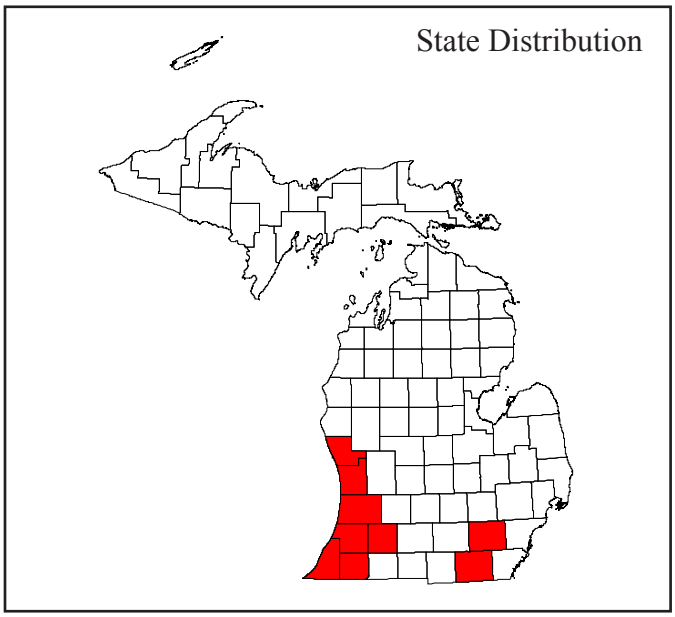
Clonophis kirtlandii Kennicott — Kirtland's Snake

Photo by James H. Harding



Best Survey Period

Status: State endangered

Global and state rank: G2S1

Other common names: Species was previously known as Kirtland's Water Snake.

Family: Colubridae

Taxonomy: *Clonophis kirtlandii* is the only member of the genus *Clonophis*. Formerly, this species was classified in the genus *Natrix*.

Range: The range of the Kirtland's Snake is restricted to the north-central Midwest and is centered in Illinois, Indiana, and Ohio (NatureServe 2009). Disjunct populations of this species occur in Michigan, Ohio, Illinois, Indiana, Kentucky, and perhaps Missouri (NatureServe 2009). Distribution in Kentucky is along the Ohio River valley (Barbour 1971). Historically, the species' range included northeastern and central Illinois, most of Indiana and Ohio, north-central Kentucky, southern Michigan, western Pennsylvania, and extreme northeastern Missouri. The species may be extirpated in Pennsylvania (NatureServe 2009).

State distribution: Kirtland's Snakes have been documented in at least ten counties across the southern half of the Lower Peninsula (Michigan Natural Features Inventory (MNFI) 2010). The most recent records are from Kalamazoo, Allegan, and Cass counties (MNFI 2010). An additional sighting was reported recently from a site in the Eaton/Calhoun county area but the exact location needs to be confirmed. However, systematic, targeted surveys for this species have not been conducted across the state. New sites have been documented in recent years, and potential exists for this species to occur in additional locations in the state.

Recognition: Kirtland's Snakes are small, reddish to dark brown snake with **four rows of alternating dark, round blotches on the back and sides**. A faint stripe is sometimes visible along the middle of the back. **The key characteristic is its bright red, pink or orange belly which is conspicuously bordered by two parallel rows of black spots.** The head is mostly black or dark brown above with light cream-colored, white or yellow labial scales on the chin and throat. This coloration pattern is unique to Kirtland's Snakes. Their average adult length is 14-18 inches (36-46 cm), however they can reach 24.5 in (36-62 cm) (Evers 1994). Newborn Kirtland's Snakes range in total length from 4-7 inches (11-17 cm). They are generally darker on top than the adults, with less distinct or sometimes nonexistent blotching, and have a deeper red color on the belly (Harding 1997). The body and tails of juveniles and adult males are moderately slender, but are more stout in females (Conant 1943).

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Several snakes in Michigan appear similar to Kirtland's Snakes and can be confused with this species. Three of these have red or orange bellies but none have the two rows of black spots along the sides of the belly. The Northern Red-bellied Snake (*Storeria occipitomaculata occipitomaculata*) has a bright red, unmarked belly but the upper surface is typically solid colored with three light spots behind the head. The Northern Ring-necked Snake (*Diadophis punctatus edwardsii*) has a yellow or yellowish orange, unmarked belly with a light ring encircling its neck. The Copperbelly/Copper-bellied Water Snake (*Nerodia erythrogaster neglecta*) has a bright orange, red, or yellow unmarked belly and is solid black or dark brown on top and much larger. Young Copperbellies have blotching on top but their bellies are still unmarked. Eastern Gartersnakes (*Thamnophis sirtalis sirtalis*) also can sometimes be confused with Kirtland's Snakes, but they have stripes along its back and plain or unmarked bellies (Harding 1997).

Photo of underside of Kirtland's Snake by G. A. Coovert

Best survey time: Kirtland's Snakes are nocturnal, fossorial, and highly secretive. Unlike other reptiles, it rarely basks in the sun and generally remains below ground in burrows or under debris, leaf litter or other cover objects. The best time to survey for this species is in the spring and fall (i.e., April, May, June, and October), although Kirtland's Snakes can be found anytime during the active season (i.e., late March or early April through late October or early November) (Conant 1938, Conant 1943, Minton 1972, Harding 1997, John Rhine pers. comm. 2006). This species can often be found foraging during mild spring or autumn nights after rain events (Evers 1994, T. Anton pers. comm.). The best way to survey for this secretive species is with cover boards. Cover boards should be placed in sufficient density throughout suitable habitat. Placing cover boards right over the openings of crayfish or animal burrows may help detect this species. Kirtland's Snakes also have been found during visual surveys by looking for snakes basking on or resting under cover objects and in pitfall traps along drift fences (M. McCustion pers. comm. 2003, John Rhine pers. comm. 2006). Observations of Kirtland's Snakes should be documented with photographs and verified by a species expert.

Habitat: Although they are the least aquatic of the water snakes, Kirtland's Snakes inhabit wet or damp, open habitats, often in close proximity to ponds, streams, and other waterbodies (Evers 1994, Harding 1997, Ernst and Ernst 2003). These include wet meadows, wet prairies, fens, edges of marshes, creeks and canals, wet pastures and fields, and grassy openings in forested wetlands (e.g., tamarack swamps) (Evers 1994, Harding 1997, Ernst and Ernst 2003). Natural community types with which this species may be associated include prairie fen, rich tamarack swamp, floodplain forest, emergent marsh, southern hardwood swamp, southern wet meadow, wet prairie, wet-mesic sand prairie, and mesic prairie (MNFI 2007). This species also has been found in residential and urban grassy areas in parks, cemeteries, and vacant lots (Minton 1972). The presence of crayfish or other animal burrows and debris or cover objects, such as leaf litter, logs, boards, or rocks, is an important habitat component for Kirtland's Snakes as they often use these burrows and cover objects for hibernation, aestivation, and/or protection from predators (Ernst and Ernst 2003). Habitat features that provide abundant prey for this species (e.g., earthworms) also may be important.

Biology: Kirtland's Snakes are generally active from late March or early April to late October or early November (Evers 1994, Harding 1997). Even during the active period, the Kirtland's Snake is a reclusive species and are generally found under cover objects or leaf litter or in burrows underground (Evers 1994, Harding 1997, Ernst and Ernst 2003). They frequently use chimney crayfish (*Cambarus diogenes*) burrows for shelter or cover (Harding 1997). They appear to be most active at night, especially in the summer (Harding 1997, Ernst and Ernst 2003). When disturbed or threatened, they will flatten their bodies in order to appear larger,

and often remain stiff and immobile at first but then may thrash around, scurry under cover, spray musk, or strike repeatedly (Harding 1997, Evers and Evers 2003, ODNR 2009).

Kirtland's Snakes generally breed in the spring in May (Harding 1997, Ernst and Ernst 2003). Gestating females have been found in May, July and August (Conant 1943, Powell and Parmerlee 1991, Ernst and Ernst 2003), and they usually give birth to live young in late summer or early fall, typically in August or September (Harding 1997). Litter sizes usually range from 4 to 15 young. Young Kirtland Snakes grow rapidly during their first year and reach sexual maturity at age two (Harding 1997). Kirtland's Snakes eat mostly earthworms as well as slugs, leeches, and sometimes insects (Conant 1943, Minton 1972, Tucker 1977, Wilsmann and Sellers 1988, Thurow 1993). Potential natural predators include hawks, owls, other snakes, larger carnivorous mammals (e.g., skunks, raccoons, foxes and cats), and fish (Wilsmann and Sellers 1988, Harding 1997).

Conservation/management: The Kirtland's Snake has declined dramatically throughout much of its range due to habitat loss and degradation (Evers 1994). This species is considered a relict of the Prairie Peninsula (Conant 1943). Urbanization, development, wetland drainage, hydrological alterations, habitat succession, and limited habitat management have contributed to loss and degradation of suitable wet prairie or grassland-type habitats for this species (Bavetz 1994, Evers 1994, Harding 1997, Edgren 2000, Ernst and Ernst 2003). This species is currently known only from disjunct populations, often surrounded by unsuitable habitat or developed lands, making them vulnerable to local extirpation (Bavetz 1994, Evers 1994, Harding 1997, Edgren 2000, Ernst and Ernst 2003). Illegal collection by reptile hobbyists for the pet trade also has been a threat to this species (Harding 1997).

Known extant populations of this species and critical habitats should be identified and protected in natural and urban areas (Harding 1997). Fens, wet meadows, and open tamarack swamps are particularly important habitats to protect and manage for this species in Michigan (Evers 1994). These habitats are often threatened by invasive species, vegetative succession, and/or hydrological alterations. Active management of these areas may be intermittently required which may include prescribed burning or mowing. Prescribed burns and mowing should be conducted when the snakes are less active or inactive (e.g., late fall or winter from November through February), of possible, to minimize adverse impacts to the species. However, the fossorial nature of the Kirtland's Snake should generally reduce or minimize the potential for adverse impacts to this species from prescribed burns and mowing conducted during the active season (Evers 1994). Maintaining or providing cover objects and crayfish or other animal burrows also would benefit the species. Flooding or draining wetlands (e.g., for waterfowl management) could make the habitat unsuitable for Kirtland's Snakes if the wetlands are significantly altered, particularly during late fall and winter. Legal protection of the species in all states across its range and public education to reduce incidental collecting and killing and increase awareness and understanding of this species and its conservation needs would be beneficial (Harding 1997). Road mortality also should be minimized.

Research needs: Surveys and research to increase our understanding and knowledge of the status, distribution, and ecology of this species in Michigan are essential. Information on population ecology also is needed for this species. Efforts to enhance our understanding of this species' status, ecology, and threats facing its long-term survival are critical for developing and implementing effective management and conservation strategies for this species. Efforts to assess and monitor the impacts and effectiveness of these strategies also are warranted.

Related abstracts: Prairie fen, rich tamarack swamp, floodplain forest, emergent marsh, wet-mesic sand prairie, southern hardwood swamp, southern wet meadow, wet prairie, mesic prairie

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