

**Eurasian water-milfoil (*Myriophyllum spicatum*)
Late Summer Bed Mapping Survey
Teal Lake (WBIC: 2417000) – Sawyer County, Wisconsin**



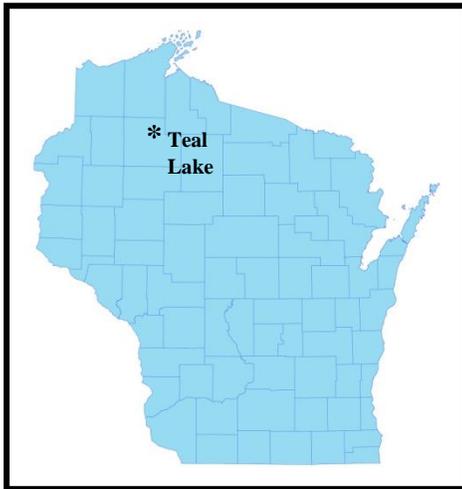
Eurasian Water-milfoil (Berg 2007)



Teal Lake Eurasian Water-milfoil Beds – September 2022

Project Initiated by:

The Quiet Lakes Improvement Association, Lake Education and Planning Services, LLC, and the Wisconsin Department of Natural Resources (Grant AEPP67622)



Dense canopied Eurasian Water-milfoil Bed - Teal Lake 9/10/22

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September 5 and 10, 2022

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INTRODUCTION:

Teal Lake (WBIC 2417000) is a 1,024-acre drainage lake in northeast Sawyer County, Wisconsin in the Town of Spider Lake (T42N R6W S26-28 and 33-34). It has a maximum depth of 31ft and an average depth of 15ft (Figure 1). The lake is eutrophic in nature, and water clarity is generally fair with summer Secchi readings ranging from 3-10ft and averaging 6.4ft from 1992-2022 (WDNR 2022). The lake's bottom substrate is variable with sand, gravel, and rock occurring along the majority of shorelines and around the lake's numerous islands and sunken islands, while sandy and organic muck dominate the deep flats and sheltered bays (Roth et al. 1969).

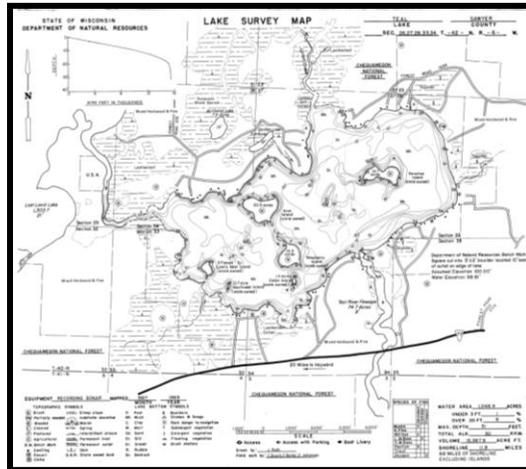


Figure 1: Teal Lake Bathymetric Map

STUDY BACKGROUND AND RATIONALE:

Eurasian water-milfoil (*Myriophyllum spicatum*) (EWM) was first identified in Lost Land Lake in 2013, and it and its hybrids with the native species Northern water-milfoil (*Myriophyllum sibiricum*) rapidly spread throughout the Lost Land/Teal Lake system. After applying for and receiving a WDNR control grant (AIRR20917), the Quiet Lakes Improvement Association (QLIA), under the direction of Tiffiney Kleczewski – Flambeau Engineering, LLC used 2016 point-intercept macrophyte surveys to develop the lakes' original Aquatic Plant Management Plan (APMP) that outlined small-scale chemical and large-scale mechanical harvester removal to control the infestation (QLIA 2017).

Per WDNR expectations (Pamela Toshner/Alex Smith, WDNR – pers. comm.), whole lake plant surveys on actively managed lakes are normally repeated every five to seven years to remain current. In anticipation of updating their plan in 2023, the QLIA – under the direction of Dave Blumer (Lake Education and Planning Services, LLC - LEAPS) – applied for and receive a WDNR AIS planning grant (AEPP67622) to help cover the cost of surveys and to update the APMP. In order to quantify the current levels of both EWM and the lake's native macrophyte community, and to compare those results to the original 2016 survey to determine if any changes had occurred over that time, the QLIA, LEAPS, and the WDNR authorized a full point-intercept survey and an EWM bed mapping survey in 2022. This report is the summary analysis of the bed mapping survey conducted on September 5 and 10, 2022.

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.

<u>Rating</u>	<u>Coverage</u>	<u>Description</u>
1		A few plants on rake head
2		Rake head is about 1/2 full Can easily see top of rake head
3		Overflowing Cannot see top of rake head

Figure 2: Rake Fullness Ratings (UWEX 2010)

**Table 1: Late Summer Eurasian Water-milfoil Bed Mapping Summary
Teal Lake – Sawyer County, Wisconsin
September 5 and 10, 2022**

Bed Number	2022 Acreage	Rake Range and Mean Rake Fullness	Depth Range and Mean Depth	Canopied	Navigation Impairment	2022 Field Notes
Bed 1	3.43	<<<<1-3; 3	3-8; 6	Near	Moderate	Would be severe impairment but subcanopy.
Bed 2	0.10	<<<<1-3; 2	3-8; 5	Near	Minor	Too small to be moderate impairment.
Bed 3	0.01	<<<<1-2; 1	4-8; 6	Near	Minor	On edge of Spatterdock bed.
Bed 4	0.04	<<<<1-3; 1	3-7; 5	Near	Minor	Along state-owned island.
Bed 5	1.03	<<<<1-3; 2	3-7; 5	Near	Minor	Too narrow to be moderate impairment.
Bed 6	0.27	<<<<1-3; 2	3-6; 5	Near	Minor	Along state-owned island - too narrow to be moderate.
Bed 7	0.09	<1-3; 3	3-6; 5	Near	Minor	Narrow ribbon along state-owned island.
Bed 8	0.26	<<<<1-3; 2	3-7; 5	Near	Minor	Narrow ribbon along state-owned island.
Bed 9	0.13	<<<<1-2; 1	3-7; 5	Near	Minor	Narrow ribbon along state-owned island.
Bed 10	0.37	<<<<1-3; 2	3-7; 5	Near	Minor	Narrow ribbon along shoreline.
Bed 11	12.19	<<<<1-3; 1	3-8; 5	Near	Minor	Highly variable area filled with merging towers.
Bed 12	0.95	<<<<1-3; 3	3-6; 4	Near	Moderate	Too narrow to be severe impairment.
Bed 13	0.06	<<1-2; 2	3-6; 4	Near	Minor	Along state-owned island – too narrow to be moderate.
Bed 14	0.04	<<<<1-2; 1	3-6; 4	Near	Minor	Open establishing bed along state-owned island.
Bed 15	0.01	<<<<1-2; 1	2-5; 4	Yes	Minor	Open bed next to state-owned island.
Bed 16	2.06	<<<<1-3; 1	3-6; 4	Near	Minor	Open bed mixed with Northern water-milfoil.
Bed 17	0.20	1-3; 2	4-8; 6	Near	Minor	Subcanopy, but full of prop-trails.
Bed 18	1.06	<<<<1-3; 2	4-7; 6	Near	Minor	Nearly continuous shoreline ribbon.
Bed 19	0.23	1-3; 3	4-7; 6	Near	Moderate	Dense but narrow bed.
Bed 20	0.32	<<1-3; 2	4-7; 6	Near	Minor	Mixed with Northern water-milfoil.
Bed 21	1.03	<<1-3; 2	4-7; 6	Near	Minor	Mixed with Northern water-milfoil.
Bed 22	0.26	1-3; 3	4-7; 6	Yes	Moderate	Too narrow to be severe impairment.
Bed 23	0.72	1-3; 3	4-7; 6	Yes	Moderate	Too narrow to be severe impairment.
Bed 24	0.63	<<1-3; 2	4-7; 6	Near	Minor	Deepwater bed away from the immediate shoreline.
Bed 25	0.05	<1-2; 1	4-7; 6	Near	Minor	Mixed with native pondweeds.

**Table 1 (continued): Late Summer Eurasian Water-milfoil Bed Mapping Summary
Teal Lake – Sawyer County, Wisconsin
September 5 and 10, 2022**

Bed Number	2022 Acreage	Rake Range and Mean Rake Fullness	Depth Range and Mean Depth	Canopied	Navigation Impairment	2022 Field Notes
Bed 26	1.17	<<<1-3; 2	3-7; 6	Near	Minor	Prop-trails throughout bed.
Bed 27	4.46	<<<<1-3; 2	3-7; 6	Near	Moderate	Almost entire bay covered in EWM.
Bed 28	1.19	<<<<1-3; 2	4-8; 6	Near	Moderate	Bay dominated by EWM/natives on inner/outer edges.
Bed 29	0.29	<<<<1-3; 2	4-8; 6	Near	Minor	Narrow ribbon next to state-owned island.
Bed 30	1.06	<<<<1-3; 2	4-8; 6	Near	Moderate	EWM between island and shore – prop trails throughout.
Bed 31	7.77	<<<<1-3; 2	4-8; 6	Near	Moderate	EWM between island and shore – prop trails throughout.
Bed 32	0.15	1-3; 3	3-7; 5	Yes	Moderate	Too narrow to be severe impairment.
Bed 33	0.09	1-3; 2	3-7; 5	Yes	Minor	Too narrow to be moderate impairment.
Bed 34	<0.01	1-3; 2	6-8; 8	Near	Minor	Deep waterbed on isolated rock bar.
Bed 35	2.65	<<<1-3; 2	3-7; 5	Yes	Moderate	Mixed with natives.
Total	44.36					

Descriptions of Eurasian Water-milfoil Beds:

Beds 1 and 35 – These two moderate to high density beds would likely have caused severe impairment had they not been subcanopy. Boats entering Teal Lake from Lost Land Lake appear to have cut them in half, but, for management purposes, they should likely be considered one area as the beds would probably have been continuous without this constant disturbance. We noted the regular traffic and prop-clipping of plants in these beds had left the entire bay full of floating fragments, and this likely makes them a priority for any future management (Figure 5) (Appendix I).

Beds 2, 3, and 4 – These three microbeds were scattered north of the channel west of Knot Island. Only Bed 2, which occurred at the entrance of an inhabited bay, was likely to have watercraft motoring through it.

Bed 5 – Established immediately east of Knot Island, this long bed was moderately dense, but too narrow to likely cause more than minor impairment. Other than seeding fragments into northern bays, this bed is probably a non-issue from a management standpoint.

Beds 6, 7, 8, and 9 – These ribbons of EWM were scattered around Raspberry Island. Similar to Bed 5, their proximity to an uninhabited shoreline and the narrowness of the beds meant that, despite their moderate to high density, they were unlikely to cause more than minor impairment.

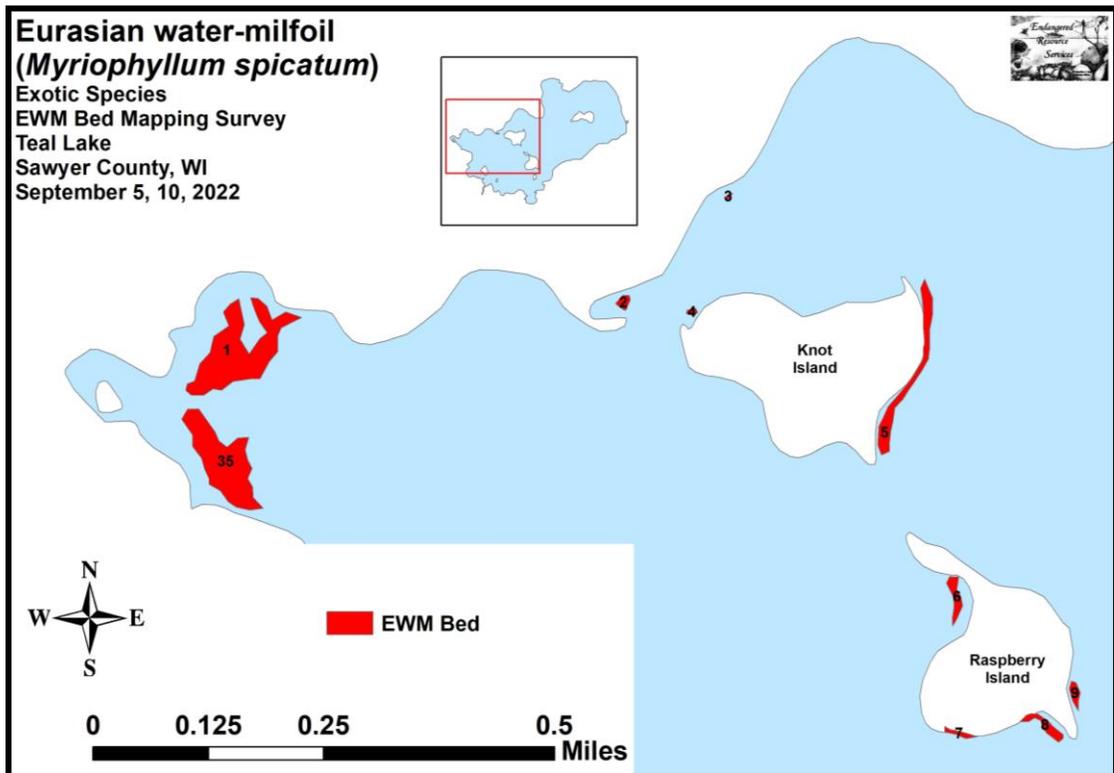


Figure 5: Beds 1-9, 35 – Northwest End

Bed 10 – This small moderately dense bed occurred along a highly developed shoreline. Although it was full of prop-clipped plants, the narrowness of the bed likely meant it wasn't more than a minor impairment (Figure 6) (Appendix I).

Bed 11 – Despite being the largest bed on the lake, Bed 11 was also one of the patchiest. This may mean that it is recently established, or it could be due to competition with the large number of native species in this diversity hotspot.

Bed 12 – This dense bed was established along a highly developed shoreline, and it likely would have caused severe impairment if not for its overall narrowness. Many plants were prop-clipped, and we noticed fragments occurred along the entire northeastern shoreline.

Beds 13, 14, and 15 – These three microbeds were scattered around Paradise Island's north and east shorelines. They were neither dense nor likely to cause significant impairment.

Beds 16, 17, 18, and 19 – This string of beds ringed the shoreline along the highly developed northeast bay. Each was prop-clipped, full of floating fragments, and likely at least a minor impairment. For management purposes, they should likely be considered a single bed.

Beds 20, 21, 22, and 23 – These beds ringed the southeast shoreline of the northwest bay. As with Beds 16-19, they showed extensive prop-trails and floating fragments, and they should also be considered continuous when developing a management plan for the area.

Bed 24 – We found this moderately dense bed established on a shallow area of a bar that was away from the immediate shoreline. Because it wasn't canopied, it was likely only a minor impairment.

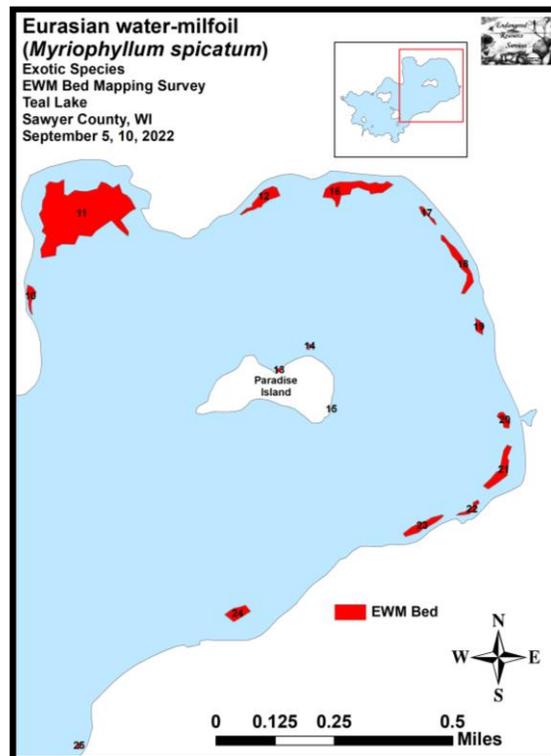


Figure 6: Beds 10-25 – Eastern Half

Bed 25 – Although this microbed was established along a developed shoreline, it was so small that it was unlikely to cause more than a minor impairment (Figure 6). We noted that, unlike most high-density EWM beds, it was mixed with significant numbers of native pondweeds (*Potamogeton* spp.)

Beds 26 and 27 – These moderate to high-density beds dominated the majority of these two developed bays (Figure 7). We observed prop-trails and floating fragments throughout each area, and it is like the impairment level, especially in Bed 26, would have been worse if it wasn't for regular in and out boat traffic chopping up the bed.

Beds 28, 30, and 31 – Collectively, the southwest bay was the worst area on the lake. EWM was dense, at or near canopy, and likely at least a moderate impairment to the area's residents. Floating fragments were everywhere, and we noted prop-trails both in front of residences and in the channels around the islands.

Beds 29 and 32 – These small beds were similar to those around the other islands. In each case, narrow littoral zones produced a ribbon-shaped bed that were unlikely to cause significant issues even though they were occasionally dense.

Bed 33 – This microbed was essentially a continuation of Bed 31. Although moderately dense, it was likely too small to be more than a minor impairment.

Bed 34 – This deepwater bed was established on an isolated rock bar. Due to its small size, it is likely a non-issue from a management standpoint.

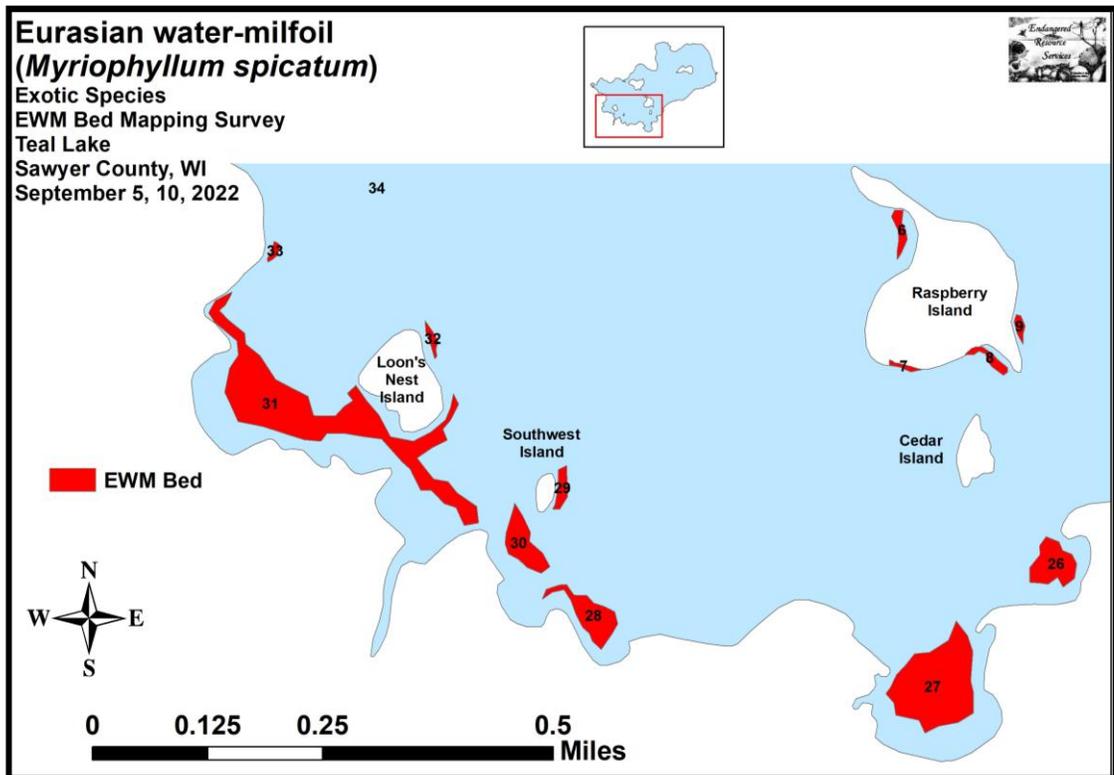


Figure 7: Beds 26-34 – Southwest End

DISCUSSION AND CONSIDERATIONS FOR MANAGEMENT:

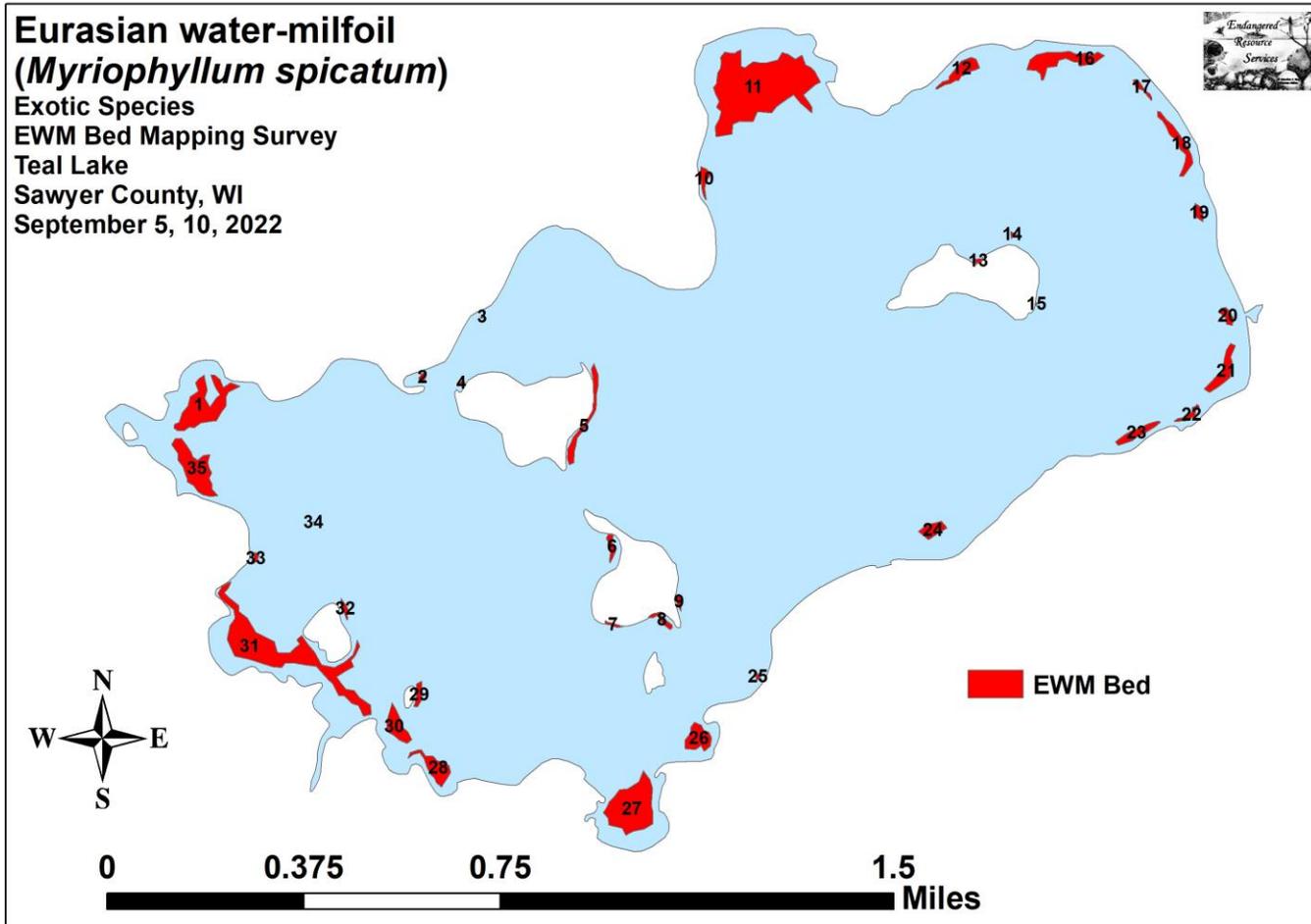
Eurasian water-milfoil currently occupies only a small percentage of Teal Lake's surface area, but it is widely-established making eradication an unrealistic expectation. With this in mind, working to control its spread in the most cost-effective manner possible, while simultaneously minimizing its impact on the lake's aquatic ecosystem will likely continue to be important goals for the QLIA moving forward.

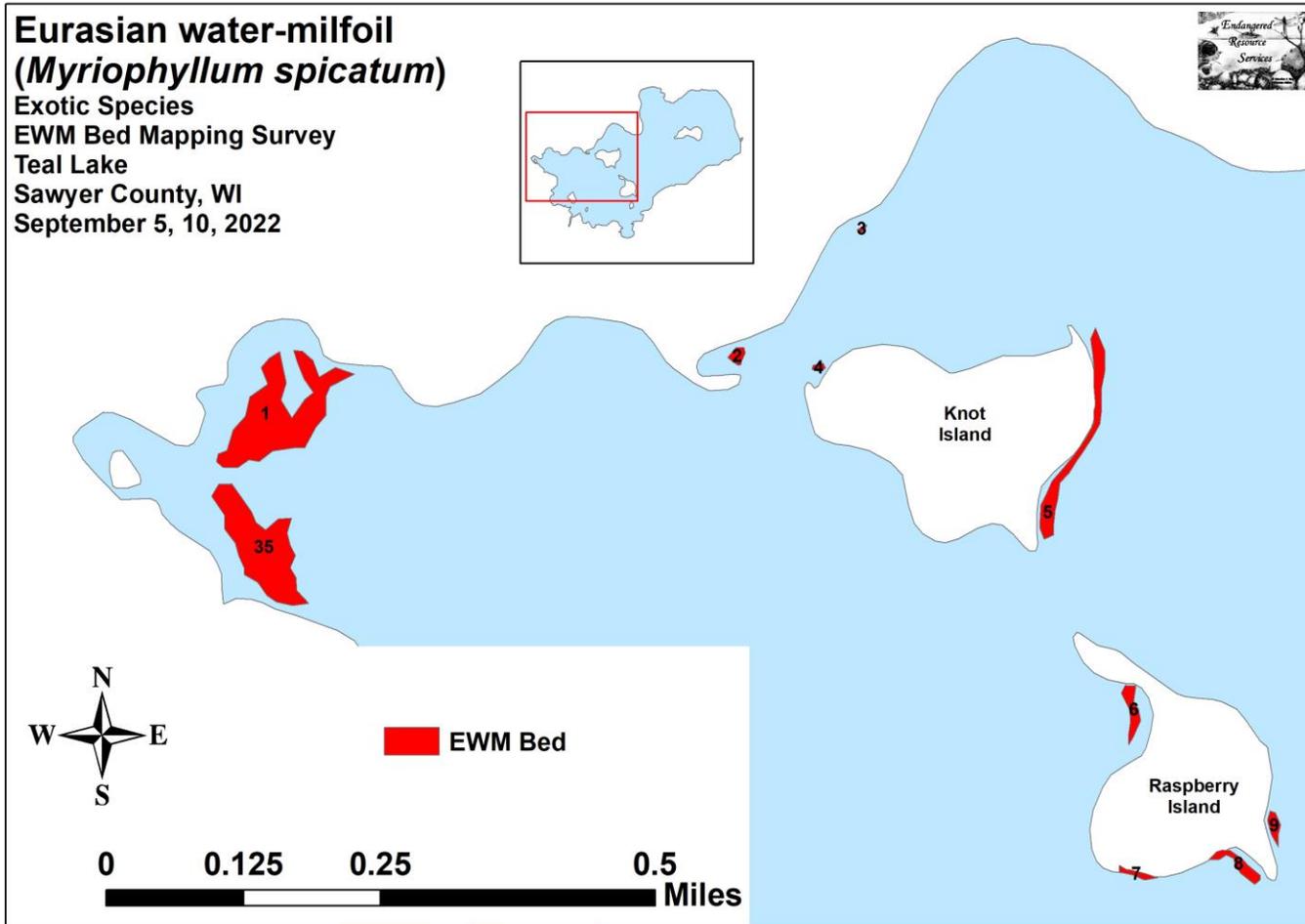
Although harvesting is apparently happening on the lake, it is not obvious that it is accomplishing the desired goal of reducing milfoil. Rather, it appears to be spreading it as we noticed an abundance of floating fragments throughout the entire lake. Without an annual monitoring program, it is impossible to know if EWM has hit "saturation" or if it will continue to spread into additional areas on the lake. Likewise, there's no way of knowing if the current harvesting program is reducing levels on the system. Hopefully the new Aquatic Plant Management Plan will a) address current realities related to management types and funding b) develop management acreage and density goals, c) clarify who and how EWM levels on the lake will be monitored to determine if management is achieving the plan's goals, and d) determine how future management areas will be chosen.

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Appendix I: 2022 Eurasian Water-milfoil Bed Maps





**Eurasian water-milfoil
(*Myriophyllum spicatum*)**

Exotic Species
EWM Bed Mapping Survey
Teal Lake
Sawyer County, WI
September 5, 10, 2022

