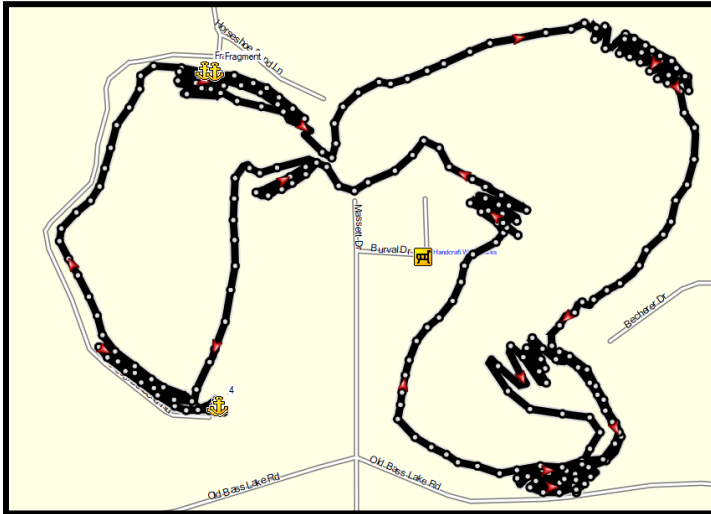


**Eurasian Water-milfoil (*Myriophyllum spicatum*)
Meandering Littoral Zone Survey
Horseshoe Lake (WBIC: 2470000)
Washburn County, Wisconsin**



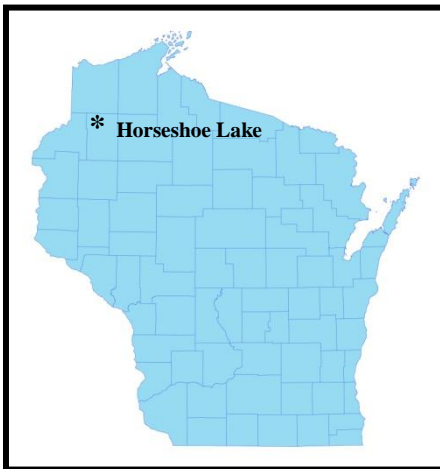
Survey tracks and EWM found 9/18/19



Small rooted EWM plant raked out of "nook" 9/28/19

Project Initiated by:

The Horseshoe Lake Property Owners Association, and the
Wisconsin Department of Natural Resources



EWM fragment found on the north shoreline of the west basin 9/28/19

Surveys Conducted by and Report Prepared by:

Endangered Resource Services, LLC
Matthew S. Berg, Research Biologist
St. Croix Falls, Wisconsin
September 22, 2019

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INTRODUCTION:

Horseshoe Lake (WBIC 2470000) is a 177 acre seepage lake in north-central Washburn County, Wisconsin in the Town of Minong (T42N R12W S30 SW SW). It reaches a maximum depth of 21ft in the northeast corner of the eastern basin and has an average depth of approximately 7ft (WDNR 2019). Secchi disc readings from 2014-2019 have averaged 12ft in the west basin and 14ft in the east basin. This suggests the lake is mesotrophic in nature with good to very good water clarity (WDNR 2019). The lake's bottom substrate is predominately sand along the shoreline, but this gradually transitions to sandy muck at most depths over 6ft (Figure 1). The only organic muck occurs in the tiny “nook” bay on the southeast end of the lake's west basin (Sather et al. 1971).

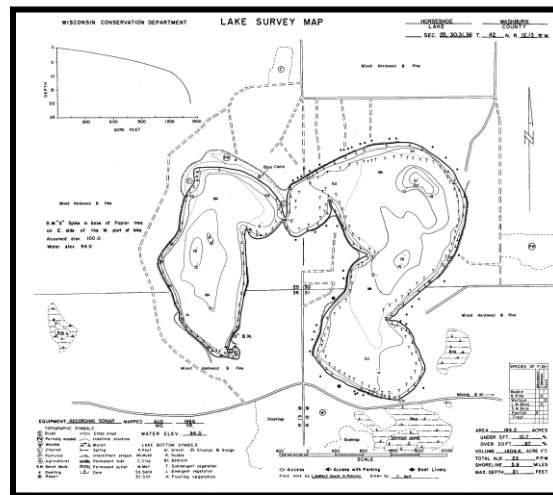


Figure 1: Horseshoe Lake Bathymetric Map

BACKGROUND AND STUDY RATIONALE:

Eurasian water-milfoil (*Myriophyllum spicatum*) (EWM) is an exotic invasive plant species that is a growing problem in the lakes and rivers of northwestern Wisconsin. Present in nearby Nancy Lake since 1991, the Minong Flowage since 2002, and Gilmore Lake since 2009, EWM was first found in Horseshoe Lake in May 2011. Under the direction of Lake Education and Planning Services, LLC (LEAPS), the Horseshoe Lake Property Owners Association (HLPOA) conducted herbicide treatments of the known EWM areas in 2011, 2012, and 2016. They also authorized meandering shorelines surveys of the entire lake to look for surviving/new EWM plants/beds throughout the summers of 2013-2018 as a way to rapidly identify and manage pioneer beds. During the two posttreatment surveys in 2016, three surveys in 2017, and the first two surveys in 2018, we failed to find any sign of surviving EWM. Unfortunately, the third survey on September 28, 2018 documented a significant “blow up” of EWM in the southeast bay near the public boat landing. We also found and rake removed a handful of plants in the “nook” bay – the first time ever EWM plants have been found in the west basin.

Following a June 2 herbicide treatment of 3.65 acres in the southeast bay (procellaCor – target concentration of 5.8 ppb), we were asked to complete a fall shoreline survey to look for surviving EWM. This report is the summary analysis of that survey conducted on September 28, 2019.

METHODS:

We conducted a meandering survey over much of the lake's visible littoral zone spacing transects close enough that our field of view overlapped from one transect to another. We paid special attention to the areas around docks as this is where Eurasian water-milfoil brought in on props is most likely to establish. We also spent extensive time motoring around, through, and between the 2016 and 2019 treatment areas to look for surviving EWM.

RESULTS AND DISCUSSION:

Water levels on the lake continued to be exceptionally high throughout the summer of 2019. Because of this, much of the east basin, where we have historically found Eurasian water-milfoil growing in 8-12ft of water, was now in the 11-15ft range. We also noted that, unlike during most past surveys, water clarity was relatively poor, and we could only see the bottom in 5-6ft of water. Both of these factors – high water levels and limited clarity – made for somewhat challenging search conditions. In total, we looked for evidence of EWM along transects totaling 11.8km (7.3 miles) (Figure 2).

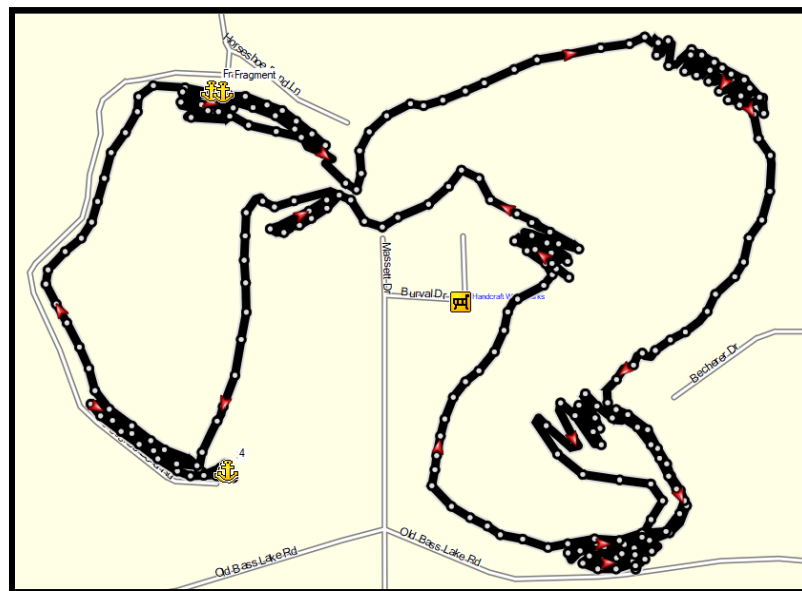


Figure 2: Horseshoe Lake September 28, 2019 Survey Tracks

The treatment in the southeast bay appeared to have been exceptionally successful as we found no evidence of EWM anywhere in the former beds or along the lake's shoreline in the east basin. However, we again found and rake removed four plants in the southeast "nook" bay in the west basin. In addition to these rooted EWM plants, we also found two 3-5 inch fragments floating within 20m of each other along the north shoreline (Figure 3). Despite spending significant time slowly searching the immediate area, we were unable to locate any additional rooted plants or any other floating fragments.

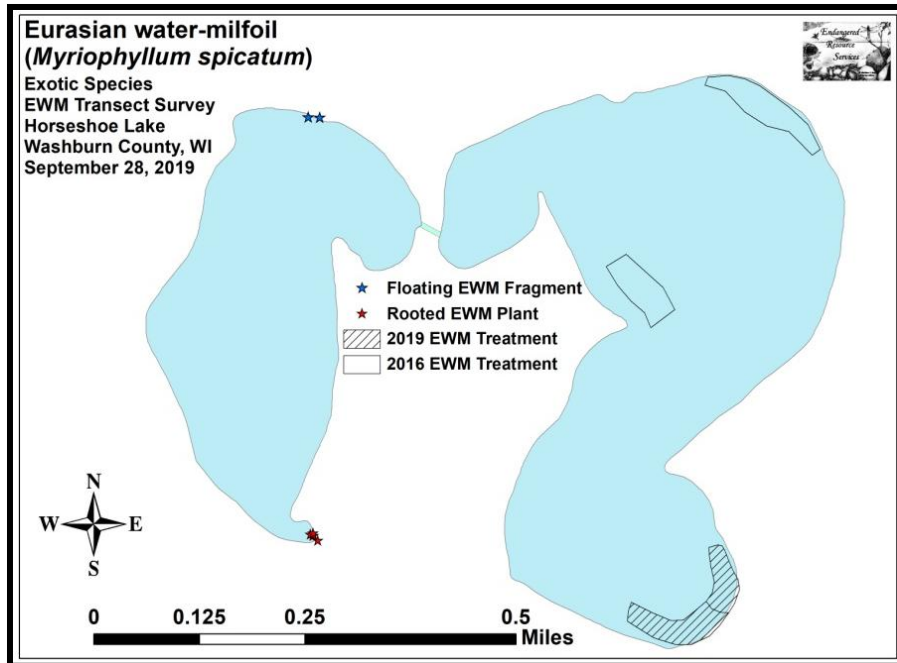


Figure 3: Horseshoe Lake September 28, 2019 EWM Plants

FUTURE MANAGEMENT CONSIDERATIONS:

Although it is possible the fragments found on the north end of the west basin drifted out of the “nook” bay, it seems more likely there is an as of yet undiscovered bed somewhere in deeper water. Hopefully the planned point-intercept survey in July of 2020 will locate any such bed. However, an earlier search might be warranted if clarity improves in the spring; especially if treating any newly discovered bed in 2020 is desired. Ultimately, the HLPOA, LEAPS, and the Wisconsin Department of Natural Resources will have to decide on a course of action. In the meantime, lake residents should remain on the lookout for any signs of EWM. If they discover a plant they even suspect may be EWM, we strongly encourage them to **immediately** contact Matthew Berg, ERS, LLC Research Biologist at 715-338-7502 and/or Alex Smith/Pamela Toshner, Regional Lakes Management Coordinators in the Spooner DNR office at 715-635-4073 for identification confirmation. If possible, a specimen, a jpg, and the accompanying GPS coordinates of the location should be included. Texting pictures from a smartphone is actually ideal as it give immediate feedback. Likewise, we are happy to identify ANY plant a lake resident finds that they may want identified.

LITERATURE CITED

Sather, L, C. Busch, N. Pokorny, and C. Holt. [online]. 1971. Horseshoe Lake Bathymetric Map. Available from <http://dnr.wi.gov/lakes/maps/DNR/2470000a.pdf> (2019, October).

WDNR. [online]. 2019. Wisconsin Lake Citizen Monitoring Data for Horseshoe Lake - Washburn County. Available from <http://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2470000&page=more> (2019, October).