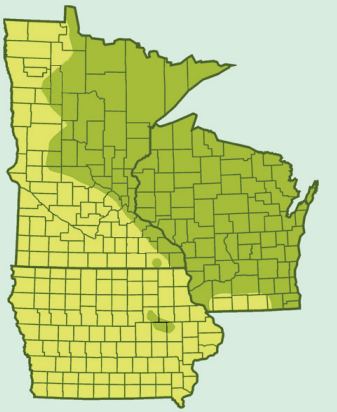
Blue–spotted Salamander *Ambystoma laterale*

Status: Wisconsin – Common
Minnesota – Common
Iowa – Endangered

Size at hatching, 8 – 10 mm total length; at metamorphosis, ~ 34 mm snout–vent length



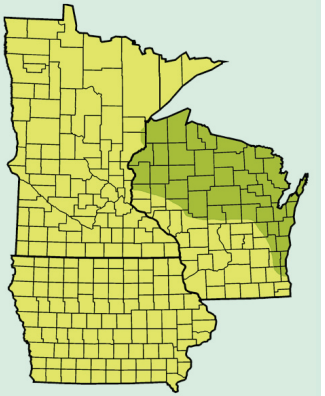
The Blue-spotted Salamander is one of four mole salamanders in our region. Other mole salamanders include the Spotted, Small-mouthed, and Tiger Salamanders. As adults, mole salamanders live under cover objects such as rotting logs or in burrows in the forest floor (Parmelee 1993). In early spring (March and April), adults migrate to temporary ponds to breed. Larvae develop during spring and summer and usually metamorphose in the fall.

The Blue-spotted Salamander is a woodland species of northern North America. The eggs are laid in small clumps (7–40 eggs) attached to vegetation or debris at the bottom of ponds. The larvae are similar to Spotted Salamanders but are more darkly colored with the fins mottled with black, and dark blotches on the dorsum. Blue-spotted Salamanders metamorphose at about the same size as Spotted Salamanders but are darker, sometimes with flecks of blue.

Spotted Salamander *Ambystoma maculatum*

Status: Wisconsin – Locally abundant
Minnesota – Status to be determined

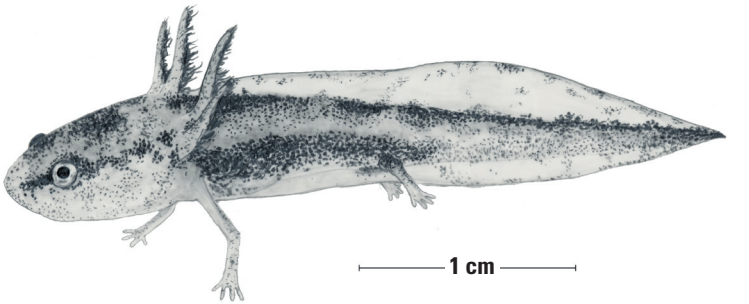
Size at hatching, 12 – 17 mm; at metamorphosis, 49 – 60 mm total length



The Spotted Salamander is present only in the northeastern part of our range (where it is sympatric with up to two other mole salamanders). Females deposit eggs in a firm oval mass (60–100 mm in diameter) attached to vegetation near the surface of the water. The eggs (1–250 per mass) are black, but the egg mass may be clear or milky, with a greenish hue because of symbiotic algae. The larvae have a light chin and throat with a dull dorsum and tail fin lacking blotches. Spotted Salamanders gain their spots shortly after metamorphosis.

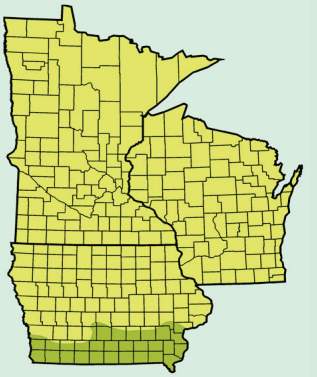
Small-mouthed Salamander *Ambystoma texanum*

Status: Iowa – Declining



Size at hatching, 7 -14 mm; at metamorphosis, 48 – 61 mm total length

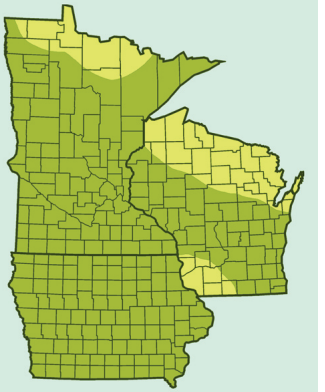
The Small-mouthed Salamander is found in the southern third of Iowa. The adult of this species resembles its common name in having a relatively smaller head and mouth compared with other mole salamanders. The eggs are laid singly or in small loose clusters on vegetation or debris in ponds (rarely in streams). Larger masses may be sausage-shaped. The larvae are similar to other mole salamanders but have pigmentation on their chin. They are a uniform brown after metamorphosis.



Tiger Salamander *Ambystoma tigrinum*

Status: Wisconsin – Common
Minnesota – Common
Iowa – Common

Size at hatching, 13 – 17 mm; at metamorphosis, 7.5 – 12.5 cm, sometimes reaching 24 cm total length



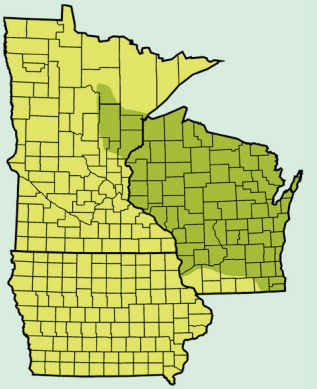
The Tiger Salamander has the widest distribution of any salamander in the United States (Conant and Collins 1991). It tolerates human disturbance and survives in agricultural regions. Adults migrate to breeding ponds very early in the spring (March), as soon as ponds are free of ice at northern latitudes. Eggs are laid singly or in masses of 18–110 eggs. Tiger Salamanders use any fish-free body of water from ponds to cattle tanks. Fresh egg masses are firm (6–7 cm diameter) and older egg masses are flimsy. In older egg masses, you can identify the developing embryos as salamanders, not frogs, because they have external gills and an elongated shape. The eggs of Tiger Salamanders are large, 2–3 mm in diameter, with three gelatinous envelopes.

The digits of larval Tiger Salamanders are quite different than the other three species of mole salamanders. They are flattened and pointed from base to tip (Figure 3b). Late-stage Tiger Salamander larvae reach > 100 mm total length versus < 61 mm for the other mole salamanders.

Four–toed Salamander *Hemidactylium scutatum*

Status: Wisconsin – Special Concern
Minnesota – Endangered

Size at hatching: 11 – 15 mm. Size at metamorphosis: 17 – 25 mm total length

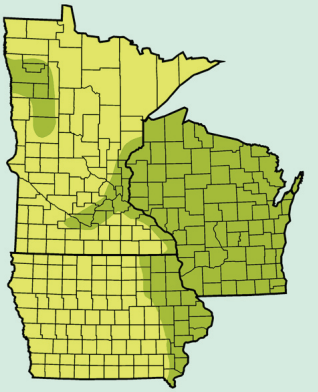


As the name suggests, this salamander has only four toes on the hind feet instead of five as in other salamanders (except the Mudpuppy). This species is in the large family of lungless salamanders, many of which lay their eggs on land and do not have a free-swimming larval stage. Four-toed Salamanders usually lay their eggs in moss near the edges of bogs. The female will stay with the eggs, guarding them. After the eggs hatch, the larvae drop into the water and spend the next several months as free-swimming larvae before metamorphosing into terrestrial adults. The larvae also have four toes, but are much smaller than Mudpuppy larvae and have a dorsal fin that extends onto their body (Figure 3c).

Mudpuppy *Necturus maculosus*

Status: Wisconsin – Locally abundant, but possibly in decline
Minnesota – Uncommon
Iowa – Uncommon

Size at hatching, 21 – 25 mm; adult features appear at 13 – 15 cm total length



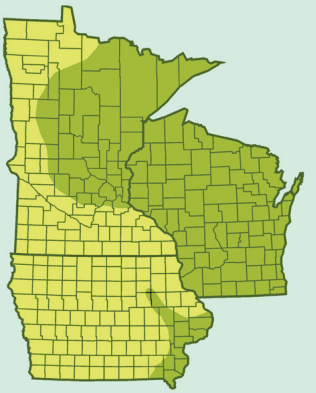
The Mudpuppy is a paedomorphic species; it retains larval characteristics in its adult form. Mudpuppies are only found in large lakes and rivers. The eggs are easily identified, laid in nests constructed by females on the underside of cover objects such as rocks, boards, and other sunken debris. The eggs are suspended individually in an area 15–30 cm in diameter; each egg is approximately 5–6.5 mm in diameter. The larvae are striped, with large external gills, four toes on the hind feet, and a dorsal fin extending only onto the tail, not onto the body (Figure 3a). Mudpuppies remain in the larval stage for several years and never acquire a terrestrial form.

Eastern Newt *Notopthalmus viridescens*

Status: Wisconsin – Common
Minnesota – Common
Iowa – Endangered

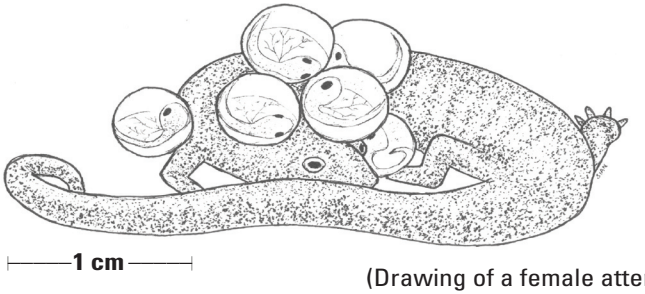
Size at hatching, 7 – 9 mm; at metamorphosis, 21 – 38 mm total length

The Eastern Newt is widely distributed over the eastern United States and is found in ponds in its aquatic form. The female lays the eggs singly, attaching them to sticks, leaves, and stems in the pond. The eggs have a tough, rubbery jelly, are often oval, and have three envelopes with a sticky outer envelope that attaches to vegetation. The larvae are unique among our salamanders in that they lack costal grooves (Figure 3a) and have a dark stripe through the eye. They also have yellow spots along the dorsum.

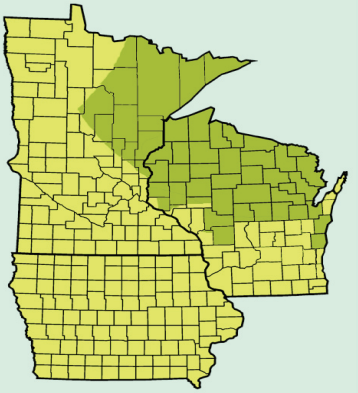


Eastern Red-backed Salamander *Plethodon cinereus*

Status: Wisconsin – Locally common
Minnesota – Locally common



(Drawing of a female attending her eggs)
Hatchling size, 2 cm total length; adults, 6-10 cm total length

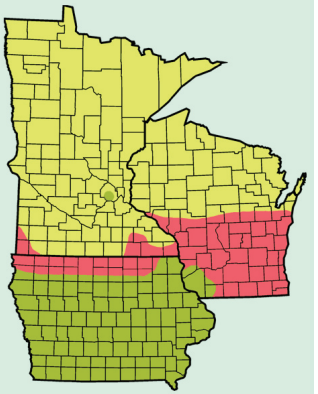


This species is our only amphibian that foregoes the aquatic larval stage, laying terrestrial eggs that develop directly into juvenile salamanders. The eggs can be distinguished from the Four-Toed Salamander because there will be an attending female Eastern Redback Salamander with her eggs. Three to 17 eggs are laid in rotten logs, or in damp soil under rocks or logs. The eggs are laid individually but in a cluster in subterranean cavities, usually naturally occurring cracks and crevices. The female remains coiled around the egg cluster until they hatch. The young hatch in about two months and are approximately 2 cm long.

Northern Cricket Frog *Acris crepitans*

Status: Wisconsin – Endangered
Minnesota – Endangered
Iowa – Declining

2.7 – 4.4 cm total length



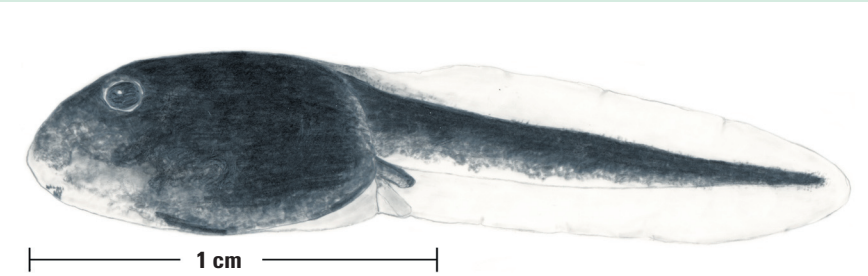
Northern Cricket Frogs lay eggs singly or in loose clusters of 7–40 eggs near the surface of streams and other bodies of water. Cricket Frogs have distinctive tadpoles when their tail tips are black. No other tadpole will have such an obvious black tail in contrast to the rest of the tail and body. This trait may or may not be present depending on conditions. For example, tadpoles that developed in ponds with predaceous dragonfly larvae had black tails (directs attacks away from the body), whereas those developing in lakes or streams with fish had clear tails (less visible; Caldwell 1982). Tadpoles of this species can also be identified by their eyes, which are located between dorsal and lateral, and the bands of pigment that lie along the dorsal edge of the tail musculature.

Northern Cricket Frogs are the least arboreal of the tree frog family in our area. The adults are found along muddy banks of streams, ponds, and lakes. There is considerable concern over the disappearance of this species in the northern parts of its range (indicated in red). A range contraction has occurred in the last few decades and the cause is under investigation (Lannoo 1998; Hay 1998). There is some evidence that this species is more susceptible to UV radiation than the leopard frogs, toads, and other tree frogs (Van Gorp 2002).

American, Canadian, Great Plains, Woodhouse's, and Fowler's Toads

American Toad *Bufo americanus*
Canadian Toad *Bufo hemiophrys*
Great Plains Toad *Bufo cognatus*
Woodhouse's Toad *Bufo woodhousii*
Fowler's Toad *Bufo fowleri*

Status: *B. americanus* – Common to locally abundant in Wisconsin, Minnesota, and Iowa.
B. hemiophrys – Locally abundant in Minnesota
B. cognatus – Locally abundant in Minnesota and Iowa
B. woodhousii – Locally abundant in Iowa
B. fowleri – Locally abundant in Iowa



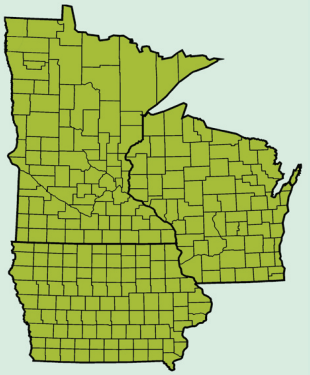
(American toad tadpole) 1.8 – 2.4 cm total length

Toad eggs and tadpoles can be found in almost any aquatic situation, from muddy farm ponds to clear swampy areas, and are distinctively different from those of other frogs. Toads lay their eggs in long strings that may be benthic or entwined in (but not attached to) vegetation. You should be able to distinguish the eggs of any species of toad based on site location and characteristics of the envelope surrounding the eggs. Canadian Toads are found in northwestern Minnesota and have a single tubular envelope enclosing the eggs. The American Toad has a double envelope surrounding the eggs, with eggs separated by partitions. Woodhouse's and Fowler's Toads, are found in western and southeastern Iowa and have a single tubular membrane not separated by partitions. Great Plains Toads are found in western Iowa and Minnesota and have a scalloped egg string.

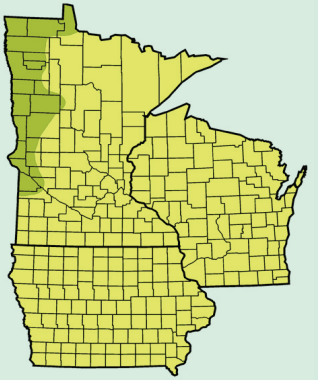
The larvae of different toad species are very similar. Toad tadpoles are small and black or dark brown, often with some bright metallic spots.

(continued next page)

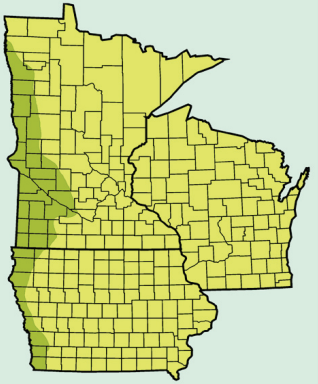
Toad Range Maps



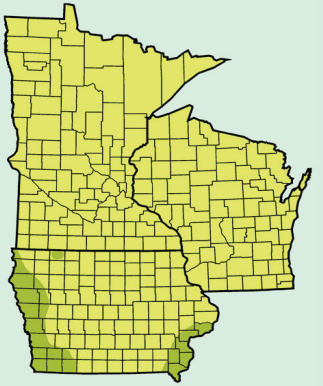
B.americanus



B. hemiophrys



B. cognatus



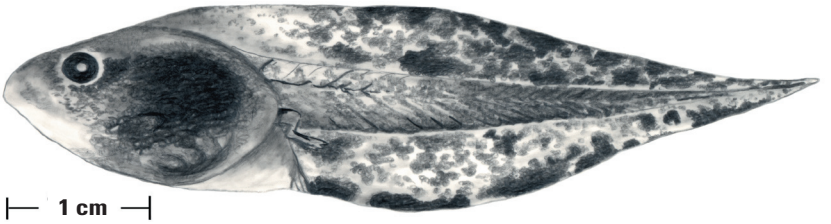
B. woodhousii
(western Iowa)
B. fowleri
(eastern Iowa)

They have a clear fin that is rounded at the tip. The eyes are dorsal and the vent is medial. Metamorphosing toads quickly acquire their unique warty skin and squatty shape.

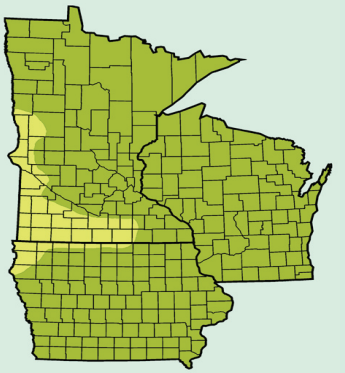
Gray and Cope's Gray Treefrogs

Gray Treefrog *Hyla versicolor*
Cope's Gray Treefrog *Hyla chrysoscelis*

Status: Wisconsin – Common
Minnesota – Common
Iowa – Common



3.2 – 3.8 cm total length



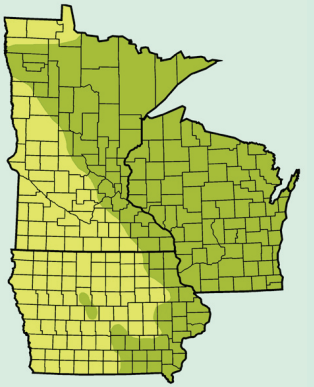
Gray Treefrogs and Cope's Gray Treefrogs cannot be distinguished based on morphology; herpetologists use calling rate or chromosomes for identification (Oberfoell and Christiansen 2001). Differences in eggs and tadpoles are unknown. The adults spend most of the year in trees and vegetation and descend to small ponds to breed in May–June. They lay clumps of 30–40 light brown eggs attached to floating vegetation near the surface. The outer jelly layer is weak and indistinct. Tree frog tadpoles are striking, with high (1.5 times depth of tail musculature) tail fins that often have a red-orange tinge (this color quickly disappears in preservative). Their tails usually end in a distinct flagellum. Eyes are lateral, and older larvae have very heavily pigmented tail fins with the pigment covering both the fins and musculature. Metamorphs have smooth skin and large toe pads.

Spring Peeper *Pseudacris crucifer*

Status: Wisconsin – Common
Minnesota – Common
Iowa – Common adjacent to Mississippi River

~ 3.4 cm total length

Spring Peeper adults are associated with forested or brushy areas. Peepers lay eggs in shallow water singly or in small clusters (2-3 eggs) attached to dead leaves, sticks, and grasses. Spring Peeper tadpoles are highly variable. They have lateral eyes and the pigmentation of the tail can be heavy or almost non-existent. When there is pigmentation on the tail it is concentrated along the outer edge and there is a clear area near the musculature.

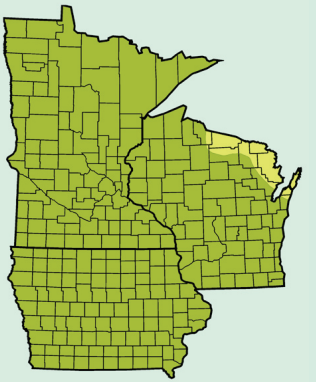


Western Chorus and Boreal Chorus Frogs

Western Chorus Frog *Pseudacris triseriata*
Boreal Chorus Frog *Pseudacris maculata*

Status: Wisconsin – Common
Minnesota – Common
Iowa – Common

2.6 – 3.7 cm total length

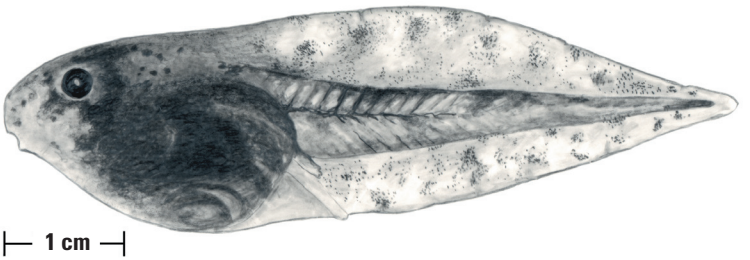


The Western Chorus Frog and the Boreal Chorus Frog are difficult to distinguish and have overlapping ranges (Platz 1989). The exact range of the Boreal Chorus Frog has not been determined. Differences in eggs and larvae are unknown and we treat them together in this account. The Chorus Frog is often one of the first frogs to call and lay eggs in the spring. They breed in ponds and smaller bodies of water and lay eggs in loose, irregular clumps of 5–20 eggs (occasionally over 100 eggs) attached to vegetation or debris in shallow water. The tadpoles can be confused with other tree frogs such as Spring Peepers, which also have lateral eyes and a high tail fin. Chorus Frog tadpoles are brownish, black, or gray above and bronze or silvery below, and usually have clear fins with a bicolored tail musculature (dark on the dorsal half, light on the ventral half).

Leopard, Pickerel, and Crawfish Frogs

Northern Leopard Frog *Rana pipiens*
Southern Leopard Frog *Rana sphenocephala*
Plains Leopard Frog *Rana blairi*
Pickerel Frog *Rana palustris*
Crawfish Frog *Rana areolata*

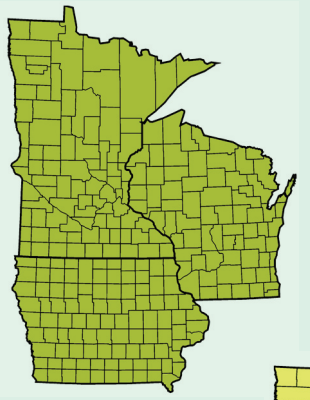
Status: *R. pipiens* – Common in Wisconsin, Minnesota and Iowa
R. sphenocephala – Uncommon and declining in Iowa
R. blairi – Locally abundant but declining in Iowa
R. palustris – Special Concern in Wisconsin, uncommon in Iowa and Minnesota
R. areolata – Extirpated in Iowa (?)



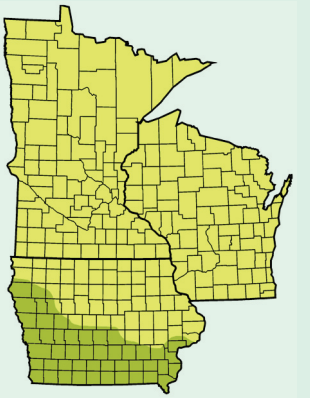
(Northern Leopard Frog tadpole) 4.5 – 8.5 cm total length

We group the eggs and larvae of the ranid species above together in this account. Geography and observation of adults may be necessary to help with identification. Southern Leopard Frogs are incidental in extreme southeastern Iowa and the Crawfish Frog has not been seen in extreme southern Iowa in over 60 years (Christiansen 1998). The eggs of these species are laid in globular masses attached to vegetation or on the bottom in shallow water. The Northern Leopard Frog and Pickerel Frog can be distinguished from each other because the Northern Leopard Frog has eggs that are black on one side and white on the other, whereas the Pickerel Frog has eggs that are brown on one side and yellowish on the other. The tadpoles are greenish or brownish with dorsal eyes and mottling on the tail. The intestinal coil is at least partly visible through the skin on the belly. Pickerel Frog tadpoles have been described as green or olive green with large dark blotches on their tail musculature and fins. Leopard Frogs are green or yellowish green without the large dark blotches.

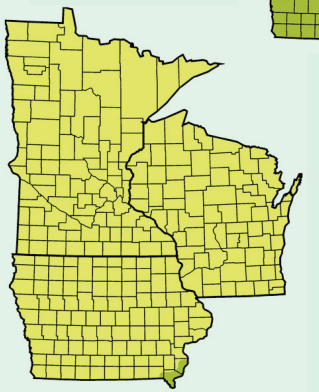
Leopard, Pickerel, and Crawfish Frog Range Maps



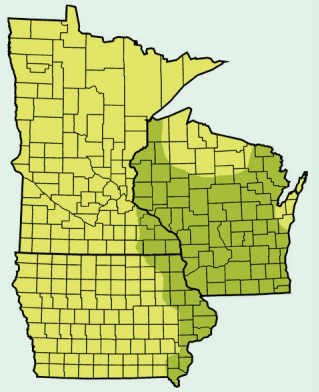
R. pipiens



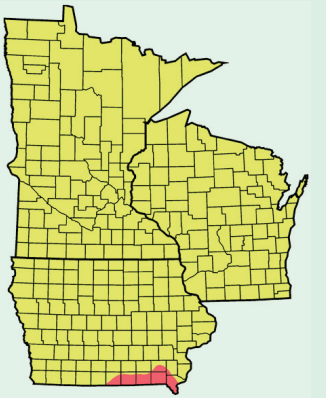
R.blairi



R. sphenocephala



R. palustris



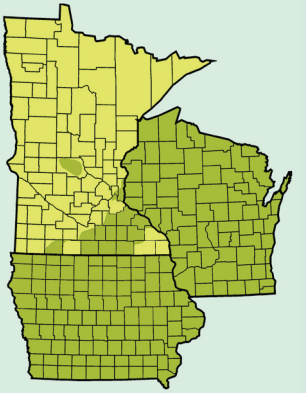
R. areolata

American Bullfrog *Rana catesbeiana*

Status: Wisconsin – Common
Minnesota – Range expanding through introductions
Iowa – Increasingly common

1 cm

~16.2 cm total length



American Bullfrogs are the largest frogs in our area, produce the greatest number of eggs, and have very large larvae that usually overwinter at the bottom of ponds and mature after a couple of years in the tadpole stage. They are now found statewide in Iowa because of introductions with stocked fish. Introductions of American Bullfrogs in the western United States have caused the decline of native species (Hayes and Jennings 1986) because adult bullfrogs will eat other frogs, as well as other large prey. American Bullfrogs are at home along permanent bodies of water and are able to sustain populations in the presence of fish predators. American Bullfrogs and Green Frogs have either skin toxins or behavioral defenses against larval predation (Kats et al. 1988; Werner and McPeek 1994).

American Bullfrogs lay their eggs in large (may exceed 1 m diameter), flat (about one egg deep) floating rafts in June or July. The eggs are small (0.12–0.17 mm in diameter) with up to 20,000 eggs in a mass. The only other frog with a large floating mass is the Green Frog, but this species has smaller eggs (0.10–0.15 mm diameter) and fewer of them (< 5,000 eggs) in the mass. American Bullfrogs have only

(continued next page)

one weak jelly layer; Green Frog eggs have two jelly layers per egg. American Bullfrog tadpoles get quite large (16 cm or larger) and are greenish brown with dorsal eyes. Intestines are visible in small tadpoles, but the belly becomes opaque in larger larvae. American Bullfrogs have distinct black spots on the dorsum of the body and on the tail, these spots are concentrated on the dorsal half of the tail. The spots are round and distinct, whereas the Green Frog has fuzzier, less distinct spotting.

Green and Mink Frogs

Green Frog *Rana clamitans*

Mink Frog *Rana septentrionalis*

Status: *R. clamitans* – Common in Wisconsin, Minnesota and Iowa
R. septentrionalis – Locally abundant Wisconsin and Minnesota

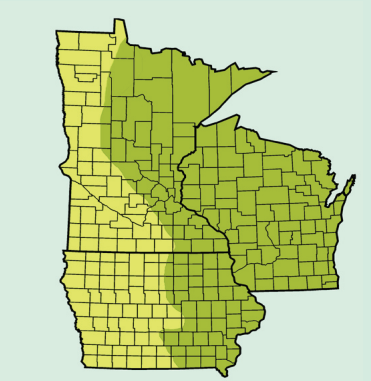
(Green Frog tadpole)

7.4 – 10.0 cm total length

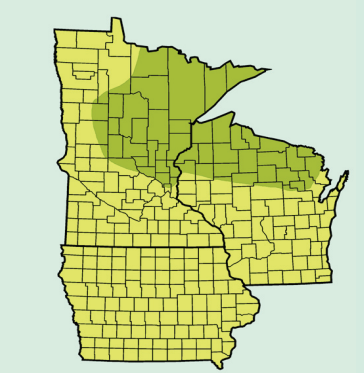
Green Frogs are found near springs, streams, and ponds and Mink Frogs are often found among lily pads in ponds, swamps, and streams. Adult Green Frogs superficially resemble American Bullfrogs as adults but are smaller and have dorsolateral folds along the back. Mink Frog adults can be difficult to distinguish from Green Frogs, but mature Green Frogs have bands, "tiger stripes," on their hind legs instead of the indefinite patterns of spots and blotches found in Mink Frogs. Also, Mink Frogs emit an odor similar to rotten onions when their skin is rubbed roughly. Mink Frogs are found only in northern Minnesota and Wisconsin within our range. Mink Frog and Green Frog tadpoles are similar, although Mink Frogs have been reported to have pink-buff colored spots on their tail.

Mink Frogs lay eggs in loose globular masses (500–3,000 eggs in a mass), often in deep water (> 1 m depth). Mink Frogs need cold, well-oxygenated water for egg development because the egg jelly is thick, and they are not laid on the surface of the water as are Green Frogs and American Bullfrogs. Green Frogs lay eggs in a large floating film with up to 5,000 eggs. Green Frog and Mink Frog tadpoles have a muscular tail with low fins. The belly is completely opaque and the greenish bodies have numerous dark blotches consisting of fuzzy dots, dashes, and splotches, but not distinct round dots.

Green and Mink Frog Range Maps



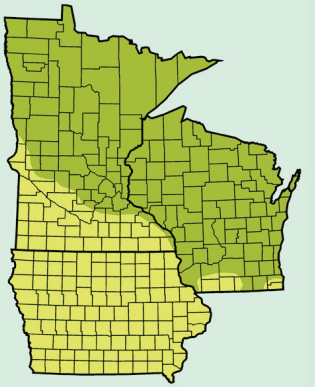
R.clamitans



R. septentrionalis

Wood Frog *Rana sylvatica*

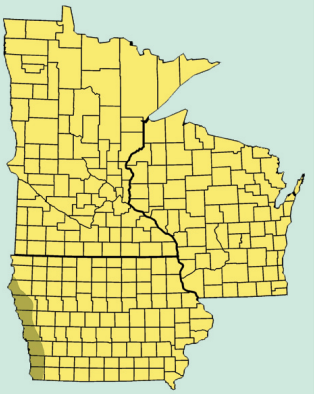
Status: Wisconsin – Common
Minnesota – Common



Adult Wood Frogs have the same general shape as other members of their genus—but are brown instead of green—with a dark brown eye mask. They breed early in spring and their eggs are often the first ranid eggs laid in the year. The eggs (500–3,000) are laid in loose, round globular masses (5-12 cm diameter) attached to submerged vegetation, often near the surface. Many females lay their eggs in the same vicinity. Egg masses are rather flimsy (although less flimsy than Northern Leopard Frog egg masses) and lose their shape when lifted from the water. A large amount of clear jelly in the egg mass causes the eggs to be widely separated. Larval Wood Frogs have clear tail fins that end in a sharp point. The fins are higher than other ranid tadpoles. The musculature of the body and tail is colored uniformly brownish with a greenish sheen. The belly is usually cream-colored with a cream line along the edge of the mouth.

Plains Spadefoot *Spea bombifrons*

Status: Iowa – Locally abundant



Plains Spadefoots are present in extreme western Iowa. Adults spend most of the year underground and breed explosively (all within a few days or weeks) in small pools after heavy spring rains (even depressions in agricultural fields) and occasionally in more permanent ponds. The eggs and tadpoles develop quickly; eggs hatch in about 20 hours at 30ºC (Justus et al. 1977), and a population in Oklahoma required only 13–14 days from egg to metamorphosis (King 1960). The eggs are laid in a cylindrical or elliptical mass of 10–250 eggs that is attached to submerged vegetation. Plains Spadefoot tadpoles have a medial vent, a characteristic they share only with toads in our region. The body is dark brown or bronze in color, and is large and bulbous (broadest just behind the eyes) with mostly clear tail fins. Pigmented "veins" are usually found on the clear fins. The spiracle is found lower on the body than our other frogs (Figure 4c). Tadpoles may also be rapidly developing "carnivorous morphs," with larger heads and mouths than the typical omnivorous forms (Pfennig 1992). A black "spade" will be observable on the hind feet well before metamorphosis.

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