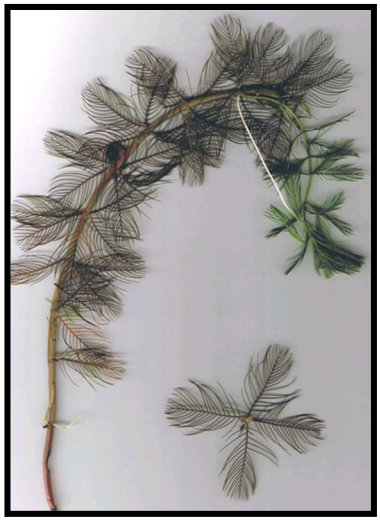
Eurasian water-milfoil (*Myriophyllum spicatum*) Late Summer Bed Mapping Survey Tomahawk Lake - WBIC: 2501700 Bayfield County, Wisconsin

Eurasian water-milfoil cluster in east bay - 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

Total Eurasian water-milfoil raked out of Tomahawk Lake - 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

INTRODUCTION:

Tomahawk Lake (WBIC 2501700) is a 131-acre stratified seepage lake on the west-central edge of Bayfield County, Wisconsin in the Town of Barnes (T45N R9W S20). It reaches a maximum depth of 42ft on the south side of the southern basin and has an average depth of approximately 13ft. The lake is mesotrophic in nature with Secchi readings in 2023 (the most recent year data was available) ranging from 9-22ft (WDNR 2025). This good water clarity produced a littoral zone that extended to at least 18.0ft in the summer of 2025. The bottom substrate is predominately sand along the shoreline, but this gradually transitions to sandy muck at most depths over 6ft (Figure 1) (Holt et al. 1971).

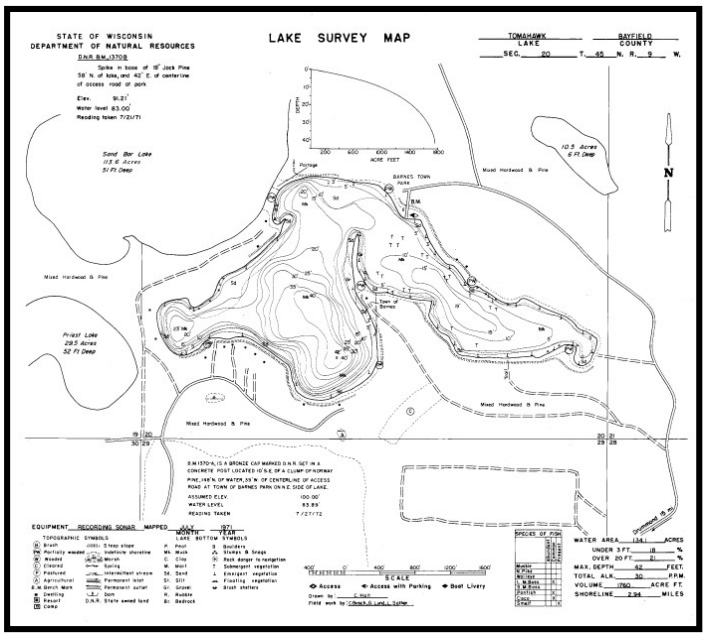


Figure 1: Tomahawk Lake Bathymetric Map

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 2025), 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 in 2017 with 2, 4-D (Shredder Amine 4) – 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. 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 areas along the north shoreline of Tomahawk Lake in 2022 and 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. This survey found no surviving EWM in the lake; however, in 2024, scattered EWM plants began to reappear, and suction harvesting resumed in 2024 with another chemical treatment in 2025. Because of this, 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.

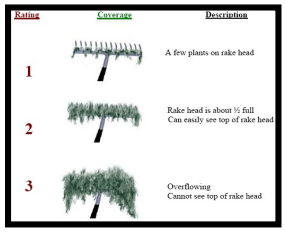


Figure 2: Rake Fullness Ratings (UWEX 2010)

RESULTS:

Treatment Area:

The 2025 treatment area by the boat landing and beach along the lake's north shoreline totaled 2.06 acres (1.57% of the lake's total surface area) (Table 1). Treatment occurred on June 11th with Northern Aquatic Services (Dale Dressel - Dresser, WI) applying ProcellaCor at a target rate of 5pdu/acre-ft (82.40 total pdu) (Figure 3) (Appendix I). The reported water temperature at the time of treatment was 67°F, the ambient air temperature was 65°F, and winds were out of the west at 3mph.

Table 1: Spring Eurasian Water-milfoil Treatment Summary
Tomahawk Lake – Bayfield County, WI
June 11, 2025

Treatment Area #	Final Treatment Area (acres)	Chemical, Rate, and Total Volume
Area 1	2.06	ProcellaCor – 5pdu/acre ft. – 82.40 pdu
Total	**2.06**	**ProcellaCor – 5pdu/acre ft. – 82.40 pdu**

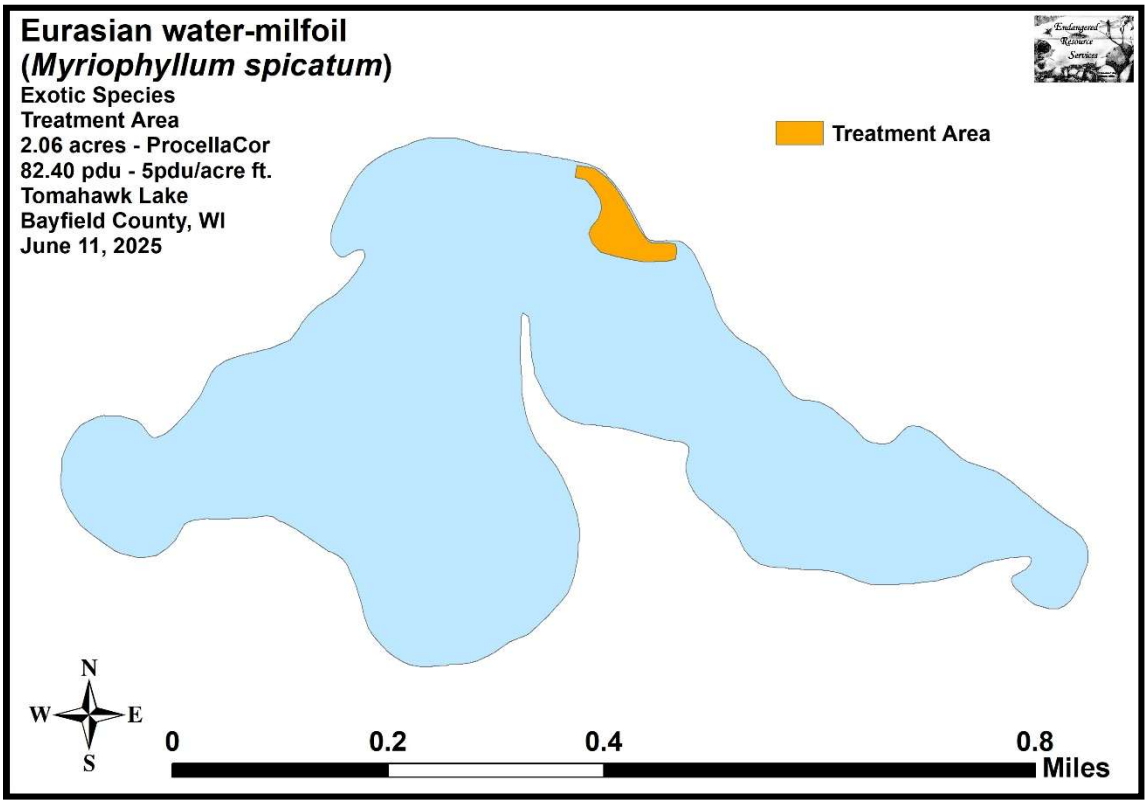


Figure 3: Eurasian Water-milfoil Treatment Areas - June 11, 2025

Eurasian Water-milfoil Bed Mapping Survey:

On August 24, 2025, we searched 10.7km (6.6 miles) of transects throughout the lake's visible littoral zone (Figure 4). Despite having partly sunny skies and relatively calm winds that allowed us to see down in the water approximately 7-8ft, we saw no evidence of Eurasian water-milfoil beds anywhere in the lake (Figure 5) (Appendix II). We did, however, find and rake remove 37 isolated plants with all but nine of them occurring in the far end of the east bay in the area formerly covered by Bed 6 (Table 2).

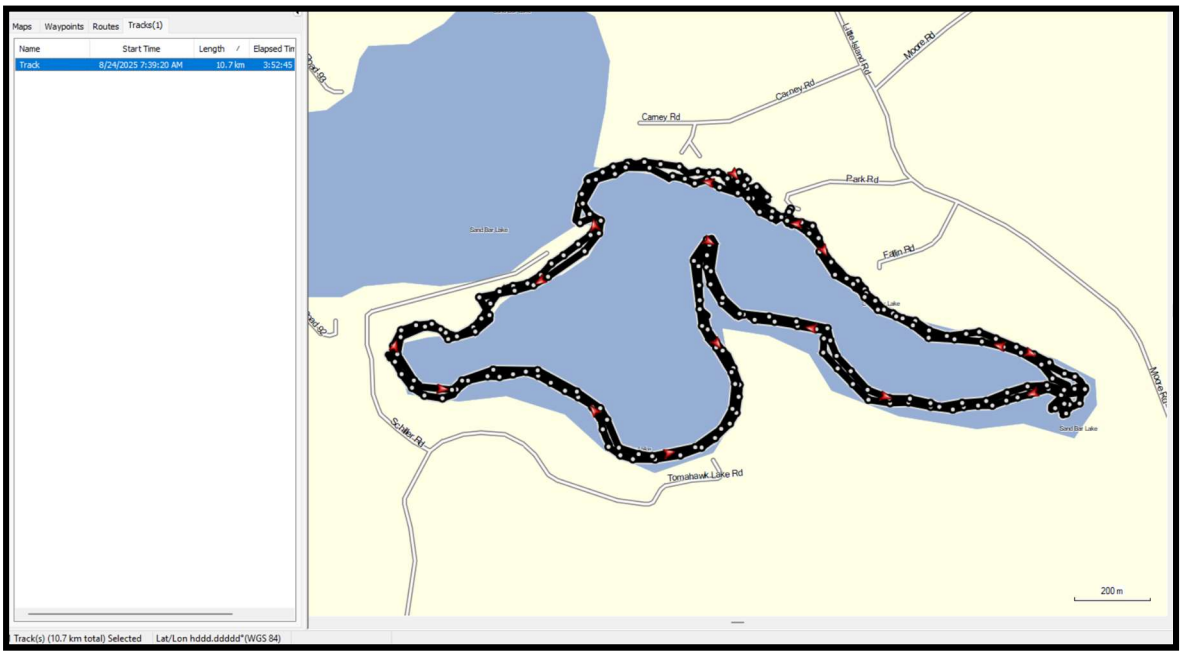


Figure 4: August 24, 2025 EWM Littoral Zone Survey – GPS Tracks

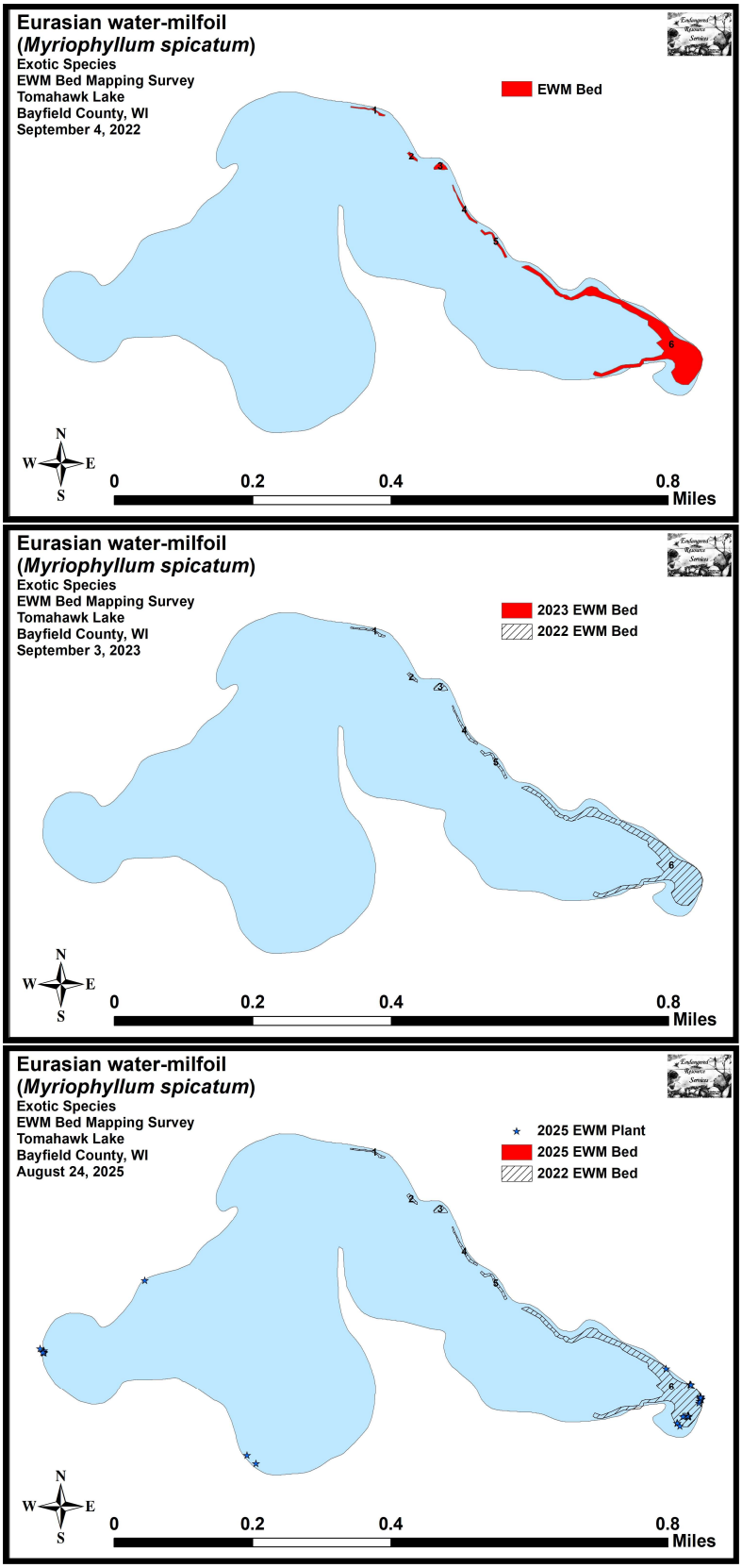


Figure 5: 2022, 2023, and 2025 Late Summer EWM Bed Maps

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

Bed Number	2025 Acreage	2023 Acreage	2022 Acreage	2023-25 Change	Rake Range and Mean Rake Fullness	Depth Range and Mean Depth	Canopied	Navigation Impairment	2025 Field Notes
Bed 1	0.00	0.00	0.07	0.00	-	-	-	-	No EWM seen.
Bed 2	0.00	0.00	0.05	0.00	-	-	-	-	No EWM seen.
Bed 3	0.00	0.00	0.09	0.00	-	-	-	-	No EWM seen.
Bed 4	0.00	0.00	0.12	0.00	-	-	-	-	No EWM seen.
Bed 5	0.00	0.00	0.12	0.00	-	-	-	-	No EWM seen.
Bed 6	0.00	0.00	3.51	0.00	<<<1-2;<<<1	2-5; 3	Yes	None	28 plants raked out.
Total	**0.00**	**0.00**	**3.96**	**0.00**					

DISCUSSION AND CONSIDERATIONS FOR MANAGEMENT:

The 2025 treatment was highly successful at reducing Eurasian water-milfoil levels in Tomahawk Lake back to being undetectable. Similarly, suction harvesting using the BAISS boat in 2024 and 2025 has kept EWM at extremely low levels outside of the treatment areas. 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

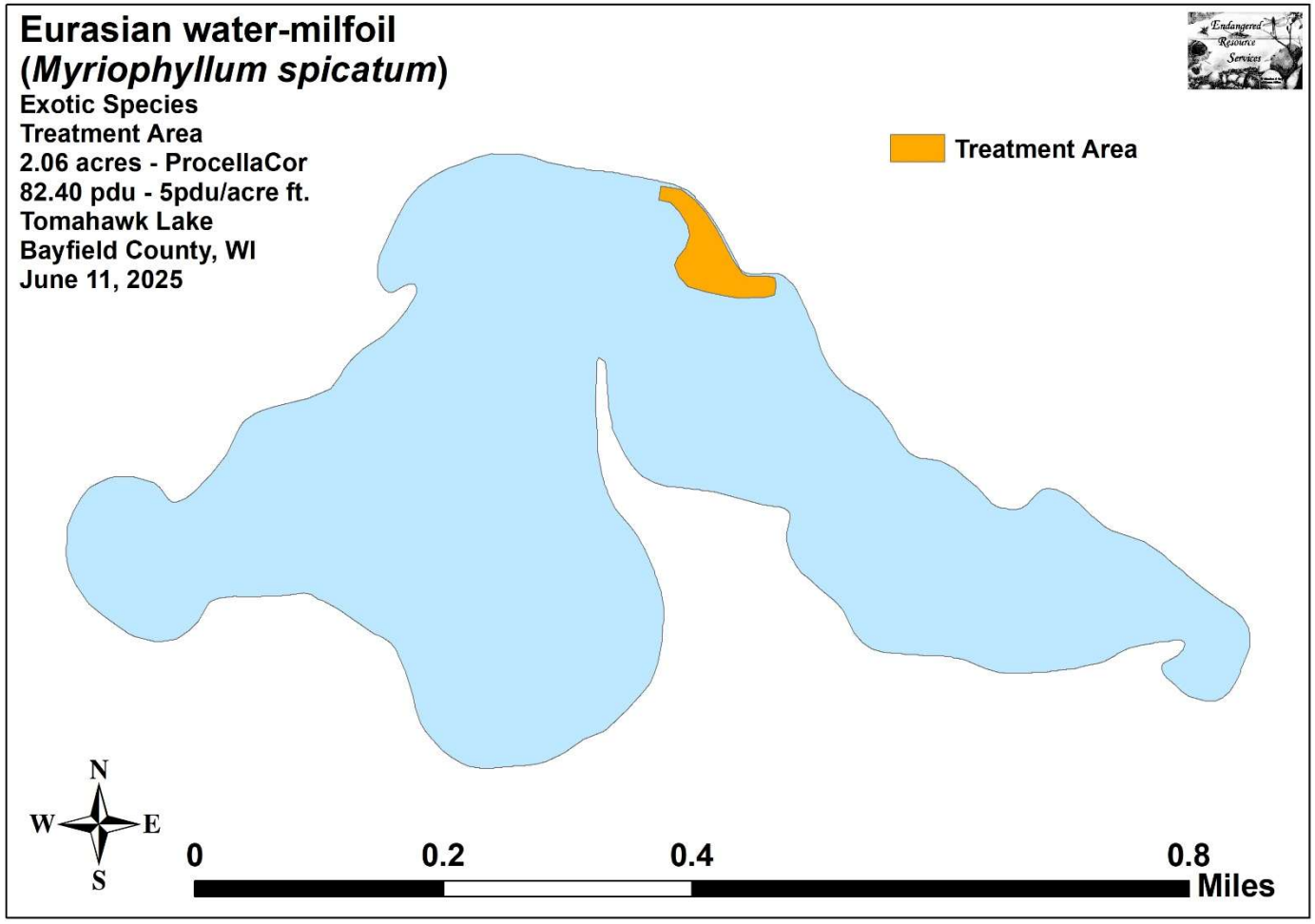
Holt, C., C. Busch, G. Lund, and L. Sather. 1971. Tomahawk Lake Bathymetric Map. https://apps.dnr.wi.gov/doclink/lakes_maps/2501700a.pdf (2025, September).

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).

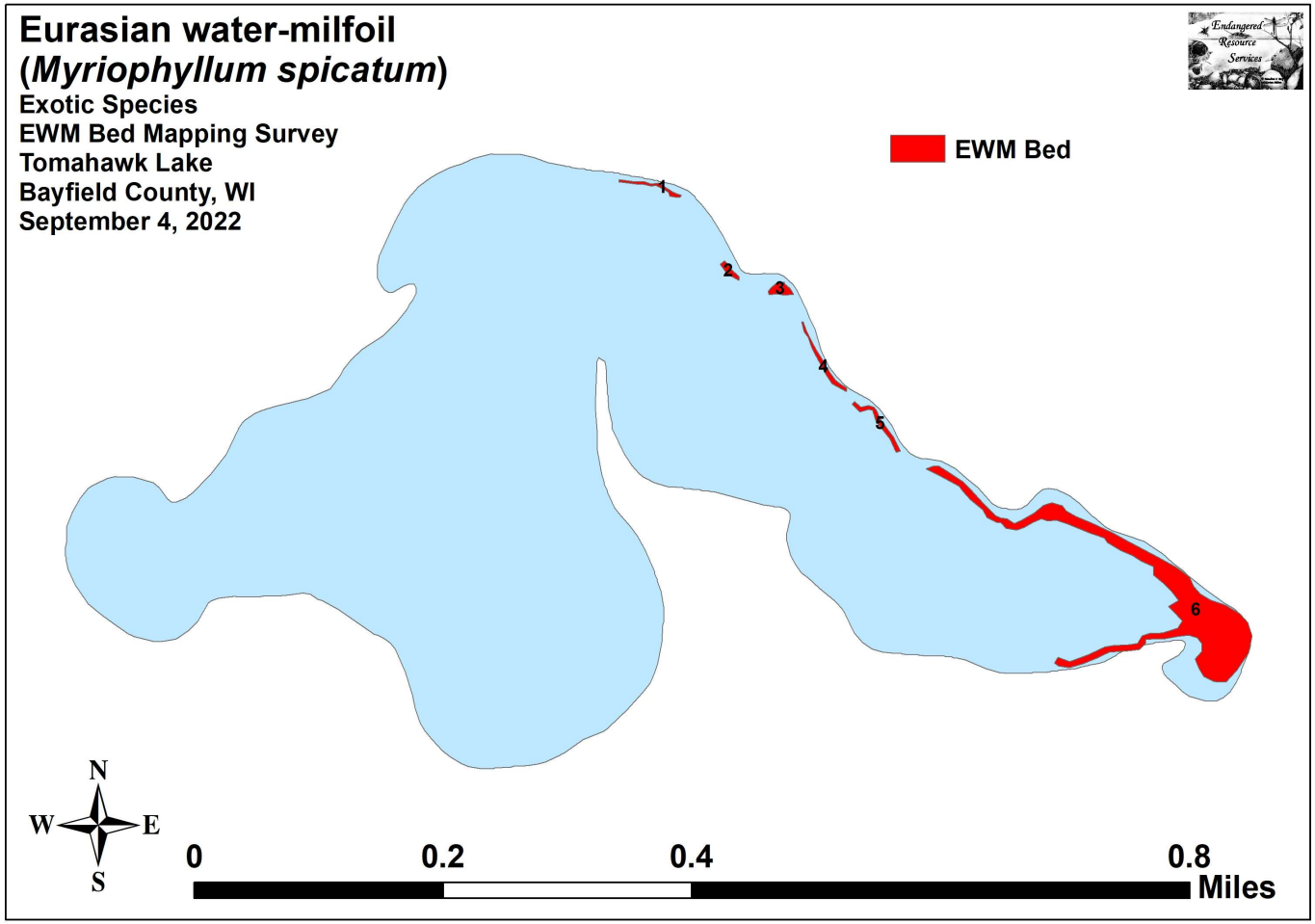
WDNR. [online]. 2025. Wisconsin Lakes Citizen Monitoring Data for Tomahawk Lake – Bayfield County. Available from https://dnr-wisconsin.shinyapps.io/WaterExplorer/?stationid=043119 (2025, September).

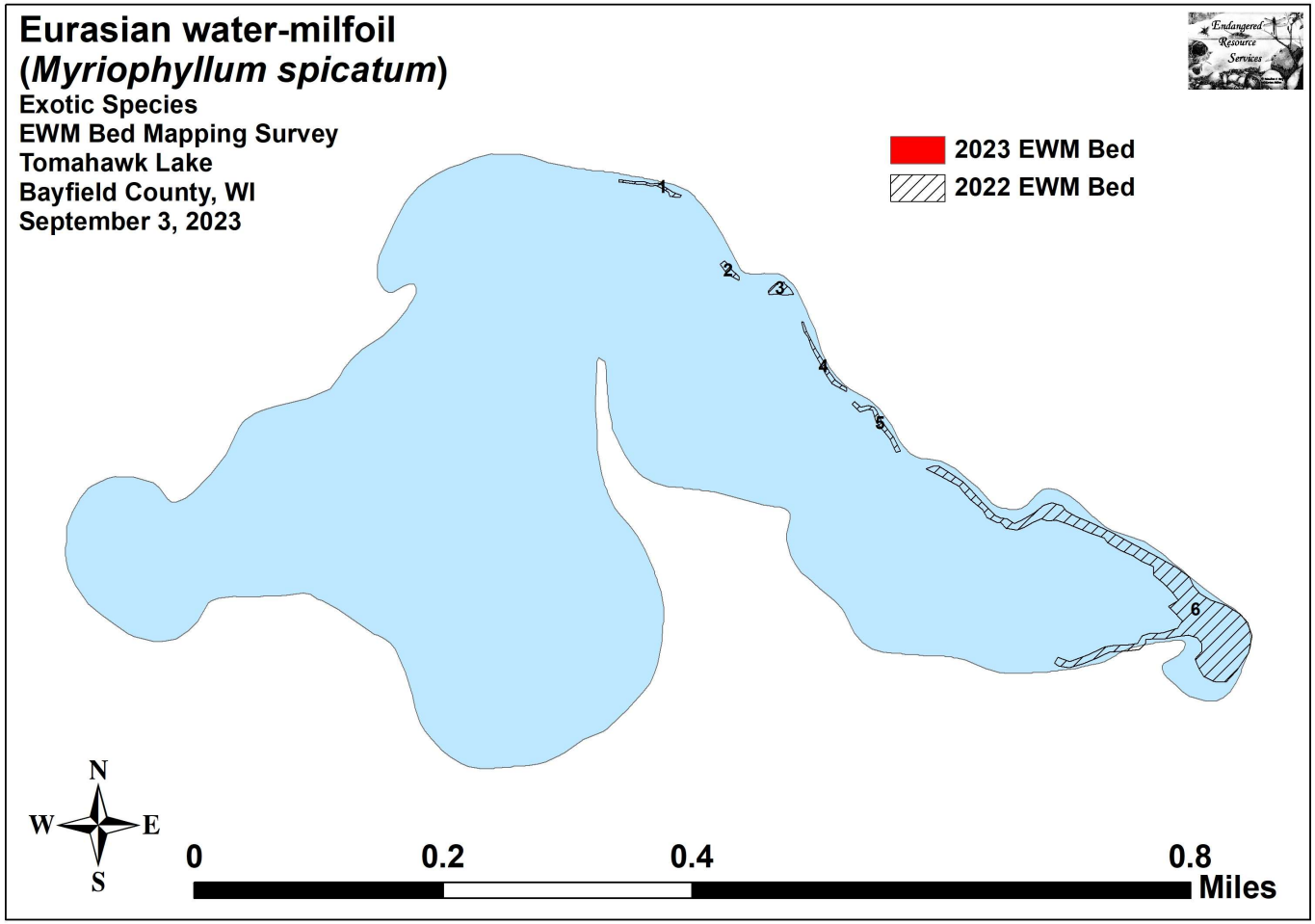
WDNR. [online]. 2025. Wisconsin Lakes Information – Tomahawk Lake – Bayfield County. https://apps.dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2501700 (2025, September).

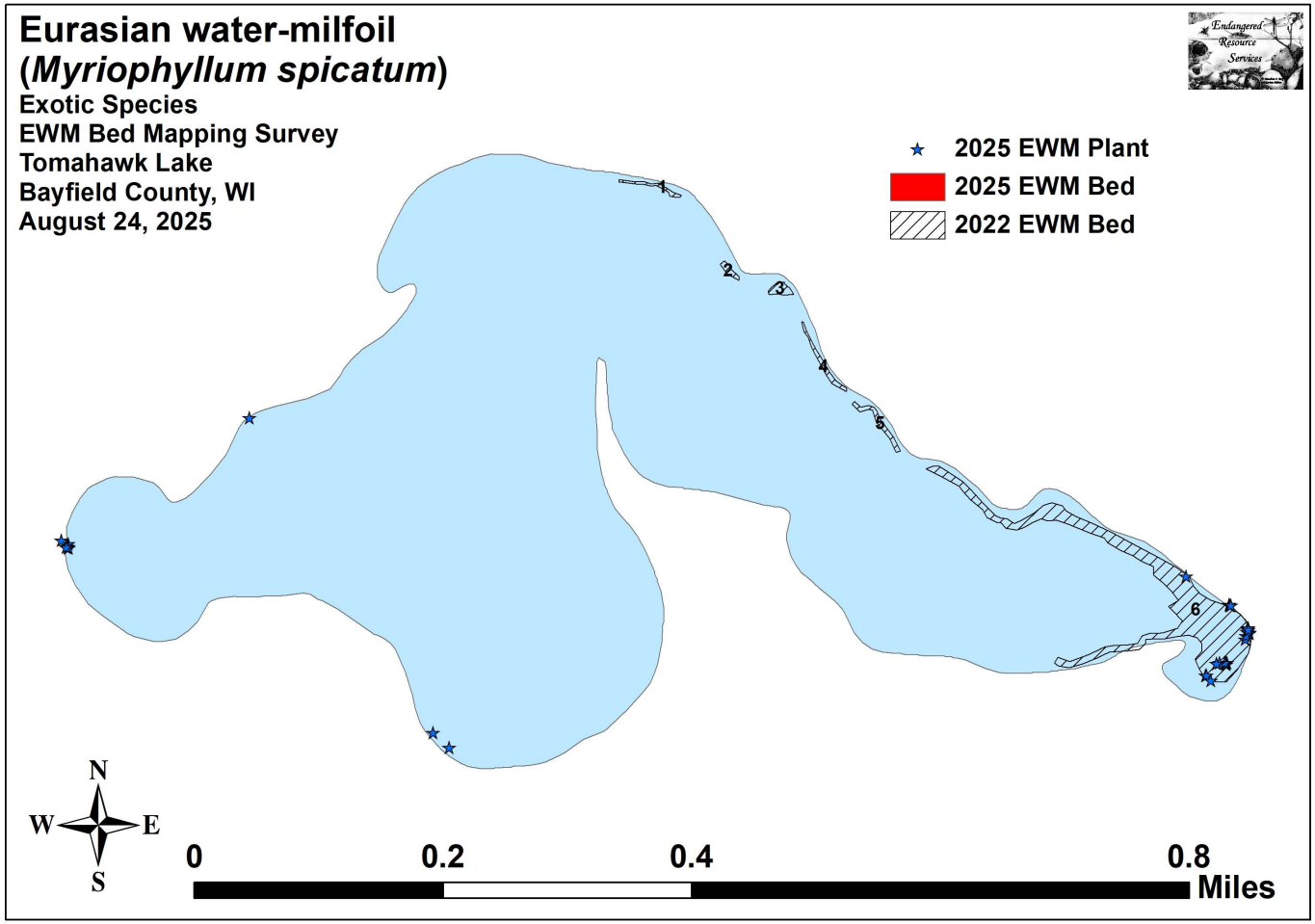
Appendix I: 2025 Eurasian Water-milfoil Treatment Area Map


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
Treatment Area
2.06 acres - ProcellaCor
82.40 pdu - 5pdu/acre ft.
Tomahawk Lake
Bayfield County, WI
June 11, 2025
Endangered Resource Services
Treatment Area
N
W
E
S
0
0.2
0.4
0.8
Miles

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


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
EWM Bed Mapping Survey
Tomahawk Lake
Bayfield County, WI
September 4, 2022
Endangered Resource Services
EWM Bed
1
2
3
4
5
6
N
W
E
S
0
0.2
0.4
0.8
Miles


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
EWM Bed Mapping Survey
Tomahawk Lake
Bayfield County, WI
September 3, 2023
Endangered Resource Services
2023 EWM Bed
2022 EWM Bed
1
2
3
4
5
6
N
W
E
S
0
0.2
0.4
0.8
Miles


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
EWM Bed Mapping Survey
Tomahawk Lake
Bayfield County, WI
August 24, 2025
Endangered Resource Services
2025 EWM Plant
2025 EWM Bed
2022 EWM Bed
1
2
3
4
5
6
7
N
W
E
S
0
0.2
0.4
0.8
Miles