Unionid Mussel Surveys at Podunk Creek, Barry County, Michigan



Prepared By:

Ashley A. Cole-Wick and Peter J. Badra Michigan Natural Features Inventory Michigan State University Extension P.O. Box 30444 Lansing, MI 48909-7944

Prepared For: Mitch Lettow Southwest Michigan Land Conservancy

9/30/2022

MNFI Report No. 2022-23



MICHIGAN STATE UNIVERSITY Extension

Acknowledgements

Funding for this survey was provided by Southwest Michigan Land Conservancy and their donors. Thank you to Mitch Lettow and Lydia Mehlhose for assistance with fieldwork. Deb Richardson, Ashley Adkins, and Brian Klatt provided essential administrative support.



Suggested Citation: Cole-Wick, A.A. and P.J. Badra. 2022. Unionid Mussel Surveys at Podunk Creek, Barry County, Michigan. Michigan Natural Features Inventory, Report No. 2022-23, Lansing, MI.

Copyright 2022 Michigan State University Board of Trustees. MSU Extension programs and materials are open to all without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, marital status or family status.

Cover Photo: Michigan Natural Features Inventory scientists searching for mussels in Podunk Creek using glass bottom buckets.

Acknowledgements Photos: Staff from Southwest Michigan Land Conservancy assists Michigan Natural Features Inventory with mussel surveys at Podunk Creek.

Purpose

Michigan Natural Features Inventory (MNFI), in cooperation with Southwest Michigan Land Conservancy (SWMLC), conducted a unionid mussel survey along Podunk Creek in August 2022. Podunk Creek flows through the SWMLC Freese Property in Barry County, a newly acquired preserve. The aim of this survey was to determine unionid mussel species presence/absence and relative abundance, assess the status of invasive species, such as zebra mussels (*Dreissena polymorpha*), and understand the water quality through aquatic fauna at the site. To our knowledge, this is the first time this stretch of the creek has been surveyed for unionid fauna. This study is part of an ongoing effort to document and assess the flora and fauna of this new preserve.

Methods

Location of surveys sites were chosen with guidance from SWMLC staff. The 90-acre preserve contains approximately 990 meters of Podunk Creek. took place in wadable habitats in forested sections of the preserve and utilized visual and tactile methods of detection. The number of individuals (live or shell) was determined for unionid mussel species at each site. We measured the search area at each site by multiplying the length of stream surveyed by the average width of that section of creek. We searched from bank to bank to encompass all microhabitats of the creek.

Live unionids and shells were located with a combination of visual and tactile means. Glass bottom buckets were used to facilitate visual searches. Tactile searches were used to detect mussels buried in substrate by passing our hands through the substrate and moving rocks and pebbles. Any live individuals were identified to species and planted back into the substrate anterior end own (siphon end up) in the immediate vicinity of where they were found. Shells were identified to species when possible, and we noted the number of shell fragments that were not identifiable. Additionally, we identified other aquatic fauna detected during surveys, such as aquatic snails and crayfish. We recorded habitat data to describe and document conditions at the time of survey. The substrate within each transect was characterized by estimating percent composition of each of the following six particle size classes (diameter); boulder (>256mm), cobble (256-64mm), pebble (64-16mm), gravel (16-2mm), sand (2-0.0625mm), and silt/clay (<0.0625mm; Hynes 1970). Woody debris, aquatic vegetation, exposed solid clay substrate, and erosion were noted when observed. Conductivity and pH were recorded with an Oakton handheld meter. Alkalinity and hardness were measured with LaMotte water chemistry kits. Latitude and longitude of sites were recorded with GPS.

Results

We completed surveys at three locations in Podunk Creek, latitude and longitude coordinates are included in Table 1. Of the approximately 990m of stream length contained on the Freese property, we cumulatively searched 190m of Podunk Creek (Table 1).

Site	Latitude	Longitude	Length	Width	Total Area
1	42.6111288	-85.3828199	28m	3.5m	98m ²
2	42.6108228	-85.3822952	52m	3.5m	182m ²
3	42.6103680	-85.3804965	110m	4.0m	440m ²

Table 1. Locations of the three surveys sites and length, width, and total area of waterway surveyed on August 11, 2022 along Podunk Creek in Barry County, Michigan.

No live unionid mussels were found at the three sites surveyed, however we encountered complete and partial shells of mussels, presented in Table 2. We identified shells of five species during the August

2022 surveys. Some of these mussel shells were only lightly worn, one with ligaments still attached, leading us to conclude that this mussel was alive until recently. Additionally, we observed 22 fragments of mussel shells that were not identifiable to species. Out of the mussel shells we identified, one of the species is State Threatened and three are State Special Concern. We did not observe any invasive aquatic species during our survey.

We documented three non-mussel aquatic species during surveys: two species of snails and one species of crayfish. We observed the northern clearwater crayfish (*Orconectes propinquus*) at two sites. This crayfish is similar in appearance to the invasive rusty crayfish (*O. rusticus*), but the northern clearwater lacks the rust-colored saddle. We encountered one aquatic freshwater snail, the pointed campeloma (*Campeloma decisum*) at two sites. We observed a second freshwater snail species, two-ridge rams-horn (*Helisoma anceps*) at all three sites.

Unionid m		Site		Total			
Species	Common Name	1	2	3			
Alasmidonta viridis (T)	Slippershell		1	2	3		
Eurynia dilatata	Spike		2	2	4		
Lasmigona compressa (SC)	Creek heelsplitter			3	3		
Pleurobema sintoxia (SC)	Round pigtoe			2	2		
Venustaconcha ellipsiformis* (SC)	Ellipse	1*	1		2		
NA	Unidentifiable fragment	5	5	12	22		
Non-mussel species							
Campeloma decisum	Pointed campeloma	1		2	3		
Helisoma anceps	Two-ridge rams-horn	1	4	3	8		
Orconectes propinquus	Northern clearwater crayfish		1	1	2		
Area searched (m ²)		98m ²	182 m ²	440 m ²			

Table 2. Numbers of unionid mussels and other aquatic fauna recorded at each survey site, August 2022.No live unionid mussels were found during surveys, so all individuals noted are shells.

We collected water chemistry data at Site 1, since all three sites were located close together. The pH of Podunk Creek was 8.13, conductivity was 487 μ S, dissolved oxygen was 87.5%, and water temperature was 19.7°C (67.5°F). Conductivity of Podunk Creek (487 μ S) was within an acceptable range for native freshwater mussels and other aquatic life. Streams supporting good fisheries typically measure between 150 and 500 μ S. Dissolved oxygen levels in Podunk Creek (87.5%, equivalent to 7.77 mg/L at 19.7°C), is high enough to support native mussels, fish, and other aquatic species. Overall, Podunk Creek was predominately comprised of riffles and runs, with few pools (Table 3). Mostly pebble and gravel substrate, Podunk Creek contained little sand and silt (Table 3).

Table 3. Substrate particle size composition based on visual estimation within the area surveyed at each survey site. Particle size classes are based on Hynes (1970): boulder (>256mm), cobble (256-64mm), pebble (64-16mm), gravel (16-2mm), sand (2-0.0625mm), and silt/clay (<0.0625mm).

Site	Aquatic vegetation	Woody debris	%Pool	%Riffle	%Run	%Boulder	%Cobble	%Pebble	%Gravel	%Sand	%Silt
1	Ν	Y	0	33	67	0	5	20	60	10	5
2	Ν	Y	20	40	40	0	5	35	35	20	5
3	Ν	Y	10	45	45	5	5	20	50	10	10



Freshwater mussels and snail shells found at Site 2 in Podunk Creek, Barry County, Michigan.

Discussion

We documented shells of five species of freshwater unionid mussels, two species of aquatic snails, and one species of native crawfish during a one-day survey at Podunk Creek at SWMLC's Freese property in August 2022. While the presence of mussel shells lends evidence that the larger waterway supports both common and rare unionids, the lack of live mussels within the area surveyed is possibly concerning.



Northern clearwater crayfish (*Orconectes propinquus*) and a lightly worn ellipse mussel (*Venustaconcha ellipsiformis*) with ligaments attached were both found during August 2022 surveys of Podunk Creek.

The ellipse (*Venustaconcha ellipsiformis*) shell found at Site 1 was deceased, but still in the filter feeding position. The ligaments that hold the two halves of the shell together were still intact, leading us to believe that this mussel was living in this stretch of Podunk Creek, rather than having been transferred from another waterbody. The ellipse was one of two species of Special Concern that we documented via shell, along with six shells from the State Threatened slippershell (*Alasmidonta viridis*).

Coolwater streams, which are intermediate between coldwater 'trout' streams and more diverse warmwater streams, in Michigan have been defined as having June through August mean water temperatures of 17.0-20.5°C and maximum daily mean temperatures of 20.7–24.6°C (Lyons et al. 2009). Subclasses of coolwater streams, coldwater transitional and warmwater transitional, have July mean water temperatures of 17.5–19.5°C and 19.5–21.0°C, respectively (Lyons et al. 2009). We measured a water temperature of 19.8°C (67.5°F) in Podunk Creek in the afternoon of August 11, 2022. Temperature data, taken over a longer time period, and/or fish community data would provide stronger evidence for

classifying Podunk Creek as a cold transitional or warm transitional stream. Increasing natural vegetation along the tributary to the east and upstream in Podunk Creek could potentially improve water quality and reduce unnatural elevation of water temperatures in Podunk Creek. Coolwater streams occur widely in temperate regions but are poorly understood (Lyons et al. 2009). Mussel diversity tends to be higher in larger rivers with higher numbers of fish species, and these tend to be warmer rivers than smaller streams with fewer fish species and colder temperatures.

Overall, the quality of the riparian area throughout the preserve was intact, with ample areas on either side providing natural riparian buffer. The tributary coming from the east passes through a farm to the east of Hull Road and may be the source of nonpoint source pollution, impacting the stream. The tributary from the south of the Preserve seems to be relatively intact. Environmental contaminants and toxins in stormwater runoff, heavy nutrient loading from agricultural sources and fertilized lawns, thermal pollution, increased erosion and siltation, and construction of dams and impoundments all pose a threat to freshwater mussels. According to the Environmental Protection Agency, nonpoint source pollution remains the leading cause of the deterioration of water quality across the United States (EPA 2022). It is recommended that efforts be made to ensure that these threats are avoided along the creek to protect any living mussels that continue to survive in Podunk Creek and other waterways in the area. Working with neighboring landowners to restore or maintain riparian buffer zones, especially in areas with agricultural activities, could likely benefit the fauna and overall water quality of this creek. It is likely, given our documentation of lightly worn mussel shells, that some persist in this stream. Therefore, we recommend managing for these species and conducting follow-up surveys in future years.

Literature Cited

EPA [Environmental Protection Agency]. 2022. Updated August 23, 2022. https://www.epa.gov/nps

Hynes, H.B.N. 1970. The Ecology of Running Waters. Liverpool University Press, Liverpool, pg. 24.

Lyons, J., T. Zorn, J. Stewart, P. Seelbach, K. Wehrly, L. Wang. 2009. Defining and Characterizing Coolwater Streams and Their Fish Assemblages in Michigan and Wisconsin, USA. North American Journal of Fisheries Management – North American Journal of Fish Management. 29: 1130-1151. 10.1577/M08-118.1.