

ARTICLES

A Biological Inventory of the Sunflower Electric Site near Holcomb, Kansas

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ABSTRACT

A biological inventory was conducted on the approximately 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 with little disturbance aside from the plant buildings, a landfill, and a network of roads.

Within the Sunflower Site, two proposed landfill sites were specifically surveyed for seven species deemed to be of ecological importance by the Kansas Department of Wildlife and Parks, Kansas Department of Health and Environment, and Sunflower Electric, Inc. These species were 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 as well as elsewhere on the Sunflower Site. The Spotted Skunk was not observed; however, its absence was anticipated. The Lesser Prairie Chicken was also not observed, and possible explanations of its absence are discussed herein.

The current landfill has had no apparent deleterious effects on the use, distribution, or abundance of the seven target species that occur on or around it. No evidence exists to demonstrate that the proposed expansion of the current landfill and the possibility of a subsequent landfill development will create any long-term effects with respect to these seven target species.

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 construction of the plant in 1981, Sunflower commissioned a biological inventory (Choate, et al., 1981) to gather data on the vegetation and vertebrates of the proposed site. The Biological Inventory was conducted between May and September, 1980, to provide a baseline for future comparisons, such that subsequent impacts from the plant's construction and continued operations could be identified. The inventory provided general soil and floristic descriptions of the Sunflower Site, as well as data on the relative abundance and diversity of terrestrial vertebrates.

At the request of Sunflower Electric Power Cooperative, an addendum survey was initiated to update the previous Biological Inventory, with particular focus on two proposed landfills (Areas A and B, Figure 2) within the boundary of the original survey, and of seven vertebrate species (Table 1). The first area (Area A) is currently occupied by a flyash and bottomash landfill scheduled for expansion. The second area (Area B) currently consists of a 60 acre sand pit surrounded by sandsage prairie and is being evaluated for future development as a landfill. 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 are currently being used as a coal ash landfill and 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.

The Kansas Department of Wildlife and Parks, Kansas Department of Health and Environment, and Sunflower; identified seven sensitive vertebrate taxa (Table 1) 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) Should the target species be located within either Area, their occurrence within that Area is to be mapped in detail.
2. Surveys for the seven target taxa on the remainder of the Sunflower Site, outside of Areas A and B.

This study hoped to update the initial Biological Inventory to determine if the species that were originally present are still present within the boundary proposed for the expanded landfill. Based on those findings, conclusions could be made 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 additional acres of landfill space.

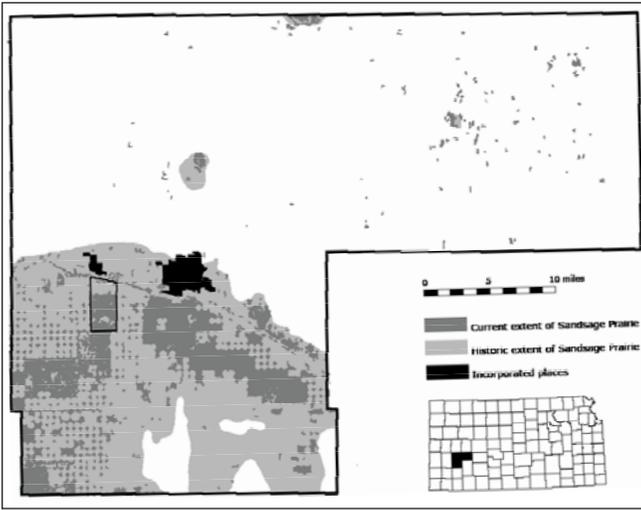


Figure 1. Map of Finney County showing the incorporated places (Holcomb [west] and Garden City) in black, the historic extent of Sandsage Prairie in light gray shading, and the current extent of Sandsage Prairie in the dark gray shading. The boundaries of the Sunflower Site are depicted by the vertical rectangle south of Arkansas River near Holcomb.

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. All sampling took place from May through August 2006.

Amphibians, Reptiles, and Turtles

Amphibians, reptiles, and turtles were surveyed on 9–12 and 26–30 May, 25–30 June, 23–28 July, and 22–26 August. Survey methods included driving roads both day and night, walking transects by day as well as passive techniques such as trapping (pitfall traps, drift-fence/pitfall/funnel traps, and turtle traps), lifting artificial cover boards, and turning natural cover (logs and brush).

Roads were driven during every day and night that herpetofaunal surveys took place and amounted to approximately 225 person-hours of time spent.

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 per-

son-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; and array four was located in Area B, in the NW 1/4 of the SE 1/4 of section 32.

Additionally, two artificial cover boards (3'x2' 3/4" plywood sheets) were laid out on either side of each drift fence array. Twenty artificial cover boards were laid out singly (not in association with a drift fence array) along the northern and western rims of the sandpit in western half of Area B.



Figure 2. Digital orthophoto and map of the Sunflower Electric Site taken during 2006 and showing features and locations discussed in the text. The Sunflower Site is 2 miles wide by 3.8 mile tall and bordered on the north by the Arkansas River, on the east and west by center-pivot irrigation, and on the south by sandsage prairie. The expanded and potential landfill sites are designated sites A and B, respectively.

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. Estimates for 1980 are based on the species accounts provided by Choate (1981) because numerical abundances of mammals were not given. The 1980 data should be viewed as the minimal number observed.

Species	1980	2006
Virginia Opossum, <i>Didelphis virginiana</i>	0	1
Least Shrew, <i>Cryptotis parva</i>	5	0
Desert Cottontail, <i>Sylvilagus audubonii</i>	4	23
Eastern Cottontail, <i>S. floridanus</i>	2	7
Black-tailed Jack Rabbit, <i>Lepus californicus</i>	^a 400	^c 800
Spotted Ground Squirrel, <i>Spermophilus spilosoma</i>	7	13
Thirteen-lined Ground Squirrel, <i>S. tridecemlineatus</i>	3	0
Black-tailed Prairie Dog, <i>Cynomys ludovicianus</i>	^b 3	0
Plains Pocket Gopher, <i>Geomys bursarius</i>	9	12
Plains Pocket Mouse, <i>Perognathus flavescens</i>	12	0
Hispid Pocket Mouse, <i>Chaetodipus hispidus</i>	3	1
Ord's Kangaroo Rat, <i>Dipodomys ordii</i>	42	92
Western Harvest Mouse, <i>Reithrodontomys megalotis</i>	11	0
Plains Harvest Mouse, <i>R. montanus</i>	13	0
White-footed Mouse, <i>Peromyscus leucopus</i>	28	1
Deer Mouse, <i>Peromyscus maniculatus</i>	22	1
Raccoon, <i>Procyon lotor</i>	0	2
Northern Grasshopper Mouse, <i>Onychomys leucogaster</i>	76	5
Cotton Rat, <i>Sigmodon hispidus</i>	7	4
Souther Plains Woodrat, <i>Neotoma micropus</i>	0	24
Prairie Vole, <i>Microtus ochrogaster</i>	1	1
House Mouse, <i>Mus musculus</i>	3	0
Coyote, <i>Canis latrans</i>	22	3
Striped Skunk, <i>Mephitis mephitis</i>	2	2
Mule Deer, <i>Odocoileus hemionus</i>	^c 1	1
White-tailed Deer, <i>O. virginianus</i>	^c 1	3
Badger, <i>Taxidea taxus</i>	2	1

a – conservative estimate of 50 per sq mile
b – only those above ground at one time were counted
c - extrapolation

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 connected by 1/2 inch netting. The traps had a netting funnel on one end allowing the turtles to enter. The end opposite the funnel was closed with netting. All the turtle traps were baited with chicken liver.

Birds

Surveys for birds took place on 23–24 May, 27–28 June, and 28–29 July. Birds were surveyed from sunrise until 1430 CDT by walking transects through the site with stops spaced approximately 0.5 miles apart. At each stop the birds observed (heard or seen) were counted over a three 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, driving roads, and setting 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. The Tomahawk traps were covered in burlap and baited with commercial cat food.

COMMUNITY ANALYSIS

This Section attempts to contrast the results of the initial and current survey. When possible (and reason-

able to do so), comparisons have been made between the 1980 survey and this survey, however for various reasons, direct comparisons are not always possible, nor are they biologically significant.

Amphibians, Reptiles, and Turtles

Table 5 summarizes those herpetofaunal taxa encountered during this survey. The three target snakes *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. Conversely, *Ambystoma mavortium*, *Kinosternon flavescens*, *Holbrookia maculata*, and *Tantilla nigriceps* were observed during the 1980 survey but were absent during this survey.

The most notable herpetological finding of the survey was the absence of *Holbrookia maculata*. The 1980 survey listed this taxon as the most observably abundant vertebrate on the site, while this recent survey effort failed to discover any examples. Their recent apparent rarity isn't limited to the Sunflower Site. The species once occurred in Kansas from the Flint Hills west and is now only recently confirmed from two populations along the Colorado border and one population in southwest Sumner County (Taggart, 2006).

Table 3. Results of target bird surveys.

Species	Number Observed
Ferruginous Hawk.....	a6
Short-eared Owl.....	2
Lesser Prairie Chicken.....	b0

a - 2-4 pairs were observed

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

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 Chickens 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 virginiana*, *Neotoma micropus*, and *Procyon lotor* were observed, but not during the 1980 survey. 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.

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 *Cryptotis parva*, *Spermophilus tridecemlineatus*, *Perognathus flavescens*, *Reithrodontomys megalotis*, and *Reithrodontomys montanus* on the Sunflower Site. Jerry Choate (pers. comm.) stated that these species are not especially abundant in the area, and typically inhabit more compacted soils. He further stated that each of them 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.

ACCOUNTS OF SPECIES

The following seven species accounts focus on those taxa of greatest biological interest on the site (Table 1). Additionally, comments are generally limited to observations in the proposed landfill areas of interest (Areas A and B). When pertinent, references are made to 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 common in Kansas until

settlement, and that the recent trend from rural to urban population centers has caused their decline in numbers and range throughout the state. 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 Arkansas River riparian corridor on the northern edge of the property.

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. 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 state that Lesser Prairie Chicken numbers might be unusually high due to the lack of habitat adjacent to the study area. Elmer Finck, Fort Hays State University, conducted the targeted avian surveys during this study, and despite not observing them during this work on the site, he is certain that Lesser Prairie Chickens persist there, but were missed because the surveys began after the birds had finished "booming," making them more difficult to locate.

Conversely, much of the habitat surrounding the Sunflower Site has been rendered unsuitable to Lesser Prairie Chickens due to anthropogenic effects associated with agriculture and urbanization. Lesser Prairie Chickens favor native prairies and are adversely affected by their conversion to other uses. Even in areas that remain largely intact and apparently suit-

Table 4. Bird records for the three target species during 2006: Ferruginous Hawk (*Buteo regalis*)—FEHA, Short-eared Owl (*Asio flammeus*)—SHOW, and Lesser Prairie-chicken (*Tympanuchus pallidicinctus*)—LEPC. Locations are given in decimal degrees (lat/long).

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

Table 5. Comparison of amphibian, reptile, and turtle species collected in 1980 and 2006.

Taxon	1980	2006
Amphibians		
Barred Tiger Salamander, <i>Ambystoma mavortium</i>	1	0
Bullfrog, <i>Lithobates catesbeianus</i>	0	6
Plains Spadefoot, <i>Spea bombifrons</i>	53	21
Great Plains Toad, <i>Anaxyrus cognatus</i>	2	4
Woodhouse's Toad, <i>Anaxyrus woodhousii</i>	9	26
Turtles		
Ornate Box Turtle, <i>Terrapene ornata</i>	22	134
Yellow Mud Turtle, <i>Kinosternon flavescens</i>	2	0
Slider, <i>Trachemys scripta</i>	0	5
Northern Painted Turtle, <i>Chrysemys picta</i>	0	4
Common Snapping Turtle, <i>Chelydra serpentina</i>	0	1
Reptiles		
Lesser Earless Lizard, <i>Holbrookia maculata</i>	544	0
Great Plains Skink, <i>Plestiodon obsoletus</i>	73	11
Six-lined Racerunner, <i>Aspidoscelis sexlineata</i>	204	25
Western Hognose Snake, <i>Heterodon nasicus</i>	8	8
Eastern Racer, <i>Coluber constrictor</i>	5	4
Coachwhip, <i>Masticophis flagellum</i>	4	14
Eastern Glossy Snake, <i>Arizona elegans</i>	25	24
Bullsnake, <i>Pituophis catenifer</i>	16	66
Longnose Snake, <i>Rhinocheilus lecontei</i>	3	9
Plains Blackhead Snake, <i>Tantilla nigriceps</i>	4	0
Prairie Rattlesnake, <i>Crotalus viridis</i>	3	12

able, 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 hypothesized 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 while conducting studies 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. 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 Snake was the second most commonly observed snake during the study behind the Bullsnake. Twenty-four were observed (all at night). This species is secretive and due to its nocturnal habits and overall similarity to the Bullsnake, the Eastern Glossy Snake is often overlooked, thereby contributing to its perception as rare. All size classes 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 Eastern Glossy Snake was observed on the existing landfill in Area A. Another was found on the eastern edge of Area A and one was also observed within Area B.

Western Hognose Snake, *Heterodon nasicus*

Eight Western Hognose Snakes were recorded during the survey, the same number reported by Choate et al. (1981). Adults, juveniles, and hatchlings (from 2005) were observed in equal proportion. All of the observations were made off the floodplain; however they undoubtedly utilize this habitat 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 sadsage prairie ecosystem has served as a refuge from the agricultural conversion and practices that

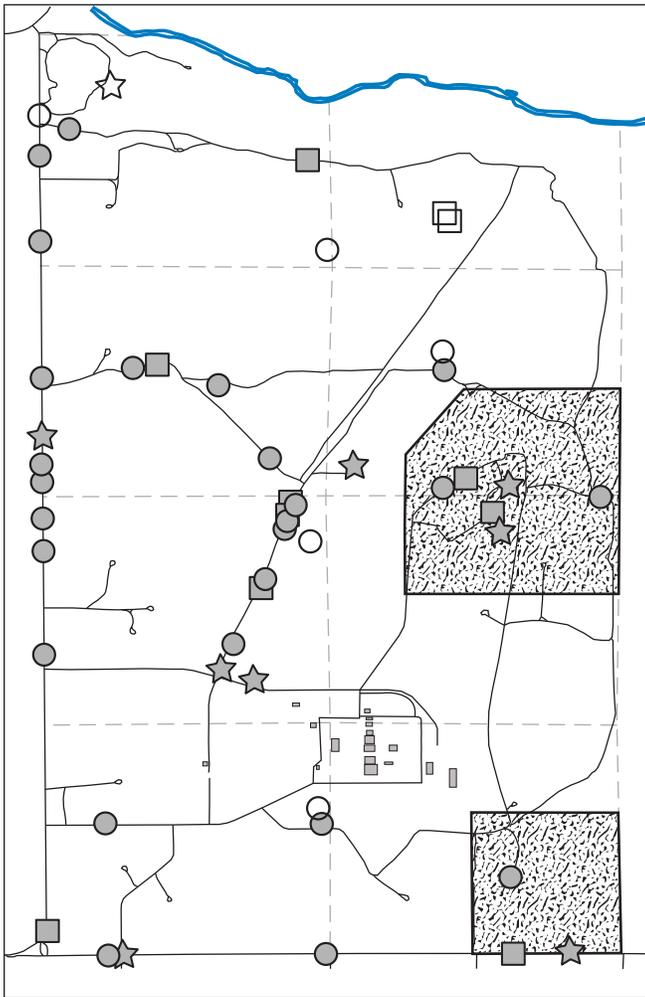


Figure 3. Distribution of the three target snake species on the Sunflower Site. Circles represent the Eastern Glossy Snake (*Arizona elegans*), stars the Western Hognose Snake (*Heterodong nasicus*), and squares the Longnose Snake (*Rhinocheilus lecontei*). Shaded symbols depict observations obtained during this study; open circles designate historic records.

have taken place on adjacent properties. Specifically, areas that contain center-pivot irrigation and crop/forage production represent critically altered landscapes with 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 present landfill. Human activities associated with the landfill construction will pose an immediate detrimental effect to most species present in those areas. This effect will be short-lived 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.

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