ADDENDUM REPORT

TO

BIOLOGICAL INVENTORY OF THE SANDSAGE PRAIRIE NEAR HOLCOMB, KANSAS

FINAL REPORT

PREPARED FOR SUNFLOWER ELECTRIC COOPERATIVE, INC.

BY

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ABSTRACT

A biological inventory was conducted on the 5,000 acre Sunflower Electric Power Corporation plant (Sunflower Site) located immediately south of the Arkansas River between Holcomb and Garden City, in Finney County, Kansas. The land is largely a remnant sandsage prairie and outside of the plant itself, a landfill, and a network of roads, is largely undisturbed.

Within the Sunflower Site two potential landfill sites (Areas A and B) were specifically targeted with respect to seven species of ecological importance. These are the Spotted Skunk, Ferruginous Hawk, Short-eared Owl, Lesser Prairie Chicken, Longnose Snake, Eastern Glossy Snake, and Western Hognose Snake.

Five of these species were found on the proposed landfill sites and elsewhere on the Sunflower Site. The Spotted Skunk was not observed, however its absence was anticipated. The Lesser Prairie Chicken was not observed either, and possible explanations are discussed herein.

The current landfill in Area A has not had any deleterious effects with respect to the use, distribution, or abundance of the seven target species. No evidence exists, to show that the proposed expansion of the current landfill in Area

A and the possibility of a subsequent landfill development in Area B, will pose any long-term effects with respect to these target species.

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INTRODUCTION

Sunflower Electric Power Corporation (Sunflower) operates a coal-fired, electric generating plant approximately four miles south of Holcomb, Kansas. The plant sits near the southern end of eight sections (ca. 5,000 acres) of native sandsage prairie (Sunflower Site; Figure 1).

Prior to the Plants' initial construction, SEC commissioned a biological inventory (Choate, et al., 1981) to gather baseline data on the vegetation and vertebrates of the Sunflower Site. The Biological Inventory was conducted between May and September, 1980. The biological inventory was specifically conducted to provide a baseline for future comparison, such that potential impacts from plant operations could be identified. The inventory provided soils and general floristic descriptions of the Sunflower Site, as well as data on the relative abundance and diversity of terrestrial.

At the request of Sunflower, this report details a review the previous Biological Inventory and provides an addendum survey, with particular focus on two areas (Areas A and B, Figure 2) within the boundary of the original survey, and seven specific vertebrate species (Table 1). The first area (Area A) is occupied by a flyash and bottomash landfill

scheduled for expansion. The second area (Area B) may potentially be developed in the future. These Areas consist roughly of the eastern three-quarters of the southern half of section 20 and eastern three-quarters of the northern half of adjacent section 29. One hundred-twelve (112) acres of Area A is currently being used as a coal ash landfill which will be expanded to 188 acres. Area B comprises the SE 1/4 of section 32 in the extreme southeastern corner of the Sunflower Site.

Through the Kansas Department of Wildlife and Parks, and Kansas Department of Health and Environment, and Sunflower; seven sensitive vertebrate taxa (Table 1) have been identified, that could be impacted by expansion of Area A or development of Area B. The objectives of this study are:

1. a. Surveys of Areas A and B with respect to the seven target taxa.

b. If the target species are located within either area, their occurrence within that area will be mapped in detail.

2. Surveys of those regions on the Sunflower Site outside of Areas A and B for the seven target taxa.

Sunflower wishes to update the initial Biological Inventory to assess if the species that were *originally* present are *still* present within the boundary proposed for the expanded landfill. Based on those findings, we can make

conclusions about the potential effect(s) the landfill operation has had on the local fauna and extrapolate those conclusions to potential project effects on the respective species by taking 76 more acres of additional landfill space.

MATERIALS AND METHODS

Whenever possible the sampling methodologies and sites used by Choate et al. (1981) were duplicated to better facilitate comparisons between the two inventories. Sampling took place from May through August 2006.

Amphibians, Reptiles, and Turtles

Amphibians, reptiles, and turtles were surveyed on 9-12, 26-30 May, 25-30 June, 23-28 July, and 22-26 August. Survey methods included cruising roads, walking transects, trapping (pitfall traps, drift-fence/pitfall/funnel traps, and turtle traps), artificial cover boards, and turning natural cover (logs and brush).

Road cruising was conducted during every day and evening that herpetofaunal surveys took place and amounted to approximately 225 man-hours. Roads were driven on at all hours and in all incurring weather conditions.

Transects were walked through both Area A and B as well as in the outlying five sections. Walking transects was conducted in the mornings and evenings to avoid the hottest parts of the day. Approximately 80 man-hours were spent walking transects.

Pitfall/funnel/drift fence arrays were constructed at six sites. Each array consisted of a 50 yard silt fence with 1/8 inch hardware cloth funnel traps on each end. Midway along each side of the fence a 24" deep plastic trash can was buried flush with the surface to serve as a pitfall. All arrays were in operation during each survey. Array one was located in Area A, just south of the existing ash pile in the NE 1/4 of the NW 1/4 of Section 29. Array two was on the western edge of Area A in the SE 1/4 of the SW 1/4 of Section 20. Array three was located in Area A in the SW 1/4 of the NE 1/4 of Section 29. Array four was located in Area B, in the NW 1/4 of the SE 1/4 of section 32.

Two sheets of artificial cover boards (3'x2' 3/4" plywood) were lain out along each array. And an additional, 20 artificial cover boards were lain out singly along the northern and western rims of the sandpit in western half of Area B.

Turtle traps were employed from 22-26 August in the sand pit in the NW 1/4 of Section 18. The traps consisted of

three metal hoops 3 foot in diameter and connected by 1/2 inch netting. The traps were baited with chicken liver and have a netting funnel on one end allowing the turtles to enter.

Birds

The birds were surveyed on 23-24 May, 27-28 June, and 28-29 July. Birds were surveyed from sunrise until 1430 CDT at stops spaced approximately 0.5 miles apart. At each stop birds heard or seen were counted during a 3 minute interval.

Mammals

The mammals were surveyed on 6-10, 17, and 22-29 May and on 20-28 August. Mammals were surveyed by walking transects, road cruising, and constructing transects of Museum Special snap traps (22-29 May) and Sherman live-catch traps (20-28 August). Tomahawk model 103 live-catch traps were used to survey for Spotted Skunks. They were covered in burlap and baited with commercial cat food.

COMMUNITY ANALYSIS

This Section serves to contrast the results of the original and present. Where possible, comparisons have been

made between the 1980 survey and this survey, however for various reasons, direct comparisons may not be possible, or they are simply biologically meaningless.

Amphibians, Reptiles, and Turtles

Table 5 summarizes those herpetofaunal taxa encountered during this survey. *Arizona elegans*, *Rhinocheilus lecontei*, and *Heterodon nasicus* were all observed during the survey. *Lithobates catesbeianus*, *Trachemys scripta*, *Chrysemys picta*, and *Chelydra serpentina* were observed during this study, but were absent during the 1980 survey (Choate, 1981). Conversely, *Ambystoma mavortium*, *Kinosternon flavescens*, *Holbrookia maculata*, and *Tantilla nigriceps* were observed during the 1980 survey but absent during this survey effort.

The most notable herpetological finding of the survey was the absence of the Lesser Earless Lizard. The 1980 survey had listed it as the most observably abundant vertebrate on the site. Their rarity however isn't currently limited to the Sunflower Site. The species once occurred in Kansas from the Flint Hills west and is now only definitively known from two populations along the Colorado border (Taggart, 2006).

Birds

Table 3 summarizes those avian target species, which were encountered during this survey. Both, the Ferruginous Hawk and Long-eared Owl were observed during this survey; however no Lesser Prairie Chicken were observed (Table 4).

Mammals

Table 2 summarizes those mammalian taxa encountered during this survey. Eighteen species of mammals were observed during the survey. *Didelphis virginina*, *Neotoma floridana*, and *Procyon lotor* were observed during this study, but not during the 1980 survey (Choate, 1981). Conversely, *Cryptotis parva*, *Spermophilus tridecemlineatus*, Cynomys ludovicianus, *Perognathus flavescens*, *Reithrodontomys megalotis*, *Reithrodontomys montanus*, and *Mus musculus* were observed during the 1980 survey but were not recorded during this survey effort.

Interestingly, several species of small mammals were not reported during this study, but were well-represented during the 1980 study. Further studies may be considered to assess the status of the Least Shrew, Thirteen-lined Ground Squirrel, Plains Pocket Mouse, Western Harvest Mouse, and Plains Harvest Mouse on the Sunflower Site. Jerry Choate (pers. comm.) indicates that these species are not

especially abundant in the area, and typically inhabit more compact soils. He further stated that they undoubtedly occur on the site but could easily be missed in sampling. Based on Choate's comments, further sampling is warranted but not a high priority.

The records for the Eastern Woodrat were noteworthy in that they are first for the species south of the Arkansas River. The Gray Woodrat (*Neotoma macropus*) is the expected Woodrat south of the Arkansas River, however it was not observed by either Choate et al. (1981), or during this study.

ACCOUNTS OF SPECIES

The following seven species accounts focus specifically on those taxa of greatest biological interest (Table 1) as outlined in the scope of this study. Additionally, comments are generally limited to observations in the proposed landfill areas of interest (Areas A and B). When pertinent, references are made to general observations that took place outside of the proposed landfill sites but within the Sunflower Site, as well observations occurring elsewhere within the range of a particular species. This study was successful in documenting five of the seven target species.

Spotted Skunk, *Spilogale putorius*

The Spotted Skunk was not observed during the initial survey of Choate et al. (1981), nor were any located during this study. Choate et al. (1974) summarized the historical distribution and abundance of this species in the state. They noted that the Spotted Skunk was probably not initially common in Kansas (or Finney County) until settlement, and that the trend from rural to urban population centers has caused their decline in numbers and range throughout the state. The Spotted Skunk has declined throughout its former range in Kansas, and its presence on the Sunflower Site was not anticipated. The Sunflower Site (and the surrounding area) does not provide adequate habitat to support a substantial population of this species. Marginal habitat does exist along the riparian corridor of the Arkansas Rivers.

Ferruginous Hawk, *Buteo regalis*

The Ferruginous Hawk was observed on the Sunflower Site during this survey. It is unlikely that it nests on the site; however it uses the Sunflower Site (and surrounding areas) to forage in. The high concentration of small mammals and reptiles on the Site, (relative to adjacent

irrigated cropland) represents an important food source for this species.

Short-eared Owl, *Asio flammeus*

A single Short-eared Owl was observed on the Sunflower Site during this survey. Like the Ferruginous Hawk, it is unlikely that this species nests on the Sunflower Site, and that it is intermittently present while foraging.

Lesser Prairie Chicken, *Tympanuchus pallidicinctus*

No Lesser Prairie Chickens were observed during this study. Choate et al. (1981) found the Lesser Prairie Chicken to be a common permanent inhabitant of the Sunflower Site, although they further states that their number might be unusually high due to the lack of habitat adjacent to the study area. Dr. Elmer Finck, Fort Hays State University, conducted the targeted avian surveys during this study, and is certain that Lesser Prairie Chickens still persist on the Sunflower Site, but were missed because the surveys began after the birds had finished “booming” and are therefore generally more difficult to locate.

Conversely, much of the habitat surrounding the Sunflower Site has been rendered unsuitable to Lesser Prairie

Chickens due to anthropogenic features such as agriculture and urbanization. Lesser Prairie Chickens favor native prairies and are adversely affected by conversion to other land-use patterns. Even in areas that remain largely intact and apparently suitable, Lesser Prairie Chickens may exhibit behavioral avoidance or abandonment of areas near roads, power lines, compressor stations, agricultural fields, and inhabited dwellings (Robel et al., 2004). Lesser Prairie Chickens avoid nesting within 300-400 yards of fields with center-pivot irrigation, 200 yards of oil or gas wellheads, 400 yards of power lines, 860 yards of improved roads, and 1,370 yards of large structures (Robel et. al 1994). The introduction of such features into prairie landscapes has been thought to increase predation rates, and also cause habitat avoidance (Bidwell et al. 2001, Robel, 1970, Robel et al. 2004). Regardless, the absence of the birds effectively increases the impact footprint of these areas. While the continued periodic monitoring of all taxa is desirable, a follow-up study of the distribution and relative abundance of the Lesser Prairie Chicken is certainly the most pressing.

Longnose Snake, *Rhinocheilus lecontei*

Eight Longnose Snakes were observed during this study. The Longnose Snake is a highly secretive species and despite its reasonable size (up to 3 feet in length) very few specimens from Kansas have been observed. The eight collected during this study is three more than the author had observed statewide over the past twenty years. Large adults, juveniles, and hatchlings were observed on the Sunflower Site during this study. Choate et al. (1981) reported three observations of this species. Longnose Snakes were observed throughout the Sunflower Site and generally in proportion with the geographic area in which they were found. Two Longnose Snakes were observed on the existing landfill in Area A. One was observed on the southern end of Area B.

Eastern Glossy Snake, *Arizona elegans*

The Eastern Glossy Snakes was the second most commonly observed snake during the study. Twenty-four were observed (all at night) during this study. This species is secretive and due to its nocturnal habits and overall similarity to the even more common Bullsnake, the Eastern Glossy Snake is often overlooked, thereby adding to its perception of rarity. All size classed were observed, from large adults (> 4 feet in length) to many hatchlings. Choate et al.

(1981) reported twenty-five observations of this species. The Eastern Glossy Snake was found in all habitat types, but was less commonly reported from the floodplain. One Longnose Snake was observed on the existing landfill in Area A. Another was found on the eastern edge of Area A. One was observed within Area B.

Western Hognose Snake, *Heterodon nasicus*

Seven Western Hognose Snakes were recorded during the survey, one less than reported by Choate et al. (1981). Adults, juveniles, and hatchlings were observed in equal proportion. All of the observations were made off of the floodplain; however they undoubtedly utilize it as well. One Western Hognose Snake was observed on the existing landfill in Area A. And another was found just south of the existing landfill in Area A. One was observed on the southern edge of Area B.

ANTICIPATED EFFECTS OF LANDFILL EXPANSION

Across the Sunflower Site (and as Choate et al., 1981 predicted), the maintenance of the large native sandsage prairie ecosystem has served as a refuge from the agricultural practices that have taken place on adjacent properties. Specifically, areas that contain center-pivot

irrigation and crop production represent critically altered landscapes and a greatly diminished faunistic composition.

The construction and use of the current landfill in Area A has not adversely affected the distribution or abundance of the seven targeted species. In fact, all three of the target species of snakes were observed on the landfill itself. Construction activities will pose an immediate detrimental effect on the particular current area of activity, however this effect will be short-term and only over a small area at any one time. There is no evidence to suggest that the 76 acre expansion of the current landfill over the next 40 years will adversely affect these species.

ACKNOWLEDMENTS

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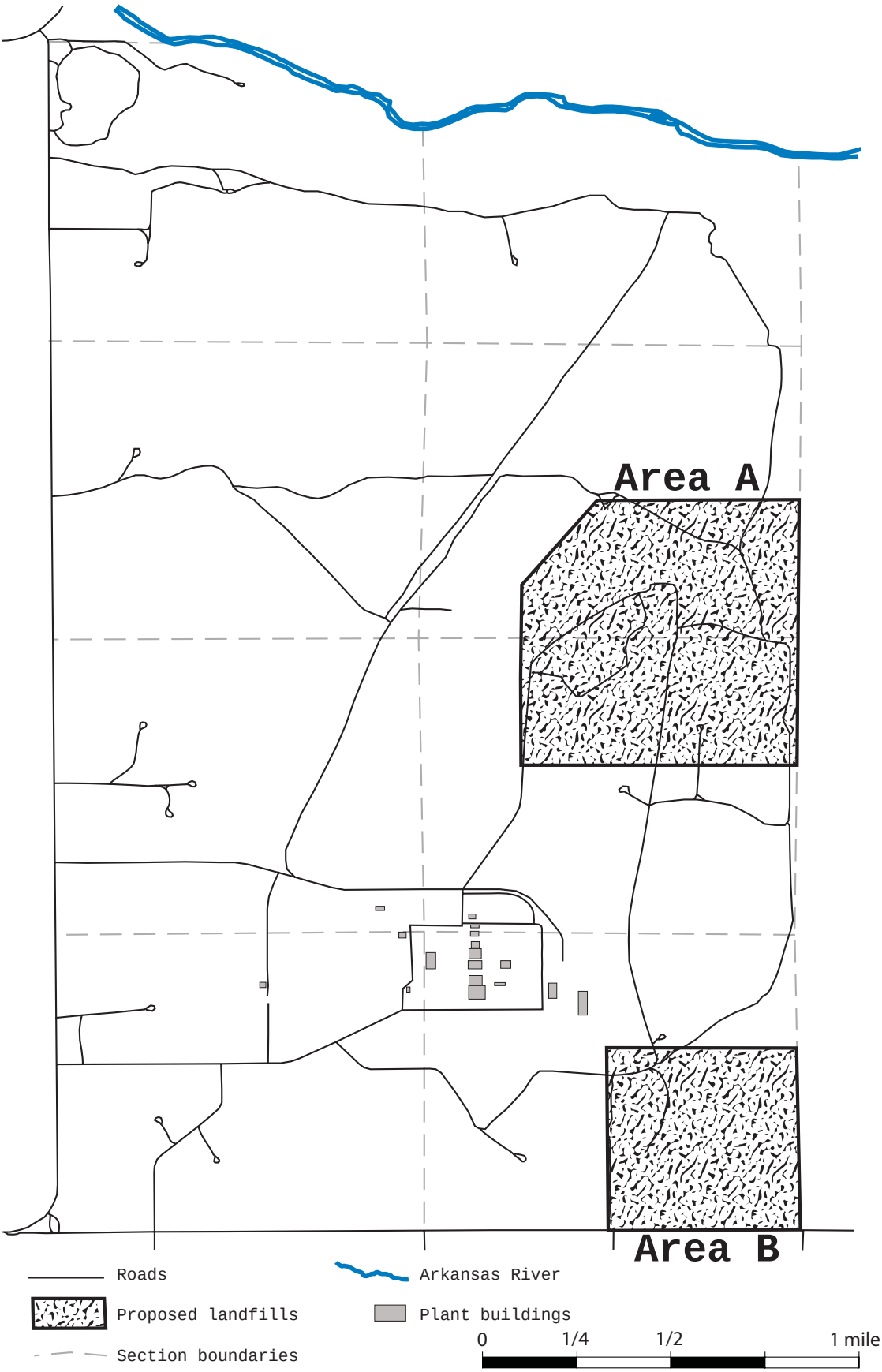

Figure 1. Map of the Sunflower Site, showing locations of features discussed in the text.

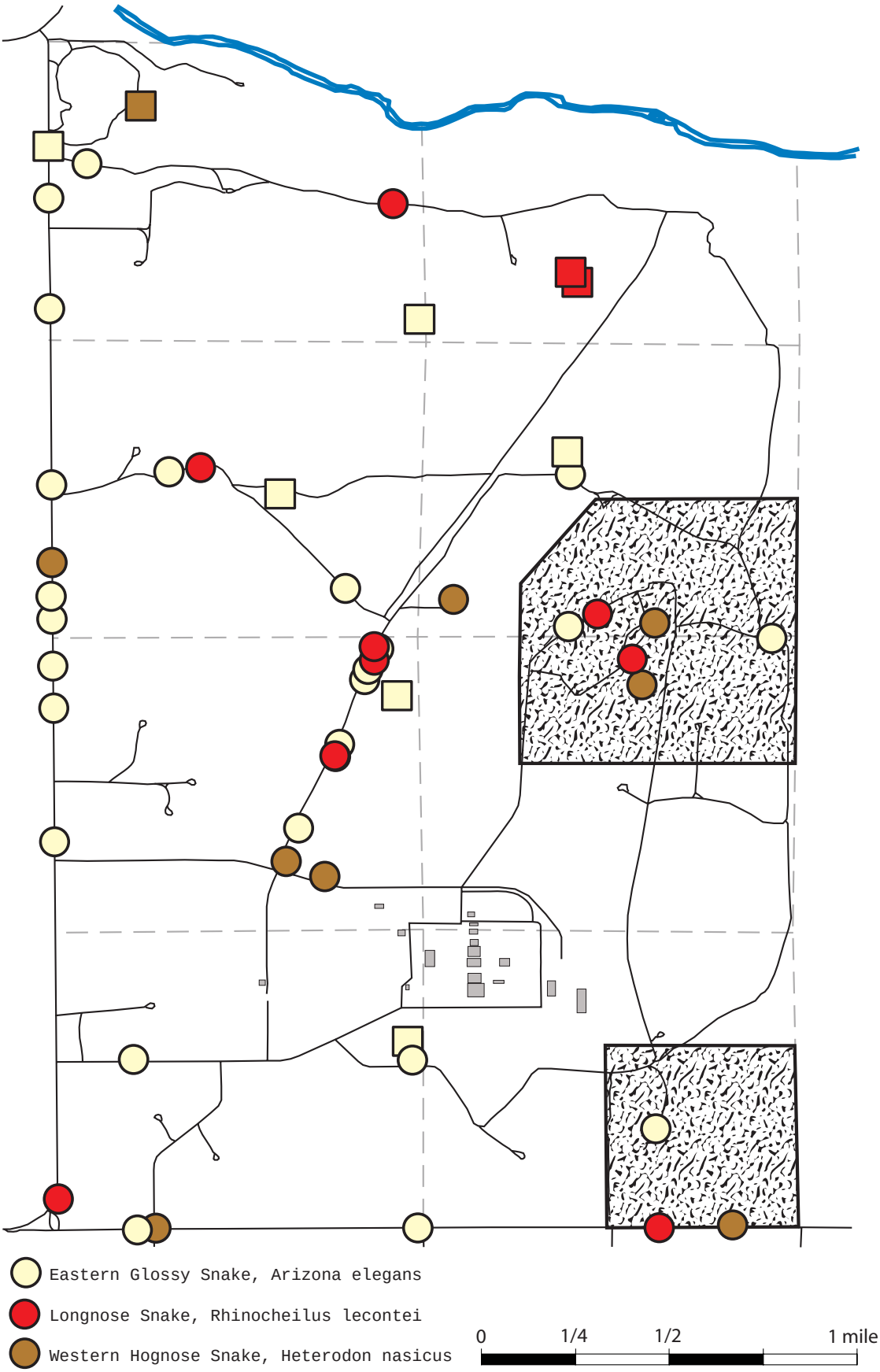

Figure 2. Distribution of the three target snake species on the Sunflower Site. Circles indicate observations made during this study and square symbols indicate observations made prior to this study.

Table 1.

Seven target species for this study.

Mammalia
Spotted Skunk, *Spilogale putorius*
Aves
Ferruginous Hawk, *Buteo regalis*
Short-eared Owl, *Asio flammeus*
Lesser Prairie Chicken, *Tympanuchus pallidicinctus*
Reptilia
Longnose Snake, *Rhinocheilus lecontei*
Eastern Glossy Snake, *Arizona elegans*
Western Hognose Snake, *Heterodon nasicus*

Table 2.

Comparison of mammal species collected in 1980 and 2006. 1980 estimates are based on the species accounts provided by Choate (1981) as numerical abundances of mammals were not given. The 1980 data should be viewed as the minimal number observed.

Species	1980	2006
Virginia Opossum, *Didelphis virginiana*	0	1
Least Shrew, *Cryptotis parva*	5	0
Desert Cottontail, *Sylvilagus audubonii*	4	23
Eastern Cottontail, *S. floridanus*	2	7
Black-tailed Jack Rabbit, *Lepus californicus*	[a]400	[c]800
Spotted Ground Squirrel, *Spermophilus spilosoma*	7	13
Thirteen-lined Ground Squirrel, *S. tridecemlineatus*	3	0
Black-tailed Prairie Dog, *Cynomys ludovicianus*	[b]3	0
Plains Pocket Gopher, *Geomys bursarius*	9	12
Plains Pocket Mouse, *Perognathus flavescens*	12	0
Hispid Pocket Mouse, *Chaetodipus hispidus*	3	1
Ord’s Kangaroo Rat, *Dipodomys ordii*	42	92
Western Harvest Mouse, *Reithrodontomys megalotis*	11	0
Plains Harvest Mouse, *R. montanus*	13	0

Table 2. (cont.)

Species	1980	2006
White-footed Mouse, *Peromyscus leucopus*	28	1
Deer Mouse, *Peromyscus maniculatus*	22	1
Raccoon, *Procyon lotor*	0	2
Northern Grasshopper Mouse, *Onychomys leucogaster*	76	5
Cotton Rat, *Sigmodon hispidus*	7	4
Eastern Woodrat, *Neotoma floridana*	0	24
Prairie Vole, *Microtus ochrogaster*	1	1
House Mouse, *Mus musculus*	3	0
Coyote, *Canis latrans*	22	3
Striped Skunk, *Mephitis mephitis*	2	2
Mule Deer, *Odocoileus hemionus*	[c]1	1
White-tailed Deer, *O. virginianus*	[c]1	3
Badger, *Taxidea taxus*	2	1

a – conservative estimate of 50 per sq mile

b – only those above ground at one time were counted

c - extrapolation

Table 3.

Results of target bird surveys.

Species	Number Observed
Ferruginous Hawk	[a]6
Short-eared Owl	2
Lesser Prairie Chicken	[b]0

a - 2-4 pairs were observed

b - leks in April; no surveys done at that time

Table 4.

Birds were surveyed from sunrise until 1430 CDT at stops spaced approximately 0.5 miles apart. At each stop, birds heard or seen were counted during a 3 minute interval. Listed below are the records for the three target species: Ferruginous Hawk (*Buteo regalis*) - FEHA, Short-eared Owl (*Asio flammeus*) - SHOW, and Lesser Prairie-chicken (*Tympanuchus pallidicinctus*) - GRPC. Locations are given in decimal degrees (lat/lon).

Date	Species	Number	Location
5/24/06	FEHA	2	37.916850°/-100.965549°
5/24/06	SHOW	2	37.953007°/-100.990628°
5/24/06	LEPC	0	-/-
6/28/06	FEHA	2	37.924818°/-100.984794°
6/28/06	SHOW	0	-/-
6/28/06	LEPC	0	-/-
7/29/06	FEHA	1	37.955024°/-100.984821°
7/29/06	FEHA	1	37.967818°/-100.982297°
7/29/06	SHOW	0	-/-
7/29/06	LEPC	0	-/-

Table 5.

Comparison of amphibian, reptile, and turtle species collected in 1980 and 2006.

Taxon	1980	2006
Amphibians		
Barred Tiger Salamander, *Ambystoma mavortium*	1	0
Bullfrog, *Lithobates catesbeianus*	0	6
Plains Spadefoot, *Spea bombifrons*	53	21
Great Plains Toad, *Anaxyrus cognatus*	2	4
Woodhouse’s Toad, *Anaxyrus woodhousii*	9	26
Turtles		
Ornate Box Turtle, *Terrapene ornata*	22	134
Yellow Mud Turtle, *Kinosternon flavescens*	2	0
Slider, *Trachemys scripta*	0	5
Western Painted Turtle, *Chrysemys picta*	0	4
Common Snapping Turtle, *Chelydra serpentina*	0	1
Reptiles		
Lesser Earless Lizard, *Holbrookia maculata*	544	0
Great Plains Skink, *Eumeces obsoletus*	73	11
Six-lined Racerunner, *Aspidoscelis sexlineata*	204	25

Table 5. (cont.)

Taxon	1980	2006
Western Hognose Snake, *Heterodon nasicus*	8	7
Racer, *Coluber constrictor*	5	4
Coachwhip, *Masticophis flagellum*	4	14
Eastern Glossy Snake, *Arizona elegans*	25	24
Bullsnake, *Pituophis catenifer*	16	66
Longnose Snake, *Rhinocheilus lecontei*	3	8
Plains Blackhead Snake, *Tantilla nigriceps*	4	0
Prairie Rattlesnake, *Crotalus viridis*	3	12