October 20, 2020

# HENNEPIN MARSH HABITAT RESTORATION THREATENED AND ENDANGERED SPECIES SUMMARY

Environmental Consulting & Technology, Inc. (ECT) has reviewed maps of the Hennepin Marsh project site, completed a threatened and endangered (T&E) species web database review, evaluated habitat suitability, and performed an onsite species-specific survey to determine presence or absence of T&E species. ECT understands that the project area involves approximately 94 acres of the Trenton Channel and adjacent northern Grosse Ile coastline and is located in the Detroit River Area of Concern (AOC) in Wayne County, Michigan. ECT understands the purpose of the project is to restore Detroit River habitat for fish and wildlife populations. Project activities may include the creation and restoration of rock shoal islands and other habitat structures, including the use of existing river sediments, to remediate from past and protect against future erosion of macrophyte beds and emergent coastal shoreline vegetation. ECT reviewed the location of the project area (T3S, R11E, S 32-33 and T4S, R11E, S 4, 5, & 8) and adjacent Sections within a 1.5-mile radius of the proposed project activities (T3S, R11E, S 27-34; T4S, R10E, S 1 & 12; T4S, R11E, S 3-10, & 16-18) for known observations of rare T&E species, which are recorded in the Michigan Natural Features Inventory (MNFI) Natural Heritage Database and the U.S. Fish & Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool. This document details the results of ECT's database review, onsite habitat evaluation and completed and proposed species-specific surveys for T&E species.

Under Act 451 of 1994, the Natural Resources and Environmental Protection Act (NREPA), Part 365, Endangered Species Protection, "a person shall not take, possess, transport, …fish, plants, and wildlife indigenous to the state and determined to be endangered or threatened," unless first receiving an Endangered Species Permit from the Michigan Department of Natural Resources (MDNR), Wildlife Division. Under the Endangered Species Act (ESA) of 1973, "the term 'take' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." A person shall not take a federal endangered or threatened species without first receiving an Incidental Take Permit from the USFWS. The responsibility to protect T&E species is not limited to those T&E species listed herein. The presence of T&E species does not preclude activities or development but may require alterations in the project plan, permitting, and/or mitigation.

## MNFI Natural Heritage Database and USFWS IPaC

MNFI's continuously updated database is a comprehensive source of existing data on Michigan's endangered, threatened, or otherwise significant plant and animal species, natural plant communities, and other natural features, referred to as "element occurrences" or "EOs." Records in the database indicate that a qualified observer has documented the presence of T&E species or special natural features. However, records within a query area

do not guarantee the presence of T&E species at a project site. Likewise, the absence of records in the database for a query area does not preclude the potential presence of T&E species at a specific project site.

In addition, the USFWS IPaC tool assesses whether the proposed project location may involve USFWS-managed resources, such as species proposed or listed under the ESA, designated critical habitat, migratory birds, inter-jurisdiction fishes, etc., and generates a list of these resources. This list indicates the potential for T&E species to be present within the county. However, unlike the MNFI database, this list does not necessarily indicate documented occurrences of T&E species within the county. Furthermore, T&E species not recorded in the MNFI database nor listed by the USFWS may be present at a specific project site. Hence, habitat assessments and species-specific surveys are often required to further evaluate the potential presence of T&E species at a specific project site.

## Results of T&E Species Database Review

ECT reviewed the location of the project area (T3S, R11E, S 32-33 and T4S, R11E, S 4, 5, & 8) and adjacent Sections within a 1.5-mile radius of the proposed project activities (T3S, R11E, S 27-34; T4S, R10E, S 1 & 12; T4S, R11E, S 3-10, & 16-18) against known EOs recorded in the MNFI database (accessed on December 6, 2018 and reconfirmed February 1, 2019), and the USFWS IPaC tool (accessed on December 6, 2018 and reconfirmed February 1, 2019). See Appendix A, Tables 2 and 3 for a complete list of EOs generated during the MNFI database query and Appendix A, Table 4 for a complete list of federally listed species from USFWS IPaC tool.

**State Listed Species**

Considering project timing and site conditions interpreted from aerial photography, ECT determined the potential for ten state-listed species to occur within the project area: one plant, namely goldenseal; three fish, namely lake sturgeon, northern madtom, and sauger; one snake, namely eastern fox snake; one bird, namely common tern; and four mussels, namely purple wartyback, wavyrayed lampmussel, eastern pondmussel, and hickorynut (Appendix A, Tables 2 and 3). A brief discussion of each species is included below.

Historically, goldenseal has been documented within the project section on Grosse Ile. Goldenseal, a terrestrial species, occurs in southern hardwood forests, moist ravines, and parts of riparian forests (MNFI 2019). Since all project activities are planned to occur in the Detroit River and all materials will be transported by and staged on a barge, ECT anticipates that no impacts will occur and does not recommend further consideration of this species.

The most recent record of eastern fox snake is documented on Grosse Ile in 1912. Eastern fox snakes occur in emergent wetlands along Great Lakes shorelines and associated large rivers and impoundments. They are primarily a wetland species but are capable of swimming long distances in open offshore waters between islands. If project activities commence as soon as the river is safe for vessel navigation (approximately March), vibrations from project work will likely deter this mobile species from entering or breeding near the site. However, newly created shoals will provide attractive rest areas and snakes may enter and remain in the project area during times of inactivity (nights, weekends, holidays). Hence, it is recommended that following periods of inactivity, the onsite crew be educated and advised to examine equipment left onsite and survey the shoals for possible basking or nesting individuals during the snakes' active period (third week of April until the fourth week of October). Given the age of the record, mobility of the species, project timing and disturbance, and the implementation of shoal surveys following periods of inactivity, ECT believes the likelihood of impact to be very low and does not recommend further consideration of this species.

Lake Sturgeon and Northern Madtom were observed within the project sections, near Grosse Ile North in 2016 and in the Detroit River in 1978, respectively. Lake Sturgeon was observed immediately north of Bridge Road along the west bank of the Trenton Channel, less than 0.3 miles from the project site, as well along the northern coastline of Grosse Ile. Sauger was last observed within 1.5 miles of the project area sections in the Detroit River in 1937. The most recent common tern sighting near the project area occurred in 2008 along Bridge Road (the toll bridge to Grosse Ile), where approximately 100 nests were located on the rock rubble of the bridge abutments adjacent to the water. Lake Sturgeon, Northern Madtom, Sauger, and common tern are mobile species that will likely avoid areas of disturbance. If project activities commence as soon as the river is safe for vessel navigation (approximately March), vibrations from project work will likely deter these mobile species from entering or breeding near the site. Additionally, suitable spawning/nesting and foraging habitat is not available within the project area, so individuals will be transient until appropriate habitat is created. Depending on project timing, if portions of the shoals protrude above waterline during the nesting season of common tern (second week of May to first week of July), onsite crews should be educated and advised to survey the shoals following significant periods of inactivity (weekends and holidays) to ensure no nests have been created and no impact occurs to the species. While it is unlikely these species will be impacted by project activities, ECT recommends fish surveys be conducted and the project team use the practices suggested above to mitigate risk during the common tern breeding season.

According to the database query, three of the four mussels were reported in 2006 in the Detroit River. Eastern pondmussel and wavyrayed lampmussel had an EO in the Detroit River north of the Grosse Ile Toll Bridge along the west bank of the Trenton Channel, less than 0.3 miles from the project area, and purple wartyback was observed in the Detroit River. Only hickorynut has a historic record from before 1936, observed near Fighting Island in the Detroit River, approximately 1.6 miles northeast of the project area. The EOs for eastern

pondmussel and wavyrayed lampmussel were records of empty shells and not living individuals. The conclusion of the surveys was that the lack of suitable habitat, the absence of any live mussel within the survey transects, and the low number of empty shells found indicated a very low probability that any live mussels were present within the area (Badra 2006). Although ECT agrees with the conclusions in Badra 2006 regarding mussel presence within the project area, a mussel survey by a qualified biologist is recommended to confirm.

**Federally Listed Species**

Seven federally listed species were identified by MNFI and the USFWS IPaC tool as potentially occurring within the project area (Appendix A, Tables 2-4). Based on a desktop review and project details, ECT concluded that consideration of five of these species, namely eastern prairie-fringed orchid, red knot, Indiana bat, northern long-eared bat, and eastern massasauga rattlesnake was not warranted because the project area does not contain suitable habitat characteristics, lacks specific conditions required for these species, or project methodology mitigates impact risk. ECT recommends Northern Riffleshell and bald eagle be considered further. A discussion on each species is provided below:

**Eastern prairie-fringed orchid:**

This plant species is primarily found in moist prairie remnants, particularly those associated with lakeplains, but it can also occur in bogs and peaty lakeshores (MNFI 2019). Though rare, this orchid can readily colonize highly disturbed sites like ditches, unmown old fields, and even the edges of golf courses as long as competition is low and proper soil fungi are present (Penskar and Higman 2000). The recovery plan for this species indicates that six populations are extant in the Lake Erie basin and lists one population in adjacent Monroe County (USFWS 1999). The most recent EO of eastern prairie-fringed orchid in Wayne County reported by MNFI dates to 2016 in the Pointe Mouillee State Game Area, which extends into Monroe County, approximately 12 miles from the project area. State EOs at or near the vicinity of the project area (e.g. within 1.5 miles) were absent in ECT's MNFI Natural Heritage Database query for the orchid. Additionally, the project area does not contain lakeplain prairie remnants and current project plans restrict all activity to the water. Thus, the project area does not provide suitable habitat, and further consideration of eastern prairie-fringed orchid is not warranted.

**Red knot:**

This shorebird species migrates through the Great Lakes region during the spring and fall. The red knot is often seen along Great Lakes shorelines as well as inland on mudflats and low reservoirs in late summer and fall or flooded fields in spring (MNFI 2019). This species may migrate through the project area, but nesting is not anticipated. Therefore, project activities will not adversely impact red knot, and no further consideration is warranted.

**Indiana bat & Northern long-eared bat:**

These bat species utilize wooded habitats and/or riparian corridors during summer and hibernate in caves in winter (USFWS 2006, 2015b, 2018b). Trees and wooded habitats to support their occurrence are present along the coastline of the project area and on the existing barrier shoal islands in South Hennepin Marsh. However, all project activities are planned to occur in the Detroit River and all materials will be transported by and staged on a barge. Therefore, ECT anticipates no terrestrial impacts will occur and does not recommend further consideration. If project methodologies change and terrestrial impacts need to occur, including tree removals or trimming of trees >3" diameter at breast height (dbh), these species will need to be reconsidered.

**Bald eagle:**

Although only a state special concern species and no longer afforded legal protection under state or federal T&E regulations, bald eagle is protected by the Bald and Golden Eagle Protection Act (BGEPA), which prohibits anyone from taking, possessing, or transporting a bald eagle or the parts, nests, or eggs of the bird without prior authorization. The BGEPA covers active as well as inactive eagle nests and prohibits take, including eagle and nest disturbance, without first obtaining a non-purposeful take permit from USFWS. If a human activity, such as noise, agitates or bothers roosting or foraging bald eagles to the degree that causes injury or substantially interferes with breeding, feeding, or sheltering and causes, or is likely to cause, a loss of productivity or nest abandonment, the activity constitutes a violation of the BGEPA (USFWS, 2007). Bald eagle is also protected under the Migratory Bird Treaty Act. Bald eagles nest in a wide variety of habitats that provide suitable nest locations and foraging habitats close to open water. Nests may be placed in snags or large live trees as well as on constructed platforms or utility poles. They are resident birds (remain year-round) if there is open water where they can forage over the winter (MNFI 2019).

No bald eagle nests were returned by ECT's MNFI Natural Heritage Database query; however, new nests are constructed each year. Although it is ECT's understanding that all project activities are planned to occur in the Detroit River and all materials will be transported by and staged on a barge, it is recommended that any terrestrial areas with large trees within 660 feet of the project area and access routes be surveyed during tree leaf-off to confirm the presence or absence of bald eagle nests. If a nest is observed, the location should be recorded with GPS to determine if project activities are likely to result in non-purposeful take using the USFWS' Bald Eagle Permit for Non-Purposeful Take Step-by-Step Guidance (USFWS 2018). Multi-day nest monitoring in early spring may be necessary to determine whether or not a nest is active. This information is used to determine appropriate protective measures and whether permitting from the USFWS is warranted.

**Northern Riffleshell:**

This mussel species occurs in fine to coarse gravel of swift current riffles and runs and sandy substrates in mainstem streams (3rd-4th order) or rivers (5th-6th order) (MNFI 2019). Hennepin Marsh and adjacent areas are

subject to significant erosion, but EOs of Northern Riffleshell and other state listed and special concern mussel species have been recorded near the project site as recently as 2006. Empty Northern Riffleshell, shells were observed immediately north of Bridge Road along the west bank of the Trenton Channel, less than 0.3 miles from the project area. The observations of empty shells rather than living individuals, along with previously discussed factors, suggests that suitable habitat is not available in the project vicinity. Although this species is unlikely to occur within the project area, ECT recommends a mussel survey be conducted by a qualified biologist to reduce risk associated with impacting this and other listed species.

**Eastern massasauga rattlesnake:**

The eastern massasauga rattlesnake (EMR) is found in a variety of wetland habitats including wet prairies, marshes, and low areas along rivers and lakes. The species also utilizes adjacent uplands including grasslands, old fields, and forest openings (USFWS 2015a). Regardless of whether individuals stay in wetlands throughout the year or disperse to uplands during summer, the association with wetlands is consistent, and EMR are rarely found more than 500 meters (1,640 feet or 0.31 miles) from a wetland (USFWS 2016).

The USFWS has designated and mapped two levels of habitat for federally threatened EMR and issued voluntary *General Project Design Guidelines for Eastern Massasauga* (USFWS 2017) with best management practices (BMPs) for each habitat tier and projects within EMR range. The IPaC tool indicates that Grosse Ile is Tier 1 habitat as mapped by the USFWS. Tier 1 includes habitat with known EMR occurrences, Tier 2 includes habitat with high likelihood of EMR presence, and areas within the known range but outside of Tier 1/Tier 2 habitat are considered less likely to be occupied by this species. The closest EO of EMR in Wayne County reported my MNFI dates to 1858 on Grosse Ile.

Although the project occurs within EMR Tier 1 habitat, further consideration is not needed for this species if project activities, including staging and site access, remain within the Detroit River. If Grosse Isle still supports an extant population of EMR, it is unlikely they would migrate to the newly created shoals. If project activities commence as soon as the river is safe for vessel navigation (approximately March), vibrations from project work will likely deter this mobile species from entering or breeding near the site. Although EMRs swim well when necessary, they favor moving to uplands (e.g. forest openings, old fields, grasslands, and prairies) adjacent to wetland hibernacula following emergence in spring and tend to remain there during the summer (Harding, 2000). However, shoal surveys for eastern fox snake will also serve to protect against impacts to EMR (active season is approximately mid-March through October). Therefore, ECT anticipates that no impacts will occur and hence, does not recommend EMR be considered further. However, if project methods change and activities or access will impact Grosse Isle or wetlands, a herpetological subcontractor should be consulted about this species and employ survey techniques and timing to optimize observation of EMR in accordance with the USFWS's *Recommended Standard Survey Protocol for the Eastern Massasauga, Sistrurus catenatus* (Casper et al., 2001)

and the project team should implement the project screening and best management practices included in the *USFWS's General Project Design Guidelines for Eastern Massasauga* (included in Appendix B).

**Target T&E Species**

As discussed above, ECT reviewed all potential element occurrences reported by the MNFI database and IPaC and compiled the following list of target T&E species (Table 1) with potential to be onsite and impacted by project activities. The T&E species listed below include only those that may be impacted by project activities occurring in the Detroit River. If project activities change to include terrestrial impacts on Grosse Isle or wetlands, the terrestrial species discussed previously may need to be considered further depending on the timing, location, and methodology of the proposed project actions.

**Table 1. Database Results: Target T&E Species Potentially in Project Proximity**

| Common Name | Scientific Name | State Status* | Federal Status* | Survey Period (if required) | Element Category |
|---|---|---|---|---|---|
| Lake sturgeon | *Acipenser fulvescens* | T | | 1st week of April to 4th week of October (electrofishing) | Animal |
| Purple wartyback | *Cyclonaias tuberculata* | T | | 1st week of April to 1st week of October | Animal |
| Northern riffleshell | *Epioblasma torulosa rangiana* | E | LE | 1st week of April to 1st week of July | Animal |
| Bald eagle | *Haliaeetus leucocephalus* | SC | ** | 1st week of May to 4th week of July | Animal |
| Wavyrayed lampmussel | *Lampsilis fasciola* | T | | 1st week of April to 1st week of October | Animal |
| Eastern pondmussel | *Ligumia nasuta* | E | | 1st week of April to 1st week of October | Animal |
| Northern madtom | *Noturus stigmosus* | E | | 1st week of April to 1st week of October | Animal |
| Hickorynut | *Obovaria olivaria* | E | | 1st week of April to 1st week of October | Animal |
| Eastern fox snake | *Pantherophis gloydi* | T | | 1st week of May to 4th week of June | Animal |
| Sauger (sand pickerel) | *Sander canadensis* | T | | 1st week of November to 4th week of October | Animal |
| Common tern | *Sterna hirundo* | T | | 1st week of May to 4th week of July | Animal |

*SC = special concern, T = threatened, E = endangered, LT = federally threatened, and LE = federally endangered. Species designated only as "Special Concern" are not included in the table above since they are not protected under state or federal endangered species legislation.
** Protected by the Migratory Bird Treaty Act (MBTA) and/or the Bald and Golden Eagle Protection Act

## Results of T&E Species Field Review

Since suitable habitat for the listed species (Table 1) potentially exists on the project site or will be created, ECT recommends a habitat assessment and several species-specific surveys be conducted to mitigate risk. Given the recent observations of mussel and fish species and the impact the project will have on river bottomlands during construction, ECT recommends that 1) a mussel expert with the appropriate experience and State of Michigan and USFWS T&E mussel permits to perform species-specific surveys in the Detroit River project area to determine presence or absence and locations of the federal and state listed mussels, 2) the fish surveys planned

for spring 2020 employ survey techniques and timing to optimize observation of Lake Sturgeon, Northern Madtom, and Sauger. See Table 1 for the best time to survey for these species as recommended by MNFI.

The mussel surveys for this project should follow the *Michigan Freshwater Mussel Survey Protocols and Relocation Procedures* (Hanshue et al., 2019). This would require 1) a Cultural and Scientific Collectors Permit issued by the MDNR Fisheries Division (required for all native mussel handling), 2) a Threatened and Endangered Species Permit from the MDNR Wildlife Division Endangered Species Program, and if requested by USFWS 3) an ESA Section 10(a)1(A) Permit. Survey plans should be provided to MDNR and USFWS for review in advance, with agency notification at least 15 days prior to the time the actual survey would occur.

As discussed above, although terrestrial species are not likely to be impacted by project activities, the newly created shoals may attract species during construction. Therefore, ECT recommends onsite crew be educated and instructed to survey the shoals for basking snakes and nesting birds following periods of inactivity (nights, weekends, and holidays) to mitigate risk of take to eastern fox snakes, EMR, or common tern.

Since an MDEQ/U.S. Army Corps of Engineers joint wetland permit is necessary for the proposed project activities, the MDEQ will likely contact USFWS for comment, per ECT's understanding of MDEQ's internal project review process. ECT recommends that the client proactively engage in informal consultation with USFWS to verify species-specific survey efforts for Northern Riffleshell and shoal surveys for EMR (as suggested above) are sufficient, decide what protective measures may be necessary to avoid adverse impacts to federal species, and confirm whether or not there is a need for incidental take permitting under the ESA. Since the project involves a federal nexus via federal funding and state permits or authorizations that implement federal laws like the Clean Water Act, the proposed project may have additional requirements for federal species under or similar to the standard Section 7 consultation process of the ESA, including consultation with the USFWS Michigan Ecological Services Field Office.

## Resources


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Casper et al. 2001. "*Recommended Standard Survey Protocol for the Eastern Massasauga, Sistrurus catenatus".* U.S. Fish and Wildlife Service. https://www.fws.gov/midwest/endangered/reptiles/pdf/eama-surv-prot.pdf

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# APPENDIX A

## MNFI Web Database Results and USFWS IPaC Results

**Table 2. MNFI Web Database Results for Project Area (T3S, R11E, S 32-33 and T4S, R11E, S 4, 5, & 8)**

| Common Name | Scientific Name | State Status* | Federal Status* | First Observed Date | Last Observed Date | Element Category |
|---|---|---|---|---|---|---|
| Lake sturgeon | *Acipenser fulvescens* | T | | 3/22/2016 | 5/10/2016 | Animal |
| Sedge | *Carex squarrosa* | SC | | 7/22/1911 | 8/21/2015 | Plant |
| Field Chickweed | *Cerastium velutinum* | X | | 5/18/1913 | 5/18/1913 | Plant |
| Northern rifffleshell | *Epioblasma torulosa rangiana* | E | LE | 7/10/2006 | 7/10/2006 | Animal |
| Goldenseal | *Hydrastis canadensis* | T | | 1914 | 5/11/1916 | Plant |
| Wavyrayed lampmussel | *Lampsilis fasciola* | T | | 7/10/2006 | 7/10/2006 | Animal |
| Eastern pondmussel | *Ligumia nasuta* | E | | 7/10/2006 | 7/10/2006 | Animal |
| Indiana bat | *Myotis sodalis* | E | LE | 1865 | 1865 | Animal |
| Northern madtom | *Noturus stigmosus* | E | | 5/16/1978 | 5/16/1978 | Animal |
| Eastern fox snake | *Pantherophis gloydi* | T | | | 1912-06 | Animal |
| Pink heelsplitter | *Potamilus alatus* | SC | | 2006-Summer | 2006-Summer | Animal |
| Kidney shell | *Ptychobranchus fasciolaris* | SC | | 7/10/2006 | 7/10/2006 | Animal |
| Shumard's oak | *Quercus shumardii* | SC | | 6/24/2015 | 8/21/2015 | Plant |
| Fire pink | *Silene virginica* | E | | 1838 | 7/1/1917 | Plant |
| Eastern massasauga | *Sistrurus catenatus* | SC | LT | 1858 | 1858 | Animal |
| Common tern | *Sterna hirundo* | T | | 5/31/2002 | 2008 | Animal |
| Trailing wild Bean | *Strophostyles helvula* | SC | | 1914 | 9/4/2014 | Plant |

* SC = special concern, T = threatened, E = endangered, LT = federally threatened, and LE = federally endangered. Special concern species are not protected under state or federal endangered species legislation. However, efforts should be taken to minimize impacts to these element occurrences.

**Table 3. MNFI Web Database Results for Sections within 1.5 Miles of Project Area**

**(T3S, R11E, S27-34; T4S, R10E, S 1 &12; T4S, R11E, S 3-10 & 16-18)**

| Common Name | Scientific Name | State Status* | Federal Status* | First Observed Date | Last Observed Date | Element Category |
|---|---|---|---|---|---|---|
| Lake sturgeon | *Acipenser fulvescens* | T | | 3/22/2016 | 5/10/2016 | Animal |
| Sedge | *Carex squarrosa* | SC | | 7/22/1911 | 8/21/2015 | Plant |
| Field Chickweed | *Cerastium velutinum* | X | | 5/18/1913 | 5/18/1913 | Plant |
| Purple wartyback | *Cyclonaias tuberculata* | T | | ?? | 2006-Summer | Animal |
| Northern rifflesheIl | *Epioblasma torulosa rangiana* | E | LE | 1930s | 1930s | Animal |
| | | | | 7/10/2006 | 7/10/2006 | |
| Goldenseal | *Hydrastis canadensis* | T | | 3/28/1905 | 5/11/1916 | Animal |
| | | | | 1914 | 5/11/1916 | |
| Wavyrayed lampmussel | *Lampsilis fasciola* | T | | 7/10/2006 | 7/10/2006 | Animal |
| Eastern pondmussel | *Ligumia nasuta* | E | | 1940-pre | 1940-pre | Animal |
| | | | | 7/10/2006 | 7/10/2006 | |
| Silver chub | *Macrhybopsis storeriana* | SC | | 6/6/1905 | 1985-03 | Animal |
| Indiana bat | *Myotis sodalis* | E | LE | 1865 | 2/7/1905 | Animal |
| | | | | 1865 | 1865 | |
| Northern madtom | *Noturus stigmosus* | E | | 5/16/1978 | 5/16/1978 | Animal |
| Hickorynut | *Obovaria olivaria* | E | | 1936-pre | 1936-pre | Animal |
| Osprey | *Pandion haliaetus* | SC | | 2016 | 2016 | Animal |
| Eastern fox snake | *Pantherophis gloydi* | T | | | 1912-06 | Animal |
| Pink heelsplitter | *Potamilus alatus* | SC | | 2006-Summer | 2006-Summer | Animal |
| Kidney shell | *Ptychobranchus fasciolaris* | SC | | 6/13/1933 | 6/13/1933 | Animal |
| | | | | 7/10/2006 | 7/10/2006 | |
| Shumard's oak | *Quercus shumardii* | SC | | 6/24/2015 | 8/21/2015 | Plant |
| Sauger | *Sander canadensis* | T | | 10/10/1937 | 10/10/1937 | Animal |
| Fire pink | *Silene virginica* | E | | 1838 | 7/1/1917 | Plant |
| Eastern massasauga | *Sistrurus catenatus* | SC | LT | 1858 | 1858 | Animal |
| Common tern | *Sterna hirundo* | T | | 5/31/2002 | 2008 | Animal |
| Trailing wild Bean | *Strophostyles helvula* | SC | | 1914 | 9/4/2014 | Plant |

* SC = special concern, T = threatened, E = endangered, LT = federally threatened, and LE = federally endangered. Special concern species are not protected under state or federal endangered species legislation. However, efforts should be taken to minimize impacts to these element occurrences.

**Table 4. USFWS IPaC Web Results for Project Area**

| Common Name | Scientific Name | State Status* | Federal Status* | Element Category |
|---|---|---|---|---|
| Red knot | *Calidris canutus rufa* | | LT | Animal |
| Northern riffleshell | *Epioblasma torulosa rangiana* | E | LE | Animal |
| Bald eagle | *Haliaeetus leucocephalus* | SC | ** | Animal |
| Northern long-eared bat | *Myotis septentrionalis* | SC | LT | Animal |
| Indiana bat | *Myotis sodalis* | E | LE | Animal |
| Eastern prairie fringed orchid | *Platanthera leucophaea* | E | LT | Plant |
| Eastern massasauga | *Sistrurus catenatus* | SC | LT | Animal |

* SC = special concern, T = threatened, E = endangered, LT = federally threatened, and LE = federally endangered. Special concern species are not protected under state or federal endangered species legislation. However, efforts should be taken to minimize impacts to these element occurrences.

** Protected by the Migratory Bird Treaty Act (MBTA) and/or the Bald and Golden Eagle Protection Act

Note: Special concern species, rare natural communities, and federal candidate species are not protected under state or federal endangered species legislation; however, affording protection to special concern and candidate species as well as unique habitats may prevent species from declining to the point of being listed as threatened or endangered in the future.

# APPENDIX B

## USFWS *General Project Design Guidelines*

## *For Eastern Massasauga Rattlesnake*

ECT Environmental Consulting & Technology, Inc.

**U.S. Fish & Wildlife Service**

# *General Project Design Guidelines for Eastern Massasauga (=rattlesnake)*

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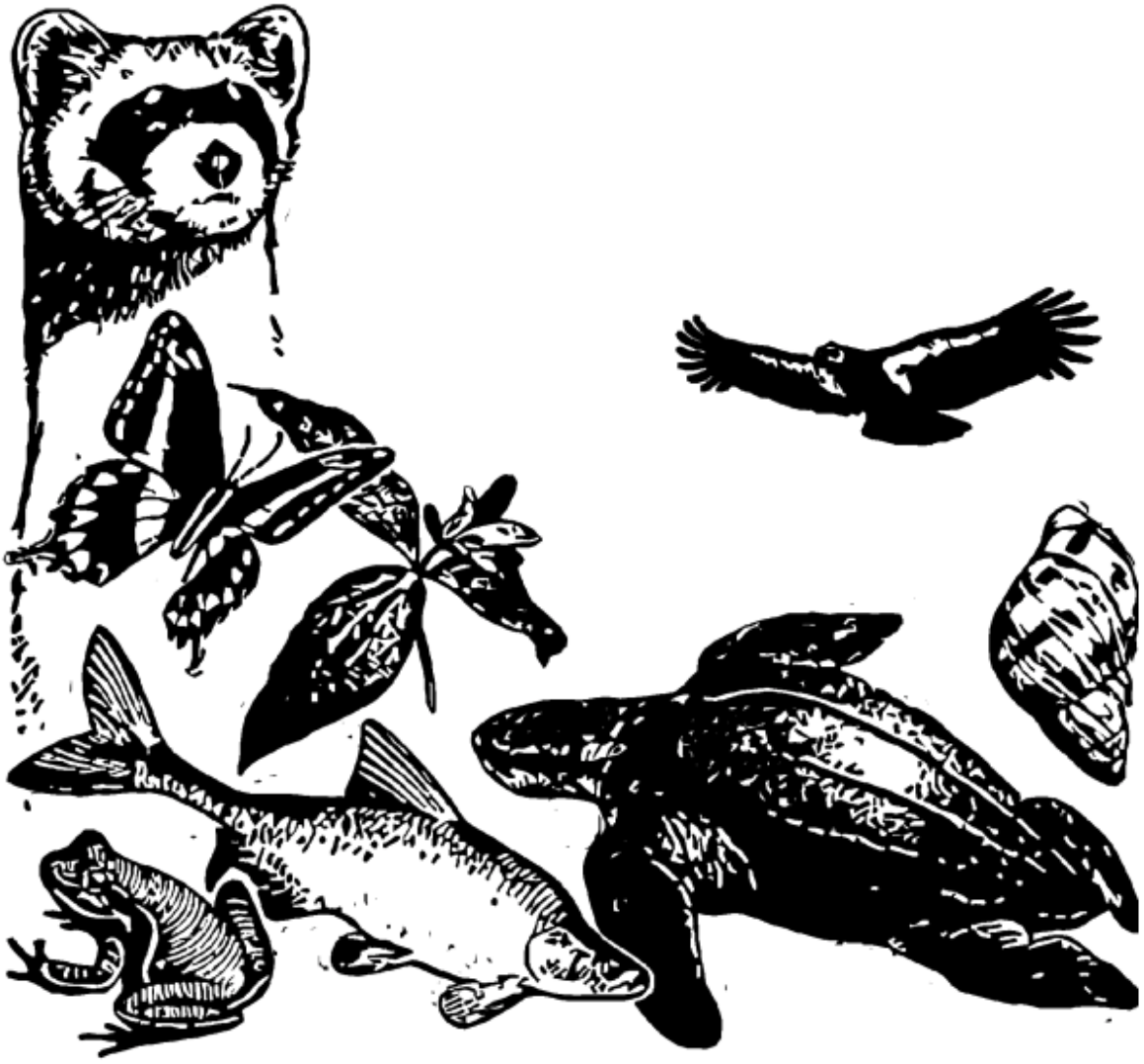

IPaC - Information for Planning and Consultation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish and Wildlife Service environmental review process.

# Environmental Screening for Eastern Massasauga Rattlesnake in Michigan

March 14, 2017

## Background

The Eastern Massasauga Rattlesnake (EMR) is listed as a threatened species under the U.S. Endangered Species Act (Act). The Act protects the EMR and their habitat by prohibiting "take" and may require agencies to coordinate with the U.S. Fish and Wildlife Service (Service) before authorizing or funding an activity affecting the species. To streamline coordination, the Service's Michigan Ecological Services Field Office has developed a set of Best Management Practices (BMPs) for specific activities potentially impacting EMR in Michigan. These BMPs are voluntary and just one of the ways that compliance with the Act may be achieved.

Projects may…

- have no effect to EMR and no need for additional ESA compliance considerations.
- have potential for adverse effects, but use BMPs to avoid adverse effects (i.e., "not likely to adversely affect" EMR) or minimize the adverse effects.
- use surveys to confirm probable absence of EMR (contact the Service for survey guidance).
- use "Informal Consultation" with Service (for actions requiring a Federal permit or funding).
- use "Formal Consultation" with Service (for actions requiring a Federal permit or funding).
- develop a Habitat Conservation Plan and seek an ESA permit, if adverse effects cannot be avoided.

For activities not listed in the BMPs, please contact the Service for project-specific recommendations. In some cases implementation of BMPs may not be sufficient to avoid all adverse impacts to EMR and additional consultation with the Service may be required. The Service can assist planners in determining whether adverse effects are likely as a result of proposed projects, and whether implementation of BMPs is sufficient to remove the risk of adverse effects.

Additional information on compliance with the Act can be found:

For Federal actions/section 7 consultation:
https://www.fws.gov/midwest/Endangered/section7/s7process/index.html

For non-Federal actions:
https://www.fws.gov/midwest/endangered/permits/index.html

For questions or comments you may contact the Service below:

U.S. Fish and Wildlife Service
Michigan Ecological Services Field Office
2651 Coolidge Road, Suite 101
East Lansing, MI 48823
Phone: (517)351-2555
Email: eastlansing@fws.gov

## Definitions

**Active Season:** The active season begins in the spring when snakes emerge from hibernation, generally when maximum air temperatures are above 50°F, and ends in the fall when EMR have returned to their hibernacula and temperatures are consistently below 45°F. In Michigan, the active season is generally April through October. The active season dates will vary by location and weather. **Contact the Service for project-specific dates based on location when work in EMR habitat is planned near the start or end of the active season**.

**Affecting hydrology:** We consider "affecting hydrology" to include projects that are likely to appreciably change the elevations of surface water upstream or downstream, or in the local ground water (as estimated pre-project vs. post-project). The concern is for changes to local hydrology (e.g., creating new ditches, creating a new impoundment) that might harm EMR hibernating at or near ground water, or actions that significantly alter available suitable habitat either through flooding or drying of EMR wetlands.

**Hibernacula:** Areas suitable for EMR to overwinter. For most EMR populations, the locations of hibernacula are not known, but these areas are critical to protect. Unfortunately, we lack information on how to reliably identify these areas. EMR usually hibernate below the frost line in crayfish or small mammal burrows, tree root networks or rock cervices in or along the edge of wetlands or in adjacent upland areas with presumably high water tables (areas where the soil is saturated but not inundated). Following egress from hibernacula in the spring, EMR typically remain aboveground in the vicinity for a week or two, and return to these areas in the fall for several weeks prior to entering hibernation. Surveys in the spring (shorting following egress) or fall (prior to ingress) when snakes are congregating in the vicinity may help identify these important areas. Maintaining stable hydrology of these areas is important during the inactive season.

**IPaC:** "Information for Planning and Conservation" is a project planning tool available on-line to the public that streamlines the Service's environmental review process.

**EMR Habitat:** "Eastern Massasaugas have been found in a variety of wetland habitats. Populations in southern Michigan are typically associated with open wetlands, particularly prairie fens, while those in northern Michigan are known from open wetlands and lowland coniferous forests, such as cedar swamps. Some populations of Eastern Massasaugas also utilize open uplands and/or forest openings for foraging, basking, gestation and parturition (i.e., giving birth to young). Massasauga habitats generally appear to be characterized by the following: (1) open, sunny areas intermixed with shaded areas, presumably for thermoregulation; (2) presence of the water table near the surface for hibernation; and (3) variable elevations between adjoining lowland and upland habitats." From Michigan Natural Features Inventory (Website: mnfi.anr.msu.edu)

**Tier 1 Habitat:** Areas known to be occupied by EMR or highly likely to be occupied by EMR.

**Tier 2 Habitat:** Areas with high potential habitat and may be occupied by EMR.

**Within the known range:** EMR can occur throughout the Lower Peninsula and on Bois Blanc Island in Mackinac County. Areas within the known range but outside of Tier 1 and Tier 2 are considered less likely to be occupied. EMR is highly secretive and cryptic in nature, and can persist in low densities, which makes them difficult to detect. Further, there are extensive areas of the state that have never been surveyed. It is likely that there are additional and yet-unknown occurrences throughout the Lower Peninsula of Michigan. Mapped habitats are subject to change based on new information identifying current Tier 1 and 2 areas as unsuitable, or based on discovery of new EMR occurrences.

# EMR Environmental Screening Step-wise Process

## Step 1. Determine if EMR may be present in the action area

- ✓ Determine whether the project is in potential EMR habitat using https://ecos.fws.gov/ipac
  - o You can search for your project location and define the action area by drawing a polygon or uploading a shapefile.
  - o IPaC will give you a list of species that may be present in the area you identified. If you click on the thumbnail for EMR, it will tell you if your project is within Tier 1 or Tier 2 habitat, or within the known range of EMR. If EMR is not listed, you do not need to consider this species. Effects to other listed species should also be considered; contact the Service if you need assistance.
  - o If EMR is listed, it does not necessarily mean that the entire action area is potential habitat, only that some potential habitat is within the action area entered. For large-scale (e.g., county-wide or multi-county projects) consider coordinating the Michigan Ecological Services Field Office for direct assistance.

***If your project is within the known range of EMR, including Tier 1 or Tier 2 habitat, continue to step 2:***

## Step 2. Determine if the project has the potential to affect EMR

### Projects have no effect on EMR when…

- ✓ There is no suitable EMR habitat in the project area and no potential impact off-site (e.g., water discharge into adjacent EMR habitat). If project site conditions are determined to be wholly unsuitable for EMR (e.g., project is in regularly mowed turf grass, row crop, graveled lot, existing building, or industrial site), it is not suitable EMR habitat.
- ✓ The project occurs within suitable habitat, but the action will have absolutely no effect on the habitat or EMR.
- ✓ In suitable EMR habitat, but the site is entirely unoccupied by the species. This is typically confirmed through surveys (contact the Service for more information). In some cases it may be easier to assume EMR are present and use BMPs than to conduct surveys for the species.

***For projects where there is a potential for effects to EMR, continue to the section of the document as follows:***

***For Tier 1 Habitat ..... Page 5***

***For Tier 2 Habitat ..... Page 6***

***Within the range of EMR ..... Page 7***

***For projects with a combination of Tier 1 and Tier 2 habitat, follow the instructions for Tier 1.***

# Tier 1 Habitat

**Tier 1: Project will not affect EMR if all of the following apply:**

1. Project will not result in any changes to suitable EMR habitat quality, quantity, availability or distribution, including changes to local hydrology
2. If EMR are present in the project area, they are not likely to have any response as a result of exposure to the action or any environmental changes as a result of the action
3. Project includes all General Best Management Practices:
   a. Use wildlife-safe materials for erosion control and site restoration (see Erosion Control Resources side panel). In Tier 1 habitat, immediately eliminate use of erosion control products containing plastic mesh netting or other similar material that could entangle EMR.
   b. To increase human safety and awareness of EMR, those implementing the project should first watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (available at https://youtu.be/-PFnXe_e02w), or review the EMR factsheet (available at https://www.fws.gov/midwest/endangered/reptiles/eama/pdf/EMRfactsheetSept2016.pdf or by calling 517-351-2555.
   c. Require reporting of any EMR observations, or observation of any other listed threatened or endangered species, during project implementation to the Service within 24 hours.

**Tier 1: Project Not Affecting EMR Coordination Recommendation:** No pre-project coordination with Service needed. Document the steps above for your records.

**Tier 1: All Other Projects:** For any other projects in Tier 1 habitat that may affect EMR or its habitat, contact the Service for assistance in evaluating potential impacts. Best Management Practices (starting on page 8) are included for many actions to help with project planning, but may not be sufficient to avoid all adverse impacts. The Service can determine whether additional measures are necessary after a project-specific review.

## Erosion Control Resources

There are a variety of products that can be used for soil erosion and control requirements. These products may incorporate plastic mesh netting to help maintain form and function. This plastic netting has been demonstrated to entangle a wide variety of wildlife from birds to small mammals. In Michigan, soil erosion control netting has resulted in the documented mortality of a number of imperiled amphibian and reptile species including the EMR and the Eastern Fox Snake (State Threatened).

Several products for soil erosion and control exist that do not contain plastic netting including net-less erosion control blankets (for example, made of excelsior), loose mulch, hydraulic mulch, soil binders, unreinforced silt fences, and straw bales. Others are made from natural fibers (such as jute) and loosely woven together in a manner that allows wildlife to wiggle free. For more information regarding wildlife-safe erosion control measures contact the USFWS Michigan Ecological Services Field Office.

# Tier 2 Habitat

**Tier 2: Project is not likely to adversely affect EMR if all of the following apply:**

1. Project does not impact more than 1 acre of wetland habitat and includes all applicable activity-specific BMPs (starting on page 8), and
2. Project will not appreciably affect hydrology
3. Project includes all General Best Management Practices:
    a. Use wildlife-safe materials for erosion control and site restoration (See Erosion Control Resources side panel, page 4). In Tier 2 habitat, eliminate the use of erosion control products containing plastic mesh netting or other similar material that could ensnare EMR as soon as is feasible but no later than January 1, 2018.
    b. To increase human safety and awareness of EMR, those implementing the project should first watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (available at https://youtu.be/-PFnXe_e02w), or review the EMR factsheet (available at https://www.fws.gov/midwest/endangered/reptiles/eama/pdf/EMRfactsheetSept2016.pdf or by calling 517-351-2555.
    c. Require reporting of any EMR observations, or observation of any other listed threatened or endangered species, during project implementation to the Service within 24 hours.

**Tier 2: Project Not Likely to Adversely Affect EMR Coordination Recommendation:** Informal consultation with Service for actions requiring a Federal permit or funding. For non-Federal projects, document the steps above for your records, but no pre-project coordination with the Service needed.

**Tier 2: All Other Projects:** Coordinate with the Service for a project-level review to determine potential impacts and whether additional conservation measures are needed to avoid adverse effects.

# Within the known range of EMR

**For projects within the known range of EMR, but outside of Tier 1 and Tier 2 habitat:**

To help ensure your project is unlikely to affect EMR:

1. Project applies the General Best Management Practices:
    a. Use wildlife-safe materials for erosion control and site restoration (See Erosion Control Resources side panel, page 4). By January 1, 2019, eliminate the use of erosion control products containing plastic mesh netting or other similar material that could ensnare EMR (within the known range but outside of Tier1 or Tier 2 habitat).
    b. To increase human safety and awareness of EMR, those implementing the project should first watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (available at https://youtu.be/-PFnXe_e02w), or review the EMR factsheet (available at https://www.fws.gov/midwest/endangered/reptiles/eama/pdf/EMRfactsheetSept2016.pdf or by calling 517-351-2555.
    c. Require reporting of any EMR observations, or observation of any other listed threatened or endangered species, during project implementation to the Service within 24 hours.
2. Project will not have significant impacts to dispersal, connectivity, or hydrology of existing EMR potential habitat, i.e., filling less than 1 acre of wetland habitat or converting less than 20 acres of uplands of potential EMR habitat (uplands associated with high quality wetland habitat) to other land uses.

**Within the Known Range, but Outside Tier 1 or 2 Coordination Recommendation:**
Document the steps above for your records and no pre-project coordination with the Service needed. If you cannot implement the General Best Management Practices contact the Service for assistance in evaluating potential impacts.

# Activity-Specific Best Management Practices

*For Tier 1, BMPs are included; however, even with implementation of the BMPs, project-specific review may be needed to determine whether they are sufficient to avoid all adverse impacts*

- In Tier 1 habitat, contact the Service regarding the potential applicability of surveys to determine EMR absence in suitable habitat. In Tier 2, surveys can be conducted to confirm the presence of suitable habitat and/or the presence/probable absence of EMR. If onsite habitat is determined to be wholly unsuitable via desktop analysis (e.g., entirely mowed lawn, row crop, graveled lot, and industrial site), then it can be classified as unoccupied and the BMPs will not be necessary.
- Minimize work in Tier 1 and Tier 2 EMR habitat. When feasible, do not route new construction projects, such as pipelines, facilities, or access roads, through potential EMR habitat. Implement the use of wildlife-friendly corridors (e.g., oversized culverts) into new road design to maintain or enhance habitat connectivity.
- Projects should be designed to minimize the potential for disturbance to EMR during project activities.

## Maintenance Activities (includes nominal modifications to existing roads and infrastructure)

1. Ground Disturbing Activities
    a. All
        i. No known EMR hibernacula are destroyed or disturbed at any time of year. Because these areas are often not known:
            1. For Tier 1: contact the Service to determine whether adverse impacts are likely as a result of ground disturbing work in Tier 1 habitat.
            2. For Tier 2: when operating in potential hibernation areas (e.g., EMR wetlands and adjacent areas with crayfish burrows, rodent holes, small mammal burrows, etc.), work is conducted well within the active season (June – August) to avoid when snakes are likely to be present. During this time, they are most likely to be able to move out of the way of disturbance and have greater chances to find alternative hibernation sites. Destroying potential hibernacula may still impact snakes indirectly. Potential hibernation areas should be avoided to the extent possible.
    b. Grading
        i. When working during EMR active season, use exclusionary fencing to separate EMR habitat from the work site to prevent EMR from accessing the disturbance area. For example, in linear projects exclusionary fencing should run parallel to the disturbance, creating a barrier to snake movement. Each end of the exclusionary fencing should be angled away from the area of disturbance to direct snakes traveling along fencing away from the site. The

exclusionary fencing will typically be traditional silt fence that is set up outside of all areas of disturbance and other types of fencing (i.e., snow fence used to delineate the work zone). Do not use fencing materials that can entangle or injure snakes.

ii. Any areas using exclusionary fencing should first be "cleared" by a qualified individual[1] before beginning construction activities. Fencing should be installed a minimum of 1 day before construction activities occur and walked weekly to ensure the integrity of the fence. If snakes are seen within the work zone, activity should stop until the snake can be safely moved, and the fence examined for breeches.

iii. Revegetate all disturbed Tier 1 and Tier 2 habitat with appropriate plant species (i.e., native species or other suitable non-invasive species present on site prior to disturbance). Monitor all restoration plantings for proper establishment and implement supplemental plantings as necessary to ensure restorations are of equal to or better habitat quality than previous conditions.

iv. In Tier 1 and Tier 2, avoid spread of invasive species into EMR habitat by following best practices. This includes inspecting and cleaning equipment and vehicles between work sites as needed to avoid the spread of invasive plant materials.

c. Trenching
   i. In Tier 1 and Tier 2, avoid trenching in EMR wetlands when possible. In Tier 1, if open trenching is required install exclusionary fencing (follow measures 1(b)(i)-(iv)) and ensure the area is clear prior to trenching.

d. Fill
   i. In Tier 1 and Tier 2, ensure all imported fill material is free from contaminants or invasive species could affect the species or habitat through acquisition of materials at an appropriate quarry or other such measures.
   ii. In Tier 1 and Tier 2, use exclusionary fencing around the area to be filled and have the site "cleared" prior to placing fill by a qualified individual (as in 1(b)(i)-(ii).

e. Ditching
   i. For Tier 1 and Tier 2, conduct work well within the active season (June-August) when snakes are not likely to be near hibernation sites and can escape disturbance, or contact Service for project specific recommendations.
   ii. For Tier 1, use exclusionary fencing around the area to be cleared/graded and have the site cleared by a qualified individual prior to construction activities.
   iii. For Tier 1, contact the Service for work greater than 200' for project specific recommendations.

[1] A qualified individual is someone who has received training on the identification and life history of EMR.

2. Site Access with vehicles (both Tiers)
    a. Limit operating vehicles/equipment, clearing trees, etc., in EMR habitat to the inactive season when the ground is frozen. During this time, under these conditions, EMR are most likely underground and will not be impacted by these activities. When possible, use low-impact equipment such as light weight track mounted vehicles with low ground pressure. In Tier 1, if the ground isn't completely frozen (due to weather conditions during the inactive season or if working near seeps and springs that are less likely to freeze), or if working near potential hibernacula, manual access (on foot) may be required.
    b. Strictly control and minimize vehicle activity in known/presumed occupied EMR habitat to the extent possible. During EMR active season, speed limits at facilities and access roads (i.e., 2-track and gravel) in occupied habitat should be <15 MPH.
    c. In Tier 1 and Tier 2 habitat areas, drivers should be aware of the potential danger to the driver of swerving to intentionally drive over snakes as well as legal and conservation implications.

3. Heavy Equipment (both Tiers)
    a. Spill Prevention for oils/fluids
        i. Site staging areas for equipment, fuel, materials, and personnel at least 100 feet from the waterway, if available, to reduce the potential for sediment and hazardous spills entering the waterway. If sufficient space is not available, a shorter distance can be used with additional control measures (e.g., redundant spill containment structures, on-site staging of spill containment/clean-up equipment and materials). If a reportable spill has impacted occupied habitat:
            1. Follow spill response plan;
            2. Call MDEQ and the National Response Center (800-424-8802), and the Service's Michigan Ecological Services Field Office (517-351-2555) to report the release.
    b. Do not use large equipment or perform earth-moving activities, water withdrawal and discharge for hydrostatic testing, or other activities that substantially affect the ground or water levels in potential EMR hibernacula areas. Avoidance measures may include, but are not limited to, re-routing of pipeline and appurtenance facilities, boring or drilling, and timing/weather-related restrictions. Measures will be determined on a site-specific basis, based on local habitat conditions, contact Service for more information.

4. Hydrology impacts (both Tiers)
        i. Water levels in known/presumed occupied habitats should not be artificially manipulated during the inactive season.

ii. Where applicable, water levels should be allowed to flow naturally and not be artificially stabilized. This allows for the restoration of early successional habitats.

## Habitat Management and Restoration

5. Vegetation Management
    a. Mowing
        i. In Tier 1, mow during the inactive season.
        ii. For Tier 2, mowing is unrestricted during the inactive season. During the active season, follow daytime mowing restrictions and mow during times of day when snakes are less likely to be active (Figure 1). Increase mower deck height to >8 inches to reduce likelihood of injury to snakes. Higher deck height will reduce the risk of death or injury to snakes in the area.
        iii. In areas with turf grass or areas where trying to discourage EMR (e.g., in areas around buildings), mow regularly and keep grass relatively short (less than 4-6 inches) to reduce its suitability for EMR. If starting with longer grass (greater than 6 inches), mow during the inactive season initially, and then maintenance mowing can occur during the active season (as long as it is regularly maintained and kept shorter than 4-6 inches, so that EMR is unlikely to use those areas). Unmaintained/longer grass may be used by snakes and make them vulnerable to mortality during the next mowing event.

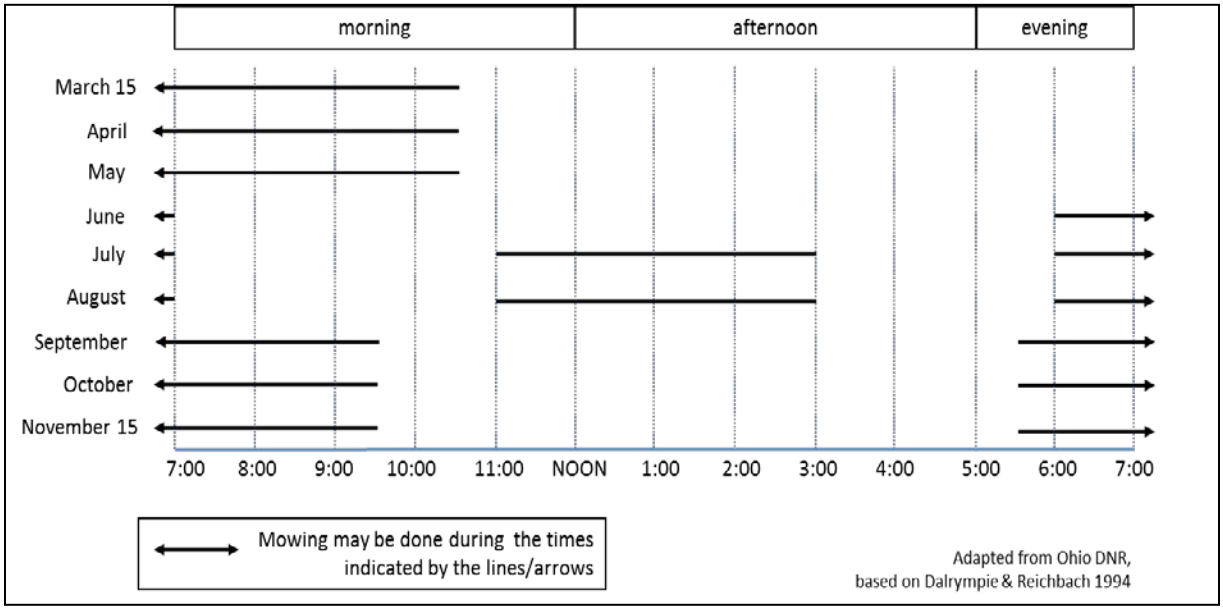


**Figure 1. EMR Active season mowing schedule (NiSource Biological Opinion, page 273, USFWS 2015)**

b. Cultivation (e.g., disking)
    i. In Tier 1 habitat, disking should be limited to the inactive season, and areas within 50 m of known or potential hibernacula should be avoided. In Tier 2, disking can occur in the active season if area is mowed during the inactive season and maintained shorter than 4-5 inches.
c. Brush/Tree Removal
    i. In Tier 1, conduct brush or tree removal in known/presumed EMR habitat during the inactive season, when the ground is frozen (such that soils can be left undisturbed).
    ii. Use low impact harvest methods in Tier 1 and Tier 2 wetlands to cut and remove individual trees. This includes using low-impact equipment such as light weight track mounted vehicles with low ground pressure. In Tier 1, if the ground isn't completely frozen (due to weather conditions during the inactive season or if working near seeps and springs that are less likely to freeze), or if working near potential hibernacula, use hand tools and access site on foot.
    iii. In Tier 1 and Tier 2, do not burn brush piles during the active season. Dispose of brush offsite or leave in place.
d. Herbicides
    i. Follow all appropriate label instructions regarding which herbicide formulation to use in potential EMR habitat. Avoid spray drift beyond the target species/area (observing label instructions regarding optimal wind speed and direction, boom height, droplet size calibration, precipitation forecast, etc.).
    ii. Avoid broadcast applications of herbicides in Tier 1. Spot spraying or wicking can be used to control invasive plants in occupied habitat. If using broadcast spray in Tier 2, limit the area of exposure to less than half of the available EMR habitat to allow for untreated areas to provide potential areas of refugia from exposure. Contact the Service if you need help in determining this.
e. Prescribed burning (Tier 1 and Tier 2)
    i. Conduct prescribed burns during the inactive season before snakes emerge from hibernation. Walk the burn unit following the burn and report any dead or injured EMR to the Service within 24 hours. Burn only a portion (e.g., one-third) of available EMR habitat in any year to leave suitable cover for EMR and its prey.
    ii. Establish fire breaks using existing fuel breaks (roads, rivers, trails, etc.) to the greatest extent possible. Cultivation (disking or roto-tilling) of burn breaks will be minimized to the extent that human health and safety are not jeopardized. Cultivation and mowing to establish fire breaks will occur during the inactive season.

6. Erosion control
    a. Use wildlife-safe erosion control blankets (without plastic mesh netting in the layers of material) as required in the general BMPs. Remove all silt fence used for erosion control once soils are stable to reduce barriers to EMR movement.
7. Revegetation
    a. Revegetate all disturbed Tier 1 and Tier 2 habitat with appropriate plant species (i.e., native species or other suitable non-invasive species present on site prior to disturbance). Monitor all restoration plantings for proper establishment and implement supplemental plantings as necessary to ensure restorations are of equal to or better habitat quality than previous conditions.
8. Invasive species
    a. In Tier 1 and Tier 2, avoid spread of invasive species into EMR habitat by following best practices. This includes inspecting and cleaning equipment and vehicles between work sites as needed to avoid the spread of invasive plant materials.
9. Wetland restoration
    a. Restoring natural hydrology in areas that have been drained by tiling and ditching may greatly benefit EMR habitat. Conduct tile breaking or excavation well within the active season to avoid potential hibernacula. Have a qualified individual walk in front of the equipment to clear the area. Work with the Service for Tier 1 habitat to ensure no indirect adverse effects are expected as a result of restoration efforts.
10. Water-level manipulation
    a. Water levels should not be artificially manipulated during the inactive season to avoid impacts to hibernating snakes. Contact the Service in Tier 1 habitat when water levels will be manipulated during the inactive season or will result in significant alterations to EMR habitat during the active season.

# HENNEPIN MARSH HABITAT RESTORATION THREATENED AND ENDANGERED SPECIES SUMMARY – MUSSEL UPDATE

Previously, Environmental Consulting & Technology, Inc. (ECT) reviewed the potential for threatened and endangered species to be present within the impact area of the Hennepin Marsh Habitat Restoration project. ECT identified elemental occurrences (EO) of three mussel species within the project area: eastern pondmussel, wavyrayed lampmussel, and northern riffleshell. As discussed in the review, those occurrences were not live specimens but empty valves from a survey conducted in 2006, which concluded that the lack of suitable habitat, the absence of any live mussel within the survey transects, and the low number of empty shells found indicated a very low probability that any live mussels were present within the area[1]. ECT initially recommended a survey to confirm their absence pending additional information review and consultations with experts. The purpose of this update is to provide to NOAA with a final recommendation on the need for mussel surveys.

Pete Badra conducted a mussel survey of the area in 2006 and his results of the survey were the most recent EOs in the Michigan Natural Features Inventory (MNFI) database query. ECT consulted with Mr. Badra and while he believed his conclusions would likely be accurate to date, he could not confirm since he had not conducted follow-up surveys since (personal communication, January 7, 2019). More recent mussel surveys (2019) have been conducted by Dr. Dave Zanatta (Central Michigan University) within the Detroit River. While no sites within the Trenton Channel (location of Hennepin Marsh) were surveyed due to contamination concerns, 56 sites within the Detroit River were surveyed. Within those 56 sites, no live eastern pondmussel, wavyrayed lampmussel, or northern riffleshell were encountered. Live mussels were only encountered at 5 of the 56 sites, with the majority (96%) of those found at two sites on the Canadian side of the river. Lastly, ECT has consulted the US Fish and Wildlife Service for previous projects in the Detroit River. Their opinion has been they assume all the listed species are extirpated from the Detroit River.

Based on recent survey data, the lack of suitable habitat in the project area, and previous consultations with experts and agency scientists, ECT does not recommend conducting mussel surveys in the project impact area. The likelihood of one of the three listed mussels being present is very low. Therefore, the project is not likely to affect any of the three listed species.

[1] Badra, P.J. 2006. Surveys for northern riffleshell (*Epioblasma torulosa rangiana*) in the Detroit River north of the Grosse Isle Toll Bridge. MFNI Report Number 2006-10.