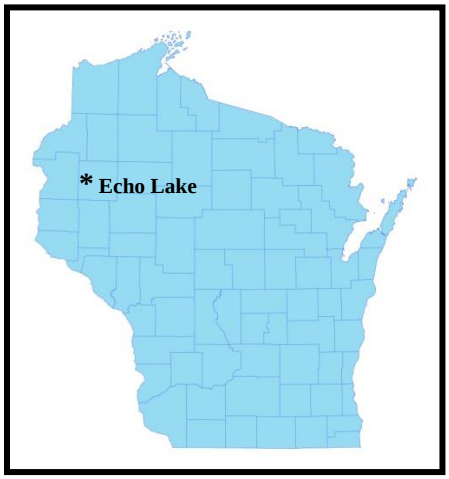
Eurasian Water-milfoil (*Myriophyllum spicatum*) Manual Rake Removal and Bed Mapping Survey Echo Lake – WBIC: 2630200 Barron County, Wisconsin

Eurasian water-milfoil (Berg 2007)

EWM removed 9/18/21

Project Initiated by:

Echo Lake Association, Lake Education and Planning Services, LLC and the Wisconsin Department of Natural Resources



Bright sun and calm survey conditions on Echo Lake 9/18/21

Survey Conducted by and Report Prepared by:

Endangered Resource Services, LLC
Matthew S. Berg, Research Biologist
St. Croix Falls, Wisconsin
September 18, 2021

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

INTRODUCTION:

Echo Lake (WBIC 2630200) is a 172-acre stratified seepage lake in west-central Barron County, Wisconsin in the Town of Almena (T34N R14W S07 NE NE). The lake reaches a maximum depth of 41ft in the southeast corner of the central basin and has an average depth of 20ft (Busch et al. 1967) (Figure 1). Echo Lake is mesotrophic bordering on oligotrophic in nature, and water clarity is good to very good with summer Secchi readings averaging 11.2ft from 2004-2020 (data for 2021 was not yet available) (WDR 2021). The lake's bottom substrate is variable with sandy muck in most bays, and rock/sandbars along most points and around the islands.

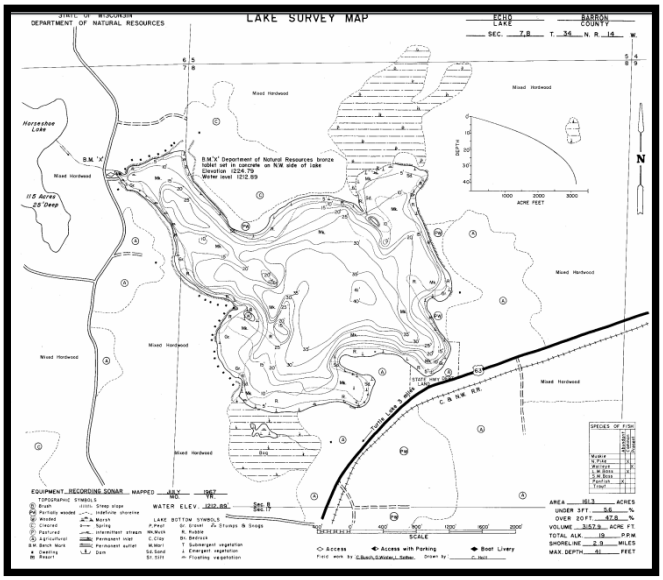


Figure 1: Echo Lake Bathymetric Map

BACKGROUND AND STUDY RATIONALE:

Eurasian water-milfoil (*Myriophyllum spicatum*) (EWM) was discovered in Echo Lake in 2004, and the Echo Lake Association (ELA) has been actively managing this invasive exotic species since 2008. Following the EWM monitoring and manual rake removal surveys in 2018 that documented a significant uptick in EWM in the northeast bay, the ELA, under the direction of Lake Education and Planning Services, Inc. (LEAPS), decided to treat 3.84 acres with granular 2, 4-D (Shredder Amine 4) with a target concentration of 4ppm on June 2, 2019. Two 2019 posttreatment surveys found and removed just five plants near the public boat landing, and two more surveys in 2020 turned up 28 plants which were also removed. Because of these low numbers, no treatment occurred in 2020 or 2021.

During the summer of 2021, the ELA and LEAPS decided to use a SCUBA diver to perform manual removal on all plants volunteers could find on the lake. That survey, conducted on July 16, 2021, located and elimianted approximately 50 plants – most of which occurred on the rock bar just southeast of the boat landing. Because of this uptick, it was requested that we return later in the summer to do a bed mapping survey with rake removal. This report is the summary analysis of that survey conducted on September 18, 2021. These data will be used to determine if and where EWM control might be considered in 2022.

METHODS:

Littoral Zone Rake Removal and Bed Mapping Surveys:

During the survey, we searched the lake's visible littoral zone for Eurasian water-milfoil. 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, took GPS coordinates at regular intervals, documented the rake range and depth range of plants, and estimated the average rake fullness rating and depth of EWM within the bed (Figure 2). Using the WDNR's Forestry Tool's Extension to ArcGIS 9.3.1, we used these coordinates to generate bed shapefiles and determine the acreage to the nearest hundredth of an acre.

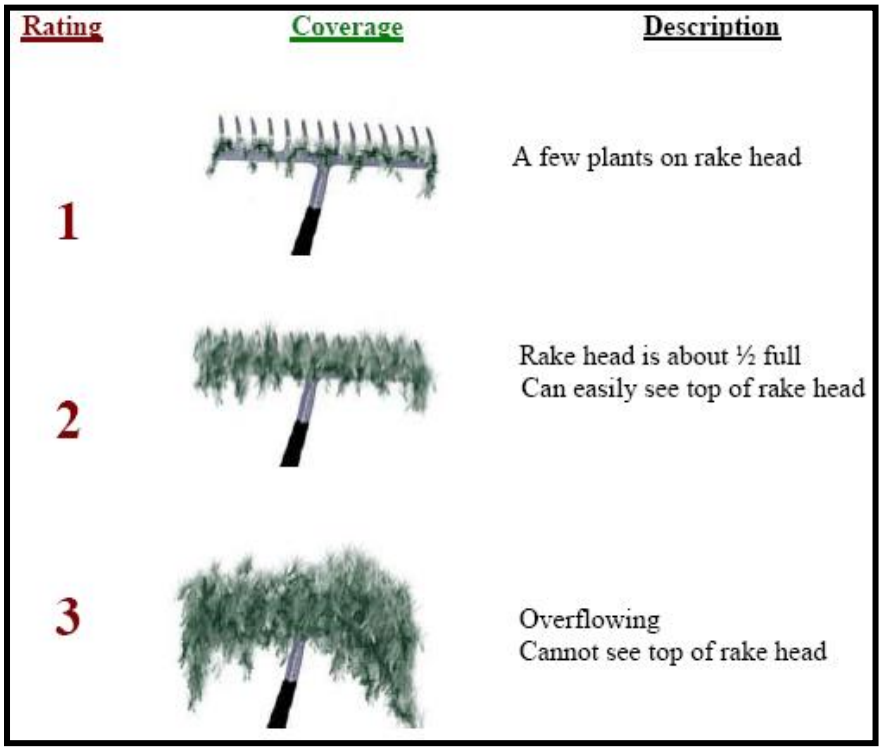


Figure 2: Rake Fullness Ratings

RESULTS AND DISCUSSION:

September Littoral Zone and Rake Removal Survey:

In mid-September, we covered transects totaling 19.7km (12.2miles) (Figure 3) and found and rake removed 50 total Eurasian water-milfoil plants. Twenty-seven plants were scattered around the rock bar southeast of the public landing in an area covering 0.08 acres. None of these plants were canopied and most were young "sprouts" that were less than 3ft tall suggesting they may have started growing after the dive removal in the area. Although this location is the likely source for "seeding" fragments that tend to turn up in the landing bay area, we only found six additional plants northwest of the bar.

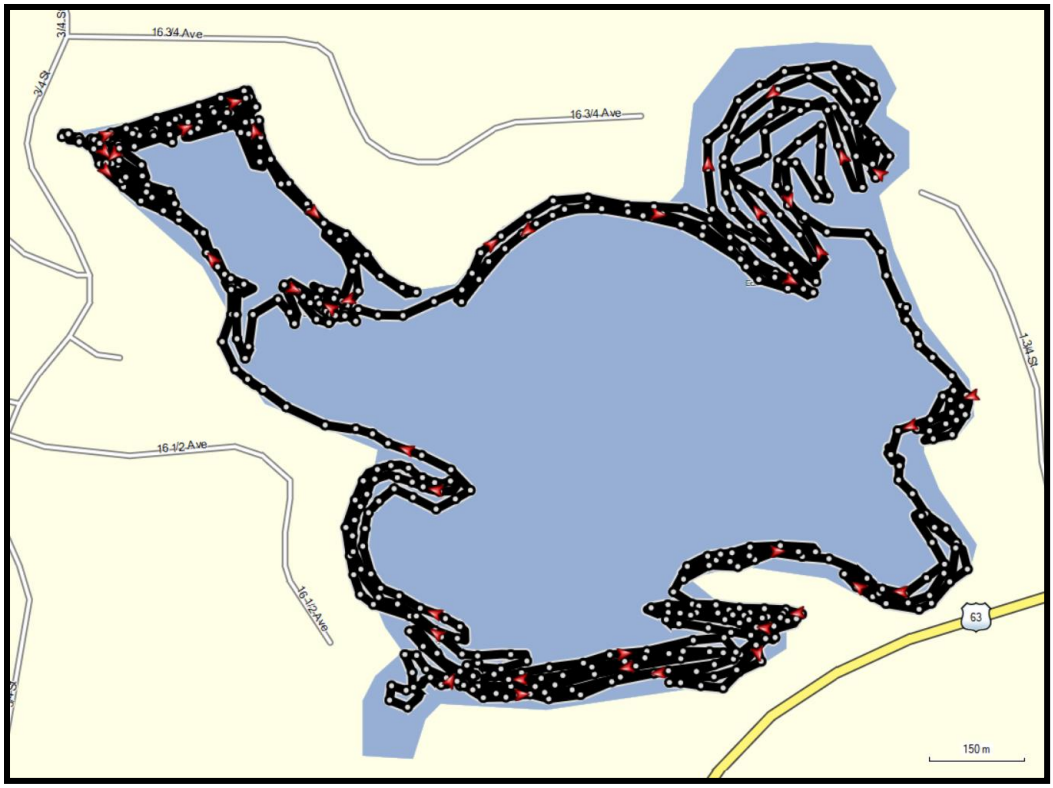


Figure 3: September 18, 2021 Survey Tracks

Elsewhere, EWM continued to be quite rare. We eliminated a small scattering of six plants in the east-central bay and off the nearby point; three plants from the southern finger bay; and a small but dense cluster of eight canopied plants near the entrance to the southwest bay. No plants were seen anywhere in the 2019 treatment areas, along the north-central shoreline, or in the southeast bay. Although our 2021 results were an increase from the 19 total plants found in August 2020 (Figure 4) and five plants found in October of 2019, it was still down significantly from the 209 plants raked out in the fall of 2017 and the 180 found in the fall of 2018 prior to the most recent treatment. (Appendix I).

Despite the lack of any true Eurasian water-milfoil beds in 2021, we noted the majority of plants in the lake were concentrated in two areas and drew polygons around them for future management consideration. Collectively, these "High Density Areas" totaled just 0.09 acres (Table 1).

Table 1: Late Summer/Fall Eurasian Water-milfoil Bed Mapping Summary
Echo Lake, Barron County
September 18, 2021

Bed Number	2021 HDA Acreage	2020 HDA Acreage	2019 Fall HDA Acreage	2018 Fall HDA Acreage	2017 Fall HDA Acreage	2016 Fall HDA Acreage	2015 Fall Bed Acreage	2014 Fall Bed Acreage	Years Treated	2021 Late Summer HDA Field Notes
1	0	0	0	0	0	0.32	0	0	2010, 2014, 2017	6 plants
2	0	0	0	0	0	0	0	0	2010	No EWM found
3	0	0	0	0	0	0	0	0	2010	No EWM found
4	0.08	0	0	0	0	0	0	0	2010	27 plants
4B	0	0	0	0	0	0	0	0	2014	No EWM found
5	0	0	0	0	0	0	0	0	2010	No EWM found
5A	0	0	0	0	0.03	0	0	0	None	No EWM found
5B	0	0	0	6.38	0.16	0	0	0	2019	No EWM found
6	0	0	0	0	0	0	0	0	2010, 2013	6 plants
6A	0	0	0	0	0.06	0	0	0	None	No EWM found
7	0	0	0	0	0	0	0	0	2010	No EWM found
8	0	0	0	0	0	0	0	0	’10, ’11, ’13, ’14	No EWM found
8A, B, C, D	0	0	0	0	0	0	0	0	2012, 2013	No EWM found
9	0	0	0	0	0	0	0	0	2010, 2011	No EWM found
10	0	0	0	0	0	0	0	0	2010	No EWM found
11	<0.01	0	0	0	0	0	0	0	’10, ’11, ’12, ’14	8 plants
11A	0	0	0	0	0.01	0	0	0	None	No EWM found
12	0	0	0	0	0	0	0	0	2010, 2014	No EWM found
12A	0	0	0	0	0.33	0	0	0	None	3 plants
12B	0	0	0	0	0	0	0	0	None	No EWM found
13	0	0	0	0	0	0	0	0	2010, 2014	No EWM found
14	0	0	0	0	0	0	0	0	2010	No EWM found
15	0	0	0	0	0	0	0	0	2010, 2014	No EWM found
Total	**0.09**	**0.00**	**0.00**	**6.38**	**0.59**	**0.32**	**0.00**	**0.00**		

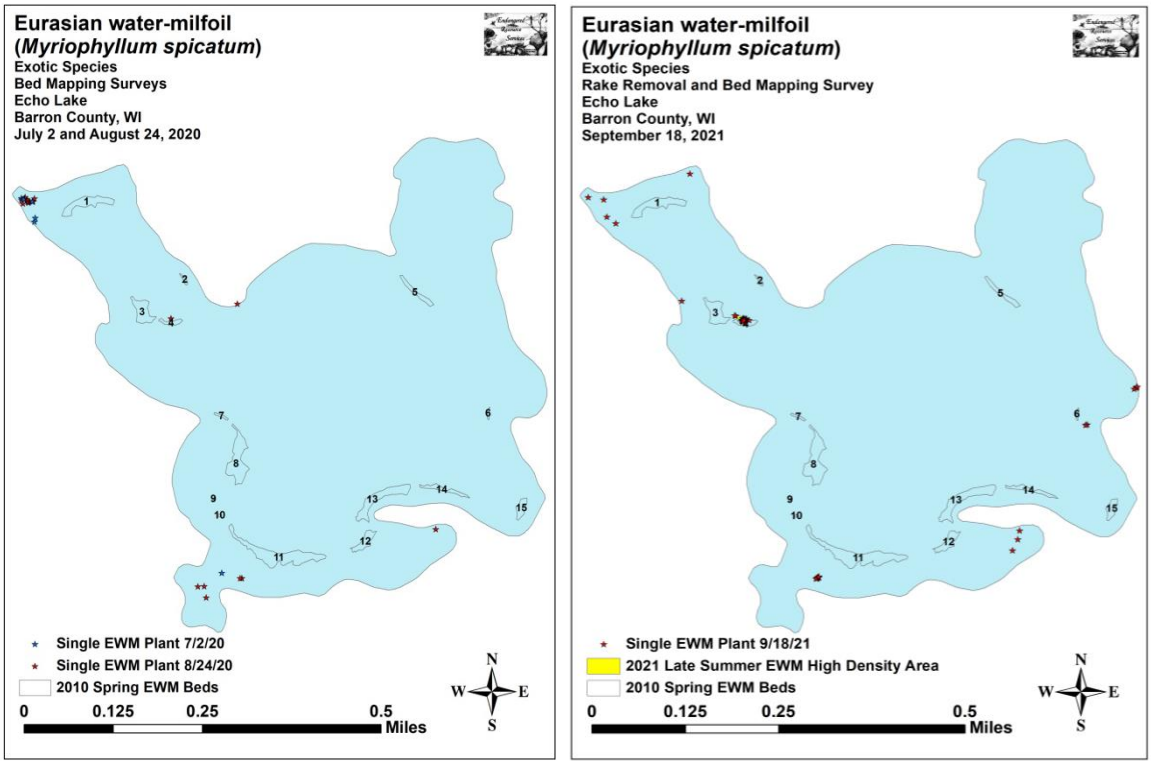


Figure 4: 2020 and 2021 EWM Locations

CONSIDERATIONS FOR MANAGEMENT:

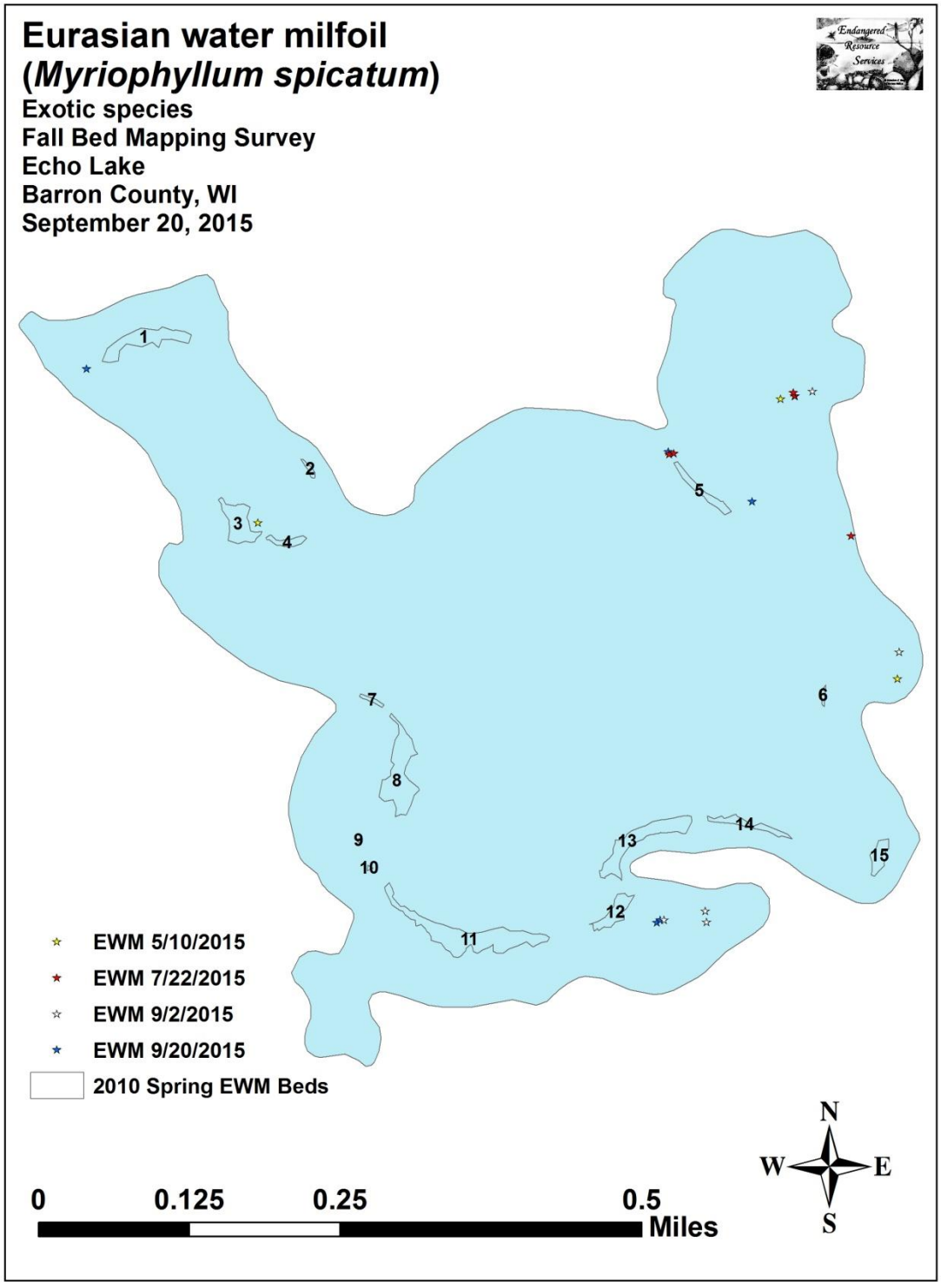
The combination of the 2019 chemical treatment in the northeast bay coupled with volunteer and professional efforts to rake remove plants on the lake proved effective in keeping the EWM infestation well in check during the 2019 and 2020 growing seasons. Unfortunately, based on the 2021 surveys, it appears that EWM numbers are again ticking up. Although chemical control might not be necessary in 2022, it could still be a consideration on the rock bar where the majority of plants were found in 2021. At this location, the compacted substrate makes it difficult to fully remove the roots and clear plants from the area. If no chemical control occurs in 2022, this area would likely be a high priority for diver removal due to the difficulty of raking plants out at this location. Elsewhere, regularly monitoring and rake remove of pioneer plants by either volunteers or professionals will hopefully continue to be a cost-effective way to slow the spread of EWM and minimize the need for widespread herbicide use.

LITERATURE CITED

Busch, C., G. Winter, L. Sather, and C. Holt. [online]. 1967. Echo Lake Map. Available from http://dnr.wi.gov/lakes/maps/DNR/2630200a.pdf (September 2021).

WDNR. [online]. 2021. Echo Lake - Citizen Lake Water Quality Monitoring Database. Available from http://dnr.wi.gov/lakes/waterquality/Station.aspx?id=033210 (September 2021).

Appendix I: 2015-2021 Bed Mapping Survey Maps


Eurasian water milfoil
(Myriophyllum spicatum)
Exotic species
Fall Bed Mapping Survey
Echo Lake
Barron County, WI
September 20, 2015
Endangered Resource Services
1
2
3
4
5
6
7
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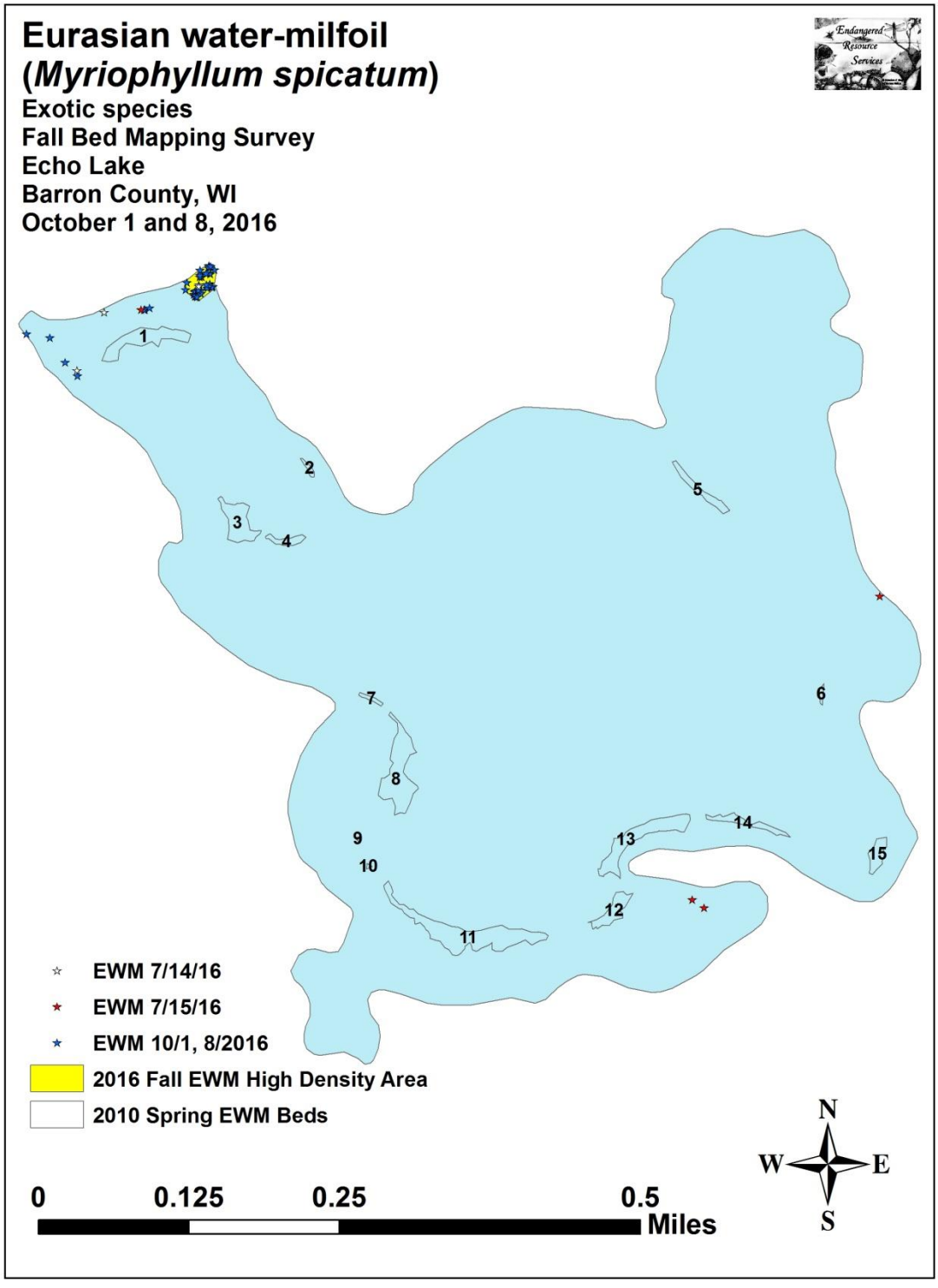
9
10
11
12
13
14
15
EWM 5/10/2015
EWM 7/22/2015
EWM 9/2/2015
EWM 9/20/2015
2010 Spring EWM Beds
N
W
E
S
0
0.125
0.25
0.5
Miles


Eurasian water-milfoil
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Exotic species
Fall Bed Mapping Survey
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Barron County, WI
October 1 and 8, 2016
Endangered Resource Services
1
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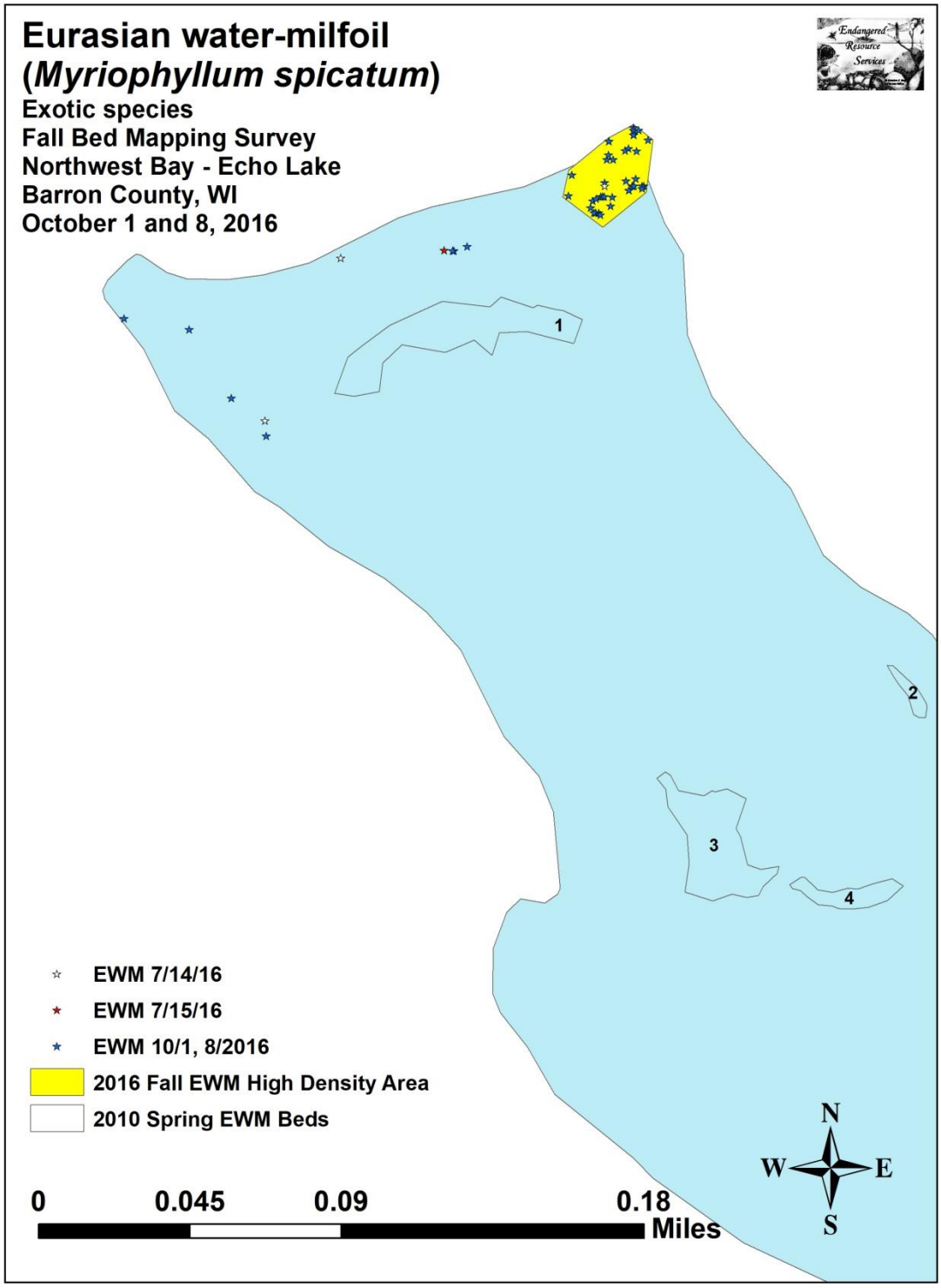
12
13
14
15
EWM 7/14/16
EWM 7/15/16
EWM 10/1, 8/2016
2016 Fall EWM High Density Area
2010 Spring EWM Beds
0
0.125
0.25
0.5
Miles
N
W
E
S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Exotic species
Fall Bed Mapping Survey
Northwest Bay - Echo Lake
Barron County, WI
October 1 and 8, 2016
Endangered Resource Services
1
2
3
4
EWM 7/14/16
EWM 7/15/16
EWM 10/1, 8/2016
2016 Fall EWM High Density Area
2010 Spring EWM Beds
0
0.045
0.09
0.18
Miles
N
W
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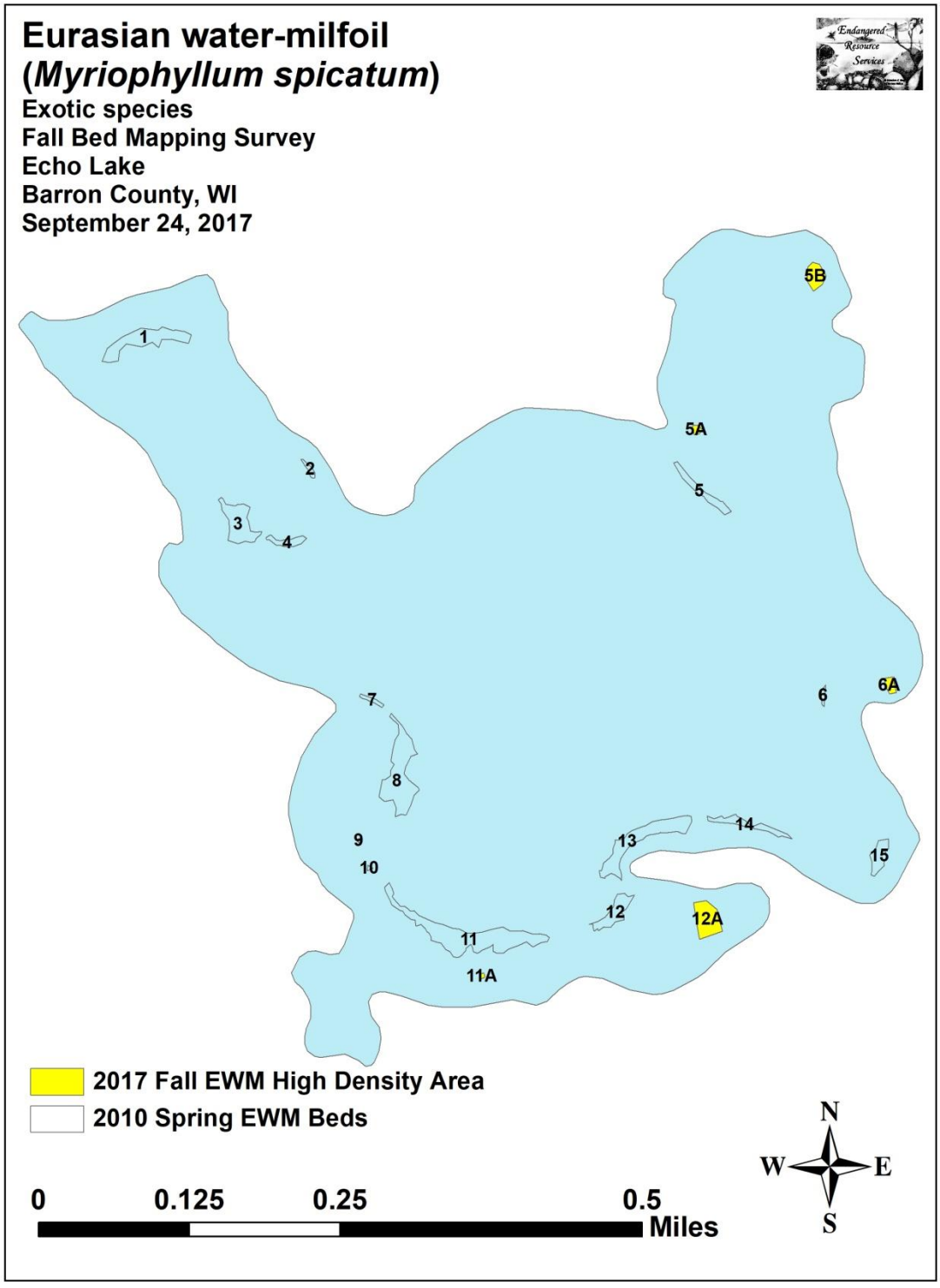
S


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic species
Fall Bed Mapping Survey
Echo Lake
Barron County, WI
September 24, 2017
Endangered Resource Services
5B
1
5A
2
5
3
4
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6A
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12A
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11A
2017 Fall EWM High Density Area
2010 Spring EWM Beds
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0.125
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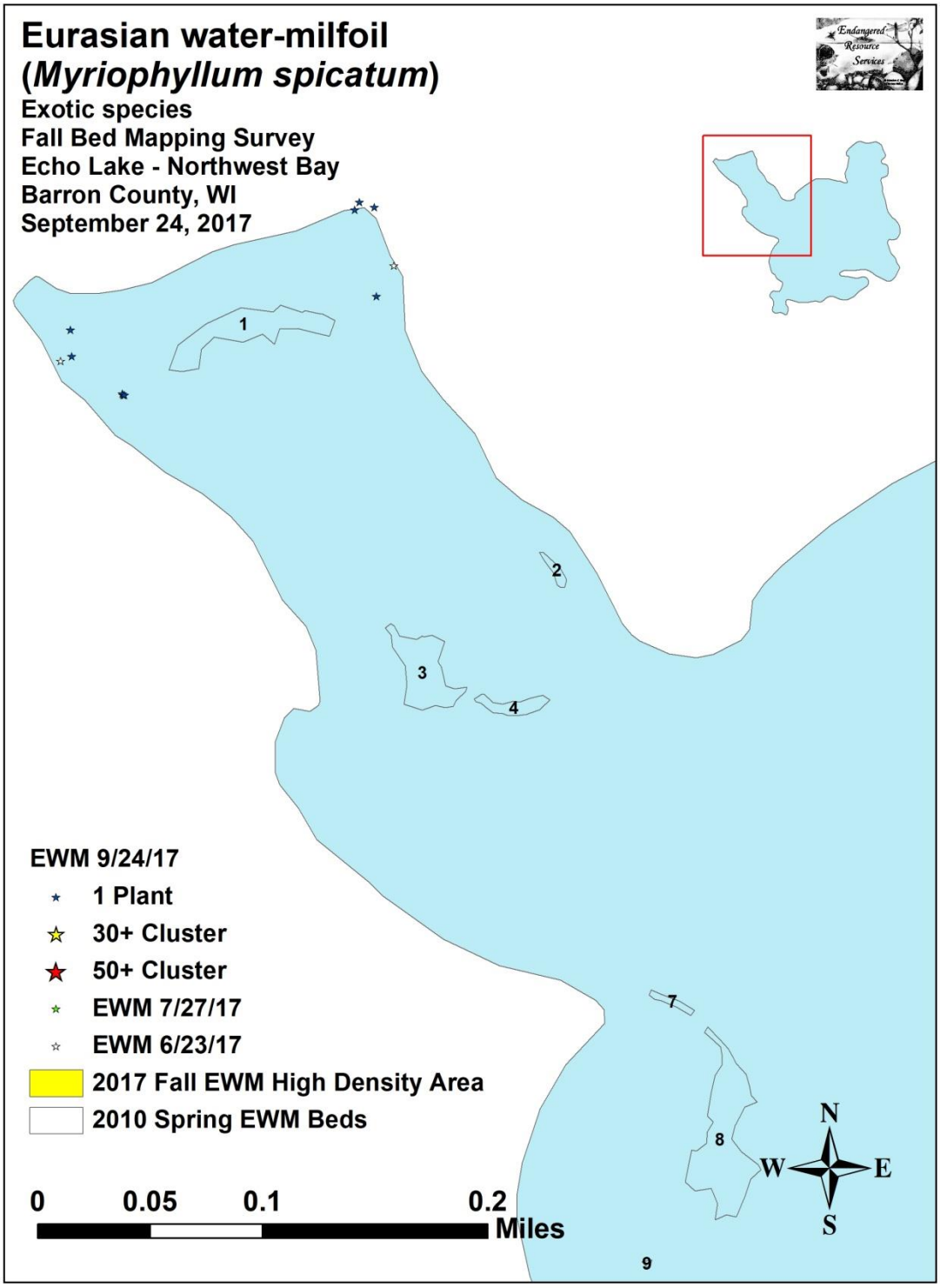
Miles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Exotic species
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Barron County, WI
September 24, 2017
Endangered Resource Services
1
2
3
4
7
8
9
EWM 9/24/17
1 Plant
30+ Cluster
50+ Cluster
EWM 7/27/17
EWM 6/23/17
2017 Fall EWM High Density Area
2010 Spring EWM Beds
0
0.05
0.1
0.2
Miles
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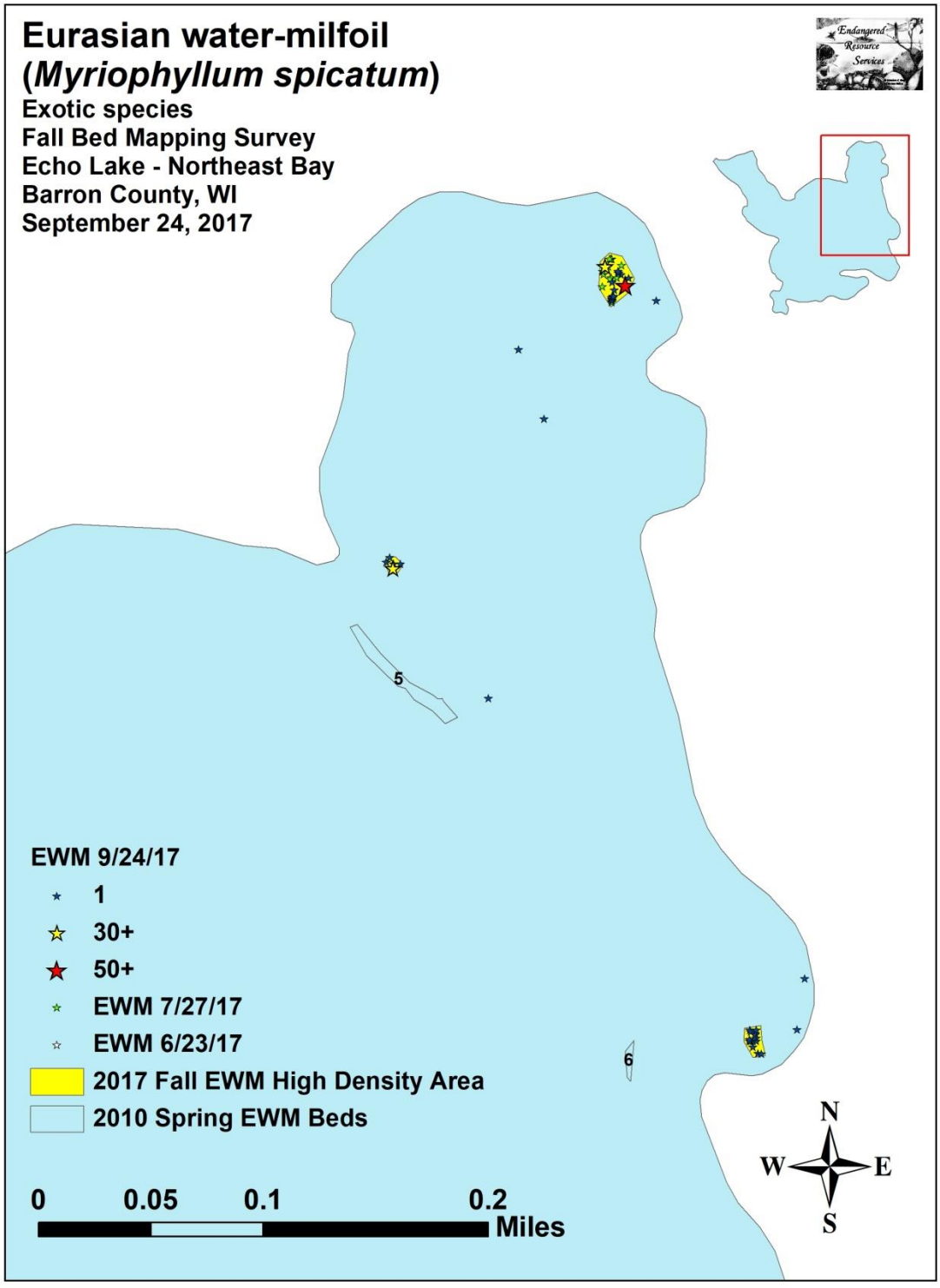
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Exotic species
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Barron County, WI
September 24, 2017
Endangered Resource Services
5
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EWM 9/24/17
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30+
50+
EWM 7/27/17
EWM 6/23/17
2017 Fall EWM High Density Area
2010 Spring EWM Beds
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0.05
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Miles
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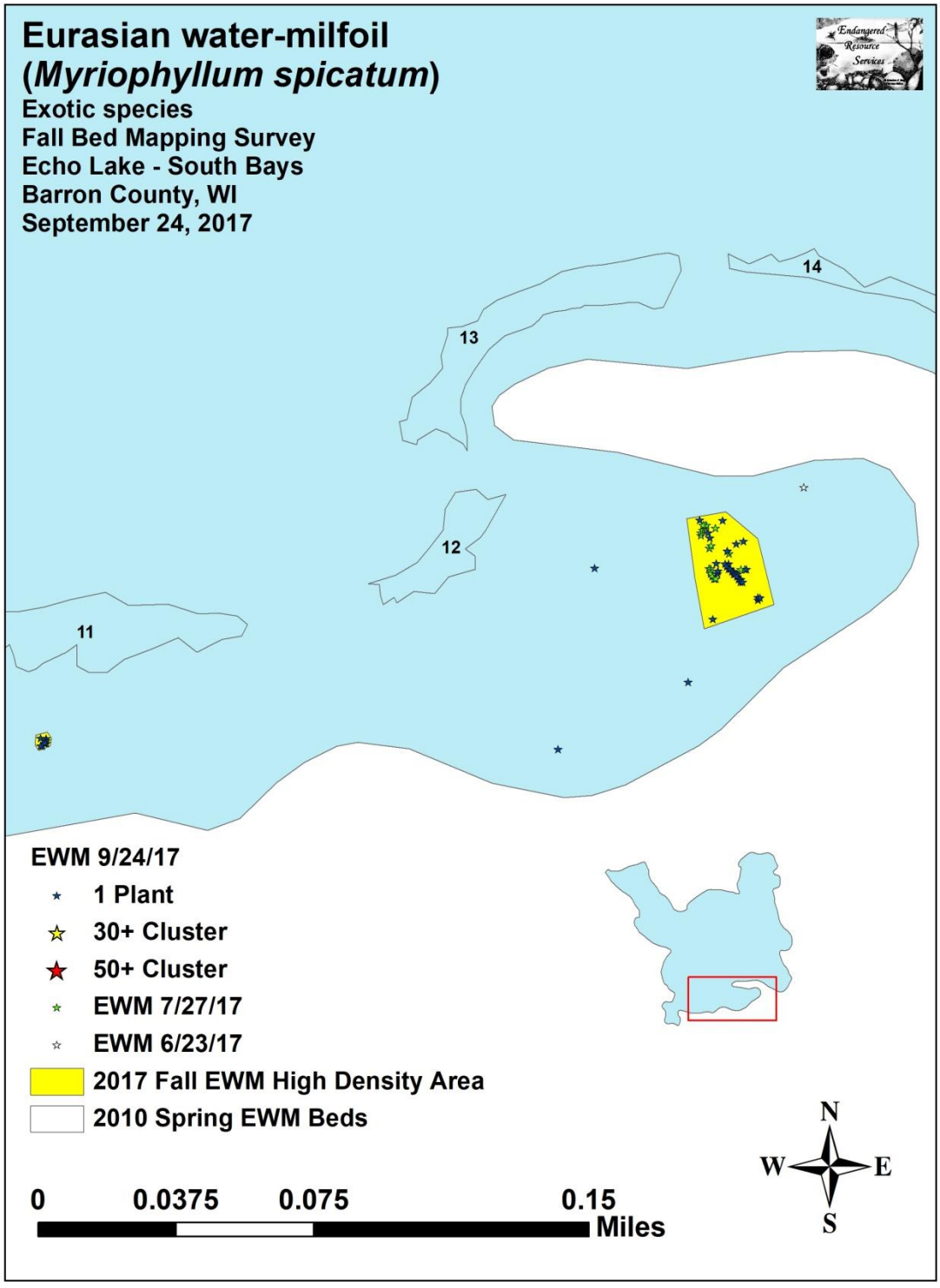
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Barron County, WI
September 24, 2017
Endangered Resource Services
14
13
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EWM 9/24/17
1 Plant
30+ Cluster
50+ Cluster
EWM 7/27/17
EWM 6/23/17
2017 Fall EWM High Density Area
2010 Spring EWM Beds
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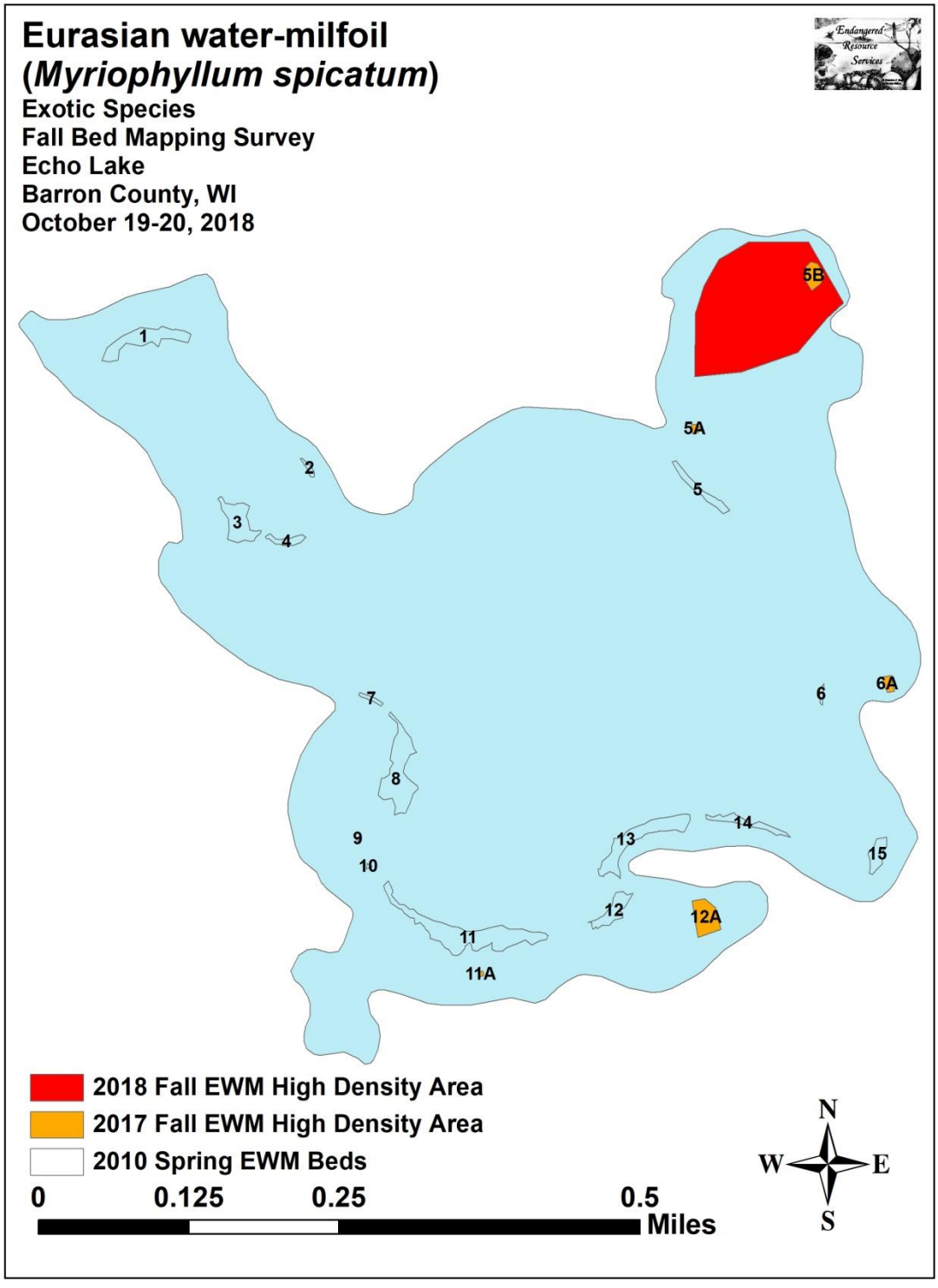
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2010 Spring EWM Beds
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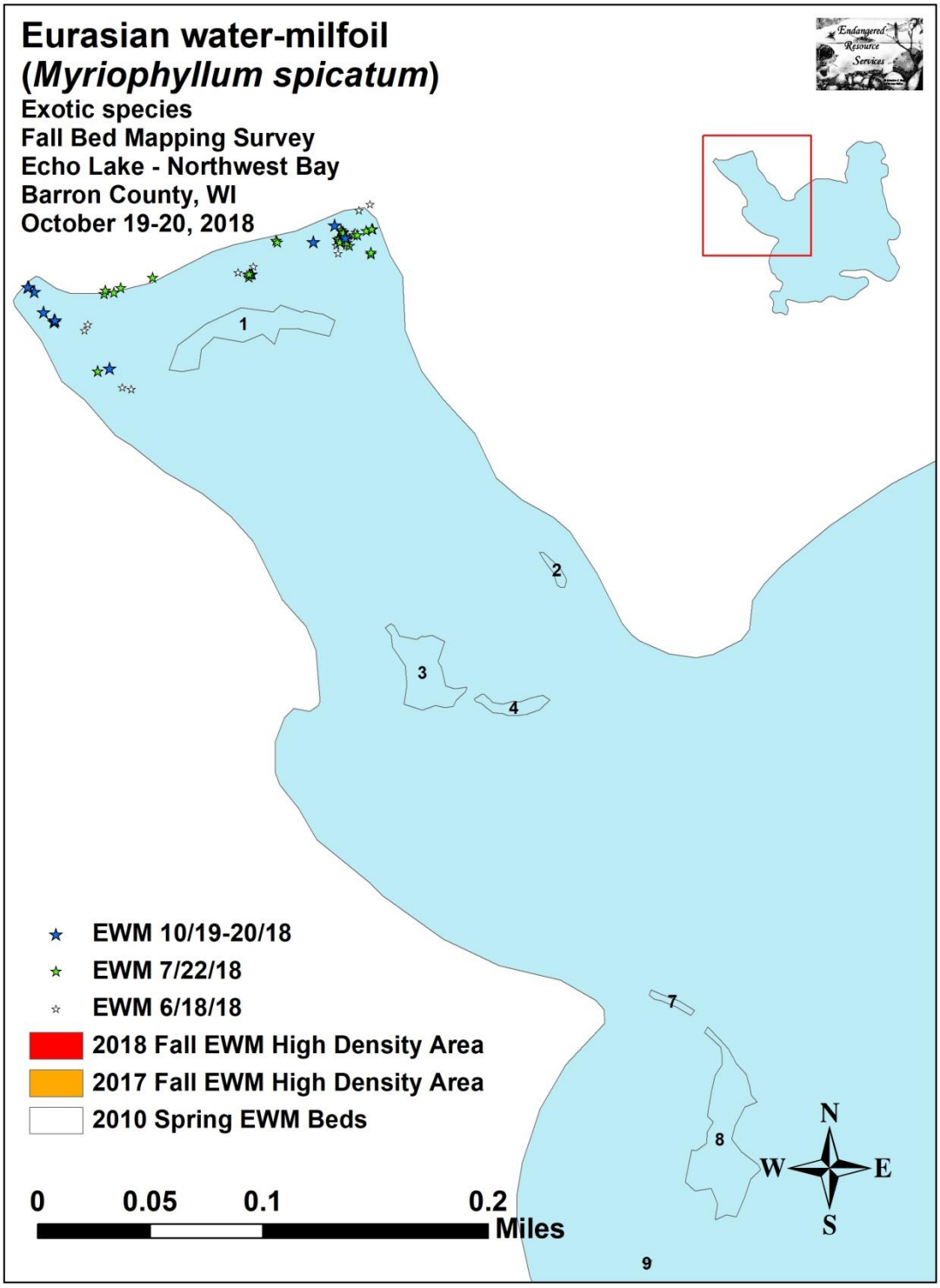
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EWM 10/19-20/18
EWM 7/22/18
EWM 6/18/18
2018 Fall EWM High Density Area
2017 Fall EWM High Density Area
2010 Spring EWM Beds
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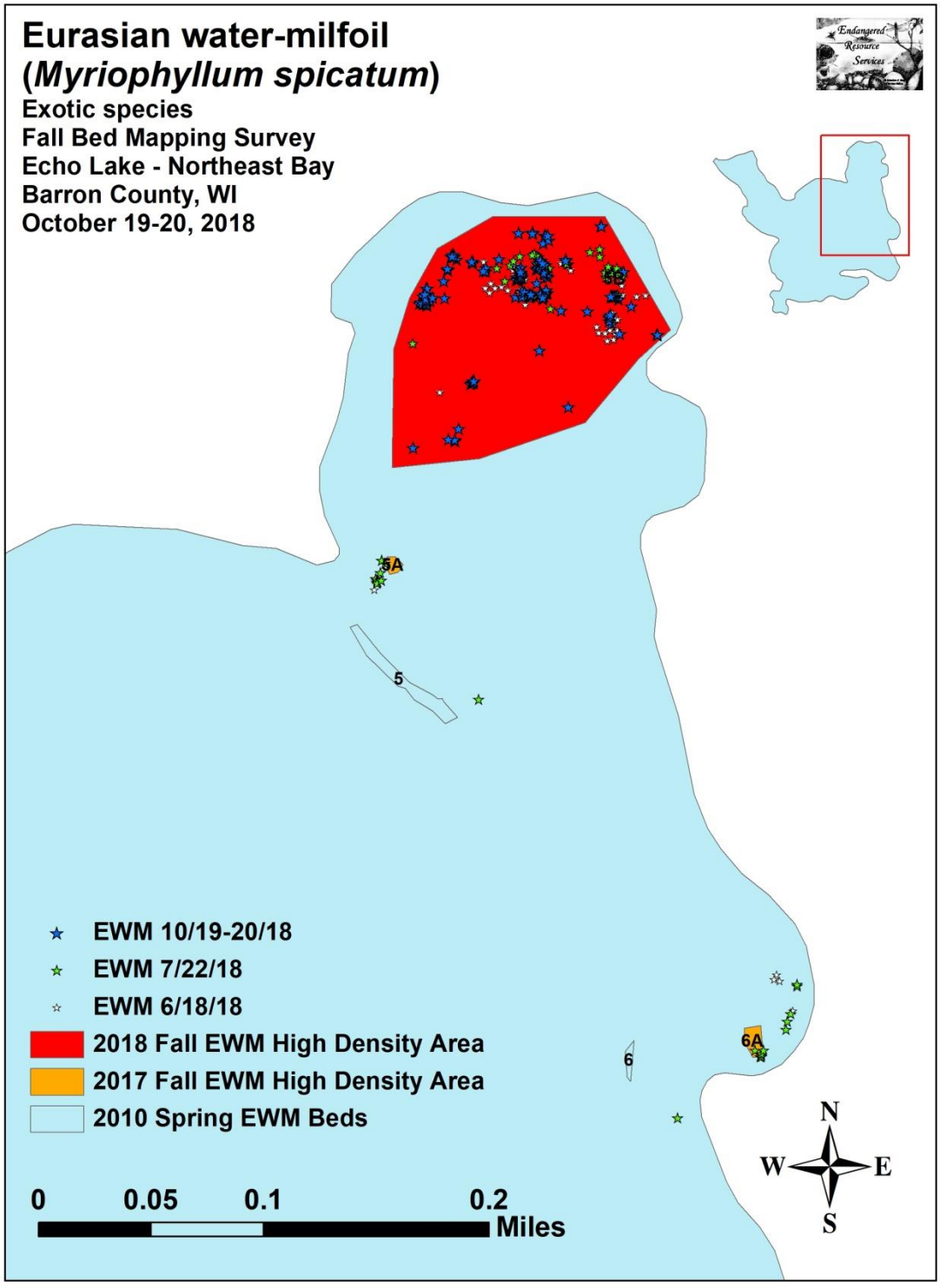
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October 19-20, 2018
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5A
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EWM 10/19-20/18
EWM 7/22/18
EWM 6/18/18
2018 Fall EWM High Density Area
2017 Fall EWM High Density Area
2010 Spring EWM Beds
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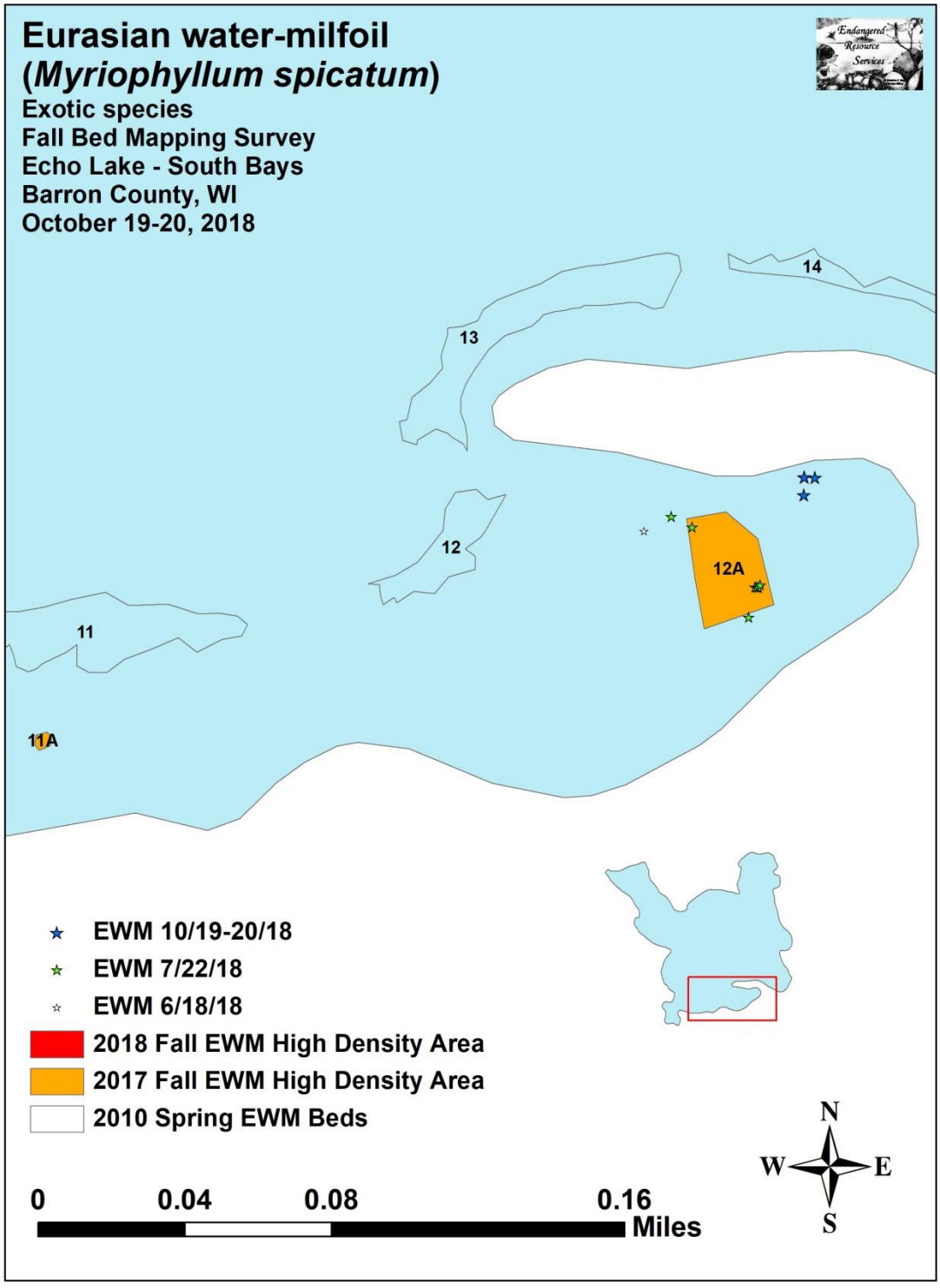
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October 19-20, 2018
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14
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12
12A
11
11A
EWM 10/19-20/18
EWM 7/22/18
EWM 6/18/18
2018 Fall EWM High Density Area
2017 Fall EWM High Density Area
2010 Spring EWM Beds
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0.04
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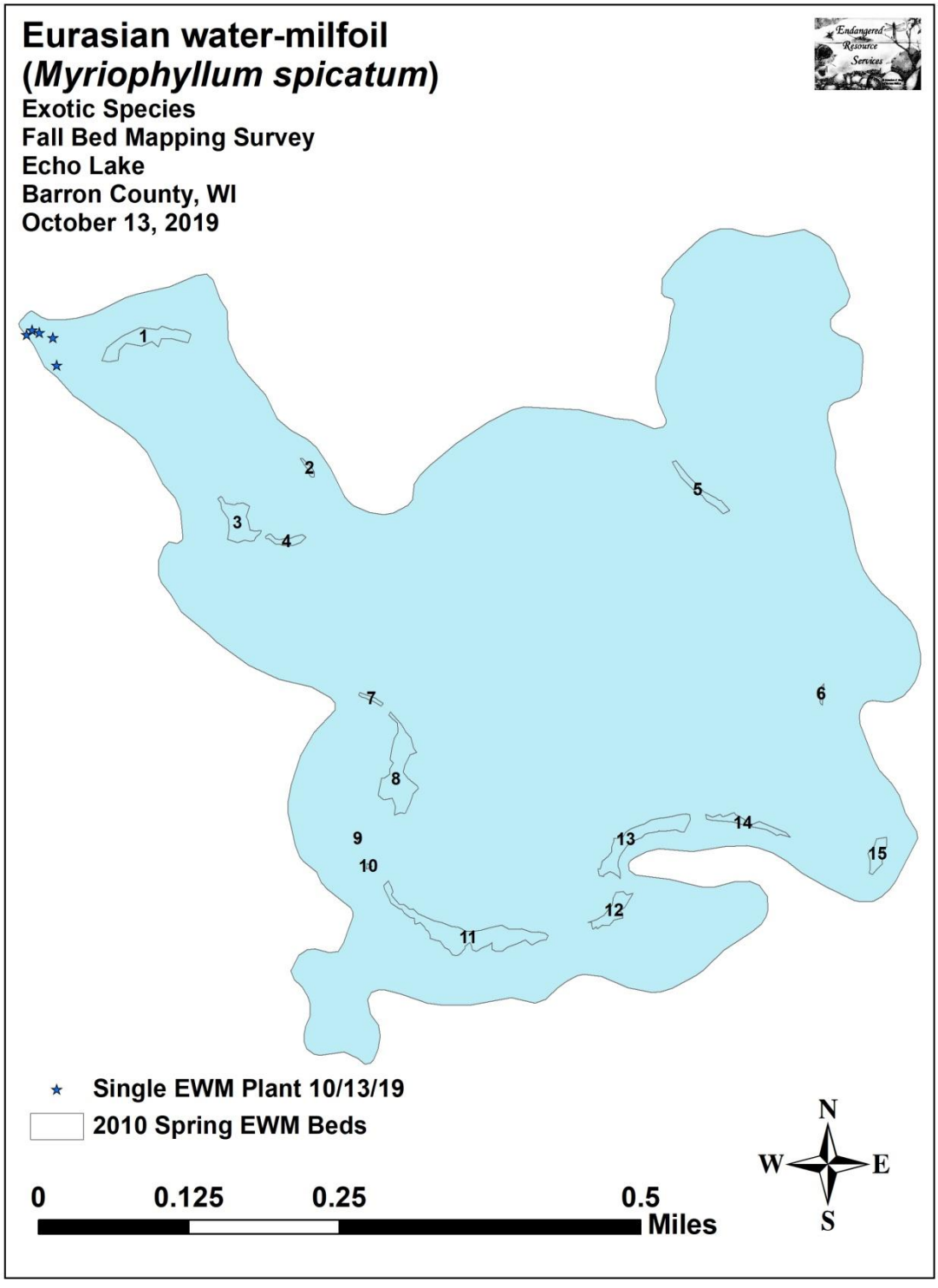
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Barron County, WI
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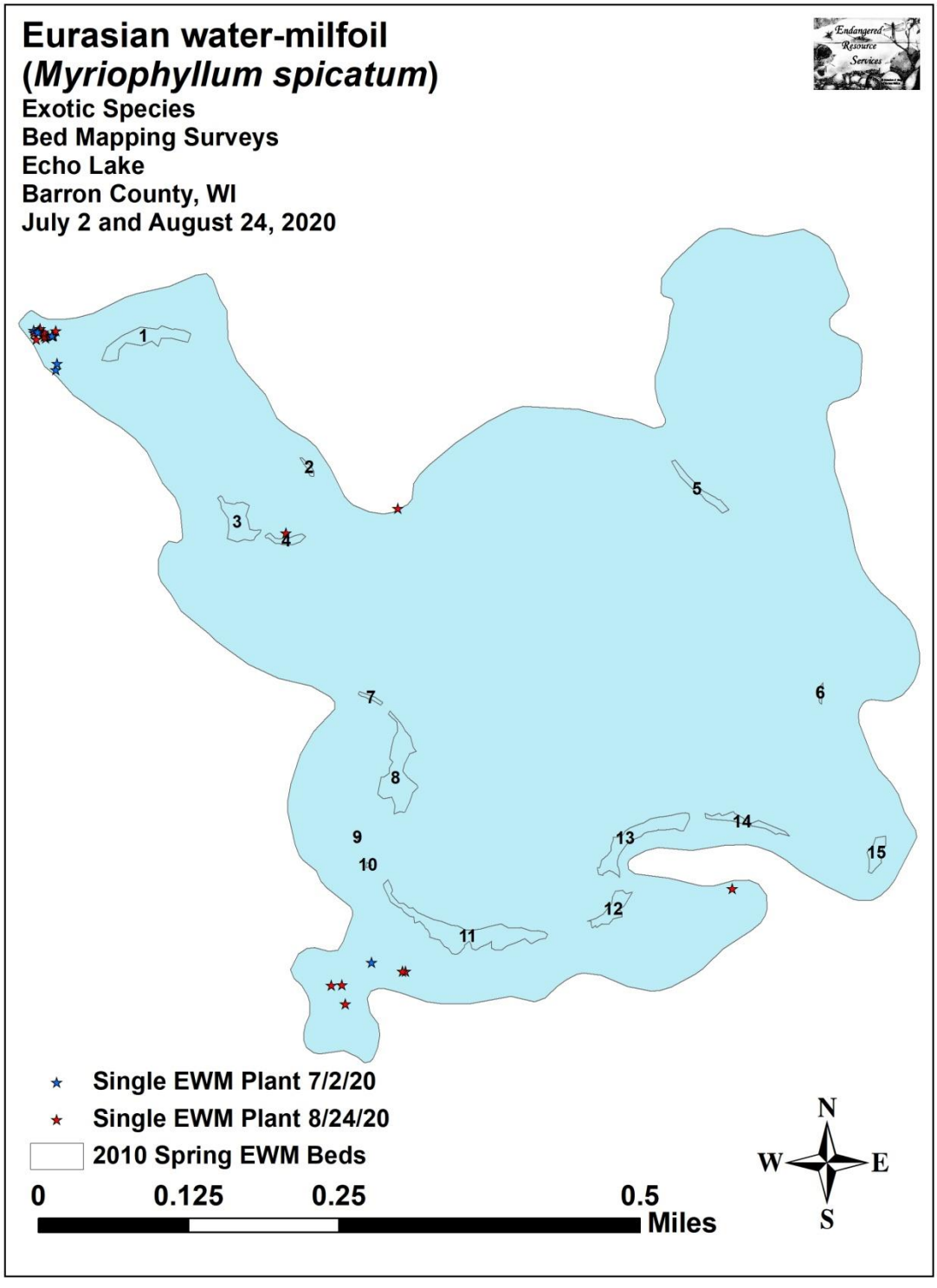
Eurasian water-milfoil
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Barron County, WI
July 2 and August 24, 2020
Endangered Resource Services
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Single EWM Plant 7/2/20
Single EWM Plant 8/24/20
2010 Spring EWM Beds
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Miles
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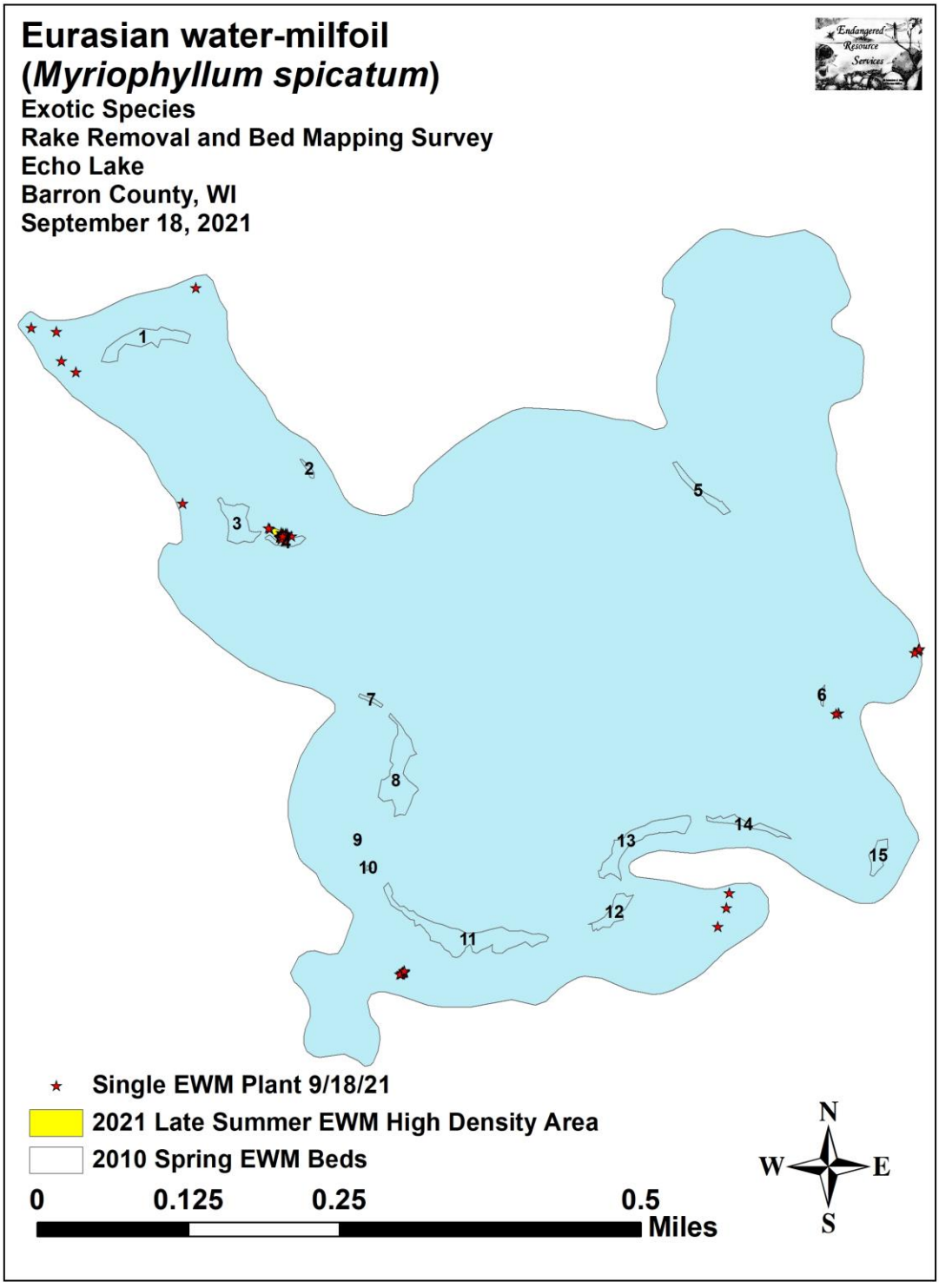
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Exotic Species
Rake Removal and Bed Mapping Survey
Echo Lake
Barron County, WI
September 18, 2021
Endangered Resource Services
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Single EWM Plant 9/18/21
2021 Late Summer EWM High Density Area
2010 Spring EWM Beds
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Miles
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