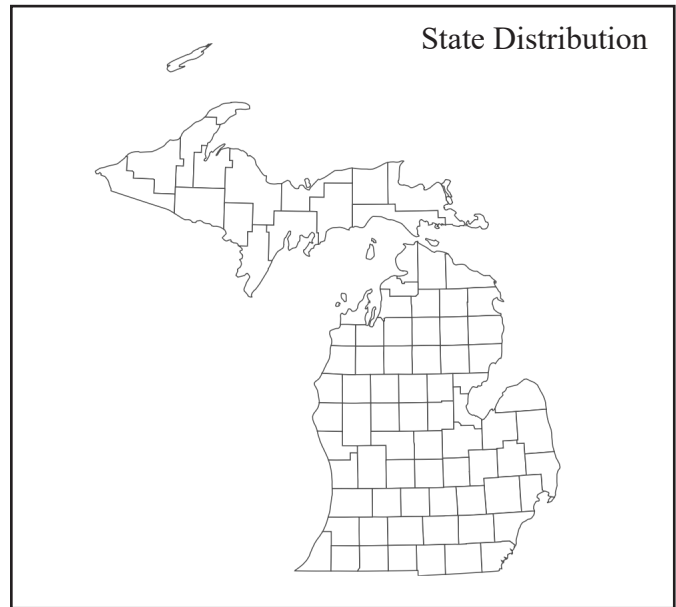
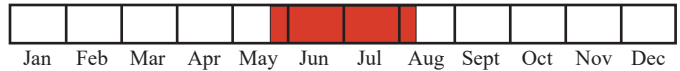


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Best Survey Period



Status: State special concern

Global and State Rank: G5 (Secure) / S3S4 (Vulnerable to Apparently Secure)

Family: Ranidae (true frogs)

Synonyms: *Aquarana septentrionalis* (Frost 2023), *Rana septentrionalis* (Baird 1854)

Taxonomy: The original description of this species was *Rana septentrionalis* (Baird 1854). This species was placed in the genus *Lithobates* by Frost et al. (2006). Some recent treatments place this species in the genus *Aquarana* rather than *Lithobates* (Frost 2023). The taxonomy of American frogs in the Ranidae family is controversial, with three taxonomic arrangements consistent with current understanding of phylogeny or evolution (Mendelson et al. 2025, Nicholson 2025, NatureServe 2026). These include a single-genus arrangement of Yuan et al. (2016) which places all Eurasian *Rana* and *Pseudorana* as well as all American ranids into *Rana*; a three-genus model of Che et al. (2007) which recognizes *Pseudorana* in Asia, *Rana* in Eurasia and western North America, and *Lithobates* in the Americas; and a seven-genus model of Dubois

et al. (2021) which recognizes *Pseudorana*, *Rana*, and *Liuhurana* in Eurasia and Amerana (the Pacific Coast ranids of North America), *Aquarana* (for the bullfrogs and allies), *Boreorana* (a monotypic genus for Wood Frog, *L. sylvaticus*), and *Lithobates* (for the leopard frogs and allies) (Mendelson et al. 2025, Nicholson 2025, NatureServe 2026). The three-genus model has been widely, but not uniformly, accepted in publications for more than 15 years and this suggests relative taxonomic stability in a group sometimes considered to be controversial (Mendelson et al. 2025, Nicholson 2025). The use of the genera *Amerana*, *Aquarana*, or *Boreorana* has been deferred at this time until more phylogenetic stability is achieved (Mendelson et al. 2025, Nicholson 2025).

Total Range: The mink frog's range extends from Labrador to southern Manitoba, and south to northern New England and northern Wisconsin (Conant and Collins 1991, Conant and Collins 1998, Blackburn et al. 2001, NatureServe 2026).

State Distribution: In Michigan, mink frog occurrences have been reported from Alger, Chippewa, Houghton, Keweenaw, Mackinac, Marquette, and Ontonagon counties (iNaturalist). These records are



concentrated in the Upper Peninsula and adjacent northern Great Lakes region, which is consistent with the species' association with cold, permanent lakes and ponds with extensive aquatic vegetation. However, mink frogs have not been systematically surveyed across its range in Michigan. Potential exists for mink frogs to occur in additional locations within the state, particularly because detection of this species is strongly influenced by survey timing and effort.

Recognition: The mink frog is a small to medium frog with a generally **green dorsal color overlaid with brown to black mottling**; mottling often becomes **dark, irregular blotches on the upper surfaces of the hind legs** (Behler and King 1979; Conant and Collins 1991, 1998). Female mink frogs are generally larger than males, and adults typically range from about 4.0 to 7.8 cm (1.6 to 3.1 in) snout-vent length (Pipino and Macklem 2025). Mink frogs may emit a distinctive **musky odor** (often described as mink-like or like rotten onions) (Harding and Mifsud 2017, Griggs 2018). The most reliable field character separating mink frogs from green frogs is the **extent of webbing on the hind foot: in mink frogs, webbing reaches the last joint of the fourth toe (i.e., longest toe) and the tip of the fifth (outer) toe, whereas in green frogs, the webbing extends to only about the second joint of the fourth toe and does not reach the tip of the fifth toe** (Harding and Mifsud 2017, Griggs 2018). Green frogs also consistently show strong dorsolateral ridges and tend to have clear dark crossbands on the legs, while mink frogs often have **weaker/absent dorsolateral ridges** and more **irregular blotching or lengthwise stripes on the legs** (Harding and Mifsud 2017). Northern leopard frogs typically have regular, distinct round spots and strong dorsolateral ridges, unlike the blotchier pattern of mink frogs (Conant and Collins 1991, 1998). Bullfrogs lack dorsolateral ridges but are generally much larger and differ in overall patterning from mink frogs (Conant and Collins 1991, 1998).

Mink frog tadpoles are green, olive, or brown with small, dark spots or heavy mottling that may extend

onto the tail, and their ventral side (belly) is yellow or opaque (Harding and Mifsud 2017). The tail is long and pointed and may be edged with pink spots (Harding and Mifsud 2017). Early development has been described from fertilization through metamorphosis, and larval size at transformation varies depending on whether tadpoles' complete development in one or two years. Tadpoles may metamorphose when they reach about 2.9 to 4.2 cm (1.1 to 1.7 in) total length if they transform within their first year but can reach about 7.2 to 10 cm (2.8 to 3.9 in) if they take two years to metamorphose (Harding and Mifsud 2017, Bevier et al. 2022, AmphibiaWeb 2026).

Best Survey Time/Phenology: Breeding occurs in late spring and summer, mainly late May through early August, with peak calling often in June-July (Vogt 1981). Nocturnal auditory call surveys along vegetated lake and pond margins are recommended during the breeding period (late May through early August; peak often June-July). Breeding call surveys can be paired with shoreline or canoe-based visual encounter surveys targeting shallow vegetated edges, peripheral pools, and inlet/outlet habitats. Repeat visits are recommended because calling activity varies with weather and local conditions (Vogt 1981, NatureServe 2026).

Habitat: Mink frogs inhabit cold lakes and ponds and their shallow peripheral pools as well as inlets and outlets of lakes and ponds, often among emergent or floating vegetation in open water or along the shores (Vogt 1981, DeGraaf and Rudis 1983,). They are highly aquatic but may venture onto land during very wet weather. Hibernation occurs underwater. Eggs and larvae develop in permanent lakes and ponds; eggs are attached to submerged vegetation but may later sink to the bottom (NatureServe 2026).

Biology: Mink frogs are active typically from May to September or October (Harding and Mifsud 2017, AmphibiaWeb 2026). Breeding occurs in late May to early August, and tadpoles undergo metamorphosis and transform into adults in July and August after one or two years of development



(Griggs 2018, AmphibiaWeb 2026). Mink frogs have an average life span of one to two years past metamorphosis, with females potentially having a slightly longer life span, sometimes reaching three to four years of age, and males rarely surviving three years (Leclair and Laurin 1996). In central Ontario, mink frogs have been reported to live 5-6 years and have an average life span of 1.7–4.0 years after metamorphosis (Shirose and Brooks 1995a, 1995b; Griggs 2018; AmphibiaWeb 2026).

Mink frogs are highly aquatic frogs of cool northern ponds, lakes, and wetlands with abundant floating and emergent vegetation (Hedeen 1986, Pipino and Macklem 2025). This species' tolerance to desiccation appears to be significantly lower than the tolerances of other northern frogs (Schmid 1965, AmphibiaWeb 2026). Mink frog activity on land is not commonly reported and is usually restricted to periods of evening and/or heavy rainfall events (Hedeen 1986, Schueler 1987, Harding and Mifsud 2017, AmphibiaWeb 2026). Although mink frogs are considered very aquatic, they do move over land, especially during rainy conditions, and juveniles, in particular, can disperse terrestrially away from natal wetlands after metamorphosis (Hedeen 1986, LeGros et al. 2021). Near the southern edge of the species' range, occupancy and calling are influenced by climate and wetland conditions, suggesting that suitable hydroperiod and cool-water habitat are important constraints on local persistence (Patrick et al. 2012).

Breeding occurs in permanent waters in areas with dense aquatic vegetation in late spring and summer, and males are best known for their distinctive vocal behavior. Calling activity may continue from around midnight until 0900 h, and males produce a repertoire of single- and multi-note calls built from “cuk” and “rumble” notes, with calls that combine both note types being especially common (Bevier et al. 2004). After mating, females deposit egg masses that can range from 500-4,000 eggs on submerged vegetation below the water surface (Vogt 1981, AmphibiaWeb 2026). The eggs hatch within three to six days of being laid (Griggs 2018). Tadpoles grow during the fall after metamorphosis, slow

down their growth during the winter, restart their growth in May after overwintering, and complete their metamorphosis in July or August after a year of being in the tadpole stage (Hedeen 1971, 1972; Vogt 1981; Griggs 2018; AmphibiaWeb 2026). Tadpoles that need a second year to develop will metamorphose in July-August the following year after a second overwintering period (AmphibiaWeb 2026). As in other northern ranids, sexual maturity is not immediate after metamorphosis; age-structure research suggests mink frogs are relatively long-lived and that males likely mature somewhat earlier than females, although both require more than one year to reach adulthood (Shirose and Brooks 1995). On average, male mink frogs reach sexual maturity in about one year after metamorphosis (range 1-2 years) at about 4.5-5.0 cm (1.8-2.0 in) in body length, and female mink frogs reach sexual maturity in about two years after metamorphosis (range 1-3 years) at about 5.4-5.9 cm (2.1-2.3 in) in body length (Hedeen 1972, Shirose and Brooks 1995, Griggs 2018, AmphibiaWeb 2026).

Mink frogs feed on a wide variety of animal prey, primarily aquatic and shoreline invertebrates. Dietary work indicates that insects make up much of the prey base, including beetles and other arthropods, and the species appears to be an opportunistic predator of suitably sized prey found in and around the water (Kramek 1972). Likely predators include snakes, fishes, wading birds, turtles, and mammals, especially where frogs are concentrated along pond margins (Pipino and Macklem 2025). In addition to escaping into water when disturbed, mink frogs possess defensive skin secretions, including antimicrobial peptides that may help protect them from microbes in their aquatic habitat (Ashcroft et al. 2014).

A suitable overwintering habitat is critical for mink frog survival because this is a cold-adapted species closely associated with permanent water. Mink frogs are not freeze tolerant (Schmid 1982, AmphibiaWeb 2026) and typically overwinter aquatically. Most mink frogs probably overwinter in the same waterbodies they inhabit during the active season, but some seasonal migrations have



been observed (e.g., in Ontario) (Schueler 1987, AmphibiaWeb 2026). Larvae commonly overwinter before metamorphosis rather than completing development in a single season (Bevier et al. 2022). This extended larval period is one of the defining features of the species' life history. Their close association with deep, cool ponds and lakes suggests that successful overwintering depends on water bodies that retain liquid water and adequate oxygen beneath the ice (Hedeen 1986, Pipino and Macklem 2025). At the southern edge of the range, climate and habitat change appear to limit occupancy, reinforcing the idea that overwinter conditions are central to the species' distribution and persistence (Hedeen 1986, Patrick et al. 2009).

Conservation/Management: Threats to mink frogs include habitat loss and degradation, chemical contamination or pollution, acidification, increased UV-B radiation, disease, and/or climate change. Residential and recreational development can cause habitat loss and degradation for mink frogs by removing or impacting the quality of wetlands and/or aquatic and emergent vegetation along and within lakes and ponds through chemical and/or mechanical means. Chemical contamination or pollution in lakes and ponds from herbicides (e.g., to control aquatic plant growth or weeds in surrounding residential yards), insecticides (e.g., for mosquito control or controlling insect pests in surrounding agricultural fields or forests), and nutrient and other chemical runoff from surrounding lands can decrease habitat quality and potentially cause adverse impacts to mink frogs, which could include reduced densities and sublethal effects (e.g., temporary paralysis) (Fairchild and Eidt 1993, McAlpine et al. 1998, AmphibiaWeb 2026). Acidification also may be a threat to mink frogs (AmphibiaWeb 2026). Mink frog occurrence and abundance have been negatively associated with higher sulfate levels in lakes and ponds which may result from inputs of acidic precipitation (Dale et al. 1985, McAlpine et al. 1998). Breeding habitats for mink frogs (i.e., permanent ponds) have been ranked as being moderately susceptible to pH depression from atmospheric acid deposition, which can potentially cause adverse effects to amphibians

in general (e.g., embryonic mortality/deformity, reduced density, delayed development, abnormalities) (Schreiber and Newman 1988). Diseases such as red-leg syndrome and ranavirus have been documented in mink frogs and pose another potential threat to populations of this species (Griggs 2018). Mink frogs also may be susceptible to and harmed by increasing ultraviolet (UV-B) light or radiation due to ozone depletion in the upper atmosphere, particularly in northern latitudes (AmphibiaWeb 2026). Finally, given the mink frog's association with cold-water habitats and potential dependence on cool, oxygen-rich water bodies for breeding (Hedeen 1986), this species may be particularly vulnerable to climate change (Popescu and Gibbs 2009). Mink frog calling surveys and occupancy modelling in upstate New York found that mean July air temperature was negatively associated with occupancy, with occupancy decreasing significantly above 19.5°C (67.1°F), suggesting warmer temperatures in the future could have a negative effect on mink frog occurrence (Popescu and Gibbs 2009).

Conservation of mink frogs should focus on maintaining cold, permanent ponds, lakes, wetlands, and beaver-influenced aquatic systems with intact, well-vegetated shorelines. Emergent and floating vegetation should be retained because it provides important structure for cover, breeding, egg deposition, and larval development (DeGraaf and Rudis 1983, Hedeen 1986, Pipino and Macklem 2025). Management should avoid activities that remove shoreline vegetation, increase sedimentation, reduce water quality, or alter hydroperiod and water levels during breeding, larval development, and larval overwintering, because larvae may remain in wetlands and waterbodies through winter rather than completing metamorphosis in a single season (Bevier et al. 2022, NatureServe 2026). Because mink frogs are highly aquatic and cold-adapted, protection of cool-water conditions and wetland permanence is especially important near the southern edge of the range, where climate change and habitat loss may reduce occupancy (Hedeen 1986, Patrick et al. 2009, Pipino and Macklem 2025). Preserving connectivity among nearby wetlands and minimizing fragmentation of adjacent shoreline



and dispersal areas may also benefit the species, particularly juveniles, which are capable of limited terrestrial dispersal after metamorphosis (Hedeen 1986, LeGros et al. 2021).

Research Needs: Targeted, systematic surveys and monitoring are needed to assess and determine the status and distribution of mink frog populations in Michigan. Research is needed to investigate the ecology of mink frogs and identify the threats facing the species and individual populations in Michigan to implement appropriate and effective management to maintain populations in the state. The prevalence and/or impacts of pesticides and other chemical pollutants, disease, and climate change warrant particular research attention. Monitoring and evaluating the impacts and effectiveness of management efforts would inform and facilitate adaptive management.

Related Abstracts: coastal fen, northern fen, poor fen, muskeg, northern wet meadow, Great Lakes marsh, emergent marsh, submergent marsh, wooded dune and swale complex, pickerel frog, boreal chorus frog

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