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Herpetofauna of Lake Meredith National Recreation Area and Alibates Flint Quarries National Monument and the Vicinity (Potter, Hutchinson, and Moore Counties, Texas)

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Abstract

Herpetofauna of Lake Meredith National Recreation Area and Alibates Flint Quarries National Monument (Texas, USA) is not well known. The current study (2002-03) documents nine species of amphibians and 28 species of reptiles; in addition, one species of amphibian and seven species of reptiles are known from museum specimens. Three species (*Bufo debilis insidior*, *Cnemidophorus tesselatus,* and *Rhinocheilus lecontei tesselatus*) are new for Moore County. The distributions of *Bufo debilis insidior* and *Thamnophis sirtalis annectens* were adjusted. An additional 13 species (three amphibians and 10 reptiles) were recorded on adjacent lands in the past, and some of those species may occur in the two protected areas as well.

Key words: amphibians, Lake Meredith, reptiles, Texas Panhandle

Introduction

The north-central Texas Panhandle lacks recent herpetological assessment, and Lake Meredith National Recreation Area and Alibates Flint Quarries National Monument have never been thoroughly surveyed for amphibians and reptiles. The only detailed herpetological study in the region was conducted at the Bugbee Ranch east of Stinnett (Hutchinson County) in 1950 when 846 specimens of reptiles belonging to 31 species were collected (Fouquette and Lindsay 1955). That study, however, omitted amphibians. A brief survey by Scudday and Scudday (1975) at the Mansfield Ranch, Oldham County, during 19 to 29 June 1974 yielded only four species of amphibians and 10 to 11 species of reptiles. The Bugbee Ranch lies 27 km NNW of the northeastern limits of Lake Meredith National Recreation Area, and the Mansfield Ranch is 45 km W of its southwestern limits. The only known document containing information on herpetofauna of Lake Meredith National Recreation Area is a list of vertebrate animals prepared by Philips (1989). The list, however, is neither annotated nor substantiated by specimens or photographs, and it is not clear whether Philips used his personal observations, published distributional maps, or both when compiling the list. The current study of herpetofauna of these protected areas was conducted in 2002-03 during a comprehensive inventory of vertebrate animals undertaken in a cooperative project between the US National Park Service and The Nature Conservancy.

STUDY AREA

Lake Meredith National Recreation Area (Lake Meredith NRA) is located within the western extension of the Rolling Plains in the Texas Panhandle (Potter, Moore, and Hutchinson counties) and encompasses 18,216 ha of uplands, steep slopes, arid plains, wetlands, and 4,000 ha of open water. Alibates Flint Quarries National Monument (Alibates Flint Quarries NM) comprises 555 ha of uplands and abuts Lake Meredith NRA in the northeastern part of Potter County (National Park Service 2000, 2001). The Canadian River has carved a narrow, steep-walled canyon 60 to 90 m deep and up to 3.3 km wide through the area. Between this canyon and the surrounding caprock, many tributary streams have created a rough and broken topography, known as the Canadian River Breaks. Construction of the Sanford Dam between these "breaks" in 1962 created a large reservoir: Lake Meredith. The area lies at elevations 855-1,013 m above sea level (National Park Service 2001). Coordinates of locations mentioned in the text can be found in the Appendix.

Climate of the area is semi-arid with considerable seasonal ranges in temperature, from the average of -7°C in winter to +33°C in summer. The average annual rainfall is ca. 500 mm, 70% of which falls between April and September. The area receives almost constant winds of ca. 20 km/hour, often reaching 50 to 60 km/hour in early spring. Estimated evaporation rates (largely due to the winds) are 60 to 65% of the total precipitation (National Park Service 2001). According to Texas Water Management Board data (2006) the area experienced several droughts as well as wetter years between 1940 and 2004. Fouquette and Lindsay's (1955) study at Bugbee Ranch coincided with one of the wetter periods, whereas the surveys reported here took place during a drought. Examination of Texas Water Management Board data revealed that average precipitation in 2000-03 was 32.7% less than that during 1948-50 (425 vs. 632 mm), e.g., rainfall between April and September decreased by 48.3% (from 515 to 266 mm). The most conspicuous decrease occurred during the months of July and August (Fig. 1).

The vegetation of Lake Meredith NRA and Alibates Flint Quarries NM was assessed by Nesom and O'Kennon (2005) and found to be "mostly in good condition" or representative of the area, especially when compared to similar vegetation types outside the parks. The following description of the parks' habitats was adopted from Nesom and O'Kennon (2005). To be able to compare this study to that of Fouquette and Lindsay (1955), the parks' habitat types were grouped into rocky slopes and uplands, sandy areas, riparian areas, and marsh. There is also a man-modified borrow area at the northeastern end of Lake Meredith NRA.

Rocky slopes consist of red sandstone slopes, gravelly slopes, Dolomite caprock, and few gypsum outcrops. These slopes are dominated by broom snakeweed (*Gutierrezia sarothrae*), small soapweed yucca (*Yucca glauca*), woolly locoweed (*Astragalus mollissimus*), white sagebrush (*Artemisia ludoviciana*), fragrant mimosa (*Mimosa borealis*), featherplume (*Dalea formosa*), sideoats grama (*Bouteloua curtipendula*), and blue grama (*B. gracilis*), with scattered one-seeded juniper (*Juniperus monosperma*), and honey mesquite (*Prosopis glandulosa*). Lace hedgehog cactus (*Echinocereus reichenbachii*) and plains prickly-pear (*Opuntia polyacantha*) are common cacti.

Sandy areas include sandhills, sandflats, and sandy valley bottoms. Rolling hills and flats of relatively deep, loose sand are dominated by sand sagebrush (*Artemisia filifolia*), annual buckwheat (*Eriogonum annuum*), small soapweed yucca, sand dropseed (*Sporobolus cryptandrus*), purple sandgrass (*Triplasis purpurea*), witchgrass (*Panicum capillare*), and scattered honey mesquite and patches of Chickasaw plum (*Prunus angustifolia*). Sandflats are dominated by grasses, especially vine mesquite (*Panicum obtusum*) and western wheatgrass (*Pascopyrum smithii*), with sand dropseed, streambed bristlegrass (*Setaria leucopila*), and sideoats grama in lesser abundance.

Riparian areas include cottonwood woodlands and hackberry-soapberry dry woodland along the larger drainages. Dominant trees and shrubs are plains cottonwood (*Populus deltoides* var. *monilifera*), Chickasaw plum, netleaf hackberry (*Celtis reticulata*), western soapberry (*Sapindus drummondii*), common hoptree (*Ptelea trifoliata*), fragrant sumac (*Rhus aromatica*), and willows (*Salix*). Herbaceous species are represent-

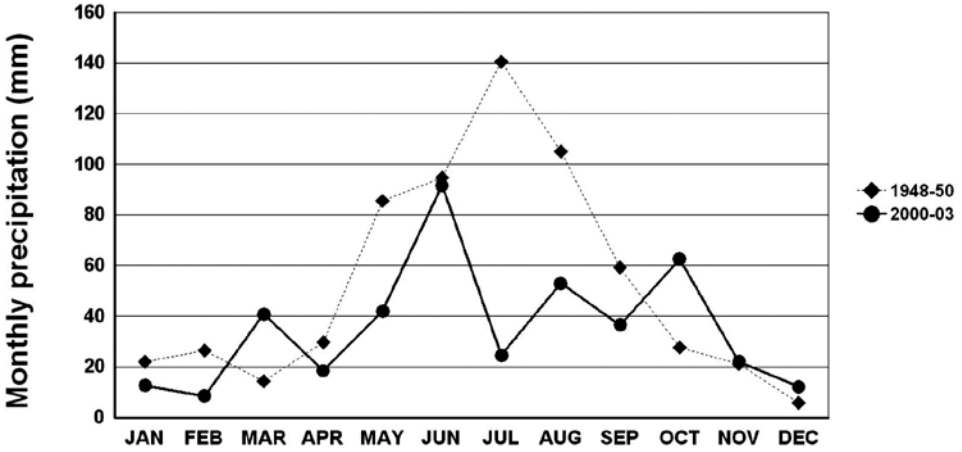

Figure 1. Average monthly precipitation in the central Texas Panhandle in 1948-50 and 2000-03.

ed by grasses, e.g., switchgrass (*Panicum virgatum*), Indian grass (*Sorghastrum nutans*), Canada wild-rye (*Elymus canadensis*), and little bluestem (*Schizachyrium scoparium*). Plains prickly-pear is also common. Common reed (*Phragmites australis*) and southern cattail (*Typha domingensis*) grow in the wettest habitats. Along relatively narrow channels of permanent or seasonal flow there are sedge meadows dominated by Cyperaceae (Nesom and O'Kennon 2005). Varying lake levels have encouraged the encroachment of nonnative salt cedar (*Tamarix ramosissima*) in floodplain areas (National Park Service 2001).

Marsh habitat is common at the south end of Lake Meredith, along the Canadian River, and immediately below Sanford Dam (Sanford Marsh). The marshes are dominated by southern cattail and common threesquare (*Schoenoplectus pungens*) in areas of deeper water, with common reed and spiny chloracantha (*Chloracantha spinosa*) around the edges. Pondweed (*Zannichellia palustris* and *Potamogeton pectinatus*) occur in deeper channels and pools (Nesom and O'Kennon 2005). Wetlands comprise ca. 34% of Lake Meredith NRA (National Park Service 2001).

The borrow area at the north end of Lake Meredith NRA, between North Canyon and FM 1319, had large amounts of rock and soil removed ca. 1962-1968 for construction of Sanford Dam. This area is now relatively flat, consistently scraped down to a level of reddish sandstone and sandy clay and naturally revegetated over the last 40 years. Honey mesquite is the dominant shrub-small tree of the borrow area. Other common species are broom snakeweed, white heath aster (*Symphyotrichum ericoides*), yellow bluestem (*Bothriochloa ischaemum*), sideoats grama, and sand dropseed (Nesom and O'Kennon 2005).

Oil and gas exploration and development have been actively pursued in the vicinity of Lake Meredith NRA and Alibates Flint Quarries NM since the late 1920s, well before establishment of the parks. In the parks today, there are 170 active well sites, 64 km of active oil field access roads, 167 km of abandoned roads, and 6 km of existing oil and gas pipelines (National Park Service 2001).

METHODS

Methods followed the "Study Plan for Biological Inventories, Southern Plains Network, National Park Service" (National Park Service 2000). Vouchers for amphibian and reptile species were allowed in the form of photographs, journal articles and technical reports, and physical specimens. Photographic evidence was used whenever possible. Photographic vouchers can be found in Patrikeev (2004). Specimens collected during this study were deposited in the collection of West Texas A&M University (WTAMU). Threatened species were not collected (unless found dead).

Visual encounters involved systematic and opportunistic searches such as turning over rocks, logs, and other debris, or looking into rock crevices and cracks in structures. Some amphibians and reptiles were recorded during surveys for other vertebrate groups.

Eighty-two coverboard stations were set up in randomly selected sites in the study area in March-April 2002: 74 in Lake Meredith NRA and 8 in Alibates Flint Quarries NM. Each coverboard station consisted of 3 coverboards: two made of chipboard material (0.7 x 1.3 m), and one of roofing tin (0.8 x 1.5 m). It was assumed that species that prefer dry microhabitats would be found under coverboards made of roofing tin, and species preferring wetter microhabitats would select chipboards. During this study, coverboards were checked from 20 May to 9 August 2002 and from 18 April to 10 June 2003. In the dry and hot summers of 2002-03, coverboards proved ineffective; temperature under coverboards (especially roofing tin) was considerable, and no visibly detectable moisture accumulated under chipboards even after summer rains. Thus, after initial efforts, coverboards were checked on a rather ad hoc basis.

Night road surveys were undertaken on rainy or warm and humid nights, and conducted by slowly driving roads looking for reptiles and amphibians crossing roadways. Detected individuals were captured, identified, and photographed. All paved park roads and the majority of accessible unpaved roads were surveyed. In total, 24 night searches were conducted: 13 in 2002 (28 April; 2, 10, 13-15, 18, 20, 26 June; 4, 13, 17 July; and 8 August) and 11 in 2003 (25, 29 April; 4, 6, 15, 28 May; 14, 18, 20 June; and 12 and 16 July).

Auditory amphibian surveys for frogs and toads were conducted in freshwater habitats during March through June 2002 and 2003 (usually following a spell of warm weather in spring, and after rains later in the season). These surveys were conducted at Sanford Marsh, the Plum Creek boat ramp, along FM 1913, and along other roads within the study area when temporary pools appeared in ditches following summer rains.

Large hoop traps were used to carry out two rounds of turtle trapping in September 2002: 6 trap-nights at Sanford Marsh (5-9 September), and 4 trap-nights in the Canadian River at Mullinaw Crossing (16-17 September).

The following collections were examined: Texas A&M University, College Station (TAMU); Texas Natural History Collection - University of Texas Memorial Museum, Austin (TNHC-UTMM); University of Texas at Arlington (UTA); West Texas A&M University, Canyon (WTAMU).

The following permits governed research activities conducted during this project: 1) NPS Scientific Research and Collecting Permit # Lake Meredith NRA-2002-SCI-0001; 2) Texas Park and Wildlife Department Scientific Collections Permit # SPR-0102-193.

RESULTS AND DISCUSSION

This study recorded the presence of nine species of amphibians and 28 species of reptiles. An additional eight species (one amphibian and seven reptiles) were known from Lake Meredith NRA-Alibates Flint Quarries NM previously and may still occur in the area.

CLASS AMPHIBIA

Night road searches and visits to potential breeding sites proved more effective than other techniques for detecting amphibians. No amphibians were found under cover boards. Employment of drift fences might increase survey effectiveness for amphibians.

ORDER CAUDATA

Family Ambystomatidae

Ambystoma tigrinum mavortium

Barred Tiger Salamander

Cryptic or rare. Not recorded in either park during this study, but one found crossing FM 1913 ca. 3.5 km west of Big Blue Creek Bridge on a rainy night of 18 June 2003. Four specimens including a transformed larvae from Potter and Hutchinson counties within Lake Meredith NRA are in the WTAMU collection. This species was common in stock tanks at Mansfield Ranch in 1974 (Scudday and Scudday 1975).

ORDER ANURA

Family Hylidae

Acris crepitans blanchardi

Blanchard's Cricket Frog

Very common in marshes at the very north of Lake Meredith NRA (Sanford Marsh, Hutchinson County). Not found in other seemingly suitable marshes, e.g., at Bonita Creek, Rosita Meadows, near Plum Creek boat ramp, or elsewhere in the Canadian River Valley. At Sanford Marsh, calling recorded from mid-April through August. Individual calling males (5-10) could be counted 18-22 April 2002, but overwhelming chorus was prevalent on 28 April 2002 and through May, June, and July. One male collected at Sanford Marsh is in WTAMU collection (15114).

Family Bufonidae

Bufo cognatus

Great Plains Toad

Listed by Philips (1989) without a photographic record or a specimen. R. J. O'Kennon (pers. comm.) reported seeing one in Spring Canyon-Sanford Marsh area in late May 2002. This species was not detected during many hours of night surveys at Sanford Marsh and elsewhere in 2002-03. Great Plains Toads had been collected in the vicinity of Dumas, Borger, and Stinnett (the two latter locations only ca. 12 and 15 km from Lake Meredith NRA, respectively), but the bulk of those records is from 1949-1950 (TNHC-UTMM, UTA, TAMU collections). In 1974, many were seen at Mansfield Ranch after light rain (Scudday and Scudday 1975). The two most recent records are from Britains Ranch north of Stinnett in 1985 (WTAMU collection). If this species still persists in Lake Meredith NRA, it is likely rare.

Bufo debilis insidior

Western Green Toad

Common but cryptic. Occurs in sandy areas and gradual slopes of Lake Meredith NRA and may be present in Alibates Flint Quarries NM. Emerges to breed after first summer rains, and forages on the surface (e.g., paved roads) on rainy or humid nights. Earliest record on 15 May; latest record on 4 July. Breeds in marshes, roadside ditches, and other ephemeral pools. Onset of breeding during 10-14 June coincided with summer rains in 2002 and 2003. Calling continued at least until 18 June during both years. Breeding congregations were recorded in a marshy area at Plum Creek boat ramp, and in a roadside ditch in Bates Canyon (both in Potter County). Only five to six calling males were found at the latter location, and the ditch dried out by 20 June 2002. During night searches, this species was encountered in Bates Canyon, Plum Creek, and along Cas Johnson Road (Potter County), Bugbee Canyon and on Sanford-Yake Road (Hutchinson County), and at Blue West (Moore County). The latter record (five toads on 17 June 2003) might be the first confirmed Moore County record (not shown in Dixon 2000).

Taxonomic note.—Two subspecies of *Bufo debilis* occur in Texas: the Eastern Green Toad, *B. d. debilis*, and the Western Green Toad, *B. d. insidior* (Dixon 2000). Dixon (2000) draws a boundary between these subspecies along a north-south line dividing Moore and Potter counties from Hutchinson and Carson counties, with *B. d. insidior* to the west of the line (in Potter Co.) and *B. d. debilis* to the east (in Hutchinson Co.). All green toads recorded during this survey likely belonged to the western subspecies *insidior*. All examined specimens displayed characteristics assigned to the western subspecies by Conant and Collins (1991): 1) black lines connect many of the round, black dots on the dorsum; 2) warts on paratoid glands and upper eyelids have black points (Fig. 2). The latter authors also emphasized that *insidior* usually occurs above 760 m above sea level (asl). All records in Lake Meredith NRA were from 880-970 m asl.

Bufo punctatus
Red-spotted Toad

Uncommon, but relatively widespread in sandy areas and gradient slopes in Lake Meredith NRA (only 17 recorded in 2002 and 2003). More common in adjacent ranches above the Canadian River Breaks. May be present in Alibates Flint Quarries NM. This is a subfossorial species that emerges to breed and forage after summer rains. Earliest record on 10 June and latest on 4 July. The rest of the year this toad probably spends underground in burrows and tunnels excavated by other animals. No breeding congregations were encountered within the parks, probably due to timing of visits rather than unsuitability of habitat, but calling was heard from ranches adjacent to FM 1913 in late June 2003. In Lake Meredith NRA, this species was only found during night road searches in Bates Canyon and Plum Creek (Potter County), Harbor Bay, Cedar Canyon and Bugbee Canyon (Hutchinson County), Blue West Road (Moore County) and FM 1913. Usually only 0-2/night, but 10 on 18 June 2003.

Bufo woodhousii woodhousii
Woodhouse's Toad

By far, the most conspicuous, widespread, and common amphibian in Lake Meredith NRA and Alibates Flint Quarries NM. Occurs in riparian and sandy areas, gradient slopes, and marshes. Breeding congregations were recorded in Bugbee Canyon, Cedar Canyon, Sanford Marsh (Hutchinson County), Plum Creek boat ramp and extensive marshes in the Canadian River Valley between Plum Creek and Bates Canyon boat ramps, and at Bonita Creek (Potter County). Probably also breeds in ephemeral pools and puddles elsewhere in the valley, and along Big Blue Creek in Lake Meredith NRA. Outside of breeding season, it emerges on humid and rainy nights; it frequently forages on paved and unpaved roads in Bates, McBride, Spring, and Bugbee canyons, Plum Creek, Mullinaw Crossing, Blue West, Big Blue Creek Valley, Harbor Bay Rd., Alibates Flint Quarries NM, Cas Johnson Rd. and FM 1913, and some were road-killed. Earliest records: 16 March (2003) and 24 April (2002). Calling at Sanford Marsh from late April to ca. 20 June with the peak of breeding activity in late May. Juveniles observed from June, but most commonly in September. Probably retreats underground in late September (latest record on 23 September 2002).

Scaphiopus couchii
Couch's Spadefoot

Common and widespread, though cryptic and difficult to detect due to subfossorial habits. Remains underground in burrows and tunnels throughout the year, emerging briefly to breed and forage following the arrival of summer rains. Earliest record on 10 June and latest on 9 August. Onset of breeding follows summer rainfall. Only three breeding congregations were recorded: in a roadside ditch in Bates Canyon (Potter County) on 13 June 2002, on a flooded asphalt road in Fritch on 18 June 2003, and in a flooded section of a dirt road in the borrow area east of North Canyon (Hutchinson County) on 20 June 2003. Probably breeds in other ephemeral pools, as they become available. Frequent on paved and unpaved roads following rains or even light drizzle. At least 25 were recorded during roadside surveys in Bates Canyon, McBride Canyon, Cas Johnson Road (Potter County), Sanford-Yake, Harbor Bay, Bugbee Canyon (Hutchinson County), and FM 1913 between Blue West Road and Big Blue Creek bridge (Moore County). Likely occurs throughout sandy parts and gradient slopes of the Lake Meredith NRA and in Alibates Flint Quarries NM.

Figure 2. Western Green Toad (*Bufo debilis insidior*) from Bates Canyon, Lake Meredith NRA, Potter County. Photo by Michael Patrikeev.

Spea bombifrons
Plains Spadefoot

Uncommon. Only 6 records during the two-year study (one in 2002 and five in 2003), with only four within Lake Meredith NRA proper. More common on private ranches above the Canadian River Breaks, e.g., >150 collected east of Stinnett in 1950 (TNHC-UTMM collection). This is a subfossorial species emerging to breed and forage following onset of summer rains (13-20 June during this study). This species may spend less time on the surface than *Scaphiopus couchii*. No breeding congregations found in the parks, but this species was heard calling from private ranches adjacent to FM 1913 in Moore County northwest from Lake Meredith NRA on 18 June 2003. Found during night road searches in Bates Canyon (Potter County) on 13 June 2002 and 18 June 2003, in Blue West (Moore County) on 18 June 2003, and in Spring Canyon (Hutchinson County) on 20 June 2003. Also, two recorded along FM 1913 between Blue West Road and Big Blue Creek Bridge on 18 June 2003.

Rana blairi
Plains Leopard Frog

Uncommon and sparsely distributed in Lake Meredith NRA. Does not form large choruses and perhaps overlooked in some areas. Confined to marsh and riparian habitats. Recorded at Sanford Marsh, Bugbee Creek, and Harbor Bay (Hutchinson County), and Mullinaw Crossing, Plum Creek, Chicken Creek, and Bates Canyon boat ramp area (Potter County). R. O'Kennon (pers. comm.) reported this species from Big Blue Creek (Moore County), and a specimen from Fritch Fortress is in WTAMU collection. No more than five or six seen or heard per location. Calling from late April (25th) to at least mid-June (14th). Juveniles recorded at Mullinaw Crossing on 20 September.

Rana catesbeiana
Bullfrog

Uncommon and sparsely distributed throughout Lake Meredith NRA. Associated with marsh and small, deep ponds. Recorded at only three sites: Sanford Marsh and Bugbee Canyon (Hutchinson County), and Bonita Creek (Potter County). Vocal activity recorded at Sanford Marsh and Bonita Creek from 22 April to 2 August. No more than three individuals were heard or seen at any single site in 2002 and 2003. Two tadpoles collected at Sanford Marsh on 28 April 2002 are in WTAMU collection (15115 and 15116).

CLASS REPTILIA
ORDER TESTUDINES

Turtles were caught in turtle traps, observed basking on rocks, logs, or emergent vegetation, encountered while driving and walking on paved and unpaved roads, and while walking cross-country. One Ornate Box Turtle was found under a coverboard.

Family Chelydridae
Chelydra serpentina serpentina
Common Snapping Turtle

Uncommon or under-recorded semiaquatic species. Although it was only found in Sanford Marsh (Hutchinson County) it likely occurs in other marshes bordering the Canadian River and in Lake Meredith. Five were caught in two turtle traps in Sanford Marsh on 6 September 2002. The largest measured 36.8 cm (carapace length) and weighed 10 kg. Three others measured 20.3-31.1 cm long (carapace) and weighed 1.1-4.9 kg. This species was rare at Bugbee Ranch in 1950: only one record (Fouquette and Lindsay 1955).

Family Kinosternidae
Kinosternon flavescens flavescens
Yellow Mud Turtle

Uncommon or under-recorded aquatic species. This turtle rarely leaves water to bask in the open (Conant and Collins 1991). Not caught in turtle traps. Only four records from this study (three in Lake Meredith NRA). Two found in pools in a drying section of the Canadian River upstream from Mullinaw Crossing (Potter County) on 3 June 2003, one on land near Sanford Marsh (Hutchinson County) on 18 September 2002, and one east of Sanford-Yake alongside FM 687 (also Hutchinson County) on 18 June 2002. A specimen from Coetus Creek is in the WTAMU collection. Probably occurs throughout the Canadian River Valley including adjacent marshes and may occur in Lake Meredith. Fifteen were collected at Bugbee Ranch (Fouquette and Lindsay 1955).

Family Emydidae
Terrapene ornata ornata
Ornate Box Turtle

Common. Most frequently encountered turtle in both parks (> 40 records). It was also common at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955), but rare at Mansfield Ranch in 1974 (Scudday and Scudday 1975). This is a mostly terrestrial turtle although occasionally it ventures into pools and mud puddles. Inhabits sandy areas, gradient slopes, borrow and riparian habitats throughout the area. Observed in Rosita Meadows, Bates Canyon, McBride Canyon, Mullinaw Crossing, Dolomite Point grasslands, Plum Creek, Alibates Flint Quarries NM, Cas Johnson Road (Potter County), Sanford-Yake, North End grasslands (Hutchinson County), and Blue West (Moore County). Frequently seen walking on paved and unpaved roads where some were road-killed (four roadkills recorded). Two dead turtles of this species were found in a vicinity of a foul-smelling gas well, and might have been overwhelmed by toxic fumes. One discovered under a chipboard. Emerges from hibernation in late April (22-25). Active throughout the summer with latest record on 7 October.

Trachemys scripta elegans
Red-eared Slider

Common locally in marshes of the Canadian River and bays of Lake Meredith. As many as 36 observed basking in Sanford Marsh on 29 March 2002. Nine caught in two turtle traps at the same location 6-9 September 2002. Observed basking in Bugbee Bay and at Cedar Canyon boat ramp. Likely occurs in

other marshes, bays, and in the Canadian River in Lake Meredith NRA. Sliders caught at Sanford Marsh (n=9) measured 17.5-26.7 cm (carapace length) and weighed 393-1,570 g (average 22.7 cm and 1,006 g). Latest record on 14 November 2003 (Sanford Marsh).

ORDER SQUAMATA
SUBORDER LACERTILIA

Six species were recorded during this study, and two additional species are known from collections. All but one species were readily found on cross-country hikes and seen while driving paved and unpaved roads. Four species were found under rocks, and three under coverboards (both chipboards and roofing tin). Use of drift fences might result in capture of species undetected in this study.

Family Crotaphytidae
Crotaphytus collaris collaris
Eastern Collared Lizard

Uncommon, but widespread (14 records). Probably under-recorded. Less common than the Prairie Lizard, Texas Horned Lizard, and Prairie Racerunner. In 1950, 65 specimens were collected at Bugbee Ranch (Fouquette and Lindsay 1955), and this species was common at Mansfield Ranch in 1974 (Scudday and Scudday 1975). Inhabits rocky slopes, and less frequently sandy and borrow areas. Usually found by turning rocks, but three were under coverboards (both chipboards and roofing tin). This species was also observed on paved and unpaved roads. Recorded at Bultaco Hill, McBride Canyon, Bates Canyon, Plum Creek, Devil's Canyon, Alibates Flint Quarries NM (Potter County), Bugbee Canyon, North Canyon (Hutchinson County), and Blue West (Moore County). Slightly more common in Blue West and Bates Canyon than elsewhere in the study area. Observed in Alibates Flint Quarries NM as early as 4 April (2003). Most conspicuous in late May-early June (roughly between 21 May and 1 June) which probably coincides with breeding season. Latest records were in mid-August, although this species may remain active into September. Immature lizards were observed near Alibates Flint Quarries NM on 28 April 2002, in Plum Creek Canyon on 2 May 2002, and in Bates Canyon on 10 August 2001.

Family Phrynosomatidae
Phrynosoma cornutum
Texas Horned Lizard

Listed as a species of concern in Texas, but common and widespread in the study area (46 records including 15 in Lake Meredith NRA and three in Alibates Flint Quarries NM). More common in ranches bordering the study area, e.g., 10 along FM1913 between Fourways and Big Blue Creek (Moore County) on 13 July 2003, 10 (total) along Cas Johnson and McBride roads (Potter County), and along FM 3395 in the vicinity of Bugbee (Hutchinson County). In 1950, 42 were collected from Bugbee Ranch (Fouquette and Lindsay 1955). In Lake Meredith NRA and Alibates Flint Quarries NM, this species is more conspicuous on paved roads, but some were found in gradient slopes, sandy areas, in draws, on unpaved roads, and in previously burned areas, e.g., in Bates Canyon, Plum Creek Canyon, Mullinaw Crossing, Alibates Flint Quarries NM (Potter County), and Blue West (Moore County). R. O'Kennon observed one in Spring Canyon (Hutchinson County). This species is very cryptic and often remains motionless if approached, making it difficult to see. Thus it was likely overlooked in suitable habitat elsewhere. More frequently seen on roads in Bates Canyon and Blue West where the most roadkills occurred (four and three, respectively). Two roadkills deposited with WTAMU collection (15112 and 15113). This species becomes conspicuous in mid to late April (earliest records on 13 April 2003 and 28 April 2002) and remains active through the summer. Latest record on 20 September. Juveniles recorded from 15 May through 20 September. Those recorded earlier in the summer likely overwintered. At present populations in both parks and the adjacent ranches appears to be healthy. Road mortality is probably significant (especially along FM roads). The construction of new paved roads in the parks should be avoided to prevent further vehicle-induced mortality.

Phrynosoma modestum
Roundtail Horned Lizard

Very cryptic or very rare. Not observed during the present study. Reported by Philips (1989) and a specimen was collected near Blue West marina at Lake Meredith, Moore County in 1987 (WTAMU collection). Also known from Potter County (Dixon 2000).

Sceloporus consobrinus (= *Sceloporus undulatus consobrinus* and *S. undulatus garmani*)
Prairie Lizard

Common and widespread (>50 records in 2002-03). Inhabits sandhills, sandflats, borrow areas (e.g., often in areas overgrown with honey mesquite), gradient slopes, and riparian woodlands throughout the parks. Recorded in Rosita Meadows, Bates Canyon, McBride Canyon, Dolomite Point grasslands, Plum Creek, Mullinaw Crossing, Alibates Flint Quarries NM (Potter County), Sanford-Yake, North Canyon, Spring Canyon, North End grasslands (Hutchinson County), and Blue West (Moore County). This species was found on the ground, under rocks, in shrubs and trees, and one under a coverboard. Emerges earlier and remains active longer than other lizards in the study area. In 2002, observed in Alibates Flint Quarries NM as early as 16 March, and at Cedar Canyon as late as 13 November. Three records of juveniles in 2002: in Spring Canyon on 6 September, at Alibates Flint Quarries NM on 10 September, and in North End grasslands on 22 October. One Prairie Lizard collected in Hutchinson County was deposited with WTAMU collection (15110).

Taxonomic Note.—According to Conant and Collins (1991) and Dixon (2000) two subspecies of *S. undulatus* inhabit the Texas Panhandle: Northern Prairie Lizard (*S. u. garmani*) and Southern Prairie Lizard (*S. u. consobrinus*). Newest sources (Collins and Taggart 2002) split prairie and fence lizards, and combine *S. u. garmani* and *S. u. consobrinus* into the Prairie Lizard *Sceloporus consobrinus*. Dixon (2000) draws a boundary between *consobrinus* and *garmani* along the north-south line dividing Moore and Potter counties on the west side from Hutchinson and Carson counties to the east. However, the division between the two subspecies is probably not that simplistic and may involve elevation gradient and possibly habitat differentiation. Specimens from TNHC and UTA collections that were collected in Hutchinson County were labeled *S. undulatus* whereas Fouquette and Lindsay (1955) recorded all 38 specimens from Bugbee Ranch as *garmani*. In this study, Prairie Lizards from Sanford-Yake (Hutchinson County) were more similar to *garmani* as described in Conant and Collins (1991): The light longitudinal stripes are bold and usually clearcut. Dark dorsal markings, prominent in other subspecies, are reduced to spots bordering the light dorsolateral stripe. In males, two long, narrow, light blue patches, one at each side of the belly, are bordered medially with black and well separated from each other. Throat markings are absent or consist of two small, widely separated blue patches (Fig. 3). Individuals from Moore and Potter counties were not closely examined, and it is possible that *consobrinus* occurs in the parks also. Perhaps the more practical approach is to follow Collins and Taggart (2002) and treat both forms as *Sceloporus consobrinus*.

Family Teiidae
Cnemidophorus gularis gularis
Texas Spotted Whiptail

Rare or extirpated. Not recorded in 2002-03. WTAMU collection contains a specimen from Lake Meredith NRA (Potter County) collected in 1979 and another one from Fritch (also in Potter County) in 1967. This lizard may still occur in the study area, although it is a conspicuous species elsewhere (pers. observ.) and thus unlikely overlooked during the two year study. Fouquette and Lindsay (1955) did not find it at Bugbee Ranch in 1950, and there are no records from Mansfield Ranch (Scudday and Scudday 1975).

Cnemidophorus sexlineatus viridis
Prairie Racerunner

Common and widespread in suitable habitats throughout the parks (> 50 records). Inhabits sandhills, sandflats, valley bottoms, and riparian woodlands. Observed in Rosita Meadows, Bonita Creek, Mullinaw Crossings, McBride Canyon, Bates Canyon, Dolomite Point grasslands, Plum Creek, Alibates Flint Quarries NM (Potter County), Sanford-Yake, east of Bugbee, North End grasslands (Hutchinson County) and Blue West (Moore County). Emerges around mid-April: earliest records on 13 April 2003 and 17 April 2002. Remains active through August. Juveniles recorded on 17 April and 19 May. A juvenile collected at Rosita Meadows is in WTAMU collection (No. 15111). This species was also very common at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955) and at Mansfield Ranch in 1974 (Scudday and Scudday 1975).

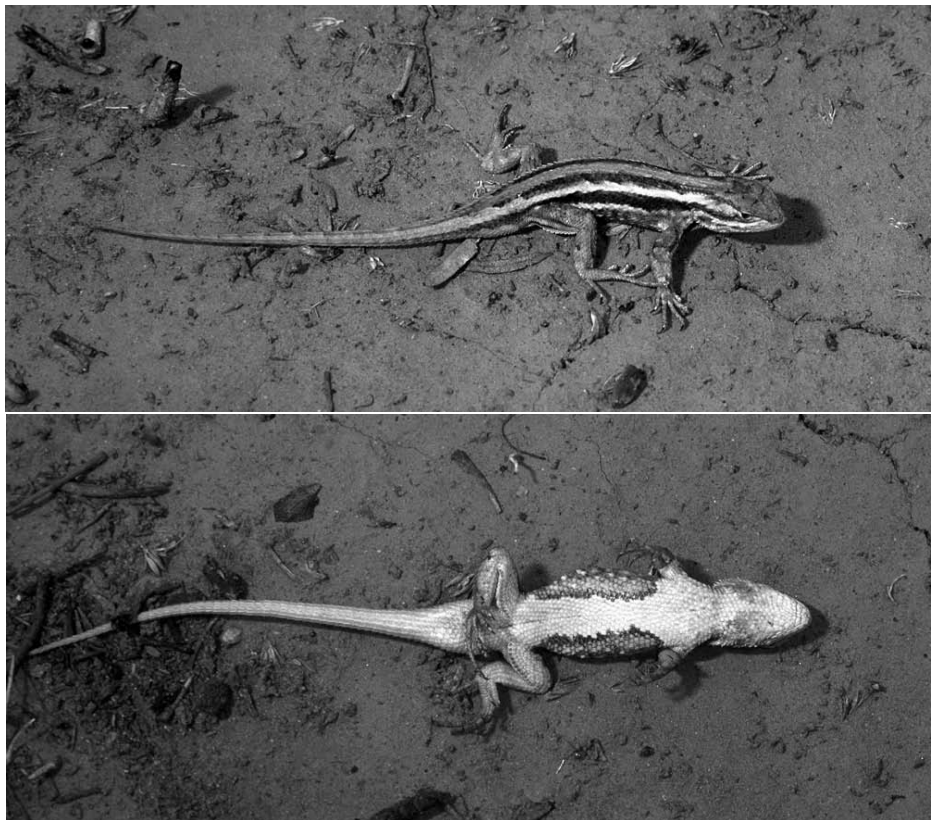

Figure 3. Prairie Lizard (*Sceloporus consobrinus* = *S. undulatus garmani*) from Sanford-Yake, Lake Meredith NRA, Hutchinson County. Dorsal (a) and ventral (b) views. Photo by Michael Patrikeev.

Cnemidophorus tesselatus
Common Checkered Whiptail

Uncommon species (eight records in 2002, none in 2003) mostly found in rocky slopes and along draws. One record from a prescribed burn site on sandflats (Bates Canyon). Other sightings were from Alibates Flint Quarries NM (3), Blue West (2), Plum Creek, and Cedar Canyon. Specimens from Bugbee Canyon (Hutchinson County), Bonita Creek and Chimney Hollow (Potter County) are in WTAMU collection. Unisexual species, young develop from unfertilized eggs (Conant and Collins 1991). No juveniles recorded during this study, but one immature observed in Blue West on 1 June. Dixon (2000) does not show this species in Moore County, and thus the records from Blue West might be the first for that county. Interestingly, Fouquette and Lindsay (1955) did not find Common Checkered Whiptail at Bugbee Ranch in 1950, although it was common at Mansfield Ranch in 1974 (Scudday and Scudday 1975).

Family Scincidae
Eumeces obsoletus
Great Plains Skink

Common and widespread (16 records). Subfossorial habits of this species make it less conspicuous than other common lizards. Usually found by overturning rocks in gradient slopes, sandflats, and borrow areas. The species was found under coverboards (chipboards) only in the second year of the study (four records). Juveniles were uncovered from under fallen bark, rocks, but also observed on paved roads. Recorded only from Bates Canyon, Alibates Flint Quarries NM (Potter County), Sanford-Yake, North Canyon, Bugbee Canyon, North End grasslands (Hutchinson County),

and Blue West (Moore County), but likely overlooked in suitable habitats elsewhere in the study area. Earliest records on 18 April 2003 and 23 April 2002. Juveniles probably hatch in early July when more than five were recorded in Alibates Flint Quarries NM and Bates Canyon (7-15 July). Sixty specimens were collected at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955); not found at Mansfield Ranch during a brief survey in 1974 (Scudday and Scudday 1975).

SUBORDER SERPENTES

Eighteen species were recorded during the 2002-03 study, and four additional species are known from museum records. The most efficient methods of detecting snakes were, by far, turning rocks and debris, and night road searches; many also were recorded during daytime cross-country hikes. Only two species (Western Coachwhip and Prairie Ringneck Snake) were found under coverboards.

Family Leptotyphlopidae
Leptotyphlops dulcis dissectus
New Mexico Blind Snake

Rarely encountered fossorial species. Likely common, but difficult to detect due to its subterranean habits (>45 collected from Bugbee Ranch in 1950; Fouquette and Lindsay 1955). Only three records during this study (all from Potter County). Found by overturning rocks: two on rocky slopes in McBride Canyon on 1 and 4 May 2002, and one in a draw in Alibates Flint Quarries NM on 25 May 2003. One specimen was deposited with WTAMU collection (No. 15109).

Family Colubridae
Arizona elegans elegans
Kansas Glossy Snake

Uncommon (or under-recorded) nocturnal snake. Only three records in 2002-03, all found on paved roads during night searches: in Bates Canyon (Potter County) on 28 April 2002; on Plum Creek Road just outside of Lake Meredith NRA boundary (Potter County) on 2 June 2002; and on FM 1913 east of Big Blue Creek bridge (Moore County) on 7 June 2003. The two latter records came on warm nights preceded by light rain or drizzle. Six additional specimens in WTAMU collection, e.g., from Alibates Flint Quarries NM (Potter County) and the vicinity of Sanford (Hutchinson County). According to Werler and Dixon (2000) this burrowing snake is confined to sandy or loamy soils. At Bugbee Ranch, seven of 12 collected specimens were found in deep sands (Fouquette and Lindsay 1955).

Coluber constrictor flaviventris
Yellowbelly Racer

Rare or perhaps uncommon species with only one record in the 2002-03 study. The snake was found under a garbage bin lid in a grassy area next to Sanford Marsh (Hutchinson County). One specimen collected "0.5 mi. W of Lake Meredith" in Moore County in 1987 (WTAMU collection). This species may occur throughout the Canadian River Valley in Lake Meredith NRA, but difficult to detect in dense-grass riverine habitats. Twenty-five were collected at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955) in a wetter than average year.

Diadophis punctatus arnyi
Prairie Ringneck Snake

Rare or overlooked due to its subfossorial habits. Only three records in 2002-03: under a rock in a borrow area at Sanford-Yake (Hutchinson County) on 15 April 2002; under a coverboard (chipboard) in riparian area at Rosita Meadows (Potter County) on 21 and 22 April 2003; a juvenile in a thick clump of grass in sandflats at the North End (Hutchinson County) on 22 October 2002. All records were made in mid-spring and autumn. This species probably spends the hottest months of the year underground. WTAMU collection contains specimens from Fritch Fortress, McBride Canyon, and Plum Creek (Potter County). Twenty-seven were collected at Bugbee Ranch by Fouquette and Lindsay (1955) who noted "large concentrations" under woody debris in the floodplain.

Elaphe emoryi emoryi
Northern Plains Rat Snake

Uncommon or rare. Almost exclusively nocturnal snake hiding under rocks, logs, and other surface objects (Werler and Dixon 2000). Only two records during this study: an adult under a rock in the upland part of the Plum Creek area (Potter County) on 28 April 2003, and a juvenile on McBride Road (Potter County) just outside the Lake Meredith NRA during a night survey on 10 June 2002. Three specimens from Alibates Flint Quarries NM, Plum Creek, and Bonita Creek are in WTAMU collection. A large collection of reptiles from Bugbee Ranch, Hutchinson County, contains only eight specimens of *emoryi* (Fouquette and Lindsay 1955).

Heterodon nasicus nasicus
Plains Hognose Snake

Rare. Reported during this study by R. O'Kennon (pers. comm.) who saw one in McBride Canyon in late April 2002. One was collected in "Alibates Canyon at ranger station" in 1994 (WTAMU collection) and eight at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955).

Heterodon platirhinos
Eastern Hognose Snake

Rare or extirpated. The eastern hognose snake was collected at Plum Creek and Bonita Creek in 1979 and 1986 (three specimens in WTAMU collection). Nineteen were collected by Fouquette and Lindsay (1955) at Bugbee Ranch. According to R. Kazmaier (pers. comm.) both hognose snake species have experienced dramatic declines in the Texas Panhandle and adjacent areas, and might have disappeared from some sites including the study area.

Hypsiglena torquata jani
Texas Night Snake

Rare or under-recorded nocturnal species. Only two records during this study: one adult under a rock on a gradient rocky slope in McBride Canyon (Potter County) on 1 May 2002; and a juvenile on paved surface of FM 687 at the North End (Hutchinson County) during a night search on 12 July 2003. Four specimens from Bugbee Canyon (Hutchinson County) and Plum Creek (Potter County) are in WTAMU collection. Nine were collected at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955), and one at Mansfield Ranch in 1974 (Scudday and Scudday 1975).

Lampropeltis getula splendida
Desert Kingsnake

Only one record of this nocturnal species: a roadkilled individual by the ranger station in Sanford-Yake (Hutchinson County) on 3 November 2002. Subsequent searches in 2003 failed to locate more individuals, so it is probably uncommon or rare. Two specimens in WTAMU collection: one labeled "Lake Meredith, Hutchinson County" and another "Alibates Park." Not recorded from Bugbee Ranch in 1950 (Fouquette and Lindsay 1955).

Masticophis flagellum testaceus
Western Coachwhip

Common and widespread (> 25 records). Along with *Crotalus atrox* this is the most frequently encountered snake in the study area. Occurs in sandflats, sandhills, gradient rocky slopes, borrow and riparian areas throughout the parks. Often seeks refuge in burrows and tunnels excavated by mammals. Emerges around mid-April: earliest records on 17 April 2003 and 23 April 2002. Active throughout the summer until at least late September. Frequently seen during daylight hours. Observed basking on paved roads (especially in late April-early May and September), and several were found road-killed. Only one juvenile recorded, a roadkill on Cas Johnson Road on 15 May 2003. Western Coachwhip was the only snake found under roofing tin coverboards (three records). Recorded from Rosita Meadows, Plum Creek, McBride Canyon, Bates Canyon, Alibates Flint Quarries NM, Cas Johnson Road (Potter County), Sanford-Yake, North End by FM 687, North Canyon (Hutchinson County), Blue West and FM 1913 (Moore County). Probably occurs elsewhere in the study area. Two roadkills deposited with WTAMU collection (Nos. 15106 and not yet as-

signed). This species was very common at Bugbee Ranch in 1950; 53 specimens were collected (Fouquette and Lindsay 1955).

Nerodia erythrogaster transversa
Blotched Water Snake

Rare or uncommon (2 records). One at Mullinaw Creek (Potter County) on 29 May 2002 (R. O'Kennon, pers. comm.), and a badly damaged roadkill by Sanford Marsh (Hutchinson County) on 13 July 2002. Four specimens are in WTAMU collection: McBride Canyon (2), Bonita Creek, and below Sanford Dam. Only one specimen was collected at Bugbee Ranch in 1950 despite special efforts to find this species (Fouquette and Lindsay 1955). Small unidentified water snakes (*Nerodia*) observed in Sanford Marsh in April-May 2002 might have been of this species. Probably occurs in small numbers throughout the Canadian River Valley in the study area including in-flowing creeks and associated marshes.

Nerodia rhombifer rhombifer
Diamondback Water Snake

Rare or extirpated. One specimen collected at Bonita Creek (Potter County) in 1979 (WTAMU collection), but not observed since. Few records from elsewhere in the Canadian River Valley in Potter and Hutchinson counties (Werler and Dixon 2000). Not among species collected at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955).

Pituophis catenifer sayi
Bullsnake

Uncommon in riparian habitats and sandy areas. Infrequently seen on paved roads where several roadkills were recorded. Only two of eight records during this study were from the parks proper: one in cottonwood woodland off Dolomite Point Road on 12 June 2002, and another under fallen bark in a sandy area with few dead cottonwoods in Alibates Flint Quarries NM on 7 July 2002 (both sites in Potter County). Six specimens from Alibates Flint Quarries NM, Bonita Creek, and the Sanford area are in WTAMU collection. This species may be more common in adjacent private ranches, e.g., those bordering Plum Creek Road (two roadkills and one live), and FM 1913 between Fourways and Plum Creek Road (one roadkilled and one live). Fouquette and Lindsay's (1955) study at Bugbee Ranch produced 11 specimens. Emerges in late April, e.g., a roadkill on US 287 north of the Canadian River bridge on 23 April 2003. A juvenile found at the intersection of FM 1913 and Plum Creek Road (Moore County) on 12 July 2003, and another in Fritch (Hutchinson County) on 15 September 2003.

Rhinocheilus lecontei tesselatus
Texas Longnose Snake

Infrequently encountered burrowing snake (six records). Probably more widespread than indicated by this study. Five found on paved roads during night road searches (usually after rain): Plum Creek Road (Potter County) on 2 June 2002, Harbor Bay Road (Hutchinson County) on 10 June 2002, Blue West Road on 5 May 2003, at intersection of the latter with FM 1913 on 12 June 2003, and at intersection of FM 1913 and Cig Road on 16 June 2003 (the last three records in Moore County). The sixth was found under a rock in Alibates Flint Quarries NM (Potter County) on 21 May 2002. Not shown for Moore County by Dixon (2000) and Werler and Dixon (2000), thus these records are likely new. Only four recorded at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955).

Sonora semiannulata
Ground Snake

Relatively common (12 records) and probably widespread, however subfossorial and found on surface during a very short period in spring (Werler and Dixon 2000). In Lake Meredith NRA, found under rocks on slopes and in canyons from 27 April through 26 May; a dead specimen was found on a trail on 2 June. Lake Meredith NRA records are from Blue West (Moore County), Bates Canyon and adjacent areas, and Plum Creek (Potter County). Four specimens from McBride Canyon are in WTAMU collection. Likely present in Alibates Flint Quarries NM. Two of five color forms recorded in Lake Meredith NRA: grayish with a red longitudinal stripe, and all red. Fifty-five were collected at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955).

Tantilla nigriceps
Plains Blackhead Snake

One record during the study period, but this species is subfossorial and probably was overlooked. The snake was found under bark that had fallen off a dead cottonwood in Alibates Flint Quarries NM (Potter County) on 26 June 2002. A search through bark shed by other dead cottonwoods in the vicinity failed to produce additional individuals. Two were collected at Plum Creek (Potter County) in 1979 (WTAMU collection) and 12 at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955).

Thamnophis marcianus marcianus
Marcy's Checkered Garter Snake

Rare or under-recorded (only one record during this study). One was found on Plum Creek Road (Potter County) on 14 November 2003 by R. Kazmaier (pers. comm.). That snake was released and not photographed. Another was collected at Plum Creek in 1983 (WTAMU collection). This species appears to be widely distributed throughout the central Texas Panhandle (Werler and Dixon 2000), e.g., 10 were collected at Bugbee Ranch (Fouquette and Lindsay 1955). It is unknown whether the lack of records in this study indicates a decline (perhaps because of the drought) or inadequate survey techniques.

Thamnophis sirtalis annectens
Texas Garter Snake

Rare (two records). Found only at the very north end of Lake Meredith NRA (in Hutchinson County) in late summer-early autumn. One critically injured by car found in Spring Canyon on 5 September 2002 (deposited with WTAMU collection, No. 15107), and another basking on surface of FM 687 at North End was caught on 22 October 2002.

Taxonomic note.—Distribution and field characteristics of *T. s. annectens* are somewhat controversial. According to Conant and Collins (1991), this subspecies occurs in Central Texas, eastern Texas Panhandle, and adjacent parts of Oklahoma, whereas Dixon (2000) and Werler and Dixon (2000) show *T. s. annectens* confined roughly to the Cross Timbers-Southern Blackland Prairie ecoregion in Central Texas. According to the latter authors, garter snakes from the Texas Panhandle belong to a different subspecies: Redsided Garter Snake, *T. s. parietalis*. However both snakes recorded at Lake Meredith NRA exhibited field characteristics of *annectens* (Fig. 4): the unusual broad, orange, mid-dorsal stripe, and lateral stripes involving rows 3, plus adjacent parts of rows 2 and 4 (Conant and Collins 1991; Dixon 2000; Werler and Dixon 2000). Fouquette and Lindsay (1955), who collected 69 specimens of *Thamnophis sirtalis* at Bugbee Ranch in 1950, suggested that "in ventral and caudal counts [those] specimens appear intermediate between *annectens* and *parietalis*. The pattern, however, was not at all suggestive of typical *parietalis*" (Fouquette and Lindsay 1955). Other experts working on garter snakes, e.g., J. Boundy (pers. comm.) and N. Ford (pers. comm.), confirmed that garter snakes from this survey are *T. s. annectens*. In addition, J. Boundy (pers. comm.) examined the 60+ garter snakes collected by Fouquette and Lindsay (1955), and found them identical to *annectens* from Waco-Austin region. A garter snake labeled "*Thamnophis sirtalis* ssp." collected from the vicinity of Borger, Hutchinson County (WTAMU collection) also exhibits *annectens* characteristics. Taxonomic status of *annectens* is currently under review and it may be merged with the nominate subspecies *T. s. sirtalis* (J. R. Dixon and J. Boundy, pers. comm.).

Thamnophis proximus proximus
Western Ribbon Snake

Not recorded in 2002-03. Collected at Bonita Creek in 1979 and by the bridge on US 287 (just outside the study area) in 1985 (WTAMU collection). This species was abundant at Bugbee Ranch in 1950 where 52 specimens were collected (Fouquette and Lindsay 1955).

Tropidoclonion lineatum
Lined Snake

Not recorded in Lake Meredith NRA and Alibates Flint Quarries NM. However, one found crossing FM 1913 between Plum Creek and Blue West roads (Moore County), less than 5 km from Lake Meredith

Figure 4. Texas Garter Snake (*Thamnophis sirtalis annectens*) from North End of Lake Meredith NRA, Hutchinson County. Photo by Michael Patrikeev.

NRA boundary, on a rainy night of 18 June 2003. This cryptic species may occur in the parks, although it was surprisingly not found at Bugbee Ranch (Fouquette and Lindsay 1955). This species probably has a patchy distribution in the Panhandle (Scudday and Scudday 1975).

Family Viperidae
Crotalus atrox
Western Diamondback Rattlesnake

Common and widespread (21 records). Along with the Western Coachwhip, this was the most frequently encountered snake in the study area. Ten were collected at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955). In the study area, this species inhabits grasslands, mesquite and cottonwood woodlands in sandy areas, gradient rocky slopes, riparian and borrow areas. Often seeks refuge in animal burrows and natural crevices. Frequently encountered basking on paved roads in early mornings, during twilight hours, or after spring rains. As a result some were road-killed (>5). Recorded in Rosita Meadows, Bates Canyon, Dolomite Point grasslands, Plum Creek, Alibates Flint Quarries NM, McBride Road (Potter County), Sanford-Yake, North Canyon, Spring Canyon (Hutchinson County), and Blue West (Moore County). Three specimens from Coetus Creek (Potter County) are in WTAMU collection. Visually more common in Bates Canyon and Alibates Flint Quarries NM (10 records). Large specimens are rare: only three diamondbacks >1 m long recorded, e.g., two in Sanford-Yake. Emerges in early May (earliest records during 4-5 May in 2002-03) and remains active to at least the end of September (latest record on 30 September). A hibernaculum was reported in a tamarisk thicket near the marina at Sanford-Yake. Immature snakes were observed from early May through late June.

Crotalus viridis viridis
Prairie Rattlesnake

Rare or uncommon. Not recorded from Lake Meredith NRA and Alibates Flint Quarries NM during this study, although three specimens from Plum Creek and Alibates Flint Quarries NM (Potter County) col-

lected in 1979-1981 are in WTAMU collection. On 12 July 2003 one was found on the side of FM 1913 near intersection with Blue West Road (Moore County) during a night survey. This record is only ca. 4 km from the Lake Meredith NRA boundary. Likely occurs in sandy areas and gradient slopes in the parks albeit in small numbers. Interestingly, Fouquette and Lindsay (1955) collected only two specimens at Bugbee Ranch in 1950, and only one was collected at Mansfield Ranch in 1974 (Scudday and Scudday 1975).

Potentially occurring species

In addition to the 44 species (10 species of amphibians and 34 species of reptiles) detected in this study or known from museum records, the following 13 species (3 amphibians and 10 reptiles) might also be present on the parks.

Pseudacris clarkii, Spotted Chorus Frog.—Not recorded in the present study, but 11 specimens were collected in rain pools in Stinnett and vicinity, and at Bugbee Ranch (Hutchinson County) in 1950 (TNHC-UTMM collection), e.g., ca. 15 km from the northernmost limits of Lake Meredith NRA. Perhaps, drier conditions in 2002-03 were unfavorable for this species.

Spea multiplicata, New Mexico Spadefoot.—This species is known from Hutchinson, Moore, and Potter counties (Dixon 2000). One was collected in Borger (Hutchinson County), only ca. 12 km east of Lake Meredith NRA, on 3 April 1990 (WTAMU collection). Two other specimens from the Amarillo area (Potter County), ca. 25 km south of Lake Meredith NRA, were collected in 1950 (TNHC-UTMM collection).

Bufo speciosus, Texas Toad.—Listed by Philips (1989) and known from Moore and Potter counties (Dixon 2000). One specimen was collected in Potter County southwest of Lake Meredith NRA in 1970 (WTAMU collection).

Apalone muticus muticus, Midland Smooth Softshell.—Recorded from Hutchinson County (Dixon 2000) and suspected in Lake Meredith NRA (Philips 1989). No specimens from Lake Meredith NRA or vicinity were found in the examined collections.

Apalone spinifera hartwegi, Western Spiny Softshell.—Known from Hutchinson and Potter counties (Dixon 2000) and suspected in Lake Meredith NRA (Philips 1989). A specimen in WTAMU collection was collected in 1981 at "Dumas Highway at the Canadian River", i.e., most likely by the bridge on US 287, just west of Lake Meredith NRA.

Holbrookia maculata maculata, Northern Earless Lizard.—No 2002-03 or prior records from the study area, but this species is known from Hutchinson, Moore, and Potter counties (Axtell 1998, Dixon 2000), e.g., 42 specimens from Bugbee Ranch (Fouquette and Lindsay 1955), and five specimens from the vicinity of Amarillo (WTAMU collection). This is a species of sandy prairies (Conant and Collins 1991) and aeolian sands (Axtell 1998), but it also occurs in the floodplain and rocky slopes (Fouquette and Lindsay 1955). The Northern Earless Lizard is likely present in Lake Meredith NRA and Alibates Flint Quarries NM, but was somehow overlooked during this study. However, Scudday and Scudday (1975) also failed to detect this species at Mansfield Ranch in 1974.

Cophosaurus texanus texanus, Texas Earless Lizard.—Listed by Philips (1989), but no literature records or museum specimens from the study area and the vicinity. Not found at Bugbee Ranch (Fouquette and Lindsay 1955). Nearest records are from Armstrong and Donley counties (Dixon 2000).

Uta stansburiana stejnegeri, Desert Side-blotched Lizard .—Presence suspected by Philips (1989), but no specimens or photographic records. Not found at Bugbee Ranch in 1950 (Fouquette and Lindsay 1955), but one was collected near Stinnett (Hutchinson County) in 1967, and four west of US 287 in Moore County in 1978 (WTAMU collection). However, those records were not included in Dixon (2000).

Ophisaurus attenuatus, Western Slender Glass Lizard.—Known from Hutchinson County (Dixon 2000), but not recorded from Bugbee Ranch (Fouquette and Lindsay 1955); also no Panhandle specimens were located through collection reviews.

Lampropeltis calligaster calligaster, Prairie Kingsnake.—This species occurs in Hutchinson County (Werler and Dixon 2000) at the western fringe of its

range so perhaps it is naturally rare in this area. One record from Bugbee Ranch in 1950 (Fouquette and Lindsay 1955).

Lampropeltis triangulum gentilis, Central Plains Milk Snake.—This snake is known from all three counties (Dixon 2000; Werler and Dixon 2000). One was collected "23 miles north of Amarillo" (WTAMU collection), i.e., possibly within Lake Meredith NRA or at least in close vicinity.

Thamnophis radix, Plains Garter Snake.—Two known specimens from Hutchinson County in the vicinity of the study area: one from Bugbee Ranch in 1950 (Fouquette and Lindsay 1955), and one from somewhere at Bugbee Creek in 1969 (WTAMU collection).

Sistrurus catenatus tergeminus, Western Massasauga.—This species was reported at the southwest corner of Potter County, and in Roberts County to the east of Hutchinson County (Werler and Dixon 2000).

CONCLUSIONS

The 2002-03 study detected most amphibian and reptile species expected to occur in the north-central Texas Panhandle. Absence of several species (Spotted Chorus Frog, New Mexico Spadefoot, Northern Earless Lizard, Eastern Hognose Snake, Western Ribbon Snake, etc.) detected during previous studies in Lake Meredith NRA and Alibates Flint Quarries NM and the vicinity might be explained by the drought in 2000-03 or inadequate sampling efforts, although it is equally possible that some of those species are locally extirpated. Three species (Western Green Toad, Common Checkered Whiptail, Texas Longnose Snake) found during this study in Moore County are likely new records for that county. This study also suggests adjustment of distributional boundaries of *Bufo debilis insidior* and *Thamnophis sirtalis annectens*. Methods employed in this study were likely insufficient to detect all expected species. Drift fences and funnel traps are strongly recommended for any further herpetological studies in the area. Monitoring of the coverboard stations should continue to determine their effectiveness over time.

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APPENDIX

Coordinates of locations mentioned in the text.

Alibates Flint Quarries	35°34'53.95"N, 101°40'39.04"W
Bates Canyon	35°34'24.83"N, 101°41'55.98"W
Big Blue Creek	35°42'54.75"N, 101°39'35.87"W
Big Blue Creek bridge	35°43'17.20"N, 101°39'44.16"W
Big Canyon	35°32'12.39"N, 101°46'56.70"W
Blue West	35°40'47.37"N, 101°38'10.32"W
Blue West Road	35°41'16.35"N, 101°40'11.48"W
Bonita Creek	35°28'07.93"N, 101°47'25.56"W
Borger	35°40'23.98"N, 101°23'30.08"W
Bugbee Bay	35°43'10.30"N, 101°35'40.89"W
Bugbee Canyon	35°43'44.26"N, 101°35'42.12"W
Bultaco Hill	35°27'48.68"N, 101°49'42.71"W
Cas Johnson Road	35°33'22.56"N, 101°40'52.11"W
Cedar Canyon	35°41'37.34"N, 101°34'28.62"W
Chicken Creek	35°28'36.79"N, 101°45'41.98"W
Chimney Hollow	35°35'07.48"N, 101°40'46.84"W
Coetus Creek	35°30'11.82"N, 101°45'44.50"W
Devils Canyon	35°33'24.66"N, 101°46'14.92"W
Dolomite Point grasslands	35°35'49.39"N, 101°40'22.40"W
Dumas	35°51'46.48"N, 101°58'08.62"W
Fourways	35°41'25.51"N, 101°57'54.62"W
Fritch	35°38'27.07"N, 101°36'06.80"W
Fritch Fortress	35°40'59.87"N, 101°35'38.81"W
Harbor Bay	35°41'52.91"N, 101°34'11.02"W
McBride Canyon	35°32'53.49"N, 101°44'14.99"W
Mullinaw Crossing	35°31'47.36"N, 101°45'37.96"W
North Canyon	35°43'28.06"N, 101°34'36.81"W
North End	35°44'05.15"N, 101°33'17.92"W
Plum Creek	35°36'05.57"N, 101°44'44.41"W
Plum Creek boat ramp	35°35'58.28"N, 101°42'59.06"W
Rosita Meadow	35°28'04.95"N, 101°50'40.02"W
Saddle Horse Canyon	35°29'38.89"N, 101°47'31.60"W
Sanford Marsh	35°43'01.61"N, 101°32'48.88"W
Sanford-Yake	35°41'39.37"N, 101°33'30.84"W
Spring Canyon	35°43'40.25"N, 101°33'14.61"W
Stinnett	35°49'34.48"N, 101°26'34.50"W

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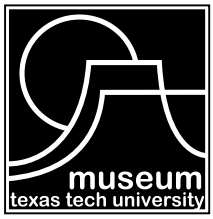

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