4. Prairie dog towns mapped within the project area and their respective size, Navajo Mine Extension Project, BNCC Mine lease area, 2007.

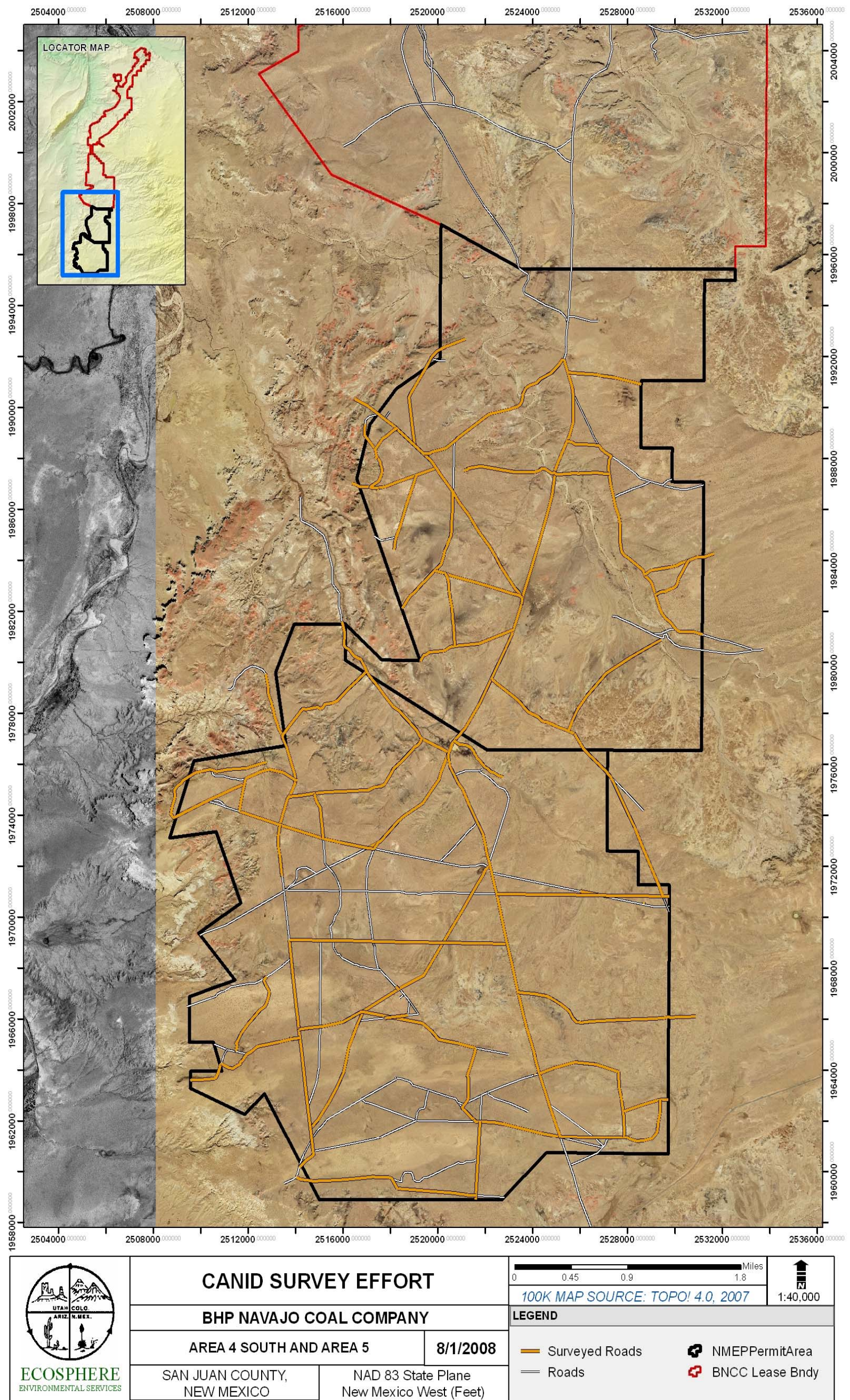


Figure 5. Spotlighting survey effort for canids in 2005 and target spotlighting surveys for kit fox in 2007 (Ecosphere 2008a) Navajo Mine Extension Project, BNCC Mine lease area.

9.0 ATTACHMENTS

Attachment 1. Data sheet for reconnaissance observations, 2005 and 2007, BNCC Mine Lease.

Reconnaissance Observations

<u>Date and Time</u>	<u>Observation</u>	<u>UTM Coordinates (NAD 83)</u>	<u>Location</u> IV North, IV South , V Other:	
<u>Habitat type</u> (arroyo shrub, alkali wash, sands, dunes, thin-break, badlands, or specify)		<u>Biologist</u>	<u>Photo</u> Yes No	
<u>Description</u>				

<u>Date and Time</u>	<u>Observation</u>	<u>UTM Coordinates (NAD 83)</u>	<u>Location</u> IV North, IV South , V Other:	
<u>Habitat type</u> (arroyo shrub, alkali wash, sands, dunes, thin-break, badlands, or specify)		<u>Biologist</u>	<u>Photo</u> Yes No	
<u>Description</u>				

<u>Date and Time</u>	<u>Observation</u>	<u>UTM Coordinates (NAD 83)</u>	<u>Location</u> IV North, IV South , V Other:	
<u>Habitat type</u> (arroyo shrub, alkali wash, sands, dunes, thin-break, badlands, or specify)		<u>Biologist</u>	<u>Photo</u> Yes No	
<u>Description</u>				

Vegetation and Wildlife Baselines

Attachment 2. Data sheet for small mammal trapping, 2005 and 2007, BNCC Mine Lease.

Capture Data for Small Mammal Trapping

Set Date:	# of Traps:	Habitat Type and # (Grid #):
Check Date:	Biologists:	Weather and Moon of trap set (night):
UTMs:		Weather and Moon of trap check (day):

Trap #	Species	Mark	Sex	Comments

Appendix 16.C

Threatened and Endangered Species Surveys

April 2008

Information regarding the locations and populations of threatened, endangered, and sensitive species has been redacted from this appendix to protect the confidentiality of this information.

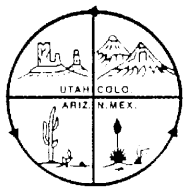
Threatened and Endangered Species Surveys

Navajo Mine Extension Project

Prepared for:

**BHP Navajo Coal Company
Navajo Mine Extension Project
Fruitland, New Mexico**

Prepared by:



ECOSPHERE ENVIRONMENTAL SERVICES

August 2008

Table of Contents

1.0	Introduction	1
2.0	Project Area	1
2.1	LOCATION	1
2.2	PHYSICAL DESCRIPTION	1
2.3	VEGETATION	2
2.3.1	<i>Dunes</i>	2
2.3.2	<i>Sands</i>	2
2.3.3	<i>Arroyo Shrub</i>	3
2.3.4	<i>Alkali Wash</i>	3
2.3.5	<i>Thin Breaks</i>	3
2.3.6	<i>Badlands</i>	4
3.0	Threatened, Endangered, and Sensitive (TES) Flora	4
3.1	METHODS	4
3.2	SURVEY RESULTS	5
3.2.1	<i>San Juan milkweed</i>	5
4.0	TES Fauna	6
4.1	METHODS	6
4.1.1	<i>Ferruginous hawk</i>	6
4.1.2	<i>Golden eagle</i>	7
4.1.3	<i>Burrowing owl</i>	7
4.1.4	<i>Mountain plover</i>	7
4.1.5	<i>Black-footed ferret</i>	8
4.1.6	<i>Banner-tailed kangaroo rat</i>	9
4.1.7	<i>Kit fox</i>	9
4.1.8	<i>Pronghorn antelope</i>	10
4.2	SURVEY RESULTS	10
4.2.1	<i>Ferruginous hawk</i>	10
4.2.2	<i>Golden eagle</i>	10
4.2.3	<i>Burrowing owl</i>	10
4.2.4	<i>Mountain plover</i>	11
4.2.5	<i>Black-footed ferret</i>	11
4.2.6	<i>Banner-tailed kangaroo rats</i>	12
4.2.7	<i>Kit fox</i>	12
4.2.8	<i>Pronghorn antelope</i>	13
5.0	Conclusions and Recommendations	13
6.0	Literature Cited	14
	Attachment A: Tables	16
	Attachment B: Figures	19
	Attachment C: 2008 Black Footed Ferret Nocturnal Survey Report	22

1.0 Introduction

Ecosphere Environmental Services (Ecosphere) was contracted by BHP Navajo Coal Company (BNCC) to conduct threatened and endangered species surveys for the Navajo Mine Extension Project (NMEP). The NMEP comprises Areas 4 South and 5 of BNCC's existing coal lease. The purpose of this survey was to adhere to the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), the Navajo Nation code requirement for species of concern (17NNC507) administered by the Navajo Natural Heritage Program (NNHP) of the Navajo Nation Department of Fish and Wildlife (NNDFW), and the Surface Mining Control and Reclamation Act of 1977 (SMCRA) (30 CFR 780.16).

This report outlines the data collections and methodologies implemented for inventorying the project area. The methodologies used are consistent with U.S. Fish and Wildlife Service (USFWS) and NNDFW guidelines and requirements; the study plan was approved by Office of Surface Mining Reclamation and Enforcement and NNDFW on May 29, 2007 and June 21, 2007, respectively.

2.0 Project Area

2.1 Location

The NMEP is located about 20 miles (linear distance) southwest of Farmington, New Mexico and is found on the Hogback S, Newcomb NE, and The Pillar NW, New Mexico 7.5-minute U.S. Geological Survey (USGS) quadrangles (Figures 1 and 2 in Attachment B). The NMEP permit area comprises 13,006 acres in BNCC lease Areas 4 South and 5.

2.2 Physical Description

The project area is located within the Colorado Plateau province, on the west edge of the San Juan Basin. 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 with shallow soils, steep hills, and rock

outcrops. Although this area is intersected by Pinabete and No Name 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 three stock ponds scattered throughout the project area. Most precipitation in the area occurs from July through October in localized, short-duration, high-intensity thunderstorms.

2.3 Vegetation

The project area is comprised of Great Basin desert-scrub habitat (Dick-Peddie 1993). Great Basin desert-scrub habitat is 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 that were identified in this area are present in two or more plant communities (Ecosphere 2004*a, b* and 2008), each vegetation community type contains a few distinguishing or unique plant species. The following brief descriptions list a few of those distinguishing or unique plant species, which typically define the vegetation community. These six vegetation communities are listed below.

2.3.1 Dunes

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

2.3.2 Sands

As with dunes, 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 sands habitat often transitions to and can

be mixed with thin breaks habitat. In years with high amounts of spring rainfall sandy soils 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*).

2.3.3 Arroyo Shrub

Arroyo shrub habitat is most commonly found in major drainages and washes, such as Pinabete and No Name arroyos. 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*).

2.3.4 Alkali Wash

Alkali wash is vegetation habitat associated with minor waterways. These areas are typically broad and level with occasional small, dense patches of galleta grass and alkali sacaton. Alkali wash range sites are typically located in washes and drainages as well as at the base of Badlands. Terrain 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.

2.3.5 Thin Breaks

Thin Breaks is characteristic of rocky areas with loose rock, occasionally with large pieces of rock, usually shale, that are firmly embedded in the ground. Thin breaks are typically upland habitats with surface rock as a unifying feature. Flat, surface rocks allow for greater water to run off and accumulate in crevices or fissures between rocks. Thin break 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.

2.3.6 Badlands

Badlands have the least vegetation of any habitat type in the project area. Among the more common plants along the small relief channels of these barren areas are 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.

3.0 Threatened, Endangered, and Sensitive (TES) Flora

Prior to conducting fieldwork, Ecosphere biologists compiled a list of threatened, endangered, and sensitive (TES) species listed by the USFWS and NNHP. Federally listed species were obtained from the USFWS Southwest Region endangered species list (USFWS 2007). The flora species currently identified by the USFWS and the NNHP that have the potential to occur in the project area are presented in Table 1 (refer to Attachment A).

Ecosphere consulted with NNHP regarding the presence of "species of concern" in the proposed project area (Attachment C). NNHP species of concern include protected, candidate, and other rare or otherwise sensitive species. The species listed by the NNHP are mapped quadrangle-specific rather than project-site specific. The potential for species occurrence was determined on quadrangle-wide coarse habitat characteristics and species information provided by NNHP. The consultation with NNHP currently indicated there were no known flora species of concern occurring within or near the proposed project area. San Juan milkweed, a NNHP species of concern, was not listed as a species with the potential to occur in the project area. However, occurrences of San Juan milkweed and suitable habitat were observed during surveys; therefore, it is included in Table 1 and discussed in further detail below.

3.1 Methods

Surveys for TES flora were conducted in Areas 4 South and 5 in 2007 using USFWS and NNDFW species-specific guidelines and in accordance with accepted scientific standards or guidelines. Previous TES surveys conducted in the BNCC mine

lease area were reviewed; we evaluated the methods used and species detected (namely, TRC Mariah 1999) to develop our study plan for efficient and thorough survey strategies.

TES flora survey methods began with examination of the potential for species to occur in the project area based on known habitat associations and agency consultation. Potential habitat in the project area was evaluated and delineated using a combination of vegetation community types and soil survey map unit descriptions. All habitats were ground truthed and observed using high-powered binoculars (8 x 42, 6.3°, Pentax, Asahi Optical Company, Japan). Field surveys were conducted May 9 to 14, 2007. Unique habitat or potential habitat was surveyed for sensitive flora presence/absence using teams consisting of two qualified botanists walking parallel transects, about 20 ft apart during the spring, the optimal survey season for most species. When TES flora species were found, their locations were digitally recorded with a handheld Garmin® GPS unit (Garmin International, Inc., Olathe, KS). Occupied habitat, and potential but unoccupied habitat, was delineated and mapped (Figure 3 in Attachment B).

3.2 Survey Results

The project area does not contain potential habitat for any of the three federally listed threatened or endangered flora species (Table 1 in Attachment A), nor were any of these federally listed species observed in the project area. None of these species have been previously documented as occurring within the project area (OSM Permit No. NM-0003F).

3.2.1 San Juan milkweed

This species was encountered at six widely dispersed locations in the project area (Figure 3 in Attachment B). Several individual milkweed plants were encountered at each of these locations. The stems of this perennial milkweed grow from a woody taproot and are 4 to 8 centimeters (cm) tall. Stems are typically prostrate with leaves 2 to 4 cm long. Diagnostic characteristics of this milkweed are the white, tomentulose leaf margins, and a terminal inflorescence with reddish-violet flowers. This milkweed flowers in April and has mature fruits in mid to late May. The characteristic habitat of

this plant is sandy soil, sometimes occurring in piñon-juniper woodlands. In the project area, this species occurs in the dunes vegetation community (Figure 3 in Attachment B).

There are no federal, state, or Navajo Nation protections for this species. The Navajo Nation does not currently have sufficient information to support this species being listed as threatened or endangered on the Navajo Endangered Species List (NESL).

4.0 TES Fauna

Prior to conducting fieldwork, Ecosphere biologists compiled a list of federal and Navajo Nation listed species and evaluated their habitat requirements to determine their potential to occur in the project area. Federally listed species were obtained from the USFWS Southwest Region endangered species list (USFWS 2008). The Navajo Nation listed species were obtained through NNHP consultation. We conducted species-specific surveys to determine presence or absence of the following target species: banner-tailed kangaroo rat (*Dipodomys spectabilis*), kit fox (*Vulpes macrotis*), mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), burrowing owl (*Athene cunicularia hypogaea*), black-footed ferret (*Mustela nigripes*), and pronghorn antelope (*Antilocapra americana*). All of these species are listed as either threatened or endangered by the USFWS, or as a species of concern by the Navajo Nation (Table 1).

4.1 Methods

We conducted surveys in coordination with NNHP species-specific guidelines (Mikesic et al. 2005), USFWS protocols, and accepted scientific standards. We utilized our knowledge of the area, biological expertise, and experience with the survey methods for these target species.

4.1.1 Ferruginous hawk

We completed ferruginous hawk surveys by focusing on habitat use and breeding/occupancy following three successive steps: 1) identifying potential habitat by analyzing USGS topographic maps and aerial photographs of Area 4 South and 5, plus a 1-mile buffer, 2) consulting with David Mikesic, NNDFW biologist, to identify known or

historic territories, 4) reviewing results of 2005 raptor surveys in Area 5 (Ecosphere, unpublished data), and 3) conducting field surveys in spring for nests or breeding individuals utilizing high-powered binoculars and spotting scopes to minimize disturbance. No official (USFWS or NNDFW endorsed) survey protocol exists for this species.

4.1.2 Golden eagle

Our survey methodology for golden eagle was similar to that for ferruginous hawk except for the timing of field surveys. Surveys were conducted for golden eagle in March since courtship, breeding, and nesting are typically initiated in mid to late February. Previous surveys identified a historic golden eagle nest located approximately 1-mile outside the lease boundary for Area 4 South, which was visited in February of 2007 for other work on the BNCC mine lease area related to water well and test drilling.

4.1.3 Burrowing owl

Burrowing owls typically use burrows made by fossorial mammals, namely prairie dogs, but also ground squirrels or badgers (Henny and Blus 1981). Therefore, we conducted surveys for burrowing owl in conjunction with mapping and describing prairie dog towns within the project area and recorded observations during vegetation and mountain plover surveys. We conducted surveys in pairs by walking parallel 100-ft transects with high-powered binoculars through areas where burrowing owls had been previously documented (Ecosphere 2004a). We identified several burrowing owls within a prairie dog town in Area 5. Consequently, we revisited the area and delineated the area containing burrows for burrowing owls. We recorded the boundaries with a Trimble® TDC1 Global Positioning System (GPS) datalogger (Trimble Navigation Limited, Sunnyvale, CA) and hand-held units from the Trimble® GeoExplorer® 2005 series and mapped the area using ArcGIS [Environmental Systems Research Institute, Inc. (ESRI), Redlands, California].

4.1.4 Mountain plover

We conducted 2007 surveys in all suitable habitats in Areas 4 South and 5 following the methodology developed by Delbert et al. (1999) for the USFWS. Per the

guidelines of the USFWS, we conducted three field surveys on May 9, May 30, and June 14, 2007 between local sunrise and 1000 or between 1730 and local sunset. We utilized roads wherever possible, stopping every few hundred meters to scan the landscape with binoculars for mountain plovers. While pedestrian surveys are not generally recommended because plovers usually flush at greater distances when approached on foot, some areas of suitable habitat in the project area could not be accessed by vehicle. We recorded all mountain plover detections using coordinates recorded in the field with a Garmin® handheld GPS unit (Garmin International, Inc., Olathe, KS).

4.1.5 Black-footed ferret

The presence of black-footed ferrets is dependent upon prairie dogs, their primary prey. Large, active prairie dog towns >198 acres (80 hectares) with ≥ 8 burrows/acre (≥ 20 burrows/ha) are required to support black-footed ferrets. Alternatively, multiple towns within 7-kilometers (km) of each other may comprise the minimum acreage and burrow density to support black-footed ferrets (USFWS 1988). Therefore, we surveyed for black-footed ferrets by mapping active prairie dog towns. Prairie dogs are known to occur in Areas 4 South and 5 (Ecosphere 2004a). We conducted preliminary surveys of prairie dog towns in spring when prairie dogs emerge from hibernation and observed several prairie dog towns on several occasions in late spring and early fall 2007. All prairie dogs observed in the project area were Gunnison's prairie dogs (*Cynomys gunnisoni*). In October and November of 2007, we mapped the boundaries of these towns, using a handheld Trimble GeoXT™ GPS unit and calculated the approximate burrow densities for individual towns. We enumerated number of burrows within two prairie dog towns to estimate burrow/ha.

In July and August 2008, we conducted nocturnal surveys for black-footed ferrets (see 2008 Black-footed Ferret Survey Report - Attachment C). We chose to conduct nocturnal surveys rather than diurnal surveys because the former method is designed to observe ferrets when their population is greatest (1 July - 31 October) and activity levels are highest, resulting in better detection of any possible remnant black-footed ferret population occurring in the NMEP area. We conducted surveys following USFWS and

NNDFW protocols (USFWS 1988, NNDFW 1985) for nocturnal surveys (see 2008 Black-footed Ferret Survey Report - Attachment C).

4.1.6 Banner-tailed kangaroo rat

The presence of banner-tailed kangaroo rats is distinguishable by identifying large mounds typically with 3 to 12 burrow openings on a raised mound ≤ 1.2 meters tall and 1.5 to 4.5 meters in diameter in sandy, desert scrub or desert grassland habitats (Mikesic et al. 2005). We visited and evaluated all previously documented mounds and any new mounds observed during 2007 vegetations surveys $< 1,500$ feet of an existing 2-track road. We looked for any fresh digging, scat, or tracks surrounding the burrow openings and we manually patted the mounds to solicit territorial thumping, which has been utilized to determine if mounds are occupied (J. Zahratka, personal experience). We also recorded the location of the mounds using a handheld Trimble GeoXT™ GPS unit and mapped each mound (Figure 4 in Attachment B). We randomly visited 18 potential banner-tailed kangaroo rat mounds to ground-truth each mound and determine their status (i.e. active or inactive). We visited mounds until we found four active mounds less than 1,500-feet from an existing two-track road and out of sight from residences. In fall 2007, we set 20 to 50 live traps ($8 \times 9 \times 23$ cm; H.B. Sherman Trap Company, Tallahassee, FL) at the four mounds and trapped for two consecutive nights in and around each mound to document presence of banner-tailed kangaroo rats.

4.1.7 Kit fox

Four biologists spotlighted at night in pairs in separate vehicles by driving slowly on passable roads throughout Areas 4 South and 5 (Figure 5 in Attachment B) for two consecutive nights. While one biologist operated the vehicle, the other scanned the horizon with a two million-candlepower spotlight (The Brinkmann Corporation and Dallas Manufacturing Company, Inc, Dallas, Texas) to scan for green eye-shine. Predator calls (Primos® Hunting Calls, Flora, Missouri) were used during each spotlighting session to attract canids in the area, which could then be identified with spotlights. We spotlighted for two to four hours after midnight and repeated surveys on four occasions in 2007. The surveys occurred on the evenings of April 9 to 10 when females and pups are most likely near a den. The second event happened June 6 to 7

when pups begin foraging with adults. The last two events occurred on July 2 to 3 and August 29 to 30 as pups become more mobile and independent from adults (Fitzgerald et al. 1994). We did not survey along the roads in the west-central portion of Area 5 due to their proximity to a residence.

4.1.8 Pronghorn antelope

According to NNHP, pronghorn antelope are not known to occur in the project area (Mikesic et al. 2005). Therefore, we did not conduct formal surveys for pronghorn; rather, we surveyed for pronghorn concurrently with vegetation and wildlife surveys in spring, summer, and fall. We used high-powered optics to identify distinguishing physical characteristics of pronghorn antelope and their sign.

4.2 Survey Results

Of the eight fauna species listed on the NESL and by the USFWS, seven were documented in the project area.

4.2.1 Ferruginous hawk

Historic information and results of 2007 surveys for ferruginous hawk and their nests within 1 mile of the Area 4 South and 5 lease boundaries are outlined in Table 2 and displayed in Figure 6.

4.2.2 Golden eagle

Historic information and results of surveys for 2007 golden eagle and their nests within 1 mile of the Area 4 South and 5 lease boundaries are outlined in Table 3 and displayed in Figure 6 in Attachment B.

4.2.3 Burrowing owl

We conducted raptor surveys in the spring when migratory burrowing owls had not yet arrived on their breeding grounds. However, burrowing owls were observed on separate occasions during vegetation surveys in June 2007 and mountain plover surveys in June 2007 (Table 4 in Attachment A; Figure 7 in Attachment B). Burrowing owls were also observed in July 2007 during a prairie dog burrow inventory (Table 4 in Attachment A; Figure 7 in Attachment B).

4.2.4 Mountain plover

We observed mountain plovers on May 9, 2007, during the first of three USFWS protocol surveys for mountain plovers; no birds were detected at this same location during the second and third surveys (Table 5 in Attachment A; Figure 8 in Attachment B). However, mountain plovers were also observed in this general area during vegetation surveys on May 25, 2007. No other mountain plovers were detected during the other surveys on May 30 and June 14, 2007.

Mountain plovers were incidentally observed during breeding bird surveys (Ecosphere 2008) on May 18, 2007 (Table 5 in Attachment A; Figure 8 in Attachment B). This site was not surveyed during the first mountain plover survey, because it is not observable from a road. However, it was surveyed on foot during the second and third surveys; no birds were detected at this site during the second and third mountain plover surveys.

4.2.5 Black-footed ferret

We documented five major prairie dog towns in Areas 4 South and 5 of the NMEP (Table 6 in Attachment A; Figure 7 in Attachment B). Prairie dog town E was large enough to warrant black-footed ferret surveys, as well as C and D combined as they are adjacent towns that together provide a large enough prey base for black-footed ferrets. Further, all five towns are within 4.2 miles of each other to comprise the minimum acreage to support black-footed ferrets (USFWS 1988). We also counted 384 prairie dog burrows on town B for a density of five burrows per acre and 399 prairie dog burrows on town C for the same density of five burrows per acre (Table 6 in Attachment A). Although these burrow densities are slightly less than required by the USFWS for black-footed ferret surveys (eight burrows per acre), they are typical for this species. The burrow density recommended by the USFWS is specific to white-tailed prairie dogs (*Cynomys leucurus*) and black-tailed prairie dog (*Cynomys ludovicianus*), both of which usually occur in greater densities than Gunnison's prairie dogs (Hoogland 2006). Further, these estimates are approximate and likely underestimate the total density of burrows due to our cursory methods; future efforts should employ standard transects for counting burrows as suggested by Biggins et al. (1993).

The results of our nocturnal spotlighting surveys conducted for black-footed ferrets in July and August 2008 were negative, i.e. we detected no black-footed ferrets or their sign (see 2008 Black-footed Ferret Survey Report - Attachment C). Additionally, we identified all green eye-shine observed in the project area to either kit fox, coyote, black-tailed jackrabbit, or desert cottontail.

4.2.6 Banner-tailed kangaroo rats

We mapped banner-tailed kangaroo rat mounds compiled from incidental observations made during vegetation surveys and previously known locations (Ecosphere 2004a; Table 7 in Attachment A; Figure 4 in Attachment B). Four of these burrows exceeded our criterion of being <1,500 ft from a road so we did not visit them (see Section 4.1.6). Of the 14 mounds we visited, one was likely a complex of Ord's kangaroo rat (*Dipodomys ordii*) burrows, two mounds were not found, and two mounds appeared inactive, i.e. no scat, tracks, or runways were observed and the mound was in poor structural condition (Table 7 in Attachment A). Of the nine active banner-tailed kangaroo rat mounds, five were too close to residences and we were advised to avoid trapping at those mounds (Collette Brown, BNCC, pers. comm.). Therefore, we trapped at four mounds. We captured banner-tailed kangaroo rats at two of the mounds, as well as two ground squirrels (*Spermophilus* spp.) at one mound (Table 7 in Attachment A).

Capture success was low for banner-tailed kangaroo rats relative to previous trapping efforts in Area 5 (Ecosphere, unpublished data). This may be due to the timing of surveys. Previous surveys in Area 5 were conducted in late summer, whereas we trapped for banner-tailed kangaroo rats in 2007 in October and November when banner-tailed kangaroo rats are less active. Because suitable habitat for banner-tailed kangaroo rats exists throughout the project area, it is likely more banner-tailed kangaroo rat mounds exist in the project area than those we randomly visited.

4.2.7 Kit fox

We observed kit fox on all five spotlighting occasions in April, May, June, July, and August 2007. We also documented two kit fox dens (Table 8 in Attachment A; Figure 5 in Attachment B). Green eyeshine, indicative of canids, was also documented during multiple spotlighting surveys.

4.2.8 Pronghorn antelope

No pronghorn antelope or sign thereof were observed in the project area.

5.0 Conclusions and Recommendations

We observed six of the eight fauna species we surveyed for in the project area: ferruginous hawk, golden eagle, burrowing owl, mountain plover, banner-tailed kangaroo rat, and kit fox, as well as potential habitat for a seventh species, the federally endangered black-footed ferret. Because we documented sufficient prairie dog towns to support black-footed ferrets, we conducted nocturnal surveys for black-footed ferrets. We did not observe any black-footed ferrets or their sign during our survey efforts. Similarly, in the last three years of conducting spotlighting surveys in the NMEP area, we also have not detected any black-footed ferrets or observed their sign. Further, black-footed ferrets are considered extirpated from New Mexico (Jim Stuart, Conservation Biologist, New Mexico Department of Game and Fish, pers. comm.). Therefore, based on the survey effort and familiarity with the project site, Ecosphere concludes that no black-footed ferrets occur in the NMEP area. General mitigation measures are provided by NNHP (Mikesic et al. 2005) for all other species. Further surveys and monitoring may be required pending recommendations from NNHP.

6.0 Literature Cited

- Biggins, D.; B. Miller; L. Hanebury; B. Oakleaf; A. Farmer; R. Crete; A. Dood. 1993. A system for evaluating black-footed ferret habitat. In: J. Oldemeyer; D. Biggins; B. Miller; R. Crete, eds. Management of prairie dog complexes for black-footed ferret reintroduction. Washington, DC: U.S. Fish and Wildlife Service Biological Report 13: 73-92.
- Delbert, P., L. Hanebury, B. Leachman, and F. Knopf. 1999. Mountain plover survey guidelines. U.S. Fish and Wildlife Service.
- Dick-Peddie, W. A. 1993. New Mexico Vegetation: Past, Present, and Future. University of New Mexico Press, Albuquerque, New Mexico.
- Ecosphere. 2001. Ecosphere Environmental Services. A Survey for Threatened, Endangered and Sensitive Species for the Proposed Navajo Mine 654 Acres Dixon Pit Lease Extension Project, San Juan County, New Mexico. 11 pages. [BHP Navajo Coal Company- Navajo Mine Permit NM-0003E, Chapter 9, Appendix 9-A]
- Ecosphere. 2004a. Ecosphere Environmental Services Floristic Survey and Ecological Study of BHP Area IV, San Juan County, New Mexico. 21 pages. [BHP Navajo Coal Company- Navajo Mine Permit NM-0003F Chapter 9, Appendix 9-B]
- Ecosphere 2004b. Ecosphere Environmental Services Wildlife Baseline Report. BHP Navajo Coal Company.
- Ecosphere 2008. Ecosphere Environmental Services 2007 Baseline Vegetation Inventories, Navajo Mine Extension Project. BHP Navajo Coal Company.
- Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History and University Press of Colorado.
- Henny, C. J. and L. J. Blus. 1981. Artificial burrows provide new insight into Burrowing Owl nesting biology. Raptor Res. 15: 82-85
- Hoogland, J.L. 2006. Conservation of the Black-tailed Prairie Dog: Saving North America's Western Grasslands. Island Press, Washington, D.C.

- Mariah Associates, Inc. 1994. Wildlife Survey at BHP World Minerals Navajo Mine, New Mexico. Prepared for BHP World Minerals Navajo Mine, Fruitland, New Mexico, by Mariah Associates Inc., Laramie, Wyoming. 25 pp.
- Mikesic, D., J. Nystedt, and D. Roth. 2005. Navajo Nation Endangered Species List (NESL). Species Accounts. Version 2.05. Navajo Natural Heritage Program Department of Fish and Wildlife. Window Rock, AZ.
- TRC Mariah Associates, Inc. 1999. No Name Project Vegetation Studies, BHP World Minerals, Navajo Coal Company, San Juan County New Mexico (unpublished).
- U.S. Fish and Wildlife Service (USFWS). 1988. Black-footed ferret recovery plan. Denver.
- U.S. Fish and Wildlife Service (USFWS). 2008. Southwest Region Endangered Species List. http://www.fws.gov/southwest/es/NewMexico/SBC_intro.cfm
- Westinghouse Electric Corporation. 1975. Terrestrial Survey of Navajo Mine Lease Associated with the Four Corners Power Plant. Prepared For Utah International, Inc. by Environmental Systems Department, Westinghouse Electric Corporation, Pittsburgh, Pennsylvania.
- Woyewodzic, R. 1987. Raptor Survey of Utah International Navajo Mine, Leasehold. 20 pp.

Attachment A: Tables

Tables containing threatened, endangered or sensitive species information have been removed to protect the confidentiality of this information.

Table 1. U.S. Fish and Wildlife Service (USFWS) and Navajo Nation Natural Heritage (NNHP) listed species with the potential to occur in the project area.

SPECIES	STATUS	HABITAT DESCRIPTION
Mammals		
Black-footed Ferret (<i>Mustela nigripes</i>)	Federally Endangered NESL Group 2	Open grasslands with year-round prairie dog colonies.
Pronghorn (<i>Antilocapra americana</i>)	NESL Group 3	Grasslands or desert-scrub with rolling or dissected hills or small mesas.
Banner-tail kangaroo rat (<i>Dipodomys spectabilis</i>)	NESL Group 4	Great Basin desert grassland or desert scrub. Presence of grasses is necessary.
Chisel-tooth kangaroo rat (<i>Dipodomys microps</i>)	NESL Group 4	Open, sandy areas in desert scrub habitat with rock or gravel; sensitive to grazing
Kit fox (<i>Vulpes macrotis</i>)	NESL Group 4	Desert scrub or desert grassland with soft, alluvial or silty-clay soils, with sparse vegetation cover.
Birds		
Mexican Spotted Owl (<i>Strix occidentalis lucida</i>)	Federally Threatened	Nests in caves, cliffs, or trees in steep-walled canyons of mixed conifer forests.
Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	Federal Candidate	Breeds in riparian woodlands with dense, understory vegetation.
Southwestern Willow Flycatcher (<i>Empidonax traillii extimus</i>)	Federally Endangered	Breeds in dense, shrubby riparian habitats, usually in close proximity to surface water or saturated soil.
Mountain plover (<i>Charadrius montanus</i>)	NESL Group 3	Breeds in short sparse vegetation in disturbed-prairies or semideserts with less than a 2-degree slope.
Golden eagle (<i>Aquila chrysaetos</i>)	NESL Group 3	Open habitats in mountainous, canyon terrain. Nests primarily on steep cliffs and occasionally large trees.
Western burrowing owl (<i>Athene cunicularia hypugea</i>)	NESL Group 4	Nests in ground burrows (often deserted prairie dog burrows) in dry open grasslands or desert scrub.
Ferruginous hawk (<i>Buteo regalis</i>)	NESL Group 3	Nests in badlands, flat or rolling grasslands and desert scrub.
Fish		
Colorado pikeminnow (<i>Ptychocheilus lucius</i>)	Federally Endangered	Large rivers with strong currents, deep pools, and quiet backwaters.
Razorback Sucker (<i>Xyrauchen texanus</i>)	Federally Endangered	Medium to large rivers with silty to rocky substrates. Prefers strong currents and deep pools.

SPECIES	STATUS	HABITAT DESCRIPTION
Plants		
Knowlton's Cactus (<i>Pediocactus knowltonii</i>)	Federally Endangered	Alluvial deposits that form rolling, gravelly hills in piñon-juniper and sagebrush communities (6,200-6,400 ft.).
Mancos Milkvetch (<i>Astragalus humillimus</i>)	Federally Endangered	Cracks of Point Lookout Sandstone of the Mesa Verde series (5,000-6,000 ft.).
Mesa Verde Cactus (<i>Sclerocactus mesae-verdae</i>)	Federally Threatened	Highly alkaline soils in sparse shale or adobe clay badlands of the Mancos and Fruitland formations (4,000-5,550 ft.)
San Juan milkweed (<i>Asclepias sanjuanensis</i>)	NESL Group 4	Sandy loam soils in juniper savanna and Great Basin desert scrub at 5,000-5,500 ft.

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. Sources: USFWS 2007; NNHP 2007.

Attachment B: Figures

Figures containing threatened, endangered or sensitive species information have been removed to protect the confidentiality of this information.

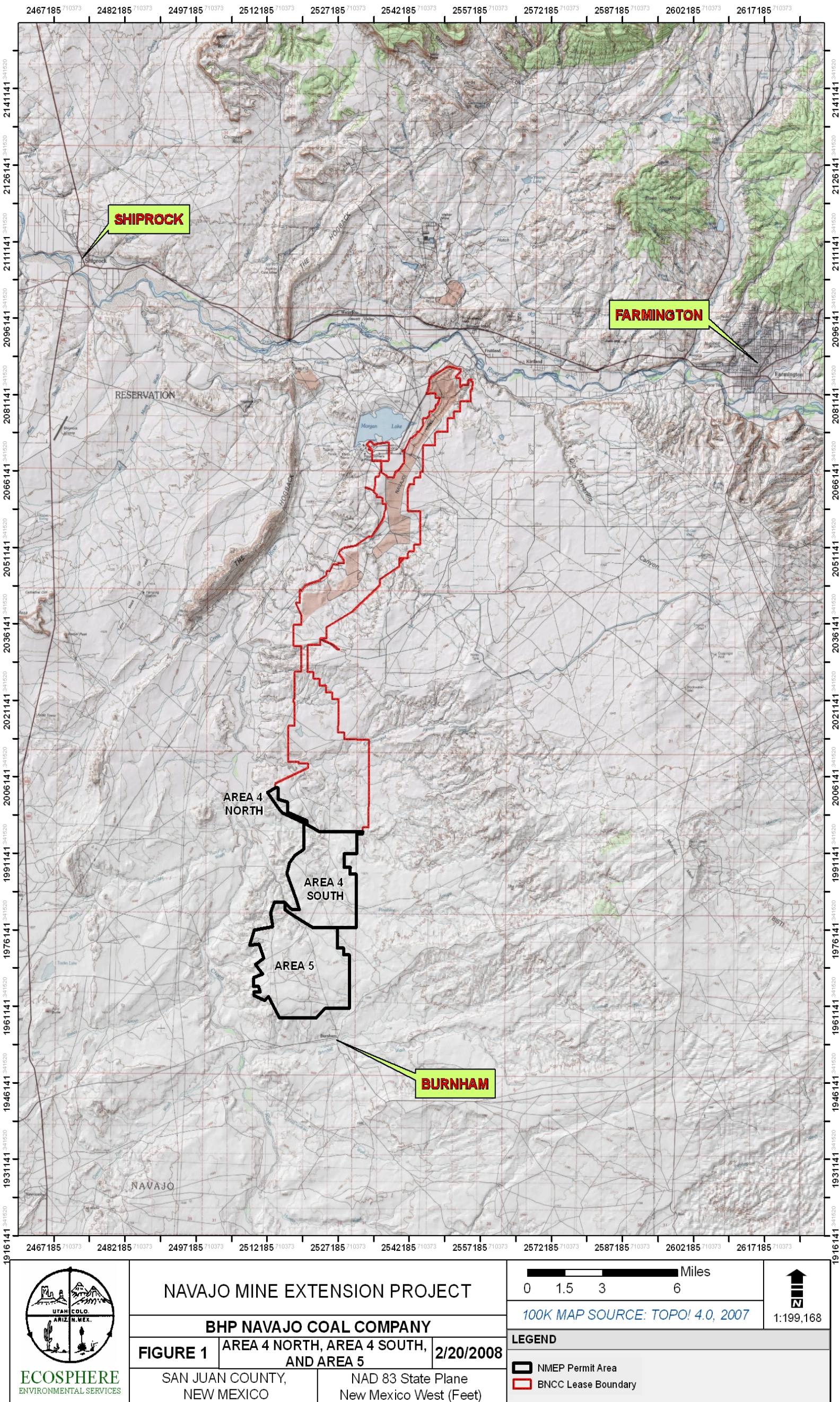


Figure 1. Vicinity map, Threatened and Endangered Species Surveys, NMEP 2007

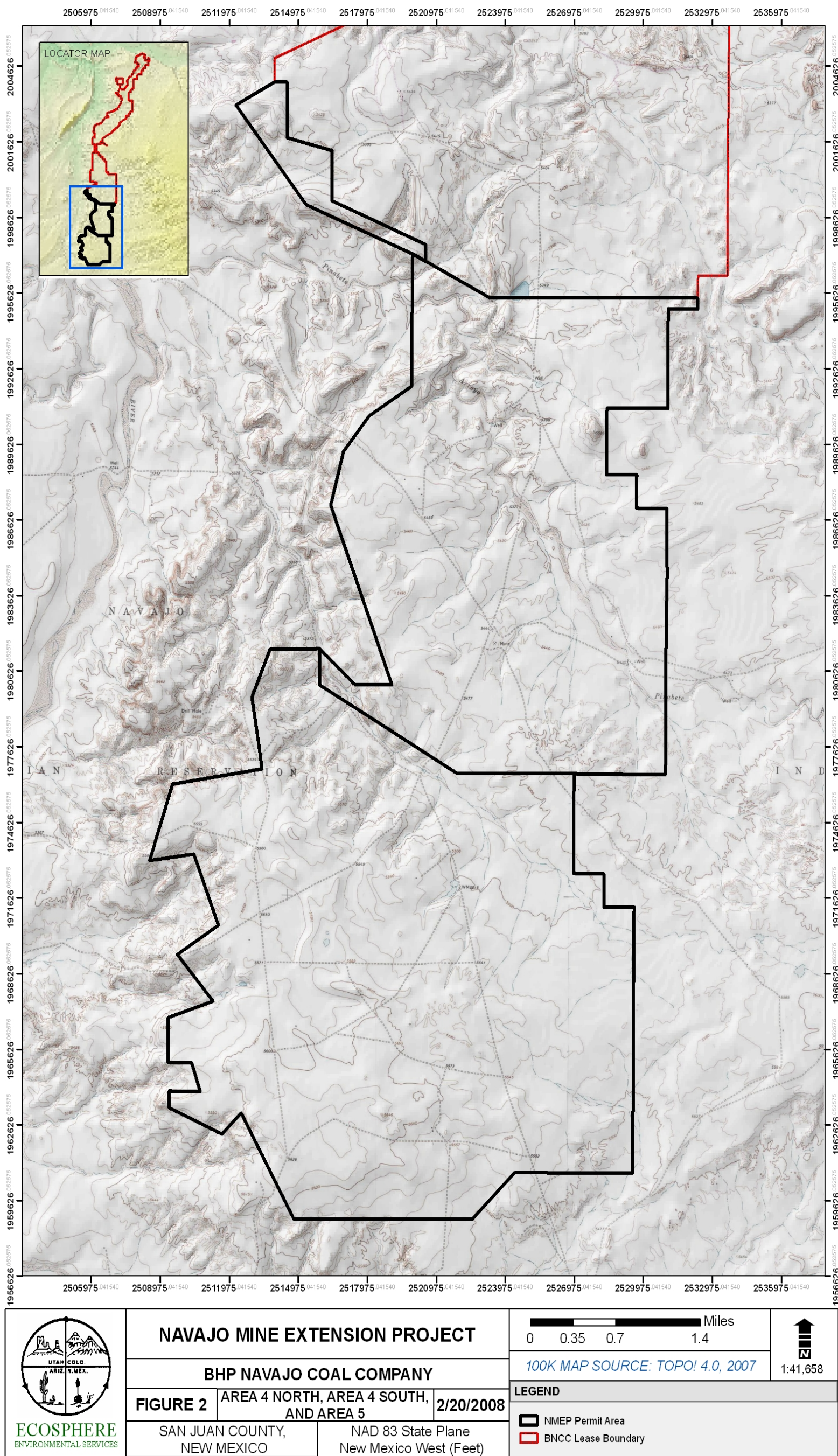


Figure 2. Map of project area, threatened and endangered species surveys, NMEP 2007.

Attachment C: 2008 Black Footed Ferret Nocturnal Survey Report

2008 BLACK-FOOTED FERRET NOCTURNAL SURVEYS

Navajo Mine Extension Project



PREPARED FOR:

BHP Navajo Coal Company
Navajo Mine Extension Project
Fruitland, New Mexico

PREPARED BY:

Ecosphere Environmental Services
2243 Main Ave, Suite 4
Durango, CO 81301

AUGUST 2008

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PROJECT AREA	1
3.0	METHODOLOGY	2
4.0	RESULTS	3
5.0	DISCUSSION.....	3
6.0	LITERATURE CITED	4

TABLE OF FIGURES

Figure 1.	Vicinity map of Navajo Mine Extension Project (NMEP).	5
Figure 2.	Map of prairie dogs towns surveyed for black-footed ferrets, Navajo Mine Extension Project (NMEP), 2008.	6

1.0 INTRODUCTION

In 2007, we documented five Gunnison's prairie dog (*Cynomys gunnisoni*) towns in Areas 4 South and 5 of the Navajo Mine Extension Project (NMEP), comprising just over 700 acres of potential habitat for black-footed ferrets (*Mustela nigripes*; Figure 1). The U.S. Fish and Wildlife Service (USFWS 1989) developed revised guidelines for black-footed ferret surveys that establish minimum acres of prairie dog habitat needed to support black-footed ferrets. These guidelines have been established for black-tailed prairie dogs (*Cynomys ludovicianus*) and white-tailed prairie dogs (*Cynomys leucurus*) only. Based on discussion with the USFWS biologist, we followed those guidelines established for white-tailed prairie dogs (Lynn Gemlo, USFWS biologist, personal communication), the species most similar to and of the same family as the Gunnison's prairie dog. According to these revised black-footed ferret survey guidelines (USFWS 1989), prairie dog towns or complexes greater than 200 acres but less than 1,000 acres in size are cleared by USFWS after completion of a survey for black-footed ferrets, provided that no ferrets or their sign are found. The Navajo Natural Heritage Program (NNHP) of the Department of Fish and Wildlife (NNDFW) also developed survey guidelines. These guidelines are similar to those developed by the USFWS and were also incorporated into our efforts so that our survey efforts complied with both the USFWS and the NNDFW. One prairie dog town was large enough to warrant black-footed ferret surveys (317 acres, Town E, Figure 1), and two other adjacent towns that combined, are >200 acres (218 acres, Towns C and D, Figure 1). Further, all five documented towns are within 4.2 miles of each other to comprise the minimum acreage to support black-footed ferrets (USFWS 1989). Therefore, we surveyed all five prairie dog towns for black-footed ferrets in July and August 2008.

2.0 PROJECT AREA

The NMEP is located about 20 miles (linear distance) southwest of Farmington, New Mexico (Figure 2). The NMEP is comprised of Great Basin desert-scrub habitat (Dick-Peddie 1993). Great Basin desert-scrub habitat is 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). According to Hoogland (2006), such desert grasslands and shrublands of New Mexico provide suitable habitat for prairie dogs.

3.0 METHODOLOGY

We followed USFWS and NNDFW protocols (USFWS 1989, NNDFW 1985) for nocturnal surveys. We chose to conduct nocturnal surveys rather than diurnal surveys because the former method is designed to observe ferrets when their population is greatest (1 July - 31 October) and activity levels are highest, resulting in better detection of any possible remnant black-footed ferret population occurring on the NMEP.

Prior to conducting field work we totaled the acres of all five prairie dog towns (708 acres; Figure 1) and divided the total by 320 acres to determine the number of survey tracts (UWFWS 1989). As a result, the prairie dog towns were divided into 3 survey tracts: towns A and B represented tract 1, towns C and D represented tract 2, and tract 3 was comprised solely of town E (Figure 1).

We conducted surveys with 3 field crews each consisting of 2 biologists in a 4-wheel drive vehicle assigned to 1 survey tract. Each crew was equipped with the following:

- 1 one-million candle power spotlight (Cyclops Solutions, LLC, Grand Prairie, TX)
- 1 two-million candle power spotlight (The Black and Decker Corporation, Towson, MD)
- 1 pair 8 x 42 binoculars (Eagle Optics, Middleton, WI)
- 1 Garmin hand-held Global Positioning System (GPS) units (Garmin International Inc., Olathe, KS)
- 1 digital camera (Olympus Imaging America, Inc. Center Valley, PA)
- 1 maglite (Mag Instrument, Inc., Ontario, CA)

We spotlighted continuously from dusk until dawn on two consecutive nights (29 and 30 July 2008). On the second consecutive survey night (30 July 2008), we were

harassed by 2 local men while gathering at our nightly check-in point, just off Burnham Road near prairie dog town B. Due to safety reasons, we promptly left the project area, having completed only about ½ of the survey. Upon discussion with the USFWS (Eric Hein, Biologist, USFWS, pers. comm.) and David Mikesic (Biologist, NNHP, pers. comm.), we agreed to complete a third, albeit non-consecutive survey when BHP could provide us a security escort (see Appendix A - Correspondence). We completed the third survey on 14 August 2008 without incident.

4.0 RESULTS

The results of our surveys efforts were negative, i.e. we detected no black-footed ferrets or their sign. Additionally, we did not observe any unidentified green eyeshine.

5.0 DISCUSSION

We did not observe any black-footed ferrets or their sign during our survey efforts. Similarly, in the last three years of conducting spotlighting surveys on the NMEP, we also have not detected any black-footed ferrets or observed their sign. Further, black-footed ferrets are considered extirpated from New Mexico (Jim Stuart, Conservation Biologist, New Mexico Department of Game and Fish, pers. comm.). Therefore, we do not believe any black-footed ferrets occur on the NMEP.

6.0 LITERATURE CITED

- Dick-Peddie, W. A. 1993. *New Mexico Vegetation: Past, Present, and Future*. University of New Mexico Press, Albuquerque, New Mexico.
- Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. *Mammals of Colorado*. Denver Museum of Natural History and University Press of Colorado.
- Hoogland, J.L. 2006. *Conservation of the Black-tailed Prairie Dog: Saving North America's Western Grasslands*. Island Press, Washington, D.C.
- Navajo Nation Department of Fish and Wildlife (NNDFW). 1985. *Black-footed ferret guidelines for the Navajo Indian Reservation*. Navajo Fish and Wildlife Department. June 20, 1985.
- U.S. Fish and Wildlife Service (USFWS). 1989. *Black-footed ferret survey guidelines for compliance with the Endangered Species Act*. Denver.

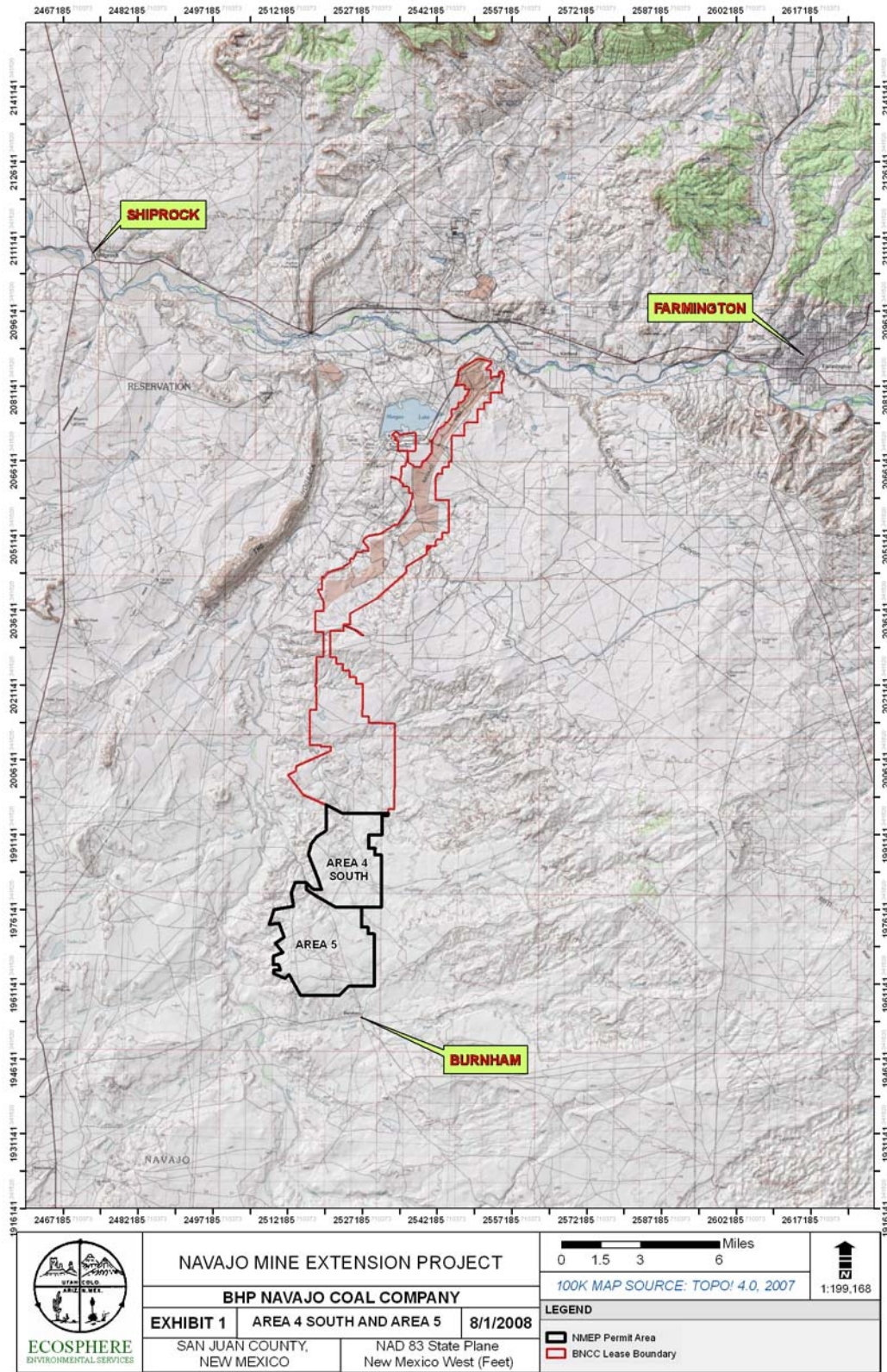


Figure 1. Vicinity map of Navajo Mine Extension Project (NMEP).

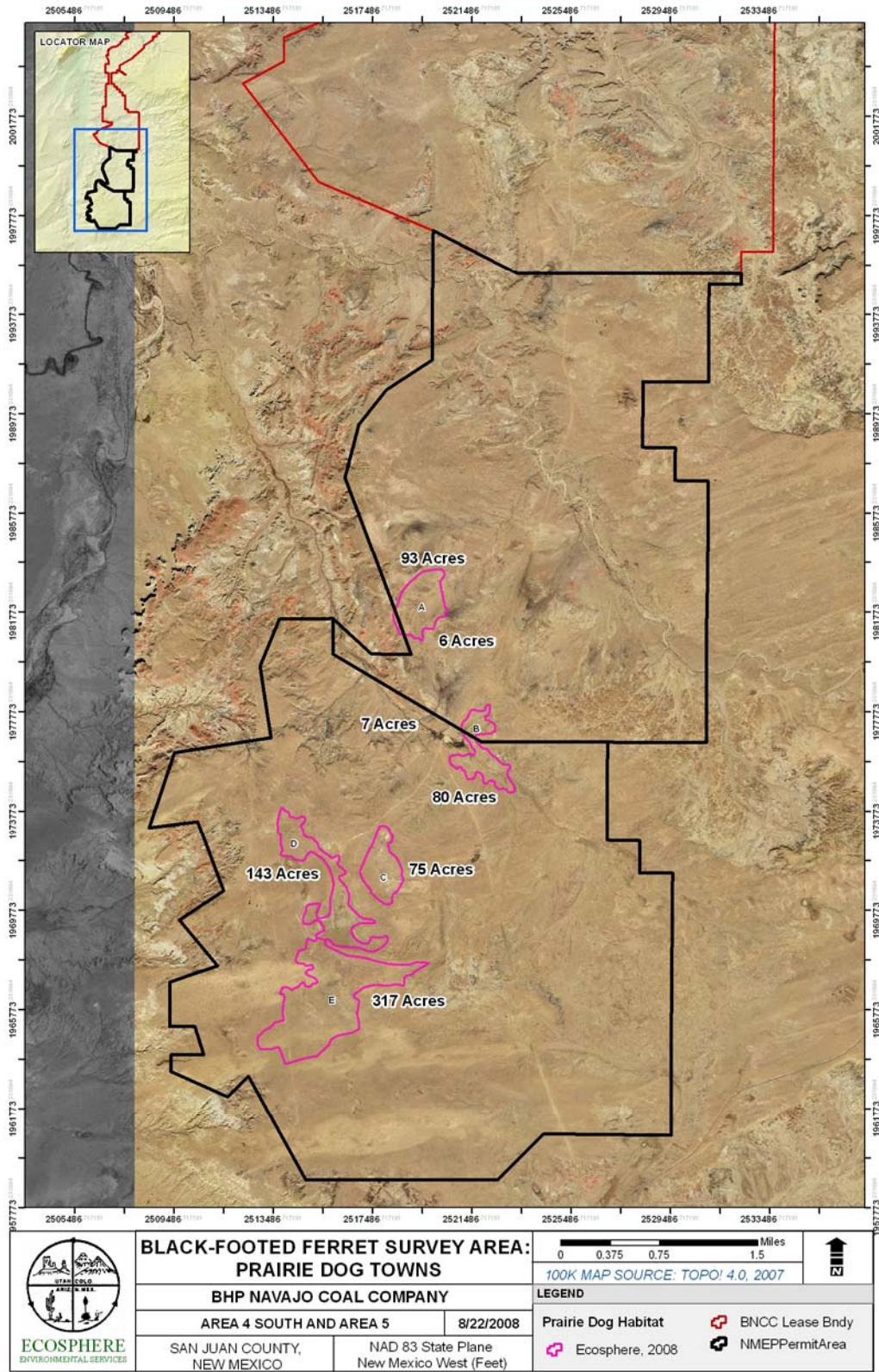


Figure 2. Map of prairie dogs towns surveyed for black-footed ferrets, Navajo Mine Extension Project (NMEP), 2008.

APPENDIX A. CORRESPONDENCE

Jennifer Zahratka

From: Eric_Hein@fws.gov
Sent: Monday, August 11, 2008 7:10 AM
To: dmikesic@navajofishandwildlife.org
Cc: 'Musslewhite, Brent'; jcole@navajofishandwildlife.org; Lynn_Gemlo@fws.gov; 'Owens, Matt P'; Jennifer Zahratka
Subject: RE: black footed ferret surveys on the Navajo Nation

We concur also Jennifer.

Eric

Eric W. Hein
U.S. Fish and Wildlife Service
2105 Osuna NE
Albuquerque, New Mexico 87113
505-761-4735; 346-2542 (fax)

"David Mikesic" <dmikesic@navajofishandwildlife.org>

08/08/2008 02:22 PM

Please respond to
<dmikesic@navajofishandwildlife.org>

To "Jennifer Zahratka" <zahratka@ecosphere-services.com>,
<Eric_Hein@fws.gov>, <Lynn_Gemlo@fws.gov>,
<jcole@navajofishandwildlife.org>

cc "Musslewhite, Brent" <Brent.Musslewhite@BHPBilliton.com>, "Owens, Matt
P" <Matt.P.Owens@bhpbilliton.com>

Subject RE: black footed ferret surveys on the Navajo Nation

Jennifer et.al.,

Sorry you ran into issues with the locals while on BFF surveys; I agree with your argument below and concur that you could run the third and final survey in the upcoming week(s) and fulfill the survey needs set forth for this project. Let me know if you have any questions, or need for further comments.

*David Mikesic, Zoologist
Navajo Natural Heritage Program
Department of Fish and Wildlife
P. O. Box 1480
Window Rock, Arizona 86515
928-871-7070*

The information contained in this email is directed to the intended recipient(s) only and may be confidential and/or contain work product. Unauthorized or unintended recipients shall immediately notify David Mikesic upon receipt.

8/20/2008

Unauthorized use of this email is prohibited.

-----Original Message-----

From: Jennifer Zahratka [mailto:zahratka@ecosphere-services.com]
Sent: Friday, August 08, 2008 9:35 AM
To: Eric_Hein@fws.gov; dmikesic@navajofishandwildlife.org; Lynn_Gemlo@fws.gov;
jcole@navajofishandwildlife.org
Cc: Musslewhite, Brent; Owens, Matt P
Subject: FW: black footed ferret surveys on the Navajo Nation
Importance: High

All,

We plan to proceed with a third and final, non-consecutive survey for black-footed ferrets on the Navajo Mine Extension Project (NMEP) south of Farmington next week. We did not observe any ferrets or their sign during the first of two consecutive nights of survey effort; in the last three years of spotlighting for canids we have never observed any ferrets or their sign; and, black-footed ferrets are considered extirpated from New Mexico. Further, our surveys are very thorough, with 3 teams of 2 biologists covering 708 acres of Gunnison's prairie dog habitat. Therefore, I feel that we are in compliance with the intent of the USFWS and Navajo Nation protocol surveys in that, if there was a small, remnant population of black-footed ferrets at NMEP we would have discovered it or will discover it with these methods.

Lynn, Eric, or David: I would still appreciate a response that you concur with this argument and our plan to proceed with the third survey next week.

Thanks for your time,
Jennifer

Jennifer L. Zahratka
Wildlife Biologist
Ecosphere Environmental Services
2243 Main Ave, Suite 4
Durango, Colorado 81301
970 382-7256 office
970 759-1070 cell

www.ecosphere-services.com

This e-mail, including any attachments, is intended only for the use of the individual or entity to which it is addressed. It may contain information that is attorney work product, privileged, confidential, exempt or otherwise protected from disclosure or use under applicable law. If you have received this e-mail in error, please notify the sender immediately by return e-mail, and delete this e-mail from all affected databases. Thank you.

From: Jennifer Zahratka
Sent: Friday, August 01, 2008 10:18 AM
To: 'Lynn_Gemlo@fws.gov'; 'dmikesic@navajofishandwildlife.org'
Subject: black footed ferret surveys on the Navajo Nation

Lynn and David,

As you are both aware, we are conducting protocol surveys for black-footed ferrets (bff) for the Navajo Mine Extension Project just south of Farmington. We began those surveys this week; unfortunately, on the second night of surveys we had a negative encounter with two Navajo men and we left the area about 12:45 am. BHP (our client) attempted to provide security for us to complete the third survey night (which would have been last night), but were unable to do so on such short notice and promptly canceled any further survey efforts until security measures could be put in place. We will likely resume surveys between August 4th and 15th.

Could you please advise us on whether or not you feel we need to restart the surveys and complete 3 consecutive surveys or if we can simply conduct one more 3rd survey, albeit not consecutive? We did not observe any bff during the surveys we have completed thus far.

Thank you,
Jennifer

8/20/2008

Jennifer L. Zahratka
Wildlife Biologist
Ecosphere Environmental Services
2243 Main Ave, Suite 4
Durango, Colorado 81301
970 382-7256 office
970 759-1070 cell
www.ecosphere-services.com

This e-mail, including any attachments, is intended only for the use of the individual or entity to which it is addressed. It may contain information that is attorney work product, privileged, confidential, exempt or otherwise protected from disclosure or use under applicable law. If you have received this e-mail in error, please notify the sender immediately by return e-mail, and delete this e-mail from all affected databases. Thank you.

8/20/2008

APPENDIX B. DATA SHEETS

BLACK-FOOTED FERRET SURVEY FORM
NOCTURNAL (NIGHTTIME) SURVEY

Date of Survey 29/30 July 2008 Species of Prairie Dog gambelii
(Night of)

Name of Individual, Location survey was conducted:

Name: Ecosphere Environmental Services (J. Zahratka + 5 staff biologists)
Location: Navajo Mine Extension Project, ~20 miles S of Farmington, NM

Weather: Temperature begin 82°F - end 61°F Wind Speed & Direction 5-8 mph
Cloud Cover clear (N)

Begin Survey: 2030 hrs End Survey: 0530 hrs

Total Man/Hrs. 54 hrs

Source:

www.underground.com/US/NM/Farmington.html#History

General Comments: (possible ferret sign encountered, tracks observed,
unidentified green eyeshine observed etc.)

No black-footed ferrets or their sign observed.

NM STATE FISH &
WILDLIFE DEPT.

83

BLACK-FOOTED FERRET SURVEY FORM
NOCTURNAL (NIGHTTIME) SURVEY

Date of Survey 30/31 July 2008 Species of Prairie Dog Gambel's

Name of Individual, Location survey was conducted:

Name: Ecosphere Environmental Services (J. Zahradka + 5 staff biologists)

Location: South of Farmington, NM, Navajo Mine Ext. Project

Weather: Temperature begin 85°F - end 60°F Wind Speed & Direction 6-10 mph (ENE)

Cloud Cover clear

Begin Survey: 2045

End Survey: 0015

Total Man/Hrs. 21

General Comments: (possible ferret sign encountered, tracks observed, unidentified green eyeshine observed etc.)

No black-footed ferrets observed, or their sign.

2008 JEM &
N.M. DEPT.

BLACK-FOOTED FERRET SURVEY FORM
NOCTURNAL (NIGHTTIME) SURVEY

Date of Survey 14/15 Aug 2008 Species of Prairie Dog gambelii
(Night of)

Name of Individual, Location survey was conducted:

Name: Ecosphere (M. Vivalda + 5 biological staff)

Location: S of Farmington, NM, Navajo Mine Extension Project

Weather: Temperature begin 70°F - end Wind Speed & Direction 6-10 mph

Cloud Cover clear (NNE)

Begin Survey: 2045 End Survey: 0530

Total Man/Hrs. 51

www.underground.com/us/nm/farmington.html#History
General Comments: (possible ferret sign encountered, tracks observed,
unidentified green eyeshine observed etc.)

No black footed ferrets or their sign observed.

WASH &
DEPT.

MV
JB

Appendix 16.D

2008 Black-footed Ferret Nocturnal Survey Report

2008 BLACK-FOOTED FERRET NOCTURNAL SURVEY REPORT

Navajo Mine Extension Project



PREPARED FOR:

BHP Navajo Coal Company
Navajo Mine Extension Project
Fruitland, New Mexico

PREPARED BY:

Ecosphere Environmental Services
2243 Main Ave, Suite 4
Durango, CO 81301

AUGUST 2008

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PROJECT AREA	1
3.0	METHODOLOGY	2
4.0	RESULTS	3
5.0	DISCUSSION	3
6.0	LITERATURE CITED	4

TABLE OF FIGURES

Figure 1.	Vicinity map of Navajo Mine Extension Project (NMEP).	5
Figure 2.	Map of prairie dogs towns surveyed for black-footed ferrets, Navajo Mine Extension Project (NMEP), 2008.	6

1.0 INTRODUCTION

In 2007, Ecosphere Environmental Services (Ecosphere) documented five Gunnison's prairie dog (*Cynomys gunnisoni*) towns in Areas 4 South and 5 of the BHP Navajo Coal Company's (BNCC) Navajo Mine Extension Project (NMEP) area, comprising just over 700 acres of potential habitat for black-footed ferrets (*Mustela nigripes*; Figure 1). The U.S. Fish and Wildlife Service (USFWS 1988) developed revised guidelines for black-footed ferret surveys that establish minimum acres of prairie dog habitat needed to support black-footed ferrets. These guidelines have been established for black-tailed prairie dogs (*Cynomys ludovicianus*) and white-tailed prairie dogs (*Cynomys ludovicianus*) only. Based on discussion with the USFWS biologist, we followed those guidelines established for white-tailed prairie dogs (Lynn Gemlo, USFWS biologist, personal communication), the species most similar to and of the same family as the Gunnison's prairie dog. According to these revised black-footed ferret survey guidelines (USFWS 1988), prairie dog towns or complexes greater than 200 acres but less than 1,000 acres in size are cleared by USFWS after completion of a survey for black-footed ferrets, provided that no ferrets or their sign are found. The Navajo Natural Heritage Program (NNHP) of the Department of Fish and Wildlife (NNDFW) also developed survey guidelines. These guidelines are similar to those developed by the USFWS and were also incorporated into our survey efforts. Therefore, the survey efforts complied with both the UWFWS and the NNDFW. One prairie dog town was large enough to warrant black-footed ferret surveys (317 acres, Town E, Figure 1), and two other adjacent towns that combined, are >200 acres (218 acres, Towns C and D, Figure 1). Further, all five documented towns are within 4.2 miles of each other to comprise the minimum acreage to support black-footed ferrets (USFWS 1988). Therefore, we surveyed all five prairie dog towns for black-footed ferrets in July and August 2008.

2.0 PROJECT AREA

The NMEP area is located about 20 miles (linear distance) southwest of Farmington, New Mexico (Figure 2). The area is comprised of Great Basin desert-

scrub habitat (Dick-Peddie 1993). Great Basin desert-scrub habitat is 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). According to Hoogland (2006), such desert grasslands and shrublands of New Mexico provide suitable habitat for prairie dogs.

3.0 METHODOLOGY

We followed USFWS and NNDFW protocols (USFWS 1988, NNDFW 1985) for nocturnal surveys. We chose to conduct nocturnal surveys rather than diurnal surveys because the former method is designed to observe ferrets when their population is greatest (1 July - 31 October) and activity levels are highest, resulting in better detection of any possible remnant black-footed ferret population occurring in the NMEP area.

Prior to conducting field work, we totaled the acres of all five prairie dog towns (708 acres; Figure 1) and divided the total by 320 acres to determine the number of survey tracts (UWFWS 1988). As a result, the prairie dog towns were divided into 3 survey tracts: towns A and B represented tract 1, towns C and D represented tract 2, and tract 3 was comprised solely of town E (Figure 1).

We conducted surveys with 3 field crews, consisting of 2 biologists in a 4-wheel drive vehicle, assigned to 1 survey tract. Each crew was equipped with the following:

- 1 one-million candle power spotlight (Cyclops Solutions, LLC, Grand Prairie, TX)
- 1 two-million candle power spotlight (The Black and Decker Corporation, Towson, MD)
- 1 pair 8 x 42 binoculars (Eagle Optics, Middleton, WI)
- 1 Garmin hand-held Global Positioning System (GPS) units (Garmin International Inc., Olathe, KS)
- 1 digital camera (Olympus Imaging America, Inc. Center Valley, PA)
- 1 maglite (Mag Instrument, Inc., Ontario, CA)

We spotlighted continuously from dusk until dawn on two consecutive nights (29 and 30 July 2008). On the second consecutive survey night (30 July 2008), 2 of the field

crews were approached by 2 local men, while gathering at our nightly check-in point, near prairie dog town B. Following BNCC's Navajo Mine Extension Project Community Response Plan, all three field crews left the project area, having completed only about ½ of the survey. Upon discussion with the USFWS (Eric Hein, Biologist, USFWS, pers. comm.) and NNDFW (David Mikesic, Biologist, NNHP, pers. comm.), we agreed to complete a third, non-consecutive survey when BNCC could provide a security escort for our field crews (see Appendix A - Correspondence). We completed the third survey on 14 August 2008 without incident.

4.0 RESULTS

The results of our surveys efforts were negative, i.e. no black-footed ferrets or their sign were detected. Additionally, we did not observe any unidentified green eyeshine.

5.0 DISCUSSION

We did not observe any black-footed ferrets or their sign during our survey efforts. Similarly, in the last three years of conducting spotlighting surveys in the NMEP area, we also have not detected any black-footed ferrets or observed their sign. Further, black-footed ferrets are considered extirpated from New Mexico (Jim Stuart, Conservation Biologist, New Mexico Department of Game and Fish, pers. comm.). Therefore, based on the survey effort and familiarity with the project site, Ecosphere concludes that no black-footed ferrets occur in the NMEP area.

6.0 LITERATURE CITED

- Dick-Peddie, W. A. 1993. *New Mexico Vegetation: Past, Present, and Future*. University of New Mexico Press, Albuquerque, New Mexico.
- Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. *Mammals of Colorado*. Denver Museum of Natural History and University Press of Colorado.
- Hoogland, J.L. 2006. *Conservation of the Black-tailed Prairie Dog: Saving North America's Western Grasslands*. Island Press, Washington, D.C.
- Navajo Nation Department of Fish and Wildlife (NNDFW). 1985. *Black-footed ferret guidelines for the Navajo Indian Reservation*. Navajo Fish and Wildlife Department. June 20, 1985.
- U.S. Fish and Wildlife Service (USFWS). 1988. *Black-footed ferret recovery plan*. U.S. Fish and Wildlife Service, Denver, Colo. 154 pp.

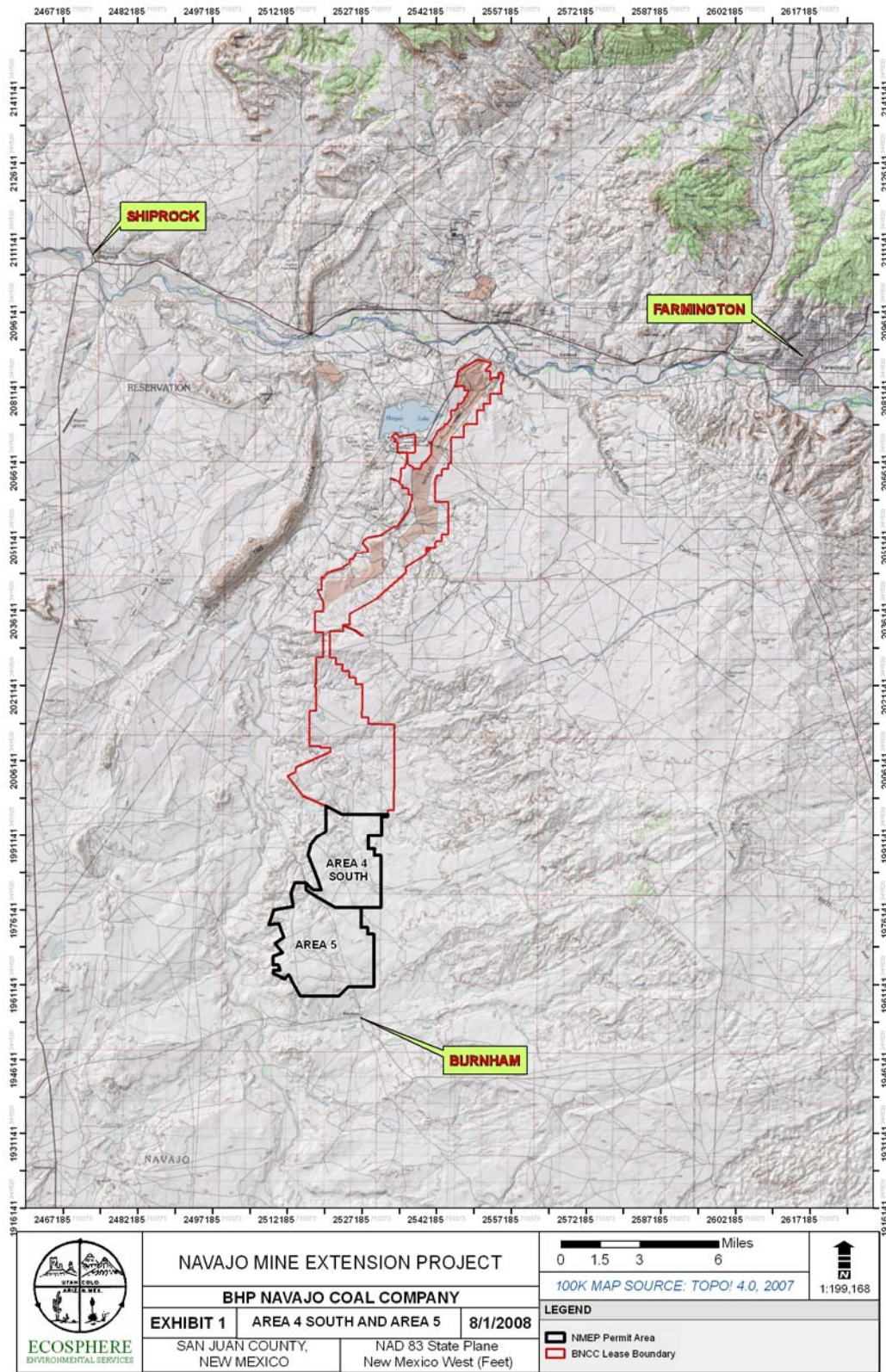


Figure 1. Vicinity map of Navajo Mine Extension Project (NMEP).

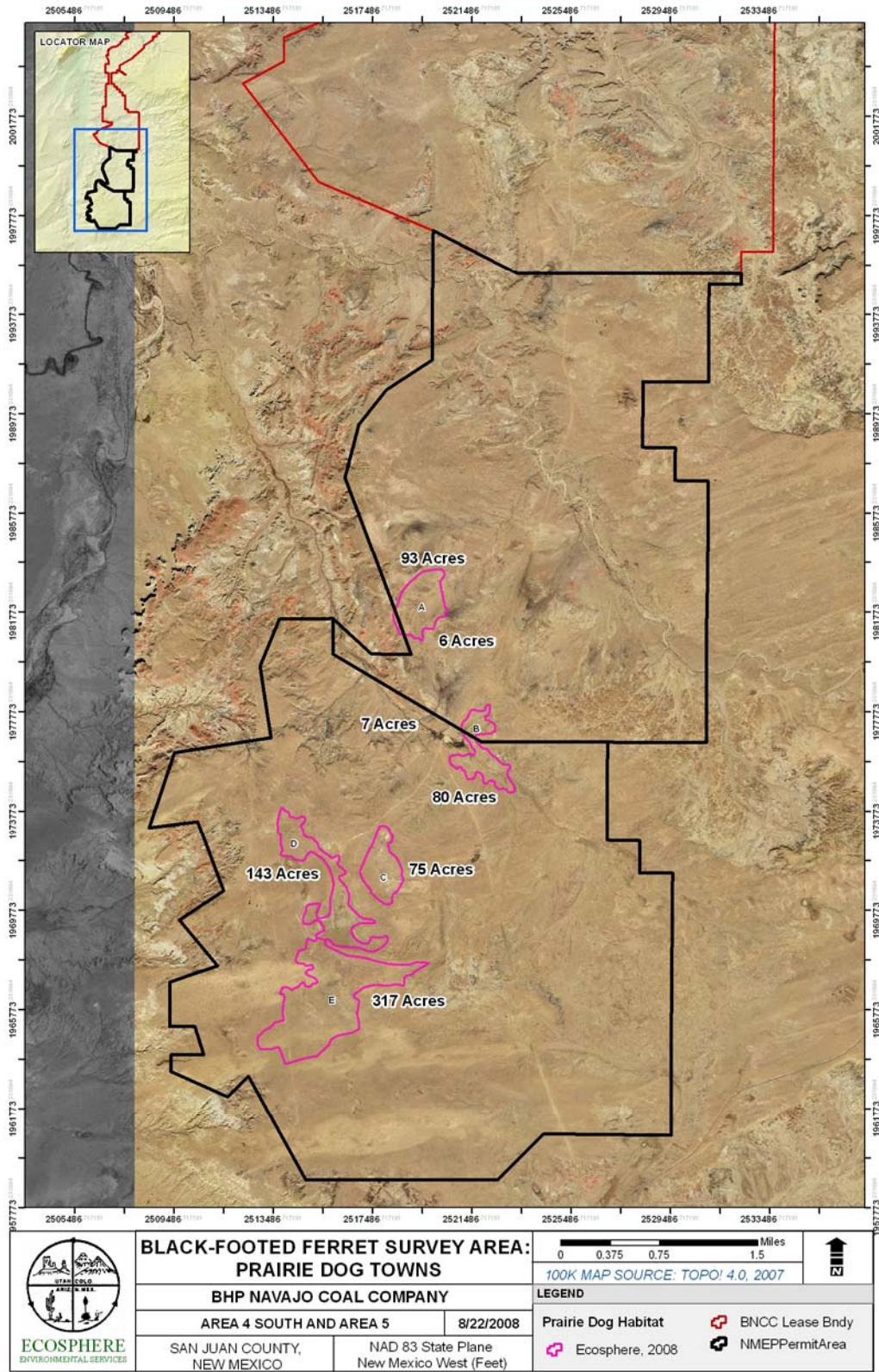


Figure 2. Map of prairie dogs towns surveyed for black-footed ferrets, Navajo Mine Extension Project (NMEP), 2008.

APPENDIX A. CORRESPONDENCE

Jennifer Zahratka

From: Eric_Hein@fws.gov
Sent: Monday, August 11, 2008 7:10 AM
To: dmikesic@navajofishandwildlife.org
Cc: 'Musslewhite, Brent'; jcole@navajofishandwildlife.org; Lynn_Gemlo@fws.gov; 'Owens, Matt P'; Jennifer Zahratka
Subject: RE: black footed ferret surveys on the Navajo Nation

We concur also Jennifer.

Eric

Eric W. Hein
U.S. Fish and Wildlife Service
2105 Osuna NE
Albuquerque, New Mexico 87113
505-761-4735; 346-2542 (fax)

"David Mikesic" <dmikesic@navajofishandwildlife.org>

08/08/2008 02:22 PM

Please respond to
<dmikesic@navajofishandwildlife.org>

To "Jennifer Zahratka" <zahratka@ecosphere-services.com>, <Eric_Hein@fws.gov>, <Lynn_Gemlo@fws.gov>, <jcole@navajofishandwildlife.org>

cc "Musslewhite, Brent" <Brent.Musslewhite@BHPBilliton.com>, "Owens, Matt P" <Matt.P.Owens@bhpbilliton.com>

Subject RE: black footed ferret surveys on the Navajo Nation

Jennifer et.al.,

Sorry you ran into issues with the locals while on BFF surveys; I agree with your argument below and concur that you could run the third and final survey in the upcoming week(s) and fulfill the survey needs set forth for this project. Let me know if you have any questions, or need for further comments.

*David Mikesic, Zoologist
Navajo Natural Heritage Program
Department of Fish and Wildlife
P. O. Box 1480
Window Rock, Arizona 86515
928-871-7070*

The information contained in this email is directed to the intended recipient(s) only and may be confidential and/or contain work product. Unauthorized or unintended recipients shall immediately notify David Mikesic upon receipt.

8/20/2008

Unauthorized use of this email is prohibited.

-----Original Message-----

From: Jennifer Zahratka [mailto:zahratka@ecosphere-services.com]
Sent: Friday, August 08, 2008 9:35 AM
To: Eric_Hein@fws.gov; dmikesic@navajofishandwildlife.org; Lynn_Gemlo@fws.gov;
jcole@navajofishandwildlife.org
Cc: Musslewhite, Brent; Owens, Matt P
Subject: FW: black footed ferret surveys on the Navajo Nation
Importance: High

All,

We plan to proceed with a third and final, non-consecutive survey for black-footed ferrets on the Navajo Mine Extension Project (NMEP) south of Farmington next week. We did not observe any ferrets or their sign during the first of two consecutive nights of survey effort; in the last three years of spotlighting for canids we have never observed any ferrets or their sign; and, black-footed ferrets are considered extirpated from New Mexico. Further, our surveys are very thorough, with 3 teams of 2 biologists covering 708 acres of Gunnison's prairie dog habitat. Therefore, I feel that we are in compliance with the intent of the USFWS and Navajo Nation protocol surveys in that, if there was a small, remnant population of black-footed ferrets at NMEP we would have discovered it or will discover it with these methods.

Lynn, Eric, or David: I would still appreciate a response that you concur with this argument and our plan to proceed with the third survey next week.

Thanks for your time,
Jennifer

*Jennifer L. Zahratka
Wildlife Biologist
Ecosphere Environmental Services
2243 Main Ave, Suite 4
Durango, Colorado 81301
970 382-7256 office
970 759-1070 cell
www.ecosphere-services.com*

This e-mail, including any attachments, is intended only for the use of the individual or entity to which it is addressed. It may contain information that is attorney work product, privileged, confidential, exempt or otherwise protected from disclosure or use under applicable law. If you have received this e-mail in error, please notify the sender immediately by return e-mail, and delete this e-mail from all affected databases. Thank you.

From: Jennifer Zahratka
Sent: Friday, August 01, 2008 10:18 AM
To: 'Lynn_Gemlo@fws.gov'; 'dmikesic@navajofishandwildlife.org'
Subject: black footed ferret surveys on the Navajo Nation

Lynn and David,

As you are both aware, we are conducting protocol surveys for black-footed ferrets (bff) for the Navajo Mine Extension Project just south of Farmington. We began those surveys this week; unfortunately, on the second night of surveys we had a negative encounter with two Navajo men and we left the area about 12:45 am. BHP (our client) attempted to provide security for us to complete the third survey night (which would have been last night), but were unable to do so on such short notice and promptly canceled any further survey efforts until security measures could be put in place. We will likely resume surveys between August 4th and 15th.

Could you please advise us on whether or not you feel we need to restart the surveys and complete 3 consecutive surveys or if we can simply conduct one more 3rd survey, albeit not consecutive? We did not observe any bff during the surveys we have completed thus far.

Thank you,
Jennifer

8/20/2008

Jennifer L. Zahratka
Wildlife Biologist
Ecosphere Environmental Services
2243 Main Ave, Suite 4
Durango, Colorado 81301
970 382-7256 office
970 759-1070 cell
www.ecosphere-services.com

This e-mail, including any attachments, is intended only for the use of the individual or entity to which it is addressed. It may contain information that is attorney work product, privileged, confidential, exempt or otherwise protected from disclosure or use under applicable law. If you have received this e-mail in error, please notify the sender immediately by return e-mail, and delete this e-mail from all affected databases. Thank you.

8/20/2008

APPENDIX B. DATA SHEETS

BLACK-FOOTED FERRET SURVEY FORM
NOCTURNAL (NIGHTTIME) SURVEY

Date of Survey 29/30 July 2008 Species of Prairie Dog gambelii
(Night of)

Name of Individual, Location survey was conducted:

Name: Ecosphere Environmental Services (J. Zahratka + 5 staff biologists)
Location: Navajo Mine Extension Project, ~20 miles S of Farmington, NM

Weather: Temperature begin 82°F - end 61°F Wind Speed & Direction 5-8 mph
Cloud Cover clear (N)

Begin Survey: 2030 hrs End Survey: 0530 hrs

Total Man/Hrs. 54 hrs

Source:

www.underground.com/US/NM/Farmington.html#History

General Comments: (possible ferret sign encountered, tracks observed,
unidentified green eyeshine observed etc.)

No black-footed ferrets or their sign observed.

NM STATE WILDLIFE &
NATURAL RESOURCES DEPT.

83

BLACK-FOOTED FERRET SURVEY FORM
NOCTURNAL (NIGHTTIME) SURVEY

Date of Survey 30/31 July 2008 Species of Prairie Dog Gambel's

Name of Individual, Location survey was conducted:

Name: Ecosphere Environmental Services (J. Zahradka + 5 staff biologists)

Location: South of Farmington, NM, Navajo Mine Ext. Project

Weather: Temperature begin 85°F - end 60°F Wind Speed & Direction 6-10 mph (ENE)

Cloud Cover clear

Begin Survey: 2045

End Survey: 0015

Total Man/Hrs. 21

General Comments: (possible ferret sign encountered, tracks observed, unidentified green eyeshine observed etc.)

No black-footed ferrets observed, or their sign.

2008 JEM &
N.M. DEPT.

BLACK-FOOTED FERRET SURVEY FORM
NOCTURNAL (NIGHTTIME) SURVEY

Date of Survey 14/15 Aug 2008 Species of Prairie Dog gambelii
(Night of)

Name of Individual, Location survey was conducted:

Name: Ecosphere (M. Vivalda + 5 biological staff)

Location: S of Farmington, NM, Navajo Mine Extension Project

Weather: Temperature begin 70°F - end Wind Speed & Direction 6-10 mph

Cloud Cover clear (NNE)

Begin Survey: 2045 End Survey: 0530

Total Man/Hrs. 51

www.underground.com/us/nm/farmington.html#History

General Comments: (possible ferret sign encountered, tracts observed, unidentified green eyeshine observed etc.)

No black footed ferrets or their sign observed.

WASH &
DEPT.

MV
JB