

FINAL REPORT: MOLLUSK SURVEY RESULTS FROM 2021-2024
FOR FOUR LAKES TASK FORCE

by

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2024 was the final year completing contracted research on native freshwater mussels for the Four Lakes Task Force. Smallwood, Secord, Wixom, and Sanford mussel surveys and reports (Woolnough et al. 2021; Laszlo et al. 2022) were completed in previous years and the pull-ahead report for the summary of snuffbox (*Epioblasma triquetra*) was completed ahead of time at the request of the Four Lakes Task Force (FLTF) (Woolnough et al. 2022).

In summary, during 2021 and 2022, standard survey methods for unionids were used to collect data. A total of 130 randomized, targeted, coverage, and tributary sites were selected using GIS and surveyed to assess as much of the region as possible (Fig. 1). Surveys were conducted with a minimum of 4 person-hours for snorkeling search methods with depths < 1 m and 1 person-hour for SCUBA search methods with depths > 1 m. Abiotic data such as sediment composition, water depth, macrophyte abundance, and siltation were estimated at all sites (data available as requested and has been provided to FLTF). Unionid and invasive species, species richness and abundance were assessed at all sites.

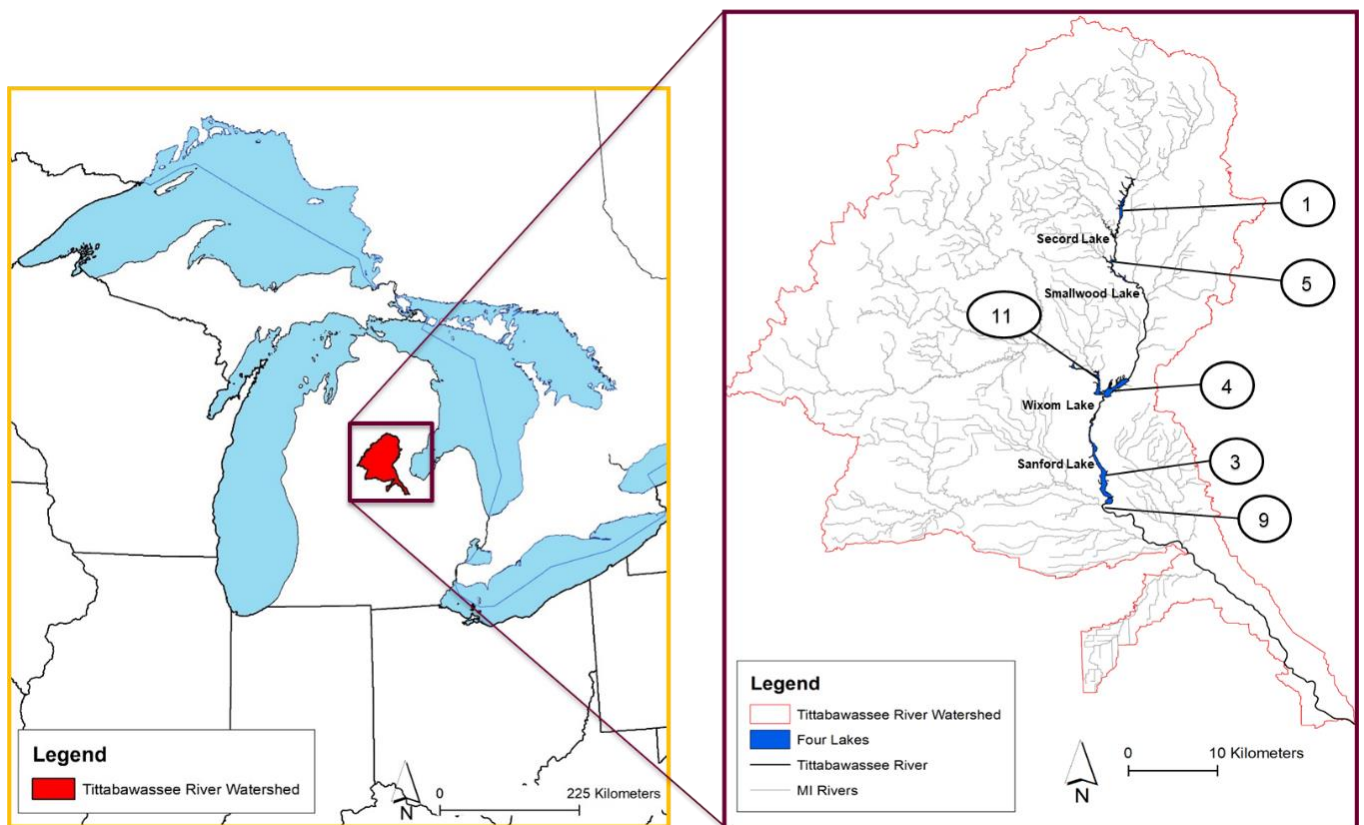


Figure 1. Four Lakes system located in the Tittabawassee River watershed. Secord, Smallwood, Wixom, and Sanford lakes and downstream of Sanford dam were surveyed in 2021 and 2022. Circles represent number of live unionid species found in lake regions.

In Secord and Smallwood lakes, that were surveyed in 2021, 5 live unionid species and 11 shell species were found, totaling 12 species (Fig. 2). *Pyganodon grandis* was the most common species in both Secord and Smallwood lakes. For invasive species, *Dreissena polymorpha* were found at 93% (Secord) and 94% (Smallwood) of all sites, with medium to high intensities. *Cipangopaludina chinensis* were found at 21% (Secord) and 16% (Smallwood) of sites with varying intensities. See Woolnough et al. (2021) for further detail on Secord and Smallwood survey results.

Wixom and Sanford lakes and downstream of Sanford Dam were surveyed in 2022, 17 live unionid species, 4 of which were found only below Sanford Dam, and 22 shell species were found, totaling 23 species (Fig. 2). The most common unionid species in both lakes and downstream of Sanford Dam were *Lampsilis cardium*, *P. grandis*, and *Lampsilis siliquoidea*. One live federally endangered *Epioblasma triquetra* was found in Wixom Lake (Tobacco River) in 2022. 46 *E. triquetra* shells were also found in the Wixom Lake (Tobacco River). For invasive species, *Dreissena polymorpha* were found at 21% (Wixom Lake – Tobacco River) , 29% (Wixom Lake – Tittabawassee River), 4% (Sanford Lake), and 80% (downstream of Sanford Dam) of sites, at low to medium intensities. One live *Cipangopaludina* sp. was found in a tributary of Wixom Lake (Tittabawassee River). See Lazslo et al. 2022 and Woolnough et al. 2022 for details on the 2022 surveys.

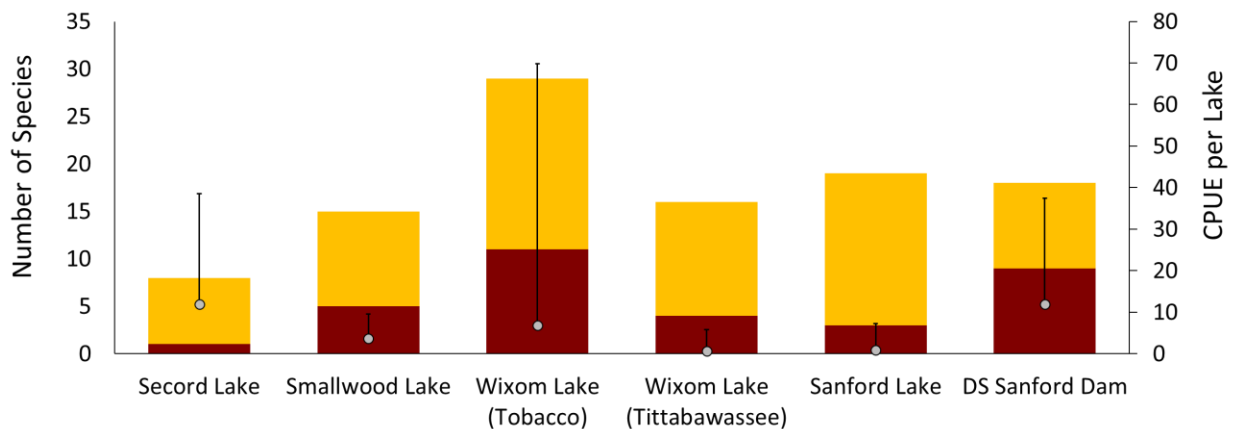


Figure 2. Comparison of live (red) and shell (yellow) unionid species found for each lake region- left y-axis. CPUE (number of live unionids per person hour; gray dots) with standard deviation error bars- right y-axis.

Abiotic data were summarized in above stated reports and substrate data are summarized in Fig. 3. See Woolnough and Zanatta (2024) for full summaries of the Wixom Lake region.

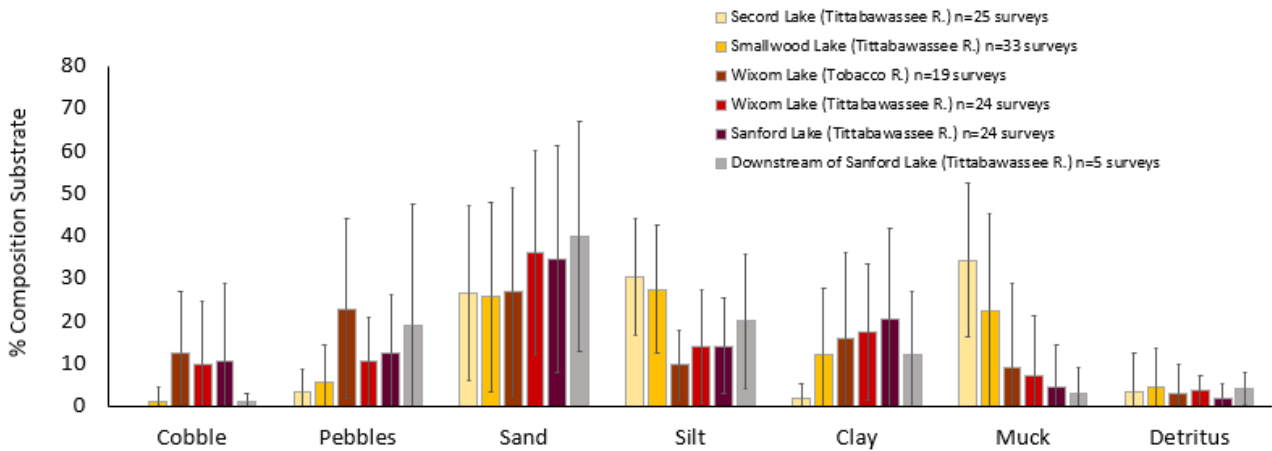


Figure 3. Comparison of estimated substrate size composition (average; %) per lake region based on Wentworth Scale (with muck and detritus). Error bars are standard deviations.

Nicole Vellequette successfully defended her MS thesis in March 2024. Her thesis focused on the Tobacco River arm of Wixom Lake “[Unionid Assemblage, Habitat, and Movement Upstream of Dams in Mid-Michigan, USA](#)”. Support for the surveys of Sites 13-19 in Vellequette’s (2024) thesis was provided as part of the FLTF funding. The results of these surveys helped support the Habitat Conservation Plan development by Merjent and data were shared with Merjent (A. Sampson and R. Roos) throughout the season. FLTF was invited to attend Nicole Vellequette’s thesis seminar (virtual and in-person). Both chapters of Vellequette’s thesis are currently in peer-review with *Freshwater Science*.

Also, in 2024 CMU was able to advise FLTF in the following:

- Worked with Merjent on requests for data collected for FLTF for the Habitat Conservation Plan based on literature, past experience, and current knowledge of the four lakes system. Throughout 2024.
- Attended virtual meetings with FLTF as requested. Throughout 2024.
- Responded to data requests and emails to FLTF as requested. Throughout 2024.

Acknowledgements

We would like to thank the members of the Four Lakes Task Force (FLTF) for funding these surveys, providing valuable input, especially with regards to site access, and feedback throughout the surveys. FLTF collaborators on virtual calls as well as in the field aided in

providing us with the data needed for successful logistics. Also, the US Fish and Wildlife Service, Michigan Department of Natural Resources specifically Jessica Pruden (USFWS) and Jeff Jolley (MDNR) for feedback throughout this study. Ava Laszlo was a CMU lab technician throughout the study and we thank her for her leadership and work on these surveys, analyses, and past reporting. Nicole Vellequette developed the figures used in this report. Alec Barczewski, Liam Daniels, Madison Dunlap, Aiden Judge, Shay Keretz, Cole Keyworth, Scott LaValley, Dylan Powell, Nathan Ring, Gabrielle Sanfilippo, Jenna Sokol, Marta Springer, Hunter Torolski, Nick Trombley, Nichelle VanTassel, Nicole Vellequette, Aaron Vlasak, Aaliyah Wright were all CMU students that helped with survey, processing and analyses of data, and shell identification and quantification.

References

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