

## INVENTORY OF TERRESTRIAL MAMMALS AT AMISTAD NATIONAL RECREATION AREA, TEXAS

MATT A. BAHM,\* JAMES M. MUELLER, AND AARON R. SIDES

*Biology Department, Sul Ross State University, Alpine, TX 79832**Present address of MAB: Department of Wildlife and Fisheries Sciences, South Dakota State University, Brookings, SD 57007**Present address of JMM: Department of Animal Sciences, Tarleton State University, Stephenville, TX 76402**\*Correspondent: matt.bahm@sdstate.edu*

**ABSTRACT**—A survey of Amistad National Recreation Area in Val Verde Co., Texas, was conducted using field sampling, literature records, and museum vouchers to compile a current list of the mammal fauna. Field work was conducted May 2003–July 2004. Small mammals were trapped along 21 transects for a total of 3,150 trap nights and medium-sized mammals were trapped on nine transects for 135 trap nights. Additional records were obtained through observations, collecting in specific habitats (rocky bluffs, grassy roadsides, etc.), salvaging road kills, and recording visual evidence of presence. Overall, 50 species of terrestrial mammals were identified as probably occurring in Amistad National Recreation Area, including seven non-native species. Previous studies documented 38, 47, and 46 species. With the exception of the northern pygmy mouse (*Baiomys taylori*), none of the native mammals captured during this study appear to be expanding their range.

**RESUMEN**—Un muestreo de Amistad National Recreation Area (NRA) en el condado de Val Verde, Texas, fue hecho utilizando muestreo de campo, registros publicados y documentos del museos para compilar una lista actualizada de la fauna mamífera. Se efectuó trabajo del campo desde mayo 2003 a julio 2004. Se atraparon mamíferos pequeños a lo largo de 21 transectos, produciendo un total de 3,150 noches de trapeo, y mamíferos de tamaño mediano fueron atrapados en nueve transectos, produciendo 135 noches de trapeo. Evidencia adicional fue obtenida a través de observaciones, colectando en hábitats específicos (riscos pedregosos, bordes de la carretera cubiertos de hierba, etc.), recobrando animales muertos a orillas de las carreteras y registrando evidencia visual de presencia. En conjunto, 50 especies de mamíferos terrestres fueron identificadas como probables habitantes en Amistad NRA, incluyendo a siete especies no nativas. Estudios previos documentaron 38, 47 y 46 especies. Con la excepción del ratón pigmeo norteño (*Baiomys taylori*), ninguno de los mamíferos nativos capturados en el transcurso de este estudio parecen estar expandiendo su distribución.

Positioned near the intersection of three biotic provinces, the Balconian, Chihuahuan, and Tamaulipan (Blair, 1950), Amistad National Recreation Area provides a unique opportunity for research. It encompasses the confluences of the Rio Grande with the Pecos and Devils rivers in Val Verde County. The mammal fauna has been studied both before construction of the reservoir (Boston, 1966) and after (Lobello, 1976; R. B. Ditton and D. J. Schmidly, in litt.; J. F. Scudday et al., in litt.). Since these studies, no comprehensive mammalian inventory has been conducted within the recreation area.

The first objective of this research was to document the current mammal fauna occurring

in Amistad National Recreation Area. Knowledge of the current fauna will allow park personnel to make informed management decisions and identify areas in need of further research. The second objective was to assess any changes that have occurred in species composition within the park since the previous studies were conducted. The third objective was to establish permanent transects to allow management personnel to monitor changes in populations and species composition over time. This information will be of value in determining effectiveness of current management practices and making decisions on future management and conservation issues. Herein, we report results of the mammal survey

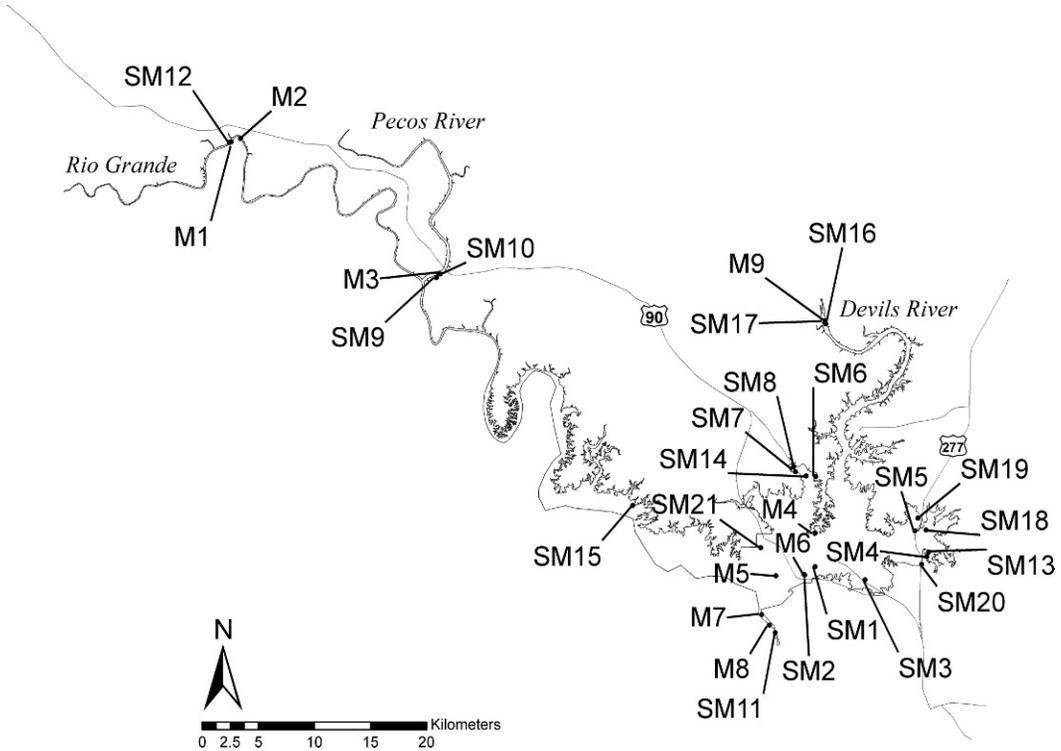


FIG. 1.—Map of Amistad National Recreation Area, Val Verde Co., Texas, showing locations of trapping sites used to sample small (SM) and medium-sized (M) mammals.

and briefly compare our data with previous studies.

**MATERIALS AND METHODS**—Amistad Dam ( $29^{\circ}26'59''\text{N}$ ,  $101^{\circ}03'29''\text{W}$ ) was completed in 1969 below the confluence of the Rio Grande and the Devils River. Lake Amistad International Reservoir has 1,432 km of shoreline, 869 km in the United States and 563 km in Mexico. Amistad National Recreation Area is located in Val Verde Co., Texas, and consists of 23,186 ha, including areas covered by the reservoir. The actual land area of the National Recreation Area fluctuates with changing lake levels. Normal conservation pool level of Lake Amistad is 340.5 m. At this level, the lake contains 27,115 ha of water, and inundates 119 km of the Rio Grande, 39 km of the Devils River, and 23 km of the Pecos River.

McMahan et al. (1984) classified Amistad National Recreation Area as being in the cenizo (*Leucophyllum frutescens*), blackbrush (*Acacia rigidula*), creosotebush (*Larrea tridentata*) association. Plants of this association, common to the recreation area, include guajillo (*Acacia berlandieri*), honey mesquite (*Prosopis glandulosa*), prickly pear (*Opuntia*), sotol (*Dasyllirion*), catclaw (*Mimosa*), hairy tridens (*Erioneuron pilosum*), slim

tridens (*Tridens muticus*), and pink pappusgrass (*Pappophorum bicolor*). Species common to the riparian areas include common reed (*Phragmites australis*), seepwillow (*Baccharis*), willow (*Salix*), tobacco tree (*Nicotiana glauca*), tamarisk (*Tamarix*), and bermudagrass (*Cynodon dactylon*).

Fieldwork was conducted May 2003–July 2004. Taxonomy and common names of mammals follow Baker et al. (2003). Voucher specimens (prepared as skins and skulls), morphological data, genetic materials, and ecological and locality data were deposited in the James F. Scudday Vertebrate Collection at Sul Ross State University. Descriptions and terminology for vegetation communities follow Casaday (2003).

Small mammals were trapped using Sherman live traps (Model LFA 7.6 by 8.9 by 22.9 cm). We trapped at 21 sites containing two parallel transects consisting of 25 traps/transect (Fig. 1). Traps were placed every 15 m, with one trap per station and 20 m between transects. Sample sites were chosen based on habitat maps developed by David Larson, former Resource Manager for Amistad National Recreation Area and included six habitat types. Lower-elevation desert grassland contained six transects (3–5, 7, 10, 17). This habitat type occurred within the inundation zone of

the reservoir and was dominated by herbaceous species, with threeawns (*Aristida*), red grama (*Bouteloua trifida*) and King Ranch bluestem (*Bothriochloa ishcaemum*) the dominant species. Wetland brush also contained six transects (6, 8–9, 12–13, 15) and occurred within the inundation zone of the reservoir. These habitats were dominated by saltcedar (*Tamarix*) and Roosevelt weed (*Baccharis neglecta*) with an understory of bermudagrass (*Cynodon dactylon*). Chihuahuan Desert scrub was on upland sites and contained three transects (14, 20, 21). Lechuguilla (*Agave lechuguilla*), blackbrush (*Acacia rigidula*), and prickly pear cactus (*Opuntia*) were the dominant species, with little herbaceous vegetation. Guajillo (*Acacia berlandieri*) brush community contained two transects (1–2) and was dominated by the shrub species of guajillo, blackbrush, and cenizo (*Leucophyllum frutescens*). Cenizo-blackbrush brush community contained two transects (16, 19) and was dominated by cenizo and blackbrush, with herbaceous vegetation patchily distributed throughout the area. Huisache (*Acacia minuata*) brush community contained two transects and was on Acuna silty clay, Inundation Zone (IZ), and Valverde silty clay loam soil types (Casaday, 2003). It formed dense thickets dominated by huisache, whitebrush (*Aloysia gratissima*), and Texas persimmon (*Diospyros texana*). Traps were closed during the morning (~0700 h) and reopened and baited with a 1:1 mixture of scratch grain and rolled oats in the evening (~1600 h) for 3 consecutive nights. Individual traps or groups of traps were used in certain situations to trap an area that appeared to have high potential to produce undocumented species. Visual surveys, firearms, and fortuitous encounters were used to document small mammals not readily captured in Sherman live traps.

Medium-sized mammals were trapped using Tomahawk Economy Rabbit Traps (22.9 by 22.9 by 66.0 cm) and Economy Raccoon Traps (25.4 by 30.5 by 81.3 cm). One transect consisting of five traps, spaced at 100 m, was placed in each of nine sites throughout Amistad National Recreation Area (Fig. 1). Traps were opened and baited with sardines in the evening and closed the following morning for 3 consecutive nights. Spotlight counts, roadkills, spoor, and fortuitous encounters also were used to document medium and large species of mammals not readily captured. Lists of specimens previously collected in Val Verde County were obtained from Abilene Christian University, American Museum of Natural History, Angelo State Natural History Collections, Carnegie Museum of Natural History, Field Museum of Natural History, Illinois Natural History Survey, Natural History Museum of Los Angeles County, Smithsonian Institution National Museum of Natural History, Sul Ross State University, Texas Cooperative Wildlife Collection at Texas A&M University, The Museum of Texas Tech University, University of Kansas Natural History Museum, and University of Michigan Museum of Zoology.

**RESULTS**—Twelve species of rodents, totaling 160 individuals, were captured during 3,150 trap nights (Table 1). Overall trap success (total captures/total trap nights) was 5.9% and ranged from 0% on Transects 6, 12, and 21 to 35.3% on Transect 9 (Table 2). Transect 9 was located on the east side of the Pecos River in the floodplain. Vegetation was dense and dominated by exotic weeds and salt cedar (*Tamarix*). Transect 14, while only having a success rate of 0.7%, did produce *Chaetodipus nelsoni*, a species rarely encountered during other sampling. The vegetation of this transect was Chihuahuan Desert scrub. *Peromyscus pectoralis* and *Sigmodon hispidus* both comprised 27.3% of total captures (Table 1).

Twenty-one medium-sized mammals representing six species were trapped during 135 trap nights. Species caught were *Didelphis virginiana* ( $n = 6$ ), *Dasyus novemcinctus* ( $n = 2$ ), *Bassariscus astutus* ( $n = 2$ ), *Procyon lotor* ( $n = 8$ ), *Mephitis mephitis* ( $n = 2$ ), and *Spilogale gracilis* ( $n = 1$ ). One juvenile *Sylvilagus audubonii* was captured in a Sherman trap. Twelve additional species were identified using other methods (firearms, visual surveys, spoor, road kills); *Lepus californicus*, *Sylvilagus floridanus*, *Castor canadensis*, *Erethizon dorsatum*, *Ursus americanus*, *Canis latrans*, *Urocyon cinereoargenteus*, *Conepatus leuconotus*, *Pecari tajacu*, *Odocoileus virginianus*, *Felis catus*, *Ovis aries*, and *Ammotragus levia*.

Museum collections accounted for nine species not documented during the study that may currently occur within Amistad National Recreation Area. These included *Cryptotis parva*, *Notiosorex crawfordi*, *Thomomys bottae*, *Chaetodipus eremicus*, *Dipodomys merriami*, *Onychomys leucogaster*, *Peromyscus maniculatus*, *Reithrodontomys fulvescens*, and *Rattus rattus*.

**DISCUSSION**—This survey documented 37 species of terrestrial mammals at Amistad National Recreation Area and found literature records that support the occurrence of an additional 13 species (Bahm, 2004). Each subsequent inventory has revealed species not documented during previous studies. Boston (1966) documented 38 species, Lobello (1976) documented 47, and R. B. Ditton and D. J. Schmidly (in litt.) documented 46 species. Lobello (1976) listed the hispid pocket mouse (*Chaetodipus hispidus*) as possibly being extirpated from the area. The following year, R. B. Ditton and D. J. Schmidly (in litt.) reported collecting six specimens of the species. One hispid pocket mouse was captured and inadver-

TABLE 1—Number of individual small mammals captured in Sherman traps by species during 3,150 trap nights on 21 permanent transects at Amistad National Recreation Area, Val Verde Co., Texas, 2003.

Site	Species											Species Richness	
	<i>Peromyscus pectoralis</i>	<i>Neotoma leucodon</i>	<i>Neotoma micropus</i>	<i>Perognathus merriami</i>	<i>Spermophilus mexicanus</i>	<i>Sigmodon hispidus</i>	<i>Peromyscus leucopus</i>	<i>Baiomys taylori</i>	<i>Chaetodipus hispidus</i>	<i>Chaetodipus intermedius</i>	<i>Chaetodipus nelsoni</i>		<i>Mus musculus</i>
1	1	1		2	1								4
2	3			9									2
3				1									1
4	13					2	1	1					4
5	1			1		2	1						4
6													-
7				9									1
8	1			1							1		3
9	5					27	1					13	4
10	5					8						4	3
11	1					1							2
12													-
13							1						1
14											1		1
15					2								1
16	2					4				1			3
17	8												1
18	1						2		1				3
19	2		1	3									3
20	1	3	2	4	4								5
21													-
Total (n)	44	4	3	30	7	44	6	1	1	1	2	17	
Total (%)	27.3	2.5	1.9	18.8	4.4	27.3	3.8	0.6	0.6	0.6	1.2	10.6	

tently released during our study, but further work is needed to assess the current status of this species in Amistad National Recreation Area.

The current work has added several previously undocumented species to the mammal fauna of Amistad National Recreation Area. The northern pygmy mouse (*Baiomys taylori*), cactus mouse (*Peromyscus eremicus*), rock pocket mouse (*Chaetodipus intermedius*), and black bear (*Ursus americanus*) are native species that previously were undocumented within Amistad National Recreation Area. With the exception of the northern pygmy mouse (Davis and Schmidly, 1994), none of the native mammals captured during our study appears to be expanding its range, and the increase in total number of species is probably an artifact of increased sampling in and around Amistad National Recreation Area.

The house mouse (*Mus musculus*), black rat (*Rattus rattus*), nutria (*Myocastor coypus*), feral cat (*Felis catus*), feral pig (*Sus scrofa*), mouflon sheep (*Ovis aries*), and aoudad (*Ammotragus lervia*) are non-native animals now present in Amistad National Recreation Area. Presence of these mammals in Amistad National Recreation Area can be attributed directly to humans. House mice and black rats are commensal with humans. Nutria were introduced to the United States for their pelts and have naturally colonized westward. Feral cats were introduced by abandonment or lack of responsibility for house pets. Feral pigs, mouflon, and aoudad were introduced by humans for the purpose of sporthunting. These animals can negatively impact native species. Management personnel need to take a proactive approach to managing

TABLE 2—Total captures in Sherman traps by species and trap success during 3,150 trap nights on 21 permanent transects at Amistad National Recreation Area, Val Verde Co., Texas, 2003.

Site	Species											Total Captures (n)	Trap Success (%)	
	<i>Peromyscus pectoralis</i>	<i>Neotoma leucodon</i>	<i>Neotoma micropus</i>	<i>Perognathus merriami</i>	<i>Spermophilus mexicanus</i>	<i>Sigmodon hispidus</i>	<i>Peromyscus leucopus</i>	<i>Baiomys taylori</i>	<i>Chaetodipus hispidus</i>	<i>Chaetodipus intermedius</i>	<i>Chaetodipus nelsoni</i>			<i>Mus musculus</i>
1	2	1		2	1								6	4.0
2	3			9									12	8.0
3				1									1	0.7
4	20					2	1	1					24	16.0
5	1			1		3	1						6	4.0
6													0	0.0
7				10									10	6.7
8	1			1							1		3	2.0
9	5					34	1					13	53	35.3
10	5					9						4	18	12.0
11	1					1							2	1.3
12													0	0.0
13							1						1	0.7
14											1		1	0.7
15					2								2	1.3
16	4					5				1			10	6.7
17	9												9	6.0
18	1						2		1				4	2.6
19	1		1	3									5	4.7
20	1	3	2	4	6								16	10.7
21													0	0.0
Total	54	4	3	31	9	54	6	1	1	1	2	17	183	

these species to limit destruction of native flora and fauna.

The order Carnivora is the least documented mammalian group at Amistad National Recreation Area. To better manage or assess these species, further research is warranted for each family in this order with the possible exception of the procyonids.

The baseline information on mammalian diversity will allow management personnel to make informed decisions and focus on areas in need of further research. Permanent transects will allow personnel to monitor changes in populations and species composition over time. This information will be of value in determining effectiveness of current management practices and making decisions on future management and conservation issues.

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