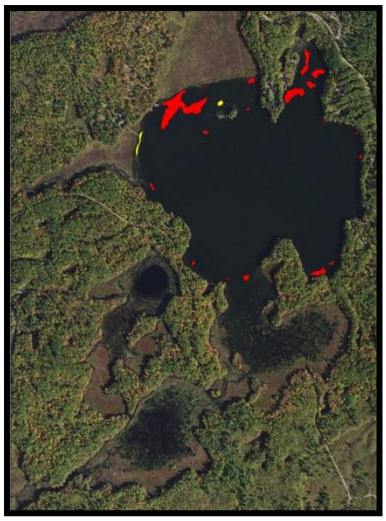
Eurasian water-milfoil (*Myriophyllum spicatum*)
Late Summer Bed Mapping Survey
Osprey Lake (WBIC: 2395100)
Sawyer County, Wisconsin

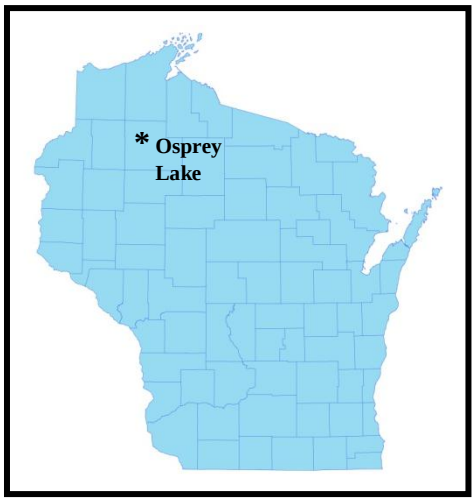


EWM beds (red)/High density areas (yellow)

Dense canopied EWM in Bed 1 on the south end of the main basin 9/5/20

Project Initiated by:

The Osprey Lake Property Owners Association, the Lac Courte Oreilles Conservation Department, the Sawyer County Land & Water Conservation Department, and the Wisconsin Department of Natural Resources



Sunny skies and perfect calm at dawn - Osprey Lake 9/5/20

Survey Conducted by and Report Prepared by:

Endangered Resource Services, LLC
Matthew S. Berg, Research Biologist
Saint Croix Falls, Wisconsin
September 5, 2020

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INTRODUCTION:

Osprey Lake (WBIC 2395100) is a 214 acre seepage lake in northwest Sawyer County, Wisconsin in the Lac Courte Oreilles Reservation and the Towns of Hayward, Hunter, and Round Lake (T40/41N R7/8W). It has a maximum depth of 32ft and an average depth of 12ft. The lake is oligotrophic in nature, and water clarity is generally good with summer Secchi readings ranging from 10-18ft and averaging 13.7ft from 2008-2014 (the last year data was available) (Figure 1) (WDNR 2020). The lake's bottom substrate is variable with sand, gravel, and rock occurring along the majority of shorelines and around the lake's island, while sandy, marly, and organic muck dominate the deep flats and sheltered bays (Holt et al. 1972).

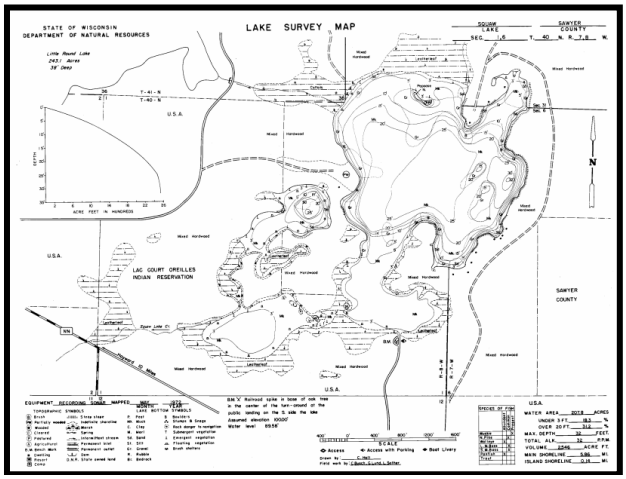

Figure 1: Osprey Lake Bathymetric Map

STUDY BACKGROUND AND RATIONALE:

Eurasian water-milfoil (*Myriophyllum spicatum*) (EWM) was first identified by the Lac Courte Oreilles Conservation Department in 2005 near the LCO boat landing. A follow-up survey by the Wisconsin Department of Natural Resources (WDNR) also located plants around the shoreline of much of the main northern basin.

After applying for and receiving a WDNR rapid response grant, the Osprey Lake Property Owners Association (OLPOA) and the Sawyer County Land and Water Conservation Department (SCLWC - K. Maki) used a 2006 WDNR point-intercept macrophyte survey to develop the lake's original Aquatic Plant Management Plan (APMP) that outlined manual removal by both volunteers and professionals as well as limited herbicide applications to control the infestation (OLPOA 2011). Since the APMP's approval by the WDNR in 2011, these small-scale herbicide treatments have occurred periodically based on low intensity boat surveys by the applicator and/or the SCLWC prior to treatment.

Following a June 22, 2020 herbicide treatment of six areas totaling 3.85 acres (1.80% of the lake's total surface area) with 1,120lbs of Renovate Max G (Trichlopyr/2,4-D) at a target concentration of 2.3ppm (Appendix I), the OLPOA requested we complete an intensive late-summer EWM bed mapping survey of the lake's visible littoral zone. These data will be used to determine the acreage and density of remaining EWM and to help guide future management. This report is the summary analysis of that field survey conducted on September 5, 2020.

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 significant EWM, we also mapped "high density areas" where EWM plants were continuous, but didn't meet all of the other "bed" criteria. When isolated individual EWM plants were found outside of the mapped beds and high density areas, we GPS marked them as these satellite plants could potentially become beds in the future.

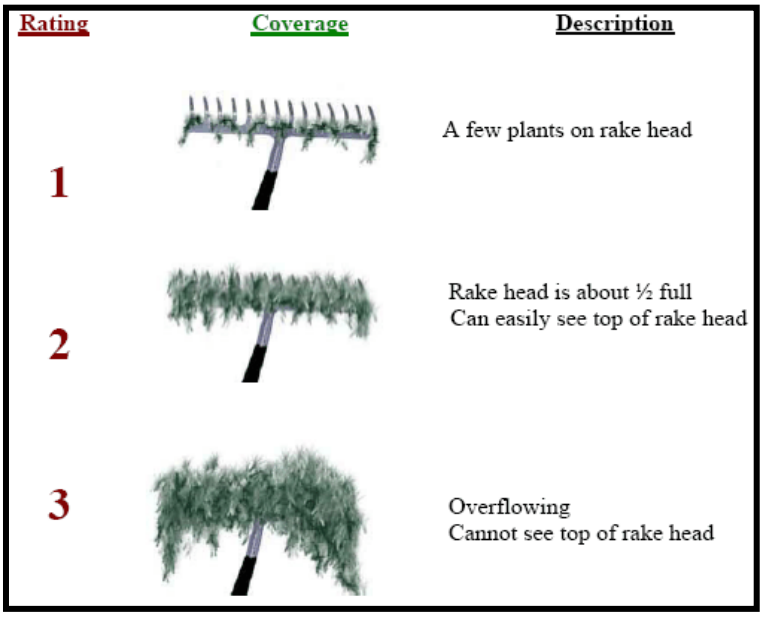

Figure 2: Rake Fullness Ratings (UWEX 2010)

RESULTS:

Eurasian Water-milfoil Bed Mapping Survey:

On September 5, 2020, we searched 25.6km (15.9miles) of transects throughout the lake's visible littoral zone (Figure 3). In total, we mapped 23 areas covering 4.26 acres (1.99% of the lake's surface area). Of these, 21 areas were true beds (red polygons) with continuous plants (4.05 acres) while two were better described as "high density areas" (yellow polygon) with scattered but regular plants (0.21 acre) (Table 1). Outside of these areas, we marked just five additional isolated plants (Figure 4) (Appendix II).

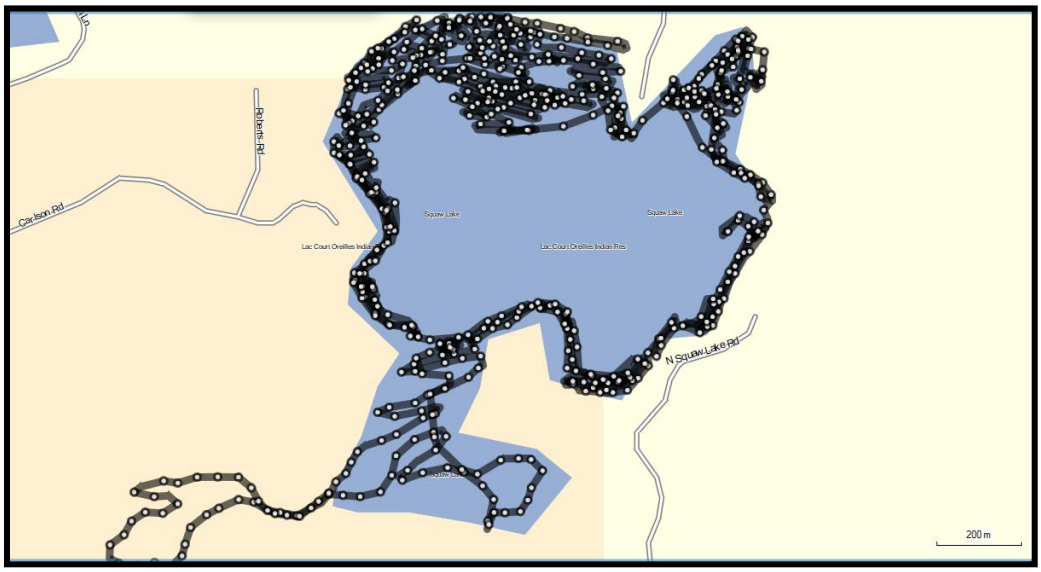

Figure 3: September 5, 2020 EWM Littoral Zone Survey – GPS Tracks

Table 1: Late Summer Eurasian Water-milfoil Bed Mapping Summary
Osprey Lake, Sawyer County
September 5, 2020

Bed/HDA Number	2020 Acreage	Rake Range and Mean Rake Fullness	Depth Range and Mean Depth	Canopied	Navigation Impairment	2020 Field Notes
Bed 1	0.09	<1-3; 2	7-9; 8	Yes	Minor	Prop-clipped – likely reseeding north bays.
Bed 2	0.01	1-3; 3	7-10; 8	Yes	Minor	Dense microbed
Bed 3	0.04	1-3; 3	8-10; 9	Near	Minor	Dense microbed – actively fragmenting
Bed 4	0.06	<<1-2; 1	8-10; 9	Near	Minor	Open reestablishing bed
HDA 5	0.13	<<1-2; <1	3-5; 4	No	None	EWM peppered throughout – mixed with natives
Bed 6	2.10	<<1-3; 1	3-10; 8	Near	Minor	Variable density – low density near shore/dense deeper
Bed 7	0.01	<<1-1; 1	3-4; 3	Near	None	Narrow strip of young plants
HDA 8	0.08	<<1-1; <1	3-4; 4	Near	None	Open cluster of sickly plants over marl
Bed 9	0.10	<<1-1; 1	2-4; 3	Near	Minor	Super cluster of low density plants in shallow water
Bed 10	0.02	1-3; 1	6-8; 7	Near	Minor	Dense microbed with satellite plants radiating out
Bed 11	0.05	1-3; 3	8-9; 9	Near	Minor	Dense microbed
Bed 12	<0.01	1-2; 1	8-10; 9	No	None	Young deepwater microbed – plants only 3ft tall
Bed 13	0.55	<<1-3; 2	5-10; 8	Near	Minor	Fragments ever where – many plants prop-clipped
Bed 14	0.14	<<1-3; 2	6-8; 7	Near	Minor	Expanding bed on all borders
Bed 15	0.35	<<1-3; 1	5-8; 7	Near	Minor	Open bed with scattered dense clusters
Bed 16	0.24	<<1-1; 1	4-6; 5	Near	Minor	Open bed with regular young plants
Bed 17	0.01	1-2; 1	8-10; 9	No	None	Deepwater microbed – plants just a few feet tall
Bed 18	0.01	<1-2; 1	4-10; 8	Near	None	Open microbed in deep water
Bed 19	0.01	<<1-1; 1	4-10; 8	Near	None	Open microbed in deep water
Bed 20	0.03	<1-2; 2	6-10; 8	Near	Minor	Small dense microbed
Bed 21	0.03	<<1-2; 1	7-9; 8	No	None	Reestablishing bed – most plants just a few feet tall
Bed 22	0.20	<<1-1; 1	4-9; 7	No	None	Reestablishing bed – most plants just a few feet tall
Bed 23	0.01	1-3; 2	5-8; 7	Near	None	Moderately dense microbed on uninhabited point
Total	**4.26**					

Descriptions of Eurasian Water-milfoil Beds and High Density Areas:

Bed 1 – We found this initial bed directly in the center of the entrance to the main basin. Many plants were prop-clipped, and it seems likely that most boats coming to and from the public landing would motor right through it. Because of this, and because it was also canopied and producing natural fragments, we believe the prevailing southerly summer winds are likely seeding areas to the north from this bed (Figure 4) (Appendix II).

Beds 2 and 3 – These two beds were located on the north and south ends of the main basin's southwest bay. Neither was large, but they were both dense and canopied or near canopy. Although likely not more than a minor impairment to local residents, control in these areas may be desired due to their ability to reseed northern bays.

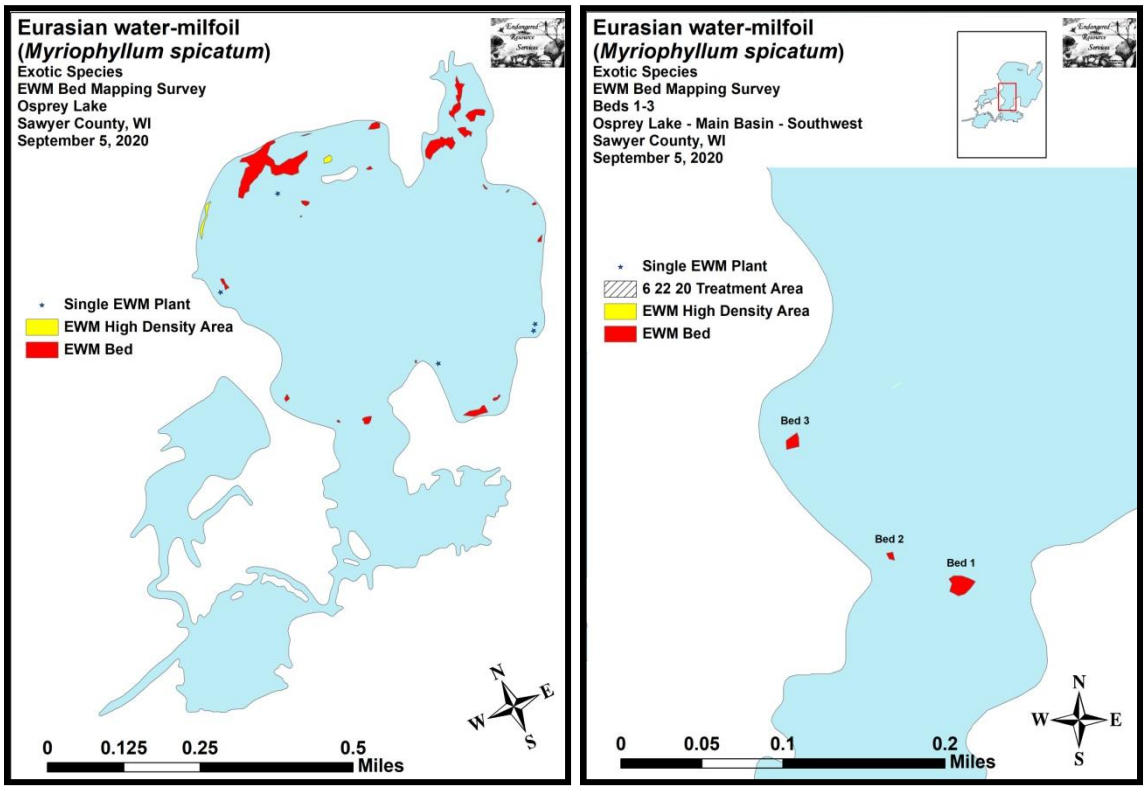

Figure 4: 2020 Fall EWM Bed Map/Beds 1-3 – Main Basin – Southwest

Bed 4 – Established just south of a treatment area, Bed 4 was patchy and mostly open which likely made it nothing more than a minor navigation impairment (Figure 5) (Appendix II). Despite this, the bed appeared to be reestablishing as we noted a number of small plants along the periphery.

HDA 5 – The northwest shoreline was dominated by Northern water-milfoil (*Myriophyllum sibiricum*) and diverse stands of native pondweeds; especially Large-leaf pondweed (*Potamogeton amplifolius*). Eurasian water-milfoil was peppered throughout this thin band, but it was never dominant and most plants appeared to be young as they were only a couple of feet tall. In the 2020 treatment area immediately east of this HDA, the bottom was carpeted with Fern pondweed (*Potamogeton robbinsii*), and we saw no evidence of EWM anywhere.

Bed 6 – This bed was the biggest on the lake, but EWM densities within it were highly variable. We found the bed became fragmented and mixed with natives near shore, and we also noted the deepwater edges were patchy in areas that were treated in June. In the 5-8ft bathymetric ring, EWM grew interspersed among beds of Wild celery (*Vallisneria americana*) before becoming the dominant and often only species found in 9-10ft.

Beds 7 and 9 – We logged a nearly continuous string of plants near the shoreline north of the island (Bed 7), and a super cluster of plants in the bay northeast of the island (Bed 9). In both cases, plants occurred at low density and appeared to be recently established as they were only a few feet tall.

HDA 8 – Immediately north of the island, we marked a low density cluster of sickly looking plants established over a marly muck – a bottom habitat type we don't normally associate with EWM. This may explain their limited numbers and poor condition.

Bed 10 – This small area contained several canopied microbeds that had satellite plants radiating out in all directions.

Bed 11 – Treatment in this area appears to have knocked out the western half of the bed, but the untreated eastern piece was extremely dense. Predictably, we documented small satellite plants from the eastern edge recolonizing the recently treated area.

Bed 12 – This deepwater microbed was barely visible as all plants were <3ft tall. The bed itself is not an issue, but it may be a source to reseed the north bays if ignored.

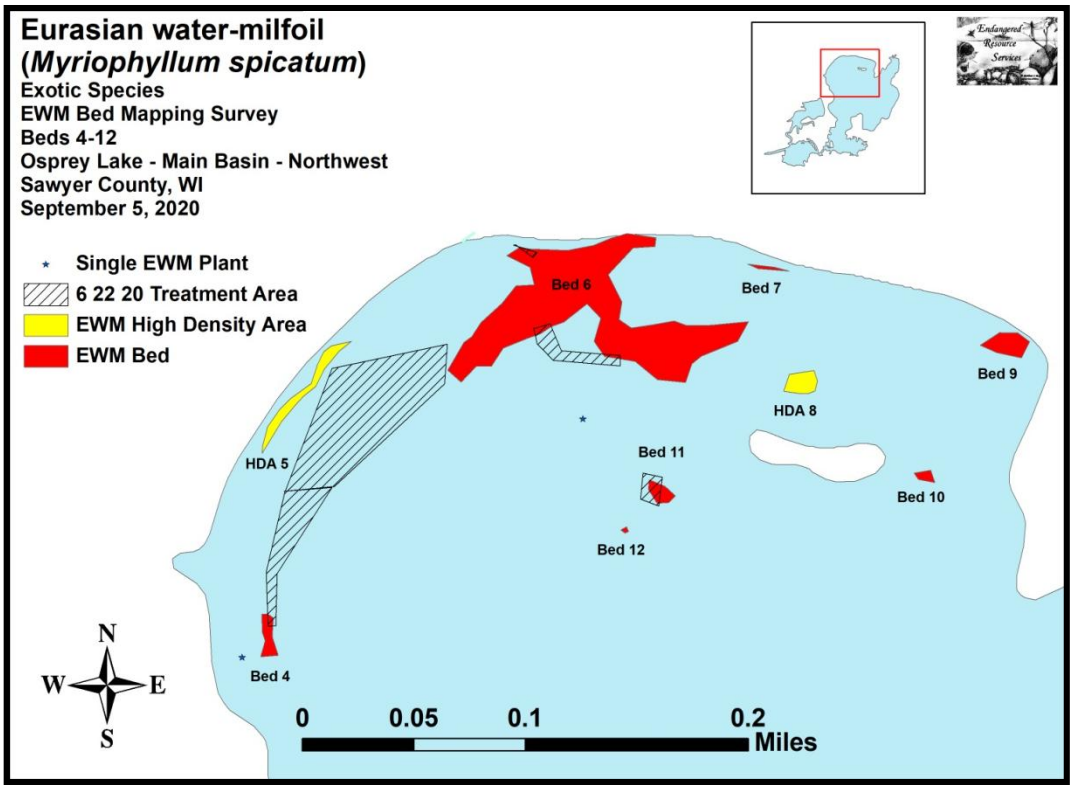

Figure 5: Beds 4-12 – Main Basin – Northwest and around the Island

Beds 13-16 – The four beds in the northeast bay should likely be considered continuous for management purposes (Figure 6) (Appendix II). During the survey, we noted the area between them was completely open and free of EWM while the inner borders were fragmented and patchy. After the survey, we found this "swath down the middle" had been treated in June. Unfortunately, most of the remaining untreated areas were solid canopied beds, and we saw prop-clipped plants and floating fragments throughout the bay suggesting the open treated area will likely be able to rapidly fill back in.

Bed 17 – This small bed was located along the point at the southern entrance to the northeast bay. Plants were regular, but only a few feet tall (Figure 6) (Appendix II)

Beds 18-20 – These three narrow microbeds were established perpendicular to the shoreline. This likely resulted in little to no impairment; especially as none were canopied.

Beds 20 and 21 – Young plants dominated these beds, and we found only a few mature towers at the core. Bed 22 was located just inshore from a 2020 treatment area which explains its low overall density.

Bed 23 – Little more than a super cluster of canopied plants, Bed 23 was established on an uninhabited area of the rocky point at the entrance to the southeast bay. If manual removal is a management option, this would be a good place for it as a treatment of such a small bed next to deeper water often has a low probability of success.

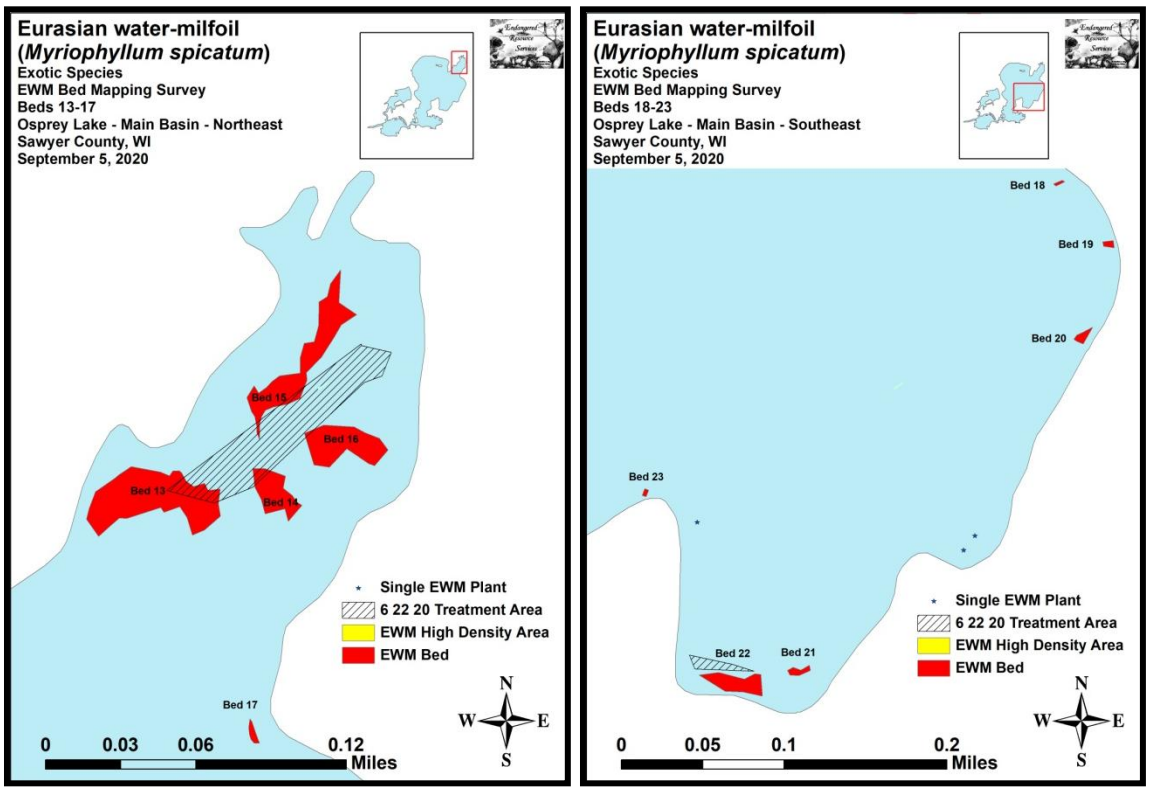

Figure 6: Beds 13-17 – Main Basin – Northeast/
Beds 18 – 23, – Main Basin - Southeast

DISCUSSION AND CONSIDERATIONS FOR MANAGEMENT:

Eurasian water-milfoil continues to occupy only a small percentage of Osprey Lake's surface area, but it is widely-established making eradication an unrealistic expectation. With this in mind, continuing to work 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 OLPOA moving forward.

To facilitate this, we encourage the OLPOA to update the lake's aquatic plant management plan as many ideas about best management practices have changed since the 2011 plan was approved. A new plan could also address current realities related to treatment funding, develop target acreage and density goals, and clarify who will monitor EWM levels on the lake to determine if and where management should occur. Applying for a grant and/or hiring a professional lake manager could help facilitate and streamline this process.

Although the 2020 treatment was successful at knocking back EWM in each area where chemicals were used, the applications often occurred only in the center of or on the edge of an existing bed. This likely means these many small treatment areas will only offer short-lived relief as beds can easily recolonize. If possible, focusing future treatments on a single larger area of the lake may offer longer-lasting control in that area. Also, working to eliminate EWM in high traffic areas first would likely help slow the rate of reestablishment from floating and windblown fragments; especially when these areas occur on the southern ends of both the entire basin and smaller bays.

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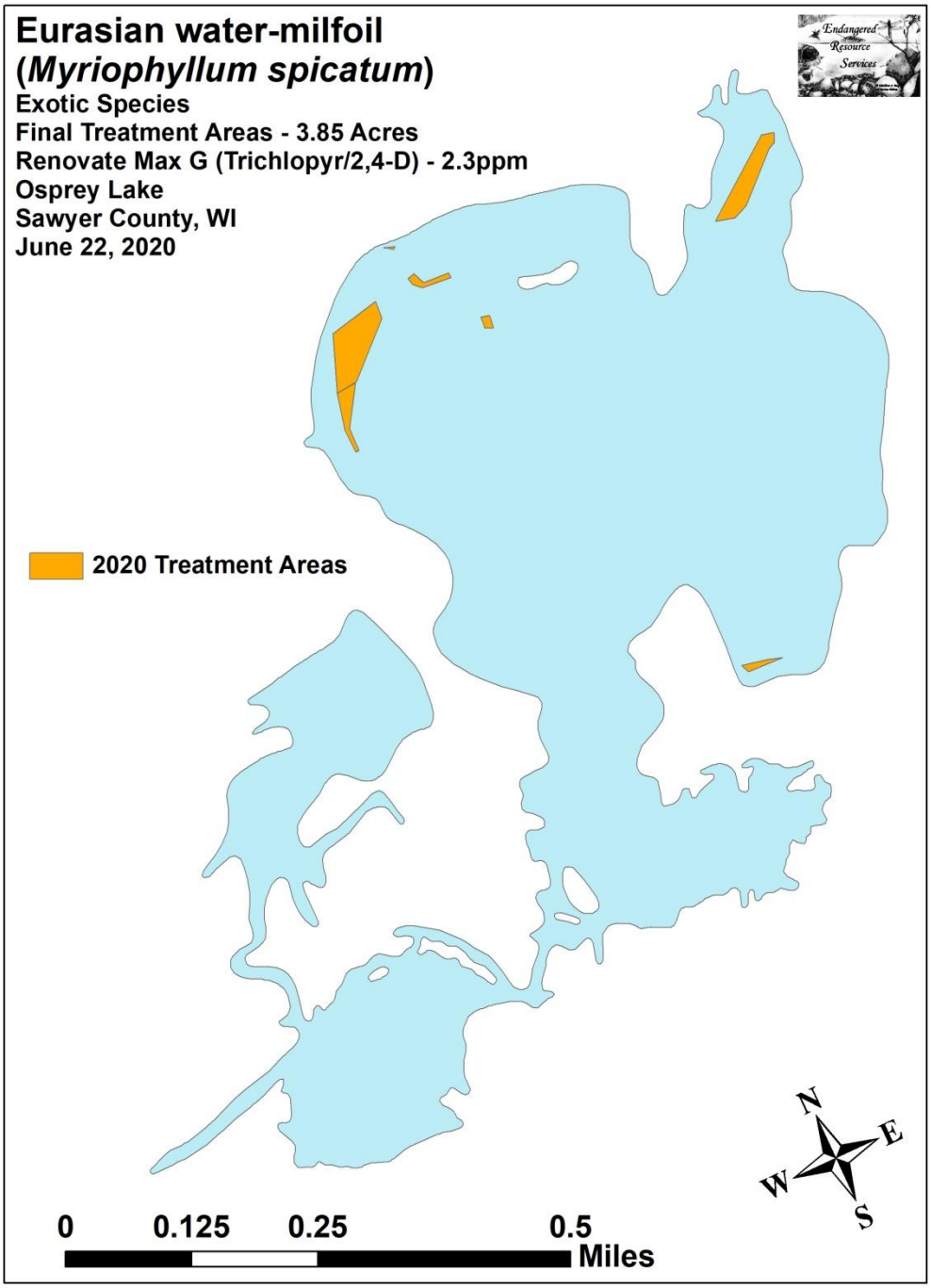
Appendix I: 2020 Eurasian Water-milfoil Treatment Areas Map


Eurasian water-milfoil
(Myriophyllum spicatum)
Exotic Species
Final Treatment Areas - 3.85 Acres
Renovate Max G (Trichlopyr/2,4-D) - 2.3ppm
Osprey Lake
Sawyer County, WI
June 22, 2020
Endangered Resource Services
2020 Treatment Areas
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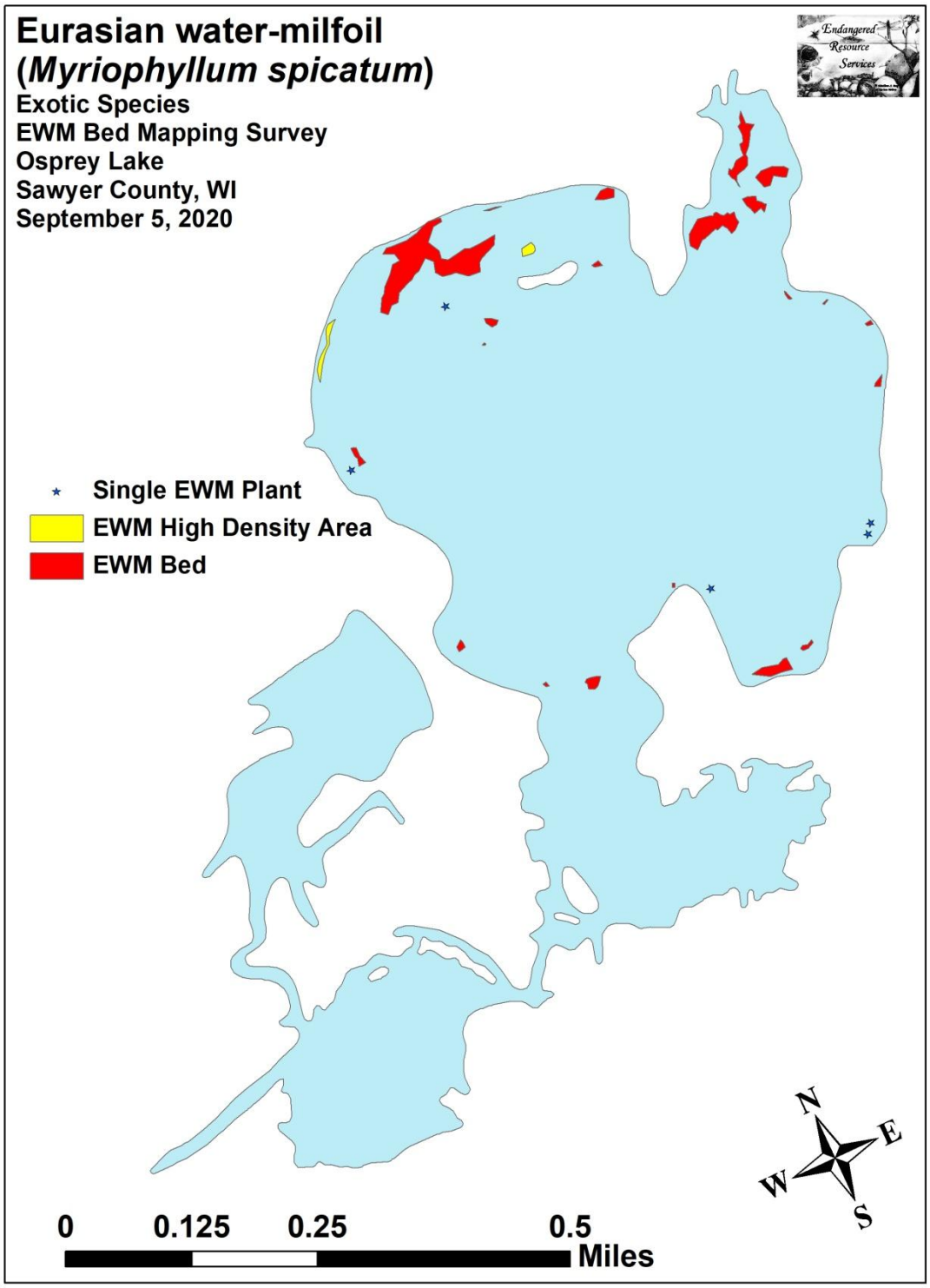
Appendix II: 2020 Eurasian Water-milfoil Bed Maps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EWM High Density Area
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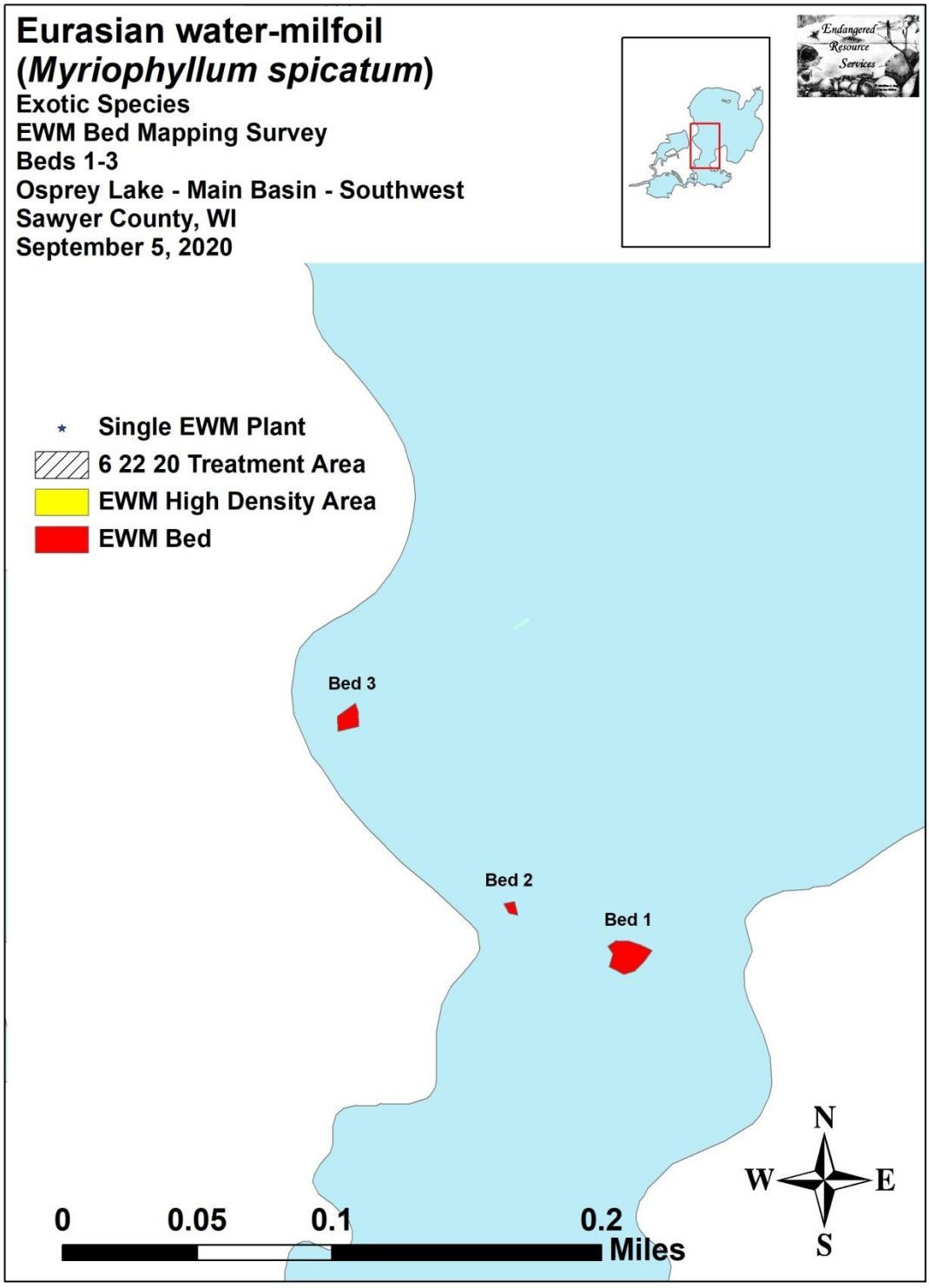
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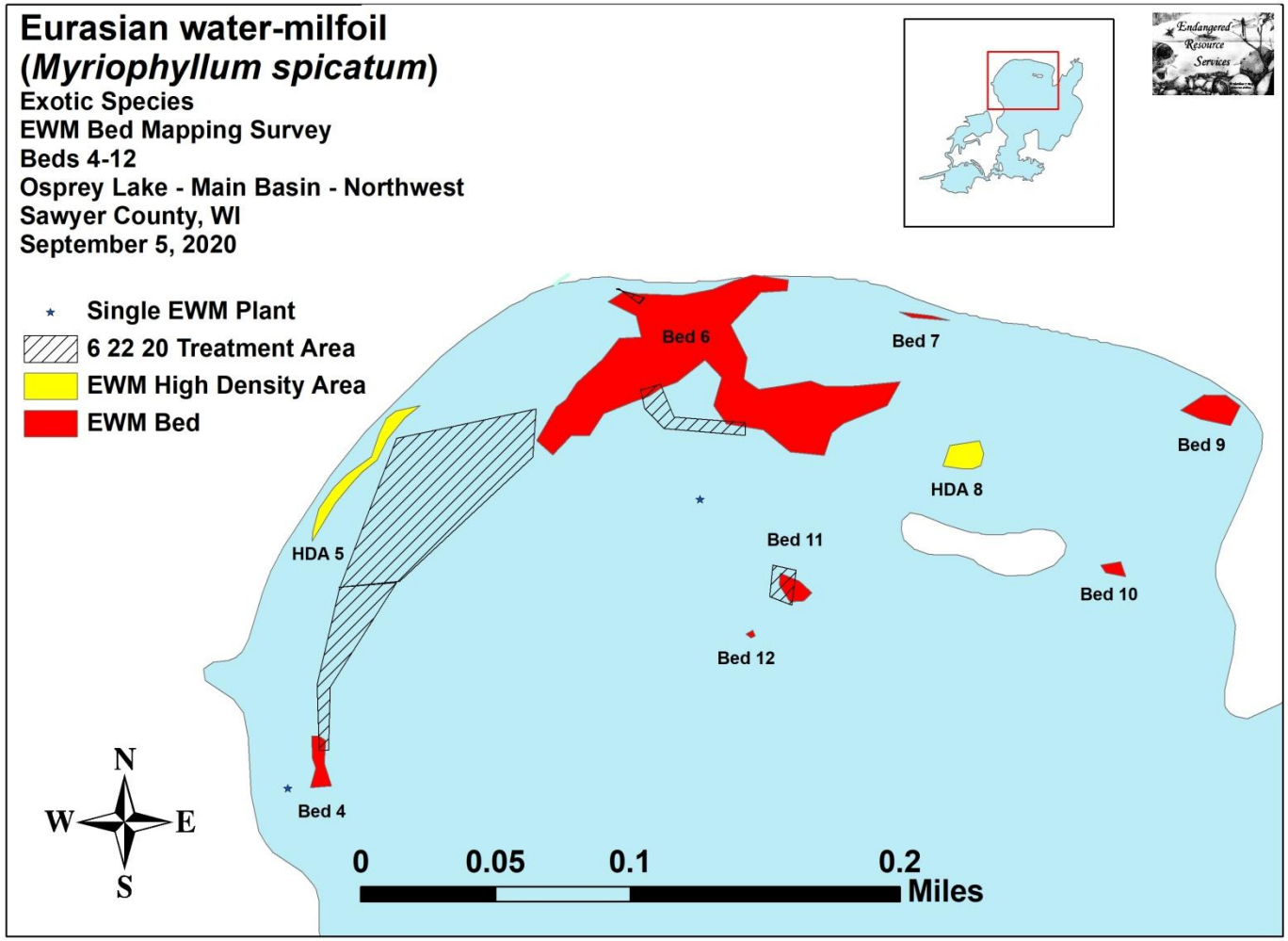
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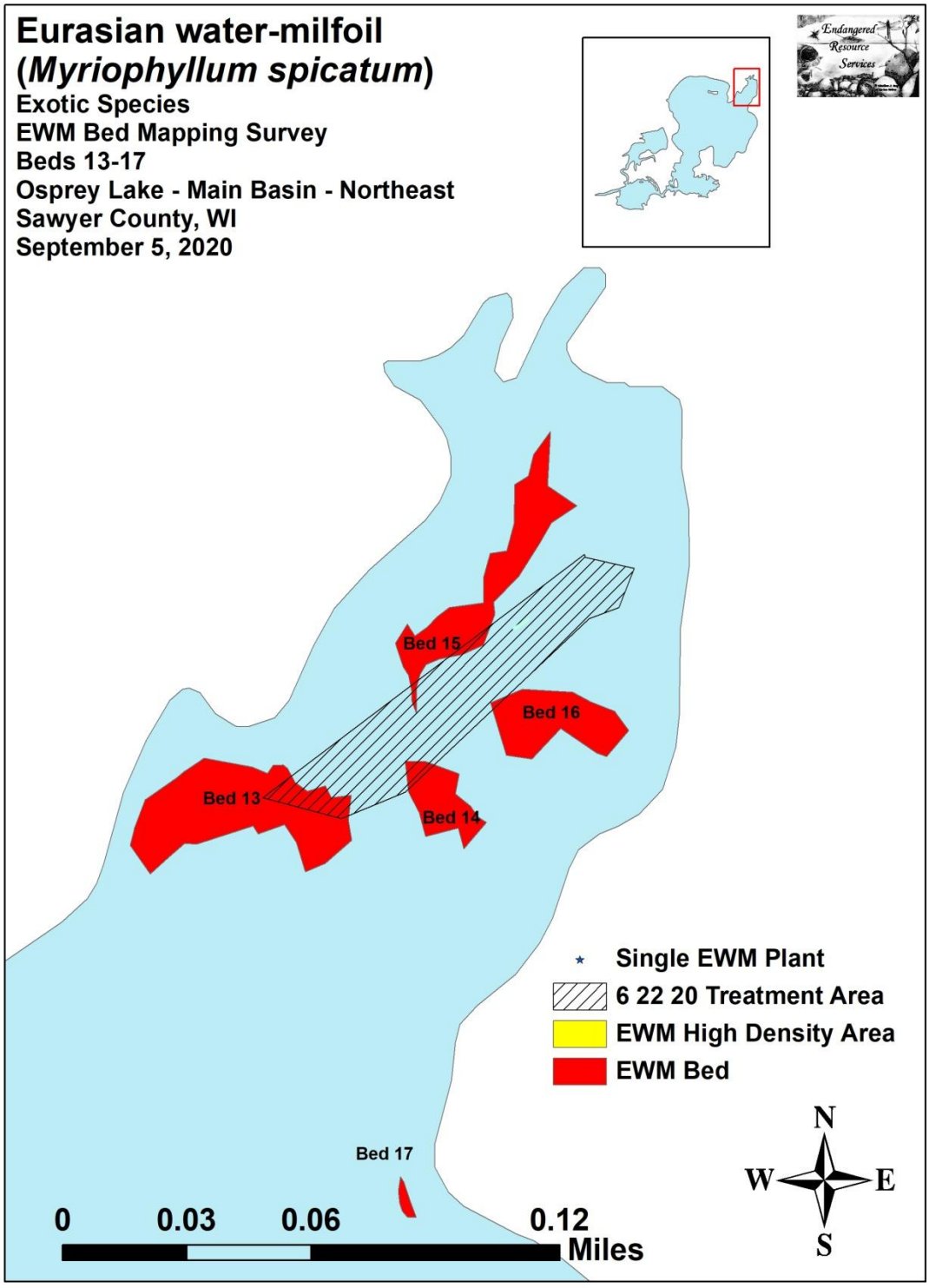
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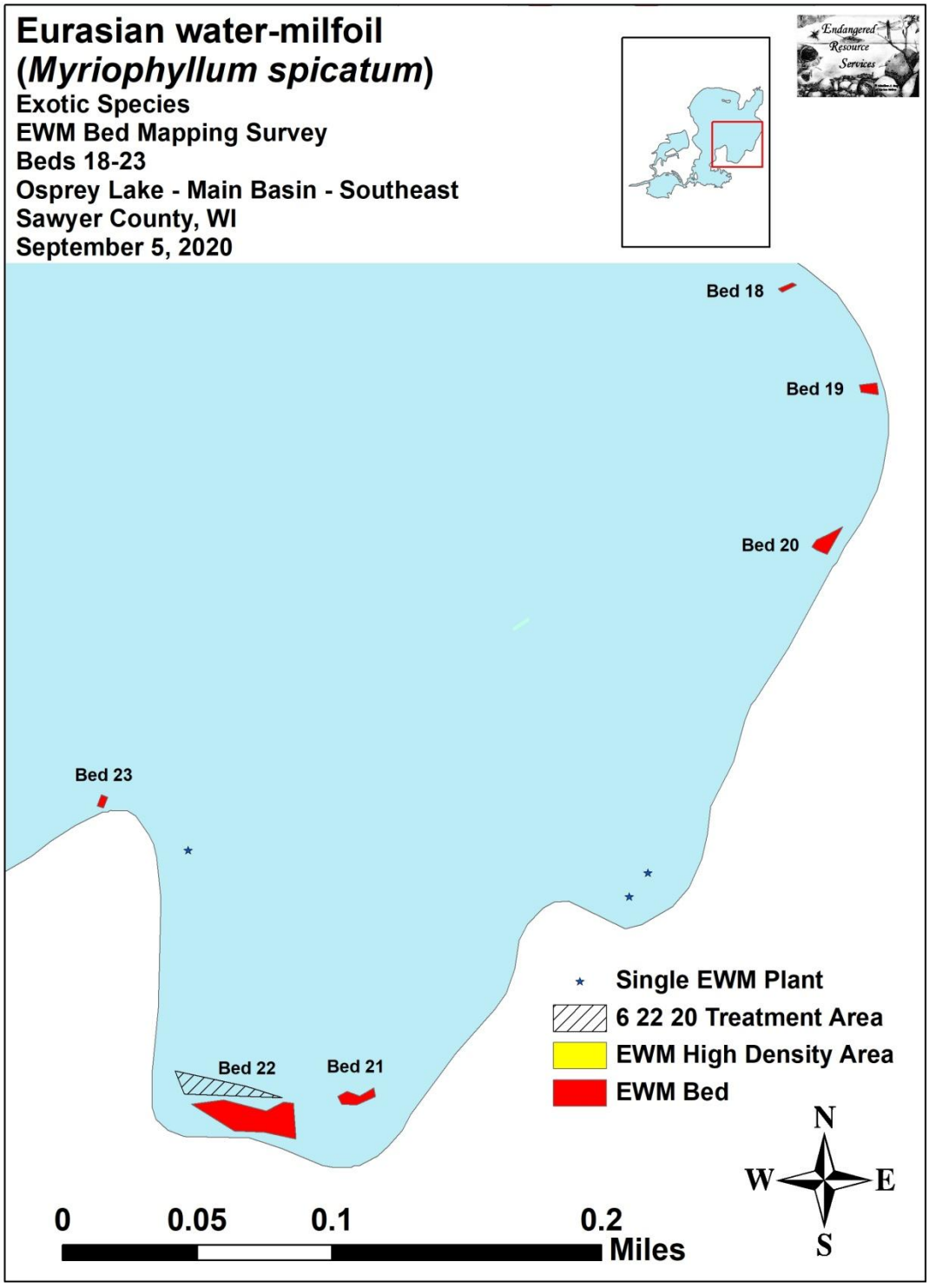
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