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



EWM plants raked out on north shoreline 8/7/22



Declining water levels and calm survey conditions 9/24/22

Project Initiated by:
The Horseshoe Lake Property Owners Association, Lake Education and Planning Services, LLC and the Wisconsin Department of Natural Resources





EWM plants raked out of the east basin 9/24/22

Surveys Conducted by and Report Prepared by:
Endangered Resource Services, LLC
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St. Croix Falls, Wisconsin
August 7 and September 24, 2022

TABLE OF CONTENTS

Page

LIST OF FIGURES…….…….. ii

INTRODUCTION…..……..……. 1

BACKGROUND AND STUDY RATIONALE…… 1

METHODS……..……... 2

RESULTS AND DISCUSSION……. 3

Early August EWM Rake Removal and Bed Mapping Survey……..…..……... 3

Late September EWM Rake Removal and Bed Mapping Survey…….……. 4

CONSIDERATIONS FOR MANAGEMENT..……. 5

LITERATURE CITED…….…….……. 6

APPENDIX…….…… 7

I: 2022 EWM Rake Removal and Bed Maps.…..……..…… 7

LIST OF FIGURES

Page #

Figure 1: Horseshoe Lake Bathymetric Map..... 1

Figure 2: Rake Fullness Ratings..... 2

Figure 3: Horseshoe Lake August 7, 2022 Survey Tracks..... 3

Figure 4: Horseshoe Lake August 7, 2022 EWM Bed map..... 4

Figure 5: Horseshoe Lake September 24, 2022 Survey Tracks..... 4

Figure 6: Horseshoe Lake September 24, 2022 EWM Bed map..... 5

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 2022). Secchi disc readings from 2014-2022 have averaged 11.1ft in the west basin and 13.9ft in the east basin. This suggests the lake is mesotrophic in nature with good to very good water clarity (WDNR 2022). 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).

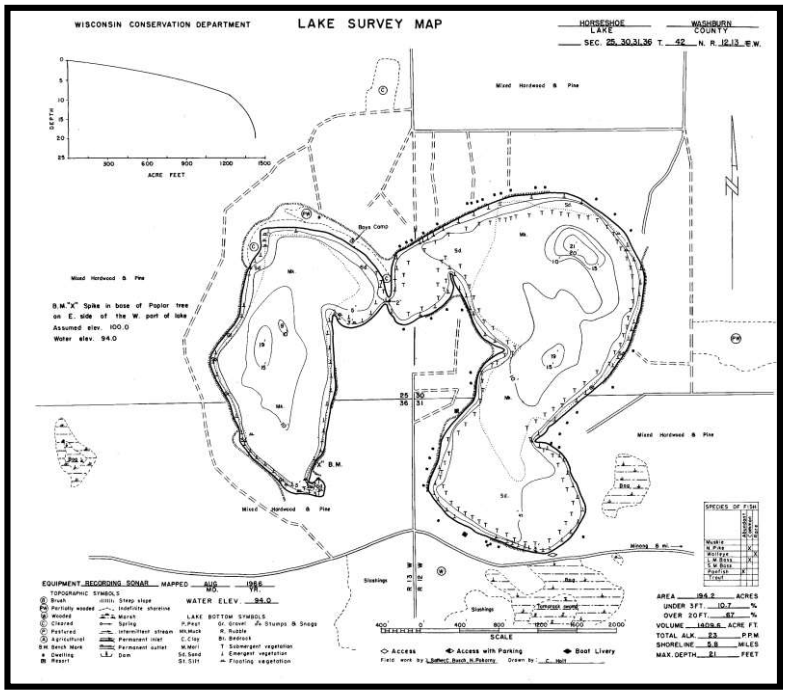


Figure 1: Horseshoe Lake Bathymetric Map

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) has conducted herbicide treatments to control EWM in 2011, 2012, 2016, 2019, and 2021. 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 2021 September posttreatment shoreline survey, we found and rake removed 14 individual EWM plants – all in the east basin. However, we saw no evidence of EWM beds anywhere in the system. Because of this, it was decided to simply continue shoreline surveys and manual removal in 2022. This report is the summary analysis of our two surveys conducted on August 7 and September 24, 2022.

METHODS:

EWM Littoral Zone Rake Removal and Bed Mapping Surveys:

During the August and September 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, 2019, and 2021 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.

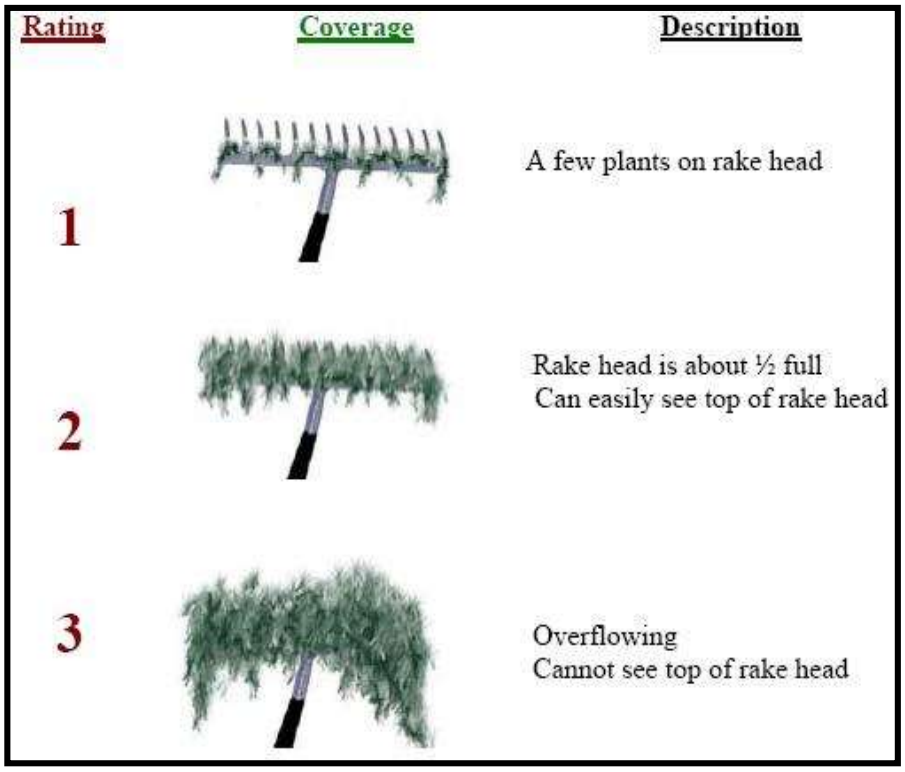


Figure 2: Rake Fullness Ratings

RESULTS AND DISCUSSION:

Early August EWM Rake Removal and Bed Mapping Survey:

Water levels in 2022 were down sharply (at least several feet) following the exceptionally high levels we observed throughout the summer of 2021. Clarity on August 7th was very good, and we felt confident we could see down approximately 7-8ft. In total, we looked for evidence of EWM along transects of over 8.2km (5.1 miles) (Figure 3).

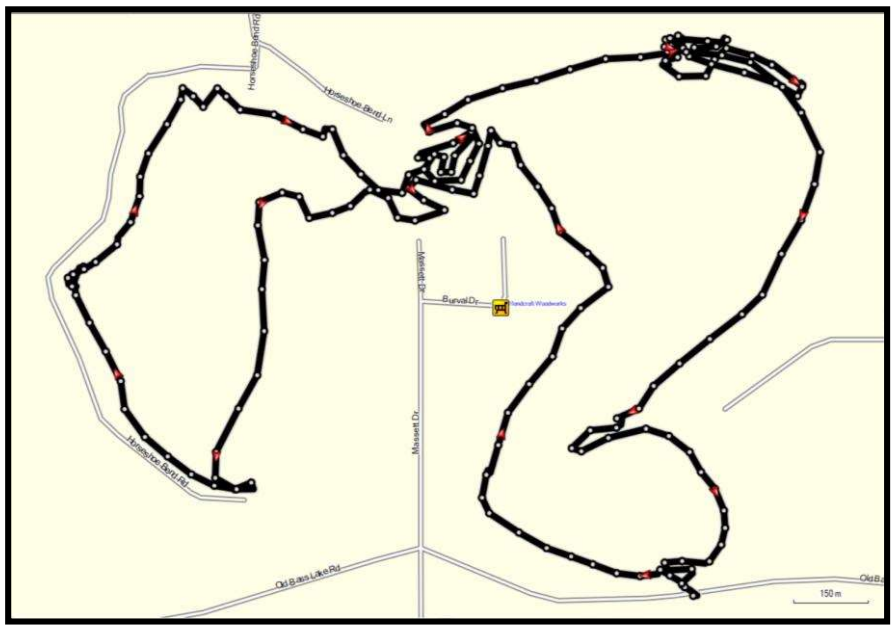


Figure 3: Horseshoe Lake August 7, 2022 Survey Tracks

We found the 2019 treatment area in the southeast bay of the east basin and the 2021 treatment areas in the west basin continued to be free of EWM. We also didn't find any evidence of EWM just east of the channel between the basins where a SCUBA diver manually removed EWM in the summer of 2021, and we found and eliminated seven mature plants that were canopied or near canopied and actively fragmenting in September 2021. In fact, the only evidence of EWM we saw anywhere in the lake was three small plants that we raked out around a dock on the north shore of the east basin (see front cover of the report) (Figure 4) (Appendix I). Despite additional searching in this area, we saw no further evidence of EWM.

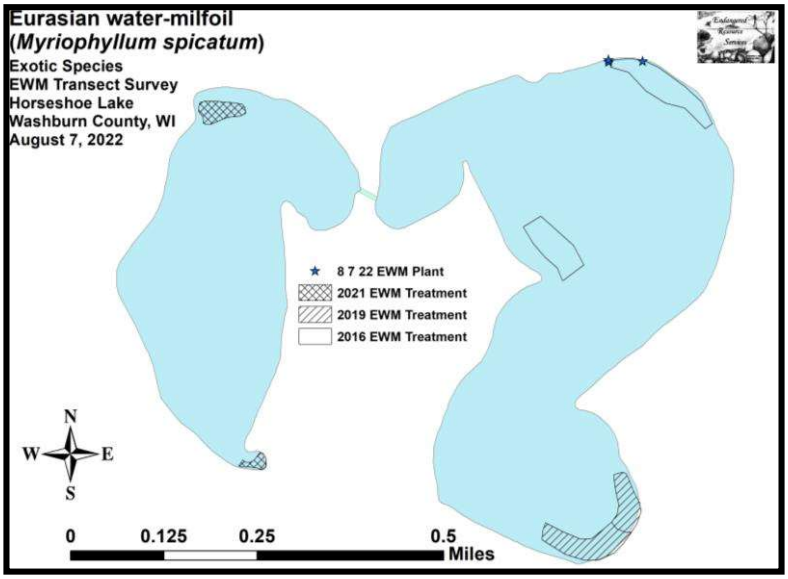


Figure 4: Horseshoe Lake August 7, 2022 EWM Bed Map

Late September EWM Rake Removal and Bed Mapping Survey:

On August 16th, a resident along the eastern shoreline of the east basin located a small, canopied bed of EWM. LEAPS was able to snorkel and remove most of the plants in this area on August 21st. On September 24th, we returned to the lake to again look for surviving EWM. Despite a further drop in water levels, clarity continued to be good, and, with calm conditions, we could see down approximately 8-9ft. In total our search transects covered 19.4km (12.1 miles) (Figure 5).

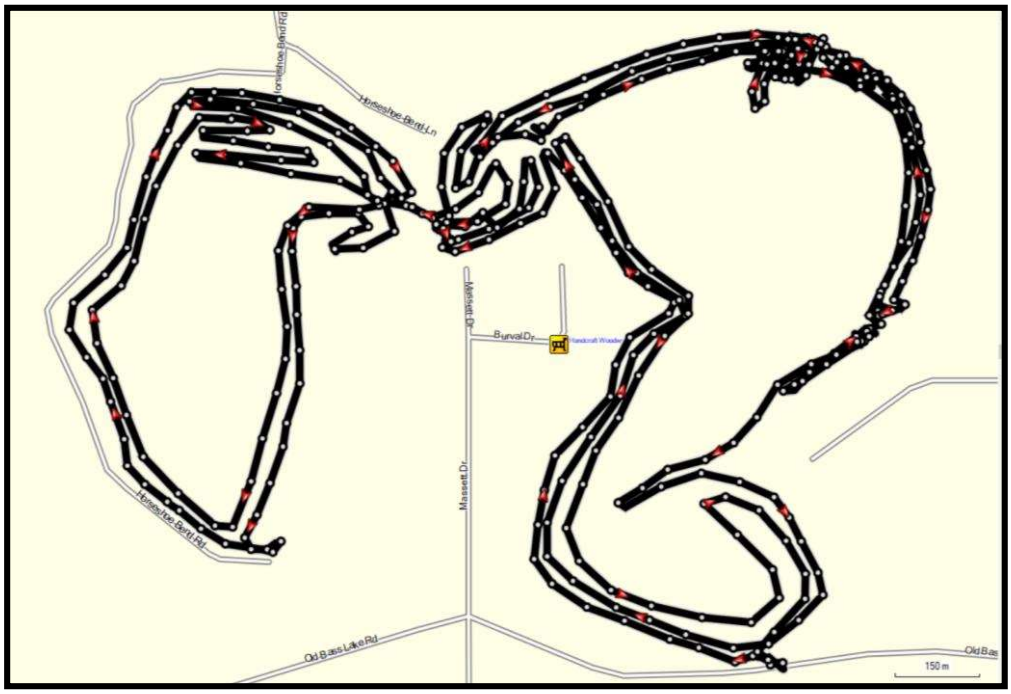


Figure 5: Horseshoe Lake September 24, 2022 Survey Tracks

We again found no evidence of EWM anywhere in the 2019 treatment area in the east basin or in the 2021 treatment areas in the west basin. We also didn't find any EWM in the SCUBA removal area just east of the channel, although we did rake remove a single plant just northeast of that area. However, along the eastern shoreline where LEAPS removed plants in August, we rake removed an additional 16 plants all of which were relatively young sprouts (Figure 6) (Appendix I). Along the north shoreline where we found just three plants in August, we also rake removed an additional 18 individual plants all of which were relatively recent sprouts. Despite an exhaustive search throughout each of these areas, we saw no evidence of larger parent beds so it's possible the plants on the north shoreline grew from fragments that drifted in from the east/central patch found in August.

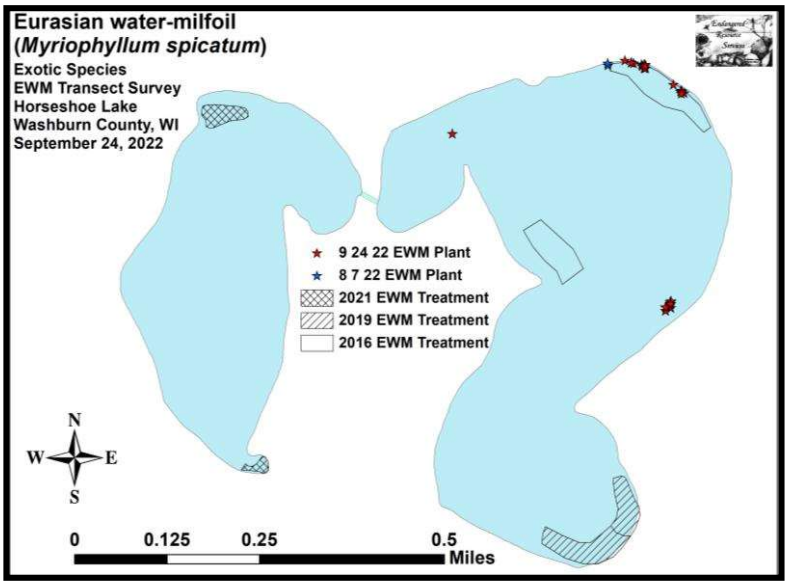


Figure 6: Horseshoe Lake September 24, 2022 EWM Bed Map

CONSIDERATIONS FOR MANAGMENT:

Despite finding two areas in the east basin with recurring plants in 2022, it seems reasonable, based on their small size, to continue with manual removal in 2023. Similarly, how much monitoring will be needed in 2023, 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.

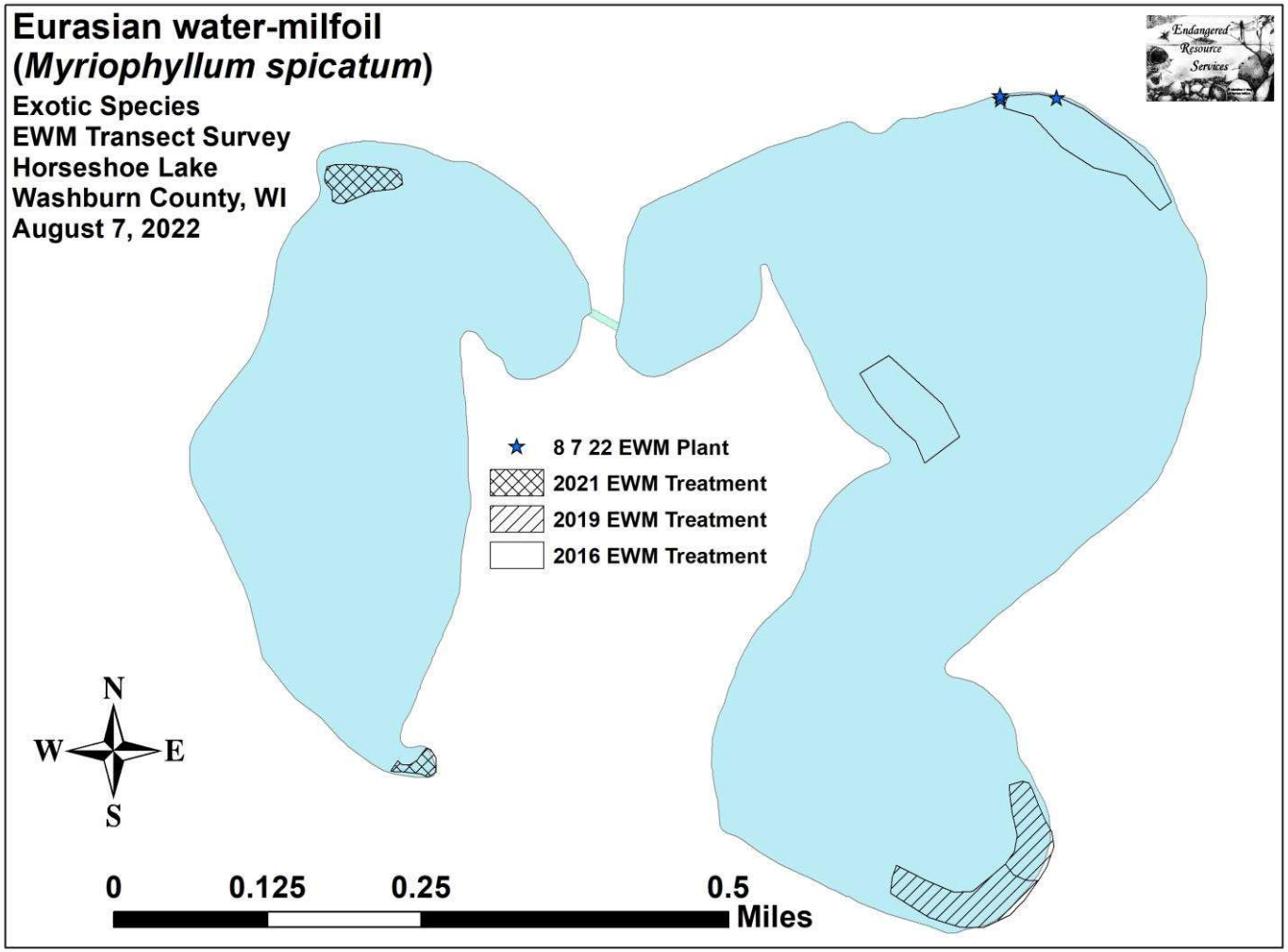
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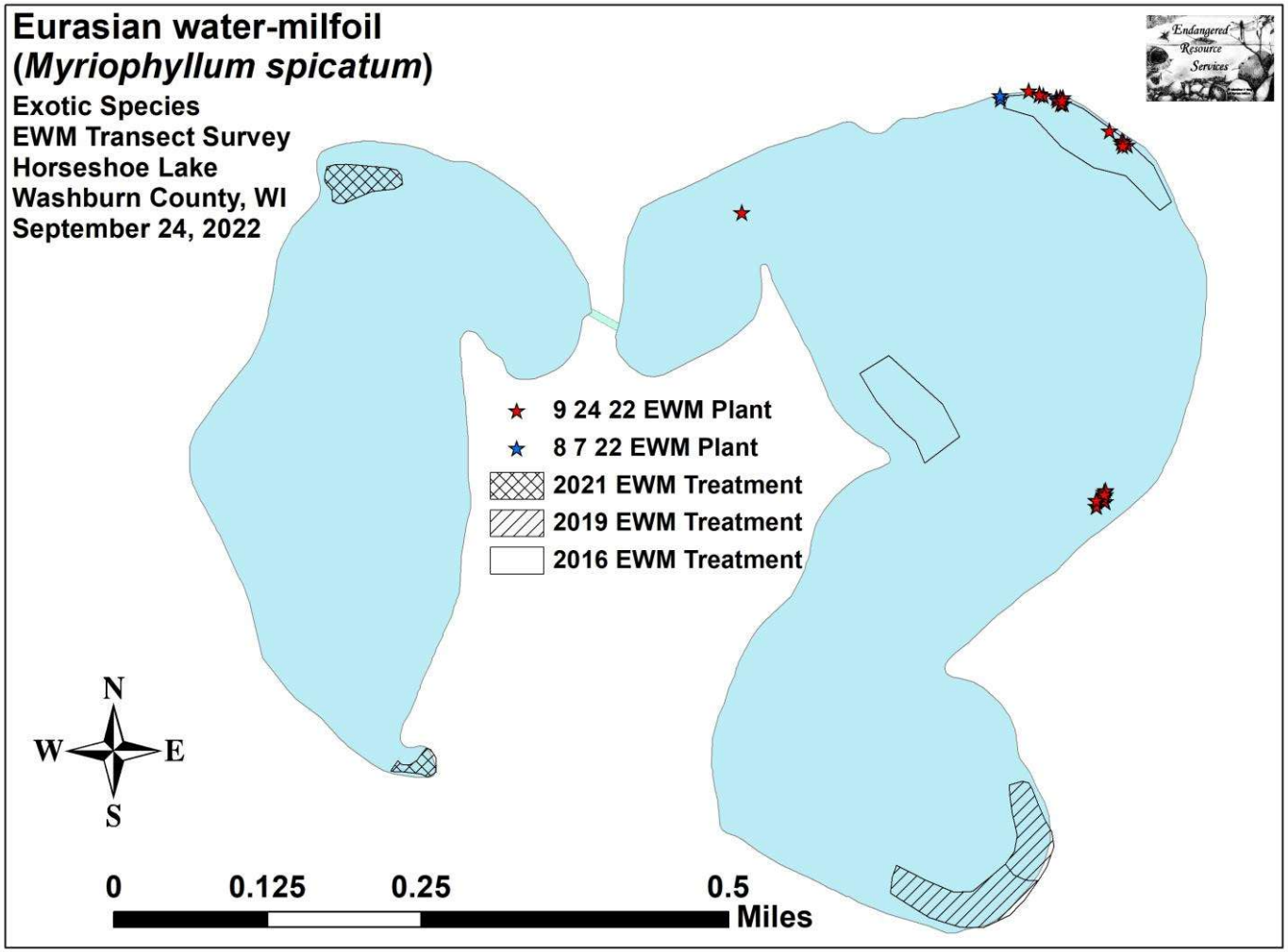
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Appendix I: 2022 EWM Rake Removal and Bed Maps


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
EWM Transect Survey
Horseshoe Lake
Washburn County, WI
August 7, 2022
Endangered Resource Services
8 7 22 EWM Plant
2021 EWM Treatment
2019 EWM Treatment
2016 EWM Treatment
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Miles


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
EWM Transect Survey
Horseshoe Lake
Washburn County, WI
September 24, 2022
Endangered Resource Services
9 24 22 EWM Plant
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2021 EWM Treatment
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0
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