

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

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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.

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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>)

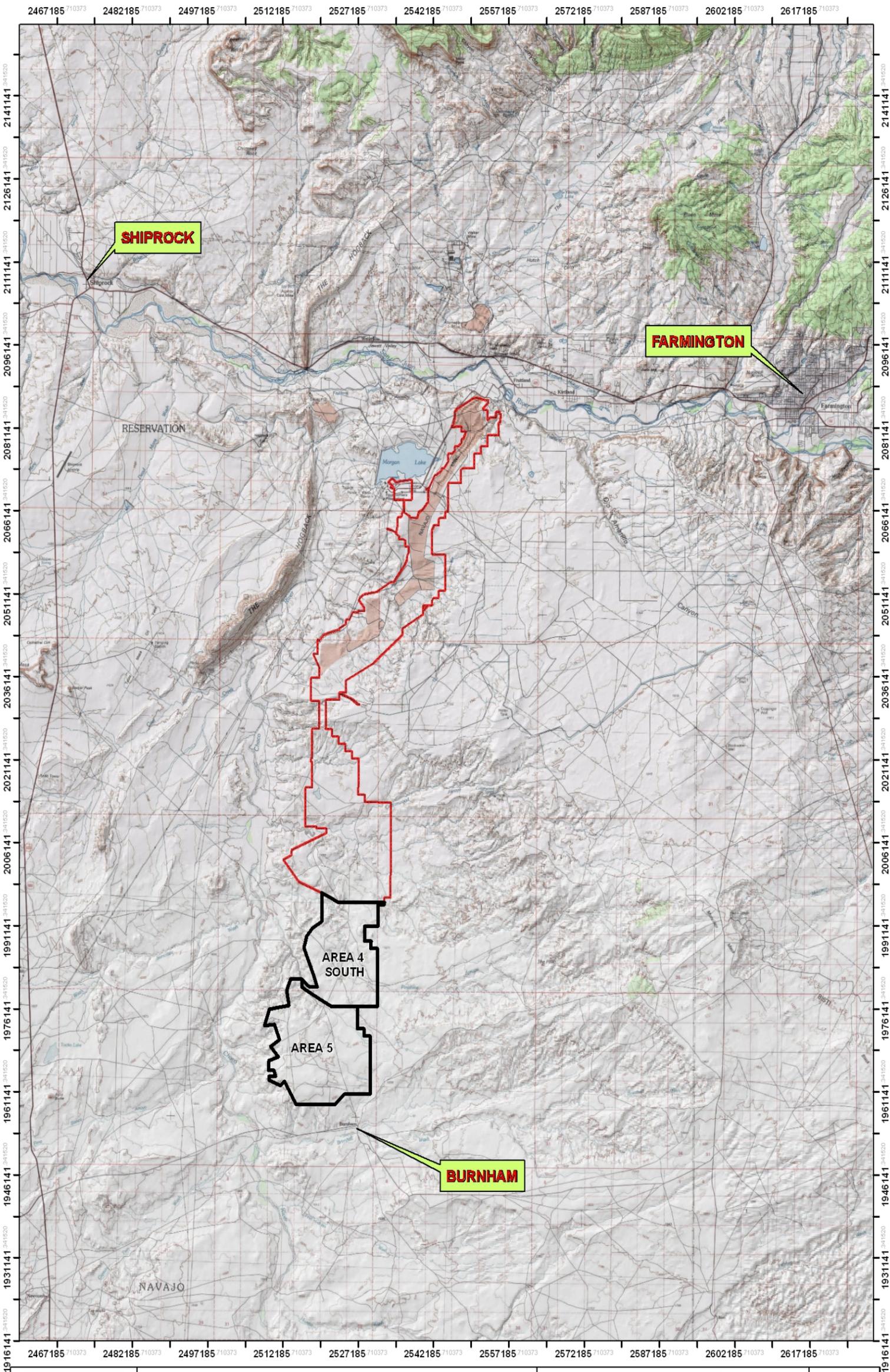
Table 2. Mean number of individuals detected per 1-km transect, species richness, (i.e. number of species detected), and index of species diversity (Simpson 1949), for strip transects conducted in 5 vegetative communities Areas 4 South and 5 during breeding bird surveys, Navajo Mine Extension Project (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			 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.

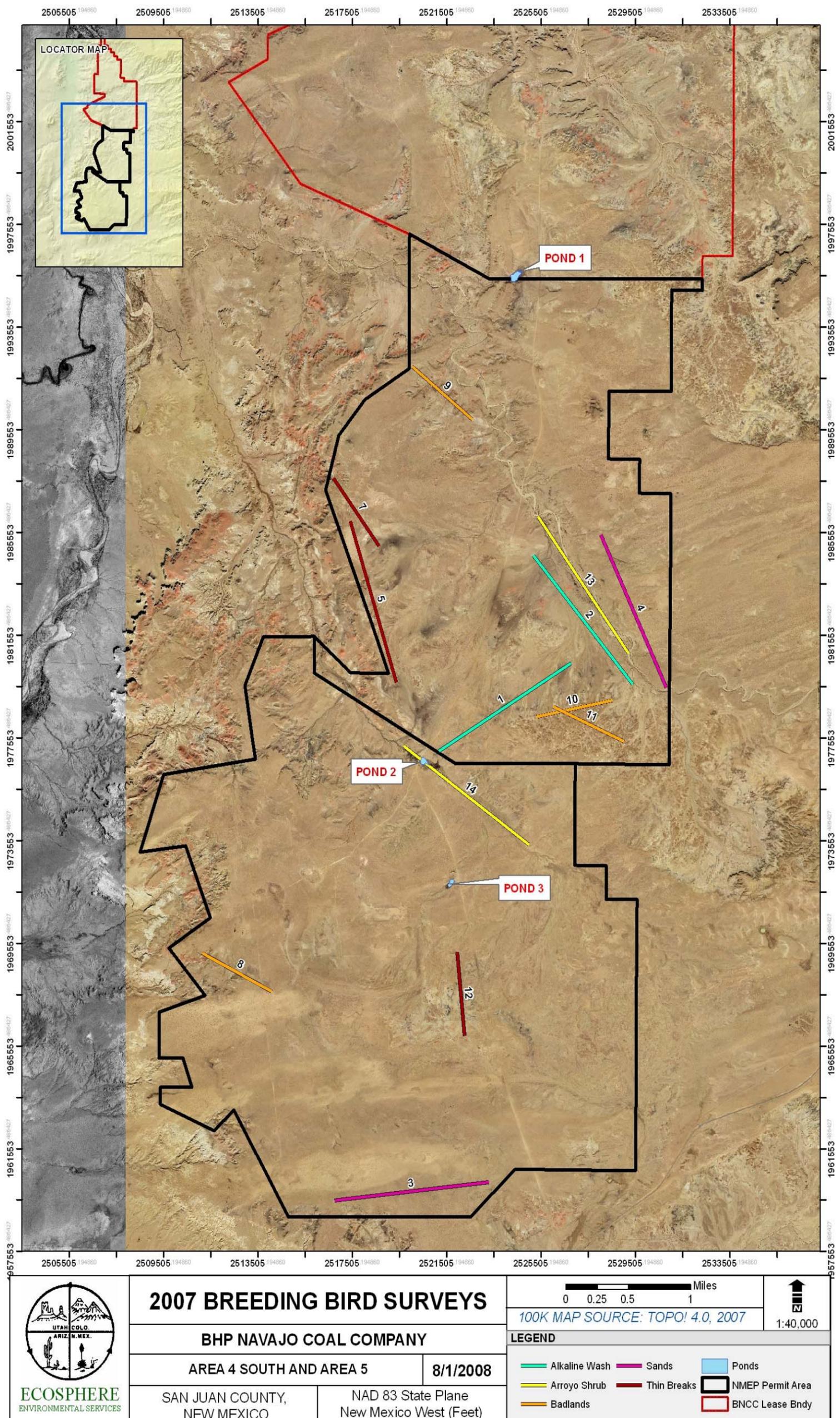


Figure 2. The locations of transects and ponds for breeding birds surveys, Navajo Mine Extension Project, BNCC Mine lease area.

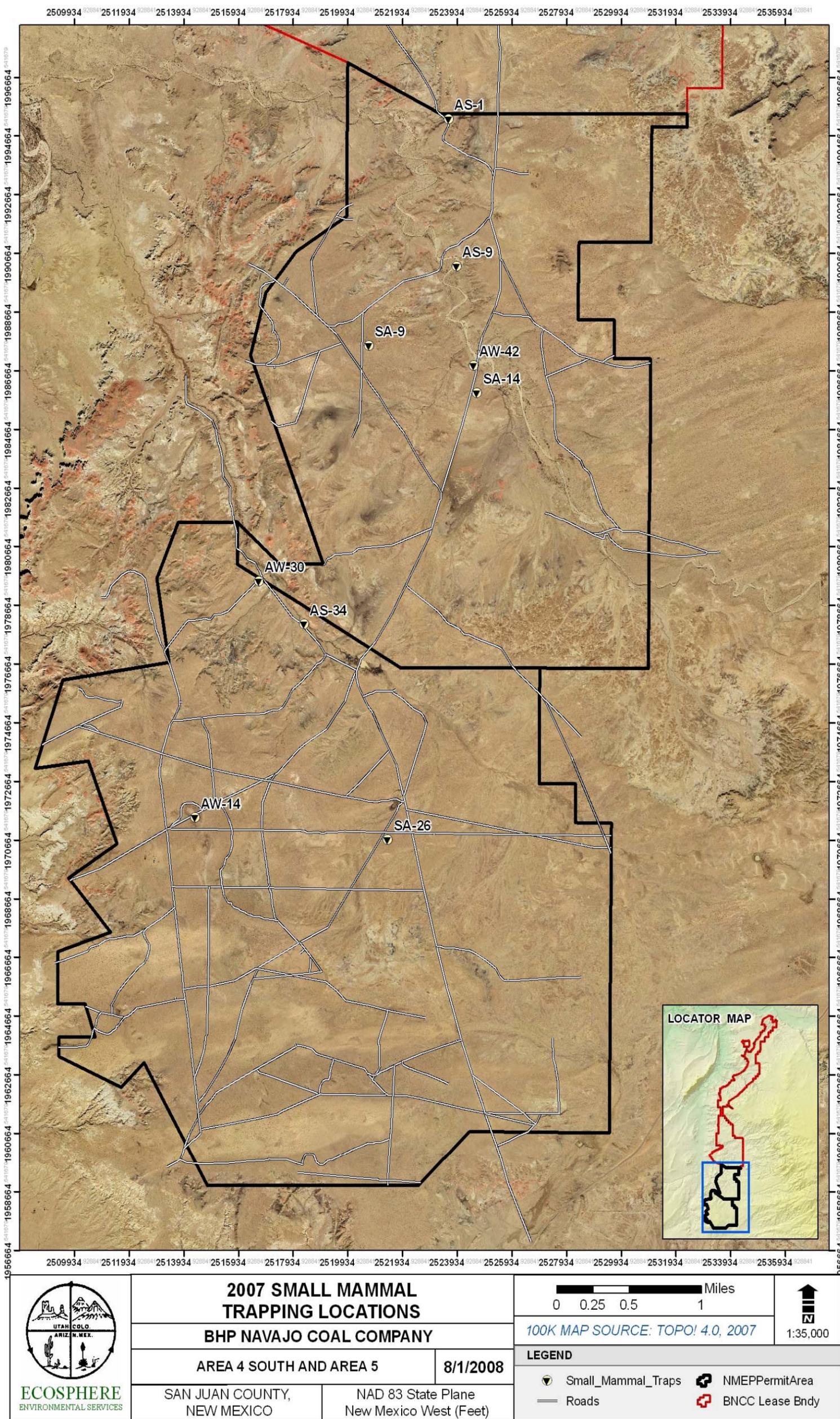


Figure 3. The locations of small mammal trapping webs and grids in 3 habitat types arroyo shrub (AS), alkali wash (AW) and sands (SA), 2007, and in 2 habitat types (AS and SA) in 2005, Navajo Mine Extension Project, BNCC Mine lease area.

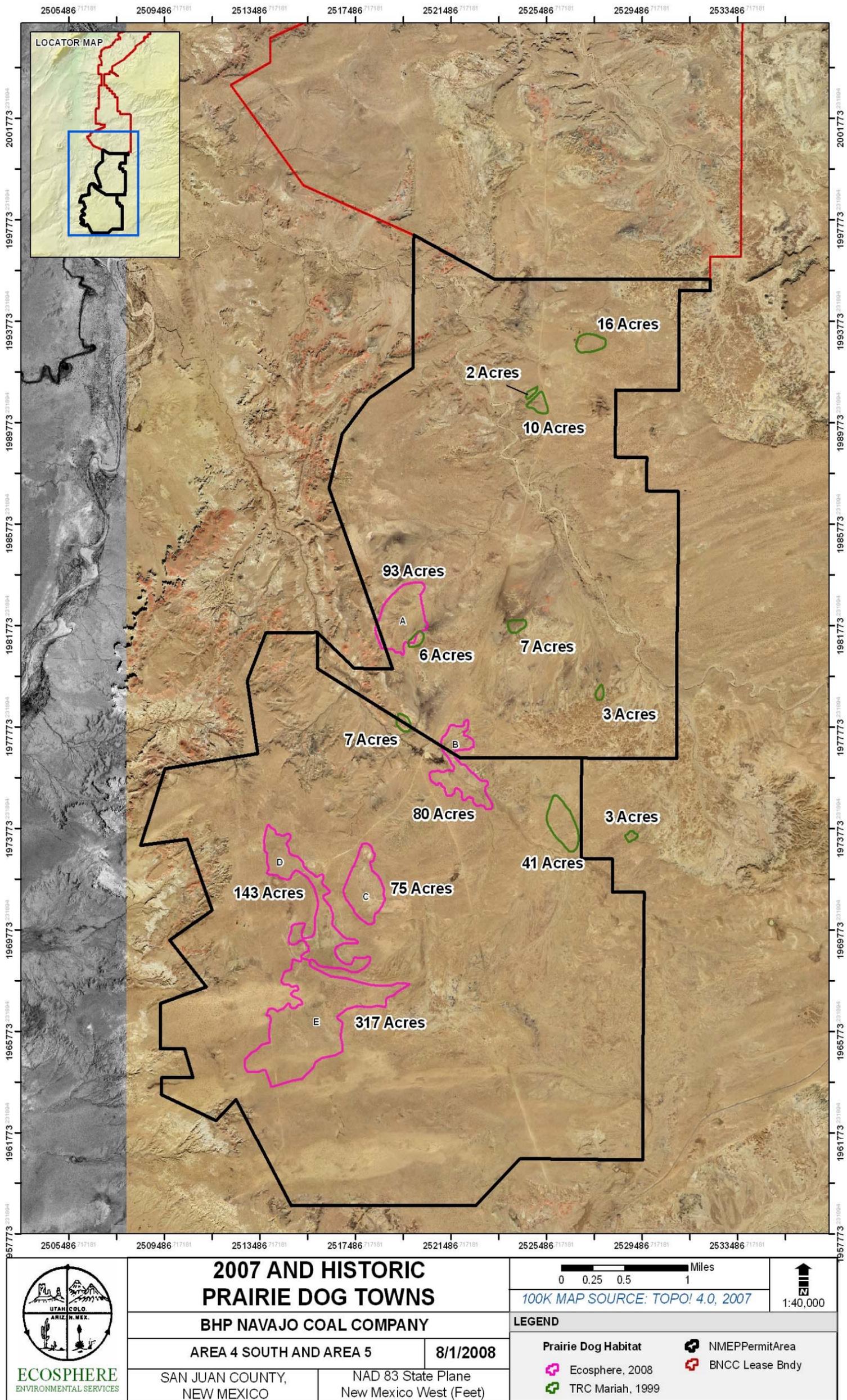


Figure 4. Prairie dog towns mapped within the project area and their respective size, Navajo Mine Extension Project, BNCC Mine lease area, 2007.

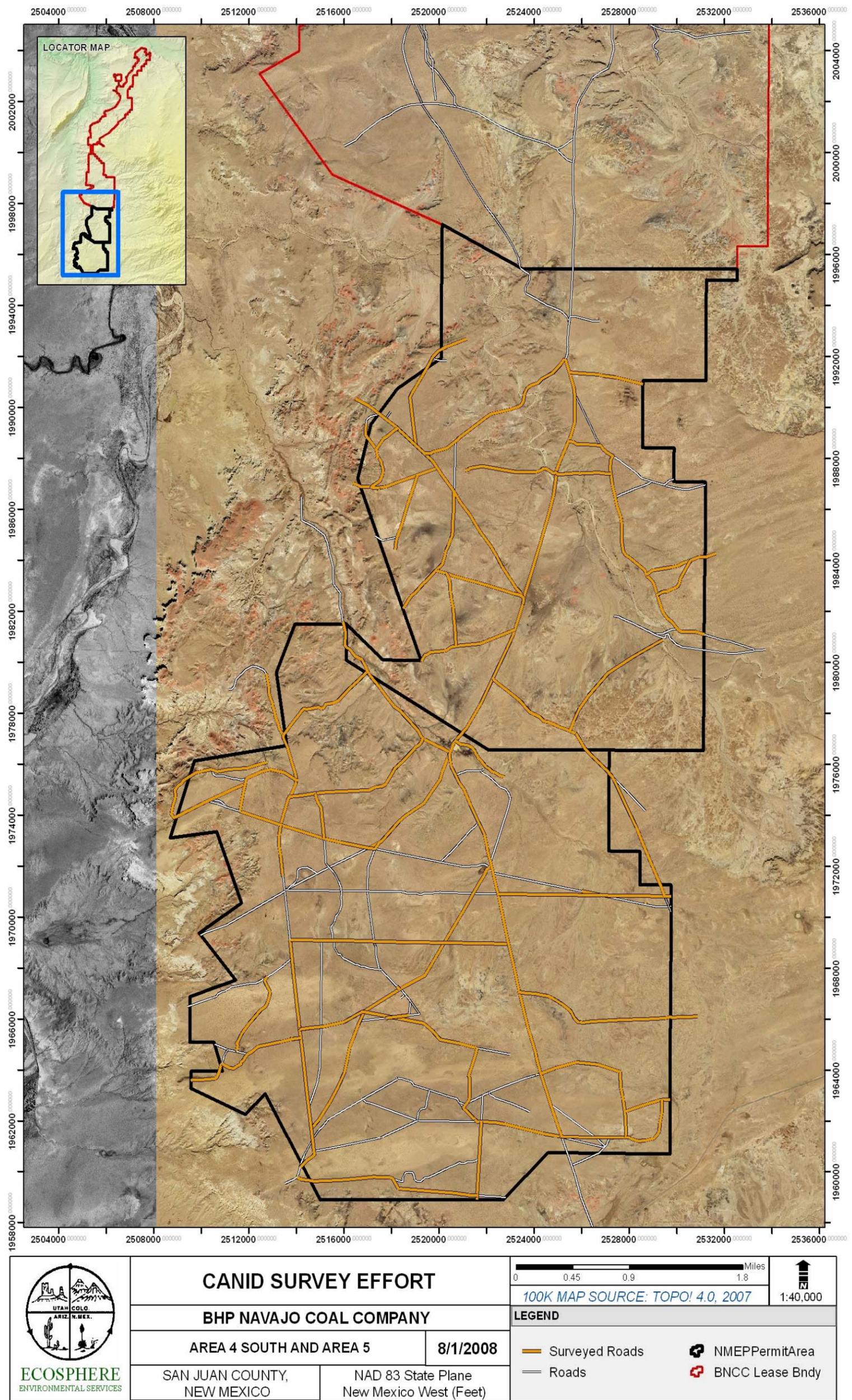


Figure 5. Spotlighting survey effort for canids in 2005 and target spotlighting surveys for kit fox in 2007 (Ecosphere 2008a) Navajo Mine Extension Project, BNCC Mine lease area.

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