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Mammalian Records from Southwestern Kansas and Northwestern Oklahoma, including the First Record of Crawford's Desert Shrew (*Notiosorex crawfordi*) from Kansas

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Abstract

Mammalian distributions are constantly changing. Some distributional shifts reflect habitat change, climate change, and human transplantations; thus, such shifts are due to actual expansions or contractions of populations. However, other species ranges that appear to shift as the result of new records being added to known distributional limits actually might reflect populations that previously were undetected due to a lack of past surveys or species that are difficult to detect. In 2013, multiple techniques were employed to document mammalian distributional records in southwestern Kansas and northwestern Oklahoma. We discovered three new county records in Morton County, Kansas (Crawford's Desert Shrew, *Notiosorex crawfordi*; American Beaver, *Castor canadensis*; and Eastern Fox Squirrel, *Sciurus niger*), with Crawford's Desert Shrew also representing the first records of the species in Kansas. We documented five new county records in Cimarron County, Oklahoma (Least Shrew, *Cryptotis parva*; American Parastrelle, *Parastrellus hesperus*; Wapiti, *Cervus canadensis*; White-tailed Deer, *Odocoileus virginianus*; and Eastern Fox Squirrel, *Sciurus niger*). The Eastern Fox Squirrel and Least Shrew likely are expanding their distribution in this region along the Cimarron River, whereas the Wapiti, White-tailed Deer, and American Beaver likely are recolonizing the area after extirpation during the last century. Occurrence of Eastern Fox Squirrels in Elkhart, Kansas, and Boise City, Oklahoma, might represent human introductions. The American Parastrelle and Crawford's Desert Shrew likely have gone undetected at those sites and have not recently experienced range expansions. Our results demonstrate the importance of continued surveys using various methods to document mammals. Both counties have been intensively surveyed for mammals, indicating that targeted surveys and various techniques are important to document distributional shifts as well as rare or difficult to capture species. Understanding the species present in an area is requisite for managing habitats and wildlife and will allow biologists to better elucidate future changes in distributions.

Key words: *Castor canadensis*, *Cervus canadensis*, *Cryptotis parva*, Kansas, *Notiosorex crawfordi*, mammals, *Odocoileus virginianus*, Oklahoma, owl pellets, *Parastrellus hesperus*, *Sciurus niger*

INTRODUCTION

Mammalian distributions in the Great Plains and elsewhere are not static and are continually changing along edges of ranges (e.g., Humphrey 1974; Taulman and Robbins 1996, 2014; Benedict et al. 2000). Distributional range maps show an accumulation of locality data acquired through time, albeit range maps give the impression that they are stationary. A number of factors contribute to distributional changes through time, such as human introductions, habitat change, and climate change. For example, humans commonly move animals purposely or inadvertently throughout the world, with one study reporting that 139 vertebrate species were introduced between North America and Europe in the last 1,500 years (Jeschke and Strayer 2005). Occasionally, species appear to expand in distribution with new localities of occurrence being found beyond their known distributional range. However, due to a lack of previous surveys in the area or because the species is difficult to detect, such populations might have always occurred in the area but were simply undocumented. Frey (2009) described how to evaluate whether a species is expanding its distributional range or whether researchers are extending their knowledge of the distribution where the species has always occurred in the past.

Throughout the Great Plains, the known distributions of many mammals have changed in recent decades (e.g., Choate and Reed 1988; Benedict et al. 2000; Hoffman and Genoways 2005; Roehrs et al. 2008; Schmidt et al. 2015). In Nebraska, for example, Benedict et al. (2000) demonstrated that >25% of mammalian species have experienced a change in distribution since the 1960s. One common trend for woodland species is a westward distributional expansion, many along west to east flowing rivers (Wilson and Choate 1996; Sparks and Choate 2000; Benedict et al. 2000; Geluso 2004; Siemers et al. 2006; Serbousek and Geluso 2009). Altered river flows caused by irrigation practices and construction of dams have caused an increase in wooded riparian habitats that were once limited in part by floods and ice flows (Johnson 1994). Another common trend is recolonization of furbearers, carnivores, and larger herbivores occupying historic ranges after previously being extirpated (e.g., Benedict et al. 2000; Hoffman and Genoways 2005).

We report new records of mammals from Morton County, Kansas, and Cimarron County, Oklahoma. Various methods were employed to search for new distributional records. Diets of Barn Owls (*Tyto alba*) from both areas also are reported, as examination of regurgitated owl pellets represented one of our sampling methods. Continued surveys for mammals will enable biologists to manage them and their habitats throughout the region as well as better elucidate explanations of future distributional shifts.

METHODS

We conducted surveys for mammals in Morton County, Kansas, and Cimarron County, Oklahoma, on 13–14 April, and 7–12 May 2013. In Kansas, grasslands, rocky outcroppings, and wooded riparian areas were targeted in the Cimarron National Grassland. In Oklahoma, pinyon-juniper woodlands, rocky outcroppings, and riparian woodlands were targeted in the Black Mesa region. Roadway bridges also were checked for owl pellets and bats in both counties. Methods used to secure distributional records included use of mist nets for bats, examination of discarded glass and plastic bottles for shrews, opportunistic sightings for larger mammals, owl pellet analyses for small mammals, and use of live traps (H. B. Sherman Traps, Inc., Tallahassee, FL) and pitfall traps consisting of 473 ml drinking cups for small mammals.

We deployed mist nets (6, 9, 12, and 18 m; Avinet Inc., Dryden, NY) under bridges and over water sources such as earthen ponds, metal stock tanks, and streams to capture bats. Time of capture, species, sex, age, reproductive condition, length of forearm, and body weight were recorded for individuals. Bats were released at sites of capture, except for a single individual that represented a new county record (American Parastrelle, *Parastrellus hesperus*; see below). We also searched under bridges for day- and night-roosting

bats, as bridges commonly are used by bats in the southwestern United States (Geluso et al. 2005; Geluso and Mink 2009).

To document shrews in southwestern Kansas, contents of discarded, littered bottles, both glass and plastic, were examined at the Point of Rocks in the Cimarron National Grassland (37.1038°N, 101.9386°W). We strategically selected arid upland habitats to examine bottles for vertebrates, because we suspected Crawford's Desert Shrews (*Notiosorex crawfordi*) occurred in the area. Glass and plastic bottles, with bottle openings elevated upslope, effectively serve as "pitfall traps" because small mammals that enter the bottles are unable to crawl out due to the slippery sides. Such littered bottles are an efficient means of documenting records of shrews and other small vertebrates (Pagels and French 1987; Benedict and Billeter 2004).

Under two of four roadway bridges examined for owls, we collected and later analyzed regurgitated Barn Owl pellets as a method of surveying for distributional records of small mammals (e.g., McDonald et al. 2006), which effectively allowed us to sample a large number of small mammals from these two counties with little time and effort in the field. Barn Owls were observed under both bridges on all days pellets were collected. On 14 April and 7 May 2013, a total of 30 pellets and other loose cranial materials were collected under a bridge in Morton County, Kansas (37.12125°N, 101.89715°W), and on 9 May 2013, a total of 171 pellets and other loose cranial materials were collected under a bridge in Cimarron County, Oklahoma (36.98304°N, 102.24950°W). Pellets were soaked in water for 10 sec to facilitate extracting cranial and dentary bones. Cranial materials not associated with intact pellets also were sorted and examined. Cranial materials were dried for >24 h at room temperature before being placed into individually labeled bags containing a unique identification number from each site. Various keys were used to identify mammalian cranial material (e.g., Carraway 1995) as well as comparative materials from the University of Nebraska at Kearney's natural history collection. We only counted craniums in final counts unless a species was only documented at a location by dentary bones (*Geomys bursarius* in Kansas and *N. crawfordi* in Oklahoma). However when possible, dentary bones were used to differentiate between similar-looking craniums, such as between *Peromyscus* and *Onychomys*, if the dentary was still associated with the cranium in a pellet.

Opportunistic sightings documented larger mammals as roads were driven at night and during the day. Due to the limited number of days in the field, relatively few Sherman live traps (n = 80 in Kansas and n = 120 in Oklahoma) and small pitfall traps (n = 15) were set to document small mammals, and therefore efforts to document small mammals focused on processing owl pellets.

Localities of captures or observations were recorded with hand-held GPS units (Garman GPS 12, Garmin International, Inc., Olathe, Kansas, USA) with map datum NAD83. This study followed the American Society of Mammalogists Guidelines for use of wildlife in research (Sikes et al. 2011) and our methods were approved by the Institutional Animal Care and Use Committee at the University of Nebraska at Kearney (protocol #060408). All study skins and representative skulls of each species obtained from owl pellets were deposited in the mammalogy collection at the Sternberg Museum of Natural History, Fort Hays State University, Hays, Kansas (FHSM). We followed Bradley et al. (2014) for the order of accounts of species as well as for common and scientific names of mammals, and we obtained authorities of species from Frey (2004).

RESULTS AND DISCUSSION

By employing various surveying techniques for mammals, eight county records, including one state record, were discovered from southwestern Kansas and northwestern Oklahoma (see accounts of species below for details). The three new records from Morton County, Kansas, included Crawford's Desert Shrew, American Beaver (*Castor canadensis*), and Eastern Fox Squirrel (*Sciurus niger*). The shrew represented a species new to the list of fauna known from Kansas. The five new county records from Cimarron County, Oklahoma, included the Least Shrew (*Cryptotis parva*), American Parastrelle (*Parastrellus hesperus*), Wapiti

(*Cervus canadensis*), White-tailed Deer (*Odocoileus virginianus*), and Eastern Fox Squirrel. The four techniques that yielded county records were opportunistic sightings (Wapiti, White-tailed Deer, American Beaver, and Eastern Fox Squirrel), owl pellet analyses (Least Shrew; Table 1), mist nets (American Parastrelle), and littered bottles (Crawford's Desert Shrew).

Analyses of Barn Owl pellets from two sites along the Cimarron River, separated by only 35 km, resulted in differences in frequency of prey items (Table 1). In Kansas, proportionally more Prairie Voles (*Microtus ochrogaster*), harvest mice (*Reithrodontomys*), deer mice (*Peromyscus*), and Hispid Cotton Rats (*Sigmodon hispidus*) were consumed, whereas farther west in Oklahoma, proportionally more Ord's Kangaroo Rats (*Dipodomys ordii*) and Hispid Pocket Mice (*Chaetodipus hispidus*) were captured as prey by Barn Owls. Differences, in part, likely reflect foraging habitats near the two bridges and composition of small mammal assemblages in those areas. Species most frequently identified in the Barn Owl diets in Kansas generally

Table 1. Number of individuals of each taxon documented in Barn Owl (*Tyto alba*) pellets collected from Morton County, Kansas, and Cimarron County, Oklahoma. Only crania were counted unless a species was only documented via a dentary bone at a site. Relative frequency represents number of each taxon per 100 pellets for a relative measure of frequency in diets of Barn Owls from the two sites.

Species	Kansas	Relative frequency	Oklahoma	Relative frequency	Total
Bird	1	0.9	4	0.9	5
Cricetidae	0	0.0	1	0.2	1
Chaetodipus hispidus	9	8.2	160	35.1	169
Cryptotis parva	1	0.9	1	0.2	2
Dipodomys ordii	12	10.9	137	30.0	149
Geomys	1*	0.9	3	0.7	4
Microtus ochrogaster	10	9.1	19	4.2	29
Neotoma	1	0.9	1	0.2	2
Notiosorex crawfordi	0	0.0	1*	0.2	1
Onychomys	10	9.1	51	11.2	61
Onychomys/Peromyscus	8	7.3	23	5.0	31
Perognathus	2	1.8	6	1.3	8
Peromyscus	25	22.7	27	5.9	52
Peromyscus/Reithrodontomys	0	0.0	1	0.2	1
Reithrodontomys	25	22.7	18	3.9	43
Scalopus aquaticus	1	0.9	0	0.0	1
Sigmodon hispidus	4	3.6	2	0.4	6
Sylvilagus	0	0.0	1	0.2	1
Total	110		456		566

*Documented via a single dentary bone for the locality.

occur in more dense or mesic habitats, such as grasslands or marshy areas, whereas species observed more frequently in the Oklahoma pellets generally occur in open, upland habitats with more bare ground (Bee et al. 1981; Jones et al. 1983). Dalquest et al. (1990) noted that this region was a transitional interface between Great Plains and Rocky Mountain ecosystems. Data from diet analyses of Barn Owls along this gradient, as well as other observations noted below in species accounts, further demonstrate the convergence of distributional limits in the region. Continued monitoring of species distributions and protection of habitats in the region might be warranted, as Lomolino and Channell (1995) demonstrated the importance of peripheral populations along edges of species' ranges, which can be critical refugia for declining species. Hall (1946) also noted the benefits of conducting studies to elucidate ecological correlates of occurrence along distributional edges rather than at the center of geographic ranges. Many mammalian species inhabit the region and continued monitoring of distributions likely will result in discovering interesting patterns of occurrence in light of global climate change.

ORDER SORICOMORPHA
Family Soricidae
***Cryptotis parva* (Say 1823)**
Least Shrew

The Least Shrew occurs throughout eastern parts of the United States as far north as New York and South Dakota, and as far west as northeastern Colorado and western Texas (Hall 1981). Recently, the distribution of *C. parva* has expanded westward in the Great Plains into eastern Wyoming (Marquardt et al. 2006), western Nebraska (Geluso et al. 2004; Merlino et al. 2012), southeastern Colorado (Choate and Reed 1988; Siemers et al. 2006; Armstrong et al. 2011), southwestern Kansas (Choate and Reed 1988), and eastern New Mexico (Hafner and Shuster 1996). In the western Great Plains, such distributional changes, in part, are suspected to be associated with increased favorable mesic habitats such as along roadway right-of-ways, agricultural runoff from irrigation, and altered riparian habitat due to construction of dams and irrigation practices.

We documented Least Shrews in Morton County, Kansas, and in Cimarron County, Oklahoma. Least Shrews previously had been reported from southwestern Kansas (Bee et al. 1981; Choate and Reed 1988; Schmidt et al. 2015). The Least Shrew from Oklahoma was obtained from a Barn Owl pellet collected under a highway bridge in northern Cimarron County on 9 May 2013. Although the closest published record within Oklahoma is 120 km to the east in southeastern Texas County (Dalquest et al. 1990), the actual nearest published record is located 3.4 km to the northeast in Baca County, Colorado (Choate and Reed 1988). Our record is the westernmost Least Shrew known from Oklahoma. Our observation of the Least Shrew along the Cimarron River likely is another example of westward movements along river drainages in western parts of the Great Plains.

Specimen examined (1).—OKLAHOMA: Cimarron Co., 19.3 km N, 0.4 km E Keyes, 36.98304°N, 102.24950°W (FHSM 41997).

***Notiosorex crawfordi* (Coues 1877)**
Crawford's Desert Shrew

Crawford's Desert Shrew resides mainly in desert and grassland habitats throughout the southwestern part of the United States (Armstrong and Jones 1972; Hall 1981). The species is known from southeastern Colorado in Baca County (Armstrong 1972; Armstrong et al. 2011) and northwestern Oklahoma in Cimarron and Texas counties (Dalquest et al. 1990). The Colorado and Oklahoma records are only 44 km and 26 km from the Kansas border, respectively. One of our main objectives in this study was to determine whether Crawford's Desert Shrew occurred in Kansas (Bee et al. 1981; Hall 1981; Choate and Reed 1988).

On 8 May 2013, the first records of Crawford's Desert Shrew in Kansas were documented from skulls found in discarded bottles at a location known as Point of Rocks in the Cimarron National Grassland, Morton County. Point of Rocks overlooks the Cimarron River and is a favorite stop for tourists, and thus accumulations of garbage are common in the immediate area. Twelve skulls were obtained from a single 2-liter plastic bottle pointing upward and another 12 skulls from a single glass beer bottle with its opening pointing upward, both on the south-facing slope below the Point of Rocks parking area. Other species observed in bottles included *Reithrodontomys* (2 skulls; possibly *R. montanus* and *R. megalotis* based on relative sizes

of crania) and *Peromyscus* (3 skulls). Habitat in the immediate area consisted of rock outcrops with scattered vegetation including soapweed yucca (*Yucca glauca*). The closest published record of a desert shrew from our study site is located 47 km southeast in Texas County, Oklahoma (Dalquest et al. 1990). Although this area was unsuccessfully surveyed in the past for Crawford's Desert Shrew (Choate and Reed 1988), we predict that the species is more widespread and common in southwestern Kansas. Continued examination of discarded bottles along roadways might detect additional individuals. Pitfall traps are highly effective in detecting desert shrews, as demonstated by Chung-MacCoubrey et al. (2009) with their capture of >2,000 desert shrews in a 7-year project in central New Mexico. Choate and Reed (1988) set pitfall traps in an attempt to capture Crawford's Desert Shrews in Morton County, but apparently their traps were set in riparian habitats along the Cimarron River and they captured only Least Shrews. Investigations of habitat use by Crawford's Desert and Least Shrews in the area, as well as the extent of the current distribution of desert shrews in southwestern Kansas, warrant further research. Documentation of Crawford's Desert Shrews in Kansas most likely represents a previously overlooked population. Because of the unknown status and distribution of the species in the state, we propose that Crawford's Desert Shrew be considered as a Species in Need of Conservation (SINC) in Kansas. Although pitfall traps are an excellent method of sampling small vertebrates, they might effectively reduce shrew populations when left in the environment for an extended period of time (Bury and Corn 1987). For this reason, littered bottles in southwestern Kansas might negatively affect shrew populations.

Specimens examined (18).—KANSAS: Morton Co., Cimarron National Grassland, Point of Rocks, 10.6 km N, 4.4 km W Elkhart, 37.1038°N, 101.9386°W (FHSM 41973-41990).

ORDER CHIROPTERA
Family Vespertilionidae
***Parastrellus hesperus* (H. Allen 1864)**
American Parastrelle

The American Parastrelle occurs throughout arid regions of the southwestern and western United States (Hall 1981). In Oklahoma, *P. hesperus* is known only from the southwestern part of the state (Caire et al. 1989); however, it has been reported <2 km from the New Mexico-Oklahoma border in Union County, New Mexico (Dalquest et al. 1990). On 10 May 2013, we captured an adult male American Parastrelle over an earthen pond in Cimarron County, Oklahoma. The individual had a mass of 4.5 g and a forearm length of 34 mm. The habitat surrounding the pond was comprised of rocky mesas with piñon-juniper woodlands. Other species of bats captured over the pond on 8 and 10 May included the Yuma Myotis (*Myotis yumanensis*), Pallid Bat (*Antrozous pallidus*), Hoary Bat (*Lasiurus cinereus*), Silver-haired Bat (*Lasionycteris noctivagans*), and Brazilian Free-tailed Bat (*Tadarida brasiliensis*). Our capture represents the first record of *P. hesperus* in the panhandle of Oklahoma, with the closest published record located about 7.6 km to the northwest in Union County, New Mexico (Dalquest et al. 1990). Our observation likely represents a range extension (sensu Frey 2009) for the American Parastrelle, as the species apparently is rare in the region though it previously was expected to be resident in the Black Mesa region of Oklahoma (Caire et al. 1989; Dalquest et al. 1990).

Specimen examined (1).—OKLAHOMA: Cimarron Co., 2.9 km S, 2.1 km E Kenton, 36.87612°N, 102.93922°W (FHSM 41971).

ORDER ARTIODACTYLA
Family Cervidae
***Cervus canadensis* Erxleben 1777**
Wapiti

Wapiti mainly occur in northern parts of the United States but have reached distributional limits as far south as central California, New Mexico, western Texas, southern Oklahoma, and northern Louisiana (Hall 1981). Throughout much of the Great Plains and eastern United States, Wapiti were extirpated by the late 1800s with settlement by Europeans, but subsequently some populations have been reestablished where they formerly occurred (Jones et al. 1983). In 1981, Wapiti were reintroduced to the Cimarron National Grassland in Morton County, Kansas, after being extirpated ca. 1900 (Bee et al. 1981). In Oklahoma, Wapiti were reintroduced from Wyoming into southwestern and eastern Oklahoma as early as 1911 (Caire et al. 1989; Dalquest et al. 1990).

On 11 May 2013, one bull and two cow Wapiti were observed in Cimarron County, Oklahoma, in the Black Mesa region of the state. We observed them in a canyon associated with one-seeded juniper (*Juniperus monosperma*) and piñon pine (*Pinus edulis*). Wapiti are known from adjacent Union County, New Mexico (Findley et al. 1975; Dalquest et al. 1990), and our observation represents the westernmost record from Oklahoma (Caire et al. 1989; Dalquest et al. 1990). We suspect our observation is the result of Wapiti continuing to return to their historical ranges from reintroduced populations in northeastern New Mexico (Jones et al. 1988) or those from the Cimarron National Grassland in Morton County, Kansas (Walter and Leslie 2002). Our observations clearly are not the first in the county, as an established hunting season is known throughout the state, with the first individuals harvested from Cimarron County in 1994 (Walter and Leslie 2002). We are reporting these data to establish the first published locality of occurrence for the county, to our knowledge, for scientific purposes.

Observational records (3).—OKLAHOMA: Cimarron Co., 0.3 km S, 2.1 km W Kenton, 36.899156°N, 102.98624°W (1 male, 2 females).

***Odocoileus virginianus* (Zimmermann 1780)**
White-tailed Deer

White-tailed Deer occur throughout the contiguous United States, except parts of some southwestern states (Hall 1981). White-tailed Deer are known from the general region in northeastern New Mexico (Best 1971; Findley et al. 1975), southeastern Colorado (Armstrong 1972; Armstrong et al. 2011), and the northern Texas Panhandle (Jones et al. 1988; Dalquest et al. 1990), but Dalquest et al. (1990) did not report a specific locality of occurrence for *O. virginianus* from the panhandle of Oklahoma. On 11 May 2013, we documented White-tailed Deer in extreme western Cimarron County, Oklahoma, along Carrizozo Creek. Carrizozo Creek is a small intermittent creek that flows into the Cimarron River. White-tailed Deer were observed in wooded deciduous riparian habitats along the creek dominated by eastern cottonwoods (*Populus deltoides*). Our observational records represent the westernmost published record of White-tailed Deer in Oklahoma (Caire et al. 1989; Dalquest et al. 1990), with the closest published record located about 28 km west in Union County, New Mexico (Best 1971). The closest record in Oklahoma is 203 km E in Beaver County (Roehrs et al. 2008). Dalquest et al. (1990) reported the expansion of the species into the Black Mesa region in the 1980s. Our observation likely is the result of White-tailed Deer continuing to increase in population, especially in riparian deciduous woodlands throughout the Great Plains, after widespread population reductions in the late 1800s and early 1990s (Caire et al. 1989).

Observational records (5).—OKLAHOMA: Cimarron Co., 0.1 km S, 3.4 km W Kenton, 36.90183°N, 103.00175°W.

ORDER RODENTIA
Family Castoridae
***Castor canadensis* Kuhl 1820**
American Beaver

The American Beaver is known throughout most of the United States (Hall 1981). Once widespread throughout the Great Plains, extensive trapping for beavers greatly reduced populations by the early 1900s, but in Oklahoma, for example, restocking and trapping management have allowed beavers to again occur statewide in many creeks, streams, and river systems (Caire et al. 1989). Beavers likely occur across Kansas where suitable habitats exist (Hall 1955); however, Bee et al. (1981) showed few counties with records of occurrence. Similarly, the Kansas Mammal Atlas (Schmidt et al. 2015) shows not a single record in southwestern Kansas. Beavers are more abundant in eastern parts of the state where much of the state's wetlands are located (Robel and Fox 1993).

Diagnostic cuttings of the American Beaver were documented in Morton County, Kansas, along the Cimarron River on 8 May 2013 in the Cimarron National Grassland. The area contained cattail marshes with scattered groups of cottonwood trees along intermittent, open pools of water. The closest published record is in Texas County, Oklahoma (no specific locality given; Caire et al. 1989). Beavers certainly are more widespread across southwestern Kansas, as beavers are known from almost all counties in northern Oklahoma (Caire et al. 1989) and were previously known farther west along the Cimarron River in New Mexico (Best 1971).

Observational record (1).—KANSAS: Morton Co., 12.5 km N, 0.6 W Elkhart, 37.12125°N, 101.89715°W.

Family Sciuridae
***Sciurus niger* Linnaeus 1758**
Eastern Fox Squirrel

The Eastern Fox Squirrel resides throughout the eastern United States (Hall 1981). In recent decades, distributional limits of *S. niger* have expanded westward along the western edge of the Great Plains due to human introductions and increases in trees along prairie rivers, with notable expansions in western Texas (Frey and Campbell 1997), eastern New Mexico (Frey and Campbell 1997; Geluso 2004), southeastern Colorado (Geluso 2004), and much of Wyoming (Orabona et al. 2012). Prior to our observations, we were not aware of published records of Eastern Fox Squirrels from either extreme southwestern Kansas or the panhandle of Oklahoma (Bee et al. 1981; Caire et al 1989; Dalquest et al. 1990).

We documented Eastern Fox Squirrels in Morton County in extreme southwestern Kansas. On 14 April and 8 May 2013, we observed and photographed individuals in large cottonwood trees at the Cimarron National Grasslands at the Cottonwood Picnic Area. Fox squirrels also were observed in the town of Elkhart, Kansas, about 12.2 km to the south of our observation, in 2007 (Schmidt et al. 2015). Although Eastern Fox Squirrels are known throughout most of Kansas, except extreme southwestern parts of the state (Bee et al. 1981), our records represent the southwestern-most records from the state. The closest published record is located about 80 km northwest at the Two Buttes Wildlife Management Area in Baca County, Colorado (Geluso 2004). Our observations might represent another example of a woodland species expanding its distribution along west-to-east flowing rivers in the Great Plains; however, given the frequency of Eastern Fox Squirrel introductions by humans, we cannot determine the source of populations in southwestern Kansas.

On 10 May 2013, we observed an Eastern Fox Squirrel on the edge of a residential area in Boise City, Cimarron County, Oklahoma. Dalquest et al. (1990) noted use of riparian habitats in the northern Texas panhandle, but those authors failed to detect these squirrels along the Beaver and Cimarron rivers in the Oklahoma panhandle. Our observation represents the westernmost record in Oklahoma (Caire et al. 1989). The Two Buttes Wildlife Management Area, located about 100 km north (Geluso 2004) in Baca County, Colorado, is the closest published record. This observation likely represents an example of expansion via human introduction, as there are no riparian woodland corridors near Boise City.

Observational records (3).—KANSAS: Morton Co., 12.0 km N Elkhart, 37.12125°N, 101.89715°W; City of Elkhart, 37.00585°N, 101.89954°W (9 May 2007). OKLAHOMA: Cimarron Co., Boise City, 36.73058°N, 102.49631°W.

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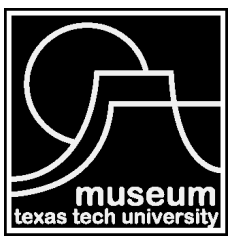

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