

Slender Glass Lizard (*Ophisaurus attenuatus*) Species Guidance

Family: Anguillidae - the slowworms, glass lizards, and alligator lizards

State Status: [Endangered](#) (1979)

State Rank: [S1](#)

Federal Status: [None](#)

Global Rank: [G5](#)

Wildlife Action Plan: [Species of Greatest Conservation Need](#)



Counties with documented locations of slender glass lizards in Wisconsin. Source: Natural Heritage Inventory Database, September 2012.



Visit the [rare species pages](#) for county map, rank and legal protection status updates.

Species Information

Photo by A.B. Sheldon

General Description: The slender glass lizard is a legless lizard with a long slender body and tail, and it grows to an average of 75 cm (29.5 in) long (snout-to-vent length) by its fifth year (Pleyte 1975). The tail is roughly 2/3 of the lizard's total length. The general body color may be brown, bronze, tan, or pale yellow, with a dark brown band running down the middle of the back, a wide dark brown band above the lateral groove on either side of the body, and two narrow bands on each side of the body located under the lateral groove. All of these dark-colored bands extend onto the tail. An original tail has the same coloration as the body, but regenerated tails are solid brown or gray. The stomach scales are typically light yellow and lack patterning. The head may have dark speckles on it; this feature is usually indicative of an older male, but some older females may possess this characteristic as well (Fitch 1989).

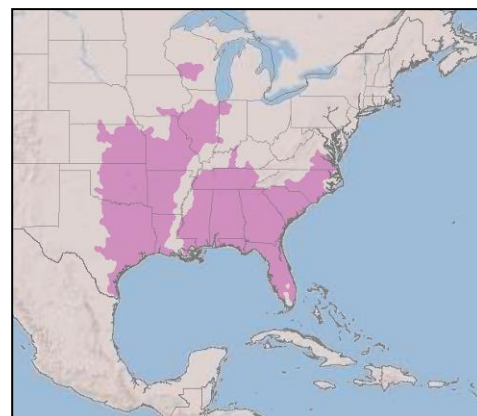
Similar Species: Slender glass lizards are often mistaken for snakes but can be easily distinguished by their external ear openings, moveable eyelids, stiff bodies, and long lateral grooves. No other legless lizard species is native to Wisconsin.

Associated Species: Glass lizards may be found in association with other species that prefer open, sandy habitats. Reptile species that can co-occur with glass lizards in Wisconsin include, but are not limited to, the North American racer (*Coluber constrictor*), six-lined racerunner (*Aspidoscelis sexlineata*), ornate box turtle (*Terrapene ornata*), and eastern hog-nosed snake (*Heterodon platirhinos*).

State Distribution and Abundance: Glass lizards may have been historically abundant in the open prairies and barrens of Wisconsin, but their range has likely declined substantially since the time of European settlement due to loss of habitat. They are rare in the state and have only been reported from Adams, Columbia, Dane, Green Lake, Jackson, Juneau, La Crosse, Marquette, Monroe, Sauk, Waushara, and Wood counties. Distribution information for this species may not reflect its full extent in Wisconsin because many areas of the state have not been thoroughly surveyed.

Global Distribution and Abundance: Slender glass lizards range from southern Wisconsin and northern Indiana south into eastern Texas and western Louisiana, and west to southeastern Nebraska and eastern Colorado (Conant and Collins 1998). Wisconsin populations are isolated from populations further south (Vogt 1981).

Diet: Slender glass lizards are strictly carnivorous and prefer insects, other invertebrates, and occasionally vertebrates such as young mice and ground-nesting bird eggs (Pleyte 1975, Vogt 1981). Glass lizards hunt primarily by smell and use an olfactory structure called a Jacobson's organ to locate prey and a sit-and-wait ambush strategy (Fitch 1989).



Global range map for the slender glass lizard. (NatureServe 2013)

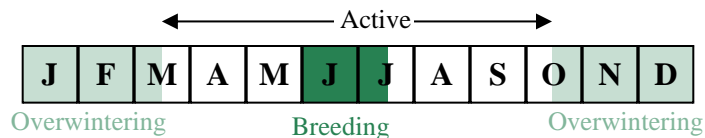
Reproductive Cycle: Slender glass lizards emerge from overwintering in late March or April. Male lizards actively search for females during the breeding season, which typically occurs from May through early July (Harding 1997). Both sexes reach sexual maturity at two years, but little is known about their breeding habits (Trauth 1984, Fitch 1989). Females lay 7-16 eggs (Trauth 1984, Behler and King 2004) in June or July (Harding 1997). Females are occasionally found near their eggs (an unusual behavior among reptiles), but they do not appear to provide heat or protection. Instead, females may remain nearby to rotate the eggs to discourage fungal growth or to position them in more favorable environmental conditions (Fitch 1989). Most hatchlings emerge in August after a 50-60 day incubation period (Harding 1997).

Ecology: Slender glass lizards spend most of their time underground in burrows. They occupy several different burrows within an area to avoid predators and inhospitable weather; females may also use burrows to lay eggs. Peak surface activity for this species occurs when air temperatures reach 20-26° C (69-79° F) in the spring and fall (Pleyte 1975, Trauth 1984, Fitch 1989). Glass lizards regulate their body temperature by absorbing heat from solar radiation (i.e., basking) or conduction (i.e., warm substrate). This species does not usually bask in full sun, and prefers instead to receive sunlight filtered through tall grass or other vegetation.

The home range of each individual lizard depends on its sex and age. Females do not travel as far as males, and young lizards do not travel as far as adults. Fitch (1989) estimated that in Kansas adult male lizards occupy a home range of approximately 1.1 acres (0.44 ha) and juveniles occupy a home range of approximately 0.4 acres (0.14 ha). In Wisconsin, Pleyte (1975) estimated an adult home range of 0.2 acres (0.07 ha) and 0.4 acres (0.15 ha) in two separate years.

Slender glass lizards propel themselves in a serpentine fashion by pushing their bodies laterally against vegetation; they cannot move forward using only their belly scales like snakes. This method of locomotion is particularly problematic on paved roads, where glass lizards are ill-equipped to cross quickly and avoid vehicle mortality or predators (Pleyte 1975, WDNR 1991).

Predators of slender glass lizards include hawks, raccoons, skunks, foxes, and snakes (Harding 1997). The vernacular name of “glass lizard” arises from the species’ ability to detach their tails in the event of a physical attack by a predator (Fitch 1989). The shed tail squirms vigorously to distract the potential predator while the lizard escapes. This type of defense is called caudal autotomy. Because of this defense behavior, caution is advised when handling this species, as even without touching the tail during stress situations may cause the lizard to detach it (Fitch 1989, Conant and Collins 1998). The loss of the tail is disadvantageous to the lizard because it impedes locomotion, and because fat reserves held in the tail are also lost. These reserves are necessary for surviving overwintering and reproduction (Pleyte 1975, Fitch 1989). In preparation for overwintering, this species begins spending more time underground by mid- to late-September (Pleyte 1975). The slender glass lizard has a maximum active period of March 15 – October 15 in Wisconsin.



Natural Community Associations (WDNR 2005, WDNR 2009):

Significant: dry prairie, dry-mesic prairie, oak barrens, pine barrens, sand prairie

Moderate: oak opening

Minimal: none

Habitat: Slender glass lizards inhabit savannas, pine/oak barrens, open woodlands and prairies with tall grasses and sandy or well drained soils (Vogt 1981, Fitch 1989, Harding 1997). Research by Pleyte (1975) in Wisconsin revealed that this species also selects non-routinely maintained roadside grass. He suggests this preference may help offset the fact that their preferred natural habitat, oak savanna, has been drastically reduced in Wisconsin. Glass lizards also occur along the edges of oak woodlands adjacent to tall grasses, and in short-grass sand prairies that possess areas of taller grasses. Pine plantations may provide habitat if suitable ground cover exists. Sandy soil is an important component of this species’ habitat needs as it is necessary to create burrows for refuges, egg-laying and overwintering.

Threats: The slender glass lizard was listed as endangered in Wisconsin in 1979 due to rarity in the state and habitat loss. Historic habitat loss likely resulted from conversion of prairies to agriculture (row crop and pasture) and barrens to pine plantations. Habitat fragmentation from development and habitat degradation from vegetative succession (prairies becoming overgrown with woody plant species) remain significant concerns. Mowing of suitable habitat further degrades or eliminates habitat and can result in the direct take (mortality) of lizards. Proliferation of invasive plant species, such as spotted knapweed (*Centaurea stoebe*), in glass lizard habitat may also negatively influence the vegetation structure and populations of invertebrates that this species preys upon (WDNR 2005).



Examples of slender glass lizard habitats in Wisconsin. Left photo, Heather Kaarakka, Wisconsin DNR, center and right photos, Rori Paloski, Wisconsin DNR

Climate Change Impacts: The effects of climate change are unclear for the glass lizard. An increased growing season (WICCI 2011) would necessitate a larger demand for grazing, and ground water usage for irrigation, greatly affecting the central sands region of Wisconsin. However, increased fragmentation might create more roadside habitat niches to help offset potential habitat loss. Shorter projected winters (WICCI 2011) may provide a larger and more versatile food source for the glass lizard.

Survey Guidelines: Persons handling slender glass lizards must possess a valid [Endangered and Threatened Species Permit](#). If surveys are being conducted for regulatory purposes, survey protocols and surveyor qualifications must first be approved by the Endangered Resources Review Program (see *Contact Information*). Fitch (1989) reports that glass lizards can be surveyed with wire funnel traps used for snakes, suggesting that cover boards might also be productive; although these methods were only moderately effective and produced skewed capture rates among sexes. Pleyte (1975) primarily used visual searches for glass lizards in Wisconsin with success, and this method appears more effective than traps or cover boards.

In Wisconsin, glass lizards spend the majority of their time underground. Pleyte (1975) found that even during times of peak activity, only a small percentage of the population was active at the surface. These periods of activity vary by season: aboveground activity spikes in late May and early June and again from late July to early September. Due to the longer duration of the summer activity peak and a pulse in the population due to hatching of the young, visual surveys to confirm the presence of this species should be conducted in spring (late May and early June) or late summer (late July to early September). Glass lizards are found predominantly at the surface when the air temperature is between 68° F and 78° F (20.0-25.6° F). In early spring, immediately after emergence lizards may be active mid-day, however warm daytime temperatures in summer often limit activity to the late afternoon and evening hours, and most animals are found aboveground in the narrow window from 5:00 or 6:00 pm until sunset. The species is also aboveground in large numbers on cool (68-75° F), sunny days in late May through early June and late July through early September (there is typically a peak in activity for an hour or two immediately after the dew evaporates). Thus, survey efforts should occur in spring (late May and early June) or late summer (late July to early September) when the air temperature is between 68° F and 78° F (either in the evening hours or during mid-day on cool, sunny days).

Concentrate all visual searches in highly and/or moderately suitable habitat. Microhabitats such as small patches of brome grass and/or grassy areas in close proximity to cover in the form of brush piles, downed trees, and woodland edges (particularly along roadsides) are generally productive places in which to search for glass lizards. Glass lizards are very wary and rarely stray far from a burrow, brush pile, or dense vegetation in which to seek cover. Surveyors should look for moving grass or subtle thrashing sounds in the vegetation to assist in locating lizards. Cover the selected site for a survey in a systematic fashion to ensure the maximum area of suitable habitat is searched during acceptable environmental conditions. Several surveyors should walk abreast, approximately five-feet apart, and focus on the ground from one to 10 feet in front of their feet to ensure adequate visual coverage of an area. The number of “person hours” spent on-site during visual surveys should typically be at least 20 person hours spread over 4 survey periods (these estimates will vary depending on the size of a site), with no more than two survey periods per week. Handle captured glass lizards gently and release them as quickly as possible, as this species will break its tail off to distract predators or under extreme stress (Pleyte 1975). It is very important to note that no survey method is considered 100% effective for determining presence/absence of this very secretive and fossorial species.

Summarize results, including survey dates, times, weather conditions, number of detections, detection locations, and behavioral data and submit via the Wisconsin DNR rare animal field report form: <https://wiatri.net/nhi/>.

Management Guidelines

The following guidelines describe actions that will help maintain or enhance habitat for the species. These actions are not mandatory unless required by a permit, authorization or approval.

Glass lizard ecology is difficult to study and poorly understood, but management or restoration of suitable habitat for this species is clearly important to its preservation (i.e., tall-grass prairie habitat maintenance and suppression of excessive vegetative succession or tree plantings).

Transmission or pipeline right-of-ways (ROWs) may represent some of the only suitable habitat remaining in areas where woody plant species succession has otherwise gone unchecked. Pleyte (1975) actually found glass lizards most frequently in grassy roadside buffers (more frequently even than in oak savanna habitat). Roadside maintenance and transmission or pipeline ROW maintenance within the known range of this species must be planned and conducted carefully to avoid impacts. Maintenance of roadways and ROWs through occasional mowing or mechanical brush removal may be beneficial to glass lizards, but over-intensive mowing regimes have the same effect on habitat structure as over-grazing, and the intensity and timing of these activities should be considered carefully. For example, in only one year, Blair (1961) observed a substantial decline in the number of glass lizards observed in a study site in Oklahoma after tall grasses were mowed. Fitch (1989) notes that the slender glass lizard does not seem well equipped to avoid the direct or indirect effects of burning. He reports that even if individuals survive grass fires by escaping into burrows, the subsequent lack of post-burn vegetation exposes them to potential predators. Therefore, mowing of any vegetation (roadside or otherwise), burning, or other management in areas with slender glass lizards must follow the [Grassland and Savanna Protocols](#) (WDNR 2011). Hand removal of woody vegetation without the use of heavy machinery can be conducted without seasonal restrictions.

Fitch (1989) reported that slender glass lizards reached maximum densities 18 years after grazing had ceased at a long-term monitoring site in Kansas (although they later declined as woody plant species became abundant over time). Intense grazing by cattle creates short-grass habitats, and therefore agricultural activities, particularly grazing, should not occur in or immediately adjacent to glass lizard habitat.

Roadways should also be designed so that they are not immediately adjacent to or bisecting glass lizard habitat. This approach will reduce likelihood of road mortality, population fragmentation, gene flow interruption, and the input of potentially toxic substances associated with runoff from vehicular traffic (i.e., road salt and oil). Wildlife underpasses designed to facilitate movement of small snake species have been successfully installed in Wisconsin for other reptile species and may be useful for glass lizards.

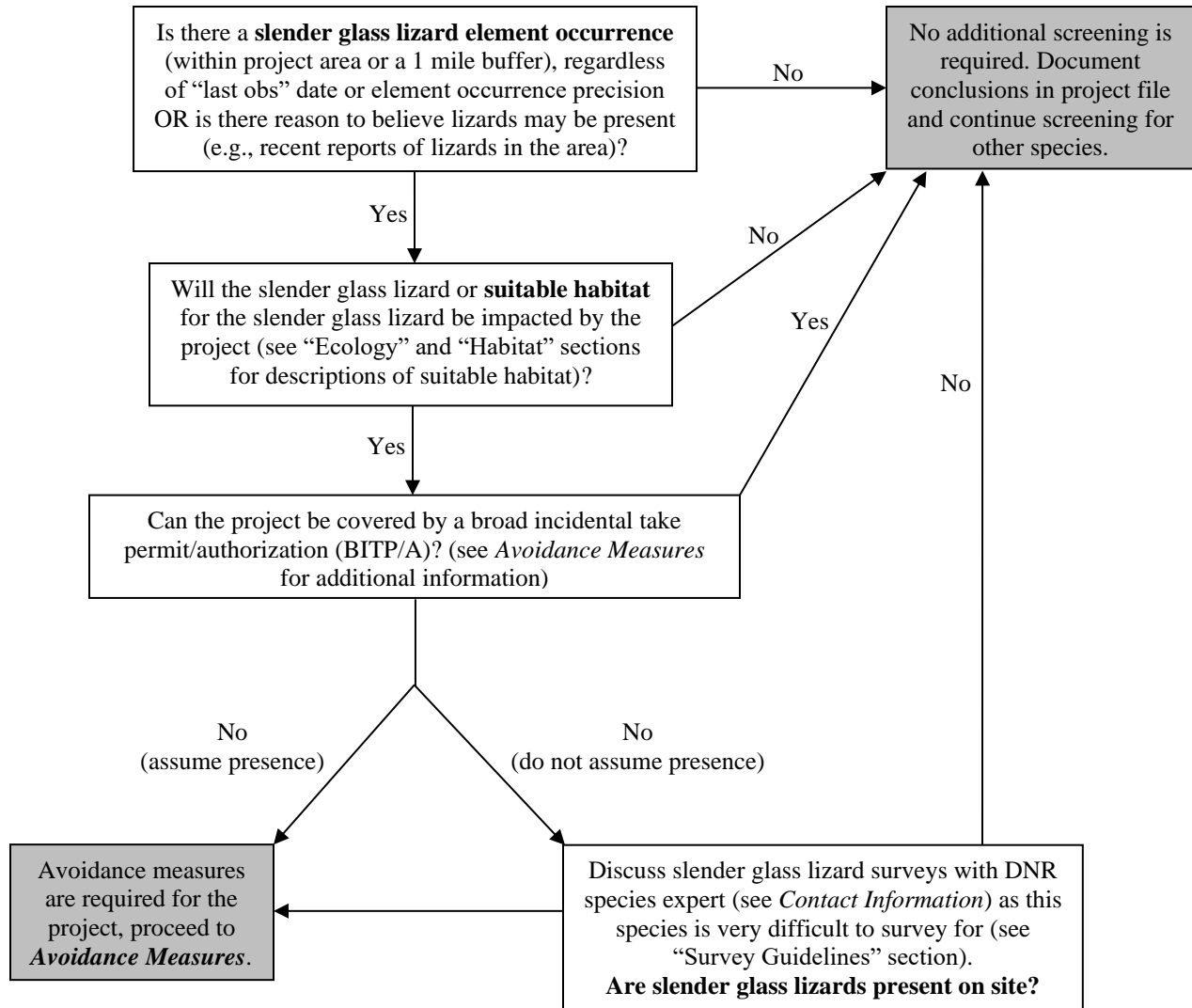
Control of invasive plant species in prairies may also be important to the persistence of glass lizards in the state, although further research on this topic is necessary. Apply pesticides and herbicide with care. Blair (1961) suggested that the mowing of tall grasses, which led to a decline in glass lizards, was the result of depleted food (i.e., invertebrates) abundances for this species.

Plastic netting without independent movement of strands can easily entrap slender glass lizards and other wildlife moving through the area, leading to dehydration, desiccation, and eventually mortality (Kapfer and Paloski 2011). Netting that contains biodegradable thread with the “leno” or “gauze” weave (contains strands that are able to move independently) has the least impact on wildlife. If erosion matting (also known as an erosion control blanket, erosion mat or erosion mesh netting) is used, the following matting (or something similar) should be used: North American Green S75BN, S150BN, SC150BN or C125BN.

Screening Procedures

The following procedures must be followed by DNR staff reviewing proposed projects for potential impacts to the species.

Follow the “Conducting Endangered Resources Reviews: A Step-by-Step Guide for Wisconsin DNR Staff” document (summarized below) to determine if slender glass lizards will be impacted by a project (WDNR 2012):



Avoidance Measures

The following measures are specific actions typically required by DNR to avoid take (mortality) of state endangered or threatened species per Wisconsin’s Endangered Species Law (s. 29.604, Wis. Stats.). These guidelines are typically not mandatory for non-listed species (e.g., special concern species) unless required by a permit, authorization or approval.

According to Wisconsin’s Endangered Species Law (s. 29.604, Wis. Stats.), it is illegal to take, transport, possess, process, or sell any wild animal on the Wisconsin Endangered and Threatened Species List (ch. NR 27, Wis. Admin. Code). Take of an animal is defined as shooting, shooting at, pursuing, hunting, catching or killing.

If *Screening Procedures* above indicate that avoidance measures are required for a project, follow the measures below. If you have not yet read through *Screening Procedures*, please review them first to determine if avoidance measures are necessary for the project.

1. The simplest and preferred method to avoid take of slender glass lizards is to avoid directly impacting individuals, known slender glass lizard locations, or areas of suitable habitat (described above in the “Ecology” and “Habitat” sections and in *Screening Procedures*).

2. If suitable habitat cannot be avoided, the following time of year restrictions can be used to avoid take:
 - For above-ground activities (e.g., tree cutting) that do not disturb the soil, conduct work during the species' inactive period (typically October 16 – March 14).
3. If impacts cannot be avoided but the No/Low Impact Broad Incidental Take Permit/Authorization (BITP/A; <https://dnr.wi.gov/topic/ERReview/ITNoLowImpact.html>) can be followed, the project is covered for any unintentional take that may occur.
4. If impacts cannot be avoided during restoration or management activities, but the Grassland and Savanna Protocols can be followed (<https://dnr.wi.gov/topic/ERReview/ItGrasslands.html>), the project is covered for any unintentional take that may occur.
5. If impacts cannot be avoided but the Common Activities Broad Incidental Take Permit/Authorization (BITP/A; <https://dnr.wi.gov/topic/ERReview/ITCommonActivities.html>) can be followed, the project is covered for any unintentional take that may occur.
6. If slender glass lizard impacts cannot be avoided or covered by the No/Low Impact BITP/A, Grassland and Savanna Protocols, or Common Activities BITP/A, please contact the Natural Heritage Conservation Incidental Take Coordinator (see *Contact Information*) to discuss possible project-specific avoidance measures. If take cannot be avoided, an [Incidental Take Permit or Authorization](#) is necessary.

Additional Information

References

- Andrews, K.M., J.W. Gibbons, and D.M. Jochimsen. 2008. Ecological effects of roads on amphibians and reptiles: a literature review. In: J.C. Mitchell, R.E. Jung Brown, and B. Bartholomew (Eds.). *Urban Herpetology*. Society of the Study of Amphibians and Reptiles. *Herpetological Conservation* No. 3: 121-143.
- Behler, J.L., and F.W. King. 2004. *National Audubon Society Field Guide to Reptiles and Amphibians*. Chanticleer Press, Inc., New York, New York.
- Blair, A.P. 1961. Notes on *Ophisaurus attenuatus attenuatus* (Anguidae). *The Southwestern Naturalist*. 6:201.
- Conant, R., and J.T. Collins. 1998. *A Field Guide to Reptiles and Amphibians of Eastern and Central North America*. Houghton Mifflin Co., New York, New York.
- Fitch, H.S. 1989. A field study of the slender glass lizard, *Ophisaurus attenuatus*, in northeastern Kansas. The University of Kansas, Lawrence, Kansas.
- Fitch, H.S. 2006. Collapse of a fauna: reptiles and turtles of the University of Kansas Natural History Reservation. *Journal of Kansas Herpetology* 17:10-13.
- Harding, J.H. 1997. *Amphibians and reptiles of the Great Lakes Region*. The University of Michigan Press. Ann Arbor, Michigan, USA.
- Kapfer, J.M. and R.A. Paloski. 2011. On the threat to snakes of mesh deployed for erosion control and wildlife exclusion. *Herpetological Conservation and Biology*. 6:1-9.
- NatureServe. 2013. Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy - Migratory Bird Program, Conservation International - CABS, World Wildlife Fund - US, and Environment Canada - WILDSPACE. Data were accessed Jan. 2013.
- Pleyte, T.A. 1975. The slender glass lizard (*Ophisaurus attenuatus*) in Waushara Co., Wisconsin. The University of Wisconsin-Milwaukee, Milwaukee, Wisconsin.
- Trauth, S.E. 1984. Seasonal incidence and reproduction in the western slender glass lizard, *Ophisaurus attenuatus attenuatus* (Reptilia, Anguidae), in Arkansas. *The Southwestern Naturalist* 29:271-275.
- Vogt, R.C. 1981. *Natural History of Amphibians and Reptiles of Wisconsin*. Milwaukee Public Museum, Milwaukee, Wisconsin.
- Wilgers, D.J., and E.A. Horne. 2006. Effects of different burn regimes on tallgrass prairie herpetofaunal species diversity and community composition in the Flint Hills, Kansas. *Journal of Herpetology* 40:73-84.

- WDNR [Wisconsin Department of Natural Resources]. 2005. Wisconsin's Strategy for Wildlife Species of Greatest Conservation Need: A State Wildlife Action Plan. Madison, Wisconsin, USA. <<https://dnr.wi.gov/topic/WildlifeHabitat/ActionPlan>>
- WDNR [Wisconsin Department of Natural Resources]. 2009. Wisconsin wildlife action plan species profile: Slender Glass Lizard. Madison, Wisconsin, USA. <material now available on the Natural Heritage Conservation species web page: <<https://dnr.wi.gov/topic/endangeredresources/biodiversity>>.>
- WDNR [Wisconsin Department of Natural Resources]. 2012. Conducting Endangered Resources Reviews: A Step-by-Step Guide for Wisconsin DNR Staff. Bureau of Endangered Resources. Wisconsin Department of Natural Resources, Madison, Wisconsin.
- WDNR [Wisconsin Department of Natural Resources]. 2013. Natural Heritage Inventory database. (accessed September 21, 2012).
- WICCI [Wisconsin Initiative on Climate Change Impacts]. Wisconsin's Changing Climate: Impacts and Adaptation. 2011. Nelson Institute for Environmental Studies, University of Wisconsin-Madison and the Wisconsin Department of Natural Resources, Madison, Wisconsin, USA. <<https://wicci.wisc.edu/2011-assessment-report/>>

Linked Websites

- Incidental Take Permit and Authorization: <<https://dnr.wi.gov/topic/erreview/take.html>>
- Natural Communities of Wisconsin: <<https://apps.dnr.wi.gov/biodiversity/Home/index/communities>>
- Rare Animal Field Report Form: <<https://wiatri.net/nhi/>>
- Wisconsin Endangered and Threatened Species: <<https://dnr.wi.gov/topic/EndangeredResources/ETList>>
- Wisconsin Initiative on Climate Change Impacts: <<https://wicci.wisc.edu/>>
- Wisconsin Natural Heritage Working List: <<https://dnr.wi.gov/topic/NHI/WList>>
- Wisconsin's Wildlife Action Plan: <<https://dnr.wi.gov/topic/WildlifeHabitat/ActionPlan>>

Funding

- USFWS State Wildlife Grants Program – <<https://www.fws.gov/program/state-wildlife-grants>>
- Sadie Nolan Amphibian and Reptile Education and Conservation Memorial Fund
- Wisconsin Natural Heritage Conservation Fund

Contact Information (Wisconsin DNR Species Expert for slender glass lizards)

- Refer to the Reptiles contact on the [Rare Species and Natural Community Expert List](#)

Contact Information

- *Endangered Resources Review Program*: WI Department of Natural Resources, Bureau of Natural Heritage Conservation (DNRRERreview@wisconsin.gov)
- *Incidental Take Coordinator*: <https://dnr.wi.gov/topic/erreview/contacts>, WI Department of Natural Resources, Bureau of Natural Heritage Conservation

Suggested Citation

- Wisconsin Department of Natural Resources. 2013. Wisconsin Slender Glass Lizard Species Guidance. Bureau of Natural Heritage Conservation, Wisconsin Department of Natural Resources, Madison, Wisconsin. PUB-ER-682.

Developed by

- Emma Pauly-Hubbard and Josh M. Kapfer, primary authors
- Gregor W. Schuurman and Rori A. Paloski, editors

Document history

- 2013 – Guidance published
- June 23, 2017 – Guidance revised
- October 31, 2023 – Rank and legal protection status updated and hyperlinks fixed

Wisconsin Department of Natural Resources
Bureau of Natural Heritage Conservation
PO Box 7921
Madison, WI 53707-7921
<https://dnr.wi.gov/>, keyword “ER”

