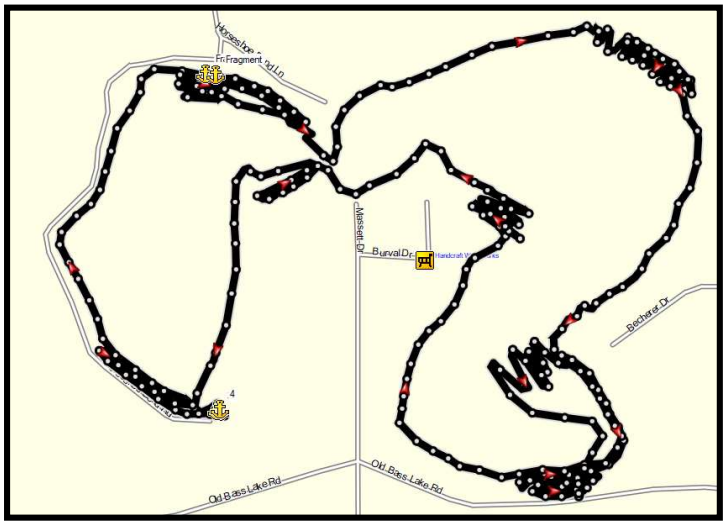
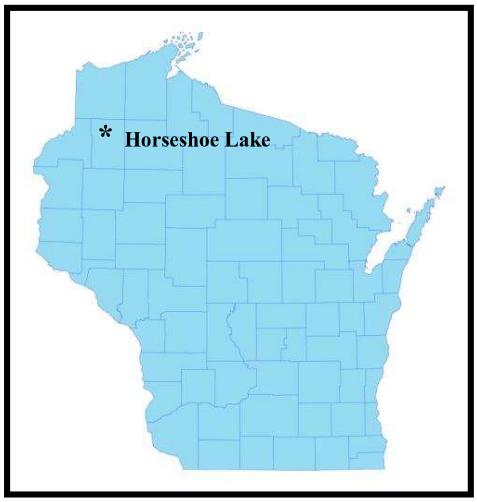
Eurasian Water-milfoil (*Myriophyllum spicatum*)
Meandering Littoral Zone Surveys
Horseshoe Lake (WBIC: 2470000)
Washburn County, Wisconsin

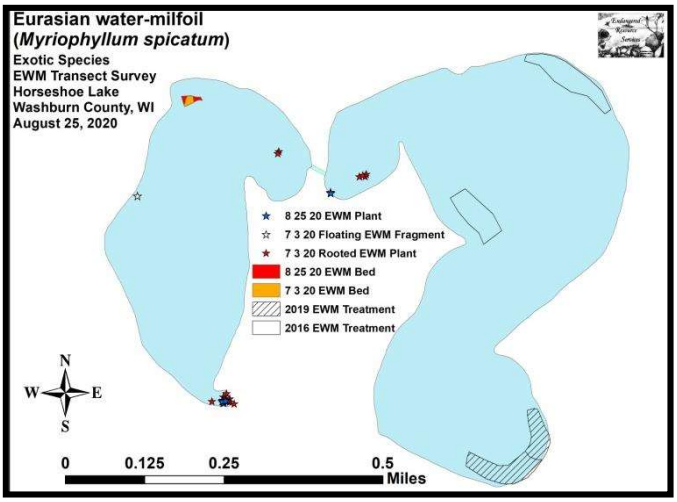


Survey tracks and EWM found during previous fall survey 9/18/19


EWM plants raked out east of the narrows 7/3/20

Project Initiated by:
The Horseshoe Lake Property Owners Association, Lake Education and Planning Services, LLC and the Wisconsin Department of Natural Resources (WDNR Grant # AEPP 61320)





Expanding EWM in the west basin and around the channel 8/25/20

Surveys Conducted by and Report Prepared by:
Endangered Resource Services, LLC
Matthew S. Berg, Research Biologist
St. Croix Falls, Wisconsin
July 3, August 2, and August 25, 2020

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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 2014-2020 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 2020). 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).

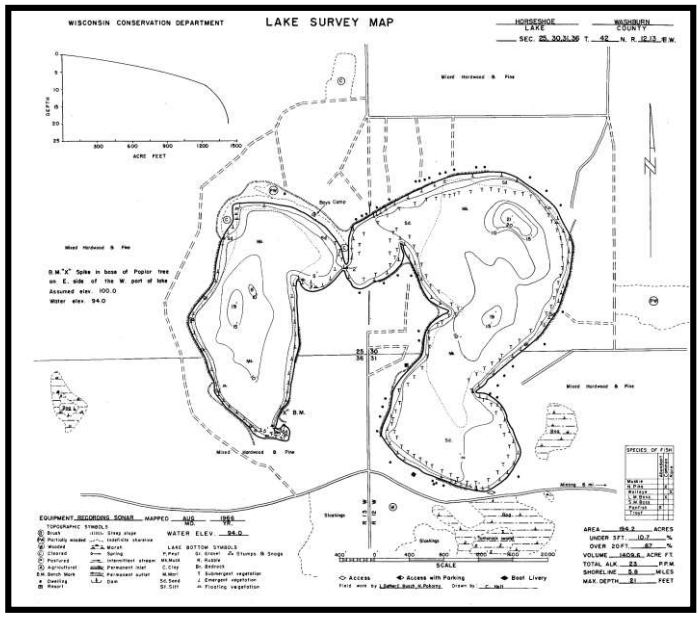


Figure 1: Horseshoe Lake Bathymetric Map

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 to control EWM in 2011, 2012, 2016, and 2019. They have also authorized annual meandering shorelines surveys of the lake to look for surviving/new EWM plants/beds since 2013. These surveys have helped to rapidly identify and manage pioneer beds thus limiting the need for large-scale or annual treatments. During the 2019 September posttreatment survey, we failed to find any sign of surviving EWM in the east basin treatment areas. However, we again found and rake removed four plants from the nook bay (see front cover of the report). We also found two floating fragments along the north shoreline of the west basin, but, because no bed was located, it was decided to simply continue shoreline surveys. This report is the summary analysis of our two surveys conducted on July 3 and August 25, 2020.

METHODS:

EWM Littoral Zone Rake Removal and Bed Mapping Surveys:

During the July and August surveys, we searched along the lake's entire shoreline 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. When found, we used a telescopic rake to remove EWM plants by their roots and logged the location with a GPS waypoint. We also took extra care to gather any fragments that broke off of the plants. If we found a "bed" where we estimated that EWM made up >50% of the plants and was generally continuous with clearly defined borders, we motored around the perimeter of the area and took GPS coordinates at regular intervals. We also estimated the rake density range and mean rake fullness of the bed (Figure 2), the range and mean depth of the bed, whether it was canopied, and the impact it was likely to have on navigation (**none** – easily avoidable with a natural channel around or narrow enough to motor through/**minor** – one prop clear to get through or access open water/**moderate** – several prop clears needed to navigate through/**severe** – multiple prop clears and difficult to impossible to row through). These data were then mapped using ArcMap 9.3.1, and we used the WDNR's Forestry Tools Extension to determine the acreage of each bed to the nearest hundredth of an acre.

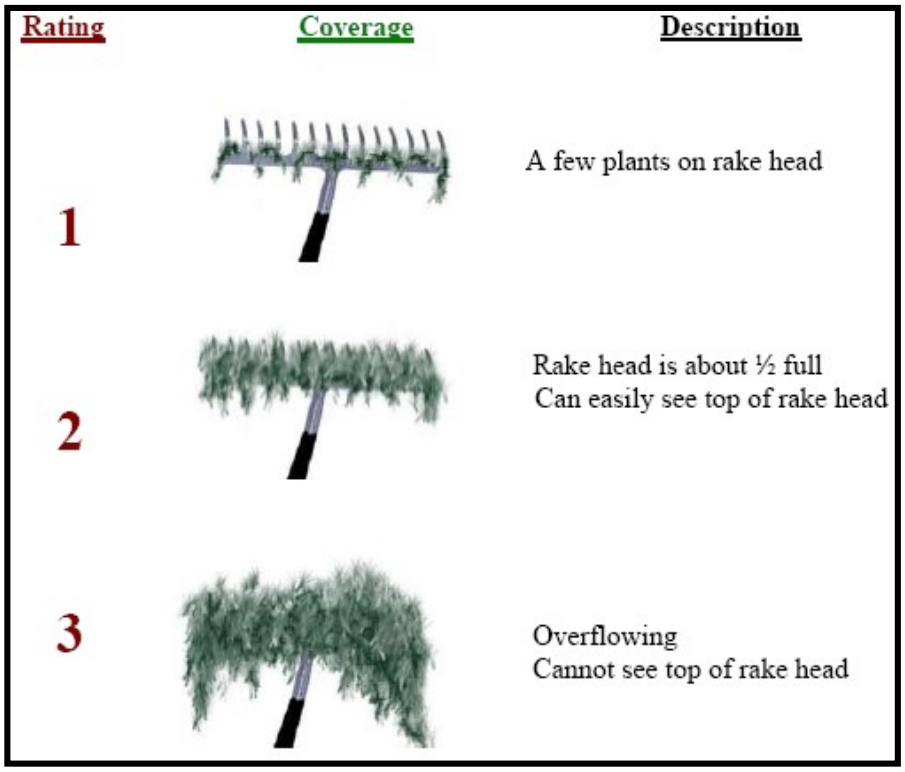


Figure 2: Rake Fullness Ratings

RESULTS AND DISCUSSION:

Early July EWM Rake Removal and Bed Mapping Survey:

Water levels on the lake continued to be exceptionally high throughout the summer of 2020. 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. Fortunately, clarity on July 3rd was better than in 2019, and we felt confident we could see down nearly 10ft into the water column. In total, we looked for evidence of EWM along transects totaling 18.2km (11.3 miles) (Figure 3).

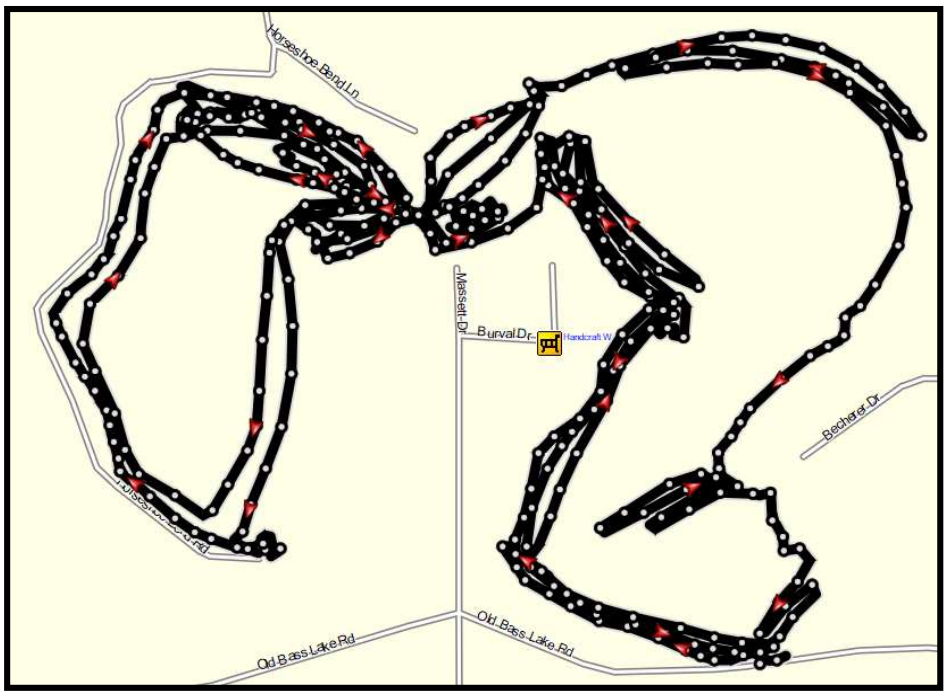


Figure 3: Horseshoe Lake July 3, 2020 Survey Tracks

The 2019 treatment area in the southeast bay continued to be free of EWM, and we saw no evidence of floating fragments anywhere in the southeast or northeast bays of the east basin. However, just east of the channel between the basins, we found and rake removed four 4ft tall plants growing in 6-8ft of water (see front cover of the report). We also found two additional plants just west of the channel growing in similar conditions. In the nook bay, we rake removed an additional 12 plants that were growing among the Watershield (*Brasenia schreberi*) and near the boat and personal watercraft docks. In addition to these 18 rooted EWM plants, we also found a floating fragment along the western shoreline. Ultimately, we discovered a single dense 0.10 acre bed that was nearing canopy in 8-10ft of water just beyond our fall 2019 search transects (Figure 4) (Appendix I). We immediately notified LEAPS, the HLPOA, and the WDNR. After much discussion, it was decided that a herbicide treatment would NOT be approved at this late date. Because of this, the HLPOA placed buoys around the bed and made a strong effort to contact and educate residents about where the bed was located so they could avoid running though it and spreading fragments.

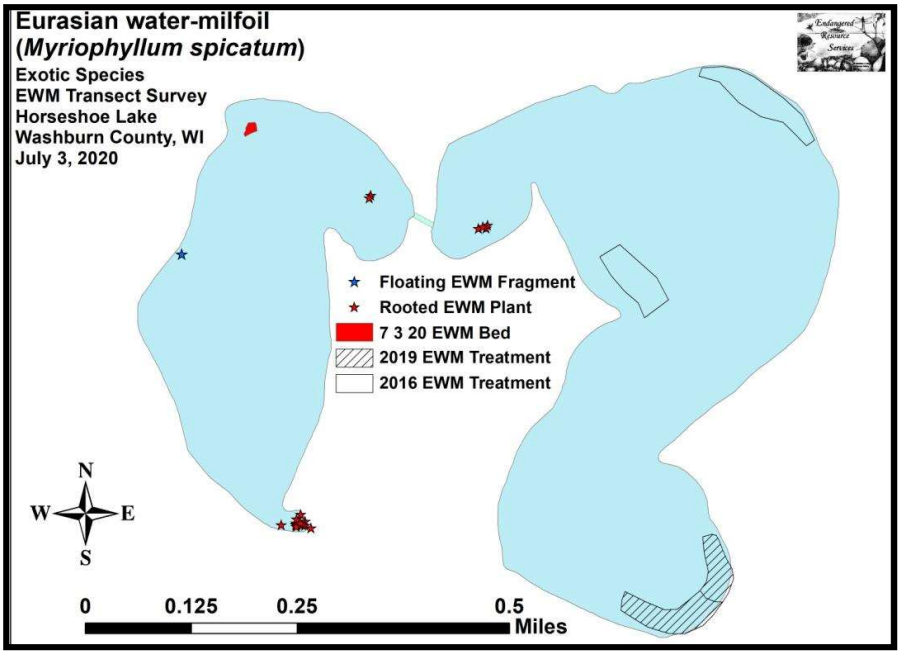


Figure 4: Horseshoe Lake July 3, 2020 EWM Bed Map

Early August Point-intercept Survey:

On August 2nd, we returned to the lake to complete a full point-intercept survey as part of the efforts to update the HLPOA's Aquatic Plant Management Plan. During this survey, we also looked for Eurasian water-milfoil between survey points. Despite search transects totaling 23.8km (14.8 miles) (Figure 5), we saw no evidence of EWM in the nook bay, near the narrows, or anywhere else in the lake with the exception of the bed in the northwest bay.

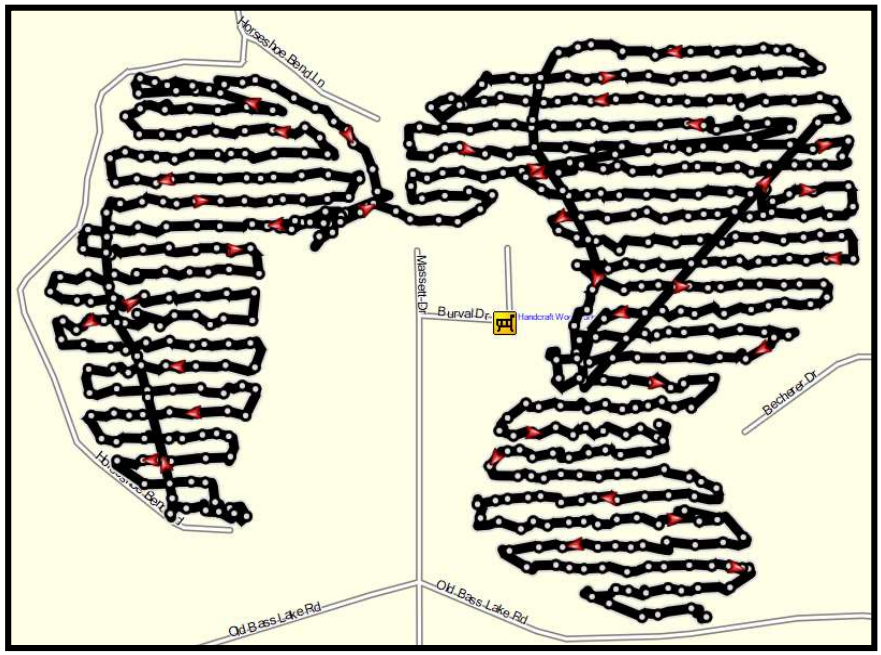


Figure 5: Horseshoe Lake August 2, 2020 PI Survey Tracks

Late August EWM Rake Removal and Bed Mapping Survey:

On August 25th, we returned to the lake to look for evidence of EWM expansion and to map the known bed again to help LEAPS and the HLPOA finalize plans for potential management in 2021. Water clarity continued to be good, and, with calm conditions, we could see down approximately 10ft. Coincidentally, our search transects again covered 18.2km (11.3 miles) (Figure 6).

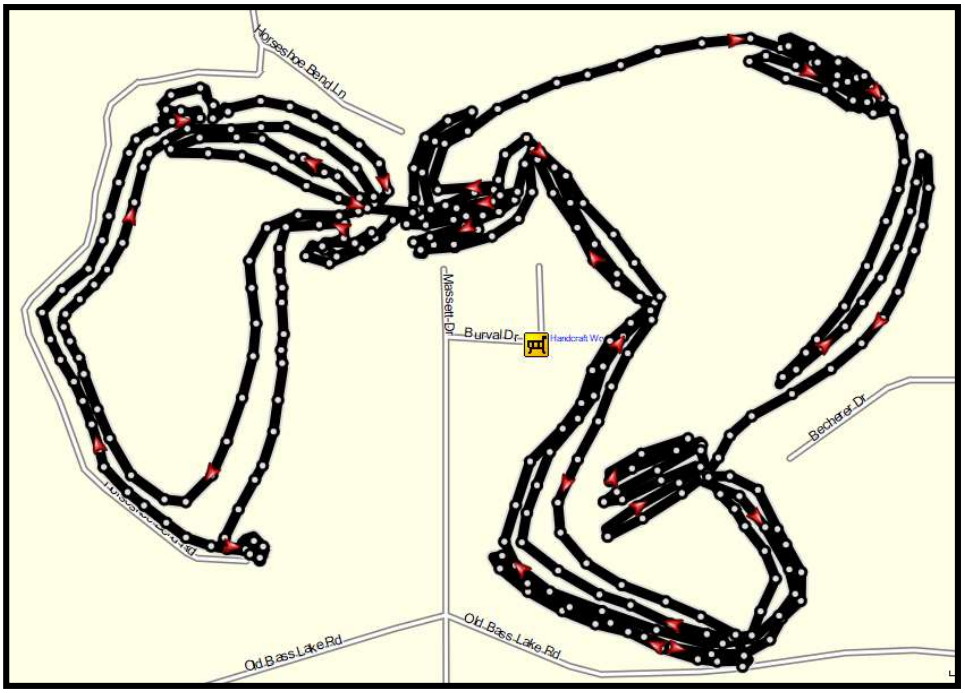


Figure 6: Horseshoe Lake August 25, 2020 Survey Tracks

We were relieved to find no evidence of EWM anywhere in the former treatment area or along the lake's shoreline in the northeast and southeast bays of the east basin. We were also pleasantly surprised that, despite extensive slow and careful searching, we didn't find any plants where we rake removed six rooted plants in July on either side of the channel between basins. The only evidence of EWM in this area was two small "sprouts" growing along the immediate shoreline in 2ft of water just southeast of the channel in the east basin. We were also relatively pleased that the nook bay had only five new plants all of which we were able to rake remove cleanly. Less encouraging was the expansion of the bed in the northwest bay. We noted EWM had thickened at its core, and plants were nearly 10ft tall. We also found that the bed had more than doubled in size to 0.21acre (Figure 7) (Appendix II). Fortunately, people appeared to be respecting the buoys as we saw no evidence of prop trails through the bed. Despite this, plants were naturally fragmenting and braking free from the bottom, and it was easy to find pieces of EWM floating along the entire north shoreline of the west basin.

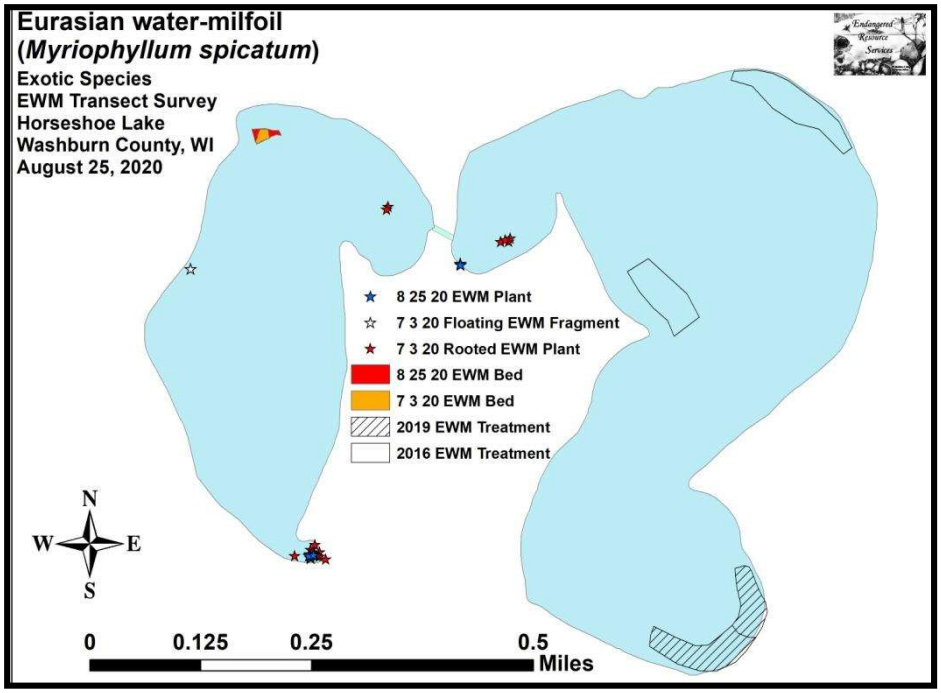


Figure 7: Horseshoe Lake August 25, 2020 EWM Bed Map

CONSIDERATIONS FOR MANAGMENT:

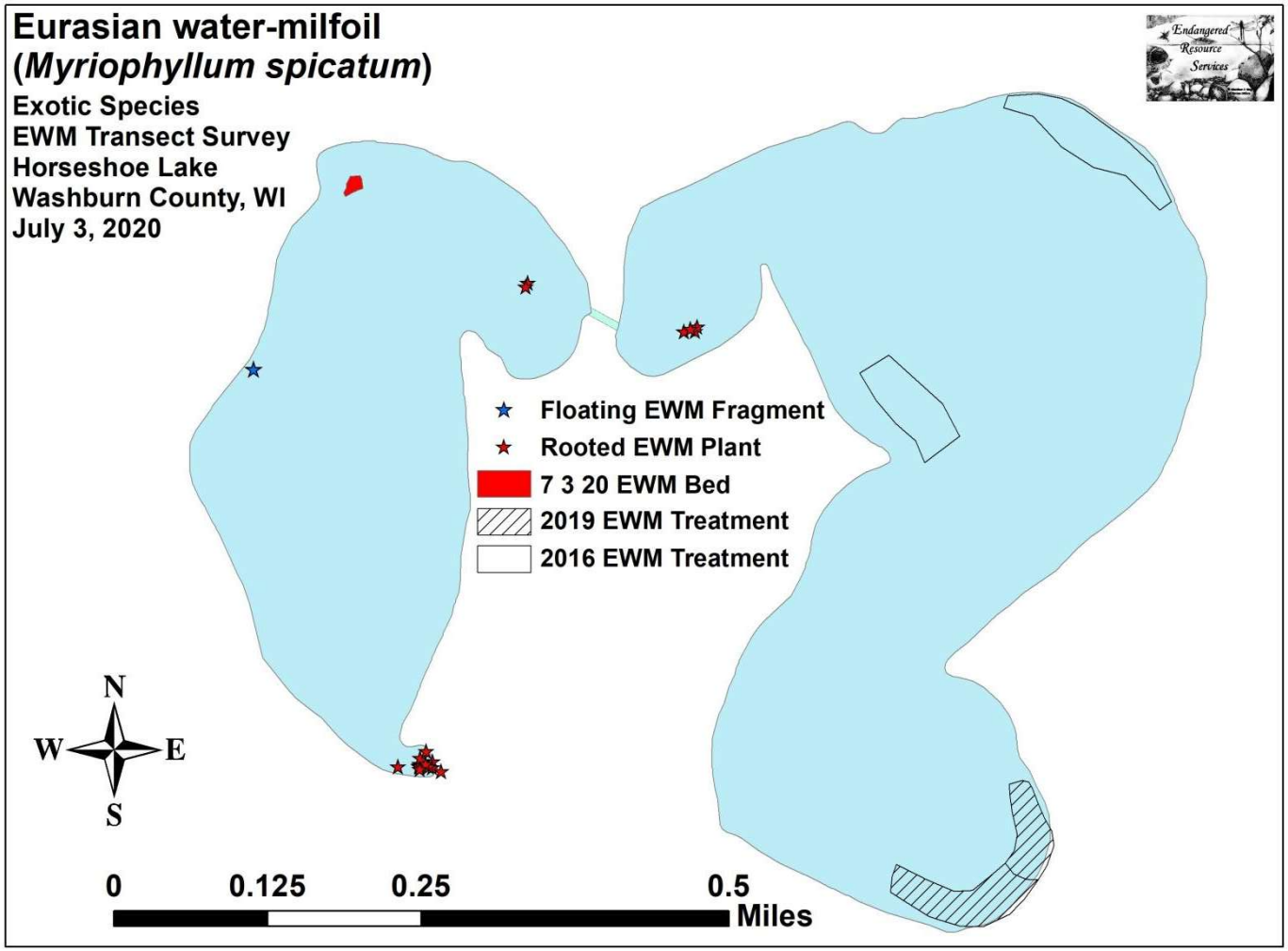
Following the discovery of a small but expanding bed in 2020, it's likely that a herbicide treatment will be needed to reset the infestation in the west basin in 2021. Whether a treatment should focus on only the northwest bed or also include the nook bay is up to debate. Similarly, how much monitoring will be needed in 2021, if any, is a conversation that needs to take place. 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 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.

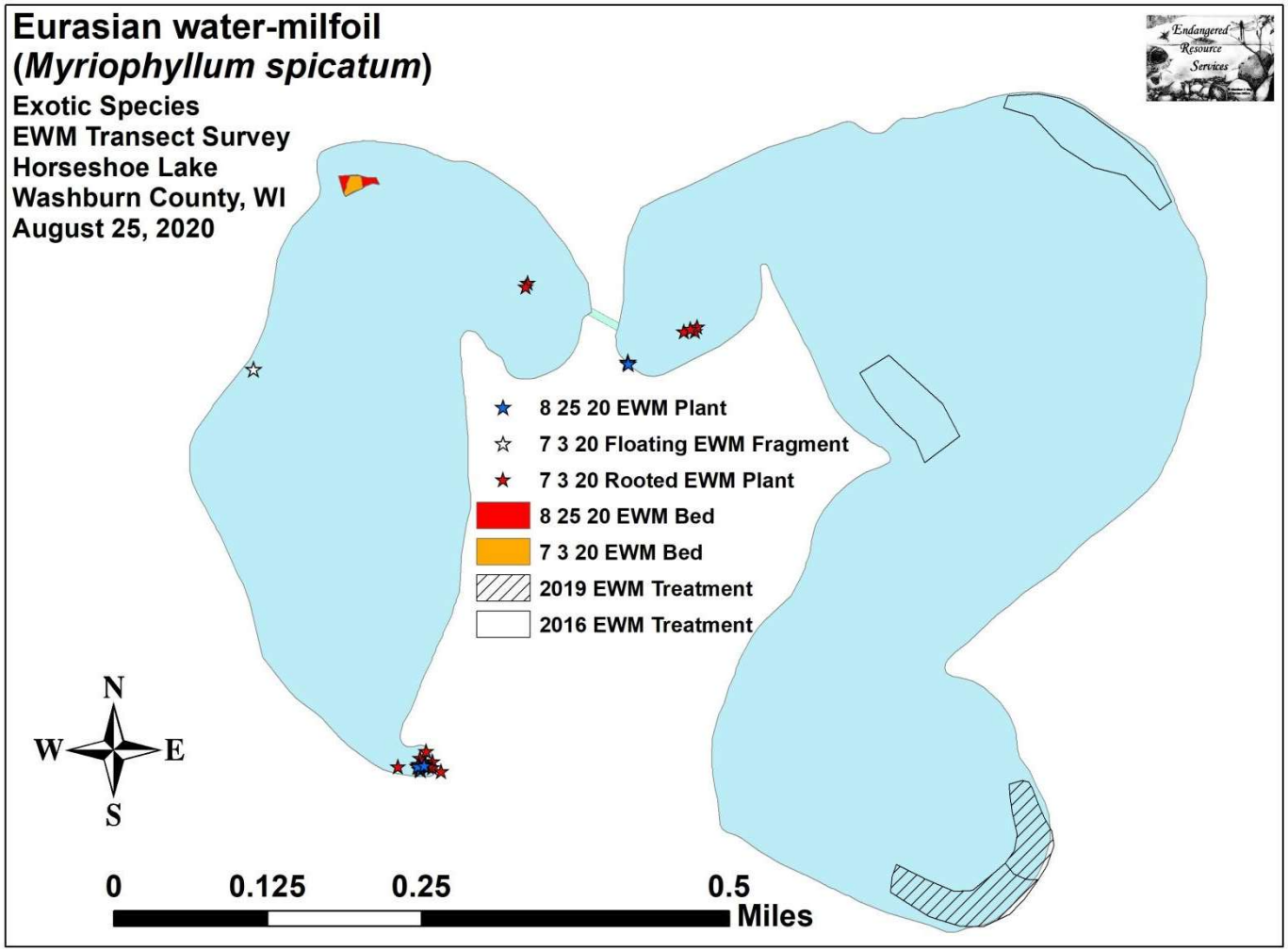
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WDNR. [online]. 2020. Wisconsin Lake Citizen Monitoring Data for Horseshoe Lake - Washburn County. Available from http://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2470000&page=more (2020 September).

Appendix I: 2020 EWM Rake Removal and Bed Maps


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
EWM Transect Survey
Horseshoe Lake
Washburn County, WI
July 3, 2020
Endangered Resource Services
Floating EWM Fragment
Rooted EWM Plant
7 3 20 EWM Bed
2019 EWM Treatment
2016 EWM Treatment
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0.125
0.25
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Miles


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
EWM Transect Survey
Horseshoe Lake
Washburn County, WI
August 25, 2020
Endangered Resource Services
8 25 20 EWM Plant
7 3 20 Floating EWM Fragment
7 3 20 Rooted EWM Plant
8 25 20 EWM Bed
7 3 20 EWM Bed
2019 EWM Treatment
2016 EWM Treatment
N
W
E
S
0
0.125
0.25
0.5
Miles