



FRESHWATER MUSSELS: FEDERALLY LISTED SPECIES UPDATES, PROTOCOLS, AND CONSERVATION MEASURES

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Federally Listed Mussels in Michigan

- Snuffbox (*Epioblasma triquetra*)
- Rayed Bean (*Villosa fabalis*)
- Clubshell (*Pleurobema clava*)
- Northern Riffleshell (*Epioblasma rangiana*)
- Round Hickorynut (*Obovaria subrotundra*)



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 - Listed as Threatened with 4(d) Rules and Designated Critical Habitat (March 9, 2023)
 - 4(d) Rules
 - Conservation and restoration efforts by State wildlife agencies
 - Channel restoration projects
 - Bank restoration projects
 - Forest management activities that implement State-approved BMPs
- Extant in Pine, Belle, and Black rivers watersheds



Salamander Mussel (*Simpsonaias Ambigua*)

- Species description
 - Small (1.5-2 in), very thin shell
 - Lifespan- 10 years
- Host fully aquatic salamander
 - Mudpuppy
 - Only freshwater mussel in North America with non-fish host

Suitable habitat

- Not present in “traditional” mussel habitat (e.g., riffles, sand/ gravel bars, pools)
- Occupies large flat rocks, logs and other debris, bedrock crevices (e.g., Mudpuppy shelter habitat)
- Clumped/ colonial distribution within mudpuppy shelter habitat



Proposed Endangered Listing and Critical Habitat Designation

- USFWS Proposed Listing as Endangered (August 22, 2023)
- Extant Populations in Michigan:
 - Clinton River Hydrological Unit (Watershed)
 - St. Clair Hydrologic Unit (watersheds of the Belle, Pine, and Black rivers)
- Michigan Proposed Critical Habitat Designation:
 - Clinton River: 7 river miles in Oakland County
 - Mill Creek: 23.6 river miles in St. Clair County
- 60-day public comment period ends on October 23, 2023

Rangewide Distribution of Salamander Mussel

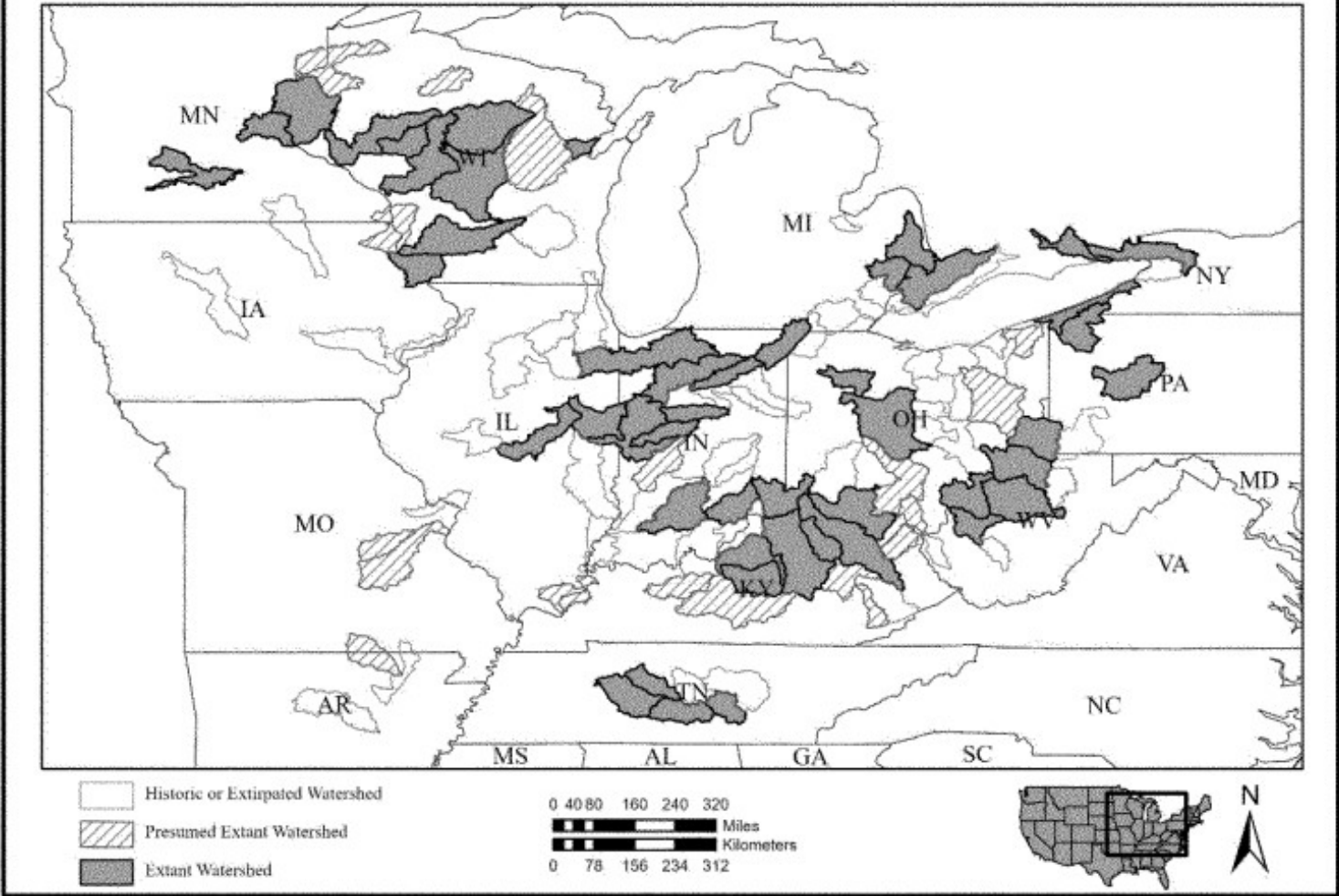
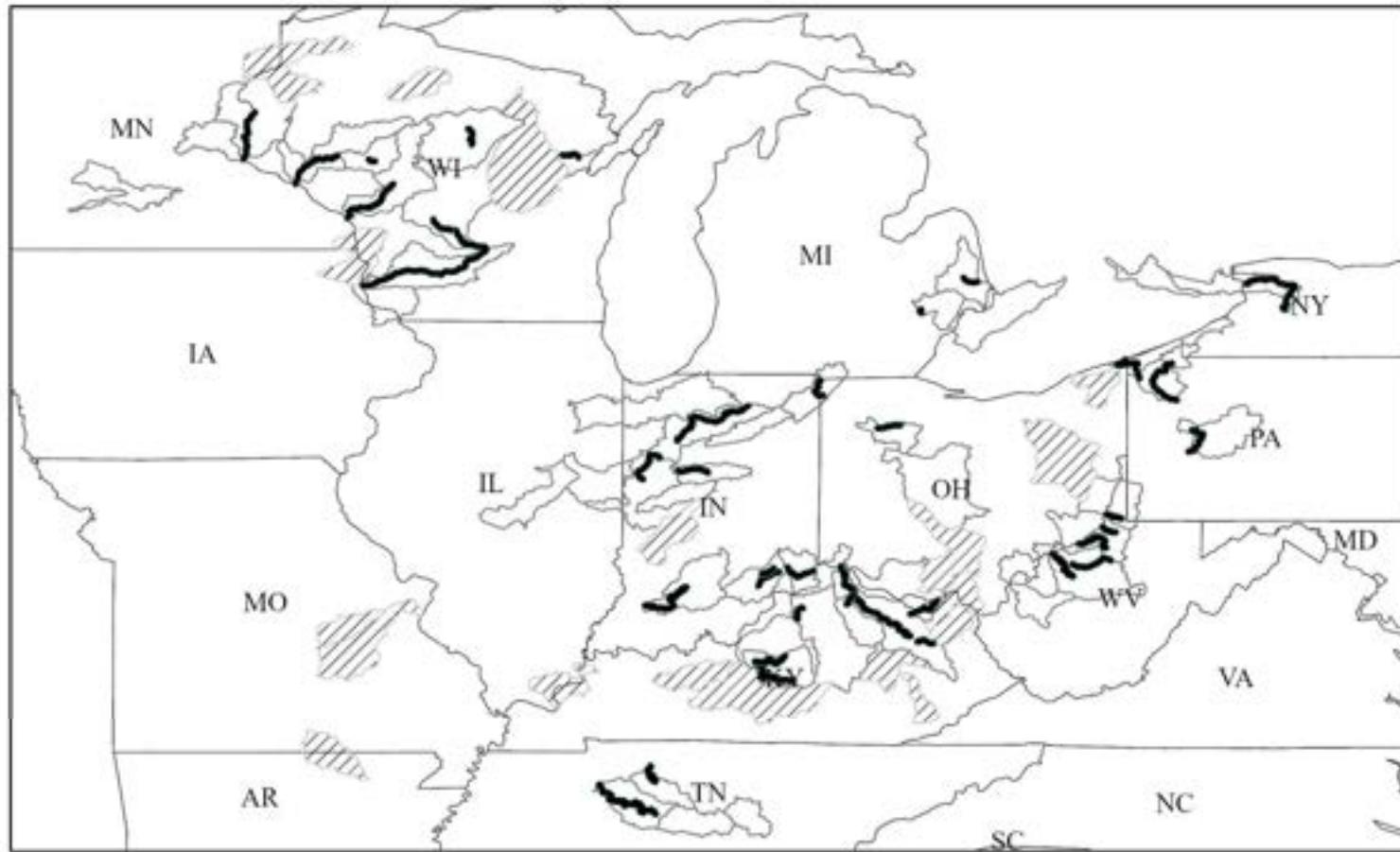
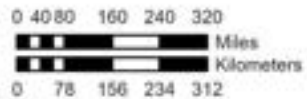


Figure 1. Distribution of all known populations of salamander mussel.

Index Map: Salamander Mussel Critical Habitat Units



- Critical Habitat Unit
- Extant Watershed
- ▨ Presumed Extant Watershed



Suitable Habitat





Michigan DNR



Michigan DNR

Protocols

- Ensure conservation/
minimize impacts
- Survey guidelines
- Survey methodology
- Relocation and rescue
procedures
- Permitting requirements
- Reporting requirements
- Workflow and
communication guidance



Lake/ Reservoir and Stream Group

- Lake and Reservoir Group

- Group 1: Lakes and reservoirs known or expected to support mussels considered to be special concern by the State, but lacking mussel occurrence data at the project site.
- Group 2: Lakes and reservoirs known or expected to support populations of State threatened and endangered mussels (Figure 2).
- Group 3: Lakes and reservoirs that support populations of federally-listed mussels (strictly based on element occurrence data, not modeled).

- Stream Groups

- Group 1: Stream and rivers likely to support mussels considered to be special concern by the State, but
- lacking mussel occurrence data at the project site.
- Group 2: Streams and rivers likely to support populations of State threatened and endangered mussels.
- Group 3: Rivers likely to support populations of federally listed mussels.



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Michigan Mussels

Mussel Map Viewer

The Mussel Map Viewer is an interactive tool to allow users to explore listed native mussels across the Michigan landscape. Watershed level species lists are available alongside the Mussel Protocol Stream Groups.

The Mussel Protocol Stream Groups are designed to document the **potential** presence or absence of state or federally listed mussel species. The layer was created by modeling the habitat suitability for each mussel species and may not correspond directly with a documented location for a listed mussel. A segment may be predicted as suitable for a number of mussel species, so the stream group number was assigned to the most restrictive of the potential mussel species present. The watersheds have associated mussel species data and can be queried to generate a species list. The Mussel Protocol Stream Groups only attribute is the corresponding stream group number.

[Go to the Mussel Map Viewer](#)

Mussel Protocol Data Availability

This data is available as an ESRI geodatabase packaged in zip file format and can be obtained at no cost with the signing of a data use agreement. Data can be requested by emailing mnfi@msu.edu

For more information, see the document [Michigan Freshwater Mussel Survey Protocols and Relocation Procedures](#)

Freshwater Mussel Information

Freshwater Mussels of Michigan posters can be ordered for \$3.00 on the [MNFI online store](#)


For more information on mussels and the role they play in our environment, download the [Freshwater Mussels of Michigan brochure](#)



About

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The Michigan Mussels Web App contains federal and state-listed mussel species occurrence by HUC 10 watershed. These mussel records are from the Michigan Natural Features Inventory (MNFI) Heritage Database of rare species and high-quality natural communities and are updated weekly.

Also included are the Mussel Protocol Stream Groups created by Michigan DNR and the USFWS. The group number triggers the type of mussel survey protocols and relocation procedures that must be followed.

 Query mussels by species or common name. In the Query Results tab, click the three horizontal dot menu and select "Show all related records" to view a layer of all the watersheds in which the mussel occurs.



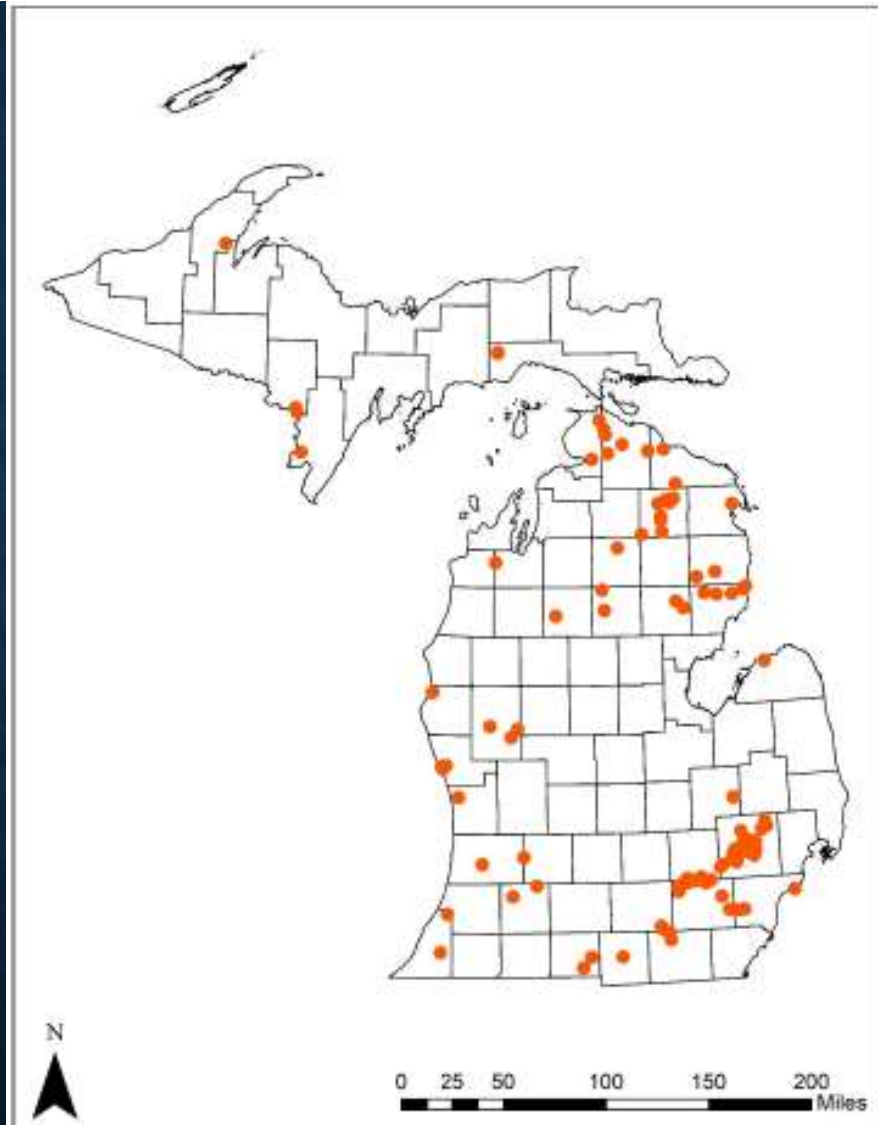


Figure 2: Group 2 lakes and reservoirs known or expected to support populations of state threatened and endangered mussels (source MDNR unpublished data).

Mussels and ESA Compliance

- Primary considerations for evaluating the potential for impacts to listed mussels:
 - Activities that may affect the substrate
 - Activities that have the potential to cause changes hydrology/ hydraulics
 - Activities that have the potential to alter water quality (e.g, dissolved oxygen temperature, sedimentation/ sediment transport, nutrients, contaminants)
- Examples of activities with potential to take or adversely affect listed mussels
 - Hydropower (e.g., operations, maintenance, and emergency actions)
 - Restoration projects (e.g., dam removal, other riparian or in river restoration efforts)
 - Transportation projects with indirect or direct impacts to waterbody
 - Recreational infrastructure (e.g., boat ramp, boardwalk)
 - Construction/ disturbance within the riparian areas (e.g., erosion control measures, shoreline stabilization, ROW development/ maintenance)

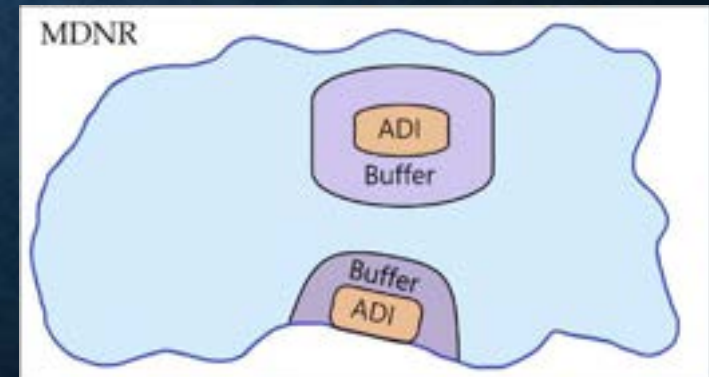
Conservation Measures

- **Avoidance**
- **Minimize Footprint**
 - Cofferdams
 - Drawdown Measures (season, rate etc.).
 - Soil and Erosion Control Measures
 - Turbidity Control Measures
 - Minimum Flow
- **Rescue and relocation efforts informed by survey effort**



Conservation Measures: Survey and Rescue/Relocation

- Defined Survey Area Includes:
 - Area of direct and indirect impact
 - altered hydrology, water quality (temperature, nutrients, sedimentation etc.)
- Survey and Relocation
 - Water temp > 50° and air temp 50-90°
 - June 1 – October 15
 - **Must** provide survey plans to MDNR (all rivers/streams) and/or FWS (Group 3 only) for review **in advance** of surveys



Conservation Measures: Rescue/ Relocation

- Goals of mussel rescue and relocation efforts
 - Maximize survival and fitness of relocated individuals
 - Minimize risk to the resident mussel fauna at the relocation site
 - Document relocation outcomes to inform future relocation efforts
 - Prioritize reduction of stress and mortality to listed species while minimizing stress and mortality to the broader mussel assemblage to the extent possible.



Conservation Measures: Permitting

- Permit Requirements
 - State (survey and relocation)
 - Cultural and Scientific Collectors Permit issued by the MDNR Fisheries Division (Group 1, 2, 3)
 - Threatened and Endangered Species Permit, MDNR Endangered Species Program (Group 2)
 - Federal Permits
 - Section 10(a)(1)(A) permits for scientific purposes or to enhance the propagation or survival of a species (Group 3, survey).
 - Authorization from USFWS required for relocation of federally listed species via section 7 or section 10a1B.



QUESTIONS?

