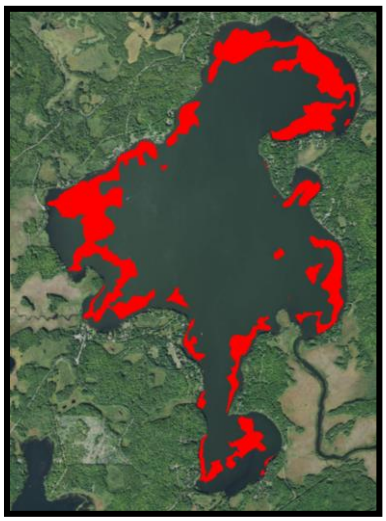
Eurasian water-milfoil (*Myriophyllum spicatum*)
Late Summer Bed Mapping Survey
Lost Land Lake (WBIC: 2418600)
Sawyer County, Wisconsin

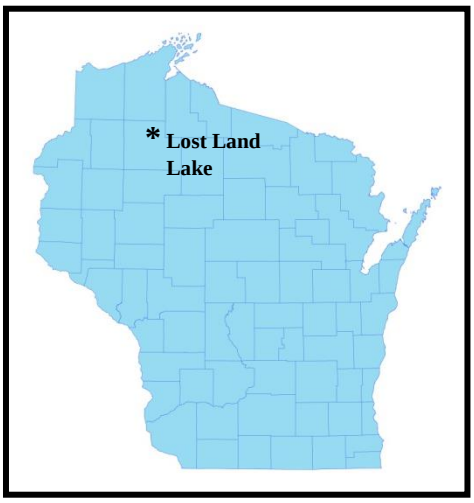
Eurasian Water-milfoil (Berg 2007)



Lost Land Lake EWM 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 AEPP67522)



Dense canopied Eurasian Water-milfoil Bed – Lost Land Lake 9/5/22

Survey Conducted by and Report Prepared by:

Endangered Resource Services, LLC
Matthew S. Berg, Research Biologist
Saint Croix Falls, Wisconsin
September 5, 2022

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INTRODUCTION:

Lost Land Lake (WBIC 2417000) is a 1,264-acre drainage lake in northeast Sawyer County, Wisconsin in the Town of Spider Lake (T42N R6W S17, 19-21, 28-30, and 32). It has a maximum depth of 21ft and an average depth of 12ft (Figure 1). The lake is eutrophic bordering on mesotrophic in nature, and water clarity is generally fair with summer Secchi readings ranging from 4-9ft and averaging 6.0ft from 1993-2022 (WDNR 2022). The lake's bottom substrate is variable with sand, gravel, and rock occurring along the majority of shorelines and on the lake's numerous bars and sunken islands, while sandy and organic muck dominate the deep flats and sheltered bays (Snyders et al. 1969).

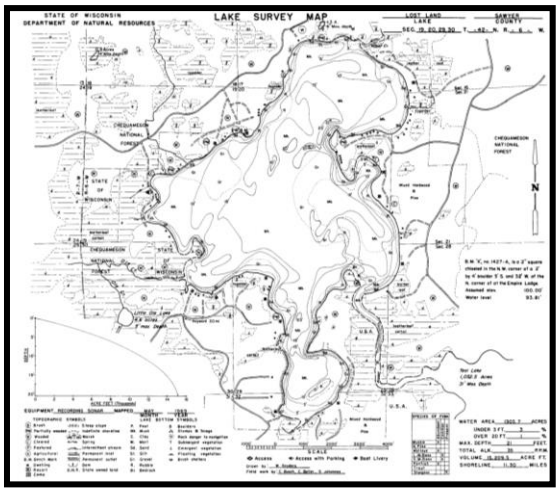

Figure 1: Lost Land Lake Bathymetric Map

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 (AEPP67522) 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, 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.

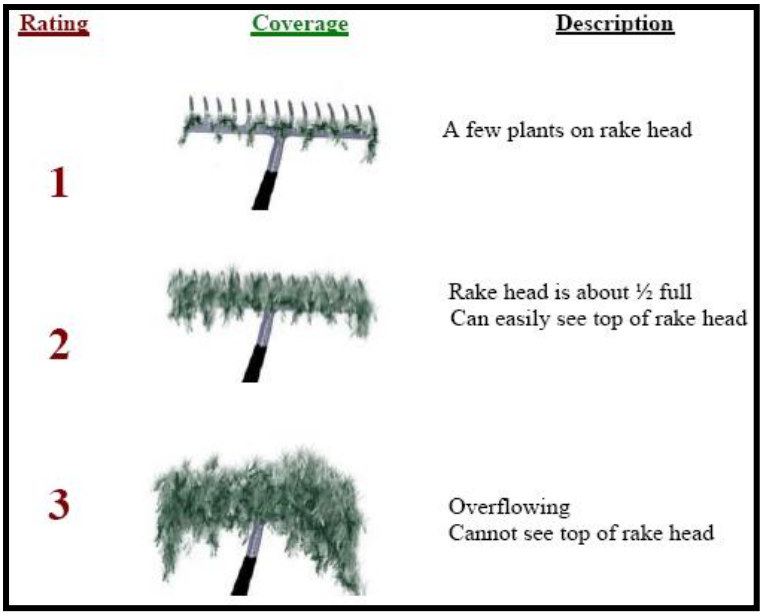

Figure 2: Rake Fullness Ratings (UWEX 2010)

RESULTS:

Eurasian Water-milfoil Bed Mapping Survey:

On September 5, 2022, we searched 62.5km (38.8miles) of transects throughout the lake's visible littoral zone (Figure 3). In total, we mapped 21 Eurasian water-milfoil beds covering 263.39 acres (20.84% of the lake's surface area) (Figure 4) (Appendix I). Most beds occurred in muck bottom bays where EWM dominated the plant community in 3-11ft of water, were canopied or near canopy, and likely caused minor to moderate navigation impairment as the majority occurred along highly developed shorelines (Table 1).

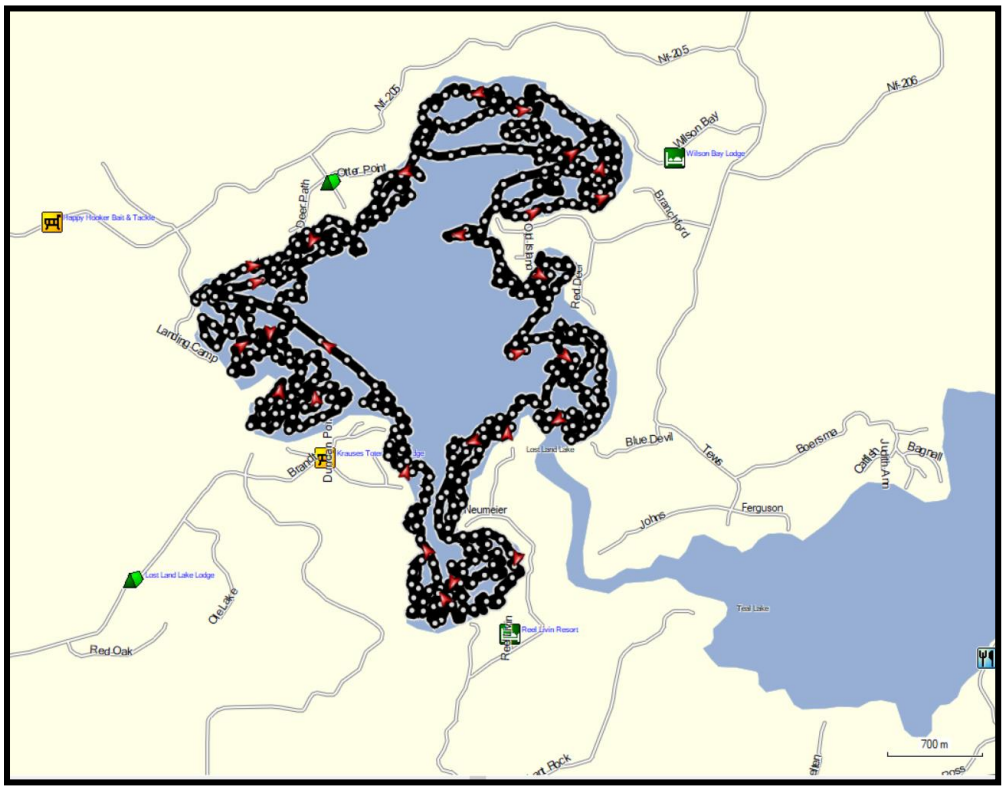

Figure 3: September 5, 2022 Littoral Zone Survey – GPS Tracks

Descriptions of Eurasian Water-milfoil Beds:

Bed 1 – This immense nearly continuous milfoil bed dominated the majority of the western bay in almost all locations from 4-11ft of water over organic and sandy-muck (Figure 5) (Appendix I). Viewed from the surface, the majority of the bed appeared to be nearly monotypic, and we noted there were few native pondweeds (*Potamogeton* spp.) visible. Within the bed's core, continuous dense EWM filled the water column, while areas over pure sand or gravel tended to be patchier with lower overall densities. For no obvious reason, most areas in the western bay were a foot or two subcanopy, although this could potentially be due to past harvesting. Despite not being canopied, we noted floating fragments and prop-clipped plants and trails throughout the bed – especially leading to/from the public landing and resorts.

Inshore from the bed, EWM was still present, but it usually occurred as individual stems or in microclusters within the native macrophyte community. On the bed's outshore side, we noted a hard edge as EWM tended to form a vertical wall that stopped abruptly as the lake depth reached the outer edge of the littoral zone.

Bed 2 – This bed was extremely dense and canopied at its core. Established on a shallow bar, its small size meant that it likely wasn't more than a moderate impairment.

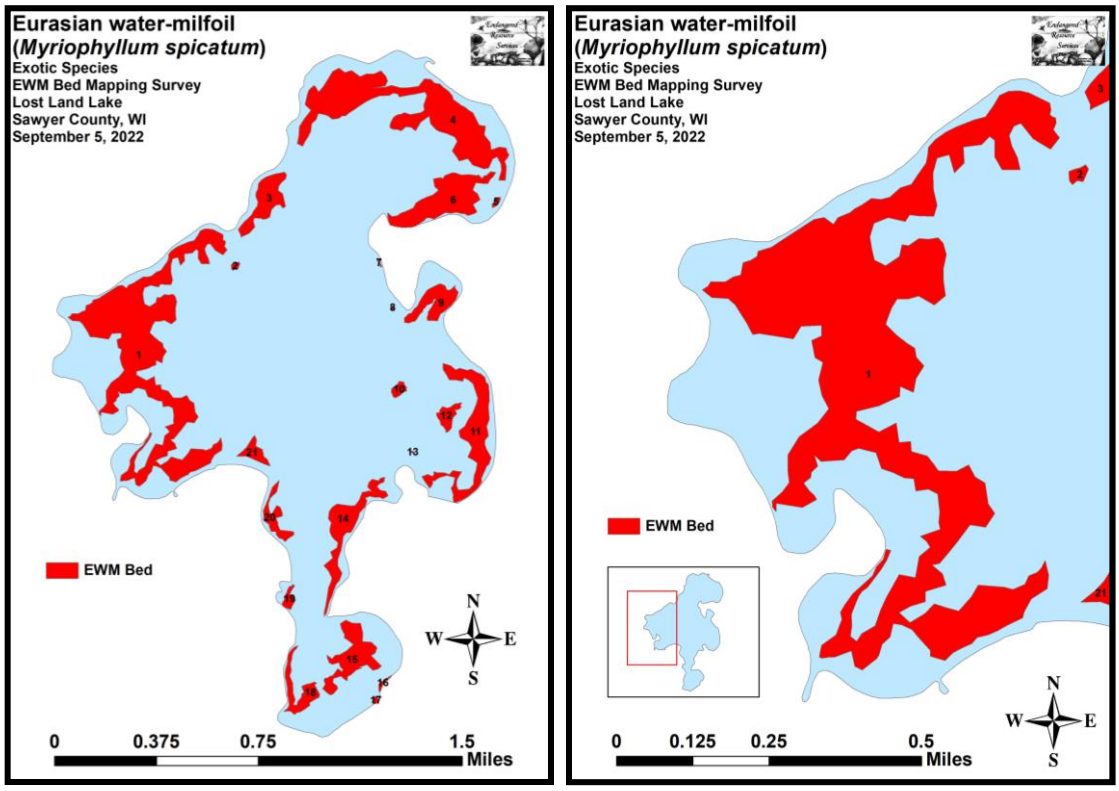

Figure 4: September 5, 2022 Eurasian Water-milfoil Beds/ Beds 1 and 2 – West Bay

Table 1: Late Summer Eurasian Water-milfoil Bed Mapping Summary
Lost Land Lake – Sawyer County, Wisconsin
September 5, 2022

Bed Number	2022 Acreage	Rake Range and Mean Rake Fullness	Depth Range and Mean Depth	Canopied	Navigation Impairment	2022 Field Notes
Bed 1	89.50	<<<1-3; 2	4-11; 8	Near	Moderate	Dense, nearly monotypic EWM throughout.
Bed 2	0.40	1-3; 3	6-10; 8	Near	Moderate	Dense bed on bar – canopied in center only.
Bed 3	10.19	<<<1-3; 2	4-10; 8	Near	Minor	Regular plants with dense microbeds interspersed.
Bed 4	60.14	<<<1-3; 3	4-10; 8	Near	Moderate	Majority of area is nearly monotypic EWM.
Bed 5	0.39	<<<1-2; <1	3-5; 4	Near	None	More of a High Density Area – peppering of plants.
Bed 6	22.10	<<<1-3; 3	2-10; 8	Yes	Severe	West side of bed canopied mat/east side fragmented.
Bed 7	0.09	<<<1-2; 1	4-10; 8	No	None	Narrow strip along shore/seems to be newly established.
Bed 8	0.07	1-3; 3	6-10; 8	Near	Minor	Dense microbed – too small to be more than a minor imp.
Bed 9	8.57	<<<1-3; 3	4-10; 8	Near	Moderate	Dense bed in majority of bay, but most subcanopy.
Bed 10	1.36	1-3; 3	7-10; 8	Yes	Moderate	Too small to be a severe impairment.
Bed 11	22.37	<1-3; 3	4-10; 8	Yes	Severe	Majority of bed canopied mat – fragments everywhere.
Bed 12	3.06	<1-3; 2	7-10; 8	Near	Moderate	Mixed with some native pondweeds.
Bed 13	0.04	1-3; 1	7-10; 8	Near	Minor	Microbed.
Bed 14	14.80	<<<1-3; 2	4-10; 8	Near	Minor	Highly variable, but essentially continuous.
Bed 15	14.03	<<<1-3; 2	4-10; 8	Near	Minor	Some plants flat on bottom/other patches canopied.
Bed 16	0.43	<<<1-2; 1	4-6; 5	Near	Minor	Thin band along shore.
Bed 17	0.27	<<<1-2; <1	4-8; 6	Near	None	Regular peppering of plants – more HDA than true bed.
Bed 18	6.46	<<<1-3; 3	4-10; 8	Near	Moderate	Majority of bed along shoreline – deep water areas dense.
Bed 19	1.52	1-3; 3	4-10; 8	Near	Moderate	Dense bed in underdeveloped bay.
Bed 20	4.57	<<<1-3; 2	4-10; 8	Near	Minor	Variable narrow bed in developed bay
Bed 21	3.03	<<<1-1; <1	4-10	No	None	Patchy – more HDA than true bed.
Total	**263.39**					

Bed 3 – We found Eurasian water-milfoil in this area was highly variable (Figure 5) (Appendix I). EWM was nearly continuous, but plants on the periphery of the bed tended to occur in scattered patches, while the core contained continuous high-density plants. This patchy nature, coupled with the majority of the bed being subcanopy, likely meant it wasn't causing more than a minor impairment despite its moderate density.

Beds 4 and 6 – These two super beds should likely be considered continuous when developing a management plan. Both areas supported dense and nearly monotypic EWM, and, especially on the western end of Bed 6, acres of canopied milfoil likely caused at least moderate and occasionally severe impairment to navigation for residents trying to access open water. As in Bed 1, areas that were inshore from the bed tended to have substrates that were a mix of gravel and sand that didn't support EWM; or they were dominated by rich beds of native vegetation with only scattered milfoil.

Bed 5 – This bed was better described as a "High Density Area" as EWM was regular, but not dense. This peppering of plants and merging clusters was establishing in high disturbance areas off the end of several docks.

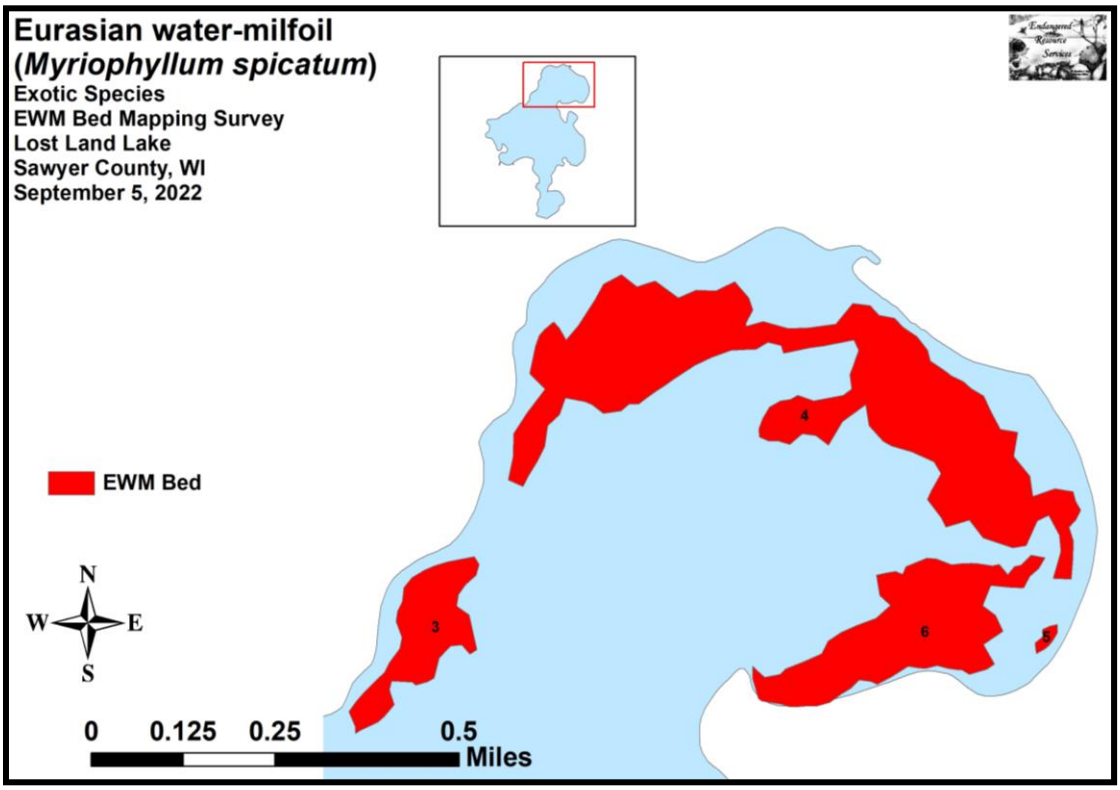

Figure 5: Beds 3-6 – Northeast Bay

Beds 7 and 8 – These two small beds both appeared to be recently established, and we noted that neither was big enough to likely cause significant impairment (Figure 6) (Appendix I). Bed 7 was located off the end of several docks on a developed shoreline, while Bed 8 was established in a small seam of muck just off a gravel bar.

Bed 9 – This dense bed dominated a highly developed bay, and it likely would have caused severe impairment if the bed had been canopied. This is an area that may have been harvested at some point as EWM formed a nearly continuous carpet, but it was still several feet below the surface. Even so, we noticed many plants were prop-clipped, and there were fragments throughout the entire bay.

Bed 10 – This dense canopied bed would have been a severe impairment, but it occurred on a small isolated hump in the middle of the greater bay and had clear navigation channels around it.

Beds 11 and 12 – These two large beds should likely be considered one area for management purposes. Bed 11 was a dense canopied mat, while Bed 12 was less dense and mixed with some native pondweeds. Each likely cause at least moderate impairment with parts of Bed 11 trending towards severe impairment as we documented prop-trails and fragments throughout.

Bed 13 – This low-density microbed was established on an isolated rock bar. Due to its small size, it's likely a non-issue from a management standpoint.

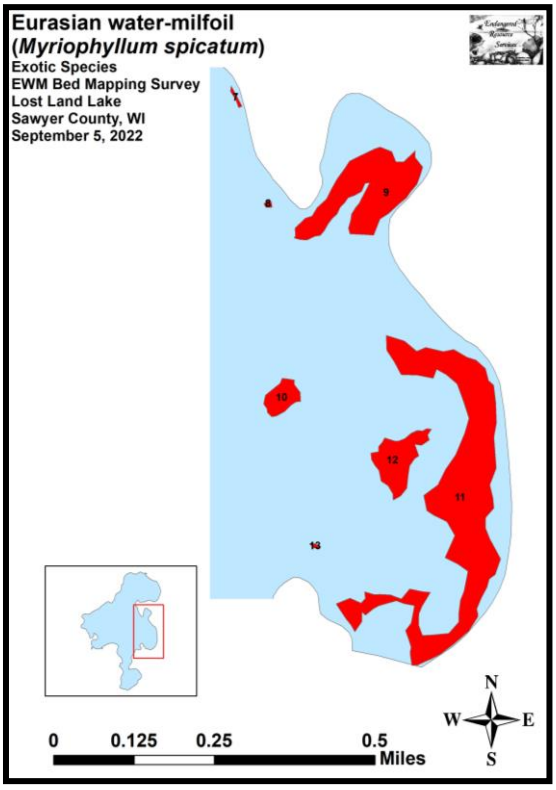

Figure 6: Beds 7-13 – Eastern Bay

Bed 14 – EWM in this expansive shoreline bed was highly variable but still essentially continuous (Figure 7) (Appendix I). Due to its fragmented nature, it likely wasn't more than a minor impairment to navigation for residents.

Bed 15 – Regular navigation to and from residences and the resort may explain the varied nature of EWM in Bed 15. For unknown reasons, we noticed milfoil was occasionally lying flat on the bottom in many areas while being vertical and nearing canopy in others. Despite covering a large area, this variability likely meant the bed wasn't more than a minor impairment.

Beds 16 and 17 – These two small low-density shoreline beds were nearly continuous. Each appeared to be relatively recently established, and neither was likely to be much of an impairment.

Bed 18 – The shoreline portion of this bed was moderately dense and canopied, while the deepwater areas were especially dense and monotypic but generally subcanopy. Taken as a whole, the bed was not likely more than a moderate impairment.

Bed 19 – This bed was extremely dense and nearly uniform throughout. Fortunately, it was established in an uninhabited bay and off to the side of the navigation channel going into/out of the south bay. Because of this, it is likely a low priority for management.

Bed 20 – Established along the entire shoreline of this developed bay, Bed 20 was likely not more than a minor impairment due to its narrowness and highly variable density.

Bed 21 – This low-density collection of clusters over gravel and sand was more of a "High Density Area" than a true bed. Because of this, it was not an impairment to navigation and likely a low priority for management.

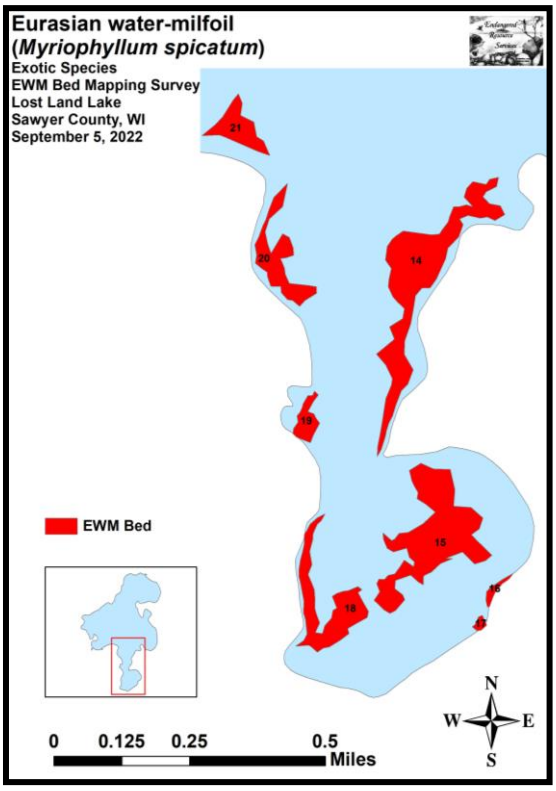

Figure 7: Beds 14-21 – Southern Bays

DISCUSSION AND CONSIDERATIONS FOR MANAGEMENT:

Eurasian water-milfoil currently dominates a large percentage of Lost Land Lake's surface area and the majority of the littoral zone. Because it is so widely-established, eradication is an unrealistic expectation. With this in mind, working to mitigate its impact on navigation 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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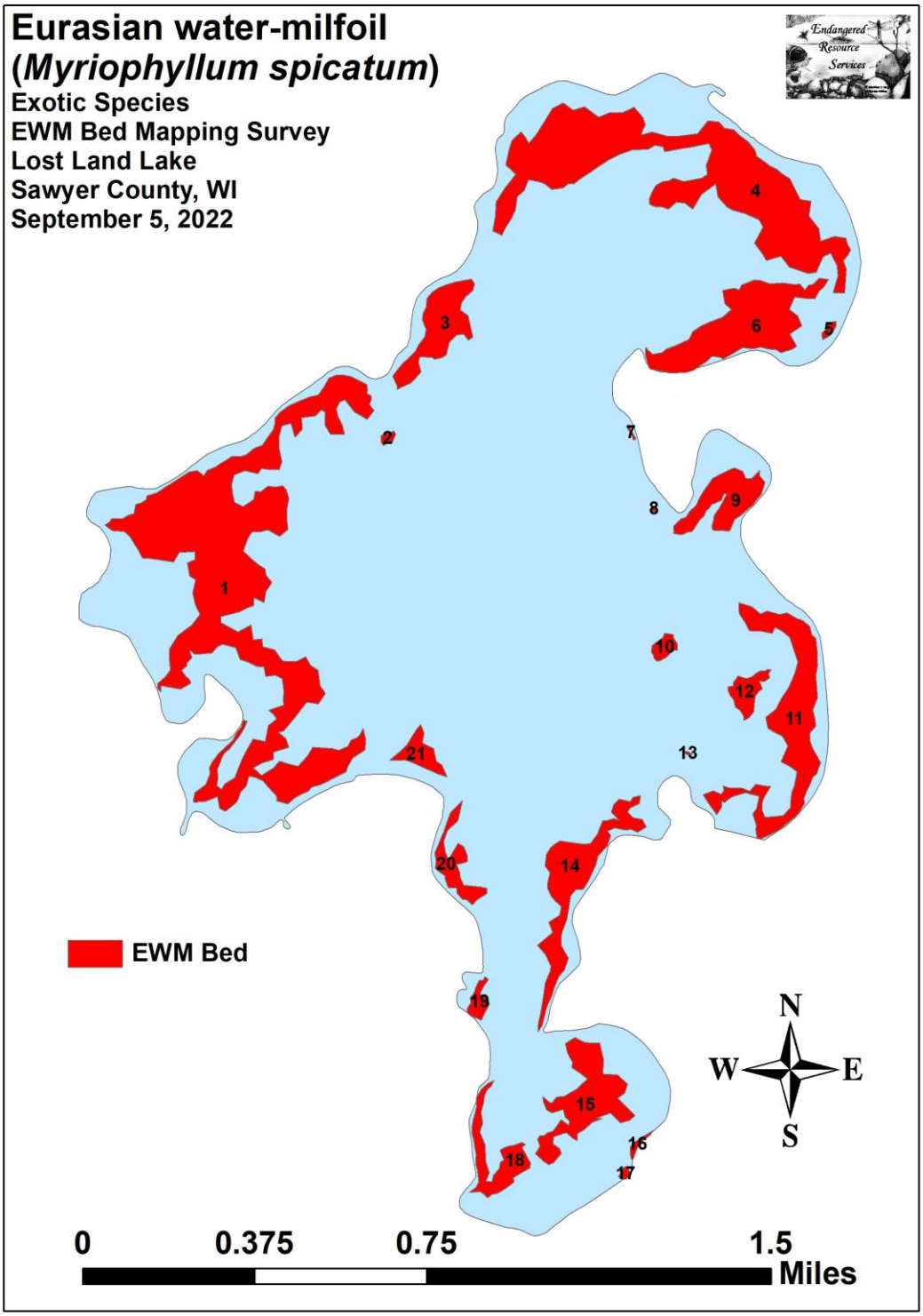
Appendix I: 2022 Eurasian Water-milfoil Bed Maps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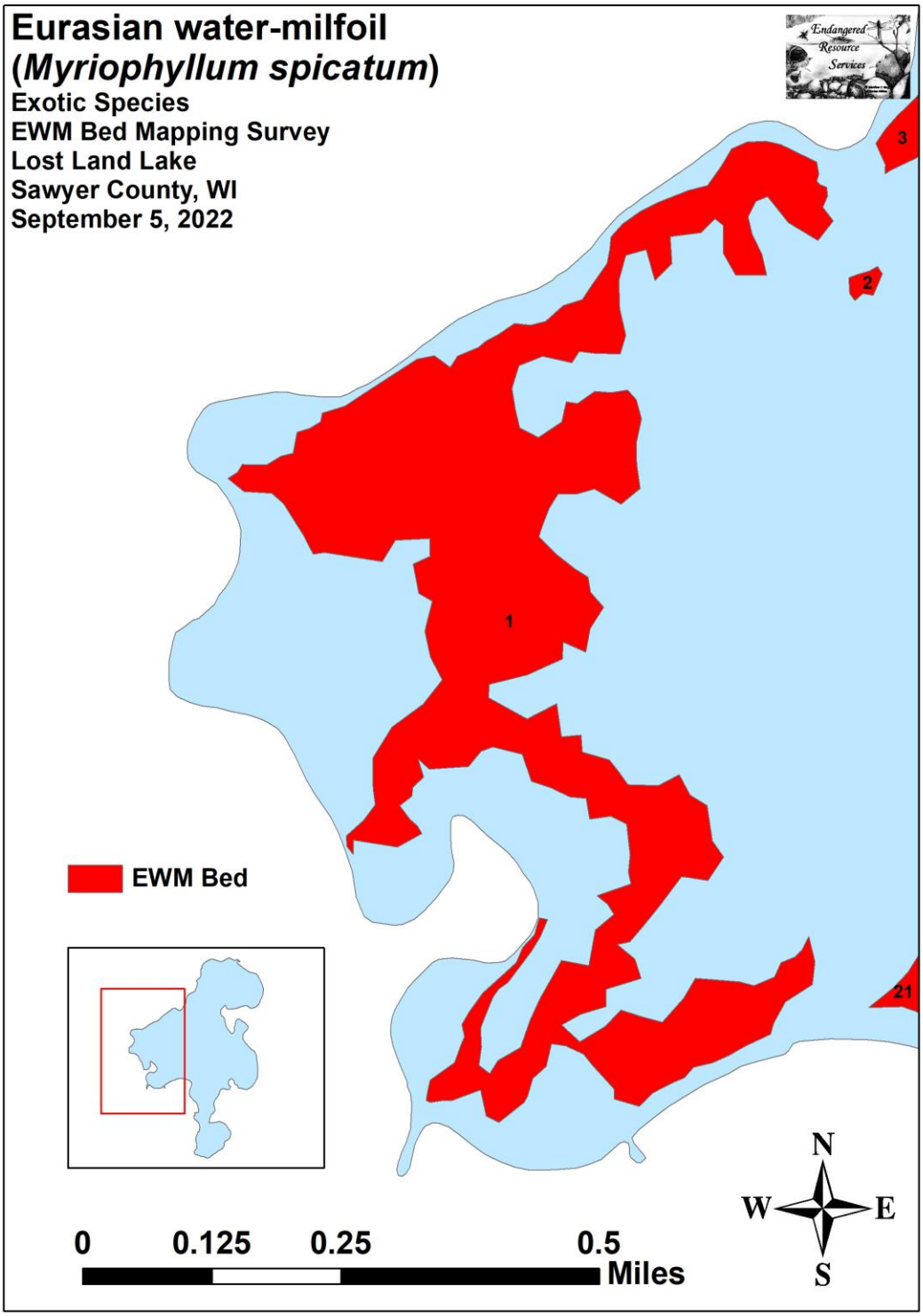
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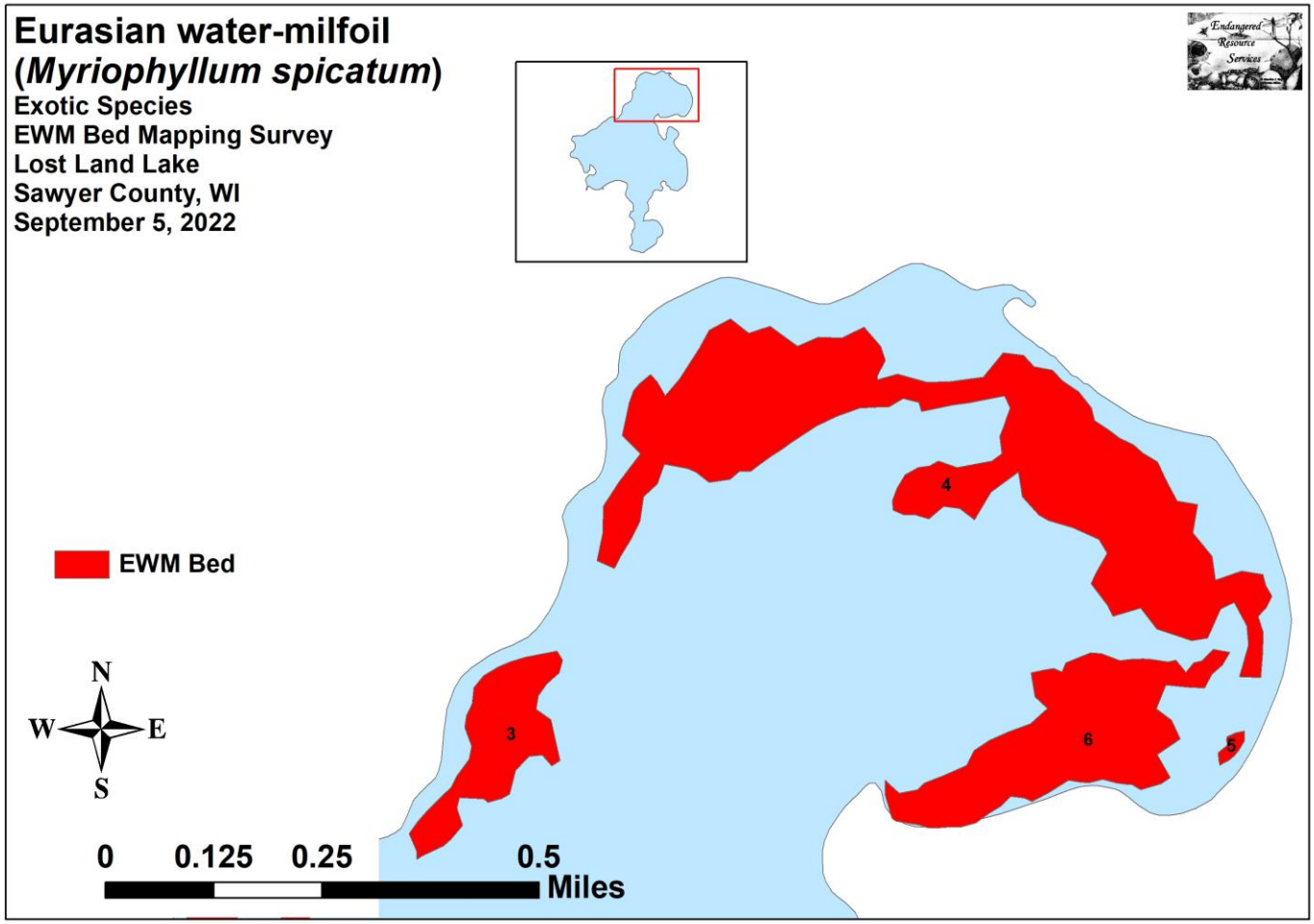
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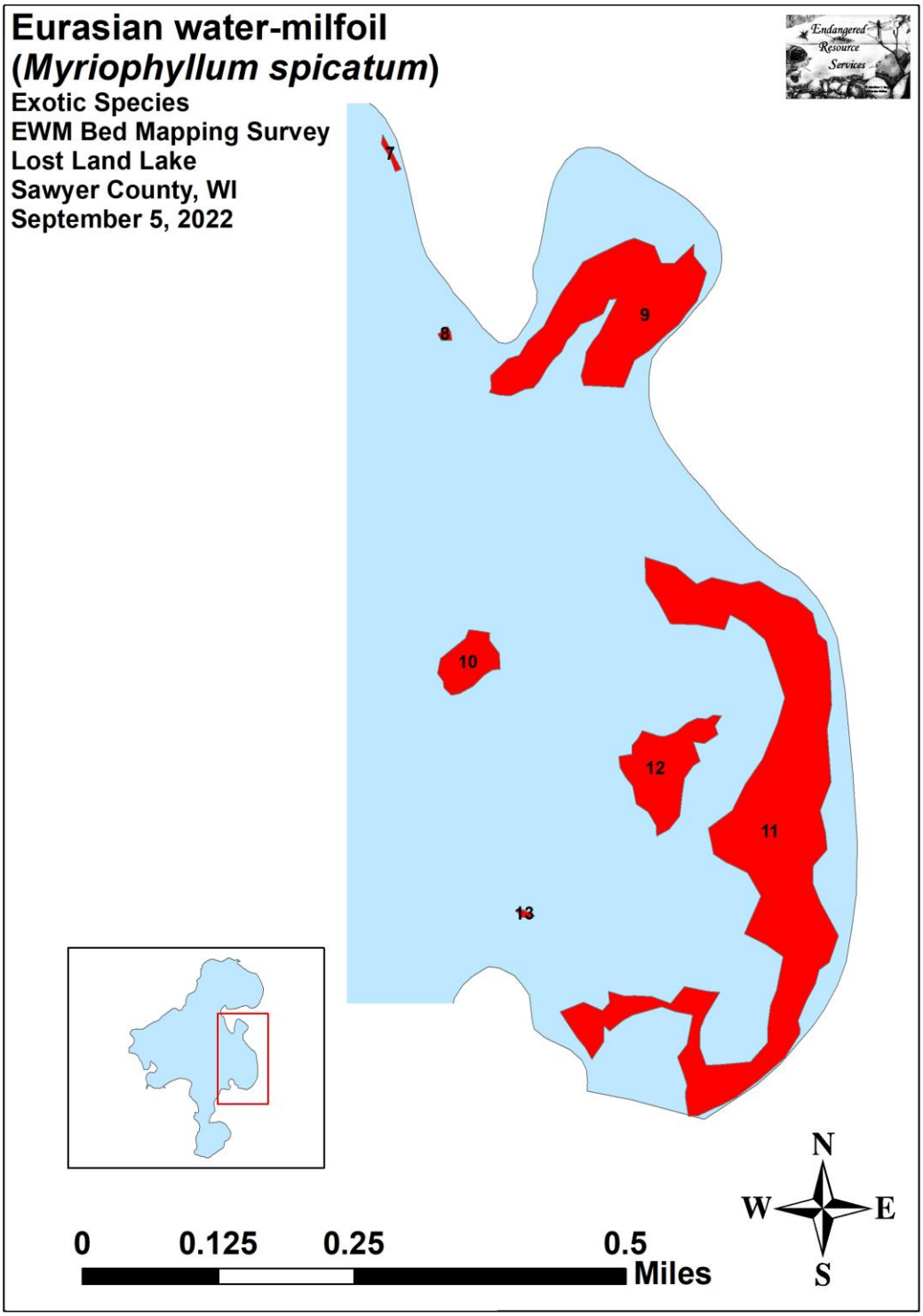
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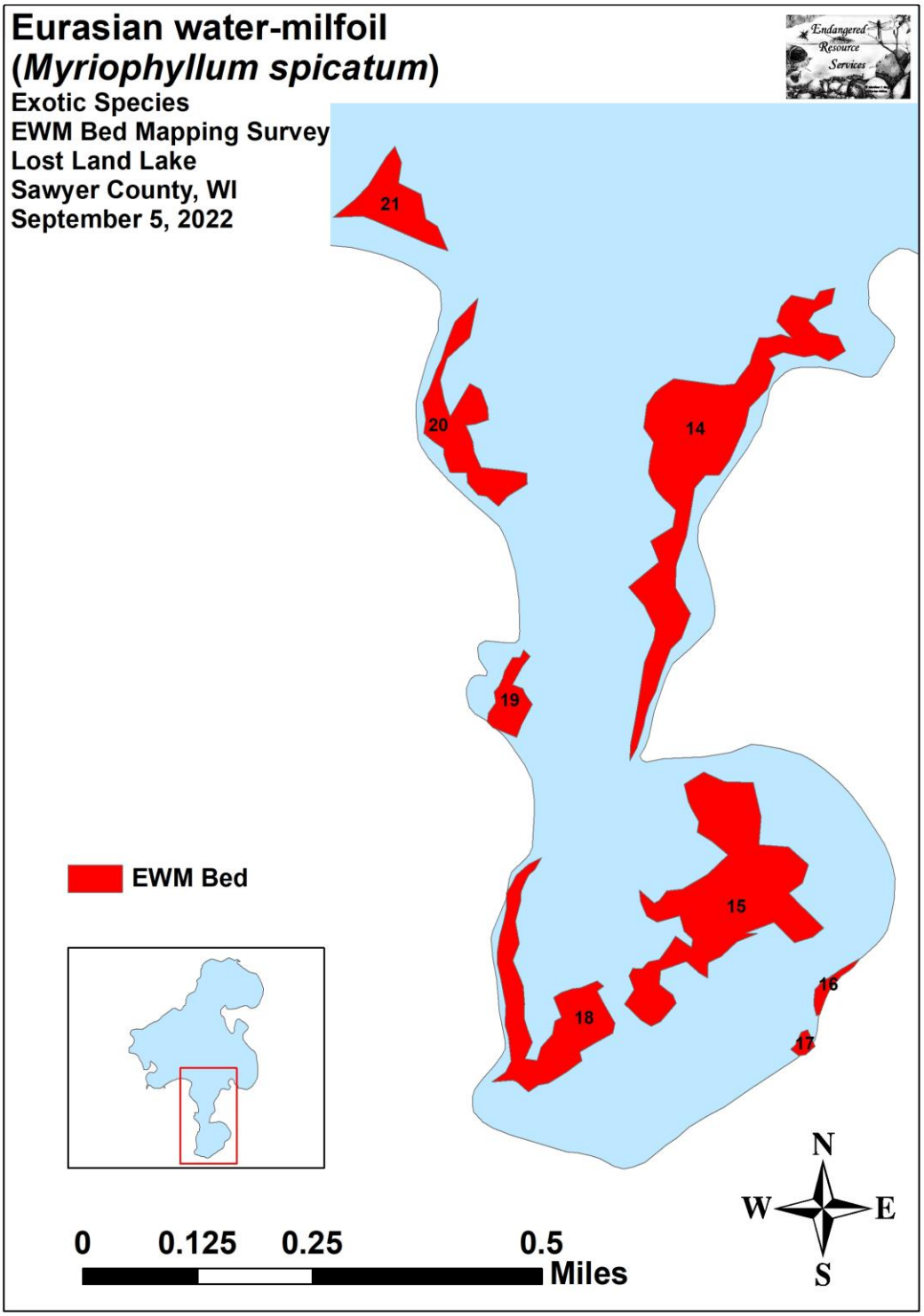
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