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HERPETOFAUNAL INVENTORY OF FORT WOLTERS IN NORTH-CENTRAL TEXAS

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Abstract—Herpetofaunal diversity of the Fort Wolters Military Installation, Texas, was surveyed from September 2002 through August 2003. During the 1-y sampling period, all amphibian and reptile sampling methods combined resulted in 1,421 captures of 10 species of amphibians (all anurans) and 25 species of reptiles. These actions represent an effort of the Texas Army National Guard to inventory the flora and fauna of federal property and create a baseline for future monitoring and management.

Resumen—La herpetofauna de la Fort Wolters Military Installation, Texas, fue monitoreada de septiembre de 2002 a agosto de 2003. Durante el año del periodo de muestreo, todos los métodos de muestreo de anfibios y reptiles combinados resultaron en 1,421 de 10 especies de anfibios (todos anuros) y 25 especies de reptiles. Estas acciones representan un esfuerzo del Texas Army National Guard de llevar a cabo un inventario de la flora y fauna de la propiedad federal y de crear una base para futuros monitoreos y manejo.

The ecological, economic, and esthetic dimensions of biodiversity represent components of biological diversity that hold value based on our direct utilization of natural resources (Wilson, 1992; Lovejoy, 1997; Meffe and Carrol, 1997). Managing for biodiversity is therefore a priority for state and federal natural resource and wildlife agencies. One threat to regional biodiversity relates to trends in land-use practices that can result in fragmented or destroyed habitat, thus increasing the probability that some components of biodiversity will experience local extinction in these habitat patches (Newmark, 1995). In some instances, local biodiversity loss has lead to cascading ecosystem-wide changes in other natural resources (Cardinale and Palmer, 2002; Srivastava, 2002). Guided by this reasoning, the Texas Army National Guard (ARNG) implemented an Integrated Natural Resources Management Plan (INRMP) in 2001 to ensure that natural resource conservation measures and all activities conducted by the Texas ARNG are consistent with federal stewardship requirements. The INRMP is an adaptive management plan ensuring that the military mission remains compatible with the sustainability and restoration of forests and grasslands. As a result of this new mission described in the INRMP, it is imperative that all Texas ARNG properties be inventoried for their components of biodiversity. Such baseline information is essential for long-term monitoring of changes in biodiversity in response to trends in land use and development. The purpose of this study was to gather baseline information on amphibians and reptiles at Fort Wolters and establish a foundation for future management decisions allowing for long-term monitoring of biodiversity.

Established in 1925, Fort Wolters is a Texas ARNG training site (ca. 1,613 ha) located on the east side of Mineral Wells, Texas in Parker and Palo Pinto counties. This property is situated in an ecotone transition between the Oak Woods and Blackland Prairie ecological regions. Several streams on the property feed into nearby Lake Mineral Wells (Fisher et al., 1996). Mean annual precipitation is 74.4 cm, and the climate is characterized by hot, humid summers and dry winters. January is the coolest month (average monthly low 0.05°C) and July is the warmest month (average monthly high 36.3°C) (Bomar, 1983). Soils at Fort Wolters consist of Truce-Bonti and Chaney-Truce-Bonti loamy clays (Greenwade et al., 1977), and sloping plains interbedded with sandstone and limestone canyon morphologies characterize the landscape (Fisher et al., 1996).

Most of the native climax vegetation has been described as grassland dominated by little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indiangrass (*Sorgastrum nutans*), sideoats grama (*Bouteloua curtipendula*), and silver bluestem (*Bothriochloa saccharoides*). Climax woody vegetation consists of blackjack oak (*Quercus marilandica*), post oak (*Q. stellata*), live oak (*Q. virginiana*), red oak (*Q. texana*), elbowbush (*Forestiera pubescens*), hackberry (*Celtis reticulata*), greenbriar (*Smilax bonanox*), and skunkbush (*Rhus aromatica*) (Farquhar et al., 1996).

We conducted 13 surveys for amphibians and reptiles (herps) from September 2002 to August 2003 by using time-constrained searches, timed nocturnal road searches, and Y-shaped drift-fence arrays (Heyer et al., 1994). In April 2003, we seined ponds on the property using a 3.5-m seine with 10-mm mesh, and in May 2003, we used baited hoop nets and Gee Minnow Traps (Cuba Specialty Manufacturing Company, Fillmore, New York) to trap aquatic amphibians and reptiles in creek channels, ponds, and reservoirs. We deposited voucher specimens, supporting genetic materials, and field notes in the Texas Cooperative Wildlife Collection at the Department of Wildlife and Fisheries Sciences at Texas A&M University. Common names used here follow standards set by the Committee on Standard English and Scientific Names established by the American Society of Ichthyologists and Herpetologists, Herpetologists' League, and Society for the Study of Amphibians and Reptiles (Crother et al., 2003).

All combined herp-sampling methods resulted in 1,421 captures of 10 species of amphibians (all Anurans) and 25 species of reptiles (Table 1; Crother et al., 2003). Time-constrained searches and night driving together accounted for 1,392 (98.0%) of the total captures. These 2 methods also yielded the most species-rich samples, with 30 and 18 species sampled, respectively (Table 2). Nocturnal road searches provided the highest capture rate (1 capture/3.2 min) among amphibian and reptile active sampling methods, while hoop nets provided the highest capture rate (1 capture/1.8 trap nights) among passive sampling methods (Table 2). Eight animals representing 6 species were observed incidentally (Table 2); all of these species were also found with standardized sampling methods.

Although 35 species of amphibians and reptiles were captured, 42.9% of individuals captured were Blanchard's cricket frogs (*Acris crepitans blanchardi*) (Table 1). The cricket frog, gray treefrog (*Hyla versicolor*), spotted chorus

TABLE 1—Amphibian and reptile species captured by month at Fort Wolters, Texas.

	2002	2003								
Species	Sep	Jan	Feb	Mar	Apr	May	June	Aug	Total	%
Amphibia										
Anura										
Acris crepitans blanchardi	218			33	30	257	49	23	610	42.9
Bufo debilis debilis							11		11	0.8
B. nebulifer	1						6		7	0.5
B. woodhousii woodhousii	1			1	2		3		7	0.5
Gastrophryne olivacea				1	1	1	109		112	7.9
Hyla versicolor				1	1	8	23		33	2.3
Pseudacris clarki				37			135		172	12.1
P. streckeri streckeri			29	85					114	8.0
Rana blairi	28		2	5	1	40		2	78	5.3
R. catesbeiana	90			1		2	1		94	6.6
Reptilia										
Squamata (Lizards)										
Aspidoscelis gularis gularis	4			7	2	12		2	27	1.9
Crotaphytus collaris	1			7		2		1	11	0.8
Eumeces septentrionalis obtusirostris						2			2	0.1
E. tetragrammus brevilineatus				1					1	0.1
Sceloporus olivaceus					3	1			4	0.3
S. undulatus consobrinus	1			3		3			7	0.5
Scincella lateralis	1			4		2			7	0.5
Squamata (Snakes)										
Agkistrodon contortrix laticinctus	2				4	7			13	0.9
A. piscivorus leucostoma	5			3	3	2			13	0.9
Coluber constrictor flaviventris					2				2	0.1
Crotalus atrox				4		2	1		7	0.5
Elaphe slowinskii				2		2	1		5	0.4
E. obsolete lindheimeri						3			3	0.2
Lampropeltis getula splendida						1			1	0.1
Leptotyphlops dulcis dulcis					1				1	0.1
Masticophis flagellum testaceus				2		2	3		7	0.5
Nerodia erythrogaster transversa	3				2	8			13	0.9
N. rhombifer rhombifer						1			1	0.1
Sonora semiannulata				8	1	9		1	19	1.3
Tantilla gracilis				1					1	0.1
Thamnophis proximus rubrilineatus						4			4	0.3
Virginia striatula				1	1	3			5	0.4
Testudines (Turtles)										
Chelydra serpentina	1				1	1			3	0.2
Pseudemys texana				1					1	0.1
Trachemys scripta elegans	15			2		8			25	1.8
Total	371	0	31	210	55	383	342	29	1,421	
%	26.1	0.0	2.2	14.8	3.9	27.0	24.1	2.0		

frog (*Pseudacris clarkii*), and Strecker's chorus frog (*P. streckeri streckeri*) relative abundances combined to make Hylidae the most common family observed (65.4%), followed by Ranidae (11.9%), Microhylidae (7.9%), and Bufonidae (1.8%). Amphibians comprised 87.1% of all herps captured during the entire study. The Texas spotted whiptail (*Aspidoscelis gularis gularis*), red-eared slider (*Trachmeys scripta elegans*), and groundsnake (*Sonora semiannulata*)

TABLE 2—Summary of amphibian and reptile sampling success at Fort Wolters, Texas from September 2002 through August 2003.

Sampling method	Duration	Individuals captured	Individual capture rate	Species richness
Time-constrained searches (*n* = 67)	254.6 h	418	1/36.5 min	30
Nocturnal road searches (*n* = 20)	52.7 h	974	1/3.2 min	18
Seine samples (*n* = 7)	7 ponds	3	1/2.3 ponds sampled	2
Hoop nets (*n* = 8)	16 trap-nights	9	1/1.8 trap-nights	2
Minnow traps (*n* = 25)	100 trap-nights	3	1/33.3 trap-nights	2
Arrays (*n* = 4)	76 trap-nights	6	1/12.7 trap-nights	6
Incidental capture	—	8	—	6

exhibited the highest relative abundances among reptiles with 1.9%, 1.8%, and 1.3% of total captures, respectively (Table 1). Individual relative abundances for other reptiles were less than 1%. The short-lined skink (*Eumeces tetragrammus brevilineatus*), Texas threadsnake (*Leptotyphlops dulcis dulcis*), desert kingsnake (*Lampropeltis getula splendida*), northern diamond-backed watersnake (*Nerodia rhombifer rhombifer*), flat-headed snake (*Tantilla gracilis*), and Texas river cooter (*Pseudemys texana*) were each observed only once during the survey.

Detection of different species varies enormously because of differences in their life histories, activity periods, population numbers, and microhabitat use. These sorts of detection biases are inherent in all general survey methods, and we realized a priori that numbers of individual species would not be easily comparable. For example, anuran breeding vocalizations allowed easy sampling of amphibians, which resulted in biased representation of amphibians in our night-driving data set. Nevertheless, we believe the protocols used were adequate for documenting presence of species and coarse changes in the abundance and distribution of individual species through time.

Night driving was the most efficient sampling method, but these surveys clearly favored detection of nocturnal and crepuscular species. Time-constrained searches yielded fewer captures than night driving, even with more time invested, but produced greater numbers of species and included diurnal, crepuscular, and nocturnal species. Seining, hoop nets, minnow traps, and drift-fence arrays failed to expand the species list generated from night driving and time-constrained searches. The latter 2 methods also were superior for documenting presence of species and coarse changes in their abundance and distribution through time, especially in Anurans. Seining, hoop nets, and minnow traps might be more appropriate for questions targeted specifically at aquatic species. In addition, precise population numbers for any species would require tailored methods and significant effort devoted to the species in question.

Survey trips were planned around periods of favorable weather to optimize survey conditions. This strategy gave us the advantage of finding species that were simply undetectable during unfavorable weather, but also resulted in unequal sampling across months, making temporal comparisons problematic. Still, temporal fluctuations in species abundances of anurans were apparent and revealed a seasonal phenology of the anuran community (Table 1). Chorus frogs were most abundant in the colder, wetter months of late winter (February–March). In the warmer, drier months of late spring (April–May), ranids became more abundant, followed by the more ephemeral breeding treefrogs and toads during the hot summer months (June–August), when weather was least predictable. Reptile species abundances peaked in March, April, and May, with no apparent differences among species.

Thirty-six species known to occur in Palo Pinto and Parker counties (Dixon, 2000) were not observed at Fort Wolters during this study and have never been found there to our knowledge. Of these, the Texas horned lizard (*Phrynosoma cornutum,* state protected) and Brazos River watersnake (*Nerodia harteri,* formerly federally threatened) are of special concern for conservation. The Texas horned lizard is disappearing from the eastern half of Texas, and the suggested causes of its disappearance are variable and complex. One of the most popular theories suggests that widespread use of the pesticide Mirex to eradicate imported fire-ant populations in the 1970s also decimated populations of the common harvester ant, a principal prey item of the Texas horned lizard (Dixon, 2000). Interestingly, Texas ARNG installations, including Fort Wolters, currently use chemical and biological methods to control fire ants, but we noted numerous harvester ant colonies on the property. Anecdotal reports from personnel at Fort Wolters suggest that Texas horned lizards might still be present in the area; however, this survey failed to confirm their presence.

The Brazos River watersnake was listed as threatened under the U.S.A. Endangered Species Act in 1987 when a large reach of its riverine habitat was scheduled to be inundated by reservoirs (Scott et al., 1989). Since then, research has shown that the species was not as adversely affected by the river impoundments as predicted, and in 1998, the United States Fish and Wildlife Service delisted the Brazos River watersnake. Records of Brazos River watersnakes have been reported on the Brazos River within 1 mile of Rock Creek (Dixon, 2000), but this survey failed to confirm their presence at Fort Wolters.

The primary goal of this project was to gather baseline information on amphibians and reptiles at Fort Wolters to help monitor population fluctuations in response to changes in land use and development. Land-use practices have drastically altered the landscape in this region of Texas, and military installations established by Texas ARNG provide islands of protected habitat surrounded by land modified for commercial, agricultural, and residential use. Integration of this baseline information on amphibian and reptile species abundances and distributions with the INRMP will allow assessment of population fluctuations in response to management and land-use practices both on and off Texas ARNG properties.

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TREE SWALLOW ENTANGLED ON TEDDY BEAR CHOLLA SPINES

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ABSTRACT—Avian collisions with human-made objects are relatively common; however, documented avian collisions with naturally occurring objects are rare in scientific literature. On 22 April 2002, we observed a tree swallow (*Tachycineta bicolor*) entangled in the spines of a teddy bear cholla (*Opuntia bigelovii*) in the Tule Mountains, Cabeza Prieta National Wildlife Refuge, Arizona. Two possible causes of this incident include the swallow flying into the teddy bear cholla, possibly being blown by a gust of wind, or being placed there by a loggerhead shrike (*Lanius ludovicanus*). Because of the flying abilities of swallows and documented diets of loggerhead shrikes, either would be unusual.

RESUMEN—Los choques de aves con objetos hechos por humanos son relativamente comunes, sin embargo los choques de aves con objetos naturales son raramente documentados en la literatura científica. El 22 de abril del 2002, observamos una golondrina bicolor (*Tachycineta bicolor*) enredada en las espinas de una choya güera (*Opuntia bigelovii*) en las montañas de Tule, Cabeza Prieta National Wildlife Refuge, Arizona. Dos causas posibles del incidente incluyen que la golondrina bilocor chocó con la choya, posiblemente empujada por una ráfaga del viento, o puede haber sido colocada allí por un acaudón verdugo (*Lanius ludovicanus*). Debido a capacidades del vuelo de las golondrinas bicolor y las dietas documentadas de los acaudones, cualquiera de estas posibilidades sería inusual.

Avian mortalities due to collisions with various human-made objects have been documented for many species. Collisions with power lines, towers, fences, buildings, wind turbines, and aircraft have been observed for many avian species and are a regular occurrence in some areas (Baines and Summers, 1997; Janss and Ferrer, 1998). Risk of bird-object collisions varies depending on species, behavior, flight capabilities, season, weather conditions, and local situations (e.g., migration route) (Dolbeer et al., 2000; Barrios and Rodríguez, 2004). There are numerous studies documenting avian collisions with human-made objects; however, documented avian collisions with naturally occurring objects are rare in scientific literature (Rea, 1983).

On 22 April 2002, the weather was warm (ca. 26°C) with winds gusting to approximately 24 km/h on ridges in the Tule Mountains on the Cabeza Prieta National Wildlife Refuge, Arizona (32°14′23.9″N, 113°50′24.0″W). At approximately 0800 h, we observed a tree swallow (*Tachycineta bicolor*) entangled in the spines of a teddy bear cholla (*Opuntia bigelovii*) along the crest of a ridgeline. The spines of the cholla were embedded in the left side of the swallow, primarily in the wing and side of the head. The tree swallow was struggling, which suggested the incident had occurred recently. We extracted the apparently uninjured swallow from the cholla by grasping both the body and head and gently pulling. After we removed the swallow from the cholla, we released it and it flew away. Because the location was in an arid area without the open water sources typically associated with swallow breeding habitat, it was highly likely that this individual was a northbound migrant (Phillips et al., 1964; Robertson et al., 1992).

There are 2 plausible explanations of how the tree swallow became entangled in the teddy bear cholla, both of which would be unusu-