Thamnophis butleri Cope, 1889 — Butler's Garter Snake

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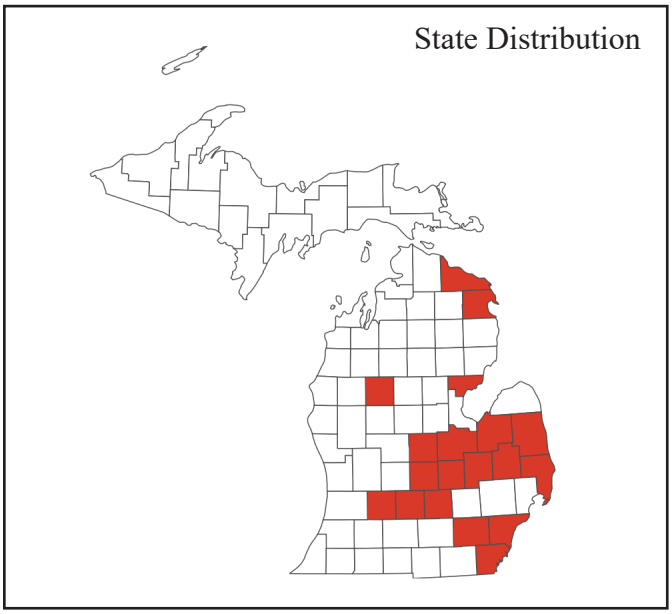
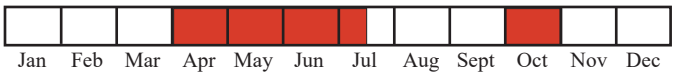


Best Survey Period



Status: State special concern

Global and state rank: G4 (Globally apparently secure) / S4 (State apparently secure)

Other common name: Butler's Gartersnake

Family: Colubridae

Synonyms: Previous synonyms/scientific names not currently in use include *Tropidonotus ordinatus* var. *butleri* (Boulenger, 1893), *Eutaenia butlerii* (Cope, 1990), and *Thamnophis radix butleri* (Wright and Wright 1957).

Total Range: The range of the Butler's garter snake extends from the eastern Lower Peninsula of Michigan and extreme southwestern edge of Ontario south to central Indiana and Ohio, with isolated populations in southern Ontario and southeastern Wisconsin (Conant and Collins 1991).

State Distribution: The Butler's garter snake is found across much of the eastern Lower Peninsula. It is currently known from 19 counties, with museum specimens from 6 additional counties (MNFI 2025, UMMZ Reptiles & Amphibians Data Group 2025). Its known range includes most of southeastern Michigan and extends north along the Lake Huron shoreline as far as Presque Isle County and west inland to Barry County. Potential exists for this species to occur in additional counties with suitable habitat as systematic surveys for this species have not been conducted throughout the state.

Recognition: The Butler's garter snake is a small-bodied, stocky snake, with adults reaching 15-28.9 inches (38-73.7 cm) in length (Harding and Mifsud 2017). **The dorsal color is dark olive-brown to black, with three prominent light-colored stripes (one centered along the top/back and one along each side of the snake).** Toward the front of the body, the **lateral stripes are centered on the third scale row and adjacent sides of scale rows two and four**. The **dorsal stripe is yellow to cream-colored** and is sometimes lighter in color than the lateral stripes. The **lateral stripes are usually yellow** but may be orange and are sometimes more vibrant towards the head. The dark background between the dorsal and lateral stripes may have two rows of alternating black spots, creating a checkered pattern.

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The ventral (belly) color is light green to greenish yellow. The ventral scales can have small black spots on the ends and are frequently edged with a rich brown color that may extend to the first scale row. The anal plate is undivided. The **scales are keeled (i.e., has a raised ridge on each scale)** and are typically in 19 rows but can be between 17 and 21 (Conant 1951, Ernst & Ernst 2003). Butler's garter snakes have a **small, blunt, bullet-shaped head**. The presence of parietal spots on the top of the head is sometimes noted as a good field mark for identification, but these spots can be present in both common garter snakes (*Thamnophis sirtalis* subsp.) and eastern ribbon snakes (*Thamnophis saurita* subsp.). The chin, throat, and labial scales along the mouth are yellow. There are typically 6-7 supralabials (scales along the upper lip) that may be slightly brown or orange (Ernst & Ernst 2003). Butler's garter snakes move very clumsily when excited, having very exaggerated side-to-side movements while moving forward little (Reddick 1895). When moving slowly, this clumsy locomotion is not apparent.

The eastern garter snake (*Thamnophis sirtalis sirtalis*) and northern ribbon snake (*Thamnophis saurita septentrionalis*) look very similar to Butler's garter snakes. Both have larger heads and grow to larger sizes than Butler's garter snakes. Eastern garter snakes have highly variable coloration and lateral stripes on scale rows two and three. Northern ribbon snakes have a distinctive white chin and spot in front of the eye, and their lateral stripes are on scale rows three and four. Ribbon snakes often have a similar rich brown-orange gradient below the lateral stripes, but the other field marks differentiate it well. Both species do not exhibit the awkward locomotion of Butler's garter snakes (Ruthven 1908).

Best survey time/phenology: The best survey methods for these snakes are visual surveys and coverboard/artificial cover surveys (Graeter et al. 2013). Although Butler's garter snakes can be observed anytime during the active season, visual surveys are best conducted in April or early May when these snakes are at their highest abundance emerging from their hibernacula (Conant 1951, Carpenter 1952a, Catling and Freedman 1980b). October can also be suitable for visual surveys when Butler's garter snakes move back to their hibernacula. Coverboard or artificial cover surveys, which consist of placing and checking coverboards (e.g., plywood, tin) in the field, are best conducted between early-May and mid-July in the evening on warm sunny days (Wisconsin Department of Natural Resources 2014). Butler's garter snakes are typically most active in the morning and early evening but are more active during midday in colder months and become crepuscular, or potentially even nocturnal, in midsummer (Catling and Freedman 1980a, Ernst and Ernst 2003, Harding and Mifsud 2017).

Habitat: Butler's garter snakes use a variety of open or semi-open canopy, wet, grassy habitats near lakes, ponds, streams, ditches, seasonal wetlands, emergent marshes, and swamps (Ruthven 1908, Conant 1951, Carpenter 1952a, Ernst and Ernst 2003, Holman 2012, Harding and Mifsud 2017, Shonfield et al. 2019). They also use adjacent open or semi-open canopy upland habitats. Suitable habitats include wet meadows, mesic prairies, shrub carrs, pastures, savannahs, fields, and other grassy edges (Ruthven 1908, Conant 1951, Carpenter 1952a, Ernst and Ernst 2003, Holman 2012, Harding and Mifsud 2017, Shonfield et al. 2019). Natural communities in which they may be associated include coastal fen, dry sand prairie, dry-mesic prairie, emergent marsh, floodplain forest, Great Lakes marsh, interdunal wetland, lakeplain oak openings, lakeplain wet prairie, lakeplain wet-mesic prairie, mesic sand prairie, northern fen, northern wet meadow, oak barrens, oak openings, prairie fen, rich tamarack swamp, southern shrub-carr, southern wet meadow, wet prairie, and wet-mesic prairie (MNFI 2025). Dense herbaceous cover and abundant thatch are important components of Butler's garter snake habitat (Carpenter 1952a, COSEWIC 2010). They also can be found in urban areas like parks, vacant lots, and abandoned industrial lands (Minton 1972, COSEWIC 2010). They avoid habitats with abundant canopy cover, such as deciduous forests, but have been found to use savan-

nahs and shrub-carr with up to 35% canopy cover (Carpenter 1952a, Shonfield et al. 2019). Butler's garter snakes have been found to avoid reed canary grass, as it can shade out basking sites and alter the habitat microclimate (Kapfer et al. 2013a).

Ecology: Butler's garter snakes typically are active from March or early April until October or November, although they have been observed earlier and later in the year (Ernst and Ernst 2003, Harding and Mifsud 2017). This species is frequently found under rocks, woody debris, or other cover objects (Ruthven 1908, COSEWIC 2010, Harding and Mifsud 2017). They have also been observed climbing into shrubs to thermoregulate and cool off on hot days (Carpenter 1956). Butler's garter snakes are rarely found more than 91 m (300 ft) from a wetland edge (Joppa and Temple 2005). Neonates and juveniles tend to stay the closest to the edge of wetlands, with males, nongravid females and gravid females increasing in average distances respectively (Joppa and Temple 2005).

Butler's garter snakes typically have exhibited limited movements and high site fidelity (Carpenter 1952a, COSEWIC 2010). A study in Ontario found that this species did not make large scale movements (>50 m [164 ft]) from spring habitat, though some individuals were recorded moving as much as 517 m (1696 ft) in 70 days (Freedman and Catling 1979). Home ranges have been reported to average around 0.8 ha (2 ac) in southern Michigan and 1.6 ha (4 ac) in southern Ontario (Carpenter 1952a, AMEC 2013, Shonfield et al. 2019). Daily movements averaged around 14 m (45 ft), with a peak in movement occurring in late summer (e.g., to and from birthing sites and hibernacula) (AMEC 2013, Shonfield et al. 2019). During mark-recapture studies in southern Ontario, Butler's garter snakes were frequently recaptured within 50 m (164 ft) of their original capture location and often under the same coverboard (AMEC 2013, 2014). These studies also found that maximum distances moved in an active season ranged from 150-380 m (492-1,247 ft), and movements across roads were rare (AMEC 2012, 2013, 2014).

Butler's garter snakes are annelid specialists, feeding almost exclusively on earthworms and leeches, although there are rare reports of spring peepers (*Pseudacris crucifer*) and western chorus frogs (*Pseudacris triseriata*) being found in stomach contents (Ruthven 1911, Conant 1951, Carpenter 1952a, Test 1958, Catling and Freedman 1980a). In captivity, they have been observed burrowing into worm holes to capture worms (Catling and Freedman 1980a). In captivity, Butler's garter snakes also have eaten American toads (*Anaxyrus americanus*), northern leopard frogs (*Lithobates pipiens*), red-backed salamanders (*Plethodon cinereus*), and small minnows (Conant 1951, Carpenter 1952a). They are likely predated by birds, mammals, and other snakes (Harding and Mifsud 2017). Butler's garter snakes are mild-tempered snakes that do not frequently bite when handled (Conant 1951, Schmidt and Davis 1941). When threatened, they frequently move away and wave their tail, coiling less often, and striking rarely, but will readily musk when handled (Herzog et al. 1989, Bowers et al. 1993).

Breeding occurs immediately following emergence in early March and April in the form of congregations of males around a female, often referred to as "breeding balls" (Ruthven 1912, Finneran 1949). Males follow females via pheromone trails (Ford 1982). Males reduce the chances of multiple paternity in a clutch by utilizing copulatory plugs which inhibit other males from mating. Males also appear to show no interest in females that have been mated with, likely via a chemical signal from the female (Devine 1977). Gestating females have been found in savannahs, swamps, meadows, and thickets, selecting moist parturition (birthing) sites with shallow clay layers (Shonfield et al. 2019). Gestation takes around 144 days and snakes typically give birth to live young between July and September (Ruthven 1928, Conant 1951). Litter sizes usually range between 4 and 15 young that are 5-7 inches (12.7-17.8 cm) long. (Ruthven 1912, Ruthven 1928, Conant 1951). Neonates grow rapidly before reaching sexual maturity after about 2 years (Carpenter 1952b).

Butler's garter snakes typically hibernate individually underground during late fall and winter (i.e., October/November-February/March; Conant 1951, Wright and Wright 1957). Suitable hibernacula or overwintering sites must provide access to underground refugia where snakes will not freeze or desiccate during the winter (WDNR 2014). Butler's garter snakes have been documented overwintering in animal burrows (i.e., typically crayfish or small mammals/rodents), tree root networks/channels, ant mounds, woodpiles, and creek drains (Carpenter 1953, WDNR 2014, Shonfield et al. 2019). Hibernacula or overwintering areas are usually located in wetland habitats or open water (e.g., drainage ditches) (WDNR 2014, Ministry of the Environment, Conservation and Parks 2019). Anthropogenic structures, such as old building foundations, improperly capped landfills and dumps, and sink holes, also may provide suitable hibernacula (Freedman and Catling 1978, WDNR 2014).

Conservation/management: Butler's garter snakes are the most cryptic of the Michigan garter snakes, making it difficult to know their status without targeted surveys. The major threats to this species are habitat loss, degradation, and fragmentation (COSEWIC 2010, Wisconsin Department of Natural Resources 2014). Urbanization, agriculture, and development have resulted in declines in habitat quantity and quality (COSEWIC 2010). As Butler's garter snakes prefer grassy habitat with relatively little canopy cover, wildfire suppression, hydrological alterations, vegetative succession, and invasive plants also have contributed to habitat loss and degradation (COSEWIC 2010, Kapfer et al. 2013a, Shonfield et al. 2019). Road mortality has been documented in a systematic road mortality survey in Ontario (Choquette and Valliant 2016), and another survey suggested road avoidance behavior (Freedman and Catling 1979). Either scenario may lead to population declines due to direct mortality or reduced gene flow, respectively. The widespread use of pesticides throughout its range is an additional likely reason for the species' decline, as earthworms have been found to be very susceptible to a wide variety of herbicides and insecticides (Miglani and Bisht 2019). Additional threats include persecution, poaching, erosion control netting, snake fungal disease, and predation (COSEWIC 2010, Kapfer and Paloski 2011).

In eastern Michigan and Ontario, Butler's garter snakes were found to have a lower genetic diversity, higher genetic differentiation, and lower allelic richness than eastern garter snakes, suggesting little gene flow between genetic populations (Snetsinger 2022). Lower gene flow may be normal for cryptic species but can be detrimental during stochastic events or a changing environment (Snetsinger 2022). Butler's garter snakes also hybridize with plains garter snakes and eastern garter snakes, but this occurs rarely and is not believed to be a threat to the species or a product of artificial disturbance (Fitzpatrick et al. 2008, Placyk et al. 2012, Kapfer et al. 2013b).

Protecting extant populations and maintaining sufficient suitable habitat within occupied sites are critical for conservation of Butler's garter snakes. Maintaining, restoring, and/or expanding open canopy or early successional wetland and adjacent upland habitats (primarily within 91 m (300 ft) of suitable wetlands), particularly in areas that are used for overwintering, gestation, and/or giving birth to young, are essential for supporting populations of this species. Conducting habitat management activities (e.g., prescribed fire, woody shrub removal) during the species' inactive season (November-March), leaving some refugia within occupied sites, especially if management occurs during the species' active season, and implementing other best management practices (e.g., setting mower blades a minimum of 20 cm [8 in] off the ground, working during weather conditions when snakes would likely be less active, under cover, or below ground [e.g., sunny and above 27°C (80°F), overcast and below 10°C (50°F)]) would avoid or reduce the potential for adverse impacts on this species (WDNR 2014). Increasing dispersal corridors between occupied sites within and between extant populations would help facilitate connectivity and dispersal, maintain or increase gene flow and

genetic diversity, and support population resiliency. Avoiding construction of new roads that would bisect or fragment habitat, closing or reducing traffic on existing roads that fragment habitat and cause snake mortality, and installing barrier fencing along the road or an ecopassage that would allow snakes to safely cross under a road would reduce snake mortality and facilitate connectivity between habitats. Preventing or controlling invasive species in occupied habitats would reduce the potential for adverse impacts on Butler's garter snakes (e.g., altering availability of basking sites, birthing areas, and/or crayfish burrows for overwintering). Minimizing the use of pesticides, herbicides, and other chemicals within and adjacent to occupied habitats would help maintain sufficient densities of prey (e.g., earthworms) and reduce potential adverse impacts on populations of this species. To avoid or minimize the spread of disease (e.g., snake fungal disease), identifying affected populations and decontaminating footwear and equipment/supplies between sites are imperative.

Research needs: Systematic, statewide surveys are needed to assess and determine the species' current status and distribution in the state. Long-term studies are needed to identify robust populations and monitor population sizes and trends throughout Michigan. More information is needed about the required habitat for a stable population, including the specifics of gestation and parturition habitat. The impact of prescribed burns and other management techniques should also be researched. Testing to assess the presence, prevalence, and impact of snake fungal disease on populations of this species also is warranted.

Related abstracts: eastern massasauga, Kirtland's snake, eastern fox snake, smooth green snake, spotted turtle, Blanding's turtle, eastern box turtle, coastal fen, dry sand prairie, dry-mesic prairie, emergent marsh, floodplain forest, Great Lakes marsh, interdunal wetland, lakeplain oak openings, lakeplain wet prairie, lakeplain wet-mesic prairie, mesic sand prairie, northern fen, northern wet meadow, oak barrens, oak openings, prairie fen, rich tamarack swamp, southern shrub-carr, southern wet meadow, wet prairie, wet-mesic prairie

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