Torch Lake Field Survey

Prepared for Three Lakes Association

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1 Summary of research

Researchers conducted a survey of the mollusk population on torch lake from June 8th 2022 to June 30th 2022. The primary goal of this survey is to identify if the population of the invasive zebra mussels are contributing to the recent outbursts of gold brown algae growth. This is believed due to the chemical shift in the water the mussels are potentially causing by increasing levels of phosphorus. 10 sites were chosen to survey the shallow water for the mollusk population composed primarily of public areas as well as a private residence. Results found that zebra mussels are a possible minor contributing factor, but there is most likely a different major cause for the algae blooms.

2 Purpose of the study

In recent years torch lake has seen an outburst of gold brown algae growth throughout the shoreline. This is due to chemical shifts in the water causing an imbalance in the ecosystem, and affecting the organisms native to the lake. One potential cause of the imbalance is the increase in phosphorus levels due to the invasive zebra mussels. To determine if the zebra mussel population is contributing to this a survey was conducted. A survey was also decided to conduct due to the previous lake survey occurring 10 years prior. Other mollusks were surveyed as well to determine if their presence also has effects on the water quality.

10 sites surrounding the western and eastern edges of Torch lake were chosen to conduct the surveys, consisting of primarily public property and a private property. Public sites included locations such as Ball Field park and Torch Lake Township Day park, which has both boat launches and recreational sections. The private property site belongs to residents who have housing directly on the lake shore that can only be accessed by the homeowners. After a site was completed samples were taken back to be studied at Au Sable Institute of Environmental Studies.

3 Methods of sample collection and identification

Sample Collection

Sites were sectioned off by 3 sets of measuring tape set 5m apart and stretching 20m into the lake. Utilizing waders, researchers walked into the lake in brackets of 1-5m, 5-10m, 10-15m, and 15-20m to collect samples at varying distances. Sites were combed on their surface for mollusks using skimmer nets. Nets were placed an inch deep into the surface of the sediment and dragged along each designated zone. Prior to continuing to the next allocated section the nets were brought back to the shore to have contents placed into plastic trays. Water was added to the trays to loosen the soil and sifted through for mollusks to be collected. Found mollusks were then placed into plastic specimen bottles and sealed shut with screw lids. Labeled bottles were then transported back to the facility and stored in a room temperature environment.

Fig. 1. Researchers setting up measuring tapes.

Fig. 2. Researchers sifting for samples.

Sample Identification

At a later date specimen bottles were individually dumped into a plastic tray to view collected samples. Mollusks were identified using the book “” to deduce the genus of each animal. Each site section was cataloged and samples were placed into a bleach bin to prevent spread of invasive species to the local campus. The bleach bin was properly disposed of after each instance of sample identification.

Fig. 3. Researchers identifying collected samples.

4 Results

Sections of the sites were cataloged based on distance into the lake. Zone A represents 1-5m from the shore into the lake. Zone B is the 5-10m stretch going into the lake. Zone C is the section of site spanning 10-15m into the lake. Zone D is the final 15-20m of surveyed area on the site. Remarks of signification observations were also made to note possible cause and effects of different environments at each site.

4.1 Ball field park: 11656 SE Torch Lake Dr, Alden, MI 49612

Survey of site occurred on 6/15/22 at 2:55pm with a sunny and clear weather day. Water at this site is significantly more murky and more gold-brown algae was present compared to other sites. Several leeches were also found at the site, while not found at other sites. There was also a significant amount of floating algae as well as algae on the lake floor.

Type of mollusk	Total found
Bithyniidae	2
Hydrobiidae	0
Planorbidae	2
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	3

Fig. 4. Zone A of Ball park

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	1
Pleuroceridae	4
Physidae	7
Valvatidae	0
Zebra	4

Fig. 5. Zone B of Ball park

Type of mollusk	Total found
Bithyniidae	1
Hydrobiidae	0
Planorbidae	1
Pleuroceridae	7
Physidae	3
Valvatidae	0
Zebra	3

Fig. 6. Zone C of Ball park

Type of mollusk	Total found
Bithyniidae	9
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	12
Physidae	1
Valvatidae	0
Zebra	3

Fig. 7. Zone D of Ball park

4.2 Barns road public access: 45°02’04.1”N 85°19’52.0”W

Survey of site occurred on 6/29/22 at 2:32pm with a sunny day and mild wind. At first glance the water appeared to be clear and sandy. Upon closer inspection the water is mostly clear with small bits of floating algae and algae coating the ground surface. In zone 4 there were pockets of black substance that would burst out when the ground was disturbed with a skimmer net. These pockets had a foul odor and clusters of mollusks were found within.

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	2
Physidae	0
Valvatidae	0
Zebra	0

Fig. 8. Zone A of Barns road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	1
Physidae	0
Valvatidae	0
Zebra	18

Fig. 9. Zone B of Barns road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	4
Physidae	0
Valvatidae	0
Zebra	5

Fig. 10. Zone C of Barns road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	11
Physidae	1
Valvatidae	0
Zebra	0

Fig. 11. Zone D of Barns road public access

4.3 Meggison road public access: 45°04'43.4"N 85°19'20.5"W

Survey of site occurred on 6/29/22 at 10:30am with a sunny day and high winds. Water was clear and lacking floating algae, but there was growth on the ground surface. High population of crawfish found at the site; which could explain low zebra mussel population if they are predating on the mussels. General low population of mollusks found in the area compared to other sites. Dense rocks on the floor surface caused difficulty with net skimming; and the area may need to be resurveyed with snorkel gear.

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	0

Fig. 12. Zone A of Meggison road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	0

Fig. 13. Zone B of Meggison road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	0
Physidae	0
Valvatidae	1
Zebra	0

Fig. 14. Zone C of Meggison road public access

Type of mollusk	Total found
Bithyniidae	1
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	0

Fig. 15. Zone D of Meggison road public access

4.4 North Train Depot Park: 10670 Coy St, Alden, MI 49612

Survey of site occurred on 6/15/22 at 10:21am with a clear sunny day. Location contained a significant amount of floating algae and algae coating the ground surface. The area consisted of dense bottoms, and may need to be resurveyed with scuba gear.

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	0

Fig. 16. Zone A of North Train Depot Park

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	0

Fig. 17. Zone B of North Train Depot Park

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	3
Physidae	1
Valvatidae	0
Zebra	4

Fig. 18. Zone C of North Train Depot Park

Type of mollusk	Total found
Bithyniidae	1
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	8
Physidae	1
Valvatidae	0
Zebra	3

Fig. 19. Zone D of North Train Depot Park

4.5 Paige road public access: 44°55'03.7"N 85°17'12.6"W

Survey of site occurred on 6/22/22 at 10:41am with a sunny day and high wind. The waterfront of the site was noticeably more clear and green than other sites with a lack of floating algae. Zebra mussels were still found at the site despite the lack of gold brown algae in the area.

Type of mollusk	Total found
Bithyniidae	9
Hydrobiidae	0
Planorbidae	1
Pleuroceridae	27
Physidae	10
Valvatidae	0
Zebra	5

Fig. 20. Zone A of Paige road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	3
Physidae	0
Valvatidae	0
Zebra	2

Fig. 21. Zone B of Paige road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	1
Physidae	0
Valvatidae	0
Zebra	0

Fig. 22. Zone C of Paige road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	1
Physidae	0
Valvatidae	0
Zebra	0

Fig. 23. Zone D of Paige road public access

4.6 Pinnell road public access: 5018 SE Torch Lake Dr, Bellaire, MI 49615

Survey of site occurred on 6/22/22 at 1:52pm with a clear sunny day and moderate wind. The waterfront of the site was significantly more clear and lacked gold brown algae. Once again Zebra mussels were identified at the site despite the lack of gold brown algae in the area.

Type of mollusk	Total found
Bithyniidae	1
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	0

Fig. 24. Zone A of Pennil road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	1
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	1

Fig. 25. Zone B of Pennil road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	1
Planorbidae	3
Pleuroceridae	0
Physidae	1
Valvatidae	0
Zebra	1

Fig. 26. Zone C of Pennil road public access

Type of mollusk	Total found
Bithyniidae	1
Hydrobiidae	0
Planorbidae	1
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	1

Fig. 27. Zone D of Pennil road public access

4.7 Private residence: 2902 S East Torch Lake Dr, Bellaire, MI 49615

Survey of site occurred on 6/21/22 at 2:08pm with a clear sunny day. The water was significantly clearer than most sites. Zone B still contained fish and crawfish but lacked any significant amount of mollusks. Owners of the residence were interviewed and reported that they do not fertilize and do not take their boat outside of torch lake. They also stated that there have been blooms of gold brown algae in previous years.

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	2
Physidae	0
Valvatidae	0
Zebra	0

Fig. 28. Zone A of Private residence

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	0

Fig. 29. Zone B of Private residence

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	1
Physidae	0
Valvatidae	0
Zebra	2

Fig. 30. Zone C of Private residence

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	3
Physidae	0
Valvatidae	0
Zebra	0

Fig. 31. Zone D of Private residence

4.8 South train depot park: 10670 Coy St, Alden, MI 49612

Survey of site occurred on 6/21/22 at 10:00am with a clear sunny day. A trend researchers noticed is that as distance from shore increases, the smaller the size of the organisms found. Presence of floating algae and algae coating ground surface rocks were found at the site.

Type of mollusk	Total found
Bithyniidae	2
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	14
Physidae	0
Valvatidae	20
Zebra	7

Fig. 32. Zone A of South Train Depot Park

Type of mollusk	Total found
Bithyniidae	4
Hydrobiidae	0
Planorbidae	1
Pleuroceridae	37
Physidae	10
Valvatidae	0
Zebra	23

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Fig. 33. Zone B of South Train Depot Park

Type of mollusk	Total found
Bithyniidae	1
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	2
Physidae	3
Valvatidae	6
Zebra	0

Fig. 34. Zone C of South Train Depot Park

Type of mollusk	Total found
Bithyniidae	6
Hydrobiidae	13
Planorbidae	1
Pleuroceridae	18
Physidae	11
Valvatidae	64
Zebra	9

Fig. 35. Zone D of South Train Depot Park

4.9 Sutter road public access: 3334 N W Torch Lake Dr, Kewadin, MI 49648

Survey of site occurred on 6/30/22 at 3:45pm with overcast and mild wind. The water contained floating algae and the ground's surface was coated with algae. Large colonies of mussels were found on rocks in zone D. When picking up these rocks pockets of black substance spewed open releasing a foul odor. Trays were preserved and checked back at the lab due to an incoming storm.

Type of mollusk	Total found
Bithyniidae	1
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	1
Physidae	0
Valvatidae	0
Zebra	0

Fig. 36. Zone A of Sutter road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	1
Physidae	0
Valvatidae	0
Zebra	5

Fig. 37. Zone B of Sutter road public access

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	5
Physidae	0
Valvatidae	0
Zebra	38

Fig. 38. Zone C of Sutter road public access

Type of mollusk	Total found
Bithyniidae	1
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	62

Fig. 39. Zone D of Sutter road public access

4.10 Township day park: 12201 Pub Dock Rd, Kewadin, MI 49648

Survey of site occurred on 6/28/22 at 2:31pm with overcast and mild wind. Survey took place to the south of the dock. Water on the south side was clear and lacked floating algae with a sandy floor. Water on the north side of the dock had algae on the rocky ground surface and was much deeper. South side of water also had floating plant debris with some coagulated underwater where clusters of molluska colonies were found. North side may require its own survey since the ground environment is drastically different than the south side.

Type of mollusk	Total found
Bithyniidae	1
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	1
Physidae	1
Valvatidae	0
Zebra	1

Fig. 40. Zone A of Township day park

Type of mollusk	Total found
Bithyniidae	3
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	0
Physidae	5
Valvatidae	0
Zebra	2

Fig. 41. Zone B of Township day park

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	1
Planorbidae	0
Pleuroceridae	1
Physidae	3
Valvatidae	0
Zebra	0

Fig. 42. Zone C of Township day park

Type of mollusk	Total found
Bithyniidae	0
Hydrobiidae	0
Planorbidae	0
Pleuroceridae	0
Physidae	0
Valvatidae	0
Zebra	0

Fig. 43. Zone D of Township day park

5 Preliminary Conclusions

Based on the evaluated data from each site it is not certain that zebra mussels are the definitive cause of the algae growth. Sites containing similar population sizes of zebra mussels varied on the amount of gold brown algae present. Only 3 of the 10 sites contained a significant population of zebra mussels, while also possessing an abundance of gold brown algae growth. Researchers also agreed that some sites may need to be resurveyed with different equipment, such as snorkel gear, due to the hardness of the lake floor. The floor of these few sites consisted

of density packed rocks which prevented a proper skim from a net. There is still reason to believe that the presence of the zebra mussels are a contributing factor to promotion of gold brown algae growth, but there is most likely a larger third party contributor.

6 Literature Cited

Voshell, J. Reese. *A Guide to Common Freshwater Invertebrates of North America*. McDonald & Woodward Pub., 2003.