



# OCCASIONAL PAPERS

Museum of Texas Tech University

Number 265 21 December 2006

## THE MAMMALS OF SAN ANGELO STATE PARK, TOM GREEN COUNTY, TEXAS

JOEL G. BRANT, ROBERT C. DOWLER, AND CARLA E. EBELING

### ABSTRACT

A survey of the mammalian fauna of San Angelo State Park, Tom Green County, Texas, began in April 1999 and includes data collected through November 2005. Thirty-one species of native mammals, representing 7 orders and 18 families, were verified at the state park. The mammalian fauna at the state park is composed primarily of western Edwards Plateau mammals, which include many Chihuahuan species, and mammals with widespread distributions. The most abundant species of small mammal at the state park were *Neotoma micropus* and *Peromyscus maniculatus*. The total trap success for this study (1.5%) was lower than expected and may reflect the drought conditions experienced in this area during the study period.

Key words: Edwards Plateau, mammal survey, San Angelo State Park, Texas, Tom Green County, zoogeography

### INTRODUCTION

San Angelo State Park (SASP) is located about 10 km (6 mi.) west of San Angelo in Tom Green County, Texas, and is situated around O. C. Fisher Reservoir and the North Concho River (Figs. 1 and 2). This area is an ecotonal zone at the junction of two major biotic regions in Texas, the Edwards Plateau (Balconian) to the south and the Rolling Plains to the north (Blair 1950). This confluence of ecological regions creates an area where eastern species might reach their western range extent or southern species might attain their northern limits.

The Concho drainage system is composed of the South Concho River with its associated lakes and

tributaries, and the North Concho River with its associated tributaries and O. C. Fisher Reservoir (Fig. 1). The North Concho River creates a dispersal corridor for eastern species to move west into west-central Texas.

The soils of SASP are composed mostly of Angelo clay loams. Other important soil types include: Kimbrough associations, Tulia loams, Rioconcho/Spur, Olton clay loams, and Kimbrough-Owens complex (Wiedenfeld and Flores 1976).

According to the National Climate Data Center, the normal precipitation at O. C. Fisher Dam, located

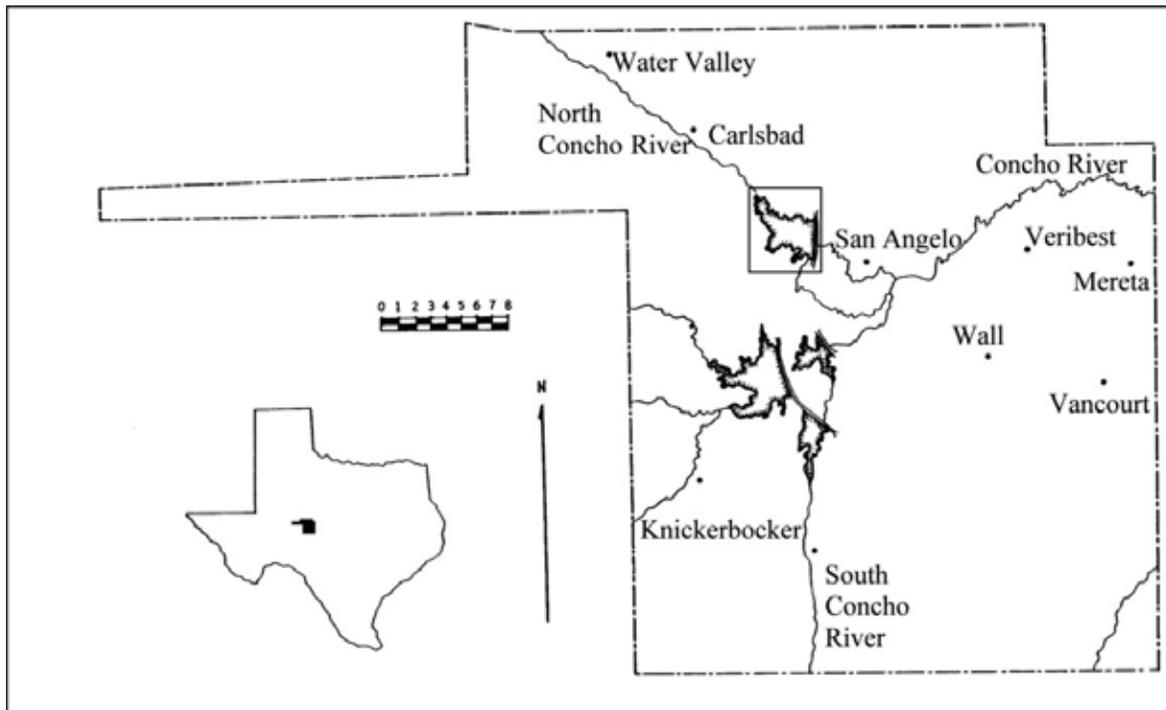


Figure 1. Tom Green County, Texas (modified from Boyd et al. 1997).

within SASP, is 55.1 cm (21.7 inches) per year. From 1980 to 1994 the average annual precipitation was 64.0 cm (25.2 inches). The average annual precipitation from 1999 to 2001 was 40.3 cm (15.9 inches), considerably lower than normal for this area.

To date, no survey of the mammalian fauna of SASP has been performed. The first records of mammals for Tom Green County were included in Vernon Bailey's biological survey of Texas (1905). Bailey designated Tom Green County as part of the semiarid Lower Sonoran region of the Lower Austral zone in Texas, which contained 82 species of mammals. Boyd et al. (1997) performed the most inclusive survey of the mammalian fauna of Tom Green County to date. They reported the occurrence of 48 species of mammals in this area. Included in this study were 17 county

records. The most recent survey to include this area was Goetze (1998), though this work described the mammals of the entire Edwards Plateau of Texas.

Our study began in April 1999 and includes data collected through November 2005. The purposes of this study were: 1) to determine the occurrence of mammal species at SASP; 2) to estimate the relative abundance of small mammal species at selected sites in the state park; 3) to determine seasonal patterns of abundance for small rodent species there; and 4) to establish permanent, georeferenceable sampling sites in SASP. The information gathered in this study should prove valuable as baseline data for future studies of biodiversity and detection of change at SASP and in west-central Texas.

## MATERIALS AND METHODS

Five sites were chosen for analysis of rodent communities from the seven wildlife management areas (WMA) west of FM 2288 as representative of the habitat types in the park (Fig. 2). These sites were

located in restricted areas of the park to reduce the probability of human interaction with trap lines. Sampling was carried out at these primary sites for small mammal relative abundance studies presented later in

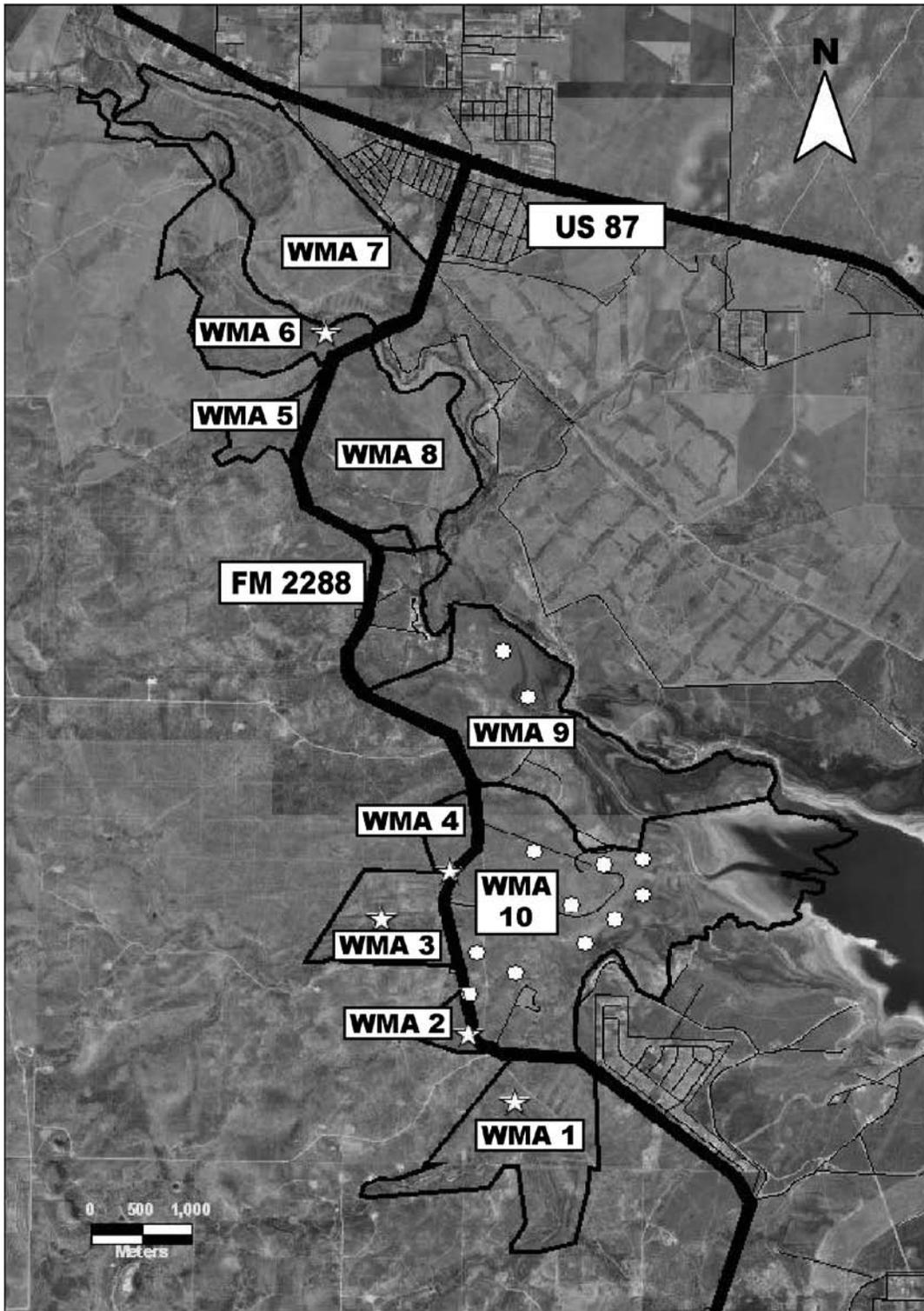


Figure 2. Wildlife Management Areas (WMA) of San Angelo State Park showing primary collecting sites used for rodent community assessment (stars) and additional localities sampled for medium-sized mammals with Trailmaster cameras (circles).

this report under Community Interactions. Additional sites throughout the park were sampled incidentally over the entire project for small and medium-sized mammals and bats. Twelve sites also were surveyed for medium-sized mammals in 2005 using Trailmaster cameras (Fig. 2). We considered road-killed animals found on roads bordering the state park as part of the park fauna.

Sampled habitat types were as follows: brush managed mesquite-prickly pear series shrubland, mesquite-prickly pear series shrubland, semi-riparian, mesquite flat, and riparian. One primary sampling site was assigned to each habitat type and sampled for rodents during three seasons. Primary sampling sites were used to gather data on reproductive status and relative abundance of rodents. Each primary sampling site was recorded by global positioning system (GPS) readings in latitude and longitude.

Wildlife Management Area 1, located 0.5 mi. N, 6.0 mi. W San Angelo (31°28.2'N, 100°32.3'W), is composed of brush managed mesquite-prickly pear series shrubland. This site is bisected by Potts Creek, which flows north into O. C. Fisher Reservoir. This site has been brush managed to control mesquite, as evidenced by the alternating bands of brushy areas and cleared areas. The soil is composed of Angelo clay loams along Potts Creek, with Olton clay loams and Tulia loams comprising the eastern side of Potts Creek, and Kimbrough associations comprising the western portions of the site (Wiedenfeld and Flores 1976).

Wildlife Management Area 2, located 1.0 mi. N, 6.5 mi. W San Angelo (31°28.6'N, 100°32.8'W), has two ponds in the middle of the area. The vegetation is mesquite-prickly pear series shrubland, the most common vegetation type in SASP, with a *Yucca* sp. influence. The soil is composed of Angelo clay loams around the ponds, Kimbrough associations along the southeastern slope, and Tulia loams comprising the northwestern portion of the area (Wiedenfeld and Flores 1976).

Wildlife Management Area 3, located 1.5 mi. N, 7.0 mi. W San Angelo (31°29.2'N, 100°33.3'W), is a semi-riparian habitat centered on Turkey Creek. This creek is intermittent, containing water only after the

area has experienced rain. The vegetation is mesquite-prickly pear series shrubland with more grasses near Turkey Creek. The soil is composed of Rioconcho and Spur soils along Turkey Creek, with Tulia loams on the southern side of the creek and Mereta clay loams on the northern side (Wiedenfeld and Flores 1976).

Wildlife Management Area 4, located 2.0 mi. N, 6.5 mi. W San Angelo (31°29.5'N, 100°32.8'W), is a mesquite flat with mesquite series shrubland vegetation. The mesquite is denser at this site than at any other site. The soil is composed of alternating bands of Angelo clay loams and Tulia loams (Wiedenfeld and Flores 1976).

Wildlife Management Area 6, located 5.5 mi. N, 7.5 mi. W San Angelo (31°32.5'N, 100°33.8'W), is a riparian habitat located in the northwestern corner of the park. Vegetation is mainly mesquite-prickly pear series shrubland with plateau live oak-pecan series deciduous woodland along the North Concho River. The soil is composed of Rioconcho and Spur soils along the river, with Angelo clay loams and Tulia loams comprising the northern portion of the site, and Tulia loams, Kimbrough associations, and Amarillo fine sandy loams south of the river (Wiedenfeld and Flores 1976).

Standard techniques for sampling small to medium-sized species were utilized to survey the mammalian fauna (Jones et al. 1996; Animal Care and Use Committee 1998). Three trap lines consisting of 50 Sherman live traps each were set in a pace-line method (10 m intervals between traps) at each primary sampling site. Medium-sized mammals were sampled using Tomahawk live traps set at each primary sampling site. Additional Sherman traps and Tomahawk traps were used at selected sites to fill in distributional records of mammals for some areas in the park where trapping was restricted for much of the year. Bat populations were sampled along the North Concho drainage system using mist nets. Spotlighting was utilized to sample nocturnal species that are difficult to trap. Large mammals were recorded by sightings and with 12 Trailmaster cameras set out for 14-day periods each during the four seasons in 2005.

Voucher specimens were made of the first capture of a species on a primary sampling site each season. Other individuals of the same species captured

during the same season on the same primary sampling site were identified in the field and released at the point of capture. Small rodents were released after measurements of tail length, hind foot length, and ear length were taken. All techniques for handling captured individuals conformed to published guidelines (Jones et al. 1996; Animal Care and Use Committee 1998). Voucher specimens were prepared as museum study skins and skeletons and deposited in the Angelo State Natural History Collections (ASNHC). Frozen tissue samples for most specimens also were deposited in the Collection of Frozen Tissues, ASNHC.

Relative abundance for small rodents was estimated using capture indices (Conroy 1996) based on the number of individual animals captured per unit of time and effort (trap night). Primary sites were sampled using 600 trap nights per season, for a total of 1800 trap nights per primary sampling site. Wildlife Management Areas 1 and 3 were only sampled for 300 trap nights each during the spring sample to yield a total of 1500 trap nights for the year for these sites.

## RESULTS AND SPECIES ACCOUNTS

Seven orders and 18 families of mammals were recorded during this survey at San Angelo State Park. The following accounts treat 31 species native to the SASP area. All collection localities were recorded in relation to the city of San Angelo. Additional records are reported as recorded on specimen labels. Phylogenetic order conforms to Nowak (1999). Scientific names follow Wilson and Reeder (1993). All subspecific designations are according to Hall (1981). Common names follow Baker et al. (2003). Distribution maps depicting collection localities for most species were included in a report to Texas Parks and Wildlife, Natural Resource Program (Dowler and Brant 2002).

### ORDER DIDELPHIMORPHIA

#### Family Didelphidae

#### *Didelphis virginiana virginiana* Kerr 1792

#### Virginia Opossum

This species is common at SASP. One specimen was collected from WMA 3 on 15 March 2000. Another specimen was collected from WMA 6 on 18 March 2000. The latter specimen was collected, along with two other individuals that were released, in the North Concho River bottom. Twenty opossums were observed in WMA 8, 10, and near Bald Eagle Creek from September 2001 to January 2002. Additionally, Trailmaster camera systems recorded this species in every season except summer in WMA 9 and in all seasons in WMA 10.

*Specimens examined* (2).—WMA 3 (31°29.2'N, 100°33.3'W), 1 (ASNHC 11792); WMA 6 (31°32.5'N, 100°33.8'W), 1 (ASNHC 11793).

*Additional records* (2).—4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 1; 6.8 mi. W San Angelo (31°27.8'N, 100°33.1'W), 1 (ASNHC).

### ORDER XENARTHRA

#### Family Dasypodidae

#### *Dasypus novemcinctus mexicanus* Peters 1864 Nine-banded Armadillo

A skull was salvaged from a male road-killed armadillo on FM 2288 near WMA 4 on 14 May 2001. Another skull was taken from a road-killed armadillo near WMA 5 on 17 March 2000. Trailmaster photographs recorded this species in spring (WMA 9 and 10), summer (WMA 10), and fall (WMA 9 and 10) of 2005. Other armadillos were sighted along FM 2288 in WMA 3 and near Angelo State University's Management Instruction and Research (MIR) Center just to the north of SASP.

*Specimens examined* (2).—2.3 mi. N Arden Rd. on FM 2288 (31°28.6'N, 100°46.0'W), 1 (ASNHC 11794); 4 mi. N, 7¼ mi. W San Angelo (31°31.3'N, 100°33.6'W), 1 (ASNHC 12861).

### ORDER CHIROPTERA

#### Family Vespertilionidae

#### *Myotis velifer incautus* (J. A. Allen 1896) Cave Bat

The cave bat is known throughout much of western Texas and this species is regularly recorded in Tom Green County (Boyd et al. 1997). Two female specimens of *M. velifer* were collected in a mist net over

the North Concho River on 31 July 2000 and 2 October 2000.

*Specimens examined* (2).—North Concho River at FM 2288 (31°32.1'N, 100°33.3'W) (ASNHC 11803, 11977).

***Lasiurus borealis*** (Müller 1776)  
Eastern Red Bat

In Tom Green County, red bats are common in riparian areas and in residential neighborhoods from May through October (Boyd et al. 1997). In SASP, this species is common along the North Concho River. We collected one specimen as early in the year as 27 April 2001. Three reproductive females were captured and released on 31 May 2001 over the North Concho River. One of these was pregnant and the other two had prominent mammae. Other specimens were collected in June, July, and August.

*Specimens examined* (8).—North Concho River at FM 2288 (31°32.6'N, 100°33.3'W), 8 (ASNHC 11795-11802).

Family Molossidae  
***Tadarida brasiliensis mexicana***  
(I. Geof. St.-Hilaire 1824)  
Brazilian Free-tailed Bat

These bats are probably the most common species of bat in Texas with a distribution that is statewide (Schmidly 1991). In Tom Green County, the species commonly roosts in buildings and under bridges (Boyd et al. 1997). We netted many *Tadarida brasiliensis* in SASP over the North Concho River and have specimens from as early as 24 March to 16 October.

*Specimens examined* (9).—North Concho River at FM 2288 (31°32.6'N, 100°33.3'W), 9 (ASNHC 11804-11808, 11978-11981).

ORDER CARNIVORA  
Family Canidae  
***Vulpes vulpes fulva*** (Desmarest 1820)  
Red Fox

Boyd et al. (1997) reported four specimens collected from the MIR Center to the north of SASP.

One of these was a pregnant female with three embryos collected on 2 March 1992. We observed a *Vulpes vulpes* during collecting activities in October of 2005 in WMA 10.

*Additional records* (4).—4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 4 (ASNHC).

***Urocyon cinereoargenteus scottii*** Mearns 1891  
Common Gray Fox

In Tom Green County, this species is more common than *Vulpes vulpes* (Boyd et al. 1997). A female was collected from near Bald Eagle Creek on 15 December 2000. A male road-killed gray fox was salvaged on FM 2288 near WMA 9. A skull was salvaged from another roadkill on Arden Road near Red Arroyo Park adjacent to SASP on 12 October 2001. One individual was sighted on 15 March 2000 emerging from a den in Turkey Creek. Trailmaster photographs of gray fox were taken from WMA 10 in winter, spring, and fall of 2005. Boyd et al. (1997) reported that gray fox were abundant at the MIR Center, which borders SASP to the north.

*Specimens examined* (3).—1 mi. S, 3½ mi. W San Angelo (31°26.9'N, 100°30.2'W), 1 (ASNHC 12862); 3 mi. N Arden Rd. on FM 2288 (31°28.3'N, 100°31.8'W), 1 (ASNHC 11809); 7.2 mi. N, 3 mi. W San Angelo (31°34.1'N, 100°29.3'W), 1 (ASNHC 11810).

*Additional records* (1).—4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 1 (ASNHC).

Family Procyonidae  
***Bassariscus astutus flavus*** Rhoads 1894  
Ringtail

A scrotal male was collected from the base of the rocky dam on the south shore of O. C. Fisher Reservoir on 8 December 1999. Another male was collected from WMA 9 on 31 March 2001. Four ringtails were observed in the northern areas of the park near Bald Eagle Creek, WMA 6, and WMA 7 from July 2000 to October 2001.

*Specimens examined* (2).—¼ mi. N, 3 mi. W San Angelo (31°28.0'N, 100°29.3'W), 1 (ASNHC 11821); WMA 7 (31°32.6'N, 100°33.6'W), 1 (ASNHC 11822).

*Procyon lotor fuscipes* Mearns 1914  
Common Raccoon

This is one of the most abundant mesomammals in Tom Green County (Boyd et al. 1997) and in SASP. One male was collected on 9 June 1999 and a pregnant female was collected on 14 December 2000 from WMA 6. A female was collected from WMA 1 on 29 June 1999. Twenty-five other raccoons were sighted or captured and released from April 1999 to February 2002 in many areas of the park, including WMA 6, 7, 8, 10, and the Bald Eagle Creek area. Trailmaster photographs documented raccoons in all seasons in WMA 9 and 10 of 2005.

*Specimens examined* (3).—WMA 1 (31°28.2'N, 100°32.3'W), 1 (ASNHC 11823); WMA 6 (31°32.5'N, 100°33.8'W), 2 (ASNHC 11824, 12863).

*Additional records* (5).—5.5 mi. N, 7 mi. W San Angelo (31°32.6'N, 100°33.4'W), 1; 5 mi. N, 5 mi. W San Angelo (31°32.2'N, 100°31.3'W), 1; 4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 3 (ASNHC).

Family Mustelidae  
*Taxidea taxus* (Schreber 1777)  
American Badger

This species has been fairly common in Tom Green County since the 1890s (Boyd et al. 1997). In SASP, one road-killed badger was collected on FM 2288 on 8 July 1994. Trailmaster photographs of *T. taxus* also document this species in WMA 10 during winter, spring, and fall of 2005.

*Specimens examined* (1).—7.5 mi. N (by road) of Jct. 853 and FM 2288 (31°29.5'N, 100°32.8'W) (ASNHC 11820).

Family Mephitidae  
*Spilogale gracilis leucoparia* Merriam 1890  
Western Spotted Skunk

In Tom Green County, this species is uncommon but has been encountered near human populations (Boyd et al. 1997). A scrotal male with testes measuring 21 by 15 mm was collected from WMA 4 on 14 July 1999. This specimen was collected in an area of Angelo clay loams with mesquite, prickly pear, and pencil cactus surrounding the trap. A second *S.*

*gracilis* was taken from WMA 10 on 13 November 2005. Trailmaster photographs of *S. gracilis* were taken in WMA 10 during winter, spring, and fall. Additional spotted skunks were captured from the Bald Eagle Creek area near the border of both SASP and the MIR Center but were radio collared and released from 2001–2004.

*Specimens examined* (2).—WMA 4 (31°29.5'N, 100°32.8'W), 1 (ASNHC 11819); WMA 10 (31°28.8'N, 100°32.6'W), 1, (ASNHC 13003).

*Additional records* (1).—7.5 mi. W San Angelo (31°27.8'N, 100°33.9'W), 1 (ASNHC).

*Mephitis mephitis varians* Gray 1837  
Striped Skunk

This species was found in every habitat type in SASP. One female without embryos was collected from WMA 1 on 2 July 1999. A scrotal male was collected from WMA 2 on 12 March 2000. A skull was collected from WMA 6. Twenty striped skunks were seen, or captured then released, from May 1999 to February 2002 at several localities within SASP, including WMA 2, 3, 6, 7, and the Bald Eagle Creek area. Trailmaster photographs of *M. mephitis* were taken in WMA 9 and 10 in all seasons.

*Specimens examined* (3).—WMA 1 (31°28.2'N, 100°32.3'W), 1 (ASNHC 11817); WMA 2 (31°28.6'N, 100°32.8'W), 1 (ASNHC 11818); WMA 6 (31°32.5'N, 100°33.8'W), 1 (ASNHC 11816).

*Additional records* (1).—4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 1 (ASNHC).

*Conepatus leuconotus mearnsi* Merriam 1902  
Hog-nosed Skunk

Two non-scrotal males with testes measurements of less than 23 by 14 mm were salvaged from road-kills along FM 2288 near WMA 5 on 6 and 20 November 1999. Four individuals were observed at WMA 7 and on the road near WMA 1 from December 2000 to January 2002. Trailmaster photographs of *C. leuconotus* were taken in WMA 10 in March of 2005. Two additional hog-nosed skunks were captured from the Bald Eagle Creek area of both SASP and the MIR Center but were radio collared and released from 2001–2002.

*Specimens examined* (2).—WMA 3, 6 mi. N of Arden Rd. on FM 2288 (31°29.8'N, 100°32.7'W), 1 (ASNHC 11812); WMA 5 (31°32.3'N, 100°33.7'W), 1 (ASNHC 11813).

Family Felidae

*Lynx rufus texensis* J. A. Allen 1829

Bobcat

In Tom Green County, bobcats are usually encountered in association with the Concho River drainage system (Boyd et al. 1997). A skull was salvaged from a road-killed bobcat on FM 2288 near WMA 7 on 11 June 2001. Boyd et al. (1997) reported one specimen collected from the MIR Center and one sight record from near O. C. Fisher Reservoir. Trailmaster photographs of the bobcat were taken in WMA 10 in winter, spring, and summer of 2005 and in WMA 9 in fall of 2005. This species is probably common in SASP.

*Specimen examined* (1).—6.1 mi. N Arden Rd. on FM 2288 (31°29.8'N, 100°32.7'W) (ASNHC 11815).

*Additional records* (1).—4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 1 (ASNHC).

ORDER ARTIODACTYLA

Family Tayassuidae

*Pecari tajacu angulatus* (Cope 1889)

Collared Peccary

A skull was collected from the Bald Eagle Creek area in October 2001, but the actual date of death is uncertain. One unsalvageable road-killed individual was sighted on the morning of 6 January 2000 on FM 2288 near the North Concho River. Trailmaster photographs documented *P. tajacu* in 2005 at WMA 9 and 10 during spring and fall, respectively.

*Specimens examined* (1).—5 mi. N, 5 mi. W San Angelo, Bald Eagle Creek Area (31°32.2'N, 100°31.3'W), 1 (ASNHC 11982).

Family Cervidae

*Odocoileus virginianus texana* (Mearns 1898)

White-tailed Deer

Skulls of two female deer were salvaged from WMA 1 and a skull of a third was salvaged from WMA

6. These skulls were found in March and June 1999. Many other individuals were sighted throughout the park and several roadkills can be seen every month along FM 2288. Controlled deer hunts are held each year at SASP.

*Specimens examined* (3).—WMA 1 (31°28.2'N, 100°32.3'W), 2 (ASNHC 11825, 11827); WMA 6 (31°32.5'N, 100°33.8'W), 1 (ASNHC 11826).

*Additional records* (1).—4 mi. N, 4 mi. W San Angelo (31°31.3'N, 100°30.3'W), 1 (ASHNC).

ORDER RODENTIA

Family Sciuridae

*Spermophilus mexicanus parvidens* Mearns 1896

Mexican Ground Squirrel

A juvenile female was collected from WMA 1 on 29 June 1999. A scrotal male was collected on 16 May 2001 from along FM 2288 near WMA 3. A third specimen was taken on 10 April 2005 at WMA 10. Mexican ground squirrels were also seen in WMA 1, 2, and 3 and photographed with the Trailmaster cameras in WMA 10 during spring, summer, and fall of 2005.

*Specimens examined* (2).—WMA 1 (31°28.2'N, 100°32.3'W), 1 (ASNHC 11830); 2 mi. N, 6 mi. W San Angelo, FM 2288 (31°29.6'N, 100°32.3'W), 1 (ASNC 11831).

*Additional records* (3).—5.2 mi. N, 6.3 mi. W San Angelo (31°32.4'N, 100°32.6'W), 2; 4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 1 (ASNHC).

*Spermophilus variegatus buckleyi* Slack 1861

Rock Squirrel

Rock squirrels occur in many areas of Tom Green County with suitable habitats that include rocky areas usually with a water source (Boyd et al. 1997). One scrotal male was collected near the headquarters on rockwork of O. C. Fisher dam on 16 May 2001. Two specimens were collected from the north part of the park on 14 February 2002.

*Specimens examined* (3).—San Angelo State Park headquarters (31°27.2'N, 100°29.6'W), 1 (ASNHC

11832); Bald Eagle Creek (31°32.1'N, 100°32.6'W), 2 (ASNHC 11833, 11834).

*Sciurus niger limitis* Baird 1855  
Eastern Fox Squirrel

A scrotal male was collected from WMA 7 on 3 December 2000. No other fox squirrels were seen during this study but they likely occur along the North Concho River and around O. C. Fisher Reservoir.

*Specimens examined* (1).—WMA 7 (31°32.6'N, 100°33.6'W), 1 (ASNHC 11828).

Family Castoridae  
*Castor canadensis texensis* V. Bailey 1905  
American Beaver

A skull was salvaged from a road-killed beaver on FM 2288 at WMA 2 on 5 March 2001. Evidence of the presence of beavers, including cuttings on trees, has been encountered along the North Concho River in WMA 7. Boyd et al. (1997) reported a specimen collected from about one mile east of the park in San Angelo. In Tom Green County, beavers have been found in both the North Concho River and the South Concho River (Boyd et al. 1997).

*Specimens examined* (1).—WMA 2 (31°28.6'N, 100°32.8'W), 1 (ASNHC 12864).

Family Heteromyidae  
*Perognathus merriami gilvus* Osgood 1900  
Merriam's Pocket Mouse

Lee and Engstrom (1991) designated the silky pocket mice in Tom Green County as *P. merriami*, based on a systematic study of *Perognathus flavus*. This was the most abundant rodent encountered in WMA 1 with six individuals collected and six individuals captured and released from 6 April 1999 to 11 March 2000. Thirteen individuals were collected from WMA 2, 3, 4, and 10 from June 1999 to April 2005.

*Specimens examined* (16).—WMA 1 (31°28.2'N, 100°32.3'W), 6 (ASNHC 11845-11849, 11860); WMA 2 (31°28.6'N, 100°32.8'W), 3 (ASNHC 11850-11852); WMA 3 (31°29.2'N, 100°33.3'W), 2 (ASNHC 11853-11854); WMA 4 (31°29.5'N, 100°32.8'W), 5 (ASNHC 11855-11859).

*Additional records* (11).—4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 5; 3.3 mi. N, 3.6 mi. W San Angelo (31°30.7'N, 100°29.9'W), 6 (ASNHC).

*Chaetodipus hispidus hispidus* Baird 1858  
Hispid Pocket Mouse

Four individuals were collected from WMA 1 from May 1999 to March 2000. One individual was collected from WMA 2 on 18 June 1999 and three individuals were collected from WMA 3 from May 1999 to December 2000. Two individuals were collected from WMA 4 on 2 June 1999 and 16 March 2000. In Tom Green County, this species is most abundant around O. C. Fisher Reservoir (Boyd et al. 1997).

*Specimens examined* (10).—WMA 1 (31°28.2'N, 100°32.3'W), 4 (ASNHC 11835, 11836, 11841, 11844); WMA 2 (31°28.6'N, 100°32.8'W), 1 (ASNHC 11837); WMA 3 (31°29.2'N, 100°33.3'W), 3 (ASNHC 11838-11840); WMA 4 (31°29.5'N, 100°32.8'W), 2 (ASNHC 11842, 11843).

*Additional records* (17).—4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 8; 3.8 mi. N, 4.1 mi. W San Angelo (31°31.1'N, 100°30.4'W), 2; 3.3 mi. N, 3.6 mi. W San Angelo (31°30.7'N, 100°29.9'W), 7 (ASNHC).

Family Muridae  
*Neotoma micropus micropus* Baird 1855  
Southern Plains Woodrat

This species was the second most abundant rodent encountered at SASP, with 30 specimens collected. Specimens were collected from each primary sampling site and 19 individuals were captured and released in WMA 2, 3, and 4. Reproductive males were recorded during October 2001, while females with embryos were found during June and July 1999 and March 2000.

*Specimens examined* (30).—WMA 1 (31°28.2'N, 100°32.3'W), 2 (ASNHC 11869, 11870); WMA 2 (31°28.6'N, 100°32.8'W), 5 (ASNHC 11868, 11871, 11885-11887); WMA 3 (31°29.2'N, 100°33.3'W), 10 (ASNHC 11872-11876, 11888-11892); WMA 4 (31°29.5'N, 100°32.8'W), 7 (ASNHC 11877-11883); WMA 6 (31°32.5'N, 100°33.8'W), 1 (ASNHC 11884);

WMA 10 (31°29.3'N, 100°32.6'W), 5 (ASNHC 11893-11897).

*Additional records* (1).—0.9 mi. N, 5.8 mi. W San Angelo (31°28.6'N, 100°32.1'W), 1 (ASNHC).

***Neotoma leucodon*** Merriam 1894  
Eastern White-throated Woodrat

Formerly recognized as within the species *N. albigula*, populations east of the Rio Grande in the United States have recently been elevated to a separate species (Edwards et al. 2001). In Tom Green County, the five known specimens of this species have been collected in juniper-live oak vegetation in the extreme northern portion of the county (Boyd et al. 1997). One pregnant female with four embryos was collected on 13 July 1999 and another female was collected on 16 October 2000 from WMA 4. These specimens indicate that the white-throated woodrat is more widespread than previously reported but remains an uncommon species in this area.

*Specimens examined* (2).—WMA 4 (31°29.5'N, 100°32.8'W), 2 (ASNHC 11866, 11867).

***Baiomys taylori taylori*** (Thomas 1887)  
Northern Pygmy Mouse

Two specimens were collected at SASP from WMA 2 on 13 March 2000 and two additional specimens were taken from WMA 10 on 13 November 2005. Boyd et al. (1997) reported six specimens from two localities in the immediate area of SASP. This species has recently been reported to be expanding its range northward and westward since the beginning of the century (Choate et al. 1990) and probably established itself in Tom Green County within the last 30-50 years (Boyd et al. 1997).

*Specimens examined* (4).—WMA 2 (31°28.6'N, 100°32.8'W), 2 (ASNHC 11864, 11865); WMA 10 (31°28.8'N, 100°32.6'W), 2 (ASNHC 13002, 13002).

*Additional records* (6).—4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 5; 0.9 mi. N, 3.6 mi. W San Angelo (31°28.6'N, 100°29.9'W), 1 (ASNHC).

***Peromyscus maniculatus blandus*** Osgood 1904  
Deer Mouse

This species was the most abundant rodent encountered at SASP, with 48 specimens collected. Reproductive individuals were recorded in March 2000 and May 2001. Scrotal males, pregnant females, and juveniles were all recorded during March 2000. These specimens along with other records indicate a healthy population of deer mice associated with O. C. Fisher Reservoir.

*Specimens examined* (47).—WMA 1 (31°28.2'N, 100°32.3'W), 6 (ASNHC 11912-11917); WMA 2 (31°28.6'N, 100°32.8'W), 17 (ASNHC 11918-11934); WMA 3 (31°29.2'N, 100°33.3'W), 16 (ASNHC 11935-11950); WMA 4 (31°29.5'N, 100°32.8'W), 7 (ASNHC 11951-11958); WMA 6 (31°32.5'N, 100°33.8'W), 1 (ASNHC 11859).

*Additional records* (10).—4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 3; 3.7 mi. N, 4.4 mi. W San Angelo (31°31.0'N, 100°30.7'W), 1; 1.8 mi. N, 6.5 mi. W San Angelo (31°29.4'N, 100°32.8'W), 4; 0.9 mi. N, 5.8 mi. W San Angelo (31°28.6'N, 100°32.1'W), 2 (ASNHC).

***Peromyscus leucopus texanus*** (Woodhouse 1853)  
White-footed Mouse

This species was the third most abundant rodent encountered at SASP and the most abundant rodent in WMA 2. Reproductive females were recorded in October and December 2000. These specimens and other records indicate that this species is fairly common throughout SASP.

*Specimens examined* (13).—WMA 1 (31°28.2'N, 100°32.3'W), 4 (ASNHC 11899-11902); WMA 2 (31°28.6'N, 100°32.8'W), 9 (ASNHC 11903-11911).

*Additional records* (19).—5 mi. N, 5 mi. W San Angelo (31°32.2'N, 100°31.3'W), 5; 4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 1; 3.3 mi. N, 3.6 mi. W San Angelo (31°30.7'N, 100°29.9'W), 2; 2.9 mi. N, 6.1 mi. W San Angelo (31°30.3'N, 100°29.9'W), 2; 1.8 mi. N, 6.5 mi. W San Angelo (31°29.4'N, 100°32.8'W), 5; 0.9 mi. N, 5.8 mi. W San Angelo (31°28.6'N, 100°32.1'W), 3; 0.9 mi. N, 3.6 mi. W San Angelo (31°28.6'N, 100°29.9'W), 1 (ASNHC).

*Sigmodon hispidus texianus*  
(Audubon and Bachman 1853)  
Hispid Cotton Rat

In Tom Green County, this species is most abundant around O. C. Fisher Reservoir (Boyd et al. 1997). Nine individuals were collected from WMA 2 from 28 July 1999 to 13 March 2000. One individual was collected from WMA 3 from 30 May 1999 to 15 March 2000.

*Specimens examined* (10).—WMA 2 (31°28.6'N, 100°32.8'W), 9 (ASNHC 11960-11968); WMA 3 (31°29.2'N, 100°33.3'W), 1 (ASNHC 11969).

*Additional records* (19).—4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 8; 4.4 mi. N, 3 mi. W San Angelo (31°31.7'N, 100°29.3'W), 1; 3.8 mi. N, 4.1 mi. W San Angelo (31°31.1'N, 100°30.4'W), 1; 3.3 mi. N, 3.6 mi. W San Angelo (31°30.7'N, 100°29.9'W), 3; 2.9 mi. N, 6.1 mi. W San Angelo (31°30.3'N, 100°32.4'W), 2; 1.8 mi. N, 6.5 mi. W San Angelo (31°29.4'N, 100°32.8'W), 3; 0.9 mi. N 5.8 mi. W San Angelo (31°28.6'N, 100°32.1'W), 1 (ASNHC).

Family Erethizontidae

*Erethizon dorsatum couesi* Mearns 1897  
Porcupine

A partial skeleton was salvaged from a road-killed individual on the edge of WMA 9 on 20 November 1999 and a skull was salvaged from another roadkill at WMA 5 on 2 October 2001. A male was collected from WMA 6 on 15 December. Trailmaster photographs recorded *E. dorsatum* during winter and spring of 2005 in WMA 10. Several other unsalvageable road-killed individuals were seen on FM 2288 throughout the study area.

*Specimens examined* (3).—WMA 5 (31°32.0'N, 100°33.8'W), 1 (ASNHC 11970); WMA 6 (31°32.5'N, 100°33.8'W), 1 (ASNHC 11971); WMA 9 (31°30.4'N, 100°33.1'W), 1 (ASNHC 11972).

ORDER LAGOMORPHA  
Family Leporidae  
*Sylvilagus floridanus chapmani*  
(J. A. Allen 1899)  
Eastern Cottontail

A skull was salvaged from a road-killed individual on Arden Road on 17 March 2000. A female was collected from WMA 4 on 2 December 2000 and a pregnant female was collected from WMA 8 on 25 March 2001. This species is almost indistinguishable from *S. audubonii*, which makes identification by sight difficult. Several cottontails were seen in WMA 1, 3, and 4, but their identity was not determined. These individuals have been designated eastern cottontails based on the lack of records for *S. audubonii* for this area and the abundance of records for *S. floridanus*. Boyd et al. (1997) reported 31 specimens of eastern cottontail from three locations in the immediate area of SASP.

*Specimens examined* (3).—1 mi. S, 4 mi. W San Angelo, 1 (ASNHC 11974); WMA 7 (31°29.5'N, 100°32.8'W), 1 (ASNHC 11975); WMA 8, 1 (ASNHC 11976).

*Additional records* (31).—5.2 mi. N, 6.3 mi. W San Angelo (31°32.4'N, 100°32.6'W), 11; 4 mi. N, 5 mi. W San Angelo (31°31.3'N, 100°31.3'W), 19; 0.4 mi. N, 5 mi. W San Angelo (31°28.2'N, 100°31.3'W), 1 (ASNHC).

*Lepus californicus texianus* Waterhouse 1848  
Black-tailed Jackrabbit

A skull was salvaged from a road-killed jackrabbit near WMA 5 on 19 March 2000 and another skull was salvaged from one near WMA 1 on 17 March 2000. A pregnant female was collected from WMA 6 on 1 December 2000. Individuals were also seen in WMA 1 and 3 during July 1999. Trailmaster photographs documented this species during 2005 in WMA 9 and 10 during summer and spring, respectively. Boyd et al. (1997) reported five specimens from three locations near SASP.

*Specimens examined* (3).—5 mi. W San Angelo, 1 (ASNHC 11973); WMA 5, 1 (ASNHC 12865); WMA 6 (31°32.5' N, 100°33.8' W), 1 (ASNHC 12866).

*Additional records* (5).—3.5 mi. N, 5 mi. W San Angelo (31°30.9'N, 100°31.3'W), 2; 7 mi. W San Angelo (31°27.8'N, 100°33.4'W), 2 (ASNHC); 5 mi. NW San Angelo (31°32.2'N, 100°31.3'W), 1 (Texas Cooperative Wildlife Collection).

#### Introduced Species

Three species of non-native mammals representing two orders occur at SASP. The domestic cat (*Felis catus*) and the house mouse (*Mus musculus*) were both encountered within SASP. Cats were seen in several areas of the park and two individuals were collected from the park, a female from WMA 6 and a male from Bald Eagle Creek. Trailmaster photographs recorded feral cats in WMA 10 during winter, spring, and summer of 2005. Two house mice were collected from the Bald Eagle Creek and Boyd et al. (1997) reported two specimens collected in the immediate area to the north of SASP. The presence of these species at SASP is most likely a result of the proximity of the city of San Angelo to the park.

While no specimens of the nutria (*Myocastor coypus*) were collected from SASP, Boyd et al. (1997) reported a specimen from the MIR Center to the north of SASP. This species is established in both the South Concho and the North Concho rivers. There was no evidence of any other introduced species in the area, including black rats (*Rattus rattus*) and feral hogs (*Sus scrofa*). We have not addressed the intentional introduction of bison (*Bison bison*), first introduced in 1996, or prairie dogs (*Cynomys ludovicianus*), first introduced in 1999 with several additional introductions to establish a viable population. Longhorn cattle also have been introduced to the park.

#### Species of Unverified Occurrence

Fifteen species of mammals representing five orders have been recorded from Tom Green County, Texas, but have not been recorded from SASP. Future research efforts might reveal the presence of these species.

Two species of shrews, the least shrew (*Cryptotis parva*) and the desert shrew (*Notiosorex crawfordi*), have been taken within 2 km of the park boundaries at the Angelo State University MIR Center. Both species no doubt occur in the park, but consistent use of pitfall traps will likely be necessary to document their occurrence.

Three species of bats have been recorded from Tom Green County but were not encountered at SASP. The western pipistrelle (*Pipistrellus hesperus*) and the eastern pipistrelle (*Pipistrellus subflavus*) have both been encountered along the South Concho River system and should occur at SASP (Boyd et al. 1997). The hoary bat (*Lasiurus cinereus*) is a migratory species that has been taken several times in Tom Green County (Boyd et al. 1997) and likely passes through SASP during spring and fall migratory periods.

Two species of carnivores are suspected of occurring in SASP. Coyotes (*Canis latrans*) have been recorded in Tom Green County since the early 1900s and are still common in some areas (Boyd et al. 1997). While there are no records of the mountain lion (*Puma concolor*) for Tom Green County, there are unconfirmed reports of sightings throughout the region (Boyd et al. 1997), including SASP. These species most likely pass through the park and future efforts should reveal their presence.

Seven species of rodents possibly occur in SASP but are not currently reported. It is possible that the Texas mouse (*Peromyscus attwateri*), white-ankled mouse (*Peromyscus pectoralis*), plains harvest mouse (*Reithrodontomys montanus*), roof rat (*Rattus rattus*), and Norway rat (*Rattus norvegicus*) occur in SASP due to the proximity of records (Boyd et al. 1997). Botta's pocket gopher (*Thomomys bottae*) occurs in southern Tom Green County and is unlikely to be found in SASP (Boyd et al. 1997). The northern grasshopper mouse (*Onychomys leucogaster*) was recorded from Tom Green County as early as the middle seventeenth century (Scott and Creel 1990) but is unlikely to occur in the region because it has not been collected in more than 100 years.

Boyd et al. (1997) reported the desert cottontail (*Sylvilagus audubonii*) as rare in Tom Green County with the only records limited to the western portions of the county. This species is unlikely to occur in the park.

#### Community Interactions

A total of 171 captures were recorded for rodents from the five primary sampling sites at SASP. Total trap success for these sites was 1.5 percent out of 11,400 trap nights. All individuals reported in this section are based on field identifications of species. Subsequent examination of voucher specimens revealed a higher occurrence of *Peromyscus maniculatus* due to the misidentification of these individuals as *P. leucopus*. Capture indices were calculated for each species by primary sampling site for the year using 2100 trap nights for WMA 1 and 3, and 2400 trap nights for WMA 2, 4, and 6 (Table 1).

The most diverse site at SASP was WMA 2 with a total of nine species recorded (Table 1). *Peromyscus leucopus* was the most abundant small rodent at this site with a capture index of 0.0067. *Neotoma micropus* was the second most abundant small rodent (0.0054) and *Peromyscus maniculatus* was third (0.0042).

Wildlife Management Area 1 had a species composition of six species (Table 1). *Perognathus merriami* was the most abundant small rodent encountered at this site with a capture index of 0.0062. *Peromyscus man-*

*iculatus* was the second most abundant rodent (0.0043) and *Chaetodipus hispidus* was third (0.0029).

Six species were captured at WMA 3 (Table 1). *Neotoma micropus* was the most abundant small rodent with a capture index of 0.0100. *Peromyscus maniculatus* was second in abundance with a capture index of 0.0067.

The species composition at WMA 4 was similar to WMA 1 and 3 with six species recorded from this site (Table 1). *Neotoma micropus* was the most abundant small rodent with a capture index of 0.0038. *Peromyscus leucopus* was the second most abundant small rodent with a capture index of 0.0025.

Wildlife Management Area 6 was the least diverse site at SASP (Table 1). Out of 2400 trap nights, only one *Neotoma micropus* and one *Peromyscus maniculatus* were captured to yield capture indices of 0.0004 each. No other rodents were encountered at this site.

The total capture indices for the year were calculated for each species using 11,400 trap nights (Fig. 3). *Neotoma micropus* was the most abundant small rodent at SASP having been encountered in every sampling site and having a capture index of 0.0040. *Peromyscus maniculatus* was the second most abundant small rodent with a capture index of 0.0033. Two species (*Baiomys taylori* and *Neotoma leucodon*) were encountered at only a single primary sampling site and are represented

Table 1. The capture indices for each species of small rodent from each of the five Wildlife Management Areas at San Angelo State Park and the total for all sites together. Bold-faced numbers represent the capture index for the most abundant species per sampling site and the number in parentheses represents the total number of captures for that species at that site.

|                               | WMA #1             | WMA #2             | WMA #3             | WMA #4            | WMA #6            | Total              |
|-------------------------------|--------------------|--------------------|--------------------|-------------------|-------------------|--------------------|
| <i>Neotoma micropus</i>       | 0.0005 (1)         | 0.0054 (13)        | <b>0.0100 (21)</b> | <b>0.0038 (9)</b> | <b>0.0004 (1)</b> | <b>0.0040 (45)</b> |
| <i>Peromyscus maniculatus</i> | 0.0043 (9)         | 0.0042 (10)        | 0.0067 (14)        | 0.0013 (3)        | <b>0.0004 (1)</b> | 0.0033 (37)        |
| <i>Peromyscus leucopus</i>    | 0.0024 (5)         | <b>0.0067 (16)</b> | 0.0029 (6)         | 0.0025 (6)        | --                | 0.0028 (32)        |
| <i>Perognathus merriami</i>   | <b>0.0062 (13)</b> | 0.0013 (3)         | 0.0014 (3)         | 0.0017 (4)        | --                | 0.0020 (23)        |
| <i>Chaetodipus hispidus</i>   | 0.0029 (6)         | 0.0004 (1)         | 0.0033 (7)         | 0.0008 (2)        | --                | 0.0014 (16)        |
| <i>Sigmodon hispidus</i>      | --                 | 0.0033 (8)         | 0.0019 (4)         | --                | --                | 0.0011 (12)        |
| <i>Baiomys taylori</i>        | --                 | 0.0008 (2)         | --                 | --                | --                | 0.0002 (2)         |
| <i>Spermophilus mexicanus</i> | 0.0005 (1)         | 0.0004 (1)         | --                 | --                | --                | 0.0002 (2)         |
| <i>Neotoma leucodon</i>       | --                 | --                 | --                 | 0.0008 (2)        | --                | 0.0002 (2)         |

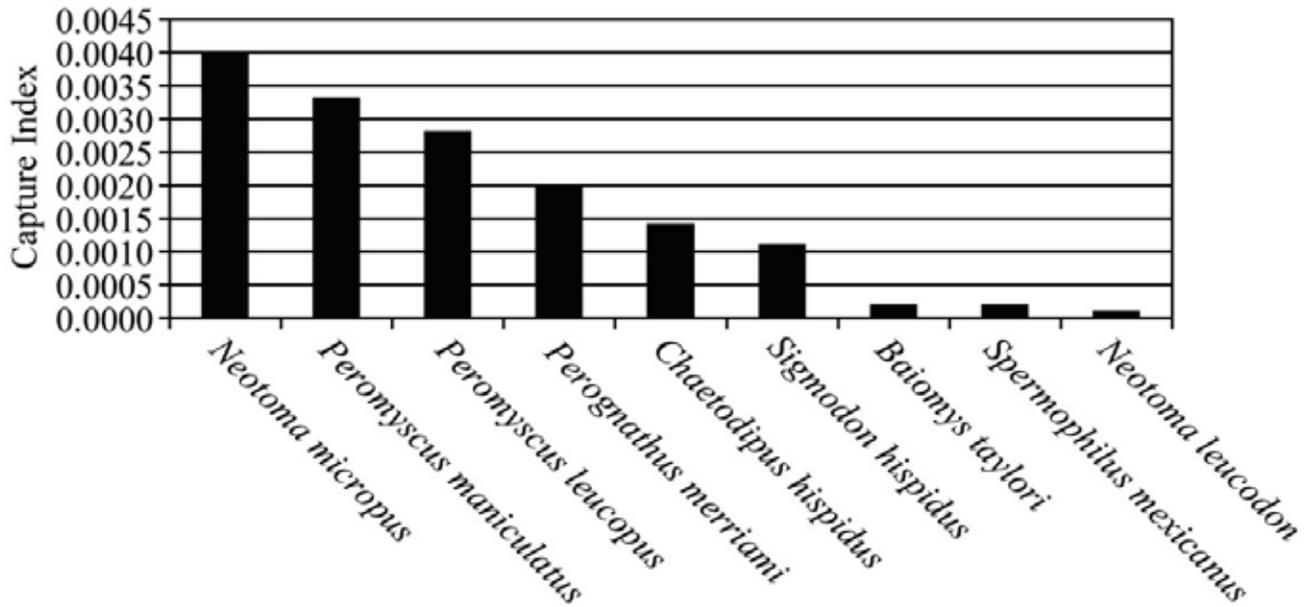


Figure 3. Graphic representation of the total capture indices for small rodents in San Angelo State Park.

by only one or two captures. This implies that these species are not an important part of the rodent communities at SASP. *Spermophilus mexicanus* (0.0002) probably has a greater abundance than evidenced at the five primary sampling sites. Two individuals were seen at other sites in the park. Additionally, this species is diurnal and less likely to be captured when traps were targeting nocturnal rodents.

Abundance for small rodents was also examined seasonally (Fig. 4). Capture indices were estimated using 2400 trap nights for spring and 3000 trap nights each for summer, autumn, and winter.

Rodent capture diversity was greatest during the winter sampling period at SASP. Eight species were captured with *Peromyscus maniculatus* being the most abundant with a capture index of 0.0093. *Neotoma micropus* and *Peromyscus leucopus* were second in abundance with capture indices of 0.0050 each. Other species captured during this period were: *Sigmodon hispidus* (0.0027), *Perognathus merriami* (0.0017), *Chaetodipus hispidus* (0.0010), and *Baiomys taylori* (0.0007).

Capture diversity during spring was six species. *Neotoma micropus* was the most abundant rodent dur-

ing this period with a capture index of 0.0075. *Peromyscus leucopus* was captured less frequently than in winter with a capture index of 0.0038. *Perognathus merriami* and *Chaetodipus hispidus* were captured more frequently than in winter with capture indices of 0.0021. The two remaining species had the following capture indices: *Sigmodon hispidus* (0.0008) and *Spermophilus mexicanus* (0.0004).

The capture diversity for summer was seven species. *Perognathus merriami* was the most abundant rodent with a capture index of 0.0030. *Neotoma micropus* (0.0023) and *Chaetodipus hispidus* (0.0023) were second in capture frequency. The four remaining species had the following capture indices: *Peromyscus leucopus* (0.0013), *Sigmodon hispidus* (0.0007), *Spermophilus mexicanus* (0.0003), and *Neotoma leucodon* (0.0003).

Capture diversity was the lowest for SASP during autumn with only five species captured. *Peromyscus maniculatus* was the most abundant rodent with a capture index of 0.0030. *Neotoma micropus* and *Peromyscus leucopus* were second in abundance with capture indices of 0.0017 each. The other two species captured during this period were *Perognathus merriami* (0.0013) and *Chaetodipus hispidus* (0.0003).

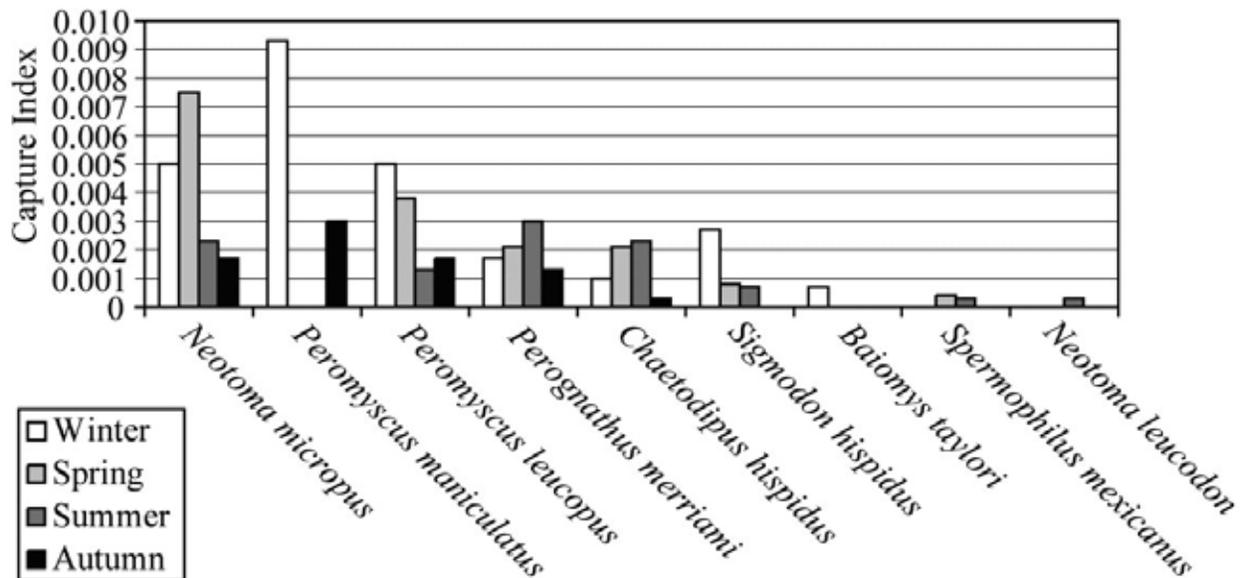


Figure 4. Graphic representation of the seasonal capture indices for small rodents in San Angelo State Park.

## DISCUSSION

Fieldwork and literature searches have recorded the presence of 34 species of mammals occurring in the immediate vicinity of SASP. These 34 species represent seven orders comprised of 1 marsupial, 1 armadillo, 3 bats, 10 carnivores, 2 artiodactyls, 15 rodents, and 2 lagomorphs. Three of the species were introduced into the area within the last 200 years. Another 15 species possibly occur in the area including 2 insectivores, 3 bats, 2 carnivores, 6 rodents, and 1 lagomorph.

The mammal fauna at SASP is similar to that of other regions in this part of Texas. Goetze (1998) listed 76 species of mammals occurring on the Edwards Plateau. The mammalian fauna of SASP has a great affinity to that of the Edwards Plateau (Balconian) Biotic Province demonstrated by the presence of all the species at SASP also being found in the Edwards Plateau. Boyd et al. (1997) listed 53 species of mammals occurring in Tom Green County. As expected, all of the species occurring at SASP are included in the list for Tom Green County.

The rodent diversity and density at most sites within SASP were low during this study with a total capture success of only 1.5 percent. This capture percentage is especially notable when compared to the

mammalian survey of Devils River State Natural Area (Brant and Dowler 2001), a similar study conducted just over 160 km south under the same drought conditions, which had a capture success of 4.9 percent. The low rainfall levels during this time might have influenced the rodent populations to the degree that they are lower than in other years. Also, disturbance in the area due to land management techniques and the amount of traffic, both pedestrian and vehicular, may be detrimentally affecting the rodent populations.

Of the ten species of small rodents sampled at five primary sampling sites, seven showed seasonal abundance peaks in the cooler portions of the year. Six of these species are murid rodents and one is a squirrel. The two heteromyid rodents, *Chaetodipus hispidus* and *Perognathus merriami*, showed seasonal abundance peaks in the warmer portions of the year. *Peromyscus maniculatus* was only collected during autumn and winter. *Neotoma micropus* is the only murid rodent more likely to be encountered in the spring than in winter. *Perognathus merriami* is more likely to be captured in the summer than at any other time of year, a result of this species' tendency to enter periods of torpor during cold temperatures (Schmidly 2004).

The zoogeography of SASP is typical of the Edwards Plateau. Goetze (1998) recognized seven faunal elements for the mammalian fauna of the Edwards Plateau. Based on his results the mammalian fauna at SASP can be divided into six faunal elements: Widespread, Chihuahuan, Neotropical, Eastern, Local, and Campestrian.

Eleven species (36%) occurring at SASP are designated as part of the Widespread faunal element. These species include: *Castor canadensis*, *Peromyscus leucopus*, *Peromyscus maniculatus*, *Erethizon dorsatum*, *Vulpes vulpes*, *Urocyon cinereoargenteus*, *Procyon lotor*, *Taxidea taxus*, *Mephitis mephitis*, *Lynx rufus*, and *Odocoileus virginianus*. Goetze (1998) determined that this faunal element accounts for 26 percent of the species occurring on the Edwards Plateau.

Ten of the species occurring at SASP are included in the Chihuahuan faunal element as follows: *Myotis velifer*, *Spermophilus mexicanus*, *Spermophilus variegatus*, *Perognathus merriami*, *Reithrodontomys fulvescens*, *Neotoma leucodon*, *Bassariscus astutus*, *Spilogale gracilis*, *Conepatus leuconotus*, and *Lepus californicus*. About a third (32%) of the faunal composition at SASP originates from the Chihuahuan faunal element. Goetze (1998) found that 36 percent of the Edwards Plateau species originated from the Chihuahuan faunal element.

Six species (19%) at SASP are included in the Neotropical faunal element as follows: *Didelphis virginiana*, *Dasyus novemcinctus*, *Tadarida brasiliensis*, *Pecari tajacu*, *Baiomys taylori*, and *Sigmodon hispidus*. Goetze (1998) determined that this faunal element accounts for 11 percent of the species occurring on the Edwards Plateau.

Three species occurring at SASP comprise the Eastern faunal element as follows: *Lasiurus borealis*, *Sciurus niger*, and *Sylvilagus floridanus*. The Eastern faunal element accounts for 10 percent of the species occurring at SASP and 11 percent of the species occurring in the Edwards Plateau (Goetze 1998).

*Chaetodipus hispidus* is the only species occurring at SASP that is included in the Campestrian faunal element. This species ranges throughout the Great Plains of North America and is usually found in association with grasses. Three percent of the mammals occurring at SASP originate from the Campestrian faunal element. Nine percent of the mammals on the Edwards Plateau originate from the Campestrian faunal element (Goetze 1998).

Only *Neotoma micropus* is included in the Local faunal element for SASP. *Neotoma micropus* occurs throughout the Edwards Plateau but has a restricted distribution in other portions of Texas. The Local faunal element comprises only three percent of the fauna of SASP. Goetze (1998) determined that this faunal element comprised four percent of the fauna of the Edwards Plateau.

The mammalian fauna at SASP is composed primarily of western Edwards Plateau mammals, which include many Chihuahuan species, and mammals with widespread distributions. The area is near the western distributional limits of three eastern species and the eastern distributional limits of four western species. The two most abundant rodents are *Neotoma micropus*, a Local species, and *Peromyscus maniculatus*, a Widespread species. The larger mammals are mostly comprised of Widespread species.

#### ACKNOWLEDGMENTS

This research was completed under contract (51892) with Texas Parks and Wildlife (TPW). Both Keith Blair, formerly with TPW, and David Riskind supplied administrative support during the project. Park Superintendents, John Culbertson and Kurt Kemp, and other personnel at SASP were helpful in scheduling field activities, providing information on mammals, and generally providing logistic support on site throughout the study.

During fieldwork for this project, we received help from graduate and undergraduate students in biology at Angelo State University. We especially thank Jeff Doty, Marisol Salazar, and Spencer Stewart who provided leadership roles in the survey efforts at the state park during the latter part of the study. Many others assisted in field collection and specimen preparation including: Amy Bishop, Josh Coffey, Stephanie Franklin, Ben Frogg , John Hanson, Justin Hollway,

Richard Humbertson, Eddie Lyons, Brandy Martin, Sarah Martinez, Marcy Revelez, and Clay White.

We also thank Connie Fletcher, secretary in the Department of Biology, for handling much of the paperwork associated with the project, including processing purchase orders and travel authorizations. Dr. Connie Russell provided equipment and advice on computer

applications. The Carr Student Research Scholarship Program and the Robert G. Carr and Nona K. Carr Scholarship Foundation provided additional funding for this project through a Carr Student Research Scholarship to Joel Brant. David Riskind, Lynn Simpson, and Fred Stangl provided comments and editorial suggestions for earlier versions of this manuscript.

### LITERATURE CITED

- Animal Care and Use Committee. 1998. Guidelines for the capture, handling, and care of mammals as approved by the American Society of Mammalogists. *Journal of Mammalogy* 79:1416-1431.
- Bailey, V. 1905. Biological survey of Texas. *North American Fauna* 25:1-222.
- Baker, R. J., L. C. Bradley, R. D. Bradley, J. W. Drago, M. D. Engstrom, R. S. Hoffmann, C. A. Jones, F. Reid, D. W. Rice, and C. Jones. 2003. Revised checklist of North American mammals north of Mexico, 2003. *Occasional Papers of The Museum, Texas Tech University* 229:1-23.
- Blair, W. F. 1950. The biotic provinces of Texas. *Texas Journal of Science* 2:93-117.
- Boyd, R. A., R. C. Dowler, and T. C. Maxwell. 1997. The mammals of Tom Green County, Texas. *Occasional Papers, Museum of Texas Tech University* 169:1-27.
- Brant, J. G., and R. C. Dowler. 2001. The mammals of Devils River State Natural Area, Texas. *Occasional Papers, Museum of Texas Tech University* 211:1-31.
- Choate, L. L., J. K. Jones, 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. *Occasional Papers, Museum of Texas Tech University* 134:1-8.
- Conroy, M. J. 1996. Abundance indices. Pp. 179-192 in *Measuring and monitoring biological diversity: standard methods for mammals* (D. E. Wilson, F. R. Cole, J. D. Nichols, R. Rudran, and M. S. Foster, eds.) Smithsonian Institution Press, Washington, D. C.
- Dowler, R. C., and J. G. Brant. 2002. Characterization and documentation of the mammalian fauna of San Angelo State Park. Final report prepared for the Natural Resources Program, Texas Parks and Wildlife. 74 pp.
- Edwards, C. E., C. F. Fulhorst, and R. D. Bradley. 2001. Molecular phylogenetics of the *Neotoma albigula* species group: further evidence of a paraphyletic assemblage. *Journal of Mammalogy* 82:267-279.
- Goetze, J. R. 1998. The mammals of the Edwards Plateau, Texas. *Special Publications, Museum of Texas Tech University* 41:1-263.
- Hall, E. R. 1981. The mammals of North America. John Wiley and Sons, Inc., New York.
- Jones, C., W. J. McShea, M. J. Conroy, and T. H. Kunz. 1996. Capturing mammals. Pp. 115-155 in *Measuring and monitoring biological diversity: standard methods for mammals* (D. E. Wilson, F. R. Cole, J. D. Nichols, R. Rudran, and M. S. Foster, eds.) Smithsonian Institution Press, Washington, D. C.
- Lee, T. E., Jr., and M. D. Engstrom. 1991. Genetic variation in the silky pocket mouse (*Perognathus flavus*) in Texas and New Mexico. *Journal of Mammalogy* 72:273-285.
- Nowak, R. M., ed. 1999. *Walker's mammals of the world*. 6th ed. Johns Hopkins University Press, Baltimore, Maryland.
- Schmidly, D. J. 1991. *The bats of Texas*. Texas A & M University Press, College Station.
- Schmidly, D. J. 2004. *The mammals of Texas*. University of Texas Press, Austin.

Scott, R. F., IV, and D. Creel. 1990. Vertebrate faunal analysis. Pp. 165-208 in Excavations at 41TG91 Tom Green County, Texas, 1978 (D. Creel). Publications in Archaeology, Texas Department of Highways and Public Transportation, Austin, Report No 38.

Wiedenfeld, C. C., and P. H. Flores. 1976. Soil survey of Tom Green County, Texas. National Cooperative Soil Survey, Soil Conservation Service, United States Department of Agriculture.

Wilson, D. E., and D. M. Reeder, eds. 1993. Mammal species of the world. 2nd ed. Smithsonian Institution Press, Washington, D. C.

*Addresses of authors:*

**JOEL G. BRANT**

*Department of Biology  
Angelo State University  
San Angelo, Texas 76909*

*Current address:*

*Department of Biology  
McMurry University  
Abilene, Texas 79697  
brant.joel@mcm.edu*

**ROBERT C. DOWLER**

*Department of Biology  
Angelo State University  
San Angelo, Texas 76909*

**CARLA E. EBELING**

*Department of Biology  
Angelo State University  
San Angelo, Texas 76909*



**PUBLICATIONS OF THE MUSEUM OF TEXAS TECH UNIVERSITY**

Institutional subscriptions are available through the Museum of Texas Tech University, attn: NSRL Publications Secretary, Box 43191, Lubbock, TX 79409-3191. Individuals may also purchase separate numbers of the Occasional Papers directly from the Museum of Texas Tech University.



**ISSN 0149-175X**

*Museum of Texas Tech University, Lubbock, TX 79409-3191*