

OCCASIONAL PAPERS

THE MUSEUM

TEXAS TECH UNIVERSITY

NUMBER 151

12 AUGUST 1992

MAMMALS OF SOUTHWESTERN OKLAHOMA

FREDERICK B. STANGL, JR., WALTER W. DALQUEST,
AND ROBERT J. BAKER

The mammals of southwestern Oklahoma have received limited and sporadic attention from collectors. The few surveys currently available are now somewhat dated. Martin and Preston (1970) provided a comprehensive assessment of the mammals of Harmon County. Mammals of the Wichita Mountains of Comanche County were treated in a series of publications by Glass and associates (bats—Glass and Ward, 1959; small mammals—Glass and Halloran, 1961; carnivores and ungulates, Halloran and Glass, 1959). More recent studies have mostly dealt with specific taxa, and these are cited in the following species accounts.

Caire *et al.* (1990) compiled the first comprehensive listing of the mammals of Oklahoma since Blair's (1939) preliminary assessment of mammalian diversity in the state. Specimens of Oklahoma mammals from major collections around the country were listed in their book, thereby providing a valuable point of departure for later survey work, such as the present study. However, a series of specific studies and general collecting in southwestern Oklahoma by parties from Midwestern State University and Texas Tech University have amassed more than a thousand specimens since the original canvassing of collections by Caire *et al.* (1990). Included among these specimens are 46 county records of occurrence and some significant extensions of known geographic ranges. The addition of these records to the literature refines our knowledge of the distribution of these species in south-

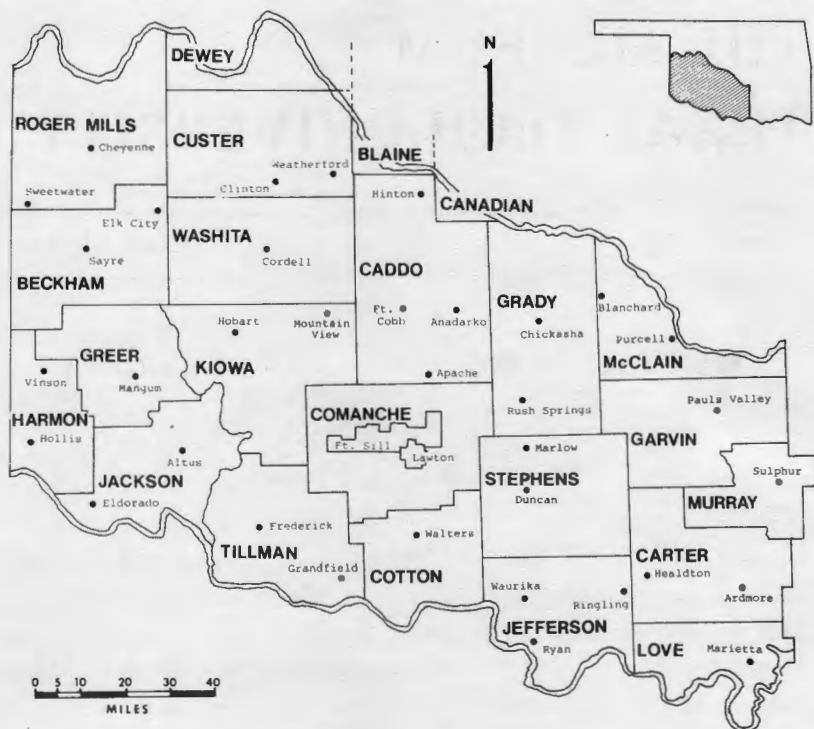


FIG. 1.—Political boundaries and major landmarks of southwestern Oklahoma commonly referenced in text.

western Oklahoma, and highlights areas currently warranting detailed comprehensive surveys.

We have arbitrarily defined southwestern Oklahoma as the 20 southwestern contiguous counties, and parts of three others, bordered on the north by the Canadian River, on the south by the Red River, and to the west by the Texas Panhandle (Fig. 1). Elevations from east to west gradually range from about 600 feet to slightly higher than 2000 feet. Some peaks in the Wichita Mountains approach 2500 feet in elevation. The climate also changes from east to west, becoming progressively less equable, warmer, and dryer.

There are several recognized native vegetative zones in the area (Fig. 2). However, largely in response to environmental gradients, most of southwestern Oklahoma is actually a broad, ecotonal mosaic between arid western grasslands and the relatively mesic deciduous woodlands, which barely enter our study area from the east. Blair and Hubbell (1938) first recognized 11 unique ecological associations of the state,

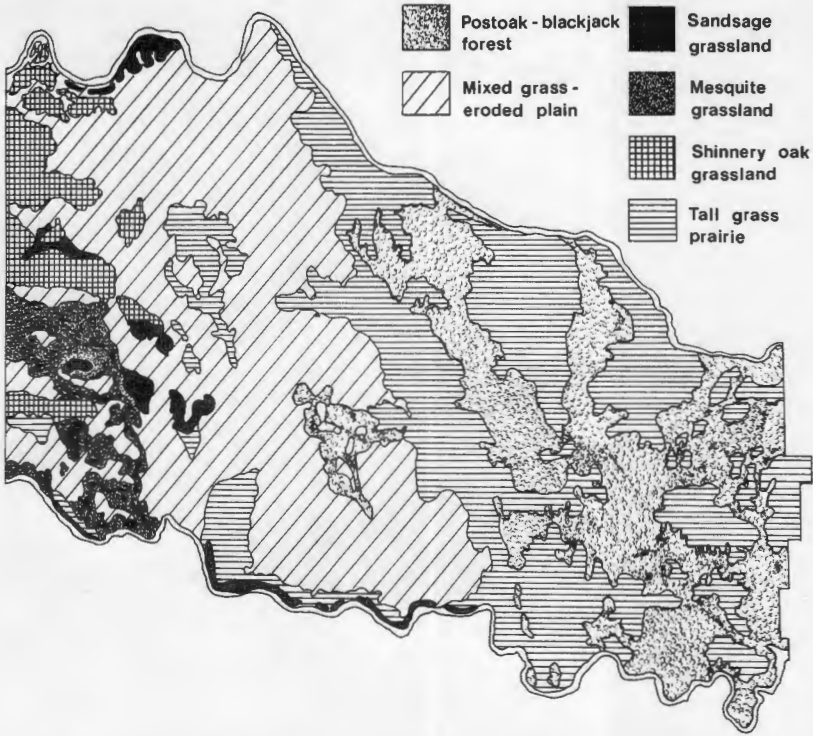


FIG. 2.—Native vegetative zones of southwestern Oklahoma, adapted from Duck and Fletcher (1943).

based on major vegetative subdivisions and the characteristic animals residing in each. Five of these are represented in southwestern Oklahoma (Fig. 3).

The diversity of the regional mammalian fauna is due mostly to the presence of both eastern (eastern deciduous woodlands) and western (Great Plains grasslands) components, many of which reach the extremities of their ranges in southwestern Oklahoma. However, the ranges of some northern plains and subtropical elements also enter the region from the north and south, respectively.

METHODS

Small mammals were collected using snap traps and live traps, and specialized traps intended for gophers and moles. Most bats were collected by hand from their day roosts. Many larger animals were salvaged from those killed along roads or were obtained from hunters and trappers; others were shot. Most smaller specimens were prepared as museum

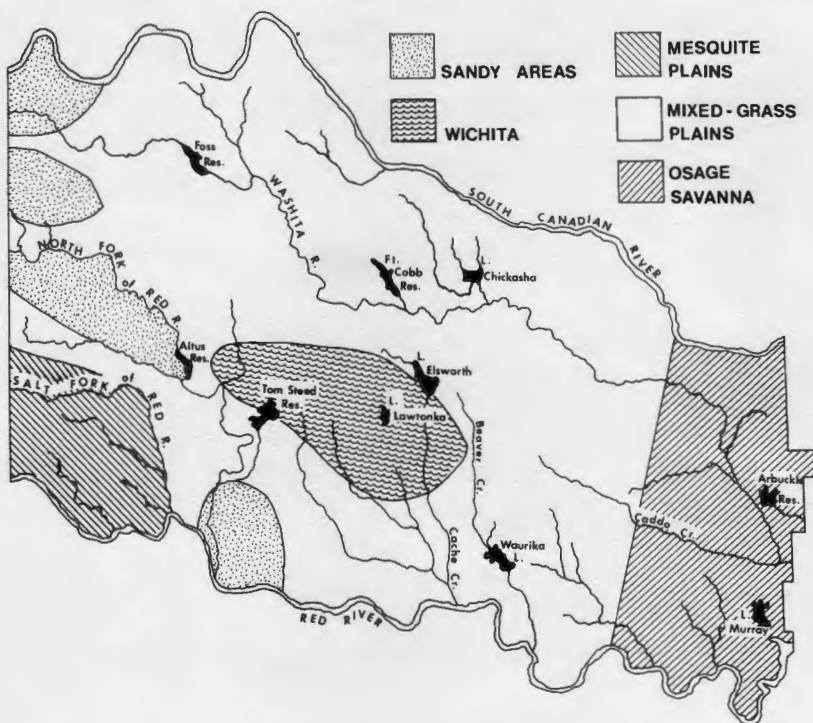


FIG. 3.—Biotic districts of southwestern Oklahoma, adapted from Blair and Hubbell (1938).

study skins accompanied by skulls or skeletons. Larger specimens were most often represented by skulls alone or by skeletons. Material deposited in The Museum of Texas Tech University is indicated by the acronym TTU; all other specimens are in the Collection of Recent Mammals at Midwestern State University.

The presence of most species in the following accounts is documented by specimens listed herein or by Caire *et al.* (1990). A few, although undocumented, are treated if judged likely to have occurred in the area during modern times. We have chosen to exclude the introduced mice and rats (*Mus* and *Rattus*), which occur uniformly throughout the region, and the feral hog (*Sus scrofa*), which is rapidly becoming a widespread pest here and in adjacent parts of Texas. Measurements are given in millimeters. Subspecific treatments follow Hall (1981), except where indicated. With few exceptions, Jones *et al.* (1992) served as the authority for use of common names.

Most of the examined specimens listed below have not been previously reported in the literature; asterisks indicate those counties from which a species is reported herein for the first time. Unless otherwise indicated, previously documented county records are from Caire *et al.* (1990).

SPECIES ACCOUNTS

Didelphis virginiana virginiana Kerr, 1792

Virginia Opossum

The opossum occurs throughout southwestern Oklahoma, although less commonly in the northwestern counties. Vehicular traffic takes a particularly heavy toll on this species, and its remains are common along often-traveled roadways.

Specimens examined (4).—COMANCHE CO.: Cache Creek and Hwy. 277, 1. *GREER CO.: 2 mi. E Mangum, 1. *JEFFERSON CO.: 6 mi. N, 4 mi. W Waurika, 1. TILLMAN CO.: 4 mi. N Tipton, 1.

County records.—Caddo, Carter, Comanche, Cotton, Custer, Garvin, Grady, *Greer, Jackson, *Jefferson, McClain, Murray, Stephens, Tillman, Washita.

Blarina hylophaga hylophaga Elliot, 1899

Elliot's Short-tailed Shrew

The short-tailed shrew seems an uncommon resident of wooded or heavily vegetated regions of the study area. However, our specimens (and probably most others) were incidentally taken; specific attempts directed towards collecting the species with pitfall traps probably will prove it to be more common and widespread than is presently thought. We found *Blarina hylophaga* most often associated with either the prairie vole (*Microtus ochrogaster*) or woodland vole (*M. pinetorum*).

This shrew is the smallest member of the genus *Blarina* and as such sometimes may be confused with the smaller least shrew, *Cryptotis parva*. We follow George *et al.* (1981) in our taxonomic assignment. The type locality of this taxon is Dougherty, Murray County.

Specimens examined (6).—COMANCHE CO.: Wichita Wildlife Refuge, near Crater Lake, 2; 3 mi. W, 2.4 mi. S Cache, 1; 8.6 km. E, 3.3 km. S Fort Sill, 1; 10.2 km. E, 3.7 km. S Fort Sill, 1. *GRADY CO.: 7.7 mi. E Chickasha County Courthouse, 1 (TTU).

County records.—Carter, Comanche, Garvin, *Grady, Kiowa, Murray.

Cryptotis parva parva (Say, 1823)

Least Shrew

The least shrew is an inhabitant of southwestern Oklahoma where dense grassland vegetation exists, especially in the eastern sections, and where *Blarina* does not occur. Common associates include the cotton rat (*Sigmodon hispidus*), which shares its runways with shrews and harvest mice (*Reithrodontomys fulvescens* and *R. montanus*).

This is usually the most widespread and abundant of our local shrews, but, like others, seldom is taken by standard collecting methods. Our Jefferson County specimen was recovered from the custody of a house cat. The examination of regurgitated owl pellets or the use of pitfall traps often show these shrews to be abundant in areas where usual collecting methods have failed to produce specimens.

So rapid is the early growth of the least shrew, that juveniles are seldom taken. All of our specimens appear to be adults.

Specimens examined (12).—COMANCHE CO.: Cache, 1; 10.7 km. E Fort Sill, 1; 1 mi. S Meers, 1. *COTTON CO.: 0.5 mi. E Red River Bridge (Hwy. 277), 1. *GREER CO.: 2.5 mi. W Quartz Mountain State Park, 1; 1 mi. S, 2 mi. W Granite, 1 (TTU). JEFFERSON CO.: 1 mi. W Ringling, 1. KIOWA CO.: 19 mi. S, 2 mi. E Mountain View, 1; 0.8 mi. W, 1.5 mi. S Mountain View, 1 (TTU). *STEPHENS CO.: Duncan, 2. *TILLMAN CO.: 0.5 mi. N Grandfield, 1.

County records.—Canadian, Comanche, *Cotton, Custer, Garvin, Grady, *Greer, Jefferson, Kiowa, *Stephens, *Tillman.

Notiosorex crawfordi crawfordi (Coues, 1977)

Desert Shrew

The desert shrew is about the size of *Cryptotis*, but the conspicuous ears readily distinguish it from the least shrew. This tiny mammal is presently known from the more arid southwestern part of our area of study, where most specimens were collected by hand from among the excavated dens of the southern plains woodrat, *Neotoma micropus* (Baker and Spencer, 1965; Martin and Preston, 1970). However, this species is not restricted to arid habitats, and we have even taken it from mesic canyons in pinyon pine woodlands of northeastern New Mexico. It may well occur over much of southwestern Oklahoma.

County records.—Comanche, Greer, Harmon, Jackson.

Scalopus aquaticus aereus (Bangs, 1896)

Eastern Mole

The conspicuously elevated soil above the runways of the eastern mole is commonly observed along sandy terraces and soil drifts of fencelines throughout southwestern Oklahoma. In many areas, burrow systems are so extensive that there is little chance of capturing a mole by use of a single trap.

This species seldom leaves its underground shelter. However, one specimen was captured by hand as it foraged in surface leaf litter in broad daylight. In northern Texas, we have found occasional specimens dead on the surface—the undamaged bodies bearing no evidence as to cause of death. The most recent revision of the eastern mole from Oklahoma and adjacent states is that of Yates and Schmidly (1977).

Specimens examined (9).—COMANCHE CO.: 3.5 mi. S Cache, 1 (TTU). *COTTON CO.: 2 mi. NW Burkburnett, Texas, 1; 2 mi. NE Burkburnett, Texas, 2; 3 mi. NE Burkburnett, Texas, 1; 0.1 mi. E Red River Bridge (Hwy. 277), 2; 3 mi. E Burkburnett, Texas, 1. *JEFFERSON CO.: 8 mi. N Byers, Texas, 1.

County records.—Beckham, Blaine, Caddo, Canadian, Carter, Comanche, *Cotton, Custer, Dewey, Grady, Greer, Harmon, Jackson, *Jefferson, Love, McClain, Stephens.

Myotis ciliolabrum ciliolabrum (Merriam, 1886)

Western Small-footed Myotis

Myotis ciliolabrum is an uncommon little bat in southwestern Oklahoma, where its occurrence seems restricted by the availability of caves for roosting sites. Glass and Ward (1959) remarked on the lack of winter-taken specimens, but speculated that the species probably hibernated in Oklahoma. No specimens of the western small-footed myotis have been taken in southwestern Oklahoma since recorded in the mid-1950s by Glass and Ward (1959), and the status of the species there must be considered questionable.

The taxonomy of this species has experienced varied treatment. Glass and Ward (1959) referred Oklahoma specimens to *M. subulatus*, but Glass and Baker (1965) assigned them to *M. leibii*. However, most authorities presently follow van Zyll de Jong (1984) in regarding western population of the *leibii* group as *M. ciliolabrum*.

County records.—Comanche, Greer, Kiowa.

***Myotis velifer magnamolaris* Choate and Hall, 1967**

Cave Myotis

The cave myotis is a locally abundant bat where caves afford the preferred roosting sites, although the acceptability of buildings as a substitute permits *Myotis velifer* to exist throughout much of the western half of Oklahoma. Populations of this species hibernate locally, and some colonies of the cave myotis in northern Texas contain bats the year around.

Glass and Ward (1959) reported that females in Oklahoma give birth to young in late June, and that volant young have been observed in mid-July. We follow Dalquest and Stangl (1984) in assigning Oklahoma representatives of the cave myotis to *Myotis velifer magnamolaris*.

Specimen examined (1).—GREER CO.: 18 mi. NW Mangum, I.

County records—Blaine, Canadian, Comanche, Custer, Dewey, Greer, Harmon, Kiowa, Roger Mills, Washita.

***Lasiurus borealis* (Müller, 1776)**

Red Bat

This is a tree bat that prefers woodland foraging grounds. It is commonly observed feeding on insects attracted to street lights in urban areas. The sexes segregate seasonally (as in adjacent areas of northern Texas—Dalquest and Horner, 1984; Jones *et al.*, 1987), and only females reside in Oklahoma in the warm months. They arrive in early spring to give birth and rear their annual litter of up to four young. Consequently, any males from southwestern Oklahoma are likely to be young animals or migrants. By late summer, most females and young, now of adult size, have migrated southward.

Lasiurus borealis is a common bat throughout much of the eastern part of the study area. Farther west, it probably is closely restricted to wooded riparian habitat. We follow Baker *et al.* (1988) in considering the red bat as a monotypic species.

County records.—Blaine, Comanche, Custer, Dewey, Greer, Harmon, Kiowa, Murray.

***Lasiurus cinereus cinereus* (Palisot de Beauvois, 1796)**

Hoary Bat

Similar to the smaller red bat, *Lasiurus cinereus* is a migratory, tree-roosting species. Little can be deduced of its life history in the state

from the few Oklahoma records. Certainly, as a powerful, wide-ranging flyer, it can be expected throughout southwestern Oklahoma, at least as a warm-weather transient. Tyler and Scott (1982) observed that Oklahoma records for males are from the western half of the state, whereas females comprised most of the records from the south and east. The single record from our study area is of a female from the Wichita Mountains.

County record.—Comanche.

***Lasiurus seminolus* (Rhoads, 1895)**

Seminole Bat

The Seminole bat is a woodland species of the southeastern United States. It closely resembles *Lasiurus borealis* in appearance and habits. Only two records (presumably extralimital of the typical range) exist for Oklahoma—one from the extreme southeasternmost part of the state and the other from the Arbuckle Mountains of Murray County.

County record.—Murray.

***Lasionycteris noctivigans* (Le Conte, 1831)**

Silver-haired Bat

Like *Lasiurus cinereus*, the silver-haired bat is a noted migrant, which could be expected as a transient at any place in Oklahoma. However, records from the state are few. Discoveries of apparently hibernating *Lasionycteris* in November from nearby Payne County, and in December from Comanche County (Tyler and Payne, 1982), suggest that the species may overwinter in the southern part of the state.

County records.—Comanche, McClain.

***Nycticeius humeralis humeralis* (Rafinesque, 1818)**

Evening Bat

The evening bat is a common and widespread bat of the woodlands of eastern Oklahoma. Westward in our study area, it becomes progressively more scarce, and probably is restricted to riparian habitat.

County records.—Comanche, Jackson, Murray.

***Pipistrellus hesperus maximus* Hatfield, 1936**

Western Pipistrelle

The western pipistrelle is an aridland species that is distributed from the desert Southwest along a narrow band across the southern Texas Panhandle and into southwestern Oklahoma. This small bat is probably resident in other counties adjacent to those in which it has been taken, and is to be expected where rocky terrain affords the preferred cracks and crevices in which it roosts. This species emerges at early dusk, and has a slow, fluttering flight.

County records.—Comanche, Greer, Kiowa.

***Pipistrellus subflavus subflavus* (F. Cuvier, 1832)**

Eastern Pipistrelle

Only in southwestern Oklahoma and adjacent Texas does the eastern pipistrelle occur sympatrically with its western relative. In size and flight, the two species are comparable, but *Pipistrellus subflavus* is richer in color, and it is locally more apt to roost and hibernate in caves.

County records.—Comanche, Custer, Greer, Harmon, Kiowa, Murray, Washita.

***Eptesicus fuscus fuscus* (Palisot de Beauvois, 1796)**

Big Brown Bat

The big brown bat generally is perceived to range more or less continuously across the United States (Hall, 1981), but a recent study by Manning *et al.* (1989) clearly indicated the extremely localized distribution in Texas; Oklahoma records (Caire *et al.*, 1990) demonstrate a comparable spotty distribution.

Two morphologically similar subspecies of *Eptesicus fuscus* occur near Oklahoma—*E. f. fuscus*, a taxon characterized by birth of twins, and the western *E. f. pallidus* Young, 1908, which typically gives birth to a single young (Manning *et al.*, 1989). The former is the race thought to occur in southwestern Oklahoma (Jones and Manning, 1990).

The big brown bat is commonly found in caves, but it also roosts in buildings. The apparent absence of *E. fuscus* from the gypsum caves of Greer, Harmon, and Kiowa counties is surprising, considering the attention these sites have been given by bat collectors in the past.

County record.—Garvin.

Plecotus townsendii pallescens (Miller, 1897)

Townsend's Big-eared Bat

Most of the known records of this big-eared bat come from in and around the gypsum caves of western Oklahoma, but the species also is known from the granite hills of the region, where caves and crevices afford preferred roosting and hibernation sites. These colonial bats seem to have little difficulty avoiding mist nets, and are most often taken by hand from their roosts.

Adjacent northern Texas populations have declined during the past 20 years (Dalquest and Horner, 1984), whereas the numbers of other local cave-dwelling bats (*Myotis velifer*, *Pipistrellus subflavus*) have remained stable. Human disturbance of colonies is a major threat to this species, which now is protected by Oklahoma law (Caire *et al.*, 1990); perhaps a particular susceptibility to pesticides acquired by eating insect prey also plays a role. The effect of insecticides, as well as formal protection of cave roosts, deserve further investigation.

Specimens examined (4).—COMANCHE Co.: Wichita Mountains Wildlife Refuge, 3. GREER Co.: 18 mi. NW Mangum, 1.

County records.—Comanche, Custer, Greer, Harmon, Kiowa, Washita.

Antrozous pallidus bunkerii Hibbard, 1934

Pallid Bat

Antrozous pallidus is another colonial western bat that reaches the eastern extent of its range in Oklahoma. This powerful flier is readily taken in mist nets, but its unusual (for local bats) habit of sometimes foraging on the ground for invertebrate prey has resulted in its being collected in snap traps set for mice.

Oklahoma specimens available to Caire *et al.* (1990) were all taken from caves, but it also commonly roosts in man-made structures. Our Harmon County specimens represent those collected from a maternity colony on 11 May from between the support timbers of a bridge over the Red River. At the same time, another colony was located on the Texas side of the bridge (Jones *et al.*, 1987). Of 12 pregnant females, Manning *et al.* (1987) reported one with a single embryo, eight with the typical twins, one with three embryos, and another carrying quadruplets.

No hibernating population has yet been discovered in Oklahoma (Caire *et al.*, 1990), although this bat typically hibernates in the vicinity of its summer grounds. The status of Oklahoma and Texas *Antrozous*

recently was reviewed and specimens were assigned to *A. p. bunkerii* by Manning *et al.* (1988).

Specimens examined (14).—HARMON Co.: 7.2 mi. S, 1 mi. W Hollis, 14 (TTU).
County records.—Comanche, Greer, Harmon (Manning *et al.*, 1988).

***Tadarida brasiliensis mexicana* (Saussure, 1860)**

Brazilian Free-tailed Bat

The free-tailed bat is a seasonal migrant that can be expected throughout the study area during summer and autumn months. *Tadarida* is a powerful flier, and often ranges miles from its roost to forage each night. It takes advantage of caves, buildings, and bridges for shelter during the day. Caves are preferred as maternity roosts, but to date none of the local caves is known to host such gatherings (Glass, 1982).

Specimens examined (104).—COMANCHE Co.: The Narrows, Wichita Mountains Wildlife Refuge, 2. GREER Co.: 15 mi. W Mangum, 12; 2 mi. W Reed, 67. HARMON Co.: 7.2 mi. S, 1 mi. W Hollis, 23 (TTU).

County records.—Comanche, Custer, Greer, Harmon, Jackson, McClain, Murray.

***Dasyypus novemcinctus mexicanus* Peters, 1864**

Nine-banded Armadillo

The past century has seen a dramatic spread northward of the armadillo (see, for example, Schultz, 1972; McBee and Baker, 1982). Caire *et al.* (1990) summarized its history in Oklahoma. Our specimens from Greer, Jackson, and Roger Mills counties represent westernmost records from the state, and indicate that the northward migration in Oklahoma is keeping pace with similar documented advancements in the adjacent Texas Panhandle (Jones *et al.*, 1988). Because *Dasyypus* is adversely affected by cold weather, it will be of interest to continue monitoring the progress of its range expansion.

Specimens examined (5).—*GREER Co.: 7.5 mi. W Quartz Mountain State Park, 1. *JACKSON Co.: 8 mi. E Altus, 1. *JEFFERSON Co.: 2 mi. W, 1 mi. S Ringling, 1 (TTU). *ROGER MILLS Co.: 1 mi. S Cheyenne, 1. STEPHENS Co.: Lake Waurika, 8 mi. N, 5 mi. W Waurika, 1.

County records.—Caddo, Carter, Comanche, Cotton, *Greer, *Jackson, *Jefferson, *Roger Mills, Stephens.

***Sylvilagus aquaticus aquaticus* (Bachman, 1837)**

Swamp Rabbit

The swamp rabbit occupies most of the eastern half of Oklahoma, where swampy, wooded habitat exists. The westernmost record is from the Wichita Mountains of Comanche County, where sightings are not uncommon. Possibly, this rabbit reached these mountains by riparian corridors during relatively recent times, for Glass and Halloran (1961, and cited earlier studies) made no mention of it.

County records.—Comanche, Love.

***Sylvilagus audubonii neomexicanus* Nelson, 1907**

Desert Cottontail

The desert cottontail prefers more open, undisturbed, and often rugged habitat than either of the other two species of *Sylvilagus* in the study area. Martin and Preston (1970) took the two specimens from Harmon County in a prairie dog town, and the Caddo County specimen was killed along a roadway through rugged, juniper-cloaked hills—a habitat preference noted earlier by Blair (1954).

Specimens examined (3).—*Caddo Co.: 13.5 mi. W Apache, 1. HARMON Co.: 2.25 mi. W, 0.75 mi. N Hollis, 2 (TTU).

County records.—*Caddo, Comanche, Harmon, Jackson.

***Sylvilagus floridanus* (J. A. Allen, 1890)**

Eastern Cottontail

The eastern cottontail is the most common and widespread *Sylvilagus* in southwestern Oklahoma. In the Wichita Mountains of Comanche County, the three cottontails known from the region occur together. Where the range of *S. floridanus* overlaps that of the swamp rabbit, the latter occurs in the swampy lowlands. Where the desert cottontail occurs, the eastern cottontail is relegated to disturbed or riparian habitat.

Two subspecies of *S. floridanus* potentially occur in southwestern Oklahoma. The subspecific boundaries as mapped by Hall (1981) indicate western, *S. f. llanensis* Blair, 1938, and eastern, *S. f. alacer* (Bangs, 1896), populations, which presumably intergrade in the central region of our study area—the eastern Wichita Mountains (Blair, 1939, 1954; Glass and Halloran, 1961). We are unable to separate any of our nine Oklahoma specimens from a large and morphologically quite variable

series of eastern cottontails (presumably good *S. f. alacer*) from adjacent Wichita County in northern Texas. Perhaps the zone of intergradation between the two nominal taxa is much broader than previously supposed. However, pending a more detailed study of the situation, we are reluctant to assign specimens arbitrarily to subspecies.

Specimens examined (9).—COTTON Co.: 6 mi. SSW Temple, 1; 11 mi. NE Burkburnett, Texas, 1; 4 km. N Randlett, 1; Red River Bridge (Hwy. 277), 2; 6 mi. E Randlett, 1. HARMON Co.: 8 mi. N, 1.5 mi. W Hollis, 1 (TTU). JEFFERSON Co.: Waurika, 1; 6 mi. W Ringling, 1 (TTU). TILLMAN Co.: 6 mi. SW Grandfield, 1.

County records.—Blaine, Caddo, Canadian, Comanche, Cotton, Custer, Dewey, Garvin, Grady, Harmon, Jackson, Jefferson, Kiowa, Love, McClain, Stephens, Tillman.

Lepus californicus melanotis Mearns, 1890

Black-tailed Jackrabbit

The jackrabbit is a conspicuous member of the local fauna throughout southwestern Oklahoma, although it is less common and of only local occurrence in eastern counties.

Specimens examined (2).—COTTON Co.: 4 km. N Randlett, 1. HARMON Co.: 12.5 mi. N, 3.8 mi. W Hollis, 1 (TTU).

County records.—Blaine, Caddo, Canadian, Carter, Comanche, Cotton, Custer, Dewey, Garvin, Harmon, Jackson, Jefferson, McClain, Stephens, Tillman.

Spermophilus pilosoma marginatus Bailey, 1890

Spotted Ground Squirrel

The spotted ground squirrel is mostly restricted to the sandy soils of river terraces, where it is commonly found in association with *Dipodomys ordii*. Although diurnal, this is a secretive species. Each of our three specimens were trapped when the anticipated catch was *Dipodomys*.

Three specimens were taken in 1939 from a meadow and prairie dog town in the Wichita Mountains (Glass and Halloran, 1961), but none has been collected there since. Our Cotton County specimens, which are from along the Red River represent easternmost records for Oklahoma. The deep sandy terraces there are dominated by sage and bluestem, which do not extend much farther to the east. Probably this ground squirrel is similarly limited.

Specimens examined (3).—*COTTON Co.: 4 mi. N Burkburnett, Texas, 1; 2.5 mi. NE Burkburnett, Texas, 1; 6 mi. SE Randlett, 1.

County records.—Caddo, Comanche, *Cotton, Harmon, Jackson, Tillman.

***Spermophilus tridecemlineatus texensis* Merriam 1898**

Thirteen-lined Ground Squirrel

The thirteen-lined ground squirrel is a resident of short-grass prairies, where it often is seen posed conspicuously in an upright position to survey its surroundings. The species is today most common in such situations as parks, cemeteries, and golf courses. Roadsides, which serve as avenues for dispersal, support lesser numbers of individuals.

All specimens of the study area probably are assignable to *Spermophilus tridecemlineatus texensis*, a relatively dark subspecies. However, the range of the distinctly paler *S. t. arenicola* (Howell, 1928) approaches the extreme northwestern corner of the region. We observed, but did not collect, ground squirrels of this species in Roger Mills County, which might have been examples of either subspecific taxon.

Specimens examined (2).—JACKSON CO.: 3.2 mi. N Altus, 1; Altus AFB, 1.

County records.—Beckham, Caddo, Canadian, Comanche, Cotton, Custer, Dewey, Garvin, Greer, Harmon, Jackson, Jefferson, Kiowa, Tillman.

***Cynomys ludovicianus ludovicianus* (Ord, 1815)**

Black-tailed Prairie Dog

The prairie dog is restricted today to isolated towns throughout the western half of Oklahoma. Caire *et al.* (1990) discussed the persecution and subsequent decline of the species in Oklahoma, a decline that ultimately led to a moratorium on control methods by state wildlife officials in 1972.

Specimens examined (4).—COMANCHE CO.: 1 mi. S, 0.8 mi. E Elgin, 1; 0.5 mi. S Elgin, 1. COTTON CO.: 6 mi. W Walters, 1. KIOWA CO.: 8 mi. NW Roosevelt, 1.

County records.—Blaine, Canadian, Comanche, Cotton, Custer, Dewey, Garvin, Grady, Greer, Harmon, Jackson, Jefferson, Kiowa, McClain, Roger Mills, Stephens, Washita.

***Sciurus carolinensis carolinensis* Gmelin, 1788**

Gray Squirrel

The gray squirrel barely extends into our study area from the east. Farther east in Oklahoma, it becomes increasingly more important as a game animal, where it is sometimes referred to as the "cat squirrel."

Sciurus carolinensis prefers dense, mature hardwood forests, and may be restricted to forested bottomlands where its range overlaps with that of the larger and more versatile fox squirrel, *S. niger*.

This species has been stocked in city parks beyond its natural range, and is, for example, established within the city limits of Lubbock, Texas, on the High Plains. It would not be surprising if such introductions occurred in western Oklahoma at some point in the future.

County records.—Garvin, Murray.

***Sciurus niger rufiventer* É. Geoffroy St.-Hilaire, 1803**

Fox Squirrel

The fox squirrel occurs in wooded situations across southwestern Oklahoma, and is commonly found in towns and cities. Its ability to survive in riparian woodlands has permitted it to extend its range far into the western grasslands. Even small, wooded stream banks can sustain populations of *Sciurus niger*.

Specimens examined (3).—COMANCHE CO.: Wichita Mountains Wildlife Refuge, 1; Lawton, 1. COTTON CO.: 5 mi. NW Thornberry, Texas, 1.

County records.—Beckham, Blaine, Caddo, Carter, Comanche, Cotton, Custer, Dewey, Grady, Harmon, Jackson, Kiowa, Murray, Stephens, Tillman.

***Glaucomys volans saturatus* Howell, 1915**

Southern Flying Squirrel

Mature hardwood forests, especially those in the vicinity of permanent water, provide the necessary requirements for flying squirrels. Riparian woodlands apparently offer a western dispersal route for *Glaucomys*, perhaps accounting for its recorded (marginal) occurrence in the Wichita Mountains (Caire *et al.*, 1990). We have received reports of occurrence of flying squirrels along the oak woodlands of East Cache Creek in Cotton County, where the attempts of hunters to flush a fox squirrel from the hollow of a dead tree instead roused a flying squirrel. The species no doubt ranges south from the Wichita Mountains, along the oak woodlands of this waterway.

Special efforts involving setting traps in trees are required to collect most specimens of the flying squirrel; we have seldom taken it from traps set on the ground. Depending on available habitat, specific collecting will no doubt produce records more westerly than those that exist today.

Adjacent specimens of the flying squirrel from Texas were referred by Hall (1981) to *G. v. texensis* Howell, 1915. The wooded banks of the Red River along the eastern half of our study area would seem to minimize the effectiveness of this watercourse as a barrier to gene flow, but the few available specimens prevent the assessment of any intergradation between Texas and Oklahoma specimens.

Specimens examined (2).—*JEFFERSON Co.: 3.5 mi. W Ringling, 1. *MURRAY Co.: 4 mi. S Dougherty, 1.

County records.—Comanche, Garvin, *Jefferson, *Murray.

Geomys bursarius

Plains Pocket Gopher

This pocket gopher occurs throughout southwestern Oklahoma where suitable soil conditions prevail, but is particularly abundant along sandy stream terraces. The *Geomys bursarius* species complex has been extensively investigated in recent years (Baker *et al.*, 1989; Block and Zimmerman, 1991; Bohlin and Zimmerman, 1982; Burns *et al.*, 1985). A distinct subdivision among Oklahoma gophers has been variously interpreted as representing differentiation of specific (Heaney and Timm, 1983) or subspecific (Honeycutt and Schmidly, 1979) magnitude. The taxonomic implications of the generic subdivisions of more northerly populations were discussed by Sudman *et al.* (1987). The issue is yet to be resolved, and we tentatively retain the more conservative subspecific treatments below.

Geomys bursarius major Davis, 1940

Specimens examined (24).—CADDO Co.: 6 mi. E Binger, 1; Apache, 1. COTTON Co.: 3 mi. E Devol, 1; 6 mi. SSW Walters, 1; 1 mi. N Burkburnett, Texas, 1; 2 mi. N Burkburnett, Texas, 1 (TTU); 4 mi. WSW Randlett, 1; 6.7 mi. SW Randlett, 1. GREER Co.: 1.8 mi. E, 2.3 mi. N Granite, 1; 1.3 mi. E, 1.3 mi. N Granite, 1; 8.5 mi. W Quartz Mountains State Park, 2. HARMON Co.: 10 mi. N, 1 mi. W Hollis, 1 (TTU); 0.5 mi. N Gould, 4 (TTU). JEFFERSON Co.: Red River Bridge (Hwy. 79), near Waurika, 1. STEPHENS Co.: 3 mi. SE Duncan, 1; Lake Waurika, 8 mi. N, 5 mi. W Waurika, 2; Velma. TILLMAN Co.: 6.5 mi. WSW Grandfield, 1; 3 mi. W, 4.9 mi. S Grandfield, 1.

County records.—Beckham, Caddo, Canadian, Comanche, Cotton, Custer, Dewey, Greer, Harmon, Jackson, Jefferson, Kiowa, Roger Mills, Stephens, Tillman, Washita.

Geomys bursarius sagittalis (Merriam, 1895)

Specimen examined (1).—LOVE Co.: 2 mi. E Greenville, 1.

County records.—Carter, Garvin, Grady, Love, McClain, Murray.

***Perognathus flavescens copei* Rhoads, 1894**

Plains Pocket Mouse

Little is known of the plains pocket mouse in Oklahoma (Caire *et al.*, 1989). It is an uncommon animal in the state, with a preference for sandy sagebrush habitat. Blair (1954) found the species locally abundant in the adjacent Texas Panhandle, but we have been unable to take it in seemingly favorable habitat in the present study area.

Specimen examined (1).—ROGER MILLS Co.: Spring Lake Recreation Area, 1 (TTU).

County records.—Blaine, Dewey, Harmon (Martin and Preston, 1970), Roger Mills.

***Perognathus flavus bunkeri* Cockrum, 1951**

Silky Pocket Mouse

The silky pocket mouse exhibits considerable habitat diversity across its range. Blair (1954) found it to be rare in the mesquite plains of northern Texas and extreme southwestern Oklahoma, whereas Martin and Preston (1970) reported it as locally abundant in Harmon County. Our specimen from Cotton County, where the species appears to be quite scarce, is the easternmost record for the state. Curiously, to the south of the Red River, in the mesquite grasslands of northern Texas, *Perognathus flavus* is common (Blair, 1954, Dalquest and Horner, 1984).

Caire *et al.* (1990) noted that four subspecies are mapped (Hall, 1981) as occurring in or adjacent to southwestern Oklahoma. Our study area falls within the range of *P. f. bunkeri*, but inadequate material does not allow an independent assessment of this subspecific assignment.

Specimens examined (2).—*COTTON Co.: 0.5 mi. E Red River Bridge (Hwy. 277), 1. HARMON Co.: 6 mi. S, 2.5 mi. W Hollis, 1 (TTU).

County records.—*Cotton, Custer, Greer, Harmon, Jackson, Roger Mills.

***Chaetodipus hispidus spilotus* Merriam, 1889**

Hispid Pocket Mouse

The hispid pocket mouse is widespread and at times locally abundant in southwestern Oklahoma. Particularly favored situations seem to be well-drained, friable soils of grasslands, with at least some exposed earth, and even grassy parks of the eastern counties provide suitable habitat. Its characteristic and predictably located burrows make this

one of the few small mammals that can be selectively taken with a single trap. A female captured on 20 October carried a single tiny embryo.

Specimens examined (48).—CADDO Co.: 4 mi. E, 2 mi. N Apache, 2; 3.8 mi. E, 1 mi. N Apache, 5. COMANCHE Co.: 1 mi. E Meers, 1; north Fort Sill, 1; 8.6 km. E, 3.3 km. S Fort Sill, 4; 3.6 mi. S Cache, 1 (TTU). COTTON Co.: 7 mi. SW Randlett, 2; 0.1 mi. E Red River Bridge (Hwy. 277), 1. GRADY Co.: 7.7 mi. E Chickasha County Courthouse, 2 (TTU). *GREER Co.: 10 mi. SE Mangum 1; 8.5 mi. W Quartz Mountains State Park, 4. HARMON Co.: 9 mi. N, 1 mi. W Hollis, 1; 15 mi. N, 1.5 mi. E Hollis, 2 (TTU); 17 mi. N, 2.5 mi. W Hollis, 2 (TTU); 18 mi. N, 9.5 mi. W Hollis, 2 (TTU); 18 mi. N, 9.5 mi. E Hollis, 1 (TTU); 4.5 mi. N Gould, 1 (TTU); 4.5 mi. N, 0.5 mi. W Gould, 1 (TTU). JEFFERSON Co.: 5.3 mi. SW Waurika, 4. ROGER MILLS Co.: Spring Lake Recreation Area, 1 (TTU). *STEPHENS Co.: Lake Waurika, 9.5 mi. N, 5 mi. W Waurika, 1. TILLMAN Co.: 18 mi. W, 1 mi. S Grandfield, 1; 15 mi. W, 4 mi. S Grandfield, 1; 8 mi. W, 1.5 mi. S Grandfield, 1; 6.5 mi. WSW Grandfield, 4; 3 mi. SE Grandfield, 1.

County records.—Beckham, Blaine, Caddo, Canadian, Comanche, Cotton, Custer, Dewey, Garvin, Grady, *Greer, Harmon, Jackson, Jefferson, Kiowa, McClain, Roger Mills, *Stephens, Tillman.

Dipodomys elator Merriam, 1894

Texas Kangaroo Rat

Since the collection of two specimens from Comanche County at the turn of the century (Bailey, 1905), the Texas kangaroo rat was unknown from Oklahoma until Baumgardner's (1987) report of a specimen taken in 1969 from near the Red River bridge in Cotton County. *Dipodomys elator* has been seen in northern Texas traveling along roadways, and the later Oklahoma record may represent an instance of bridge-crossing. We have trapped near the site of that capture on many occasions since 1969, but have failed to produce additional specimens of the Texas kangaroo rat.

Other workers have attempted to discover modern populations in Oklahoma (Martin and Preston, 1970, for example); results of the most recent survey (Moss and Melhop-Cifelli, 1990) led to the conclusion that *D. elator* no longer occurs in the state. However, areas of preferred heavily grazed grassland (Stangl *et al.*, 1992) still exist in southwestern Oklahoma, and continued surveillance for its presence is warranted.

County records.—Comanche, Cotton (Baumgardner, 1987).

Dipodomys ordii richardsoni (J. A. Allen, 1891)

Ord's Kangaroo Rat

Ord's kangaroo rat seems absent from the southeastern counties of our study area, but elsewhere it is common and often locally abundant along well-drained, sandy terraces. A female taken on 21 October carried three small embryos.

Specimens examined (108).—Caddo Co.: 3.5 mi. E, 1.3 mi. N Apache, 1. Cotton Co.: Red River and Hwy. 277, 63; 5 mi. N Byers, Texas, 2; 2 mi. N Burkburnett, Texas, 1 (TTU); 6 mi. ESE Burkburnett, Texas, 1 (TTU). Greer Co.: 8 mi. S, 4 mi. E Granite, 3; 2.5 mi. N, 1.5 mi. E Granite, 1 (TTU). Harmon Co.: 10 mi. SE Hollis, 6; 17 mi. N, 2.5 mi. W Hollis, 4 (TTU); 15 mi. N, 1.5 mi. E Hollis, 2 (TTU); 1.5 mi. W Gould, 1 (TTU). Jackson Co.: 12 mi. S Altus, 1; 13.6 mi. S Altus, 2. *Jefferson Co.: Waurika, 1; 6 mi. SW Waurika, 1. Roger Mills Co.: Black Kettle National Grasslands, 1 (TTU); Spring Lake Recreation Area, 1 (TTU). Tillman Co.: 4.0 mi. N Tipton, 2; 1.6 mi. S, 0.5 mi. W Davidson, 1; 1.6 mi. S Davidson, 2; 7 mi. N Oklaunion, Texas, 1; 6.8 mi. NNW Burkburnett, Texas, 1; 11 mi. WSW Grandfield, 7; 3 mi. SE Grandfield, 1; 4 mi. SE Grandfield, 1.

County records.—Beckham, Blaine, Caddo, Canadian, Cotton, Custer, Dewey, Grady, Greer, Harmon, Jackson, *Jefferson, Kiowa, McClain, Roger Mills, Tillman.

Castor canadensis texensis Bailey, 1905

Beaver

The beaver occurs in southwestern Oklahoma along streams, rivers, and in lakes and stock ponds—just about everywhere that permanent water is found. Where an abundance of trees exist for building materials, as in the eastern counties, its presence along small streams sometimes is marked by dams, less often by lodges. Farther west, often along surprisingly small streams, shelter commonly consists of a burrow into a bank with an underwater entrance. In each instance, however, trees gnawed off near the base provide evidence of their presence. Caire *et al.* (1989) remarked on this scarcity of dams and lodges in western Oklahoma, although on one occasion we observed a dam and small lodge in northwestern Roger Mills County. Three young animals, with their third molars not yet erupted, were obtained from Caddo County on 22 June.

Castor is commonly trapped for its pelt in Oklahoma. Subsequent to the earlier depletion of populations of the beaver by fur trappers, intermingling of survivors with transplants from elsewhere probably has obscured subspecific distinctions (Caire *et al.*, 1990). The grounds for our assignment is on geographic grounds only.

Specimens examined (7).—Caddo Co.: 3.8 mi. E, 1.6 mi. N Apache, 5. ROGER MILLS Co.: Spring Lake Recreation Area, 1 (TTU). STEPHENS Co.: 10 mi. NE Duncan, 1.

County records.—Blaine, Caddo, Canadian, Comanche, Cotton, Grady, Jefferson, Kiowa, McClain, Roger Mills, Stephens.

Oryzomys palustris texensis J. A. Allen 1894

Marsh Rice Rat

The rice rat is an uncommon resident of marshy lowlands in southeastern Oklahoma, and almost nothing is known of its habits in the state. The species might be confused with the black rat (*Rattus rattus*) or a pale cotton rat (*Sigmodon hispidus*). It has only recently (Gettinger, 1991) been reported from among cattails along the margins of Lake Murray, at the eastern periphery of our study area, although no voucher specimens were saved. We follow the recent review of the genus in the United States by Humphrey and Setzer (1989) in our sub-specific assignment.

Reithrodontomys fulvescens laceyi J. A. Allen, 1896

Fulvous Harvest Mouse

Although common and widespread in the eastern half of Oklahoma, *Reithrodontomys fulvescens* has been reported as scarce (single specimen from Wichita Mountains—Glass and Halloran, 1961) or absent (Blair, 1939, 1954; Martin and Preston, 1970) from the western counties. Dalquest and Horner (1984) recorded an expansion of known range in northern Texas during recent years, and the five new county records presented herein, particularly those from Greer and Kiowa counties, are evidence that the species is similarly spreading in Oklahoma. It is likely that the range of the fulvous harvest mouse is now continuous across western Oklahoma into much of the Texas Panhandle, as was mapped by Hall (1981).

Typical associates of the fulvous harvest mouse include such mesic grassland mammals as *Cryptotis parva*, *Microtus ochrogaster*, and *Sigmodon hispidus*. Where grassy parks in woodland situations also support such species as *Blarina hylophaga*, *M. ochrogaster*, *Peromyscus attwateri*, and *P. leucopus*, we also have found this harvest mouse to be abundant. It appears to be scarce on sandy soils and sparsely vegetated areas, where the smaller plains harvest mouse (*R. montanus*) is present.

Lactating females were taken on 9 and 18 November. A female obtained on 27 April carried four embryos measuring 13 in crown-rump length.

Specimens examined (42).—Caddo Co.: 1.5 mi. E, 0.3 mi. N Apache, 1; 2 mi. E Apache, 1; 3.5 mi. E, 1.8 mi. N Apache, 3; 4 mi. E, 1.7 mi. N Apache, 2; 3.7 mi. E, 1 mi. N Apache, 2; 4 mi. E, 2 mi. N Apache, 1; 1 mi. E Apache, 1; 2 mi. S, 1 mi. W Anadarko, 1 (TTU). Comanche Co.: 2 mi. S Meers, 1; 5 mi. SW Boone, 1; 10.7 km. E, 3.7 km. S Fort Sill, 3. *Cotton Co.: north of Burkburnett, Texas, 1; 0.1 mi. E Red River Bridge (Hwy. 277), 2. *Grady Co.: 7.7 mi. E Chickasha, 1. *Greer Co.: 1.3 mi. E, 2.3 mi. N Granite, 2; 2 mi. N, 1.5 mi. E Granite, 4 (TTU). Jefferson Co.: 8 mi. W Waurika, 1; 6 mi. W, 1 mi. N Ringling, 1. *Kiowa Co.: 0.8 mi. W, 1.5 mi. S Mountain View, 7 (TTU). *Love Co.: 2 mi. W Greenville, 1. McClain Co.: 2 mi. E Blanchard, 2 (TTU); 1 mi. W Blanchard, 1 (TTU). Murray Co.: 1 mi. S Dougherty, 1. *Tillman Co.: 1.9 mi. S, 4.2 mi. W Grandfield, 1.

County records.—Caddo, Comanche, *Cotton, Garvin, *Grady, *Greer, Jefferson, *Kiowa, *Love, McClain, Murray.

Reithrodontomys montanus griseus Bailey, 1905

Plains Harvest Mouse

The plains harvest mouse is the least common but most widespread of Oklahoma *Reithrodontomys*, occurring locally in grassy regions around the state. However, preferred habitat is the relatively open, sparsely vegetated arid plains of the west, where it is commonly found with *Peromyscus maniculatus*. Three females taken on 12 October, 9 November, and 5 February carried four, four, and five embryos, respectively, measuring (crown-rump) 10, 10, and 11.

Specimens examined (11).—*Caddo Co.: 4 mi. E, 2 mi. N Apache, 2; 4.9 mi. E, 4.1 mi. N Apache, 1; 3.7 mi. E, 1 mi. N Apache, 1; 5.5 mi. W, 0.8 mi. N Apache, 1. Comanche Co.: Fort Sill, 1. Cotton Co.: 3 mi. NE Burkburnett, Texas, 1; 6 mi. E Burkburnett, Texas, 1. *Greer Co.: 2 mi. N, 1.5 mi. E Granite, 1 (TTU). Harmon Co.: 4.5 mi. N Gould, 1 (TTU). Tillman Co.: 3.5 mi. SW Grandfield, 1.

County records.—*Caddo, Canadian, Comanche, Cotton, Custer, Dewey, *Greer, Harmon, Jackson, McClain, Roger Mills, Tillman.

Peromyscus attwateri J. A. Allen, 1895

Texas Mouse

Broken (and usually rocky), wooded habitat is preferred by the Texas mouse. It is an adept climber, and even traps set in trees for flying squirrels take an occasional specimen of the Texas mouse. Caire *et al.* (1990) claimed that *Peromyscus attwateri* can be taken on every rocky ledge from every mountain in the Wichita Mountains, and our ex-

perience there and elsewhere in suitable habitat suggests this is true. Where conditions are favorable, this mouse is usually extremely abundant. The number of embryos carried by four females taken on 20 October were four, four, five, and six, respectively, measuring 14, 21, 23, and 9 in crown-rump length.

Specimens examined (38).—COMANCHE Co.: Wichita Mountains, 6; 9 mi. NNW Indianola, 13; Cache, 1; 3 mi. N, 0.3 mi. E Medicine Park, 1. *GREER Co.: 10 mi. N Altus, 2; Quartz Mountains State Park, 1. KIOWA Co.: 19 mi. S, 2 mi. E Mountain View, 1; 15.6 mi. W Apache, 13.

County records.—Caddo, Carter, Comanche, Custer, *Greer, Jackson, Kiowa, Murray, Washita.

***Peromyscus leucopus* (Rafinesque, 1818)**

White-footed Mouse

The white-footed mouse is one of the most common of Oklahoma mammals. This species is ubiquitous in the study area. Caire *et al.* (1990) observed that few species of Oklahoma mammals have not been taken in association with *Peromyscus leucopus*.

The species has not been revised since Osgood (1909), whose study indicated the occurrence of *P. l. tornillo* in the extreme northwestern (Roger Mills County) corner of our study area, and of *P. l. texanus* in the south-central region (southern Tillman and Cotton counties). Intergrading populations (those not assignable to a defined subspecies—Osgood, 1909) were indicated as occupying the western half of our area, whereas no specimens were available to Osgood from the remaining eastern counties. Subsequent workers of the region have offered only tentative or qualified (taking into account individual variation and intergrade populations) subspecific assignments (Blair, 1939, 1945; Martin and Preston, 1970). We decline to follow these earlier examples.

A distinct genetic subdivision within the distribution of the species has been documented (Baker *et al.*, 1983), which divides the overall range into approximately equal northeastern and southwestern halves. The zone of intergradation, described on the basis of independent chromosomal (Stangl, 1986) and biochemical (mitochondrial DNA and protein—Nelson *et al.*, 1987) studies, appears to extend across the northern tier of counties in our study area. The subspecific implications of these findings were discussed by Stangl and Baker (1984), who concluded that any valid subspecific boundaries must reflect this major genetic subdivision.

Reproductive activity in southern Oklahoma exhibits peaks in June and November, and is largely suppressed in August and January (Stangl, 1984). Reproductive data collected subsequent to that study are as follows. Five females taken in October had embryo counts (and respective crown-rump measurements) of four (8), four (16), five (4), five (12), and six ("tiny"). Embryo counts (and respective crown-rump measurements) for three November-taken animals were four (18), five (3), and six (16). A female obtained in December carried three embryos measuring 11.

Specimens examined (313).—BLAINE Co.: 1.5 mi. S, 2 mi. E Roman Nose State Park, 2 (TTU). CADDO Co.: 0.5 mi. N Apache, 1; 0.3 mi. N Apache, 5; 1.5 mi. E, 1.3 mi. N Apache, 1; 1 mi. E Apache, 2; 1.2 mi. E, 0.5 mi. S Apache, 1; 1.9 mi. W jct. Hwys. 21 and 9 in Anadarko, 24 (TTU); 2 mi. S, 1 mi. W Anadarko, 4 (TTU); 1.4 mi. N Fort Cobb, 12 (TTU). CARTER Co.: 2 mi. W Springer, 1. COMANCHE Co.: 2 mi. S Meers, 1; 6 mi. W Wichita Mountains Wildlife Refuge, 1; Wichita Mountains Wildlife Refuge, 1; Wichita Mountains, 3; Camp Boulder, 2; 9 mi. NNW Indianola, 3; 10.7 km. E Fort Sill, 1; 7.9 km. E, 3.7 km. S Fort Sill, 2; 8.6 km. E, 3.3 km. S Fort Sill, 1; 11 mi. E Lawton, 1; 9 mi. W, 6 mi. S Lawton, 1; 6.5 mi. S, 2 mi. W Cache, 8 (TTU); 5 mi. SSW Cache, 3 (TTU). COTTON Co.: near jct. Red River and Hwy. 277, 27; 2 mi. N Burkburnett, Texas, 3 (TTU); 3.2 mi. W Temple on East Cache Creek, 2; Cache Creek, 2 mi. E Taylor, 4. GRADY Co.: 7.7 mi. E Chickasha County Courthouse, 13 (TTU). *GREER Co.: 1.8 mi. E, 2.8 mi. N Granite, 1; 8 mi. S, 4 mi. E Granite, 2; 8.5 mi. W Quartz Mountains State Park, 10; Quartz Mountain State Park, 2; 2 mi. N, 1.5 mi. E Granite, 1 (TTU). HARMON Co.: 10 mi. N, 1 mi. W Hollis, 6 (TTU); 7.5 mi. S, 3 mi. E Hollis, 1 (TTU); 12.5 mi. N, 7.5 mi. E Hollis, 1 (TTU); 15 mi. N, 1.5 mi. E Hollis, 1 (TTU). JACKSON Co.: 7 mi. SW Eldorado, 2; 12 mi. S Altus, 1; 10 mi. S Altus, 1 (TTU). JEFFERSON Co.: 6 mi. W Ringling, 4 (TTU); 6 mi. W, 1 mi. N Ringling, 2; 3.5 mi. W Ringling, 2; 3 mi. W Ringling, 2 (TTU); 2.5 mi. W, 0.5 mi. S Ringling, 2; 3 mi. W Ringling, 7; 5.5 mi. N Byers, Texas, 1; Red River Bridge (Hwy. 79), 2. KIOWA Co.: 19 mi. S, 2 mi. E Mountain View, 2; 0.8 mi. W, 1.5 mi. S Mountain View, 1. *LOVE Co.: 2 mi. W Greenville, 1. McCLAIN Co.: 2 mi. E Blanchard, 33 (2 MWSU, 31 TTU); 1 mi. W Blanchard, 54 (TTU); 2 mi. E Raiford, 3 (TTU). MURRAY Co.: 2 mi. S Dougherty, 4. ROGER MILLS Co.: Spring Creek Recreational Area, 11 (TTU). STEPHENS Co.: 8 mi. NE Duncan, 1; Lake Waurika, 8 mi. N, 5 mi. W Waurika, 3. TILLMAN Co.: 2 mi. W Hwy. 183 and Red River, 1; 1.6 mi. S Davidson, 1; 7 mi. N Oklaunion, Texas, 1; 6.5 mi. WSW Grandfield, 2; 6.6 mi. W, 4 mi. S Grandfield, 1; 6 mi. SW Grandfield, 1; 2 mi. S Grandfield, 1; 3 mi. W, 4.9 mi. S Grandfield, 1; 11 mi. WSW Grandfield, 10.

County records.—Blaine, Beckham, Caddo, Canadian, Carter, Comanche, Cotton, Custer, Dewey, Garvin, Grady, *Greer, Harmon, Jackson, Jefferson, Kiowa, *Love, McClain, Murray, Roger Mills, Stephens, Tillman, Washita.

Peromyscus maniculatus (Wagner, 1845)

Deer Mouse

Peromyscus maniculatus is a widespread species. Although usually uncommon, we have found that this mouse can be locally abundant, especially in relatively undisturbed expanses of grasslands where it is the only *Peromyscus* present. Common associates include *Perognathus flavus*, *Reithrodontomys montanus*, *R. fulvescens*, *Microtus ochrogaster*, and *Onychomys leucogaster*.

The systematic relationships among populations of *P. maniculatus* are complex and not fully understood. Caire and Zimmerman (1975) examined chromosomal and morphological variation among the species in Oklahoma, where *P. m. ozarkiarum* (at the eastern edge of our study area) intergrades with *P. m. luteus* (occupying the western three-quarters or more of the region) to the west, but not with adjacent populations of *P. m. pallescens* in Texas. Lacking chromosomal characters of the two Oklahoma subspecies makes definitive subspecific assignments of specimens from near the point of contact tenuous.

Embryo counts and respective measurements (crown-rump) for gravid females are as follows: September, five (8); October, four (24), five (4), five (5), and six (5); November, five (7) and six (15); and December, five (8).

Specimens examined (107).—BLAINE Co.: 5 mi. W Canton, 1 (TTU). CADDO Co.: 4 mi. E, 2 mi. N Apache, 2; 4 mi. E, 1.7 mi. N Apache, 6; 3.5 mi. E, 1.3 mi. N Apache, 12; 0.3 mi. N, 1.5 mi. E Apache, 4; 0.5 mi. N Apache, 1; 1 mi. E Apache, 1; 5 mi. W, 3 mi. S Apache, 3. COMANCHE Co.: 5 mi. W, 3 mi. S Apache, 2; Wichita Mountains, 1; 2 mi. S Meers, 1; Fort Sill, 1; 7.9 km. E, 3.7 km. S Fort Sill, 1; 11 mi. E, 4.5 mi. S Lawton, 4; 3.5 mi. S Cache, 2 (1 MWSU, 1 TTU); 9 mi. W, 6 mi. S Lawton, 2; COTTON Co.: 3 mi. E Devol, 1; 5.2 mi. NNE Burkburnett, Texas, 1. 6.7 mi. SW Randlett, 1; 1 mi. N, 2 mi. E Burkburnett, Texas, 1; 5 mi. N Byers, Texas, 1. CUSTER Co.: 4 mi. N, 0.3 mi. W Weatherford, 1. *DEWEY Co.: 3.3 mi. W Canton, 3 (TTU). GRADY Co.: 7.7 mi. Chickasha County Courthouse, 1 (TTU). GREER Co.: 8.5 mi. W Quartz Mountains State Park, 1. HARMON Co.: 12.5 mi. N, 7.5 mi. E Hollis, 3 (TTU); 1.5 mi. W Int. Hwy. 30 and Elm Creek fork of Red River, 2 (TTU). JEFFERSON Co.: 2 mi. S Waurika, 1; Terral, 2. KIOWA Co.: 19 mi. S, 2 mi. E Mountain View, 1; 1.8 mi. S, 0.9 mi. W Mountain View, 22 (TTU); 0.8 mi. W, 1.5 mi. S Mountain View, 9 (TTU). *STEPHENS Co.: Lake Waurika, 8 mi. N, 5 mi. W Waurika, 3. TILLMAN Co.: 1.6 mi. S Davidson, 1; 19 mi. W, 1 mi. S Grandfield, 1; 11 mi. WSW Grandfield, 1; 2 mi. W Grandfield, 1; 5 mi. S Grandfield, 1. WASHITA Co.: 2 mi. W Burns Flat, 5 (TTU).

County records.—Beckham, Blaine, Caddo, Canadian, Carter, Comanche, Cotton, Custer, *Dewey, Garvin, Grady, Greer, Harmon, Jackson, Jefferson, Kiowa, McClain, Murray, Roger Mills, *Stephens, Tillman, Washita.

***Peromyscus pectoralis laceianus* Bailey, 1906**

Encinal or White-ankled Mouse

The range of *Peromyscus pectoralis* in Oklahoma seems limited to a series of limestone ledges in oak woodland near Marietta, Love County. Kilpatrick and Caire (1973) found the species in association with *P. leucopus* and *Neotoma floridana*, but *P. attwateri* (which prefers similar habitat) was locally absent.

The subspecific status of Oklahoma and adjacent Texas populations was reviewed by Schmidly (1972) and Kilpatrick and Zimmerman (1976).

County record.—Love (Kilpatrick and Caire, 1973).

***Baiomys taylori taylori* (Thomas, 1887)**

Northern Pygmy Mouse

The pygmy mouse is a species of subtropical grasslands that has been spreading north and west through Texas in recent years (Choate *et al.*, 1990). *Baiomys* now occurs throughout most of north-central Texas and into the southern Panhandle of that state (Jones and Jones, 1992), but until quite recently (Stangl and Dalquest, 1986), it was unknown from Oklahoma. The adverse effects that severe spells of cold weather are known to have on northerly populations of the pygmy mouse (Stangl and Kasper, 1987) result in the periodic stalling or reversal of northward movements. Caire (1991) reported on a breeding population of *Baiomys* found in 1989 in southern Harmon County, and from a locality where the species had not been taken during trapping efforts in the preceding several years. The advance nevertheless seems persistent, and *B. taylori* now is to be looked for throughout the southernmost tier of counties in southwestern Oklahoma.

Specimen examined (1).—COTTON Co.: 2 mi. NE Burkburnett, Texas, 1.

County records.—Cotton (Stangl and Dalquest, 1986), Harmon (Caire, 1991).

***Onychomys leucogaster breviauritus* Hollister, 1913**

Northern Grasshopper Mouse

Onychomys leucogaster is seldom abundant in southwestern Oklahoma, except for patches of favored habitat. This grasshopper mouse is closely associated with sandy river terraces, where it is found with *Dipodomys ordii*. One individual was trapped while still partially

emerged in the vertical burrow of a hispid pocket mouse, *Chaetodipus hispidus*.

Specimens examined (15).—Caddo Co.: 4 mi. E, 2 mi. N Apache, 1. Greer Co.: 1.8 mi. E, 2.3 mi. N Granite, 2; 8.5 mi. W Quartz Mountains State Park, 2. Harmon Co.: 10 mi. SE Hollis, 1; 12.5 mi. N, 7.5 mi. E Hollis, 1 (TTU); 17 mi. N, 2.5 mi. W Hollis, 1 (TTU); 4 mi. N, 0.5 mi. W Gould, 1 (TTU); 8 mi. N, 1.5 mi. W Gould, 1 (TTU). Roger Mills Co.: Spring Creek Recreational Area, 2 (TTU). Tillman Co.: 18 mi. W, 0.5 mi. S Grandfield, 1; 17 mi. W, 1.5 mi. S Grandfield, 2.

County records.—Blaine, Caddo, Canadian, Custer, Dewey, Greer, Harmon, Jackson, Roger Mills, Tillman.

Sigmodon hispidus texianus (Audubon and Bachman, 1853)

Hispid Cotton Rat

Sigmodon hispidus occurs nearly everywhere that sufficient grassy cover permits the construction and maintenance of its characteristic runways. These passageways are shared with a variety of small mammals, including *Cryptotis*, *Peromyscus*, and *Reithrodontomys*. The cotton rat is far more abundant than our numerous collection records below would indicate, because collectors seldom have the time to save each specimen taken from every locality.

Embryo counts (and respective crown-rump measurements) for females taken in the following months are: June, seven (23); September, 10 (24); and October, six (25) and seven (18).

Specimens examined (59).—Caddo Co.: 2 mi. S, 1 mi. W Anadarko, 4 (TTU). *Carter Co.: 2 mi. N Ardmore, 1. Comanche Co.: 9 mi. NNW Indianola, 1; 1 mi. W Lawton, 1; 9 mi. W, 6 mi. S Lawton, 1. Cotton Co.: 3.2 mi. W Temple on East Cache Creek, 1; 5.2 km. W Randlett, 1; near jct. Red River and Hwy. 277, 4; 1 mi. NE Burkburnett, Texas, 1; 2 mi. NE Burkburnett, Texas, 1; 5.2 mi. NE Burkburnett, 1. *Greer Co.: 8.5 mi. W Quartz Mountains, 3. Harmon Co.: 9 mi. N, 1 mi. W Hollis, 2; 10 mi. N, 1 mi. W Hollis, 3 (TTU). Jackson Co.: 0.5 mi. N Altus, 1; 7 mi. SW Eldorado, 1. *Jefferson Co.: 6 mi. W, 1 mi. N Ringling, 1; 5.3 mi. SW Waurika, 1. McClain Co.: 2 mi. W Blanchard, 10 (TTU); 1 mi. W Blanchard, 4 (TTU). Roger Mills Co.: Spring Creek Recreational Area, Black Kettle National Grasslands, 7 (TTU). Stephens Co.: Lake Waurika, 8 mi. N, 5 mi. W Waurika, 2. Tillman Co.: 2.8 mi. W Tipton, 1; 17 mi. W, 1.5 mi. S Grandfield, 1; 15 mi. W, 4 mi. S Grandfield, 1; 11 mi. WSW Grandfield, 1; 6.5 mi. WSW Grandfield, 3.

County records.—Beckham, Blaine, Caddo, Canadian, *Carter, Comanche, Cotton, Custer, Dewey, Garvin, Grady, *Greer, Harmon, Jackson, *Jefferson, Kiowa, McClain, Murray, Roger Mills, Stephens, Tillman.

Neotoma floridana attwateri Mearns, 1897

Eastern Woodrat

The eastern woodrat occupies the eastern woodlands of our study area. It often builds its large, conspicuous stick nests at the bases of trees, shrubs, or other structures. We observed one such nest that actually extended up a low-lying branch that was in contact with the main nest to a second chamber situated about six feet off the ground in an oak tree. Other den sites commonly included hollow logs, deserted buildings, rock crevices, and caves. Occasional animals apparently do not construct a nest, for we have taken these rats in traps set by inconspicuous burrows at the bases of trees in areas that were devoid of typical nests.

All woodrats can climb, but *Neotoma floridana* appears to be a particularly nimble (if somewhat cautious), partly arboreal species. The cambium of tender twigs provides at least seasonal nutrition for this rat, for the ground surrounding several nests (one early March) were found to be littered with short sections of denuded branches (probably of the dominant hackberry). Vast expanses of bark also had been stripped from the upper reaches of large hackberry trees along the nearby floodplain—presumably from animals stranded for a time above flood waters. In Caddo County, traps set in the crotches of oak trees 20 to 30 feet above ground, where piles of acorn hulls suggested *Glaucomys*, took only *N. floridana*. The climbing ability of the eastern woodrat was demonstrated for us by an animal routed from its nest that easily negotiated thin branches more than 30 feet above the ground. Females taken in February and March, respectively, carried two and three embryos measuring 30 and 16 in crown-rump length.

Caire *et al.* (1990) listed *N. f. osagensis* as the subspecies of southwestern Oklahoma, following Hall (1981). However, in the most recent revision of the species, apparently overlooked by Hall, Birney (1973) synonymized this taxon under *N. f. attwateri*.

Specimens examined (25).—Caddo Co.: 3.5 mi. E, 1.5 mi. N Apache, 1; 1.5 mi. E, 0.3 mi. N Apache, 1. Comanche Co.: 0.6 mi. W Wichita Mountains Wildlife Refuge, 1; 7.9 km. E, 3.7 km. S Fort Sill, 1. Cotton Co.: 6 mi. SSW Walters, 1; 1 mi. N, 1 mi. E Burkburnett, Texas, 3; 4 mi. S Randlett, 1. *Jefferson Co.: 6 mi. W Ringling, 1; 6 mi. SW Waurika, 2; 7 mi. NE Byers, Texas, 1 (TTU). *Kiowa Co.: 15.6 mi. W Apache, 1. *Love Co.: 2 mi. W Greenville, 2. McClain Co.: 2 mi. E Blanchard, 2 (TTU); 1.1 mi. W Blanchard, 1 (TTU); 1 mi. W Blanchard, 4 (TTU). Murray Co.: 1.5 mi. S Dougherty, 1; 2 mi. S Dougherty, 1.

County records.—Blaine, Caddo, Canadian, Carter, Comanche, Cotton, Custer, Dewey, Grady, *Jefferson, *Kiowa, *Love, McClain, Murray.

***Neotoma micropus canescens* J. A. Allen, 1891**

Southern Plains Woodrat

The southern plains woodrat occupies the more arid and open western parts of the study area. The ranges of this animal and the closely related eastern woodrat are mutually exclusive, the eastern boundary of the range of *Neotoma micropus* coinciding almost precisely with the western limits of *N. floridana*.

Despite the often close proximity of the two species (and their capability of producing viable young under laboratory conditions), natural hybridization is unknown in southwestern Oklahoma. Birney (1973), however, detailed the breakdown in reproductive isolation between the two species at a site just to the north in Major County. Along the southern bank of Red River in Cotton County, the eastern woodrat occurs under and to the east of the bridge, whereas we took *N. micropus* only 100 yards west of the same bridge (from higher on the bank, therefore in Texas, and so not listed herein). Specimens have been taken from this point of contact at intervals over several years, and none has evinced intermediate characteristics. A female taken on 14 August carried four embryos measuring 10 in crown-rump length.

Caire *et al.* (1990) followed Hall's (1981) major subdivision of *N. micropus*. While recognizing the variability within the subspecies *N. m. canescens*, Birney (1973) chose to retain all United States specimens of the species under this heading. We follow Birney's review.

Specimens examined (66).—GREER CO.: 8 mi. S, 4 mi. E Granite, 1; 10 mi. SE Mangum, 1; 8.5 mi. W Quartz Mountains State Park, 3. HARMON CO.: 1 mi. W Oklahoma Hwy. 30 and Elm Fork of Red River, 4 (TTU); 5.5 mi. N, 2 mi. W Hollis, 8 (TTU); 5 mi. N, 2 mi. W Hollis, 1 (TTU); 2.5 mi. S, 11 mi. E Hollis, 1 (TTU); 7.5 mi. S, 3 mi. E Hollis, 1 (TTU); 10 mi. W Hollis, 1 (TTU); 6.4 mi. S Hollis, 36; lower slope of Elm Fork, Red River, 2 (TTU); 10 mi. N, 1 mi. W Hollis, 1 (TTU); 1.5 mi. N, 0.5 mi. W Gould, 1 (TTU); 4.5 mi. N, 2.5 mi. W Gould, 1 (TTU); 1 mi. W jct. Hwy. 30 and Elm Fork of Red River, 1 (TTU). ROGER MILLS CO.: Spring Creek Recreational Area, 2 (TTU). TILLMAN CO.: 4.0 mi. N Tipton, 1.

County records.—Beckham, Greer, Harmon, Jackson, Kiowa, Roger Mills, Tillman.

***Microtus ochrogaster haydenii* (Baird, 1858)**

Prairie Vole

The southernmost known population of *Microtus ochrogaster* is found on the artillery firing range of Fort Sill in the Wichita Mountains of Comanche County. Choate (1989) reported that this vole preferred well-drained soils dominated by a variety of gramma grasses, but avoided denser, tall bunch grasses and lower, damper habitats. Common associates were *Blarina*, *Cryptotis*, *Chaetodipus hispidus*, and *Reithrodontomys fulvescens*. However, the most abundant of small mammal species was *Sigmodon hispidus*, which tended to force *Microtus* into small, isolated colonies. The artillery range is protected from other human activities that would adversely affect the habitat, and the results are favorable to *M. ochrogaster*. If the recent reduction of defense spending should result in abandonment of this range or change in its usage, this population might become endangered, and, therefore, should be closely monitored.

The isolation of the Wichita Mountains voles from more northerly Oklahoma populations seems not to be complete, for Smith (1992) collected two specimens in adjacent Caddo County, and one of us (WWD) observed a low-flying raven in Roger Mills County carrying a vole in its bill. Recent records of the prairie vole from the Texas (Jones *et al.*, 1988) and Oklahoma (Dalquest *et al.*, 1990; Dalquest and Baskin, 1991; Reed and Choate, 1988) panhandles further support the possibility of a more continuous distribution of the species in our study area.

Choate (1989) reported reproductive activity in the Comanche County population during every month of the year except July and August. For 12 adult females, litter sizes ranged from one to six (mean 3.0).

Specimens examined (73).—Caddo Co.: 3.8 mi. E, 1.8 mi. N Apache, 2. Comanche Co.: 7.9 km. E, 3.7 km. S Fort Sill, 18; 8.6 km. E, 3.3 km. S Fort Sill, 23; 10.4 km. E, 1.8 km. S Fort Sill, 5; 10.1-10.7 km. E, 3.7 km. S Fort Sill, 25.

County records.—Caddo (Smith, 1992), Comanche (Choate, 1989).

***Microtus pinetorum nemoralis* Bailey, 1898**

Woodland Vole

We have taken this uncommon vole in its deeply cut runways under the protective thatch of grassy parks among stands of oak, but also under other circumstances (for example, in the leaf litter of dense

forest, and in rank, overgrown vegetation of railroad rights-of-way) in the absence of runways or other obvious evidence of its presence.

Specimens examined (10).—COMANCHE CO.: near Crater Lake, Wichita Mountains Wildlife Refuge, 3. *LOVE CO.: 2 mi. E Greenville, 1. McCLAIN CO.: 1.1 mi. W Blanchard, 1 (TTU); 1 mi. W Blanchard, 1 (TTU). *MURRAY CO.: 0.5 mi. SSE Dougherty, 1; 2 mi. S Dougherty, 3.

County records.—Caddo, Carter, Comanche, *Love, McClain *Murray.

***Ondatra zibethicus cinnamominus* (Hollister, 1910)**

Muskrat

The muskrat probably occurs in some numbers throughout most of our study area where permanent water exists. It is apparently most common in northeastern Oklahoma, and progressively scarcer to the south and west in the state (Caire *et al.*, 1990).

Martin and Preston (1970 and references cited therein) report muskrats from Harmon County as inhabiting lakes and waterways in sadsage habitat. We have observed this species a short distance to the northwest in Donley County, Texas (Stangl *et al.*, 1989), under similar circumstances, and from where we recovered the remains of one animal from the regurgitated pellets of a great horned owl (*Bubo virginianus*).

County records.—Caddo, Jackson, Kiowa.

***Erethizon dorsatum epixanthum* Brandt, 1835**

Porcupine

Erethizon dorsatum occurs throughout the study area, but it can be surprisingly inconspicuous for an animal of its size and familiarity. Residents often are unaware of its presence until the telltale quills are removed from the pelt of a skinned furbearer, or from domestic dogs. Voucher specimens are typically the skulls of individuals killed on highways by automobiles. We follow Stangl *et al.* (1991) in assigning all Oklahoma porcupines to *E. d. epixanthum*.

Specimens examined (1).—*TILLMAN CO.: 3 mi. S Davidson, 1.

County records.—Comanche, Custer, Garvin, Greer, Harmon, Jackson, Kiowa, Roger Mills, *Tillman.

***Myocastor coypus* (Molina, 1782)**

Nutria

The nutria has been raised commercially for its fur, but accidental escapes and purposeful introductions into the wild have led to established populations of this semiaquatic South American furbearer throughout much of the United States (Hall, 1981). A nutria farm once existed in north-central Oklahoma (Garfield County) during the 1960s, and regionally, *Myocastor* was introduced near Hinton (Caddo County) and Fort Sill (Comanche County) during the early 1950s (Caire *et al.*, 1990). Although no voucher specimens appear to exist for the species in the region, it can be expected throughout the study area in conditions preferred by muskrat and beaver.

***Canis latrans* Say, 1823**

Coyote

The coyote is a ubiquitous carnivore in our study area. We took only two specimens (both road-killed animals), but the species was heard at night from nearly all sites at which we collected, and individuals often were sighted crossing roadways during daylight hours.

Halloran and Glass (1959) reported that the jackrabbit and various invertebrates comprised the bulk of food items of 48 mostly winter-taken coyotes from the Wichita Mountains, and cited an observation where *Canis latrans* killed three pronghorn on that wildlife refuge.

With the extermination of larger carnivores from the study area, the coyote has no natural enemy save man. It is widely trapped for its pelt, and Martin and Preston (1970) reported that coursing this fleet canid with dogs is a locally popular pastime. One landowner informed us of an infestation of red mange in coyotes from south-central Oklahoma in the late 1970s. The animals presumably were infected from a domestic dog, and starving, practically denuded coyotes were common for a time. Few survived the winter, and populations remained below normal for a few years thereafter.

Hall (1981) indicated that the western third of our study area is occupied by *C. l. latrans* Say, 1823, whereas eastern populations are referred to *C. l. frustror* Woodhouse, 1851—an arrangement followed by Caire *et al.* (1990).

Specimens examined (3).—COTTON Co.: 8 mi. S Temple, 1 (TTU). HARMON Co.: 7.5 mi. S, 3 mi. E Hollis, 1 (TTU). JACKSON Co.: 3.8 mi. W Tipton, 1.

County records.—Beckham, Canadian, Comanche, Cotton, Custer, Dewey, Grady, Harmon, Jackson, Jefferson, Kiowa, Love, McClain, Murray.

***Canis lupus nubilus* Say, 1823**

Gray Wolf

The gray wolf probably never was common in southwestern Oklahoma as the region is situated along the southeastern limits of its recent historic range. The few early historical accounts from the state are summarized by Tyler and Anderson (1990), although early travelers often failed to distinguish between the wolf and smaller coyote. Of interest to this report are the included nonverified reports of the wolf from the Wichita Mountains in the mid-1700s, and from the Canadian River of central Oklahoma in 1820.

Halloran and Glass (1959) indicated that four specimens were taken from the Wichita Mountains in 1906, and that sightings persisted there until 1933. Since that time, occasional subfossil remains have been recovered from caves in western Oklahoma (Woodward County—Caire *et al.*, 1990), and Goetze (1989) reported the ulna of a wolf from presumably Pleistocene sediments in Tillman County.

County records.—Comanche.

***Canis rufus rufus* Audubon and Bachman, 1851**

Red Wolf

The red wolf probably occurred as far west in Oklahoma as the Wichita Mountains. As its numbers declined, the genetic integrity of this species was destroyed by introgression from coyotes and possibly dogs. Pure red wolf stock may have disappeared from Oklahoma by the turn of the century, and most museum specimens of "*Canis rufus*" taken since then were determined to be large coyotes or red wolf-coyote hybrids (Nowak, 1979). The uncertainty of distinguishing large coyotes from the red wolf or wolf-coyote hybrids (Nowak, 1979) necessitates that records based on red wolves taken in late years be accepted with caution.

Sightings of wolves are occasionally reported in eastern Oklahoma and farther west along the Red River, but these likely relate to large coyotes or perhaps coyote-dog crosses.

County records.—Comanche, Garvin, Tillman.

***Vulpes vulpes fulva* (Demarest, 1820)**

Red Fox

The red fox occurs throughout the state where sufficiently dense cover exists. Tyler (1979) reported on the occurrence of the species in western Oklahoma, and offered evidence that it has spread westward in the state only since the 1960s, and is successfully reproducing in Custer, Jackson, Kiowa, and Tillman counties. The success of this species has apparently been at some expense to the gray fox (Caire *et al.*, 1990). *Vulpes vulpes* is hunted and trapped for its pelt, but the uncertainty of its status in the state led to a closing the harvest season in 1976 (Hatcher, 1982).

The validity of the subspecific taxonomy of the red fox is questionable, given that it has been widely transplanted for sporting purposes. Tyler (1979) cited a transplant of some Minnesota-taken red foxes to Dewey County in the early 1970s.

Specimen examined (1).—JACKSON Co.: near Altus, 1.

County records.—Jackson, Kiowa, Tillman.

***Urocyon cinereoargenteus ocythous* Bangs, 1899**

Gray Fox

This fox commonly inhabits rough, broken country, preferably in the presence of woodlands. It is an important and easily trapped furbearing species. Halloran and Glass (1959) recounted earlier reports that indicated this fox was scarce to nonexistent in the Wichita Mountains in the early 1900s, but it had become abundant by the 1940s and 1950s.

Urocyon is an opportunistic omnivore. Stomach contents of animals taken in the Wichita Mountains revealed insects, *Peromyscus*, and parts of a rabbit according to Halloran and Glass (1959). Those authors also cited the report of an adult wild turkey being killed and partially eaten by a gray fox.

Subspecific assignment is tentative, and based on geographic grounds. The Red River boundary between Oklahoma and Texas is mapped as separating *U. c. ocythous* from *U. c. floridanus* Rhoads, 1895, to the south in Texas.

Specimens examined (2).—*COTTON Co.: 5 mi. SSW Walters, 1; 8 mi. S Temple, 1.

County records.—Caddo, Comanche, *Cotton, Kiowa, Murray.

***Ursus americanus americanus* Pallas, 1780**

Black Bear

Although the black bear once may have ranged throughout Oklahoma (Tyler and Anderson, 1990), by the 1900s the species seems to have persisted regionally only in the Wichita Mountains of Comanche County. Sightings occurred there as late as 1934 (Halloran and Glass, 1959; Halloran, 1963). Our specimen from Tillman County is the lower jaw of an adult bear, probably dating to pre-Columbian times.

Specimen examined (1).—TILLMAN CO.: 10 mi. E, 2 mi. S Davidson, 1.
County record.—Comanche, Tillman (Stangl and Dalquest, 1986).

***Bassariscus astutus flavus* Rhoads, 1894**

Ringtail

The ringtail is documented in southwestern Oklahoma mostly from rugged, woodland habitat associated with rock outcrops. It is a secretive species that apparently escaped the earlier notice of Halloran and Glass (1959) during their inventory of Wichita Mountains carnivores.

County records.—Comanche, Greer, Jackson, Jefferson, Kiowa, McClain, Tillman.

***Procyon lotor hirtus* Nelson and Goldman, 1930**

Common Raccoon

In our study area, the raccoon may be the most abundant carnivore. Its remains are commonly found along roadways, especially where they intersect streams and rivers. *Procyon* is an important furbearer, but is often numerous and bold enough to become a pest, especially within the boundaries of parks and wildlife refuges, where it is protected. Halloran and Glass (1959) reported the species becoming numerous enough in the Wichita Mountains to be live-trapped for export elsewhere in the state. Animals at one state park began foraging through empty camp sites at sundown, and repeatedly invaded our occupied camp after dark. A later visitor told us that these animals disappeared after one fall when the price of raccoon pelts exceeded 30 dollars in value.

The raccoon sometimes also interferes with collecting activities of scientists. One particularly persistent individual literally tore open the side of an aluminum Sherman live trap to remove a captured eastern woodrat, leaving only some fur and blood.

Specimens examined (10).—CARTER Co.: 2 mi. W Baum, 2. *COTTON Co.: 6 mi. N Randlett, 2. COMANCHE Co.: Wichita Mountains Wildlife Refuge, 1. *JEFFERSON Co.: 13 mi. E Waurika, 1; 5 mi. W Ringling, 1; 5 mi. N Byers, Texas, 1. *KIOWA Co.: 3 mi. NW Snyder, 1 (TTU). STEPHENS Co.: 4 mi. S LOCO, 1 (TTU).

County records.—Caddo, Carter, Comanche, *Cotton, Custer, Dewey, Garvin, Grady, Harmon, *Jefferson, McClain, Stephens, Tillman.

***Mustela nigripes* (Audubon and Bachman, 1851)**

Black-footed Ferret

The range of the black-footed ferret probably once coincided closely with that of *Cynomys ludovicianus*, thus enveloping all but the easternmost counties of our study area. Eradication efforts directed towards the prairie dog probably have eliminated this mustelid from all of Oklahoma, except perhaps the Panhandle. The Kiowa County record is based on the skull since lost—Caire *et al.*, 1990—of a specimen taken in 1904 from near Mountain View.

County record.—Kiowa.

***Mustela vison letifera* Hollister, 1913**

Mink

The mink is a secretive and seldom-seen animal, unless trapped or glimpsed in the headlights of an automobile at night. Preferred habitat is brushy or wooded areas, usually in the vicinity of permanent water. The species is to be expected throughout southwestern Oklahoma along streams and rivers.

Specimen examined (1).—*JEFFERSON Co.: 0.5 mi. N Terral (1).

County records.—Caddo, Canadian, Comanche, Custer, Jackson, *Jefferson, Tillman.

***Taxidea taxus berlandieri* Baird, 1858**

Badger

The badger occurs throughout the region. Characteristic diggings are more commonly seen than the animal itself, although it sometimes forages abroad during daylight hours.

County records.—Blaine, Caddo, Comanche, Custer, Dewey, Garvin, Grady, Jackson, Kiowa, McClain, Roger Mills, Tillman.

***Spilogale putorius interrupta* (Rafinesque, 1820)**

Eastern Spotted Skunk

The spotted skunk is rarely observed. It probably occurs throughout the area, especially in broken country. Martin and Preston (1970) cited reports by Harmon County residents that this little skunk was more common there during the 1930s than during the late 1960s. A similar decline on the Wichita Mountains Wildlife Refuge since the 1920s is discussed by Halloran and Glass (1959).

County records.—Caddo, Comanche, Custer, Grady, Jackson, Kiowa, Tillman, Washita.

***Mephitis mephitis* (Schreber, 1776)**

Striped Skunk

Distributed throughout the region, it is particularly abundant in agricultural or settled areas. The characteristic odor is often detected even when the animal is not. Automobiles take a great toll on this bold species, and most of our animals were salvaged from roadkills.

Halloran and Glass (1959) discussed a severe 1940 "die-off" of spotted and striped skunks in the Wichita Mountains Wildlife Refuge, which was attributed to a pneumonic epizootic. Those populations were said to have recovered completely by 1954.

Two subspecies are mapped by Hall (1981) as occurring in the region—*Mephitis mephitis varians* Gray, 1837, to the west, and *M. m. mesomelas* Lichtenstein, 1832, to the east.

Specimens examined (6).—CARTER Co.: 20 mi. W Ardmore, 3 (TTU). *JEFFERSON Co.: 1 mi. W Waurika, 1; 5 mi. N Byers, Texas, 1. TILLMAN Co.: 6.5 mi. WSW Grandfield, 1.

County records.—Blaine, Carter, Comanche, Custer, Dewey, Grady, *Jefferson, McClain, Tillman.

***Lutra canadensis canadensis* (Schreber, 1776)**

River Otter

The otter probably was widespread but never common in Oklahoma. Caire *et al.* (1990) cited early accounts of the species from Caddo, Comanche, and Kiowa counties of the study area, but no specimens appear to have been preserved.

Lutra wanders widely along watercourses, and often also overland. It still may be an occasional visitor to our easternmost counties. The

presence of this shy animal often is revealed only by its droppings, which are left characteristically on rocks protruding from streams.

***Felis concolor stanleyana* Goldman, 1938**

Mountain Lion

Caire *et al.* (1990) and Tyler and Anderson (1990) provided reports from travelers since the mid-1700s that make clear reference to the mountain lion from such regional localities as the Wichita Mountains (Comanche County), Cache Creek (Comanche or Cotton counties), near Grandfield (Tillman County), along the Canadian River (McClain and Roger Mills counties), and near the Red River (Harmon or Jackson counties).

No currently established populations seem to exist here or elsewhere in the state, but *Felis concolor* is a noted wanderer, and the several reliable sightings and occasional animals taken by hunters from south-western Oklahoma (for example, 1983 in Roger Mills County—Caire *et al.*, 1990) probably represent visitors from New Mexico or Texas.

***Lynx rufus texensis* J. A. Allen, 1895**

Bobcat

The secretive bobcat occurs throughout the region, but it is not commonly observed unless trapped or cornered by dogs. Both means have been employed in its capture, for its pelt is presently more valuable than that of other furbearers. Caire *et al.* (1990) cited evidence that trapping pressure on the species has adversely affected populations in Oklahoma. Martin and Preston (1970) reported that this cat often is hunted with hounds in Harmon County.

Trapping records of *L. rufus* from the Wichita Mountains Wildlife Refuge indicate that population fluctuations sometimes occur. During the period of 1932-1944, 24 bobcats were taken, but not until the 1956 recovery of a dead animal was the species again recorded from there (Halloran and Glass, 1959).

We follow the assessment of Schmidly and Read (1986), who assigned specimens from our study area to *L. r. texensis*.

Specimens examined (4).—COTTON Co.: 6 mi. NE Burkburnett, Texas, 1. HARMON Co.: 8.5 mi. N, 2.5 mi. W Hollis, 1 (TTU). *JEFFERSON Co.: 8 mi. W Waurika, 1. TILLMAN Co.: Frederick Lake, 1 (TTU).

County records.—Beckham, Blaine, Caddo, Canadian, Comanche, Cotton, Garvin, Grady, Harmon, *Jefferson, Kiowa, Love, McClain, Roger Mills, Stephens, Tillman.

***Tayassu tajacu angulatus* (Cope, 1889)**

Javelina or Collared Peccary

There seems to have been no basis for previous authorities (culminating with Hall, 1981) regarding the range of the javelina as extending into extreme north-central (Montague County) Texas. However, animals transplanted to Wilbarger County, Texas, now have spread successfully into adjacent regions of Texas, and they sometimes forage into southern Oklahoma along the floodplain of the Red River (Stangl and Dalquest, 1990). Future expansion into southern Oklahoma by *Tayassu* probably will depend on ameliorating climatic conditions. Stangl and Dalquest (1990) reported on the adverse affects of cold weather on these animals at the northern periphery of the range in Texas.

***Cervus elaphus* Linnaeus, 1758**

Wapiti or Elk

The elk once occurred in southwestern Oklahoma at least as far east as the Wichita Mountains; numerous reports dating to the early 1800s make reference this species (Tyler and Anderson, 1990). The last animal was reported killed there in 1881 (Halloran and Glass, 1959). The subspecific identity of these early herds of *Cervus elaphus* is uncertain, for no specimens were ever preserved. Some authorities have assigned these native populations to the extinct *C. e. merriami* Nelson, 1902 (for example, Caire *et al.*, 1990; Hall, 1981)—a geographically distant taxon otherwise known only from isolated desert mountain ranges in Arizona and southern New Mexico. Others think the applicable subspecies (as mapped by Hall, 1981) was *C. e. canadensis* Erxleben, 1777, as earlier supposed by Halloran and Glass (1959). We favor the latter as more probably correct.

Specimens living in the Wichita Mountains today are derived from the successful reintroduction in 1912 of animals from the Jackson Hole (Wyoming) herd (*C. e. nelsoni* Bailey, 1935—as mapped by Hall, 1981).

Specimens examined (2).—COMANCHE Co.: Wichita Mountains Wildlife Refuge, 2.
County record.—Comanche.

***Odocoileus hemionus crooki* (Mearns, 1897)**

Mule Deer

No specimens of the mule deer are known from the region, although the species once may have ranged east to the Wichita Mountains as late as the 1800s (Caire *et al.*, 1990). *Cervus hemionus* occurs today in the rugged, broken lands of the Texas Panhandle, often in association with juniper. It is not unlikely that occasional individuals wander into the western counties of Oklahoma.

Halloran and Glass (1959) recounted an unsuccessful attempt in 1929 to stock mule deer in the Wichita Mountains of Comanche County.

***Odocoileus virginianus texanus* (Mearns, 1898)**

White-tailed Deer

Despite the absence of specimens from much of the region, the white-tailed deer is found throughout the eastern counties, and along wooded or riparian habitat elsewhere to the west. The species apparently was extirpated, or nearly so, by the late 1800s from all of southwestern Oklahoma except the Wichita Mountains, from which dispersing and transplanted individuals later spread to repopulate the area (Caire *et al.*, 1990).

County records.—Caddo, Comanche, Murray, Stephens.

***Antilocapra americana americana* (Ord, 1815)**

Pronghorn

The pronghorn was common in the region as far east as the Wichita Mountains as late as the 1800s (Caire *et al.*, 1990; Halloran and Glass, 1959; Nelson, 1925); Tyler and Anderson (1990) cited reports of its local abundance as recently as 1890 in Greer County, and 1900 in Tillman County. Hunting and habitat destruction led to its demise in southwestern Oklahoma.

Caire *et al.* (1989) and Halloran and Glass (1959) provided details of several failed attempts to re-establish regional populations since 1910.

***Bison bison bison* (Linnaeus, 1758)**

Bison

The last of the native bison had vanished from southwestern Oklahoma by the late 1800s. Caire *et al.* (1990) summarized the decline

and disappearance of the species in Oklahoma, and provide terminal dates of 1885 for Beckham County and 1878 for Tillman County. Remains of the bison are abundant in examined Holocene sediments of Tillman (Goetze, 1989) and Caddo (Smith, 1991) counties.

Local ranchers sometimes maintain a few animals, and a confined herd in the Wichita Mountains Wildlife Refuge dates back to the original 1907 restocking. Our specimens include the skeleton of a 13-year-old bull, which was suffering from a circular wound of perhaps 30 centimeters in diameter and was infested with screwworm larvae, before being put to death on 18 October 1984 by refuge personnel.

Specimens examined (3).—COMANCHE Co.: Wichita Mountains Wildlife Refuge, 3. *County record*.—Comanche.

Ovis canadensis canadensis Shaw, 1804

Bighorn or Mountain Sheep

Although never native to Oklahoma, an unsuccessful attempt was made to establish a population on the Wichita Mountains Wildlife Refuge in 1929 with seven animals from Alberta, Canada (Halloran and Glass, 1959). One was poached by a hunter, and the others lost weight and died within a year of the introduction.

SPECIES OF POSSIBLE OCCURRENCE

The known ranges of several species of western (Great Plains) or eastern (deciduous woodlands) origin closely approach the limits of our defined study area. Intensive field surveys of marginal eastern and western counties may uncover the presence of elusive or uncommon species, as well as document the expansion of others.

Bats.—Attempts to collect bats have been strongly biased towards cave-roosting species. We feel that there is a high probability that the persistent use of mist nets in the eastern woodlands of our study area will produce westernmost records for some of the eastern *Myotis* species (for example, *M. austroriparius*, *M. keeni*, *M. lucifugus*, and *M. sodalis*). Similar collecting methods also are apt to yield more records of migrant species, including *Nyctinomops macrotis*.

Cratogeomys castanops (yellow-faced pocket gopher).—Known from the adjacent Texas Panhandle. An unlikely possibility in westernmost counties of study area at present, although this taxon has been expanding its range in areas where arid conditions prevail.

Reithrodontomys megalotis (western harvest mouse).—Recorded from Ellis County. To be looked for in grasslands of northwestern counties.

Reithrodontomys humalis (eastern harvest mouse).—Recently taken from Pottawatomie County, adjacent to northeastern corner of study area.

Peromyscus gossypinus (cotton mouse).—Recorded from Bryan County and eastward. May occur in wooded southeastern counties of region.

Neotoma albigula (white-throated woodrat).—Occurs in adjacent counties of Texas. To be looked for near junipers in broken country of westernmost counties.

Vulpes velox (swift fox).—May be uncommon resident of northwesternmost counties.

Mustela frenata (long-tailed weasel).—Known from north-central Oklahoma and Texas Panhandle. Probably occurs uncommonly in at least northern and western parts of study area.

SUMMARY AND CONCLUSIONS

The rich mammalian diversity of southwestern Oklahoma is a result of the presence of both western (Great Plains) and eastern (deciduous woodlands) faunas, which intergrade over much of the region. However, it must be recognized that results of any study such as ours must be treated as tentative, temporary, and soon outdated, given the dynamic nature of animal distributions, shifting climatic regions, and the effects of human alterations on ecological conditions.

The current global warming trend favors a northward expansion of such subtropical species as *Dasypus novemcinctus* and *Baiomys taylori*. Past abuses through hunting, trapping, and especially habitat destruction has led to the local extirpation of some species (*Ursus americanus*, *Bison bison*, *Antilocapra americana*, for example). Although diligent collecting efforts should lead to the discovery of uncommon or reclusive resident species (see list of species of hypothetical occurrence), discoveries also may reflect active expansion or contraction of the ranges of others. Riparian habitats continue to serve as avenues of westward dispersal for woodland taxa such as *Sylvilagus aquaticus*, and *Glaucomys volans*, just as sandy river terraces afford penetration to the east by others (for example, *Spermophilus spilosoma*, *Dipodomys ordii*, *Perognathus flavus*, *Onychomys leucogaster*). The clearing of land for agricultural purposes can further the eastern expansion of grasslands species such as *Chaetodipus hispidus* and *Spermophilus tridecemlineatus*, but it can lead to extirpation locally of woodlands species. Purposeful introductions of some mammals (for example, *Vulpes vulpes*, *Sciurus carolinensis*, *Tayassu tajacu*) have led to establishment of populations beyond their native ranges—sometimes at the expense of resident native species.

It is clear that future distributional studies in southwestern Oklahoma (as well as elsewhere) should be directed to areas where little

or no collecting has occurred in the past. However, our best understanding of the dynamics of mammalian faunas and their associated ecosystems may result from efforts directed to areas intensively worked in the past, because such studies provide baseline data for necessary chronological comparisons.

ACKNOWLEDGMENTS

We gratefully acknowledge the field assistance and companionship provided by numerous students from Midwestern State University and Texas Tech University. Of these, the following individuals accompanied us on more than one expedition: Laura Baker, Robert Bradley, Ronald Chesser, Larry Choate, Cynthia Dunn, Jim Goetze, Malane Grace, Meredith Hamilton, Craig Hood, Steven Kasper, Ben Koop, David McCullough, Kimberlyn Nelson, Calvin Porter, Madison Powell, Tracy Schafer, Kent Smith, Fred M. Stangl, Ronald Van Den Bussche, and Shelly Witte. For the loan of galley sheets prior to the publication of their book on Oklahoma mammals, we thank the authors, William Caire, Jack Tyler, Bryan Glass, and Michael Mares. The Oklahoma Department of Wildlife Conservation kindly provided the necessary collecting permits.

Finally, we wish to acknowledge the following landowners for allowing us to collect specimens on their property: Alan and Lynn Deitrich, Leroy Mindeman, James Patterson, Merrell Patterson, Don G. Smith, Jack Varner, and the wildlife staff of the U.S. Army post at Fort Sill.

Financial support for field work was provided by faculty research funds made available by Midwestern State University (to Stangl and Dalquest), and National Science Foundation grants DEB-83-00764 and BSR-86-00646 (to Baker).

LITERATURE CITED

- BAILEY, V. 1905. Biological survey of Texas. N. Amer. Fauna, 25:1-222.
- BAKER, R. J., AND D. L. SPENCER. 1965. Late fall reproduction in the desert shrew. J. Mamm., 46:330.
- BAKER, R. J., J. C. PATTON, H. H. GENOWAYS, AND J. W. BICKHAM. 1988. Genic studies of *Lasiurus* (Chiroptera: Vespertilionidae). Occas. Papers Mus., Texas Tech Univ., 117:1-15.
- BAKER, R. J., L. W. ROBBINS, F. B. STANGL, JR., AND E. C. BIRNEY. 1983. Chromosomal evidence for a major subdivision in *Peromyscus leucopus*. J. Mamm., 64:356-359.
- BAKER, R. J., S. K. DAVIS, R. D. BRADLEY, M. J. HAMILTON, AND R. A. VAN DEN BUSSCHE. 1989. Ribosomal-DNA, mitochondrial-DNA, chromosomal, and allozymic studies on a contact zone in the pocket gopher, *Geomys*. Evolution, 43:63-75.
- BAUMGARDNER, G. D. 1987. A recent specimen of the Texas kangaroo rat, *Dipodomys elator* (Heteromyidae), from Oklahoma. Southwestern Nat., 32:285-286.
- BIRNEY, E. C. 1973. Systematics of three species of woodrats (genus *Neotoma*) in central North America. Misc. Publ. Mus. Nat. Hist., Univ. Kansas, 58:1-173.

- BLAIR, W. F. 1939. Faunal relationships and geographic distribution of mammals in Oklahoma. *Amer. Midland Nat.*, 22:85-133.
- . 1954. Mammals of the mesquite plains biotic district in Texas and Oklahoma, and speciation in the central grasslands. *Texas J. Sci.*, 3:235-264.
- BLAIR, W. F., AND T. H. HUBBELL. 1938. The biotic districts of Oklahoma. *Amer. Midland Nat.*, 20:425-454.
- BLOCK, S. B., AND E. G. ZIMMERMAN. 1991. Allozymic variation and systematics of plains pocket gophers (*Geomys*) of south-central Texas. *Southwestern Nat.*, 36:29-36.
- BOHLIN, R. G., AND E. G. ZIMMERMAN. 1982. Genic differentiation of two chromosome races of the *Geomys bursarius* complex. *J. Mamm.*, 63:218-228.
- BURNS, J. C., J. R. CHOATE, AND E. G. ZIMMERMAN. 1985. Systematic relationships of pocket gophers (genus *Geomys*) on the central Great Plains. *J. Mamm.*, 66:102-118.
- CAIRE, W. 1991. A breeding population of the northern pygmy mouse, *Baiomys taylori*, in southwestern Oklahoma. *Southwestern Nat.*, 36:364-365.
- CAIRE, W., AND E. G. ZIMMERMAN. 1975. Chromosomal and morphological variation and circular overlap in the deer mouse, *Peromyscus maniculatus*, in Texas and Oklahoma. *Syst. Zool.*, 24:89-95.
- CAIRE, W., J. D. TYLER, B. P. GLASS, AND M. A. MARES. 1990. Mammals of Oklahoma. Univ. Oklahoma Press, Norman, xiii + 567.
- CHOATE, L. L. 1989. Natural history of a relictual population of the prairie vole, *Microtus ochrogaster*, in southwestern Oklahoma. *Occas. Papers Mus., Texas Tech Univ.*, 129:1-20.
- CHOATE, L. L., J. K. JONES, JR., R. W. MANNING, AND C. JONES. 1990. Westward ho: continued dispersal of the pygmy mouse, *Baiomys taylori*, on the Llano Estacado and in adjacent areas of Texas. *Occas. Papers Mus., Texas Tech Univ.*, 134:1-8.
- DALQUEST, W. W., AND J. A. BASKIN. 1991. Local abundance of prairie voles in Beaver County, Oklahoma. *Texas J. Sci.*, 43:104-105.
- DALQUEST, W. W., AND N. V. HORNER. 1984. Mammals of north-central Texas. Midwestern State Univ. Press, Wichita Falls, Texas, 254 pp.
- DALQUEST, W. W., AND F. B. STANGL, JR. 1984. The taxonomic status of *Myotis magnamolaris* Choate and Hall. *J. Mamm.*, 65:485-486.
- DALQUEST, W. W., F. B. STANGL, JR., AND J. K. JONES, JR. 1990. Mammalian zoogeography of a Rocky Mountain-Great Plains interface in New Mexico, Oklahoma, and Texas. *Spec. Publ. Mus., Texas Tech Univ.*, 34:1-78.
- DUCK, L. G., AND J. B. FLETCHER. 1943. A game type map of Oklahoma. *Oklahoma Biol. Surv.*, 1 p.
- GEORGE, S. B., J. R. CHOATE, AND H. H. GENOWAYS. 1981. Distribution and taxonomic status of *Blarina hylophaga* Elliot (Insectivora: Soricidae). *Ann. Carnegie Mus. Nat. Hist.*, 50:493-513
- GETTINGER, D. 1991. New distributional records for rice rats (*Oryzomys palustris*) in Oklahoma. *Proc. Oklahoma Acad. Sci.*, 71:53.

- GLASS, B. P. 1982. Seasonal movements of Mexican freetail bats *Tadarida brasiliensis mexicana* banded in the Great Plains. *Southwestern Nat.*, 27:127-133.
- GLASS, B. P., AND R. J. BAKER. 1965. *Vespertilio subulatus* Say, 1823: proposed suppression under the plenary powers (Mammalia, Chiroptera). *Bull. Zool. Nomenclature*, 22:204-205.
- GLASS, B. P., AND A. F. HALLORAN. 1961. The small mammals of the Wichita Mountains Wildlife Refuge, Oklahoma. *J. Mamm.*, 42:234-239.
- GLASS, B. P., AND C. M. WARD. 1959. Bats of the genus *Myotis* from Oklahoma. *J. Mamm.*, 40:194-201.
- GOETZE, J. R. 1989. Mammalian faunas of a late Pleistocene-Holocene terrace of the Red River, Tillman County, Oklahoma. *Texas J. Sci.*, 41:205-209.
- HALL, E. R. 1981. The mammals of North America. John Wiley & Sons, New York, 2nd ed., 1:xv + 1-600 + 90 and 2:vi + 601-1181 + 90.
- HALLORAN, A. F. 1963. Specimens of the black bear (*Euarctos americanus*) from the Wichita Mountains of Oklahoma. *Southwestern Nat.*, 8:174.
- HALLORAN, A. F., AND B. P. GLASS. 1959. The carnivores and ungulates of the Wichita Mountains Wildlife Refuge, Oklahoma. *J. Mamm.*, 40:360-370.
- HATCHER, R. T. 1982. Distribution and status of red foxes (Canidae) in Oklahoma. *Southwestern Nat.*, 27:183-186.
- HEANEY, L. R., AND R. M. TIMM. 1983. Relationships of pocket gophers of the genus *Geomys* from the central and northern Great Plains. *Misc. Publ. Mus. Nat. Hist., Univ. Kansas*, 74:1-59.
- HONEYCUTT, R. L., AND D. J. SCHMIDLY. 1979. Chromosomal and morphological variation in the plains pocket gopher, *Geomys hirsarius*, in Texas and adjacent states. *Occas. Papers Mus., Texas Tech Univ.*, 58:1-54.
- HUMPHREY, S. R., AND H. W. SETZER. 1989. Geographic variation and taxonomic revision of rice rats (*Oryzomys palustris* and *O. argentatus*) of the United States. *J. Mamm.*, 70:557-570.
- JONES, C., R. D. SUTTKUS, AND M. A. BOGAN. 1987. Notes of some mammals of north-central Texas. *Occas. Papers Mus., Texas Tech Univ.*, 115:1-21.
- JONES, J. K., JR., AND C. JONES. 1992. Revised checklist of Recent land mammals of Texas, with annotations. *Texas J. Sci.*, 44:53-74.
- JONES, J. K., JR., AND R. W. MANNING. 1990. Additional comments on big brown bats (*Eptesicus fuscus*) from northwestern Texas. *Southwestern Nat.*, 35:342-343.
- JONES, J. K., JR., R. W. MANNING, C. JONES, AND R. R. HOLLANDER. 1988. Mammals of the northern Texas Panhandle. *Occas. Papers Mus., Texas Tech Univ.*, 126:1-54.
- JONES, J. K., JR., R. S. HOFFMANN, D. W. RICE, C. JONES, R. J. BAKER, AND M. D. ENGSTROM. 1992. Revised checklist of North American mammals north of Mexico, 1991. *Occas. Papers Mus., Texas Tech Univ.*, 406:1-23.
- KILPATRICK, C. W., AND W. CAIRE. 1973. The first record of the encinal mouse *Peromyscus pectoralis* for Oklahoma, and additional records for north-central Texas. *Southwestern Nat.*, 18:351.
- KILPATRICK, C. W., AND E. G. ZIMMERMAN. 1976. Biochemical variation and systematics of *Peromyscus pectoralis*. *J. Mamm.*, 57:506-522.

- MARTIN, R. E., AND J. R. PRESTON. 1970. The mammals of Harmon County, Oklahoma. *Proc. Oklahoma Acad. Sci.*, 49:42-60.
- MANNING, R. W., J. K. JONES, JR., AND C. JONES. 1989. Comments on distribution and variation in the big brown bat, *Eptesicus fuscus*, in Texas. *Texas J. Sci.*, 41:95-101.
- MANNING, R. W., C. JONES, R. R. HOLLANDER, AND J. K. JONES, JR. 1987. An unusual number of fetuses in the pallid bat. *Prairie Nat.*, 19:261.
- MANNING, R. W., C. JONES, J. K. JONES, JR., AND R. R. HOLLANDER. 1988. Subspecific status of the pallid bat, *Antrozous pallidus*, in the Texas Panhandle and adjacent areas. *Occas. Papers Mus., Texas Tech Univ.*, 118:1-5.
- MCBEE, K., AND R. J. BAKER. 1982. *Dasyopus novemcinctus*. *Mamm. Species*, 162:1-9.
- MOSS, S. P., AND P. MELHOP-CIFELLI. 1990. Status of the kangaroo rat, *Dipodomys elator* (Heteromyidae), in Oklahoma. *Southwestern Nat.*, 35:356-358.
- NELSON, E. W. 1925. Status of the pronghorned antelope, 1922-24. *Bull. U.S. Dept. Agric.*, 1346:1-64.
- NELSON, K., R. J. BAKER, AND R. L. HONEYCUTT. 1987. Mitochondrial DNA and protein differentiation between hybridizing cytotypes of the white-footed mouse, *Peromyscus leucopus*. *Evolution*, 41:864-872.
- NOWAK, R. M. 1979. North American Quaternary *Canis*. *Monogr. Mus. Nat. Hist., Univ. Kansas*, 6:1-154.
- OSGOOD, W. F. 1909. Revision of the mice of the American genus *Peromyscus*. *N. Amer. Fauna*, 28:1-285.
- REED, K. M., AND J. R. CHOATE. 1988. Southwestern records of the prairie vole. *Southwestern Nat.*, 33:495-496.
- SCHMIDLY, D. J. 1972. Geographic variation in the white-ankled mouse, *Peromyscus pectoralis*. *Southwestern Nat.*, 17:113-138.
- SCHMIDLY, D. J., AND J. A. READ. 1986. Cranial variation in the bobcat (*Felis rufus*) from Texas and surrounding states. *Occas. Papers Mus., Texas Tech Univ.*, 101:1-39.
- SCHULTZ, C. B. 1972. Holocene interglacial migrations of mammals and other vertebrates. *Quart. Res.*, 2:337-340.
- SMITH, K. S. 1991. A Holocene mammalian fauna from Box Elder Creek, Caddo County, Oklahoma. Unpublished M.S. thesis, Midwestern State Univ., Wichita Falls, Texas, 25 pp.
- . 1992. The prairie vole, *Microtus ochrogaster*, in Caddo County, Oklahoma. *Texas J. Sci.*, 44:116-117.
- STANGL, F. B., JR. 1984. Dynamics of chromosomal variation between chromosomally characterized races of *Peromyscus leucopus* (Rodentia: Cricetidae). Unpublished Ph.D. dissertation, Texas Tech Univ., Lubbock, v + 48 pp.
- . 1986. Aspects of a contact zone between two chromosomal races of *Peromyscus leucopus* (Rodentia: Cricetidae). *J. Mamm.*, 67:465-473.
- STANGL, F. B., JR., AND R. J. BAKER. 1984. A chromosomal subdivision in *Peromyscus leucopus*: implications for the subspecies concept as applied to mammals. Pp. 139-145, in *Festschrift for Walter W. Dalquest in honor of his sixty-sixth*

- birthday (N. V. Horner, ed.). Dept. Biology, Midwestern State Univ., Wichita Falls, Texas, xx + 163 pp.
- . 1986. Two noteworthy records of Oklahoma mammals. *Texas J. Sci.*, 31:123-124.
- STANGL, F. B., JR., AND W. W. DALQUEST. 1990. Status of the javelina, *Tayassu tajacu*, in north-central Texas and southern Oklahoma. *Texas J. Sci.*, 305-306.
- STANGL, F. B., JR., AND S. KASPER. 1987. Evidence of communal nesting and winter-kill in a population of *Baiomys taylori* from north-central Texas. *Texas J. Sci.*, 39:292-293.
- STANGL, F. B., JR., S. KASPER, AND T. S. SCHAFFER. 1989. Noteworthy range extensions and marginal distribution records for five species of Texas mammals. *Texas J. Sci.*, 41:436-437.
- STANGL, F. B., JR., R. D. OWEN, AND D. E. MORRIS-FULLER. 1991. Cranial variation and asymmetry in southern populations of the porcupine, *Erethizon dorsatum*. *Texas J. Sci.*, 43:237-259.
- STANGL, F. B., JR., T. S. SCHAFFER, J. R. GOETZE, AND W. PINCHAK. 1992. Opportunistic use of modified and disturbed habitat by the Texas kangaroo rat (*Dipodomys elator*). *Texas J. Sci.*, 44:25-35.
- SUDMAN, P. D., J. R. CHOATE, AND E. G. ZIMMERMAN. 1987. Taxonomy of chromosomal races of *Geomys bursarius lutescens* Merriam. *J. Mamm.*, 68:526-543.
- TYLER, J. D. 1979. Occurrence of the red fox (*Vulpes vulpes*) in western Oklahoma. *Proc. Oklahoma Acad. Sci.*, 59:124-125.
- TYLER, J. D., AND W. J. ANDERSON. 1990. Historical accounts of several large mammals in Oklahoma. *Proc. Oklahoma Acad. Sci.*, 70:51-55.
- TYLER, J. D., AND L. PAYNE. 1982. Second Oklahoma record for the silver-haired bat, *Lasionycteris noctivigans*. *Southwestern Nat.*, 27:245.
- TYLER, J. D., AND C. M. SCOTT. 1982. Status and distribution of *Lasiurus cinereus* (Chiroptera: Vespertilionidae) in Oklahoma. *Proc. Oklahoma Acad. Sci.*, 62:91-91.
- VAN ZYLL DE JONG, C. G. 1984. Taxonomic relationships of Nearctic small-footed bats of the *Myotis leibii* group (Chiroptera: Vespertilionidae). *Canadian J. Zool.*, 62:2519-2526.
- YATES, T. L., AND D. J. SCHMIDLY. 1977. Systematics of *Scalopus aquaticus* (Linnaeus) in Texas and adjacent states. *Occas. Papers Mus., Texas Tech Univ.*, 45:1-36.

Address of authors: *Department of Biology, Midwestern State University, Wichita Falls, Texas 76308 (FBS and WWD); The Museum and Department of Biological Sciences, Lubbock, Texas, 79409 (RJB)*. Received 27 March 1992, accepted 4 May 1992.

PUBLICATIONS OF THE MUSEUM
TEXAS TECH UNIVERSITY

Three serials of The Museum of Texas Tech University are published by Texas Tech University Press. Short research studies are published as Occasional Papers, whereas longer contributions appear as Special Publications. Papers of practical application to collection management and museum operations are issued in the Museology series. All are numbered separately and published on an irregular basis. A complete list of titles is available from the Sales Office.

The preferred abbreviation for citing the Occasional Papers is *Occas. Papers Mus.*, Texas Tech Univ.

Subscriptions (\$30/yr. domestic individuals; \$33/yr. domestic institutions or foreign individuals; \$36/yr. foreign institutions; typically 10 numbers issued per year) are available through Texas Tech University Press, Sales Office, Texas Tech University, Lubbock, Texas 79409-1037. Separate numbers of the Occasional Papers can be purchased (\$3.00 each with a minimum order of 5 copies in any combination) from Texas Tech University Press. Remittance in U.S. currency check, money order, or bank draft must be enclosed with request (add \$1.50 for every 5 / \$5.00 for overseas air; residents of the state of Texas must pay sales tax on the total purchase price). Copies of the "Revised checklist of North American mammals north of Mexico, 1991" (Jones et al., 1992, *Occas. Papers Mus.*, Texas Tech Univ., 146:1-23) are available at \$2.00 each in orders of 10 or more.

ISSN 0149-175X

TEXAS TECH
UNIVERSITY
P R E S S

Lubbock, Texas 79409-1037 USA