



Mammals of the Rio Grande Wild and Scenic River Downstream of Big Bend National Park

2008 Final Report

Natural Resource Technical Report NPS/CHDN/NRTR—2011/490



ON THE COVER

Canoeing down the Rio Grande Wild and Scenic River
Photograph by M. Hildegard Reiser.

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Introduction

The Rio Grande stretches from the mountains of southern Colorado to the Gulf of Mexico at the U.S.-Mexico border, a distance of approximately 3,034 km (1,885 miles) (Penn, 2001). Much of the region through which this river flows is rugged, arid, and desolate. In 1978, Congress designated a 308-km (191-mile) section of river as a part of the national Wild and Scenic River system. This segment flows through an extremely rugged portion of the Chihuahuan Desert, from within Big Bend National Park (river mile 842.3 above Mariscal Canyon, at the Chihuahua-Coahuila state border) downstream to the Terrell-Val Verde County line (river mile 651.1) (16 U.S. Code §1274). Approximately 111 km (69 miles) of the Rio Grande Wild and Scenic River occurs within Big Bend National Park (National Park Service, 2007). The remaining portion borders Black Gap Wildlife Management Area and private lands.

Recently, the National Park Service developed a new plan for managing its natural resources (National Park Service, 1999). This plan recognized that external factors threatened to change the natural resources of many park units. The Rio Grande Wild and Scenic River is of special concern due to the overdraft of water that has occasionally resulted in the complete cessation of flow. The World Wildlife Fund included the Rio Grande in the list of the 10 most threatened rivers in the world due to this problem (Wong et al., 2007). The National Park Service acknowledged that it did not have enough knowledge about many of its natural resources even to begin monitoring. Thus, the first step for many park units to begin this program was to conduct an up-to-date inventory of the vertebrates and vascular plants.

The mammal fauna of the northern Chihuahuan Desert is generally well known. Schmidly (1977) summarized the distributions of all mammals in the Trans-Pecos region and included maps of collection localities for all museum specimens. Johnson et al. (1997) included mammal literature in their bibliography of biological literature of the region. Boer and Schmidly (1977) described mammal distributions along the riparian corridor in Big Bend National Park. They found 30 species inhabiting the riparian zone. Only one species, the beaver (*Castor canadensis*), was restricted to riparian habitats. More recently, the mammals of Amistad National Recreation Area, including the Rio Grande from Langtry to Del Rio, Texas, were documented by Bahm and Mueller (2005) and Bahm et al. (2008). In addition, Ammerman et al. (2002) reported on chiropteran surveys along the Rio Grande riparian corridor.

The purpose of this study was to survey the mammal fauna in selected riparian habitats along the Rio Grande from the eastern border of Big Bend National Park in Brewster County, downstream through Terrell County. This section of the river flows through the rugged limestone canyons of the Stockton Plateau, and is commonly referred to as the Lower Canyons. Access to most of the Lower Canyons is limited to multi-day float trips. Klepper (2005) described the characteristics of the terrain and logistical difficulties of conducting this survey in a popular article.

Methods

A teams of biologists was led on surveys of the Rio Grande Wild and Scenic River in Texas downstream of Big Bend National Park from La Linda (UTM Zone 13, 711080E, 3259711 N), Brewster County, to Shafter Crossing (UTM Zone 13, 779122E, 3299427N), Terrell County. This administrative unit is limited to 64.75 hectares (160 acres) of land on the United States side

of the river per river mile, but much of this corridor remains privately owned. The maximum level of acquisition allowed in the creation of this park unit corresponds to an average width of approximately 400 m (437.45 yds). Thus, surveys were restricted to the riparian zone and immediately adjacent uplands within 400 m (437.45 yds) of the river.

The climate of the region is dry and hot. Average precipitation at Boquillas, Texas, on the Rio Grande in Big Bend National Park is 25.1 cm (9.88 inches) (National Oceanic and Atmospheric Administration, 2005). Most precipitation falls in the summer months, with more than 75% of the annual precipitation falling in the six months from May to October. Average annual temperature at Boquillas is 21°C (70°F). During this study, temperatures ranged from -10.6°C (13°F) on 25 December 2004 to 46.7°C (116°F) on 5 July 2005 (National Oceanic and Atmospheric Administration, 2004, 2005).

Vegetation of the study area consisted of a riparian habitat bordered by a Chihuahuan Desert shrub community. The riparian habitat was dominated by introduced giant reed (*Arundo donax*) and native common reed (*Phragmites australis*) interspersed with occasional small trees, including honey mesquite (*Prosopis glandulosa*), introduced salt cedar (*Tamarix* spp.), and willows (*Salix* spp.) (Figures 1 and 2). The Chihuahuan Desert shrub community was typical of that described by Powell (1998).

Biologists conducted fieldwork from 3 September 2004 to 29 July 2005, including three 1-week float trips through the Lower Canyons. We surveyed seven locations over multiple nights using small mammal traps and mist nets (Table 1). We sampled small mammals at each of these sites with 100 Sherman traps (Model LFA, 3 x 3.5 x 9 inches) placed in five transects with a spacing of 15 m (16.40 yds) between traps. We placed transects to try to cross all unique habitats at each site. In addition, we used 40 larger Sherman traps (Model XL, 4 x 4.5 x 15 inches) to supplement this trapping in March 2005.

Bats were captured using mist nets. In addition, acoustic files were recorded using Anabat detectors to supplement capture data. An Anabat detector was often used wherever fieldwork was conducting and a second detector was installed at the Dryden takeout to record acoustic files while unattended.

All observations of mammals and mammal sign, including visual observations, tracks, cuttings by beavers, and gopher mounds were recorded. cameras were set at some locations and sites were baited with beaver castor, catnip, sardines, or fox urine. Gopher traps were used at some sites to verify the species of gophers present.



Figure 1. Typical habitat along the Rio Grande where it leaves Black Gap Wildlife Management Area and approaches the deep canyons known as the Lower Canyons, May 2005.



Figure 2. Typical habitat along the Lower Canyons of the Rio Grande showing riparian vegetation abutted by steep cliffs. This photo is from the trail to the Asa Jones pump house at Silber Canyon, May 2005.

Table 1. Trapping locations, distances downstream from La Linda (from maps in Aulbach and Butler, 1998), UTM coordinates (Zone 13), and number of nights traps were set.

Location Name	River Mile	Coordinates	Nights
La Linda	0	711210E, 3259984N	3
Maravillas Canyon	11	715358E, 3272394N	4
Black Gap WMA, Fish Camps 23-24	22	721536E, 3283962N	5
Reagan Canyon	28	724638E, 3292451N	1
Silber Canyon	38	735452E, 3295783N	6
Upper Madison Falls	55	752768E, 3295876N	3
San Francisco Creek	66	758909E, 3308413N	3
Paso Colorado	77	770501E, 3304095N	1
Dryden Crossing (Harrison Ranch)	83	776778E, 3300410N	9

Results

Forty-three species of mammals representing five orders and 16 families were documented over the duration of the study (Table 2). Species diversity was greatest in the Rodentia (n = 17 species) and Chiroptera (n = 13 species). The only non-native species found was the nutria (*Myocastor coypus*).

Small mammal trapping

Small mammal traps were set on 35 nights for a total effort of 3,322 trap nights. Twelve species of rodents and one western spotted skunk (*Spilogale gracilis*, Table 3) were captured. The skunk was captured in a Model XL Sherman trap. The fulvous harvest mouse (*Reithrodontomys fulvescens*) was captured only on the Mexican side of the river at Upper Madison Falls. The most common species captured (Figure 3) were the cactus mouse (*Peromyscus eremicus*; 26%), Merriam's kangaroo rat (*Dipodomys merriami*; 20%), Nelson's pocket mouse (*Chaetodipus nelsoni*; 17%), and the white-ankled mouse (*Peromyscus pectoralis*; 17%). Trap success based on available traps was 10% (313/3026); this calculation excludes 296 traps found sprung or on their side.

Mist netting

Mist nets were set on 19 nights for a total effort of 66 net nights. One hundred eighty three bats representing 13 species (Table 4, Figure 4) were caught. The potential species that were not captured do not have echolocations that are ideal for acoustic recording; i.e., their echolocations are either soft (low decibel) or difficult to distinguish from other species. The acoustic data recorded during mist netting did document some species much more effectively than the mist netting. Specifically, the ghost-faced bat (*Mormoops megalophylla*) and western bonneted bat (*Eumops perotis*) were both easily detected. These data were not analyzed further. No useful acoustic data were obtained from the remote system installed at the Dryden takeout due to equipment malfunction and weather events.

Observations

Sixteen additional species of mammals were detected by direct observation, remote cameras, or sign (Table 2). Species that were most effectively monitored this way were diurnal rodents, lagomorphs, carnivores, and artiodactyls.

Table 2. Mammal species documented via direct capture, observation or sign, or remote-controlled cameras on the Rio Grande Wild and Scenic River, September 2004 — July 2005.

Order	Family	Species	Common name	Captured	Observed	Photos
Chiroptera	Mormoopidae	<i>Mormoops megalophylla</i>	Ghost-faced Bat	5		
	Vespertilionidae	<i>Antrozous pallidus</i>	Pallid Bat	19		
		<i>Lasiurus cinereus</i>	Hoary Bat	2		
		<i>Myotis californicus</i>	California Myotis	2		
		<i>Myotis velifer</i>	Cave Myotis	1		
		<i>Myotis yumanensis</i>	Yuma Myotis	20		
		<i>Pipistrellus hesperus</i>	Western Pipistrelle	7		
		<i>Perimyotis subflavus</i>	Eastern Pipistrelle	4		
		<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	1		
	Molossidae	<i>Tadarida brasiliensis</i>	Brazilian Free-tailed Bat	103		
Lagomorpha		<i>Nyctinomops femorosaccus</i>	Pocketed Free-tailed Bat	29		
		<i>Nyctinomops macrotis</i>	Big Free-tailed Bat	1		
		<i>Eumops perotis</i>	Western Bonneted Bat	1		
	Leporidae	<i>Sylvilagus audubonii</i>	Desert Cottontail		1	
		<i>Sylvilagus floridanus</i>	Eastern Cottontail			1
		<i>Lepus californicus</i>	Black-tailed Jackrabbit		4	
	Sciuridae	<i>Ammospermophilus interpres</i>	Texas Antelope Squirrel		7	
		<i>Spermophilus variegatus</i>	Rock Squirrel		8	
	Geomyidae	<i>Thomomys bottae</i>	Botta's Pocket Gopher	1	2	
	Heteromyidae	<i>Chaetodipus eremicus</i>	Chihuahuan Desert Pocket Mouse	14		
Rodentia		<i>Chaetodipus intermedius</i>	Rock Pocket Mouse	2		
		<i>Chaetodipus nelsoni</i>	Nelson's Pocket Mouse	53		
		<i>Dipodomys merriami</i>	Merriam's Kangaroo Rat	61		
	Castoridae	<i>Castor canadensis</i>	American Beaver		6	
	Muridae	<i>Reithrodontomys fulvescens</i>	Fulvous Harvest Mouse	5		
		<i>Peromyscus boylii</i>	Brush Mouse	1		
		<i>Peromyscus eremicus</i>	Cactus Mouse	83		
		<i>Peromyscus leucopus</i>	White-footed Mouse	13		
		<i>Peromyscus maniculatus</i>	Deer Mouse	6		
		<i>Peromyscus pectoralis</i>	White-ankled Mouse	53		
		<i>Sigmodon hispidus</i>	Hispid Cotton Rat	18		
		<i>Neotoma leucodon</i>	Eastern White-throated Woodrat	2		
	Myocastoridae	<i>Myocastor coypus</i>	Nutria		1	

Table 2. Continued.

Order	Family	Species	Common name	Captured	Observed	Photos
Carnivora	Canidae	<i>Canis latrans</i>	Coyote		4	
		<i>Urocyon cinereoargenteus</i>	Common Gray Fox		1	3
	Procyonidae	<i>Bassariscus astutus</i>	Ringtail		4	1
		<i>Procyon lotor</i>	Northern Raccoon		2	
	Mephitidae	<i>Spilogale gracilis</i>	Western Spotted Skunk	1		
		<i>Conepatus leuconotus</i>	White-backed Hog-nosed Skunk		1	
	Felidae	<i>Puma concolor</i>	Mountain Lion		1	
Artiodactyla	Tayassuidae	<i>Pecan tajacu</i>	Collared Peccary		5	
	Cervidae	<i>Odocoileus hemionus</i>	Mule Deer		4	
		<i>Odocoileus virginianus</i>	White-tailed Deer		1	

Table 3. Total captures of small mammals in Sherman traps by species and location, trap effort, and trap success, Rio Grande Wild and Scenic River, Texas and Mexico, September 2004 — July 2005

Location	<i>Chaetodipus eremicus</i>	<i>Chaetodipus intermedius</i>	<i>Chaetodipus nelsoni</i>	<i>Dipodomys merriami</i>	<i>Reithrodontomys fulvescens</i>	<i>Peromyscus boylii</i>	<i>Peromyscus eremicus</i>	<i>Peromyscus leucopus</i>	<i>Peromyscus maniculatus</i>	<i>Peromyscus pectoralis</i>	<i>Peromyscus sp.</i>	<i>Sigmodon hispidus</i>	<i>Neotoma leucodon</i>	<i>Spilogale gracilis</i>	Trap Nights	Total Capture	Trap Success (%)
La Linda	6		1	7			8		3	2					298	27	9
Maravillas Canyon	4		3					1							360	8	2
Black Gap WMA	4	1	20	15		1	45		1	1					474	88	19
Silber Canyon			14				3		2	26	1	4			568	50	9
Upper Madison Falls			6		5		21	7		20	1		1		294	61	21
San Francisco Creek			1				1			2					238	4	2
Dryden Crossing			7	39			4	5				13	1		721	69	10
Other		1	1				1			1		1			73	6	8
Total	14	2	53	61	5	1	83	13	6	52	2	18	2	1	3,026	313	10

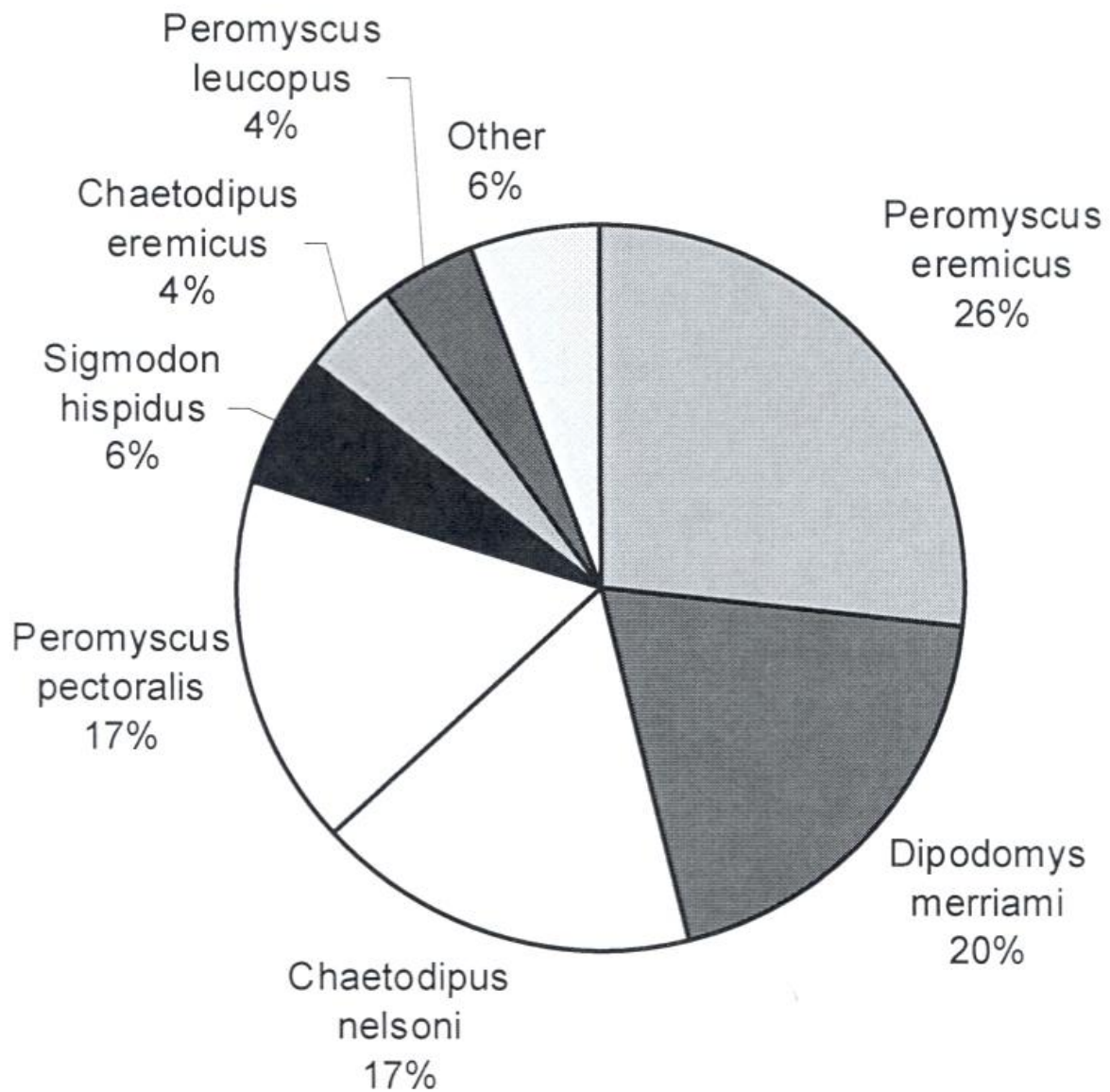


Figure 3. Relative abundance of rodents in the Lower Canyons of the Rio Grande based on 313 captures, September 2004 - July 2005.

Table 4. Total captures of bats by species and location and effort, Rio Grande Wild and Scenic River, Texas and Mexico, September 2004 — July 2005.

Location	<i>Mormoops megalophylla</i>	<i>Antrozous pallidus</i>	<i>Lasiurus cinereus</i>	<i>Myotis californicus</i>	<i>Myotis velifer</i>	<i>Myotis yumanensis</i>	<i>Pipistrellus hesperus</i>	<i>Perimyotis subflavus</i>	<i>Corynorhynchus townsendii</i>	<i>Tadarida brasiliensis</i>	<i>Nyctinomops famorosaccus</i>	<i>Myctinomops macrotis</i>	<i>Eumops perotis</i>	Net Nights	Total Captures
La Linda														0	0
Maravillas Canyon	4	3					1			42	10			4	60
Black Gap WMA														0	0
Silber Canyon		7		1		6		2	1	5	1			18	23
Upper Madison Falls														2	0
San Francisco Creek		3	1			6	2			45	11		1	8	69
Dryden Crossing	1	1	1		1	5		1						13	10
Other		5		1		3	4	1		1	5	1		21	21
Total	5	19	2	2	1	20	7	4	1	93	27	1	1	66	183

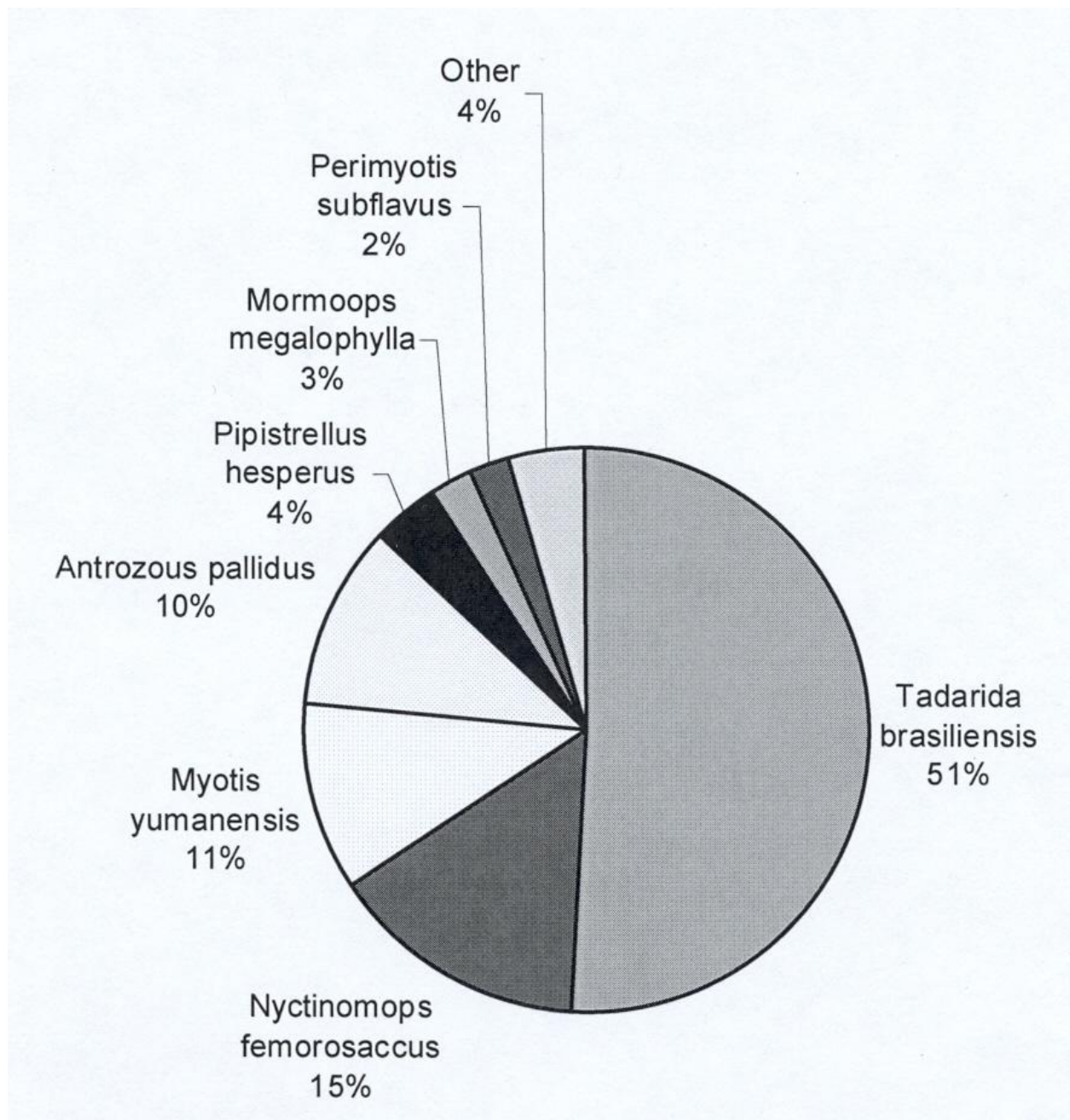


Figure 4. Relative abundance of bat species based on 183 captures in the Lower Canyons of the Rio Grande, Texas, September 2004 - July 2005.

Discussion

The rodent community appears relatively unaffected by exotic species. For example, no house mice (*Mus musculus*) were captured. The single exotic species detected was the nutria. This species was not found in the Trans-Pecos region 30 years ago (Schmidly 1977), but now is common above and below the study area. It was detected at one site during this study. Beavers (*Castor canadensis*) are still common. Texas antelope squirrels (*Ammospermophilus interpres*) were seen throughout the year but never captured because diurnal trapping was not conducted.

Several recent papers have reported on the chiropteran fauna in the region (Weyandt et al. 2001, Ammerman et al. 2002, Higginbotham and Ammerman 2002, Ammerman 2005, Yancey and Jones 2006, Yancey et al. 2006). The results of this study support the observations of the other studies. Specifically, the eastern pipistrelle (*Perimyotis subflavus*) was captured four times and appears to have established itself throughout this region. Of note, the pocketed free-tailed bat was captured 29 times, and was more common than expected; this species was especially common at Maravillas Canyon.

Species of the Carnivora were documented infrequently with methods in this study. The bobcat (*Lynx rufus*) undoubtedly occurs in the region, but was not observed. This species is trapped on surrounding ranches and this may be why no sign was found during this study. Likewise, any human observation of mountain lion (*Puma concolor*) sign in this region usually results in efforts to kill the animal. No white-nosed coati (*Nasua narica*) or ocelot (*Leopardus pardalis*) were documented, although these may rarely pass through the area, as do American black bear (*Ursus americanus*), when dispersing from populations in Mexico.

Hooved mammals were uncommon throughout the study area. No feral hogs (*Sus scrofa*) were observed, although they occurred during the study downstream in Amistad National Recreation Area (Bahm et al. 2008) and upstream within Big Bend National Park. Likewise, aoudad (*Ammotragus lervia*) were not observed, but free-ranging populations occur within Brewster County to the north. Both of these exotic species can be expected to move into the study area. However, the rugged terrain, may effectively exclude feral hogs from many stretches of the riparian corridor. The range of white-tailed deer (*Odocoileus virginianus*) continues to expand westward, with a concomitant retraction of mule deer (*O. hemionus*) range. The ranges of the two species overlap in the study area. These species hybridize extensively in this region (Stubblefield et al. 1986).

The mammal fauna of the Lower Canyons of the Rio Grande has not been altered greatly by anthropogenic effects. The rugged nature of the region reduces the ability of livestock to graze the area, although goats have probably altered the vegetation in many areas. Reduced, and occasionally complete, cessation of river flows that now plague the Rio Grande through Big Bend National Park are mitigated to a great extent by springs that sustain a perennial flow through the Lower Canyons. Monitoring of this area should focus on key riparian species, specifically beaver and chiropterans that appear to be abundant due to the riparian corridor. In addition, presence of exotic species should be monitored. Any construction activities, such as those proposed for borderland security, should take precautions to reduce the chance of introducing species such as the house mouse. The ruggedness of this area may protect the mammal fauna from the extent of changes often caused by anthropogenic effects. However, any

increased development to the river corridor, for example through border security initiatives, mining, or oil and gas exploration, will increase the risk of more substantial changes to the mammal fauna.

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