Asylum Lake Preserve Amphibian and Reptile Assessment Report

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Prepared by:
Herpetological Resource and Management, LLC
P.O. Box 110
Chelsea, MI 48118
(313) 268-6189

Prepared for:
Western Michigan University
1903 Western Michigan Avenue,
Kalamazoo, MI 49008

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Executive Summary

In 2019, Herpetological Resource and Management, LLC (HRM) was contracted by Western Michigan University (WMU) to conduct herpetofaunal surveys at Asylum Lake Preserve. Objectives of this rapid assessment were to help establish a baseline of herpetofauna richness and spatial distribution within the preserve and to guide recommendations for habitat restoration and long-term management opportunities.

Major findings of these surveys include:

- HRM documented the presence of eleven species of herpetofauna including four amphibians and seven reptiles, two of which are Special Concern in Michigan, the Blanding’s Turtle (Emydoidea blandingii) and the Eastern Box Turtle (Terrapene carolina carolina).
- Overall habitat quality is good to very good though several invasive species of plant were observed on the landscape in portions of the preserve. Continued effort to remove these species could significantly improve habitat function and value for herpetofauna.
- Based on habitat available and current conditions, an additional 26 species of reptile and amphibian species may occur within the project area, including seven listed as Special Concern in Michigan (Fowler’s Toad, Pickerel Frog, Mudpuppy, Eastern Smooth Green Snake, Black Rat Snake).
- Long-term habitat recommendations include supplementing habitat features critical for herpetofauna, including basking, nesting, and overwintering sites.
- Early detection and rapid response for invasive vegetation is highly recommended to restore and preserve the ecological integrity of this site.
**Introduction**

Amphibian and reptiles (collectively known as herpetofauna) are considered key bioindicators. They are ecologically important as they fulfill an essential mid-level position in many food webs as both predators and as a prey base for other animals (Lagler 1943; Rowe 1992; Walls and Williams 2001; Harding and Mifsud 2017). These animals are also highly sensitive to environmental pollutants and habitat disturbances. (Cooperrider, Boyd et al. 1986; Welsh and Droge 2001; Guilfoyle 2010). The presence, age class structure, spatial distribution, and relative abundance of herpetofauna communities can be used to assess overall ecosystem quality, identify the need for and success of habitat improvement projects, and guide development of long-term habitat management plans (Cooperrider, Boyd et al. 1986; Shear, Stadler-Salt et al. 2003; Guilfoyle 2010).

In 2019, Western Michigan University (WMU) contracted Herpetological Resource and Management, LLC (HRM) to conduct an assessment targeting herpetofauna at the Asylum Lake Preserve. Objectives of these assessments were to establish a baseline of herpetofauna (amphibians and reptiles) richness and spatial distribution within the preserve. While conducting our rapid assessment surveys, HRM also identified opportunities for habitat restoration and developed long-term management recommendations targeting herpetofauna.

**Site Location and Description**

The Asylum Lake Preserve lies within the city of Kalamazoo, Kalamazoo County, Michigan. It is a 274-acre parcel of land owned and managed by Western Michigan University that includes a variety of natural communities, such as the 44-acre Asylum Lake, Little Asylum Lake, old field, grassland, mixed and deciduous upland forest, and emergent marsh (Photos 1-7).

**Herpetofaunal Regulations**

Michigan Threatened and Endangered species are afforded protection against collection or take through the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection, administered by the Michigan Department of Natural Resources (MDNR) Wildlife Division. The law requires permits when listed species might be harmed, handled, or disturbed, even if proposed work includes conservation activities that are likely to benefit the species long-term (Michigan Department of Natural Resources 1994). Most Special Concern species in Michigan are not afforded protection under this legislation; however, Special Concern reptiles and amphibians are protected from take in accordance with MDNR Fisheries Division Order (224.16). The order states that take from the wild or possession of any such species is prohibited except as authorized under a scientific collectors permit. The Eastern Massasauga Rattlesnake is also listed as Federally Threatened. The Federal Endangered Species Act of 1973 protects threatened and endangered species by prohibiting take including harassing, harming, hunting, shooting, wounding, killing, trapping, capturing, or collecting individuals (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1973).
Methods

Herpetofauna surveys were conducted on May 10, June 21, July 10, and August 7, 2019 during suitable conditions by teams of two to six biologists trained in the identification of amphibian and reptile species. HRM crews performed targeted meandering transects survey throughout the project area surveying both aquatic and terrestrial habitats. Aquatic surveys involved the use of waders to assess wetlands bordering Asylum Lake. These areas were searched for all life stages of herpetofauna and evaluated for potential habitat. Various survey techniques including visual observation, aural surveys for calling amphibians, turning over cover materials and identification of potential nesting and basking spots were utilized to assess the diversity and distribution of resident herpetofauna in terrestrial and wetland habitats. No voucher samples were collected, but photographs were taken when possible. All survey activities were in accordance with HRM’s Scientific Collector’s and Threatened and Endangered Species permits issued by the State of Michigan.

Each positively identified amphibian and reptile was recorded in the database. The following data were collected for each record: (1) species, (2) sex of each individual (when possible), (3) behavior of each individual, and (4) reproductive condition of each individual (if it can be determined). Observation locations were recorded using a Trimble® Juno SB GPS Unit, which records the location to U.S. Environmental Protection Agency (EPA) Tier II National Geospatial Data Spatial Standards, and mapped using ArcMap software.

Results

Ongoing research into the genetics, physiology, behavior, and fossil history of amphibians and reptiles has led to debates about their proper classification. Some biologists have proposed the splitting of established genera like Rana (“typical frogs”) and Bufo (“true toads”) into the newer genera Lithobates and Anaxyrus, respectively (Harding and Holman 1999). Some suggestions have included using the newly proposed groupings as subgenera, allowing recognition of the new divisions while maintaining name stability. For the purposes of this report this system will be followed for the genus of toad Bufo (Anaxyrus). The genus of “typical frogs” will not include subgenera based on a recent publication which supports the placement of all North American ranid frogs in the genus Rana (Yuan, Zhou et al. 2016). These classifications are also recognized by the recently revised Amphibians and Reptiles of the Great Lakes Region (Harding and Mifsud 2017).

During the course of HRM’s 2019 surveys, a total of 11 species of herpetofauna were recorded within the project boundaries. Four species of amphibians were observed, including Eastern American Toad (Bufo [Anaxyrus] americanus americanus) (Photo 8), Bullfrog (Rana [Lithobates] catesbeiana), Green Frog (Rana [Lithobates] clamitans melanota) (Photo 9), Northern Leopard Frog (Rana [Lithobates] pipiens) (Table 1, Map 1). Seven species of reptile were observed, including Eastern Snapping Turtle (Chelydra serpentina serpentina) (Photo 10), Midland Painted Turtle (Chrysemys picta marginata) Blanding’s Turtle (Emydoidea blandingii), Northern Map Turtle (Graptemys geographica),
Eastern Box Turtle (Terrapene carolina carolina) (Photo 11), Northern Water Snake (Nerodia sipedon sipedon) (Photo 12), and Eastern Garter Snake (Thamnophis sirtalis sirtalis) (Photo 13) (Table 2, Map 1).

Based on available habitat and conditions, an additional 26 species of herpetofauna may occur within the project area. Fourteen potential amphibian species include Fowler’s Toad (Bufo [Anaxyrus] fowleri), Gray Treefrog (Hyla chrysoscelis/versicolor), Northern Spring Peeper (Pseudacris crucifer crucifer), Midland Chorus Frog (Pseudacris triseriata triseriata), Pickerel Frog (Rana [Lithobates] palustris), Wood Frog (Rana [Lithobates] sylvatica), Blue-spotted Salamander (Ambystoma laterale), Spotted Salamander (Ambystoma maculatum), Unisexual Salamander (Ambystoma spp.), Eastern Tiger Salamander (Ambystoma tigrinum), Four-toed Salamander (Hemidactylium scutatum), Mudpuppy (Necturus maculosus maculosus), Eastern Newt (Notophthalmus viridescens), Eastern Red-backed Salamander (Plethodon cinereus) (Table 1). Twelve potential reptile species include Five-lined Skink (Plestiodon fasciatus), Blue Racer (Coluber constrictor foxii), Northern Ring-necked Snake (Diadophis punctatus edwardsii), Eastern Hog-nosed Snake (Heterodon platirhinos), Eastern Milk Snake (Lampropeltis triangulum triangulum), Eastern Smooth Green Snake (Opheodrys vernalis vernalis), Black Rat Snake (Pantherophis spiloides), Northern Red-bellied Snake (Storeria occipitomaculata occipitomaculata), Northern Ribbon Snake (Thamnophis sauritus septentrionalis), Eastern Spiny Softshell Turtle (Apalone spinifera spinifera), Northern Musk Turtle (Sternotherus odoratus), and Red-eared Slider (Trachemys scripta elegans) (Table 2).

Discussion and Recommendations

Herpetofauna species richness was moderate, and in portions of the project area was lower than expected given the overall diversity of habitat and size the Preserve. There was a notable lack of herpetofauna observations in early season surveys, despite high visibility post burn (Photo 14). Detection in grasslands was difficult once vegetation had started to grow, but detection was aided by mowed trails bisecting fields (Photo 15). Implementing cover board object surveys would be beneficial for increasing species detection, particularly cryptic herpetofauna that are likely present within the preserve.

The Asylum Lake Preserve contains a mosaic of moderate to high quality habitats capable of supporting a diverse assemblage of herpetofauna species. In Michigan, more than 60% of herpetofauna are listed as Species of Greatest Conservation Need (SGCN) by the Michigan Wildlife Action Plan (Derosier, Hanshue et al. 2015). Two species listed as Special Concern in Michigan, Eastern Box Turtle and Blanding’s Turtle, were observed within the property (Map 2). Thirteen amphibians and reptiles considered SGCN have the potential to occur within the property. This number includes five species listed in Michigan as Special Concern (Fowler’s Toad, Pickerel Frog, Mudpuppy, Smooth Green Snake, and Black Rat Snake) (Table 1). Black Rat Snakes are historically known from the property, with one being observed prior to 2001 during surveys conducted by the Kalamazoo Nature Center (Kalamazoo Nature Center 2001). Several of these species have also been reported within a few miles of the property, with healthy populations known to occur in the general region. This property and its complex habitat blocks should be managed with the needs of these animals taken into consideration.
Long-term management efforts of the Asylum Lake Preserve should include a focus on preserving connectivity within the property and with adjacent habitats in order to maintain the overall ecosystem health and functionality. Establishment of invasive plant species is one form of habitat degradation that presents a large threat to habitat connectivity and herpetofauna populations. These plant species often grow in dense monocultures and eliminate access to important habitat features for amphibians and reptiles such as basking and nesting sites (Mifsud 2014). The Asylum Lake Preserve currently has several invasive species, including Garlic Mustard (Alliaria petiolata) (Photo 16), Oriental Bittersweet (Celastrus orbiculatus), Multiflora Rose (Rosa multiflora), Glossy Buckthorn (Rhamnus frangula), Honeysuckle (Lonicera sp.), and Common Reed (Phragmites australis). In some locations, these invasives have already carpeted the ground, reducing the amount of habitat available to Eastern Box Turtles and other SGCN.

Western Michigan University is already taking steps to eliminate these invasives from the preserve, including prescribed burns and herbicide application. Prescribed burns can be an effective measure to control invasive plants, but it is important to conduct such activities during late fall or early winter in order to minimize risks to herpetofauna, such as Eastern Box Turtles. A better understanding of local species distribution and natural history will help guide such management efforts. Removing invasives from these natural communities is a critical step toward ensuring this property continues to support habitats capable of sustaining healthy amphibian and reptile populations. Early detection of and rapid response to invasive plants is highly recommended to protect and improve the ecological integrity of the preserve.

Adding and augmenting habitat features used by herpetofauna at Asylum Lake Preserve would benefit local populations of several species. Several predated turtle nests were observed along the trails at Asylum Lake. It is recommended that additional, more suitable turtle nesting sites be created by exposing sandy soil in grassland habitat and along the shoreline of the lakes. Additionally, consider incorporating nest protectors and other means of reducing turtle nest predation. Placing woody debris capable of serving as basking sites along the shoreline of Asylum Lake should also be considered as basking opportunities were notably limited. Including these efforts into management of the property will help allow the preserve to continue supporting natural communities capable of providing habitat to diverse and healthy amphibian and reptile populations.

Conducting additional surveys within the property during early spring and summer months may result in increased species detection and likely increased richness and distribution. Early season sampling would also increase the probability of detecting a wider variety of age classes, and make it easier to evaluate reproductive success for various species.

Conclusion

HRM conducted baseline assessments within Asylum Lake Preserve to document herpetofauna community composition and distribution. Overall, diversity was moderate though portions had lower diversity than expected. The site has the potential to support relatively high diversity.
Protection and restoration of critical habitats are among the key components of effective management and conservation of herpetofauna. The Asylum Lake Preserve contains mosaics of moderate to high quality habitats capable of supporting a diverse assemblage of herpetofauna. Long-term management of this property should focus on preserving the connectivity of these natural communities, including early detection and rapid response to invasive vegetation growth and creation or augmentation of critical herpetofauna habitat features where needed. This property likely serves as refugia to a number of rare and imperiled herpetofauna, thus efforts to protect its ecological integrity are highly warranted.

This site has potential to support comparatively high species diversity. Additional surveys conducted across a wider variety of times within the amphibian and reptile active seasons are recommended to better determine the species richness and spatial distribution of this site. Incorporation of cover objects to aid in detection and use of trapping will likely increase species detection and increase species diversity for the site.
### Table 1: Asylum Lake Preserve Amphibian Richness

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Species Name</th>
<th>Observed Species</th>
<th>Potential Species</th>
<th>State Status</th>
</tr>
</thead>
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<tr>
<td><strong>Frogs and Toads</strong></td>
<td></td>
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<tr>
<td>Eastern American Toad</td>
<td><em>Bufo [Anaxyrus] a. americanus</em></td>
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<tr>
<td>Fowler's Toad</td>
<td><em>Bufo [Anaxyrus] fowleri</em></td>
<td></td>
<td>X</td>
<td>SC</td>
</tr>
<tr>
<td>Gray Treefrog</td>
<td><em>Hyla chrysoscelis/versicolor</em></td>
<td></td>
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</tr>
<tr>
<td>Northern Spring Peeper</td>
<td><em>Pseudacris c. crucifer</em></td>
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<tr>
<td>Midland Chorus Frog</td>
<td><em>Pseudacris t. triseriata</em></td>
<td></td>
<td>X</td>
<td>SGCN</td>
</tr>
<tr>
<td>Bullfrog</td>
<td><em>Rana [Lithobates] catesbeiana</em></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Green Frog</td>
<td><em>Rana [Lithobates] clamitans</em></td>
<td></td>
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<td>SC</td>
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<tr>
<td>Pickerel Frog</td>
<td><em>Rana [Lithobates] palustris</em></td>
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<tr>
<td>Northern Leopard Frog</td>
<td><em>Rana [Lithobates] pipiens</em></td>
<td></td>
<td>X</td>
<td>SGCN</td>
</tr>
<tr>
<td>Wood Frog</td>
<td><em>Rana [Lithobates] sylvatica</em></td>
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<td><strong>Salamanders</strong></td>
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<td>Unisexual Salamander</td>
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</tr>
<tr>
<td>Four-toed Salamander</td>
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<td>Mudpuppy</td>
<td><em>Necturus m. maculosus</em></td>
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<tr>
<td>Eastern Newt</td>
<td><em>Notophthalmus viridescens</em></td>
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<tr>
<td>Eastern Red-backed Salamander</td>
<td><em>Plethodon cinereus</em></td>
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</table>

Table 1. Observed and potential amphibians of Asylum Lake Preserve.  
(SGCN – Species of Greatest Conservation Need, SC – Special Concern)
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Species Name</th>
<th>Observed Species</th>
<th>Potential Species</th>
<th>State Status</th>
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<tr>
<td><strong>Lizards</strong></td>
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<td>Five-lined Skink</td>
<td><em>Plestiodon fasciatus</em></td>
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<tr>
<td><strong>Snakes</strong></td>
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<td>Blue Racer</td>
<td><em>Coluber constrictor foxii</em></td>
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<td>Eastern Hog-nosed Snake</td>
<td><em>Heterodon platirhinos</em></td>
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<td>Eastern Milk Snake</td>
<td><em>Lampropeltis t. triangulum</em></td>
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<td>Black Rat Snake</td>
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<td>Northern Brown Snake</td>
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<td>Northern Red-bellied Snake</td>
<td><em>Storeria o. occipitomaculata</em></td>
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<td>Northern Ribbon Snake</td>
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<td><strong>Turtles</strong></td>
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<td><em>Chelydra s. serpentina</em></td>
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<td>Midland Painted Turtle</td>
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<td>Blanding's Turtle</td>
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<td><em>Graptemys geographica</em></td>
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<td>Eastern Musk Turtle</td>
<td><em>Sternotherus odoratus</em></td>
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<td>Eastern Box Turtle</td>
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<td>Red-eared Slider</td>
<td><em>Trachemys scripta elegans</em></td>
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</table>

Table 2. Observed and potential reptiles of Asylum Lake Preserve.  
(SGCN – Species of Greatest Conservation Need, SC – Special Concern)
Photos

Photo 1. Asylum Lake seen from an emergent marsh.

Photo 2. Recently burned stand of *Phragmites* on northwest corner of preserve.
Photo 3. Recently burned stand of *Phragmites* in emergent marsh on West side of ALP.

Photo 5. Grassland in ALP which has potential to support several species of herpetofauna.

Photo 6. Grassland in Asylum Lake Preserve with taller meadow species.
Photo 7. Upland deciduous forest in Asylum Lake Preserve with open understory.

Photo 8. Eastern American Toad observed during 2019 surveys of Asylum Lake.
Photo 9. Green Frog observed during 2019 surveys of Asylum Lake.

Photo 10. Eastern Snapping Turtle observed during 2019 surveys of Asylum Lake.
Photo 11. Eastern Box Turtle observed during 2019 surveys of Asylum Lake.


Photo 15. Tall grass present in grassland surveyed in August 2019.

Appendix I: Species Profiles

Fowler's Toad (*Bufo [Anaxyrus] fowleri*)

The Fowler's Toad is listed as Special Concern in Michigan, affording it protection under MDNR Fisheries Order 224.16 (Michigan Department of Natural Resources 2016). This species closely resembles the Eastern American Toad being tan or brown with a light strip down the back. Most individuals have dark blotches spread randomly around their body and limbs. This species is found within open woodlands, sand prairies, meadows and beaches but can also be found in suburban and agricultural areas. Sandy soil is usually a common factor between all of the location that Fowler’s Toads are found. Diet for this species includes terrestrial invertebrates such as insects but may not be quite as varied as the diet of the Eastern American Toad. Breeding occurs in the spring with males making nasally low pitched bleats a couple of seconds long. This species most commonly is active during the day and can withstand higher temperatures than American Toads but become less active as temperatures lower. Hibernation Particular care should be taking preserving known breeding sites of this species. However, overall habitats should also be sought to be protected in order to protect this declining species as it is likely that its habitats have been degraded through human activities (Harding 1997; Holman 2012).
The Pickerel Frog is listed as Special Concern in Michigan, affording it protection under MDNR Fisheries Order 224.16 (Michigan Department of Natural Resources 2016). Pickerel Frogs are commonly confused as Northern Leopard Frogs but have more square spots that are aligned in two rows down the back. Additionally, this species is bright yellow on the underside of the back legs and the groin region. Pickerel Frogs are entirely limited by the presence of cool clear water. Grassy stream banks along streams or cold springs are the preferred habitat for this species. Pickerel Frogs will hibernate in the mud along these streams commonly below debris like logs or rocks. Diet for this species includes insects, spiders and other invertebrates. Breeding occurs in the spring around April or May and males can be identified by their snore-like croak. Pickerel Frog populations have remained mostly stable over the years and it is currently unknown if they have faced as drastic of population declines as its look alike the Northern Leopard Frog. This species has almost no tolerance to any pollution so its presence is an indicator for a healthy stream system. However, because of its habitat requirements development and other human activities can have a very large impact on this frog’s populations (Harding and Mifsud 2017).
Mudpuppy (*Necturus maculosus maculosus*)

Mudpuppies are large entirely aquatic salamanders that are listed as Special Concern in Michigan. They are easily recognized by their large size (up to 1.5 feet long) and large external gills just behind the head (Harding and Mifsud 2017). Small Mudpuppies might resemble the larvae of other salamanders, but have only four toes on each foot instead of five. In Michigan, this species is the only amphibian that normally inhabits the open water of large lakes and rivers, spending most of its time hiding under flat rocks. They are highly carnivorous and are often caught by fishermen, even in winter. Because of their unique appearance and unjustified reputation as predators of game fish, they are often killed when captured, even though they are harmless. Mudpuppies breed in fall, entering shallow water as the temperatures cool, but do not nest until the following spring. Females require moderately shallow water with plenty of large, flat rocks on the bottom beneath which they can deposit their eggs. Mudpuppies are the obligate host species for the larvae of the Salamander Mussel (*Simpsoniella ambigua*), a state Endangered species (Derosier et al. 2015). This species is also potentially important in helping control invasive species. They have been recorded eating invasive round gobies (*Apollonia melanostomus*) and invasive mussels making them an important species in maintaining healthy aquatic habitats.
The Eastern Smooth Green Snake is listed as Special Concern in Michigan, which affords it protection under MDNR Fisheries Order 224.16 (Michigan Department of Natural Resources 2016). Within the state they have become increasingly rare and are locally extirpated across much of the Lower Peninsula. They are also listed as Special Concern in North Carolina and Montana and are endangered in Indiana and Ohio. This species, which is entirely bright green on its upper surfaces and white, ivory, or pale yellow on the bottom, ranges from 12 to 26 inches in length. Eastern Smooth Green Snakes prefer to inhabit moist grassy communities including prairie remnants and savannas, meadows, pastures, old fields, and marshes. They can often be found basking or hiding beneath debris including logs, bark, flat rocks, or artificial materials. They are the only Great Lakes species that predominantly eat insects with a preference for grasshoppers, crickets, and hairless caterpillars. Although their coloration helps create a camouflage in their grassy environments, Smooth Green Snakes are vulnerable to a number of predators including birds, mammals and larger snakes. Declines of Smooth Green Snakes have been noted throughout its range, particularly in the southern portion of the Great Lakes basin. Habitat loss largely due to the agricultural conversion and loss of food sources from the wide spread of use of pesticides have been contributed to these declines (Harding and Mifsud 2017).
Black Rat Snake (*Pantherophis spiloides*)

A Species of Special Concern in Michigan protected under the MDNR Fisheries Order 224.16, Black Rat Snake populations have been declining in recent years particularly in southeastern Michigan (Michigan Department of Natural Resources 2016; Harding and Mifsud 2017). The largest snake species in the State, adults range from 40 to 101 inches with hatchlings starting out over 10 inches long. As their name suggests, this species is black with white coloration on its throat. Black Rat Snakes are primarily found in woodlands or open areas next to them such as fields, pastures, bogs or marshes. Common prey items include small mammals, birds, which they hunt using arboreal behavior and occasionally amphibians and other reptiles. Their diet also makes them useful to farmers in that they are excellent pest control. Black Rat Snakes establish home ranges of about 2,000 ft. in diameter and have interactions with others of their species to establish dominance. Due to their size there are relatively few predators that threaten them, the primary being humans. Similar to several other species of snakes, Black Rat Snakes hibernate communally and will commonly share hibernacula with other species of snake as well. Mating occurs mostly in the spring and eggs are usually laid around late June or July in loose soil, rotted stumps, or under cover like rocks. Long lived, this species has been known to live almost 23 years in captivity but are particularly vulnerable in the wild to road mortalities and human activities (Holman 2012).
Blanding’s Turtle (*Emydoidea blandingii*)

In Michigan, the Blanding’s Turtle is listed as a Species of Special Concern and protected under the MDNR Fisheries Order 224.16 (Michigan Department of Natural Resources 2016). While still locally common in some parts of Michigan, this species is listed as Threatened and Endangered in other portions of its range, and it is currently being considered for federal protection. This species requires a mosaic of wetland habitats for its survival. For much of the year, they prefer open water areas with structures such as logs or stumps on which to bask. Females require well drained soils, usually with southern exposure, for nesting and will travel long distances to locate a suitable nesting location. Hibernation occurs within ponds where the animals burrow into the mud below the frost line. The Blanding’s Turtle has a life span of approximately 80 years, and does not reach sexual maturity until around 20 years of age. Adults have few natural predators, but hatchling and juvenile turtles suffer very high mortality rates. Annual nest predation by predators, especially raccoons, is often 100%. For this reason, it may take one adult female decades to produce enough turtles to replace herself and her mate and thus maintain a stable population. Due to their very low reproductive rate, it is extremely important to maintain ample nesting areas as well as the shrub swamp wetland habitat that young Blanding’s Turtles rely on for shelter (Carl H. Ernst 2009; Harding and Mifsud 2017).
The Eastern Box Turtle (Terrapene carolina carolina) is listed in Michigan as a Species of Special Concern and is protected under the MDNR Fisheries Order 224.16. These turtles are primarily terrestrial, favoring wooded areas consisting of deciduous or mixed trees with sandy soils but can also be found utilizing nearby open habitats such as fields and marshes. They require some form of access to water, including streams, ponds, or bogs, and spend most of the summer buried in leaf litter or, when temperatures are high, near their source of water. This species is diurnal and peak periods of activity are typically in the morning or after a rainstorm. During the winter box turtles hibernate by burrowing into the ground. These turtles have relatively small ranges and have an omnivorous diet consisting of plants, berries, invertebrates, and some small vertebrates. Major predators include raccoons, skunks, foxes and other mid-sized carnivores. However, road mortality of these animals is an even larger threat. These long lived animals (40-50 years in the wild but occasionally to 100) can take up to 10 years to reach sexual maturity and because of the high mortality rates of young box turtles it can take some time for adults to replace themselves in the population. The largest threats facing the Eastern Box Turtle come from humans, ranging from habitat destruction and road mortality to collection for the pet trade (Harding and Mifsud 2017).
References


Michigan Department of Natural Resources (2016). Regulations on the Take of Reptiles and Amphibians. M. D. o. N. Resources. 224.16.


