

Queensnake (*Regina septemvittata*) Species Guidance

Family: Colubridae

State Status: [Endangered](#) (1972)

State Rank: [S1](#)

Federal Status: [None](#)

Global Rank: [G5](#)

**Wildlife Action Plan
Mean Risk Score:** [4.3](#)

Wildlife Action Plan Area

Importance Score: [2](#)



Counties with documented locations of queensnakes in Wisconsin. Source: Natural Heritage Inventory Database, July 2012.



Photo by Ohio DNR

Species Information

General Description: Queensnakes are semi-aquatic, slender, moderate-sized snakes. They possess a head that is narrow, relative to the body. Body color is olive-gray or brown, with a light yellow or cream lateral stripe on dorsal scale rows one and two. Juveniles and occasionally adults have three light ventral stripes running from the head to tail, most prominent near the neck. The chin, throat, and belly are yellow with four brown stripes (two mid-ventral stripes are prominent) running lengthwise, merging or becoming indistinguishable near the tail. The queensnake has seven dark stripes in all, hence its scientific name *Regina* (queen) *septemvittata* (seven stripes). Coloration and patterns are generally more distinct in juvenile queensnakes, and fade with age (Vogt 1981). Adult total body length ranges from 38-61 cm (15-24 in). A queensnake possesses keeled scales, and the anal plate (or scale immediately anterior to the vent) is divided. Queensnakes have 19 dorsal scale rows at mid-body. Adult males have longer tails than females, but this difference is subtle.

Similar Species: Gartersnakes (*Thamnophis* spp.) are similar in size and somewhat similar in coloration, but lack the queensnake's striped belly and distinctive light-colored dorsal stripe. The northern watersnake (*Nerodia sipedon*) may be confused with the queensnake because it is also found in aquatic habitats, but differs from the queensnake in having distinctive blotches on the body, rather than stripes, and dark bands along the infralabial and supralabial scales (scales surrounding the mouth).

Associated Species: Aquatic crayfish are primary prey for queensnakes (Wood 1949). Predators include herons, hawks, raccoons, mice, other snakes, fish, amphibians (i.e., bullfrogs) and crayfish themselves which can clasp and drown young or overwintering queensnakes (Branson and Baker 1974, COSEWIC 2000, Ernst 2003, Gibbons and Dorcas 2004).

State Distribution and Abundance: Southeastern Wisconsin is the most northwest extent of the queensnake's continental range. The species has been recorded from Green, Jefferson, Milwaukee (considered extirpated), Ozaukee, Racine, Rock, Walworth, Washington and Waukesha counties, but many of these populations have been extirpated and the species' range has contracted. Queensnakes are still locally abundant in suitable habitat in extreme southeastern Wisconsin. Distribution information for this species may not reflect its full extent in Wisconsin because many areas of the state have not been thoroughly surveyed.

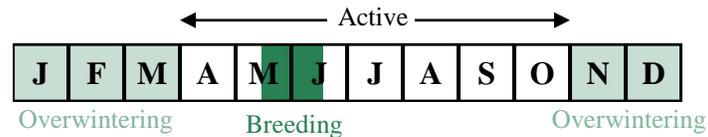
Global Distribution and Abundance: From southern Ontario and southwest New York south to the Gulf Coast's Florida-Alabama border and west to southeastern Wisconsin (Conant 1960, Harding 1997, Ernst 2003).

Diet: Diet consists largely (> 90%) of freshly molted crayfish (Branson and Baker 1974, Godley et al. 1984). Queensnakes are usually passive hunters, and wait under rocks where molted crayfish prefer to hide. Studies of stomach contents have shown queensnakes can also be opportunistic – they occasionally eat frogs, tadpoles, newts, minnows, snails, and fairy shrimp (Conant 1960, Branson and Baker 1974). Feeding behavior varies little between sites or time of year (Branson and Baker 1974).

Reproductive Cycle: Mating occurs from mid-May through mid-June, however Branson and Baker (1974) suggest a fall mating period as well. Females are ovoviviparous and "give birth" to 5-31 young (average 10-12) between late July and early September (Harding 1997). Newborn queensnakes average 2.4-4.2 g (0.08-0.15 oz), and have total body lengths of 172-265 mm (6.7-10.4 in; Branson and Baker 1974). Juvenile queensnakes are first to overwinter in the fall and last to emerge in the spring (Ernst 2003).

Newborns more than double in size during their first year, but growth slows after the second year (Branson and Baker 1974, Harding 1997). Most females are sexually mature at three years and males at two years.

Ecology: The queensnake is rare in this region, and information about its natural history in Wisconsin is scarce. Understanding of queensnake ecology, therefore, comes largely from research conducted elsewhere. Queensnakes may emerge from overwintering as early as April 1 and begin overwintering by the end of October, before freezing occurs. The queensnake’s daily activity is greatest at mid-morning and again from mid-afternoon to early evening (Branson and Baker 1974, Ernst 2003). This species is apparently inactive at night (Wood 1949, Harding 1997). The few studies that have examined movement patterns in the queensnake show that this species has a small home range and does not travel far from water. For example, Ernst (2003) found that queensnakes remained within 6 m of the water, while Branson and Baker (1974) report that most remained within 3 m of water.



Little is known about the queensnake’s mating habits, reproductive success rate, ability to colonize new sites and spatial ecology, and this lack of knowledge poses a significant barrier to the conservation of this species in Wisconsin. Longevity of wild snakes is unknown, but a report of a 19-year-old captive individual exists (Harding 1997).

Natural Community Associations (WDNR 2005, WDNR 2009):

Significant: [emergent aquatic \(emergent marsh\)](#), [shrub carr](#), [southern sedge meadow](#), [submergent aquatic \(submergent marsh\)](#), [warmwater rivers](#), [warmwater streams](#), [wet prairie](#)

Moderate: alder thicket, coolwater streams, impoundments/reservoirs, inland lakes

Minimal: none

Habitat: Queensnakes require small to medium-sized, clear, spring-fed streams that are permanent and relatively shallow (Vogt 1981). Queensnakes remain extremely close to the streams throughout the year, typically not venturing further than 6 m (20 ft) into the uplands. Ample crayfish (their preferred prey) is a defining characteristic of suitable habitat (Branson and Baker 1974, Ernst and Ernst 2003). Preferred streams typically have moderate to fast currents, and rocky substrates with somewhat wooded or brushy edges for basking (Branson and Baker 1974, Vogt 1981, Gibbons and Dorcas 2004). Branson and Baker (1974) report that the majority of individuals captured during their study (95.6%) were found resting under rocks. No peer-reviewed studies have examined queensnake habitat requirements in Wisconsin, but Wood (1949) identified conditions necessary for large queensnake populations in Ohio. Suitable conditions include perennial streams that are cool to warm (18.3° C [65.0° F] or greater) during most of the active season, with abundant cover (flat rocks partially in water) and crayfish. Queensnakes prefer streams, but they may also occur in marshes, drainage canals, and ditches near suitable streams (Conant 1960). Hibernacula are usually natural holes, cracks in dams, bridge abutments, the undersides of flat rocks, or possibly crayfish burrows that extend deeper than the frost line (Vogt 1981, Ernst and Ernst 2003). Most hibernacula are located within, or very close to, summer stream habitat. Queensnakes may congregate in suitable hibernacula for over-wintering, and are known to communally overwinter with other species such as the common watersnake (Branson and Baker 1974).



Photos (left to right): stream habitat suitable for queensnakes in Washington County (first and second photo) and suitable habitat in Walworth County. Rori Paloski, Wisconsin DNR.

A more comprehensive inventory of all suitable waterways is needed to better understand and protect extant queensnake populations in Wisconsin. Locating and protecting hibernacula is a priority because these important sites represent large seasonal concentrations of queensnakes.

Threats: The queensnake has been listed as Endangered in Wisconsin since 1972. The greatest threat to the queensnake’s persistence is habitat loss and degradation (Harding 1997, COSEWIC 2000), and it is particularly vulnerable to extirpation because of its

specialized habitat and diet requirements. Major sources of habitat loss and degradation include clearing of riparian vegetation, conversion of riparian corridors to agriculture, and urban development. Dams may disrupt stream flow and cause habitat loss (Conant 1960, COSEWIC 2000). Agricultural runoff and erosion, which causes siltation, as well as eutrophication, can destroy habitat for both queensnakes and their preferred prey (crayfish; see *Diet*; Harding 1997). Mercury accumulation threatens the queensnake indirectly by damaging crayfish populations (COSEWIC 2000). Invasive species may create unsuitable conditions for crayfish populations. Queensnakes, like other snake species, are also threatened by persecution from humans. Anglers may kill queensnakes because they incorrectly perceive the species as a direct competitor for game fish (Harding 1997).

Climate Change Impacts: The effects of climate change are unclear for the queensnake. A warmer climate may extend the queensnake range farther north in Wisconsin, but a drier climate may reduce the extent of suitable waterways. Anticipated changes in storm frequency and intensity (WICCI 2011), peak water levels, and other waterway characteristics may threaten the hibernacula of queensnakes and persistence of crayfish populations.

Survey Guidelines: Persons handling queensnakes 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*). Visual encounter surveys (either along predetermined transects or random searches timed to calculate level of effort) are effective for this species. Surveys should be concentrated along suitable shoreline habitat, and conducted during the morning on warm days, or afternoons on cool spring days from May 1 – September 30. Surveyors conducting visual searches should canvas as much area as possible, prodding vegetation where basking individuals may be concealed, watching for basking individuals in the branches of shrubs near the water’s surface, and flipping rocks for individuals in refugia (Branson and Baker 1974). A total of 20 person-hours, split between at least four survey sessions (no more than one survey session per week), must be spent conducting visual surveys. Visual searches in spring and fall should also be conducted at potential hibernacula to observe individuals entering or exiting winter refuges.

Summarize results, including survey dates, times, weather conditions, number of detections, detection locations, and behavioral data and submit via the WDNR online report: <<http://dnr.wi.gov>, keyword “rare animal field report form”>.

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.

Habitat management and/or restoration are likely critical components of queensnake conservation, but have been little-studied. Summer-habitat management efforts for the queensnake should focus on maintaining riparian area vegetation, stream substrate integrity, and water clarity. Efforts to reduce siltation and erosion, in the form of leaving riparian vegetation intact up to 25 m from stream banks, or installation of erosion control fencing, are likely important. Although woody vegetation (in the form of shrub branches overhanging the water) and debris provide important basking opportunities for this species (Ernst and Ernst 2003), removal or control of woody vegetation, so that canopy coverage remains < 50%, is important. Placement of ample large, flat rocks in streambeds and along riparian corridors during restoration projects may benefit this species, but rip rap is not recommended.

Agricultural activities should be buffered from riparian and stream habitat to lessen siltation, chemical and nutrient runoff, and livestock impacts. Urban development should also be buffered to minimize sedimentation in sensitive areas and reduce the likelihood of harassment. Buffer zones may be achieved by maintaining or restoring natural riparian vegetation to provide cover and mitigate stream quality impacts. This species likely requires relatively narrow buffers, given its tendency to remain close to stream banks. Installation of stream fences (Homyack et al. 2002) may also be a suitable management practice.

Roadways should be designed so that they are not immediately adjacent to or bisecting queensnake habitat. This design will reduce the 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). Installations of wildlife underpasses designed to facilitate movement of small snake species have been successfully completed in Wisconsin. However, their efficacy as a means of reducing road mortality and maintaining linkages between habitat patches has not been extensively studied for snakes. Bridges that span suitable queensnake stream habitat must be designed to facilitate snake migration. Such bridges should possess underpasses that are wide enough to accommodate not only water flow, but also streambanks and vegetation (as opposed to the installation of culverts).

Known or potential hibernacula should be identified, monitored, and protected. Protecting potential hibernacula includes avoiding repairs or alterations to existing rocks, holes in dams, bridge abutments, etc. Existing bridge abutments that are known hibernacula should not be destroyed when a new bridge is installed, instead a longer, higher bridge should be installed to span the existing abutments (i.e., hibernacula). Public access at known or potential hibernacula should be kept at a minimum to avoid disturbance in these areas. Creation of hibernacula at stream restoration sites within the known range of this species may be useful, although the best methods for creating this type of artificial hibernacula have not been rigorously analyzed.

Management for native aquatic crayfish is an important component of queensnake conservation. Streams used, or potentially used, by queensnakes should be maintained or restored to natural pH levels and siltation should be minimized, as these are important

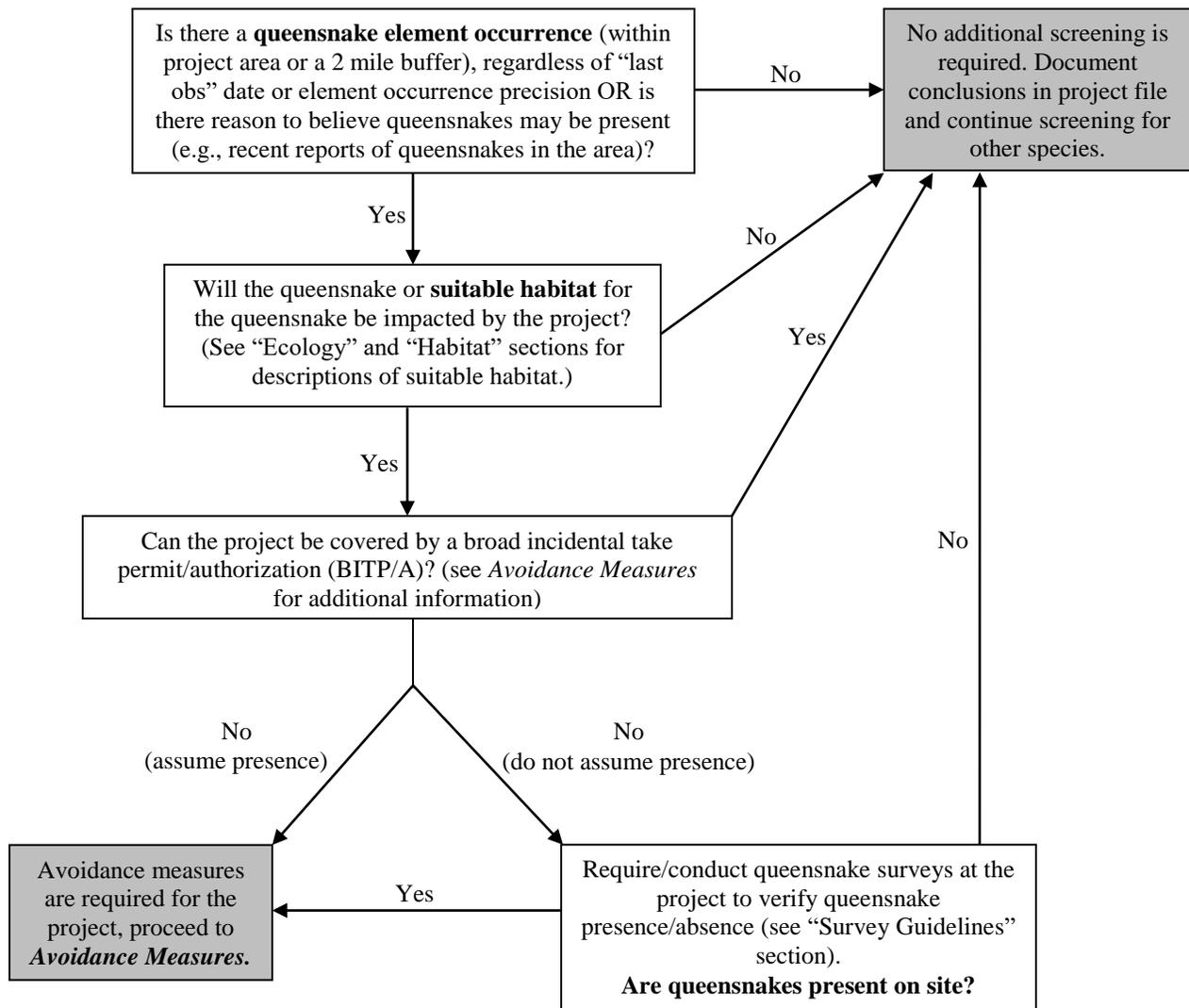
requirements for crayfish and thus queensnake population viability. Invasion by species such as reed canary grass and zebra mussels should be prevented.

In general, habitat management and/or restoration activities should be conducted during the inactive season for this species, although this may not completely avoid take of individuals (see Avoidance Measures). However, hand removal of some woody vegetation without the use of heavy machinery can be conducted without seasonal restrictions.

If erosion matting (also known as an erosion control blanket, erosion mat or erosion mesh netting) is used, caution should be used in selecting the type of matting. Netting that contains biodegradable thread with the “leno” or “gauze” weave (contains strands that are able to move independently) has the least impact on snakes. Plastic netting without independent movement of strands can easily entrap snakes and other wildlife moving through the area, leading to dehydration, desiccation, and eventually mortality. If erosion matting is used, the following types of 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 queensnakes 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 queensnakes is to avoid directly impacting individuals, known queensnake locations, or areas of suitable habitat (described above in the "Ecology" and "Habitat" sections and in *Screening Procedures*).
2. If impacts cannot be avoided but the No/Low Impact Broad Incidental Take Permit/Authorization (BITP/A; <http://dnr.wi.gov/topic/ERReview/ITNoLowImpact.html>) can be followed, the project is covered for any unintentional take that may occur.
3. If queensnake impacts cannot be avoided or covered by the No/Low Impact 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

- Branson, B.A. and E.C. Baker. 1974. An ecological study of the queensnake, *Regina septemvittata* (say) in Kentucky. *Tulane Studies in Zoology and Botany* 18(4): 153-171.
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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 July 15, 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. <http://www.wicci.wisc.edu/report/2011_WICCI-Report.pdf>

Wood, J.T. 1949. Observations on *Natrix septemvittata* (say) in southwestern Ohio. The American Midland Naturalist 42(3): 744-750.

Linked Websites

- Incidental Take Permit and Authorization: <<http://dnr.wi.gov>, key word “incidental take overview”>
- Natural Communities of Wisconsin: <<http://dnr.wi.gov>, key word “natural communities”>
- Rare Animal Field Report Form: <<http://dnr.wi.gov>, key word “rare animal field report form”>
- Wisconsin Endangered and Threatened Species: <<http://dnr.wi.gov>, key word “endangered resources”>
- Wisconsin Endangered and Threatened Species Permit: <<http://dnr.wi.gov>, key word “endangered species permit”>
- Wisconsin Natural Heritage Working List: <<http://dnr.wi.gov>, key word “Natural Heritage Working List”>
- Wisconsin Wildlife Action Plan: <<http://dnr.wi.gov>, key word “Wildlife Action Plan”>

Funding

- USFWS State Wildlife Grants Program – <<http://wsfrprograms.fws.gov/subpages/grantprograms/swg/swg.htm>>
- Sadie Nolan Amphibian and Reptile Education and Conservation Memorial Fund
- Wisconsin Natural Heritage Conservation Fund

Contact Information (Wisconsin DNR Species Expert for queensnakes)

- 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*: [Rori Paloski](#), WI Department of Natural Resources, Bureau of Natural Heritage Conservation (608-264-6040, rori.paloski@wi.gov)

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Developed by

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

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

