

Frogs and Toads

Based primarily on Dayton et al. (2007)

Introduction

Amphibians comprise an important part of the food web. They consume insects and other invertebrates and are prey for a long list of fish, reptile, bird, and mammal species. Amphibians are also good indicators of environmental change due to their sensitivity to a variety of factors (e.g., pollution, habitat destruction, and disease). Twelve species of amphibians have been recorded at Big Bend National Park (NP) over the last 100 years (Dayton et al. 2007, Leavitt and Fitzgerald 2009). These include the non-native green treefrog (*Hyla cinerea*; native to southeastern North America), which was recently discovered at the park in and around two ponds in Rio Grande Village (Dayton et al. 2007, Leavitt and Fitzgerald 2009), and the non-native American bullfrog (*Rana catesbeiana*), which is widespread along the Rio Grande and in the ponds at Rio Grande Village. One additional species, the tiger salamander (*Ambystoma tigrinum*), was recorded from a single record. Excluding the tiger salamander, frogs and toads (anurans) are the only amphibians at Big Bend NP.

Big Bend NP, located within the bend of the Rio Grande in southwestern Texas, is more than 800,000 acres in size. The park encompasses the largest protected area representative of the Chihuahuan Desert. Elevations in the park range from about 1,800 feet (549 meters) to 7,800 feet (2,377 meters), with the majority being between 1,800 and 3,200 feet (975 meters). The park receives an average of about 15 inches (38 centimeters [cm]) of rain per year, primarily from May to September (Dayton et al. 2007). Low-elevation desert scrub communities, such as mesquite shrublands, lechuguilla “forests,” and creosote flats, are found on the majority of the park. Higher elevations of the Chisos Mountains are forested, and more than 200 permanent and intermittent springs occur in the park.

Frogs and toads go through a tadpole stage (a larval stage) before becoming an adult. There is considerable variety in the length of time this takes and the exact process by which it occurs (Dayton et al. 2007). Most often the eggs (fertilized externally) develop into free-swimming tadpoles, which metamorphose into juveniles; juveniles then grow into adults. The majority of frog and toad breeding in Big Bend NP occurs from May through September, after summer monsoon rains. Most of the species reproduce in ephemeral (temporary) wa-

FACT SHEET



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Red-spotted toad

ter bodies. Although this makes for a less-predictable breeding environment, these pools also have fewer predators. The anurans that reside in the drier areas of the park seek refuge from the intense sun and dry conditions (in cracks or holes or beneath rocks or plants) for up to several months at a time. The best time to observe them is after a summer rain.

Frog and Toad Species in the Park

During a study in the park, researchers found that soil type appeared to be a good indicator of the presence or absence of four species—Couch’s spadefoots (*Scaphiopus couchii*), red-spotted toads (*Bufo punctatus*), Texas toads (*Bufo speciosus*), and Western green toads (*Bufo debilis insidiator*) (Dayton et al. 2004). The species were disproportionately associated with soils that hold water for longer periods than other soil types. Species richness and abundance were highest in Tornillo and Glendale-Harkey soils, where almost half of all the anurans were detected; these soils comprised only 12% of the available soil along the research transects. Of the species found on Tornillo and Glendale-Harkey soils, the vast majority were Couch’s spadefoots and Texas toads—both species that burrow.

The 12 (including the green treefrog) frog and toad species of Big Bend NP fall into six Families, the Ranidae (true frogs), Bufonidae (true toads), Pelobatidae (spadefoots), Microhylidae (narrow-mouthed toads), Hylidae (treefrogs), and Lepidodactylidae (tropical frogs). These species/families are described in the following sections. Note that all information that follows is from Dayton et al. (2007) unless otherwise stated. Dayton et al. is the first guide to the park’s amphibians.

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Rio Grande leopard frog

It also contains descriptions of the calls of each species, which are not discussed here.

Family Ranidae (True Frogs)

There are two members of this family in the park—the Rio Grande leopard frog (*Rana berlandieri*) and the American bullfrog (Dayton et al. 2007). Both frogs are good jumpers with long, powerful hind legs. As opposed to other species in the park, they have extremely webbed toes. Physical descriptions and distinguishing features of these species are shown in Table 1. The **Rio Grande leopard frog** breeds mainly in permanent water (e.g., the Rio Grande and permanent springs), but it sometimes breeds in temporary pools. The time taken to grow from a tadpole to an adult varies between four and nine months, depending on local conditions. The Rio Grande leopard frog is common throughout the park and, along the Rio Grande, has been found to be more highly associated with mud banks than rock or cliff (canyon) areas (Jung et al. 2002). The **American bullfrog** is not native to Big Bend NP. It was first recorded in 1981 in the western part of the park near Santa Elena Canyon (R. Skiles, pers. obs., as cited in Jung et al. 2002). This species has been found along the Rio Grande (and surrounding floodplains) and in the Beaver Pond at Rio Grande Village (Dayton 2005, Dayton et al. 2007), but not in interior areas. Bullfrogs were found in higher numbers in a western stretch of the river compared to eastern stretches (Jung et al. 2002). Because this species may consume and/or compete with the park's native anurans, it poses a threat to these species, particularly if it is able to establish itself inland (Dayton et al. 2007).

Family Bufonidae (True Toads)

In general, members of this family have dry, “warty” skin, and they move by making short hops. Members of the family also have two tubercles on each hind foot and parotoid glands

behind their eyes (Dayton et al. 2007). The tubercles range in color from tan to black and are used for digging backward into the soil. The parotoid gland contains a toxic substance that provides defense against potential predators. Four species of true toads occur in the park. Physical descriptions and distinguishing features of each species are shown in Table 1. The **Texas toad** breeds during the summer in pools of water formed by summer rains. Mating pairs may converge in groups and deposit their eggs at the same clump of vegetation. Eggs hatch in about two days, and tadpoles metamorphose in 40-50 days. This species is common along the Rio Grande and in the north part of the park from Tornillo Flat to Persimmon Gap. For a North American amphibian, the **red-spotted toad** occupies particularly harsh desert environments. Temporary pools, often in desert washes or on rocky slopes, make up its breeding habitat. Individually-laid eggs hatch in a week or less, and 30-50 days are required for tadpoles to reach metamorphosis. Juveniles and adults of this species seek refuge during dry periods by seeking cover beneath plants and rocks. This species is found in a variety of habitats throughout the park. The third toad species in the Bufonidae family is the **Western green toad**, which breeds in temporary pools resulting from summer rain. Eggs hatch in two to three days, and 30 days are required for tadpoles to reach metamorphosis. Adults avoid desiccation during dry periods by remaining beneath cover. Most individuals of this species have been found in the scattered, patchy grasslands of the northern part of the park. **Woodhouse's toad** (*Bufo woodhousii*) was documented in the park beginning in the early 1900s, but a sighting of this species has not been reported since 1975. The species was known to occur in the floodplains of the Rio Grande, particularly in Rio Grande Village and Santa Elena Canyon areas. This toad is known to breed in temporary pools along rivers and creeks, and alterations to the Rio Grande may have led to reduced breeding habitat for the species at the park (Dayton et al. 2007).



Western Green toad

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Family Pelobatidae (Spadefoots)

Two members of this family occur at Big Bend NP— Couch’s spadefoot and Mexican spadefoot (*Spea multiplicata*) (Dayton et al. 2007). Features that distinguish this family from the true toads are summarized in Table 1. The tubercles, or spades, on the hind feet allow the spadefoots to burrow into the soil, where they may remain for several months during dry periods. The **Couch’s spadefoot** breeds in temporary pools formed by summer rains; eggs hatch in about a day and a half, and, in the fastest time for a North American amphibian, tadpoles metamorphose into juveniles in eight to ten days. Although found throughout the park, this species occurs in the highest densities from Tornillo Flat to the park’s northern boundary. The second member of the family, the **Mexican spadefoot**, has not been observed in the park since the early 1990s. It is typically found in grasslands and mesquite shrublands. As with most of the other anurans, breeding occurs in temporary pools created during summer rains. Eggs hatch in about two days, and tadpoles metamorphose in about 21 days.



Couch’s spadefoot

Family Microhylidae (Narrow-mouthed Toads)

Only one member of the Microhylidae family, the **Great Plains narrow-mouthed toad** (*Gastrophryne olivacea*), occurs within the park (Dayton et al. 2007). Features that distinguish this family from the true toads and spadefoots are summarized in Table 1. Although relatively inconspicuous, this species is one of the most widespread amphibians at Big Bend NP. These toads take refuge under rocks and plants and in earthen cracks and animal burrows during dry periods. They breed in a variety of habitats, with eggs laid in temporary pools after summer rains. Eggs, which are laid upon the water surface, hatch within two days; 30-50 days are required for tadpoles to metamorphose.

Family Hylidae (Treefrogs)

Two members of the treefrog family are found in the park (Dayton et al. 2007, Leavitt and Fitzgerald 2009). Physical descriptions and distinguishing features are shown in Table 1. The **canyon treefrog** (*Hyla arenicolor*) lives in steep-walled canyons in which water accumulates during the summer (Dayton et al. 2007). In the park, they breed primarily in temporary, summer pools in the Chisos Mountains. Eggs hatch in about three days, and tadpoles reach metamorphosis in 30-50 days. Canyon treefrogs seek refuge in rock crevices during dry months. They are able to change color rapidly, from a solid pale brown to a mottled dark brown and olive. The second treefrog, the **green treefrog**, is not native to the park. It was first identified by its call in 1999-2000 at Rio Grande Village (R. Skiles, pers. com.). The species is known to occur in all ponds and springs of Rio Grande Village, including mosquito-fish ponds, the beaver pond, and the irrigation settling pond. The next closest known breeding population is at least 199 miles (320 kilometers) away. The size of the local population has increased rapidly, and Leavitt and Fitzgerald (2009) have examined the frogs’ diet to begin to assess potential ecological effects of the species.

Family Leptodactylidae (Tropical Frogs)

The **spotted chirping frog** (*Syrhophus guttilatus*) is the only tropical frog to occur in the park (Dayton et al. 2007). A physical description and distinguishing features of this frog are shown Table 1. With relatively large eyes, this frog is nocturnal and spends most of its life deep in rock crevices. Breeding takes place from April through July. Eggs are thought to be laid in moist crevices, and, upon hatching, fully formed frogs emerge. The species occurs in suitable habitat (talus slopes, rocky streambeds, and small caves) throughout the park (R. Skiles, pers. com.). Its densities may be greatest in the Chisos Mountains. The frogs in the park represent a relic population; the closest known population is to the north near Elephant Mountain (Dayton et al. 2007).

Table 1. Summary of physical descriptions and distinguishing features of frogs and toads at Big Bend NP (information from Dayton et al. 2007).		
Species	Summary description	Distinguishing features
Rio Grande leopard frog ¹	Average body length, 2.5-4.0 inches (6.3-10.2 cm). Color is usually light brown with several dorsal spots on the back; individual color varies from light brown to green.	Dorsolateral ridges that extend down the entire trunk.

Table 1 continued. Summary of physical descriptions and distinguishing features of frogs and toads at Big Bend NP (information from Dayton et al. 2007).

American bullfrog ¹	Avg. body length, 3.5-6 inches (8.9-15.2 cm; the largest frog in North America). Dorsal color varies from green to brown with some spots and mottles. Under-side is usually white with some dark mottling. Chin and hind legs may be yellowish.	A fold of skin that extends from behind the eye to just behind the tympanum (the round eardrum); also the large size.
Texas toad ²	Avg. body length, 2.0-3.5 inches (5.1-8.9 cm). Generally gray to brown in color with scattered dark spots or blotches on the back (USGS 2010). Tubercles on the hind feet are black.	Lacks distinct cranial crests; has oval parotoid glands; and has green spots scattered down its back.
Red-spotted toad ²	Avg. body length, 1.5-2.5 inches (3.8-6.3 cm). These toads have red spots on their back (although Texas toads may also have red spots).	Round parotoid glands. Unlike other toads in the park, eggs are laid individually.
Western green toad ²	Avg. body length, 1.0-2.0 inches (2.5-5.1 cm). May have small black spots and bars on the dorsal side, which may connect to one another (USGS 2010). If approached, it may flatten itself against the ground.	Kidney bean-shaped parotoid glands, and green, "warty" skin.
Woohouse's toad ²	Avg. body length, 2.5-4.0 inches (6.3-10.2 cm). Color and pattern vary (see "distinguishing features"). Note that no sightings of this toad have been reported in the park since 1975.	A middorsal stripe the length of its back; pronounced cranial crests above the eyes.
Couch's spadefoot ³	Avg. body length, 2.25-3 inches (5.7-7.6 cm). Family differs from true toads by: 1) one tubercle on each hind foot, 2) vertical pupils, 3) smooth skin, and 4) no distinct parotoid glands. See also "distinguishing features."	Vertical pupils; green mottling on the dorsal surface; and one elongated tubercle (spade) on each hind foot.
Mexican spadefoot ³	Avg. body length, 1.5-2 inches (3.8-5.1 cm). Also see physical description of family, immediately above, and "distinguishing features."	Vertical pupils; one wedge-shaped tubercle (spade) on each hind foot; and tan-colored skin with red spots on the back.
Great Plains narrow-mouthed toad ⁴	Avg. body length, 1.0-1.25 inches (2.5-3.2 cm). Family differs from true toads by their smooth skin and absence of parotoid glands; and from spadefoots by a lack of spades on their feet and a visible tympanum.	A distinct fold of skin behind the eyes (that runs across the head), and lack of a visible tympanum (external ear-drum).

Table 1 continued. Summary of physical descriptions and distinguishing features of frogs and toads at Big Bend NP (information from Dayton et al. 2007).

Canyon treefrog ⁵	Avg. body length, 1.25-2.0 inches (3.2-5.1 cm). Color varies from solid pale brown to mottled dark brown and olive.	The presence of pads on their toes; different coloration than green treefrog.
Green treefrog ⁵	Avg. body length, 1.25-2.25 inches (3.2-5.7 cm). Color varies, but is usually bright green. It may be nearly yellow, or a dull greenish- or slate-gray (Conant 1975). Usually has a white or yellowish stripe along its sides.	The presence of pads on their toes; different coloration than canyon treefrog.
Spotted chirping frog ⁶	Avg. body length, 0.75-1.25 inches (1.9-3.2 cm). Coloration a yellowish-brown to greenish with dark markings.	Small, slender body with smooth skin and mottled dorsal markings; lacks spades on the hind feet.

Anuran Families: 1=Ranidae; 2=Bufonidae; 3=Pelobatidae; 4=Microhylidae; 5=Hylidae; and 6=Leptodactylidae.

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