



Frogs and Toads

(ORDER ANURA)

Frogs and toads, collectively called anurans, are short-bodied, tailless amphibians with enlarged hind limbs adapted for jumping or swimming. With over 6,500 anuran species, grouped into 435 genera, recognized worldwide, this order must be considered one of the most successful vertebrate groups. In general, warty-skinned, short-legged, hopping anurans are called toads, while smoother-skinned, long-legged, leaping anurans are called frogs, although there are no widely accepted definitions for these terms. Two Great Lakes anurans are commonly called toads, both members of the family Bufonidae or “true toads.” Important identifying characters of the order are shown in figure 6.

The reproductive habits of Great Lakes anurans follow a pattern typical of most north-temperate species. Males move to aquatic breeding sites in spring and use species-specific calls (the “advertisement” call) to attract

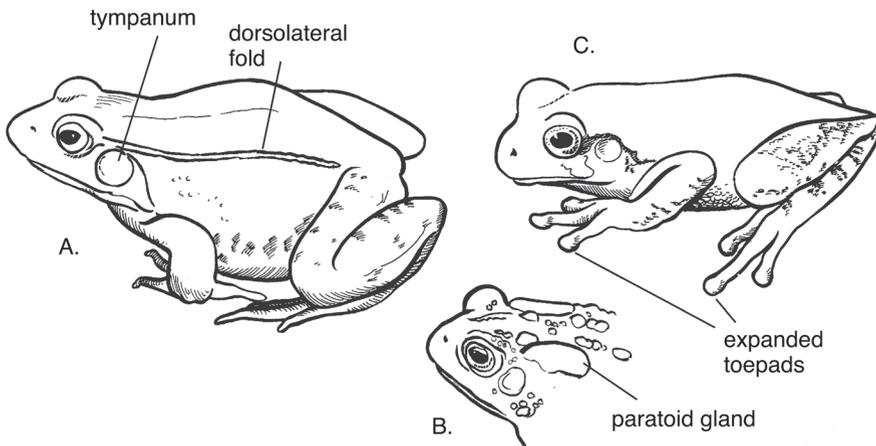


Fig. 6. Anuran characteristics. A. Typical frog (*Rana*). B. Toad (*Bufo/ Anaxyrus*). C. Treefrog (*Hyla*). (Drawing by G. van Frankenhuyzen)

females and (in some species) to warn other males away from their territories. Either the male or the female may play the larger role in choosing a mate, depending on species. Using his front feet, the male clasps the female from above in an embrace called amplexus. In this position the male fertilizes the eggs externally as they are deposited by the female. Depending on the species, the eggs may be laid singly, in submerged loose or globular masses, spreading surface masses, or (in toads) in long strings. The aquatic larva, commonly called a tadpole or polliwog, has a short oval body and a long compressed tail with an upper (dorsal) and lower (ventral) fin. The gills of new hatchlings are external but soon are enclosed by the opercular fold. During respiration, water taken in through the mouth passes over the gills and exits through an opening, called the spiracle, on the left side of the body. Tadpoles feed largely by filtering minute plants (algae), bacteria, and other organic material from the water or bottom debris. Their beaklike mouths, rimmed with keratinous denticles (toothlike structures), are used for scraping attached algae from rocks, plants, and substrate. Many species are at least partly carnivorous and may eat the eggs and larvae of other amphibians or even their own siblings. During metamorphosis, the hind legs become visible near the vent, while the front legs develop within the opercular (gill) chamber and are not visible until just before transformation. Numerous other internal and external changes must occur before the fishlike herbivorous larva becomes a semiterrestrial carnivorous tetrapod, including drastic modifications of the mouth parts and digestive tract.

Many anurans from subtropical and tropical regions display unique reproductive strategies that differ significantly from the “typical” life cycle summarized above. As with salamanders, some species have direct development (i.e., they lack a free-swimming larva and hatch directly into an immature “adult” form), but none of these is native to the Great Lakes area.

Unlike the largely silent salamanders, all native frogs and toads possess distinctive voices that facilitate field identification and population surveys. The spring “advertisement” calls of males are most familiar and are described in the species accounts. Other types of vocalizations include distress and warning calls, territorial announcements, and a “release” call that is given by a male or nonreceptive female frog or toad when it is mistakenly grasped by another male.

Selected general references for anurans: Altig et al. 2015; Bartlett and Bartlett 2006; Dodd 2013; Duellman and Trueb 1986; Powell et al. 2016; Stebbins and Cohen 1995; and Wright and Wright 1949.



True Toads

FAMILY BUFONIDAE

Most “true” toads are terrestrial or burrowing anurans with relatively thick, warty skin and short legs. As of this writing there are about 590 species in 49 genera distributed throughout most of the world’s temperate and tropical regions. Bufonids have toothless jaws, and most have prominent enlarged parotoid glands behind the eyes. The classification of North American toads is controversial; here we include a newly proposed, though disputed, genus name (*Anaxyrus*) as a subgenus under the traditional genus *Bufo* for the two species that inhabit the Great Lakes region.

Eastern American Toad (*Bufo* [*Anaxyrus*] *americanus americanus*)

Description: This is a typical “true toad,” with a short, stocky body; warty skin; and relatively short hind legs. Unlike frogs, they walk or hop rather than making long leaps. This species is highly variable in color, ranging from tan, brown, or reddish-brown to gray or olive. They have some color changing ability, and the same animal may slowly darken or lighten depending on its immediate environment. Most specimens display dark, rounded spots on the back, each of which encircles one or two warts. The large parotoid glands behind the eyes are oval or kidney shaped, and there are enlarged warts on the tibia (lower part of the hind leg, below the knee). A light line may run down the middle of the back. The throat and belly are whitish or yellowish with black or gray spotting, particularly on the “chest” area. Adult length: 5.1 to 11.1 cm (2 to 4.4 in).

Note: American Toads living on some islands in the Great Lakes reach considerably larger sizes than those on the mainland. Snout to vent lengths of up to 15.5 cm (6.1 in) have been reported. It is not yet known if the greater size of island toads is due to genetic differences, greater longevity, or other factors. Despite this uncertainty, some herpetologists have given the name *Bufo americanus* “*alani*” to the giant toads of northern Lake Michigan islands.





Male American Toads are generally smaller than females and have darkened, enlarged “thumbs” on the forefeet. The male’s vocal sac is visible as a grayish flap of skin on the throat, especially during the breeding season.

The tadpoles are blackish, with plump bodies and thin, rounded tails. The tiny black tadpoles often collected by children from suburban ponds are usually this species.

Voice: A prolonged, high-pitched musical trill that may last for more than thirty seconds.

Confusing Species: Fowler’s Toads usually have three or more warts within each of the larger spots on their backs and lack enlarged warts on the tibia. In addition, Fowler’s usually have unmarked whitish undersides, though some individuals may have one or a few dark spots on the chest. Their short, nasal breeding call is quite unlike the long, musical trill of the American Toad. These two toad species occasionally interbreed. The hybrid offspring may show a blending of traits or they can resemble one of the parent species, but their advertisement calls are usually intermediate between the two.

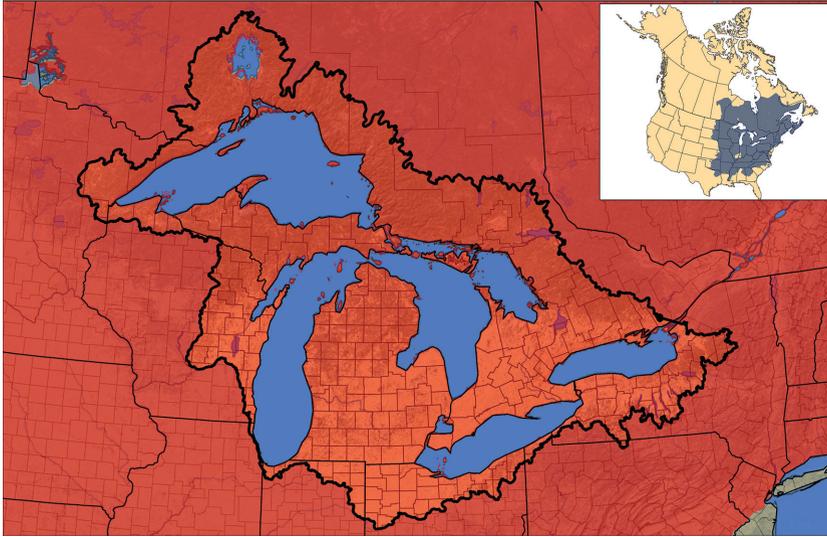
Distribution and Status: The Eastern American Toad ranges from Labrador and central Quebec west to James Bay and southeastern Manitoba, south to Kansas and Mississippi, and east to Virginia and New England. It is found throughout the Great Lakes region. A smaller subspecies, the Dwarf American Toad (*Bufo [Anaxyrus] a. charlesmithi*), occurs from southern Indiana to Oklahoma and northeastern Texas.

American toads are a generally common and tolerant species, but recent local population declines have been reported in portions of the Great Lakes region.

Habitat and Ecology: American Toads tolerate a wide variety of habitats, including open woodlands and woods edges, prairies, meadows, marshes, suburban yards and parks, and agricultural areas. Toads are most active on rainy or humid evenings. When not foraging, they usually remain buried in moist soil or leaf litter or beneath logs or rocks. When digging, they “back in” using their hind feet as shovels. During winter and prolonged dry periods they burrow deeply into the soil and remain dormant until conditions improve.

Long valued as a friend of the gardener and farmer, American Toads eat many types of insects and insect larvae, as well as spiders, centipedes, millipedes, snails, slugs, and earthworms. The type of food chosen depends





largely on what is most available. It is common for these amphibians to gather under yard lights and streetlights on warm nights to consume insects attracted there. Toads use a quick flick of their sticky tongues to capture prey and will use their front feet to push larger prey items into their toothless mouths.

American Toads have a number of behavioral and chemical defenses against predators. Encounters with predators are undoubtedly reduced by their cryptic coloration and burrowing habit. When approached by a potential enemy, a toad may lower its nose and hunch its body forward. This makes the toad appear larger and also presents the attacker with the poison-producing parotoid glands. The whitish parotoid secretions contain steroidal chemicals that can affect heart function and blood pressure and can cause illness or death in small mammals that chew or consume a toad. A seized toad will expel urine and may puff up by inflating its lungs, perhaps making itself more difficult to swallow. Despite these defenses, certain predators regularly eat toads, including the Common Garter and Eastern Hognose Snakes, hawks, herons, and some waterfowl. Raccoons feed on toads by eating them from the belly side and avoiding the glands on the head and back. Humans can handle toads safely but should avoid getting toad skin secretions into the eyes or mouth, as these can be irritating. Handling toads does not cause warts.

Reproduction and Growth: Eastern American Toads prefer to breed in shallow, temporary waters with sparse to moderate amounts of emergent and



American Toad



American Toad, tadpole (Photo: Wayne VanDevender)

submergent vegetation. Typical sites include flooded fields, ditches, stock and ornamental ponds, open marshes, and backwaters of slow-moving streams. They will also use the shallows of larger lakes if other sites are lacking. First movement to breeding sites is often triggered by humid or rainy conditions combined with warm evening temperatures, typically in mid- to late April in the southern part of the basin and late May in the north. Males arrive a few days before the females, and most breeding occurs within a period of about ten to fourteen days. If interrupted by cold weather, breeding activity may be resumed after temperatures moderate and can (rarely) extend into June or July.

Male American Toads usually call while sitting upright in shallow water or on land at the water's edge. During the prolonged call, the large grayish vocal sac is fully inflated. A male will attempt to clasp any passing toad; if the intended mate is a male, it gives a special chirping "release" call while



vibrating its body to inform the first toad of its mistake. Once a receptive female is amplexed, the pair often moves to another part of the pond, perhaps to avoid attempts by other males to “cut in.” Female toads sometimes drown when clasped by two or more competing males.

During amplexus, the female lays from 2,000 to more than 20,000 eggs, which emerge in two gelatinous strings. The egg strings may be twined among submerged branches or vegetation or simply left in loops on the bottom. Hatching occurs in two to fourteen days, depending on water temperature. The black tadpoles form schools during the day (often congregating preferentially with siblings) and move about together in the shallows, seeking warmth and food. They eat algae, diatoms, and other planktonic organisms, soft vegetation, and carrion. Although toad tadpoles appear to be repellent to some predators, they are readily eaten by many fish, diving beetles, and other aquatic insects.

The tadpoles grow quickly and transform in six to ten weeks into tiny toadlets about 0.8 to 1.3 cm (0.3 to 0.5 in) long. At the time of metamorphosis young toadlets may swarm by the hundreds near breeding ponds, but few will survive the two to three years required to reach sexual maturity. These toads can survive for more than ten years in the wild, and potentially much longer; a captive specimen of a related species lived for thirty-six years.

Conservation: American Toads are adaptable animals, and populations often persist in urban parks, suburban gardens, and farming areas. Local declines in this species can result from the loss or degradation of breeding sites. Use of certain pesticides can also pose a threat, though more research is needed to determine levels of sensitivity to various chemical formulations. Another significant local threat is vandalistic destruction during the breeding season. Calling and amplexed toads in shallow waters are extremely vulnerable to wanton killing; sadly, such vandalism is often perpetrated by unsupervised children not sensitized to wildlife values.

Fowler’s Toad (*Bufo* [*Anaxyrus*] *fowleri*)

Description: This species resembles the Eastern American Toad in general appearance. Background color varies from tan or brown to olive green or gray, and there is usually a light stripe down the middle of the back. Most specimens have a number of dark spots or blotches on the back, with each large spot enclosing three or more warts. There are no enlarged warts on the tibia (lower leg). The throat and belly are white or dull yellow, sometimes

