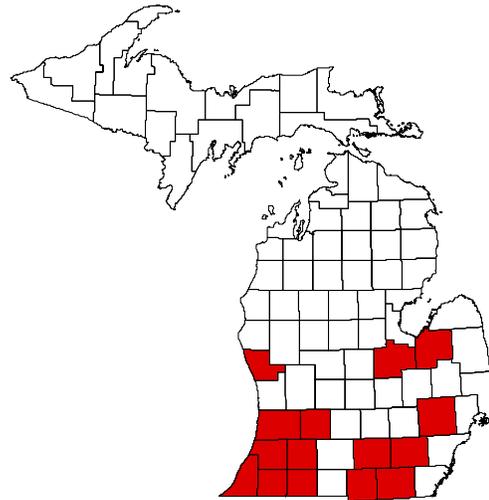
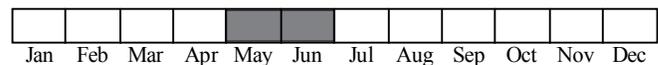


State Distribution



Best Survey Period



Status: State special concern

Global and state rank: G5T5/S3

Family: Colubridae

Taxonomic comments: The Gray Ratsnake in Michigan was formerly described as the Black Ratsnake (*Elaphe obsoleta obsoleta*), one of seven subspecies in the Eastern Ratsnake (*Elaphe obsoleta*) complex. Based on genetic (i.e., mitochondrial DNA) and morphological analyses, Burbrink et al. (2000) and Burbrink (2001) concluded that the Eastern Ratsnake complex should be divided into the following three geographically distinct clades or taxonomic groups: 1) an eastern clade known as the Eastern Ratsnake (*Elaphe alleghaniensis*), 2) a central clade referred to as the Central Ratsnake (*Elaphe spiloides*), and 3) a western clade referred to as the Western or Texas Ratsnake (*Elaphe obsoletus*). In 2002, Utinger et al. found that the New World ratsnakes are part of a clade outside of Old World ratsnakes. As a result, the genus for most North American ratsnakes was changed from *Elaphe* to *Pantherophis* (Utinger et al. 2002, Crother et al. 2008). Crother et al. (2008) refer to this species as the Gray Ratsnake (*Pantherophis spiloides*), while Collins and Taggart (2002) refer to this species as the Midland Rat Snake (*Elaphe spiloides*).

Range: The range of the Gray Ratsnake extends from the Apalachicola River and the Appalachian Mountains to the east, the Mississippi River to the west, western New York, southern Ontario, Canada, southern Michigan, and southwestern Wisconsin to the north, and along the Gulf Coast from Florida to Louisiana to the south (Burbrink 2001). The range of the former Black Ratsnake subspecies included portions of the current range of the Eastern Ratsnake, specifically areas east of the Appalachian Mountains from southeastern New York, southern Vermont, and western Massachusetts south to northwestern South Carolina and northern Georgia (Burbrink 2001). However, this portion of the Eastern Ratsnake’s range has been referred to as a potential area of taxonomic uncertainty because of hybridization with the Gray Ratsnake (Burbrink 2001).

State distribution: The Gray Ratsnake occurs in the southern half of Michigan’s Lower Peninsula (Harding 1997). Although this species has been documented from a number of counties across southern Michigan, it has been reported from only a small number of sites within each county (Michigan Natural Features Inventory (MNFI) 2008a and 2008b). In addition, the species was last reported from many of these sites in the 1980’s and 1990’s (MNFI 2008a and 2008b). However, targeted, systematic surveys for this species have not been conducted throughout its range or in



recent years. Consequently, information on this species' current distribution in Michigan is incomplete, and additional populations of this species may be documented in areas with suitable habitat.

Recognition: The Gray Ratsnake is the largest snake in Michigan and the Great Lakes region, with **total adult lengths ranging from 1.0 to 2.6 m** (3.5 to 8 ft) (Harding 1997). **Adults are black or dark brown in color**, often with underlying or remnant blotches or traces of white, yellow, orange, or red on the skin between the body scales (Harding 1997, Ernst and Ernst 2003). **The belly is white or yellow with dark checkerboard markings** on the forward part of the body becoming gray or brown toward the middle part of the body and the tail (Harding 1997, Ernst and Ernst 2003). **The throat, chin, and labial scales along the lips also are white** (Harding 1997). **There is a dark stripe that extends from the eye to the corner of the mouth**, and a dark stripe also may occur between the eyes (Ernst and Ernst 2003). **The sides of the body are straight and the belly is flat, resulting in a squarish cross-sectional profile** (Harding 1997, Ernst and Ernst 2003). The scales on the top and sides of the body are keeled (i.e., have a raised ridge), and the anal plate or scale that partly covers the anal or cloacal opening is divided (Harding 1997, Ernst and Ernst 2003).

Young Gray Ratsnakes are strongly patterned, with dark brown, gray or black blotches along the back and sides of the body on a light gray background (Harding 1997). Newly hatched Gray Ratsnakes range in length from 27 to 37 cm (10 to 14.5 in) (Harding 1997). Young or juvenile Gray Ratsnakes appear similar to and may be confused with several other snakes in Michigan including young Eastern Foxsnakes (*Pantherophis gloydi*) and Blue Racers (*Coluber constrictor foxi*). However, Eastern Foxsnakes have 216 or fewer scales on the belly while Gray Ratsnakes have 221 or more ventral or belly scales (Conant and Collins 1998, Ernst and Ernst 2003). Young Blue Racers have dark blotches, but they have smooth scales and no line from the eye to the corner of the mouth (Harding 1997, Conant and Collins 1998). Other snakes with dark blotches in Michigan include the Eastern Hog-nosed Snake (*Heterodon platyrhinos*) which has an upturned snout, the Eastern Milk Snake (*Lampropeltis triangulum triangulum*) which has

smooth scales and an undivided anal plate, the Eastern Massasauga (*Sistrurus catenatus catenatus*) which has a rattle at the end of its tail, and the Kirtland's Snake (*Clonophis kirtlandii*) which has a bright red belly.

Best survey time: The best time to survey for this species is in May and June during the spring emergence period and mating season (Fitch 1963, Blouin-Demers et al. 2000, Blouin-Demers and Weatherhead 2001). Surveys in September and October also may be productive as snakes are moving back to their hibernation sites and concentrating their activities in these areas (Fitch 1963). An effective way to survey for this species is with drift fences and funnel traps (Fitch 1963, Blouin-Demers et al. 2000, Blouin-Demers and Weatherhead 2001). Drift fences and funnel traps should be placed in areas with suitable habitat, particularly around hibernacula, and should be checked at least once daily or more frequently, if possible (Karns 1986, Blouin-Demers et al. 2000, Blouin-Demers and Weatherhead 2001). Visual encounter surveys also can be conducted by looking for snakes on the ground and under cover objects as well as above ground in trees, although snakes may be difficult to see among tree branches particularly after leaf-out. Visual surveys should be conducted during appropriate weather conditions, generally with air temperatures between 60-80 degrees Fahrenheit (16-27 degrees Celsius), partly sunny or cloudy skies, and little to no wind.

Habitat: The Gray Ratsnake typically occurs in forested habitats, primarily deciduous or mixed forests, but also utilizes adjacent open or shrubby habitats including old fields, prairies, and edges of swamps, marshes, and bogs (Fitch 1963, McAllister 1995, Harding 1997, Ernst and Ernst 2003). Ratsnakes in Ontario appear to prefer the edge or ecotone between fields and deciduous forests, particularly during the bird nesting season (Weatherhead and Charland 1985). Natural community types in Michigan within which this species has been found or has potential to occur include mesic to dry southern forests, oak barrens, mesic prairie, mesic to dry sand prairies, emergent marsh, and bog (MNFI 2008b). Gray Ratsnakes also are often found in and around barns, outbuildings, old foundations, and other buildings where rodents are abundant (Ernst and Ernst 2003).



Biology: Gray Ratsnakes in Michigan typically are active from late April through October with peak activity in May and June (Harding 1997). Gray Ratsnakes are active primarily during the day, although they may forage in the evening or at night during the summer (Ernst and Ernst 2003). Gray Ratsnake movement distances and home range sizes have not been documented in Michigan but have been documented in several other states or provinces. Gray (or Black) Ratsnakes have been documented moving, on average, from 247 to 460 m (810 to 1,509 ft/0.3 mi) from their hibernacula (Weatherhead and Hoysak 1989, Blouin-Demers and Weatherhead 2002). Maximum distances moved from hibernacula have ranged from 966 m (0.6 mi) (Fitch 1963) to 3,985 m (2.5 mi) (Blouin-Demers and Weatherhead 2002). Average home range sizes have ranged from 1.4 ha (3.5 ac) for females and 7.6 ha (18.8 ac) for males in Ontario (i.e., with water bodies included in home ranges, 1.22 ha and 3.9 ha without water bodies) (Weatherhead and Hoysak 1989) to 10 ha (24 ac) for females and 12 ha (29 ac) for males in Kansas (Fitch 1963). Blouin-Demers and Weatherhead (2002) reported an even larger average home range size for ratsnakes in Ontario of 18.5 ha (46 ac) (range 1.2-93.2 ha/3-230 ac). The species also has been reported to have stable or similar home ranges from year to year (Fitch 1963, Stickel et al. 1980).

Ratsnakes are excellent climbers and often can be found basking, resting, and/or foraging up to 15 m (49 ft) high in trees (Fitch 1963, Stickel et al. 1980, Ernst and Ernst 2003). They also are good swimmers (Ernst and Ernst 2003). Although they do not appear to defend territories, male ratsnakes do engage in dominance combat dances, probably to compete for females (Stickel et al. 1980, Ernst and Ernst 1980). During these combat dances, one male attempts to pin the other male's head or body to the ground (Stickel et al. 1980).

Gray Ratsnakes have been reported to reach sexual maturity in their third or fourth year when snakes have reached snout-to-vent lengths of over 80-82 cm (31-32 in) (Ernst and Ernst 2003). In Michigan, mating generally occurs in the spring, primarily in May and June (Harding 1997). Fall mating also may occur (Ernst and Ernst 2003). The females typically lay their eggs in late June or July (Harding 1997). Typical nest sites include hollow or decomposing stumps or logs, tree

holes or cavities, rotting vegetation, burrows in loose soil, piles of manure or sawdust, and cavities in or under rocks, boards or other debris (Harding 1997, Ernst and Ernst 2003). Females usually lay only one clutch per year, and clutches range from 5 to 44 eggs per clutch with usually about 12 eggs in a clutch (Harding 1997, Ernst and Ernst 2003). Hatchlings usually emerge in late August or September (Harding 1997). Ratsnakes may be quite long-lived as captive individuals have been reported to live over 20 years (Harding 1997, Ernst and Ernst 2003).

Ratsnakes primarily feed on mammals and birds (Harding 1997, Ernst and Ernst 2003). Mammal prey items include mice, chipmunks, squirrels, shrews, rabbits, voles, opossum, weasels, and even bats (Harding 1997, Ernst and Ernst 2003). A wide variety of bird species can be prey for ratsnakes ranging from raptors, owls, woodpeckers, and crows to warblers, finches, sparrows, and other passerines (Ernst and Ernst 2003). Ratsnakes also consume bird eggs. Juvenile ratsnakes and occasionally adults also will feed on small frogs, reptiles, and reptile eggs (Harding 1997, Ernst and Ernst 2003). Adult ratsnakes have few natural predators but juveniles and small adults can be prey for other snakes and reptiles, hawks, owls, and mammals such as raccoons, weasels, and coyotes (Harding 1997, Ernst and Ernst 2003).

Typical hibernation or overwintering sites for ratsnakes include mammal burrows, old stumps, tree root networks, rock crevices, stone walls, cisterns, wells, foundations of old buildings, and other burrows or crevices that allow snakes to find refuge from freezing temperatures (Harding 1997, Ernst and Ernst 2003). Rat snake hibernacula in Ontario were typically located on rocky, south-facing slopes (Prior and Weatherhead 1996). Ratsnakes in Ontario also have been reported to bask arboreally in trees in the immediate vicinity of the hibernaculum (i.e., ≤ 30 m from the main opening of the hibernaculum) for several days after emergence prior to dispersal to summer home ranges (Prior and Weatherhead 1996). Ratsnakes often hibernate communally with other snakes (Minton 1972, Harding 1997). They also appear to exhibit very high fidelity to hibernation sites, using the same communal hibernacula over multiple years (Prior et al. 2001).



Gray Ratsnakes are relatively slow-moving compared to other large snake species, and often will “freeze” when encountered (Harding 1997). Many adults and juveniles also will coil, vibrate their tails, and strike if cornered or seized, but these snakes are non-venomous and harmless (Harding 1997). They also can release a foul-smelling musk from their cloaca as a defense mechanism (Harding 1997). The belief is that a predator will instinctively ignore a dead animal that smells offensive.

Conservation/management: The Gray Ratsnake is uncommon to rare in the Great Lakes region and has dramatically declined in parts of its range such as in southeastern Michigan and southern Ontario (Harding 1997, NatureServe 2007). However, this species is still fairly common in parts of its range and can be locally common in areas with appropriate habitat and abundant prey (Ernst and Ernst 2003, NatureServe 2007). The primary threat to this species is habitat loss and fragmentation as forest and forest-edge habitats are developed for intensive agricultural, residential, and commercial uses (Harding 1997). This large, slow-moving snake also is threatened by human persecution, road mortality, and illegal collection (Harding 1997).

Protection and management of remaining Gray Ratsnake populations and habitat are critical for conservation of this species in Michigan. Maintaining large complexes or mosaics of suitable forested and open habitats is essential for providing sufficient habitat for viable populations of this species. Small-scale timber harvesting and agricultural development can create mosaics of forested, open, and edge habitats which can benefit the species (Harding 1997). To reduce road mortality, the construction of new roads through occupied habitat complexes should be discouraged or minimized. Hibernation sites also should be maintained and protected. In addition to habitat protection and management, public education is needed to raise awareness and understanding of this species, demonstrate the value and benefits of maintaining this species (e.g., its consumption of rodents makes it useful in agricultural areas), and discourage illegal persecution and harassment. In Michigan, the Gray Ratsnake is listed as a species of special concern and is protected from take by the Director’s Order No. DFI-166.98, Regulations on the Take of Reptiles and Amphibians,

which is administered by the Michigan Department of Natural Resources’ Bureau of Fisheries. It is unlawful to take a Gray Ratsnake from the wild except as authorized under a permit from the Director (legislated by Act 165 of the Public Acts of 1929, as amended, Sec.302.1c (1) and 302.1c (2) of the Michigan Compiled Laws). Public land managers and the general public should be informed that this species is rare and protected and should not be collected or harmed. Any suspected illegal collection of Gray Ratsnakes should be reported to local authorities, conservation officers, or wildlife biologists.

Research needs: An assessment of the Gray Ratsnake’s current status and distribution in Michigan is critical for effective management and conservation of this species. Additional information on the species’ life history, ecology, and threats to its survival in the state also should be obtained to develop and implement effective conservation and management strategies. The species’ ecology, distribution, and associated habitat should be analyzed at local and landscape scales to determine habitat requirements and connectivity among populations. Long-term population studies including population viability analyses are needed to understand Gray Ratsnake population dynamics and identify parameters that impact population viability. Effective methods for surveying and monitoring this species should be further evaluated and refined. Effective methods to educate the public to raise awareness and encourage stewardship of this and other snake species also need to be researched. Finally, conservation and management efforts for this species should be monitored over the long-term to evaluate the effectiveness of such efforts and to refine efforts, as needed, to enhance their effectiveness.

Related abstracts: Eastern Massasauga, Eastern Foxsnake, mesic southern forest, dry-mesic southern forest, oak openings, oak barrens, mesic prairie, dry-mesic prairie, dry sand prairie, bog

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