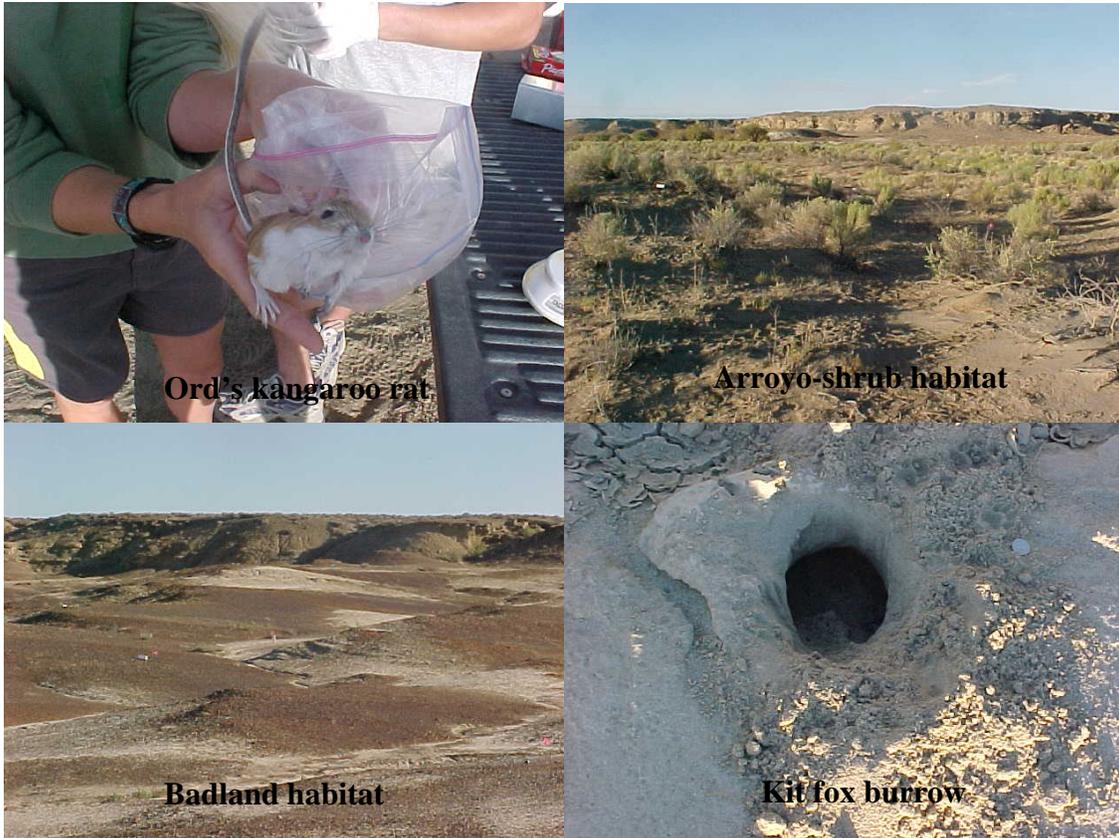


Appendix 16.A

Wildlife Baseline Report November 2004

WILDLIFE BASELINE REPORT

BHP BILLITON - NAVAJO MINE



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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.

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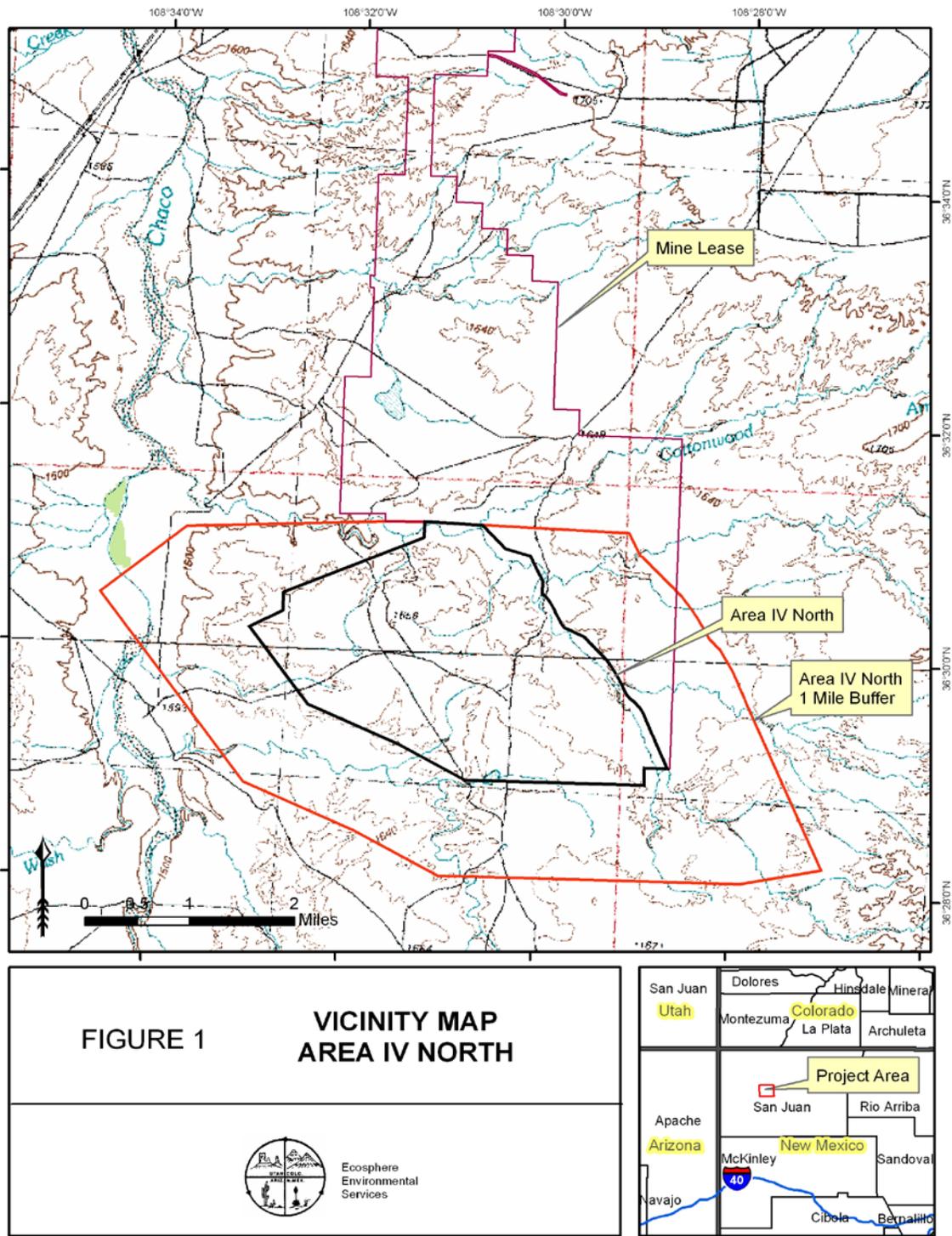


Figure 1. General vicinity map of study area showing Area IV N (within the greater mine lease area) plus a 1-mile buffer, Summer 2004.

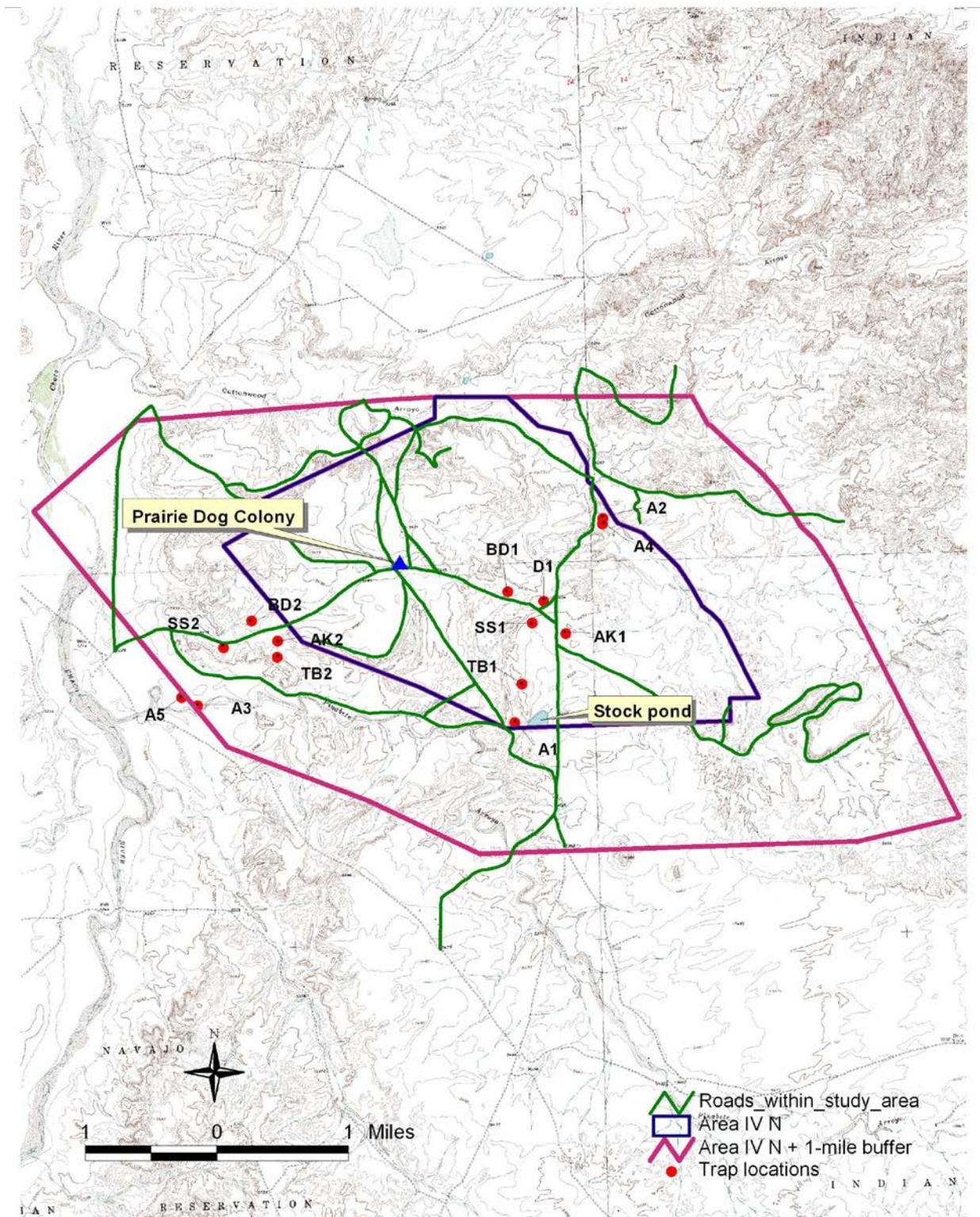
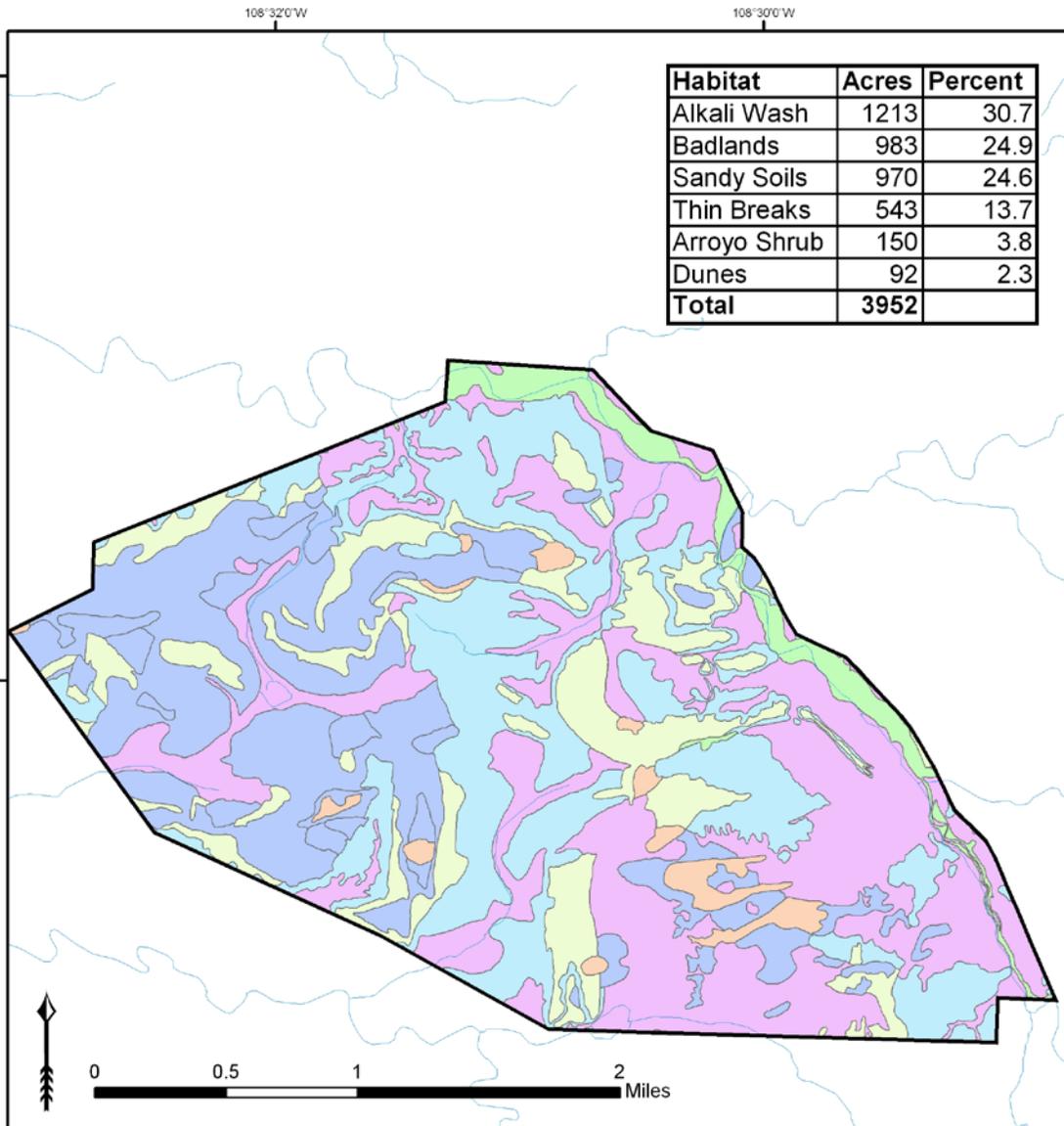


Figure 2. Map of study area of Area IV North plus a 1-mile buffer (rounded), including spotlight routes along drivable roads within the study area, all small mammal trap locations, as well as the location of the stock pond and the prairie dog colony, plotted on the Hogback S, Kirtland SW, Newcomb NE,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



**FIGURE 3 MICRO-HABITAT TYPES (6)
AREA IV NORTH**



Ecosphere
Environmental
Services

Legend

Habitat Type

- Alkali Wash
- Arroyo Shrub
- Badlands
- Dunes
- Sandy Soils
- Thin Breaks

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.

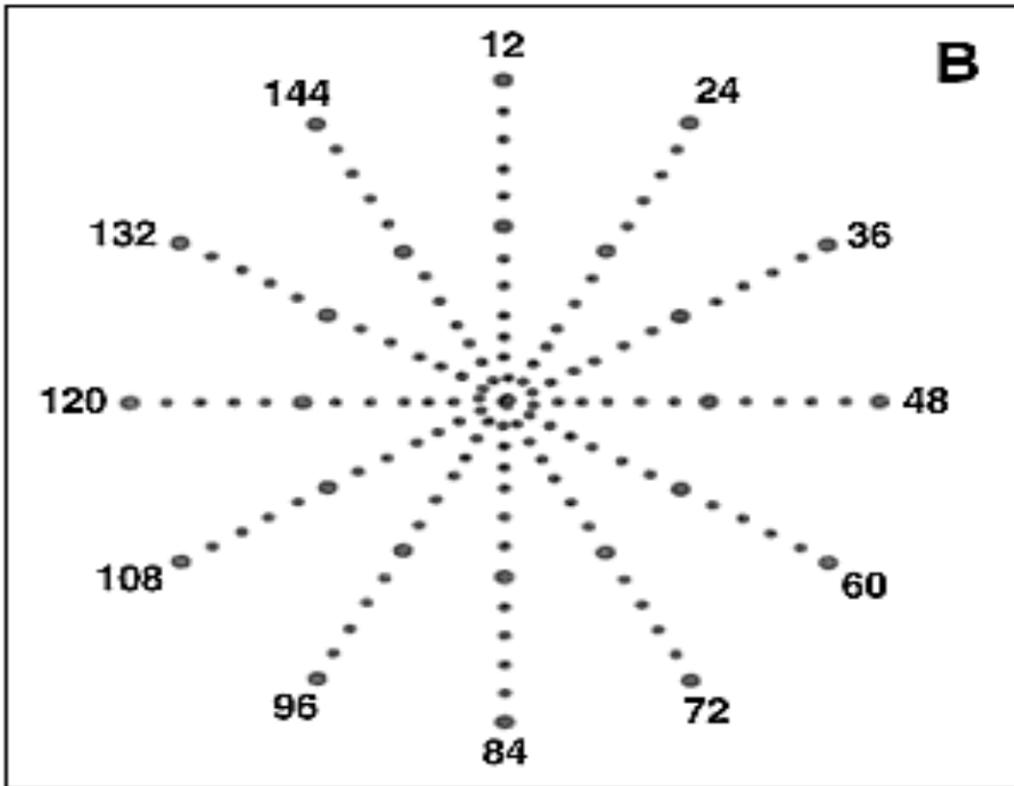


Figure 4. Schematic representation of a trapping web showing 148 trap locations along 12 spokes 30° apart with the first 4 traps spaced 5 m apart and the subsequent 8 traps spaced 10 m apart for a total trapping web size of 3.14 ha (Parmenter et al. 1998).

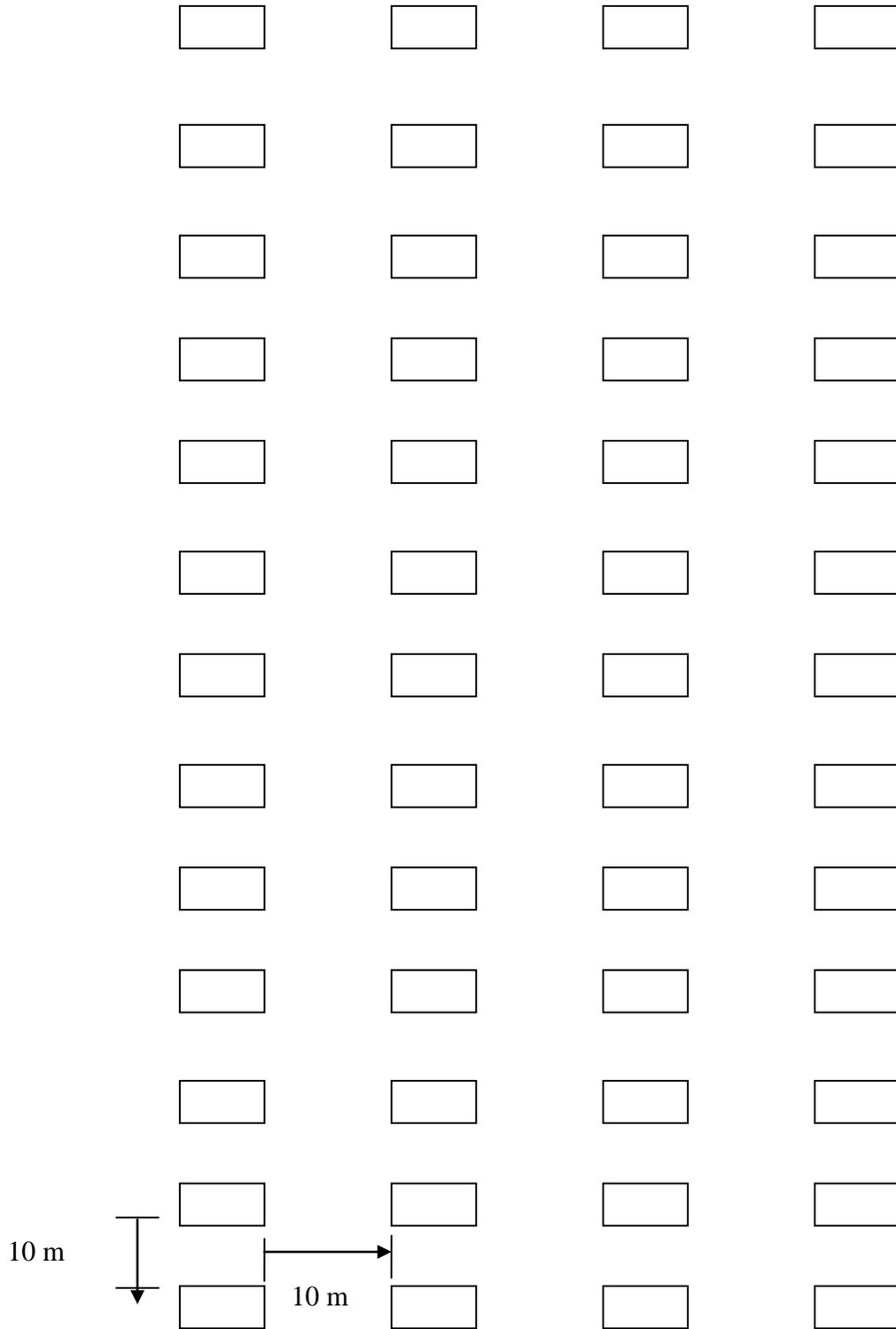


Figure 5. Trapping grid schematic using 4 transects spaced 10 m apart with 12 traps in each transect also 10 meters apart for a total trapping grid area of 0.33 ha. Each  represents a Sherman live-trap, Area IV North, summer 2004.

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

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