Eurasian water-milfoil (*Myriophyllum spicatum*) Late Summer Bed Mapping Survey Sand Bar Lake - WBIC: 24924900 Bayfield County, Wisconsin

EWM among the dead jack pine along Sand Bar Lake's shoreline - 8/24/25

Eurasian water-milfoil (Berg 2007)

Project Initiated by:

The Town of Barnes – Aquatic Invasive Species Committee and the Wisconsin Department of Natural Resources

BAISS boat with Gus tribute – 8/24/25

Survey Conducted by and Report Prepared by:

Endangered Resource Services, LLC
Matthew S. Berg, Research Biologist
St. Croix Falls, Wisconsin
August 24, 2025

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES……..……..……..……. ii

INTRODUCTION…….. 1

BACKGROUND AND STUDY RATIONALE…..…… 1

METHODS……..…….…….. 2

RESULTS..……..…….…….. 3

2024 Treatment Areas……. 3

Eurasian Water-milfoil Bed Mapping Survey…… 4

Descriptions of Past and Present EWM Beds and High-density Areas……. 7

DISCUSSION AND CONSIDERATIONS FOR MANAGEMENT……. 8

LITERATURE CITED…….…….……. 8

APPENDIXES…….…….…….……. 9

I: 2024 Eurasian Water-milfoil Treatment Area Map...…...…… 9

II: 2022, 2023, and 2025 Eurasian Water-milfoil Bed Maps……...…… 11

LIST OF FIGURES AND TABLES

Page

Figure 1: Sand Bar Lake Bathymetric Map……... 1

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

Table 1: Spring Eurasian Water-milfoil Treatment Summary –
Sand Bar Lake – Bayfield County, WI – June 4, 2024……... 3

Figure 3: Eurasian Water-milfoil Treatment Areas – June 4, 2024…….…….. 3

Figure 4: August 24, 2025 EWM Littoral Zone Survey – GPS Tracks……. 4

Figure 5: 2022, 2023, and 2025 Late Summer Eurasian Water-milfoil Bed Maps... 5

Table 2: Late Summer Eurasian Water-milfoil Bed Mapping Summary –
Sand Bar Lake – Bayfield County, WI – August 24, 2025…… 6

INTRODUCTION:

Sand Bar Lake (WBIC 2494900) is a 127-acre stratified seepage lake on the west-central edge of Bayfield County, Wisconsin in the Town of Barnes (T45N R9W S19/20). It reaches a maximum depth of 49ft on the east side and has an average depth of approximately 25ft. The lake is oligotrophic in nature with Secchi readings in 2023 (the most recent year available) averaging 18.8ft (WDNR 2025). This good to very good water clarity produced a littoral zone that extended to at least 20ft in the summer of 2025. The bottom substrate is predominately sand along the shoreline, but this gradually transitions to sand with a thin top layer of muck at most depths over 6ft (Figure 1) (Holt et al. 1972).

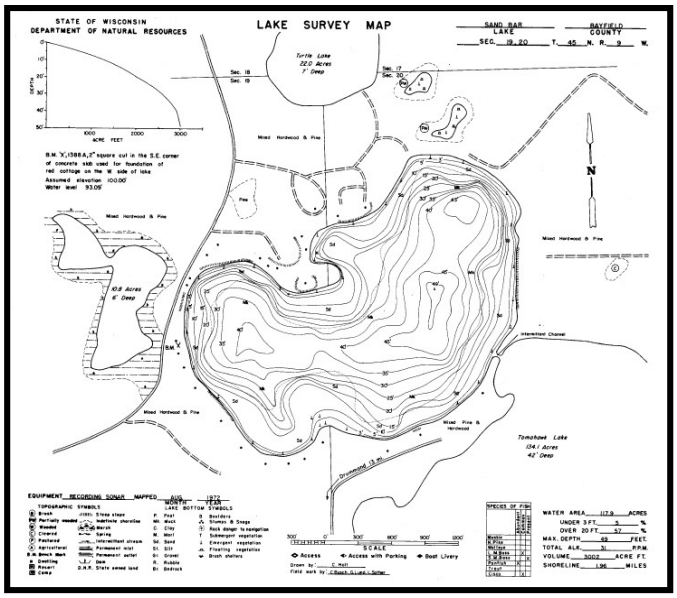


Figure 1: Sand Bar Lake Bathymetric Map

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. Now present in at least 14 different Bayfield County waterbodies (WDNR 2023), the Town of Barnes Aquatic Invasive Species Committee (TOB) and the Wisconsin Department of Natural Resources (WDNR) first confirmed EWM in Tomahawk and Sand Bar Lakes in the fall of 2004. Because the lakes are so similar (and even connected at high water), WDNR and Army Corp of Engineer (ACE) biologists decided they would initially serve as test (Tomahawk) and control (Sand Bar) lakes for a variety of treatments regimes as shareholders decided how to best fight the infestation. Over the next several years, the lakes would become a true case study as managers used different types of herbicides singly and in combination; tried them at varying concentrations; and conducted both bed and whole-lake applications. To assess the impacts of these treatments (or the lack there of in the case of Sand Bar) on both EWM and the lakes' native macrophytes, WDNR and ACE biologists conducted annual macrophyte surveys on Tomahawk from 2006 to 2015 and on Sand Bar from 2007 to 2015. However, due to budget cuts and a lack of staffing, these surveys were discontinued after the July 2015 survey at which time the TOB took over primary responsibility for the management of the lakes.

In 2016, the TOB built and began using a suction harvester as part of an integrated approach to managing EWM. Following a whole-lake treatment with 2, 4-D (Shredder Amine 4) that occurred on May 15, 2017 – the "Barnes Aquatic Invasive Species Sucker" or BAISS was utilized as the only active management during the rest of 2017 through 2021. Initially, annual full point-intercept surveys requested by the TOB and the WDNR showed suction harvesting was sufficient to maintain EWM at low levels. The 2018 surveys found no sign of EWM on Sand Bar Lake and only a floating fragment near the public landing on Tomahawk Lake. Although the 2019 survey found that the BAISS continued to keep EWM at undetectable levels on Sand Bar, EWM was spreading rapidly along Tomahawk's northern shoreline. The 2020 and 2021 surveys found that harvesting was no longer keeping up with EWM's expansion in Tomahawk and barely keeping up in Sand Bar, and, in 2022, we found EWM had essentially reestablished throughout Sand Bar. This prompted the TOB, under the direction of Lake Education and Planning Services, LLC (LEAPS – Dave Blumer), to apply for a permit to chemically treat a narrow strip along the eastern shoreline on Sand Bar Lake in 2023. Although no formal pre/posttreatment surveys were done, it was requested that we conduct a late summer EWM bed mapping survey to assess the impact of the treatment and allow for future active management decisions. When this survey found the limited treatment had had little impact, five additional areas were chemically treated in 2024 and suction harvesting resumed in 2025. Following these efforts, we were asked to complete another bed mapping survey. This report is the summary analysis of that survey conducted on August 24, 2025.

METHODS:

Eurasian Water-milfoil Bed Mapping Survey:

During the survey, we searched the visible littoral zone of the lake. By definition, a "bed" was determined to be any area where we visually estimated that EWM made up >50% of the area's plants, was generally continuous with clearly defined borders, and was canopied or close enough to being canopied that it would likely interfere with boat traffic. After we located a bed, we motored around the perimeter taking 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. Because the goal of the survey was to identify all areas of the lake with EWM, we also mapped single plants as well as "high-density areas" where EWM plants were continuous but didn't meet all of the other "bed" criteria.

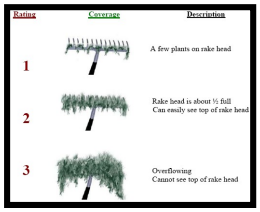


Figure 2: Rake Fullness Ratings (UWEX 2010)

RESULTS:

2024 Treatment Areas:

In the spring of 2024, the TOB treated five areas around the lake totaling 7.53 acres (5.93% of the lake's total surface area) (Table 1). Treatment occurred on June 4th with Northern Aquatic Services (Dale Dressel - Dresser, WI) applying ProcellaCor at a target rate of 4-5pdu/acre-ft (264.8 total pdu) (Figure 3) (Appendix I). The reported water temperature at the time of treatment was 67°F, the ambient air temperature was 66°F, and winds were out of the south at 2-4mph.

Table 1: Spring Eurasian Water-milfoil Treatment Summary
Sand Bar Lake – Bayfield County, WI
June 4, 2024

Treatment Area #	Final Treatment Area (acres)	Chemical, Rate, and Total Volume
East Shoreline	2.76	ProcellaCor – 5pdu/acre ft. – 138.0 pdu
North Shoreline	1.57	ProcellaCor – 5pdu/acre ft. – 62.8 pdu
West-central Bay	0.92	ProcellaCor – 4pdu/acre ft. – 18.4 pdu
Southwest Bay	0.82	ProcellaCor – 4pdu/acre ft. – 16.4 pdu
South Shoreline	1.46	ProcellaCor – 4pdu/acre ft. – 29.2 pdu
Total	**7.53**	**ProcellaCor – 4-5pdu/acre ft. – 264.8 pdu**

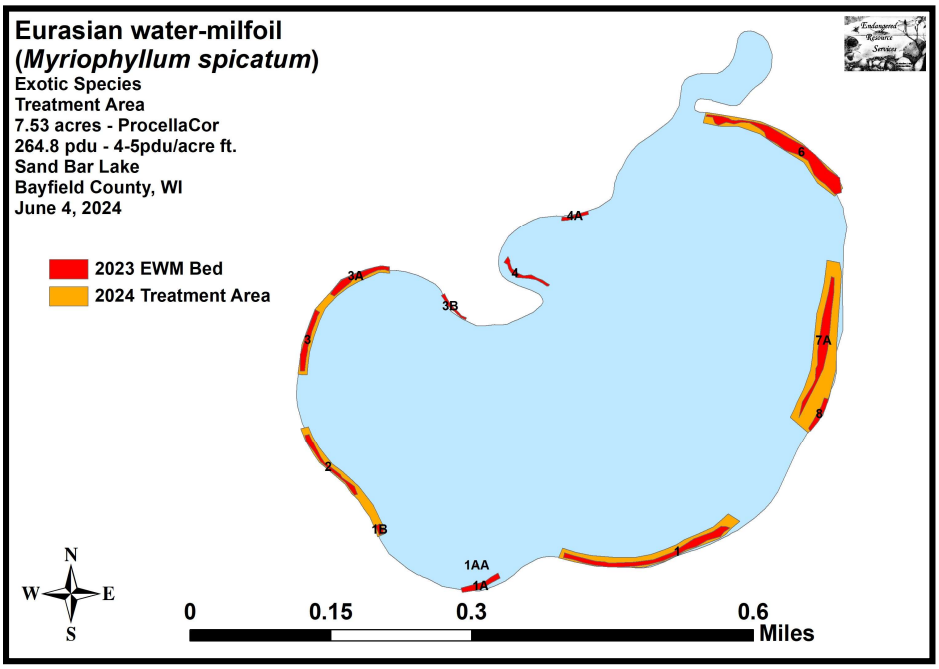


Figure 3: Eurasian Water-milfoil Treatment Areas - June 4, 2024

Eurasian Water-milfoil Bed Mapping Survey:

On August 24, 2025, we searched 8.9km (5.5 miles) of transects throughout the lake's visible littoral zone (Figure 4). We had partly sunny skies and relatively calm winds that allowed us to see down in the water approximately 8-10ft. We found the 2024 treatment areas continued to be nearly free of EWM, while areas not treated had small beds. In total, we mapped six microbeds covering 0.14 acre (0.11% of the lake's surface area) and rake removed six isolated plants (Figure 5). This represented a 3.33-acre (-95.97%) decline compared to the 2023 survey when we found 13 beds on 3.47 acres (2.73% surface area). The 2025 total was also a 1.07-acre (-88.43%) decline compared to 2022 when we found eight beds covering 1.21 acres (0.95% surface area) (Table 2).

.

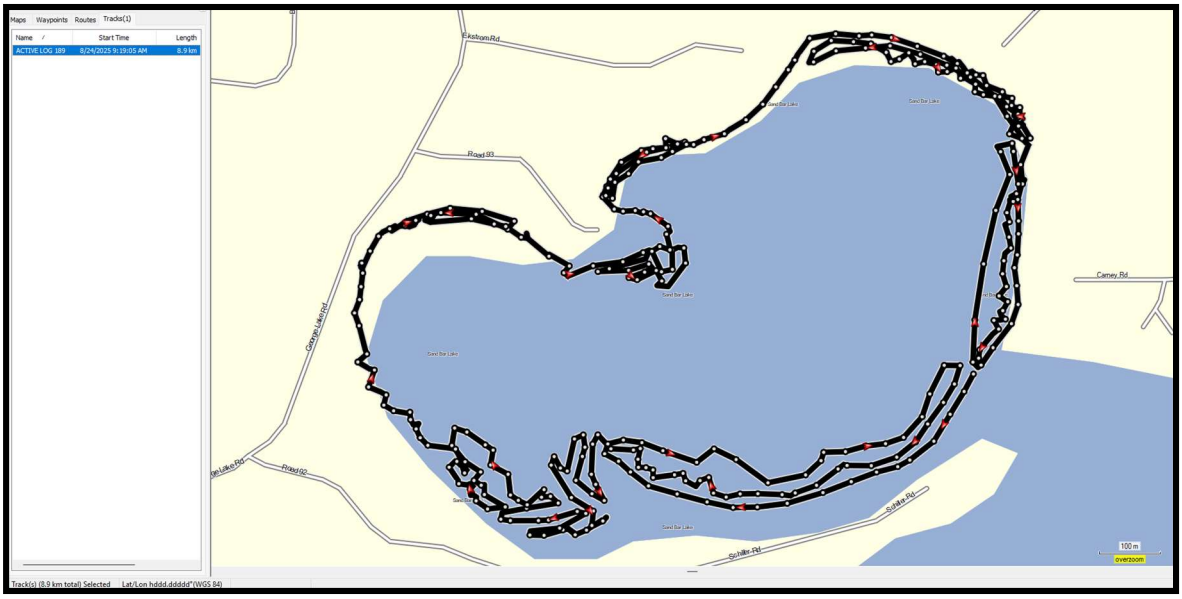


Figure 4: August 24, 2025 EWM Littoral Zone Survey – GPS Tracks

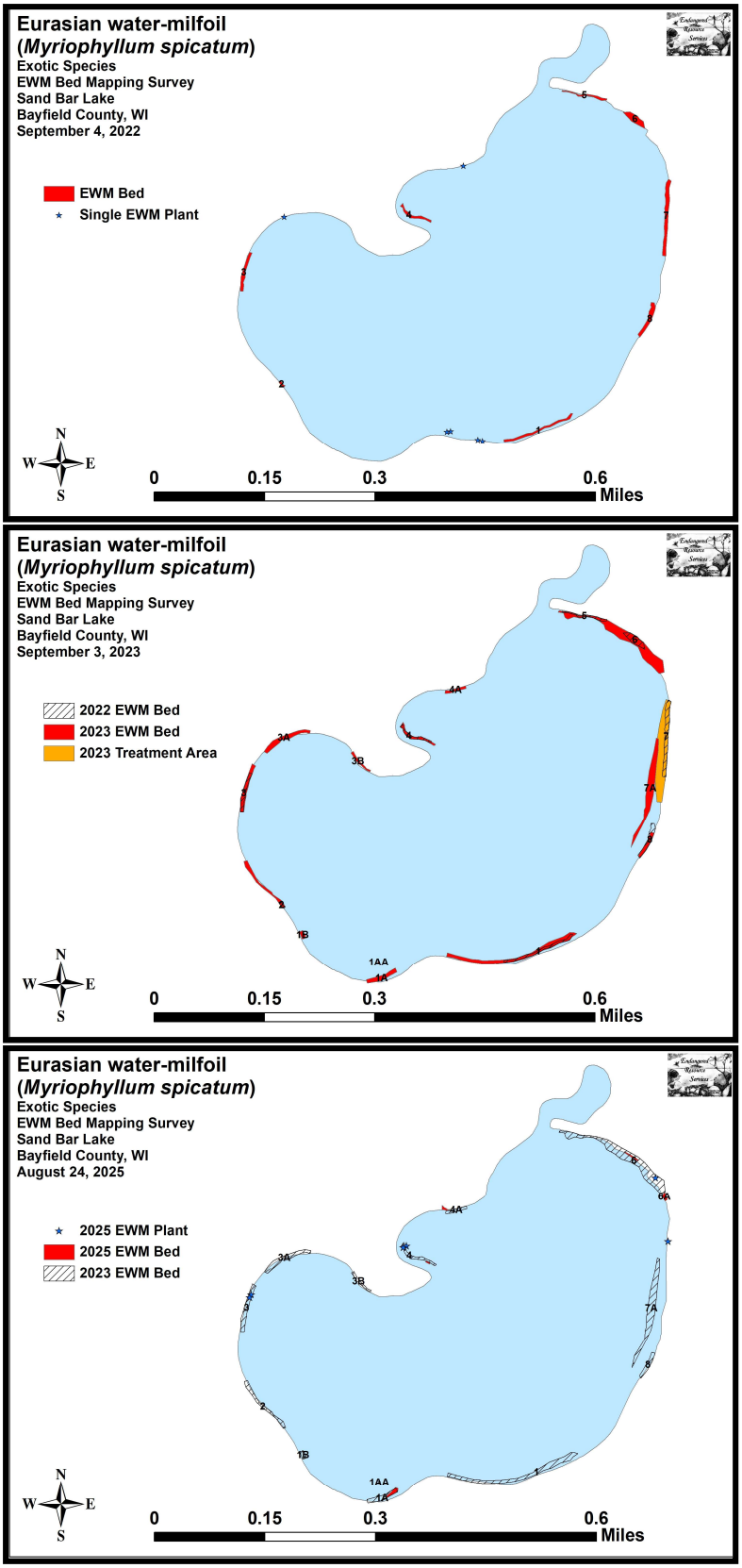


Figure 5: 2022, 2023, and 2025 Late Summer EWM Bed Maps

Table 2: Late Summer Eurasian Water-milfoil Bed Mapping Summary
Sand Bar Lake – Bayfield County, WI
August 24, 2025

Bed Number	2025 Acreage	2023 Acreage	2022 Acreage	2023-25 Change in Acreage	Rake Range and Mean Rake Fullness	Depth Range and Mean Depth	Canopied	Navigation Impairment	2025 Field Notes
Bed 1	0.00	0.61	0.20	-0.61	-	-	-	-	No EWM seen.
Bed 1A	0.05	0.16	0.00	-0.11	<<<1-2; 1	1-4; 3	Yes	None	Regular plants in dead pines.
Bed 1AA	0.00	<0.01	0.00	-<0.01	-	-	-	-	No EWM seen.
Bed 1B	0.00	0.04	0.00	-0.04	-	-	-	-	No EWM seen.
Bed 2	0.00	0.19	0.02	-0.19	-	-	-	-	No EWM seen.
Bed 3	0.00	0.23	0.15	-0.23	<<<1	3-5; 4	No	None	Two plants found/raked out.
Bed 3A	<0.01	0.25	0.00	-0.23	<<<1-2; 1	2-7; 4	No	None	Regular plants.
Bed 3B	0.00	0.06	0.00	-0.06	-	-	-	-	No EWM seen.
Bed 4	0.01	0.12	0.10	-0.11	<<<1-2; <1	1-4; 3	No	None	Regular plants in dead pines.
Beds 4A	0.02	0.06	0.00	-0.04	<<<1-2; <1	1-4; 3	No	None	Regular plants.
Bed 5/6	0.03	1.01	0.25	-0.98	<<<1-2; <1	1-4; 3	No	None	Scattered but regular plants.
Bed 6A	0.03	0.00	0.00	0.03	<1-3; 2	4-8; 6	No	None	Deepwater bed.
Bed 7	0.00	0.00	0.32	0.00	-	-	-	-	No EWM seen.
Bed 7A	0.00	0.62	0.00	-0.62	<<<1	4	No	None	Single plant raked out.
Bed 8	0.00	0.12	0.17	-0.12	-	-	-	-	No EWM seen.
Total	**0.14**	**3.47**	**1.21**	**-3.33**					

Descriptions of Past and Present EWM Beds and High-density Areas:

Beds 1, 1AA, 1B, and 2 – We saw no evidence of Eurasian water-milfoil in these former beds.

Bed 1A – EWM in this area was almost exclusively found growing among the flooded dead Jack pines along the shoreline. Although currently unlikely to be an impairment to navigation, it is also likely a difficult area for manual removal.

Bed 3 – We found, and rake removed two plants along the western shoreline.

Bed 3A – This microbed in the northwest bay was little more than a narrow continuous strip of plants. Although not likely to cause impairment, its proximity to a dock make it likely to be prop-clipped in the future. Because of this, it is probably a priority for manual removal in 2026.

Bed 3B – We saw no evidence of EWM in this former bed.

Beds 4 and 4A - Similar to Bed 1A, most EWM in these areas was found growing among or just out from the ring of dead trees on the lake's margin.

Beds 5 and 6 – On the north and northeast shorelines, we saw no evidence of EWM in Bed 5 and only scattered plants in the nearshore areas of Bed 6.

Bed 6A - Just southeast of Bed 6, we delineated a small but moderately dense deepwater bed that represented the worst EWM area on the lake.

Bed 7 – A single plant was found and raked out of the area formerly covered by Bed 7.

Beds 7A and 8 – We saw no EWM on the eastern shoreline near Tomahawk Lake.

DISCUSSION AND CONSIDERATIONS FOR MANAGEMENT:

The 2024 treatment provided effective control of EWM throughout almost the entire lake, and suction harvesting using the BAISS boat in 2025 largely maintained EWM at low levels. Ultimately, the TOB and the WDNR will have to decide on what, if any, active management should occur in 2026. Similarly, how much monitoring will be needed in 2026, if any, is a conversation that needs to take place.

LITERATURE CITED

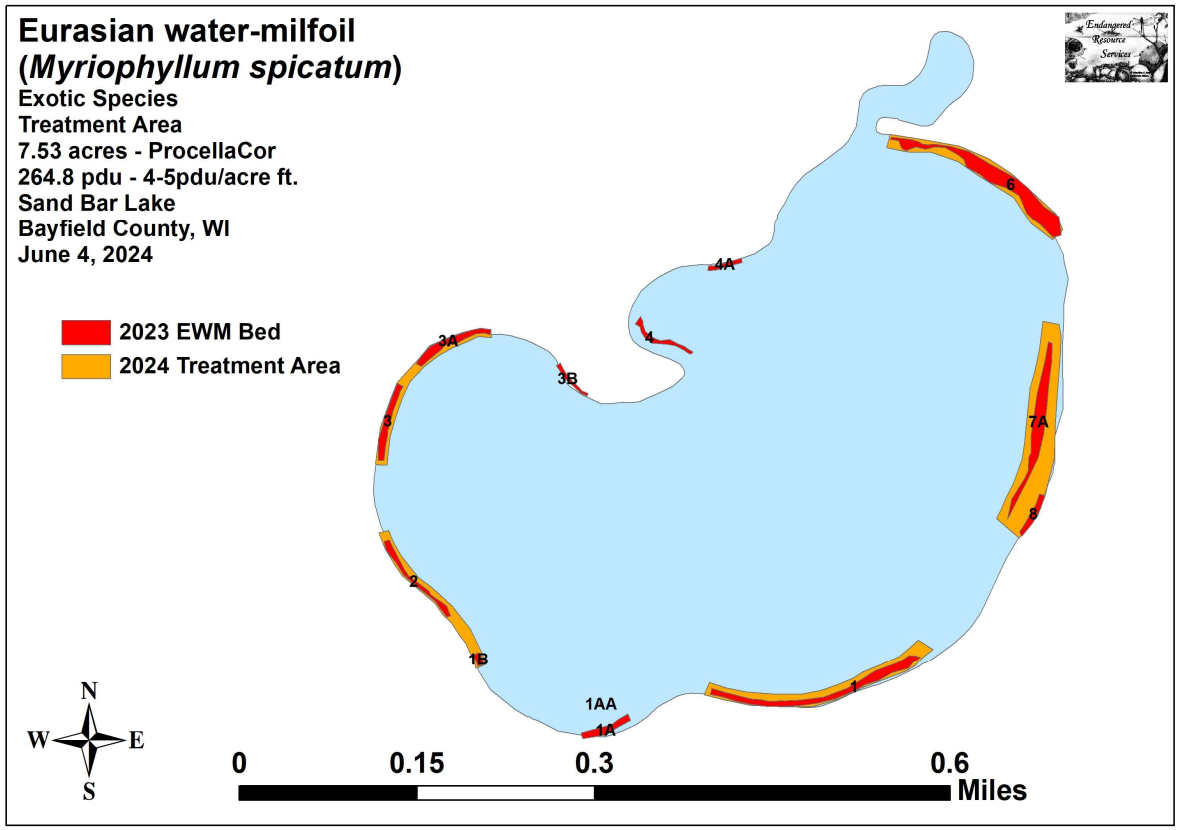
Holt, C., C. Busch, G. Lund, and L. Sather. 1972. Sand Bar Lake Bathymetric Map. https://apps.dnr.wi.gov/doclink/lakes_maps/2494900a.pdf (2025, September).

UWEX Lakes Program. [online]. 2010. Aquatic Plant Management in Wisconsin. Available from http://www.uwsp.edu/cnr-ap/UWEXLakes/Pages/ecology/aquaticplants/default.aspx (2025, September).

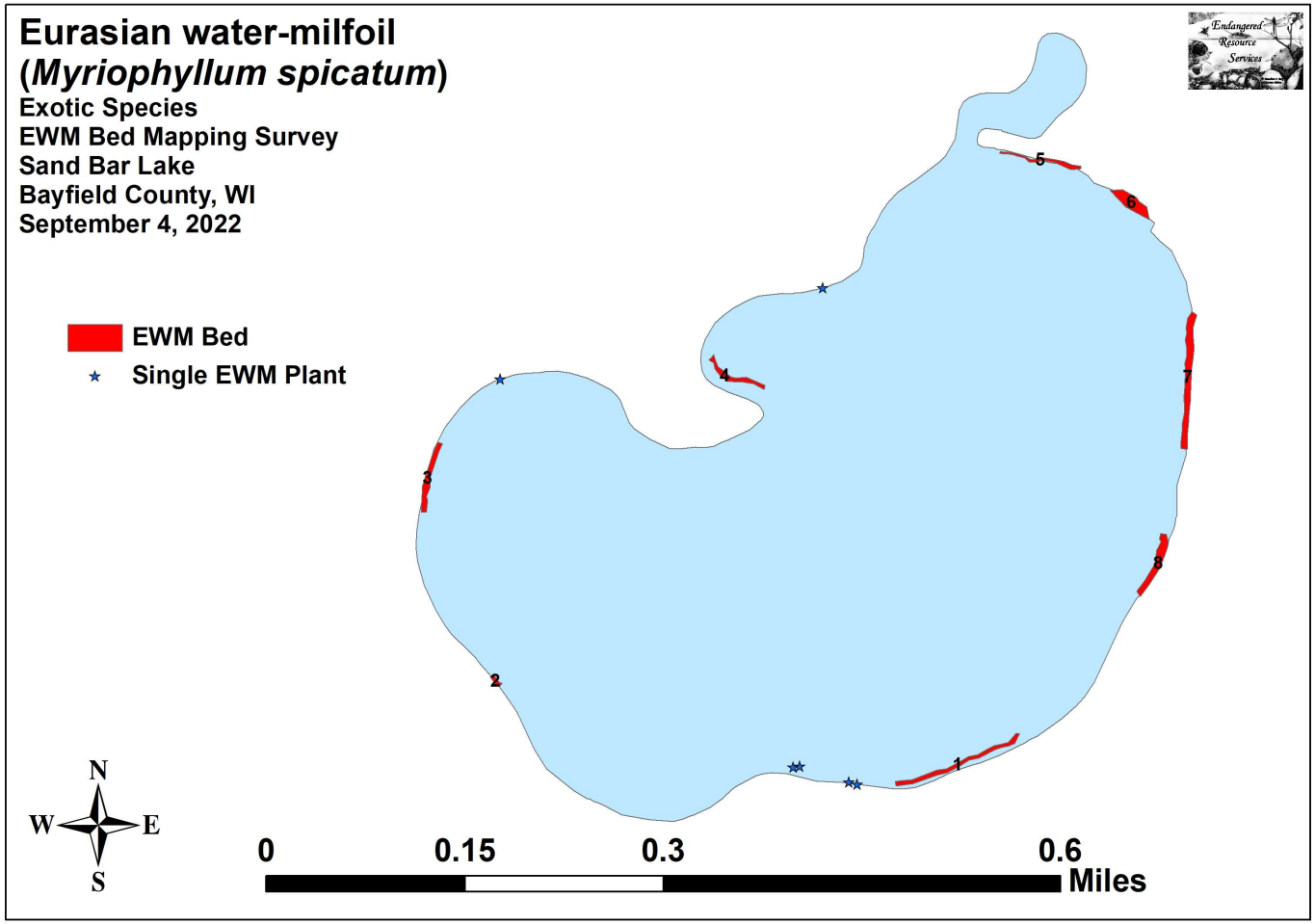
WDNR. [online]. 2025. Wisconsin Lakes Citizen Monitoring Data for Sand Bar Lake – Bayfield County. Available from https://apps.dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2494900&page=waterquality (2025, September).

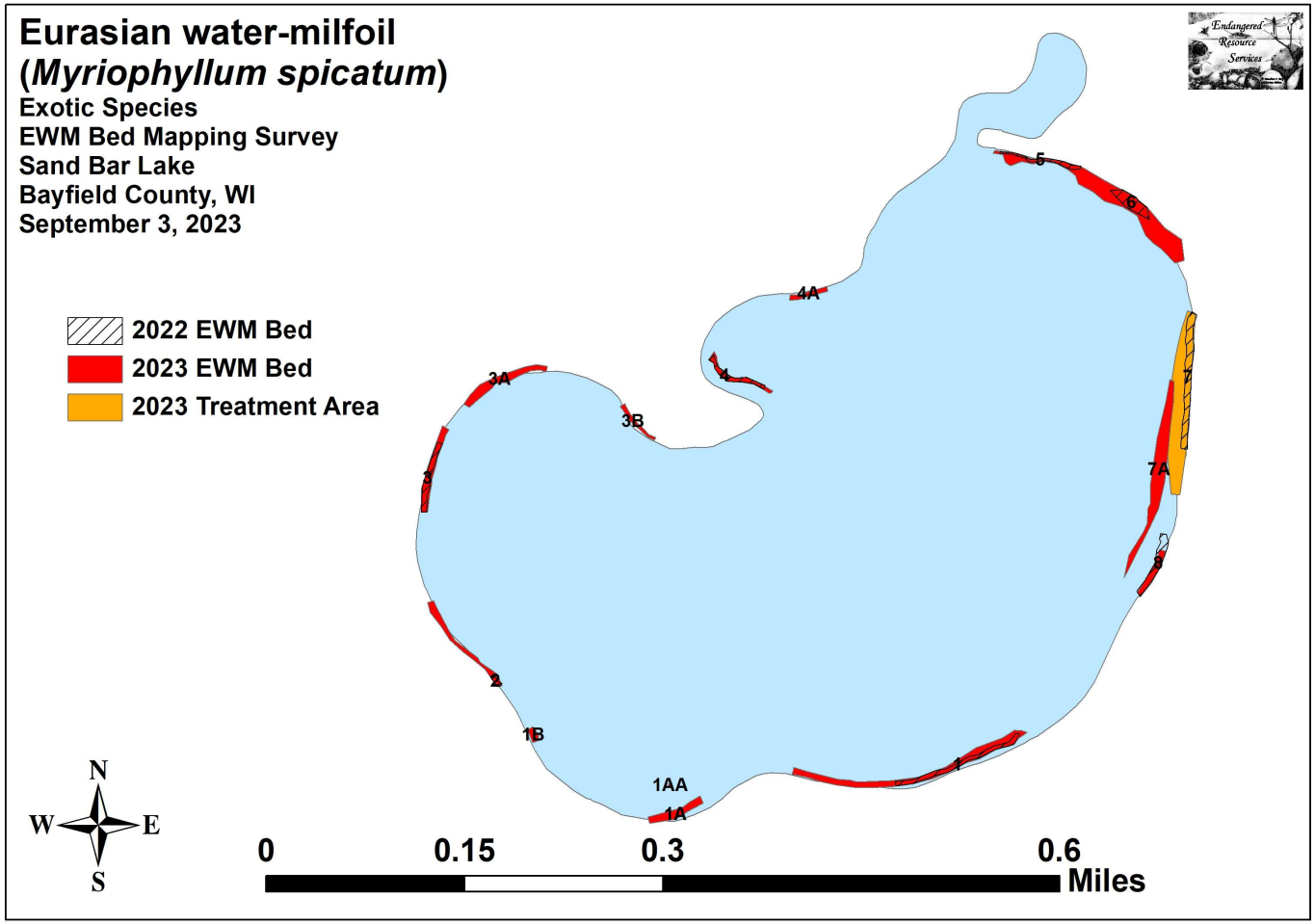
WDNR. [online]. 2025. Wisconsin Lakes Information – Sand Bar Lake – Bayfield County. https://apps.dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2494900 (2025, September).

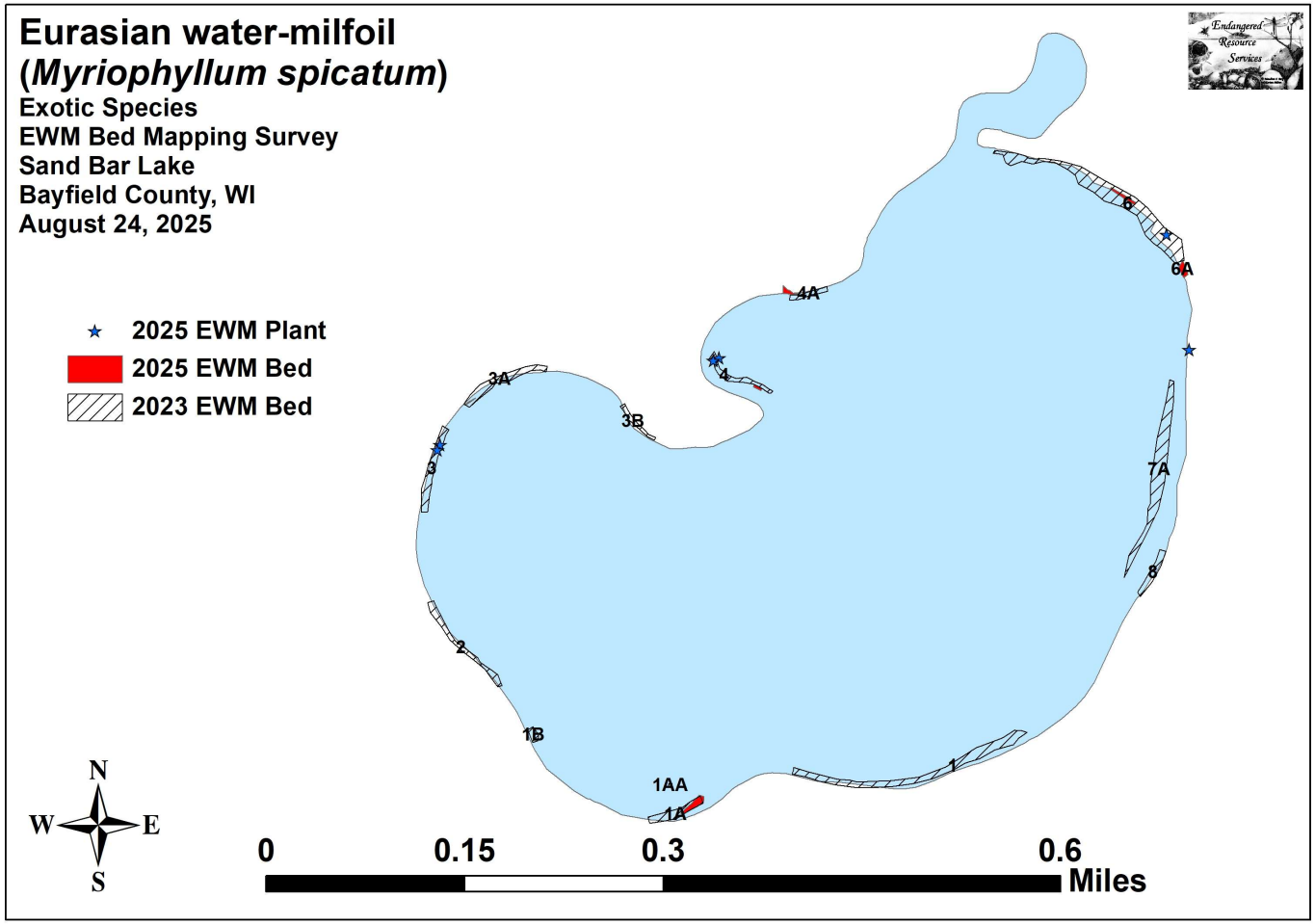
Appendix I: 2024 Eurasian Water-milfoil Treatment Area Map


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
Treatment Area
7.53 acres - ProcellaCor
264.8 pdu - 4-5pdu/acre ft.
Sand Bar Lake
Bayfield County, WI
June 4, 2024
2023 EWM Bed
2024 Treatment Area
Endangered Resource Services
6
4A
4
3A
3B
3
7A
8
2
1B
1AA
1A
1
N
W
E
S
0
0.15
0.3
0.6
Miles

Appendix II: 2022, 2023, and 2025 Eurasian Water-milfoil Bed Maps


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
EWM Bed Mapping Survey
Sand Bar Lake
Bayfield County, WI
September 4, 2022
EWM Bed
Single EWM Plant
Endangered Resource Services
1
2
3
4
5
6
7
8
N
W
E
S
0
0.15
0.3
0.6
Miles


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
EWM Bed Mapping Survey
Sand Bar Lake
Bayfield County, WI
September 3, 2023
2022 EWM Bed
2023 EWM Bed
2023 Treatment Area
Endangered Resource Services
5
6
4A
4
3A
3B
3
7
7A
8
2
1B
1AA
1A
1
N
W
E
S
0
0.15
0.3
0.6
Miles


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
EWM Bed Mapping Survey
Sand Bar Lake
Bayfield County, WI
August 24, 2025
2025 EWM Plant
2025 EWM Bed
2023 EWM Bed
Endangered Resource Services
6
6A
4A
4
3A
3B
9
7A
8
2
1B
1AA
1A
1
N
W
E
S
0
0.15
0.3
0.6
Miles