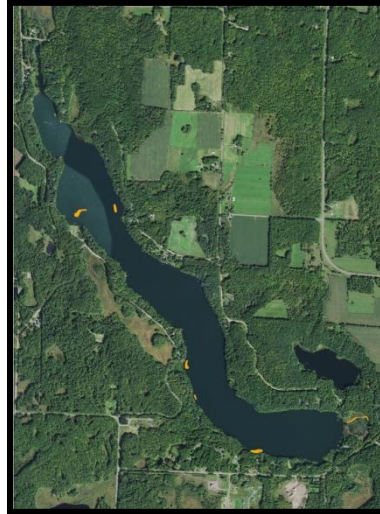


**Eurasian water-milfoil (*Myriophyllum spicatum*)  
Fall Bed Mapping Survey  
Sand Lake - WBIC: 2661100  
Barron County, Wisconsin**



Eurasian water-milfoil (Berg 2007)



2020 June EWM Treatment Areas

**Project Initiated by:**

The Sand Lake Management District, Lake Education and Planning Services, LLC, and the Wisconsin Department of Natural Resources



Canopied EWM near the boat landing 10/3/20

**Survey Conducted by and Report Prepared by:**

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October 3, 2020

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## **INTRODUCTION:**

Sand Lake (WBIC 2661100) is a 322 acre drainage lake in northwestern Barron County, Wisconsin in the Town of Maple Plain (T36N R14W S17 NW NE). It reaches a maximum depth of 57ft in the south basin and has an average depth of approximately 30ft. Sand Lake is mesotrophic bordering on oligotrophic in nature with good to very good water clarity. From 1988 to 2020, summer Secchi readings have ranged from 9-18ft with an average of 13.2ft (WDNR 2020). The bottom substrate is predominately sand and sandy muck with scattered gravel primarily along the shoreline. Some areas of thick organic muck occur in bays on the west side of the lake and at the far north and south ends (Miller et al. 1965).



**Figure 1: 2020 June EWM Treatment Areas**

## **STUDY BACKGROUND AND RATIONALE:**

Eurasian water-milfoil (*Myriophyllum spicatum*) (EWM) was discovered in Sand Lake in 2002, and the Sand Lake Management District (SLMD) is engaged in active management using herbicides to control this invasive exotic plant species. Most recently, on June 3, 2020, the SLMD – under the direction of Lake Education and Planning Services, LLC (LEAPS) – chemically treat six areas totaling 2.32 acres (0.72% of the lake’s surface area) with 2,4-D (Sculpin G or Amine-4) at a target concentration of 4.0ppm (Figure 1).

Historically, fall bed mapping was used to determine where EWM control might be considered the following year. However, in 2016, LEAPS, the SLMD, and the Wisconsin Department of Natural Resources (WDNR) decided that an annual warm-water point-intercept survey at a higher resolution than the original WDNR survey grid would replace the annual pre/posttreatment monitoring and the fall bed mapping surveys. This change in methodology was made because a regular quantitative survey allowed for statistical year-over-year comparisons as a way to assess the effectiveness of the lake’s active management while simultaneously providing a way to more closely measure any potential impacts on the lake’s native plants. It was also chosen to better detect deep water beds that were occasionally missed due to poor water clarity in the fall. Following four years of monitoring, it was decided that this intensive methodology did not provide significantly improved data relative to the cost. Because of this, it was decided to revert to fall bed mapping surveys. This report is the summary analysis of that survey conducted on October 3, 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.




<u>Rating</u>	<u>Coverage</u>	<u>Description</u>
1		A few plants on rake head
2		Rake head is about ½ full Can easily see top of rake head
3		Overflowing Cannot see top of rake head

Figure 2: Rake Fullness Ratings (UWEX 2010)

## RESULTS AND DISCUSSION:

### Fall Eurasian Water-milfoil Bed Mapping Survey:

On October 3<sup>rd</sup>, 2020, we searched the lake's visible littoral zone for EWM. Water clarity was fair, and, with dead calm conditions, we estimated we could see down approximately 7-8ft into the water column. We located and mapped 30 beds ranging in size from < 0.01 acre (Beds 19A) to 1.04 acres (Bed 19) (Figure 3) (Appendix I). Collectively, they totaled 3.18 acres (Table 1). This was an increase of 1.43 acres (+81.71%) from the 1.75 acres we mapped in 2015 and 2014 (Table 2). In general, it appeared the 2020 treatment provided only limited relief as almost all of the treatment areas still had plants present to varying degrees.

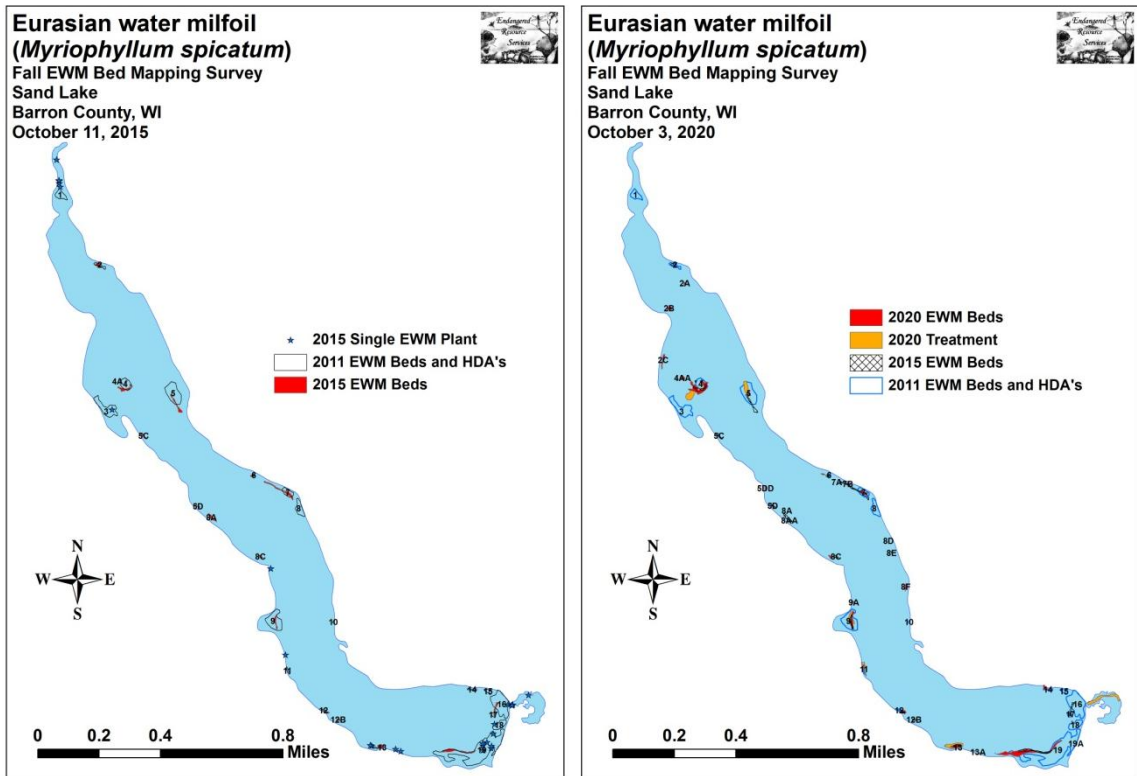


Figure 3: 2015 and 2020 Fall EWM Bed Maps

**Table 1: Fall Eurasian Water-milfoil Bed Descriptions  
Sand Lake, Barron County  
October 3, 2020**

<b>Bed/HDA Number</b>	<b>2020 Acreage</b>	<b>Rake Range and Mean Rake Fullness</b>	<b>Depth Range and Mean Depth</b>	<b>Canopied</b>	<b>Navigation Impairment</b>	<b>2020 Field Notes</b>
Bed 1	0	-	-	-	-	No EWM found
Bed 2	0	-	-	-	-	No EWM found
Bed 2A	0.03	1-3; 3	7-11; 9	Yes	Minor	Too small to be issue
Bed 2B	0.08	1-3; 3	7-10; 8	Near	None	Dense microbed
Bed 2C	0.12	<<<1-3; 2	7-10; 9	Near	Minor	Patchy narrow bed
Bed 3	0	-	-	-	-	No EWM found
Bed 4	0.64	<1-3; 3	7-11; 9	Yes	Moderate	Deep dense bed
Beds 4A/AA/B	0.07	<<1-3; 2	7-11; 9	Yes	Moderate	Some patchiness.
Bed 5	0.04	<<<1-2; 1	7-9; 8	Near	None	Microbed in NWM
Beds 5B/C/CC	0	-	-	-	-	No EWM found
Beds 5D/DD	0.06	1-3; 3	7-10; 9	Yes	Minor	Dense microbed
Bed 6	0.03	1-3; 3	6-10; 8	Yes	Minor	Dense microbed
Bed 7	0.11	1-3; 2	6-8; 7	Yes	Minor	Dense microbed
Bed 7A	0.01	1-3; 3	6-10; 8	Yes	Minor	Dense microbed
Bed 7B	0.04	1-3; 3	6-8; 7	Yes	Minor	Dense microbed
Bed 8	0.01	1-3; 3	6-8; 7	Yes	Minor	Dense microbed
Beds 8A/AA	0.05	1-3; 3	7-10; 9	Yes	Minor	Dense microbed
Bed 8C	0.05	<1-3; 3	7-11; 9	Near	Minor	Patchy/mixed w/ NWM
Beds 8D/E	0.03	1-3; 3	7-10; 9	Near	Minor	Dense microbed
Bed 8F	0.06	<1-3; 2	7-9; 8	Near	Minor	Patchy/mixed w/ NWM
Bed 9	0.23	1-3; 2	7-11; 9	No	None	Deep water bed
Bed 9A	0.02	1-3; 2	7-11; 9	Near	None	Microbed w/ NWM
HDA 10	0	-	-	-	-	No EWM found
Bed 11	0.05	<<1-3; 1	5-11; 9	Yes	Minor	Continuous low density
Bed 12	0.06	1-3; 3	6-11; 9	Yes	Moderate	Prop-clipped
Bed 12A	0	-	-	-	-	No EWM found
Bed 13	0.15	<1-3; 3	4-11; 9	Yes	Minor	Prop-clipped
Bed 13A	0.04	<1-3; 1	4-11; 9	Yes	Minor	Continuous low density
Bed 14	0.09	1-3; 3	7-10; 9	Yes	Minor	Narrow dense bed
HDA15	0	-	-	-	-	No EWM found
HDA 16	0	-	-	-	-	No EWM found
Bed 17	0.03	<1-2; 1	7-9; 8	Yes	Minor	Low density micro bed
Bed 18	0.01	<1-3; 3	7-9; 8	Yes	Minor	Mod. density micro bed
Bed 19	1.04	<1-3; 3	4-11; 9	Yes	Moderate	Source for fragments
Bed 19A	<0.01	<1-2; 1	3-5; 4	Yes	Minor	Microbed at landing
<b>Total</b>	<b>3.18</b>					

**Table 2: Fall Eurasian Water-milfoil Bed Mapping Summary  
Sand Lake, Barron County 2011-2015, 2020**

<b>HDA/ Bed Number</b>	<b>2020 Fall Bed Acreage</b>	<b>2015 Fall Bed Acreage</b>	<b>2014 Fall Bed Acreage</b>	<b>2013 Fall Bed Acreage</b>	<b>2012 Fall Bed Acreage</b>	<b>2011 Fall Bed Acreage</b>	<b>2020 Acreage Change</b>
1	0	0	0	0	0	0.48	0
2	0	0.08	<0.01	0.05	0	0.17	-0.08
2A and AA	0.03	0	<0.01	<0.01	0	0	0.03
2B	0.08	0	0	0	0	0	0.08
2C	0.12	0	0	0	0	0	0.12
3	0	0	0	0	0	1.27	0
4	0.64	0.20	1.01	0	0	0.66	0.44
4A, 4AA, and 4B	0.07	0.04	0	0	0	0	0.03
5	0.04	0.19	0	<0.01	0	1.61	-0.15
5C and 5CC	0	0.06	<0.01	0	0	0	-0.06
5D and 5DD	0.06	0.03	0.07	0.04	0	0	0.03
6	0.03	0.03	0	0	0	0.03	0
7, 7A, 7B, and 8	0.17	0.31	0	0	0	0.44	-0.14
8A, 8AA, and 8B	0.05	0.13	<0.01	0.01	0	0	-0.08
8C	0.05	0.04	0	0	0	0	0.01
8D and 8E	0.03	0	0	0	0	0	0.03
8F	0.06	0	0	0	0	0	0.06
9	0.23	0.11	0	0	0	1.49	0.12
9A	0.02	0	0	0	0	0	0.02
10	0	0	0	0	0	0.02	0
11	0.05	0	0	0	0	0.06	0.05
12	0.06	0.03	0.05	0.04	0	0.02	0.03
12B	0	0.03	0	0	0	0	-0.03
13	0.15	0.08	0.33	<0.01	0	0.10	0.07
13A	0.04	0	0	0	0	0	0.04
14	0.09	0	0	0	0	0.08	0.09
15	0	0	0	0	0	0.16	0
16	0	0.11	0.23	0	0	2.12	-0.11
17	0.03	0	0	0	0	0.09	0.03
18	0.01	0	0.02	0	0	0.56	0.01
19 and 19A	1.05	0.32	0	0.03	0	5.29	0.73
<b>Total Acres</b>	<b>3.18</b>	<b>1.75</b>	<b>1.75</b>	<b>0.22</b>	<b>0.00</b>	<b>15.25</b>	<b>+1.43</b>



## **Descriptions of Current and Former EWM Beds/High Density Areas:**

HDA 1 and Lake Outlet – We didn't find any EWM in the lake outlet channel.

Beds 2 and 2A – We also saw no EWM in the area formerly occupied by Bed 2. However, nearby Bed 2A was a small dense bed with a few satellite clusters.

Bed 2B – This bed located just north of the shallow sandy point was small in area, but we noticed it had numerous prop trails running through it. There were also large numbers of floating fragments in the area.

Bed 2C – Gaps in this bed were likely from residents accessing their docks. Due to its narrowness, it likely wasn't more than a minor impairment.

HDA 3 – We saw no evidence of EWM in Silo bay or along the immediate shoreline just northwest of the bay.

Beds 4, 4A, and 4B – Treatment in this area appeared to have been largely ineffective as many areas of the “reef” again supported dense stands of EWM. Most plants were on the outer edges of the drop-off in 7-10ft of water, although there were also a few towers mixed in with the NWM in shallower areas. On the outer edge, most of these plants were just visible from the surface.

Bed 5 – Treatment appeared to have been more successful in Bed 5 as the only EWM we saw occurred on the southeast edge of the treatment area.

Bed 5C – We didn't see any EWM in this former microbed.

Beds 5D and 5DD – The beds along this highly developed shoreline were somewhat variable in density – potentially due to in/out boat traffic. Despite this, we noted there were more or less continuous plants in 8-10ft of water.

Beds 6, 7, 7A, 7B, and 8 – The beds in the east-central bays were dense and canopied. Although many were prop-clipped, there were sizable gaps between them allowing residents to access open water with likely only minor impairment.

Beds 8A, 8AA, and 8C – These small dense microbeds were mixed into larger patches of NWM. Collectively, they were causing some impairment, but the narrowness of the beds likely minimized their impact.

Bed 8B – We found no EWM in this former bed between 8A and 8C on the west-central shoreline.

Beds 8D and 8E – These two microbeds were mixed in with dense areas of NWM along the eastern shoreline on the outer edge of the rooted littoral zone.

Bed 8F – Although solid at its core, this newly established bed was somewhat patchy as it had NWM interspersed within it.

Bed 9– The treatment in this area knocked EWM back, but not out. Plants were 5-6ft tall in 10-12ft of water.

Bed 9A – Mixed with NWM, this microbed was likely too small to cause impairment.

HDA 10 – We saw no evidence of EWM in this former High Density Area.

Bed 11 – Following treatment, this area still had continues canopied and near canopied plants and clusters. We also found many were prop-clipped.

Bed 12 – This small bed was located right off of a resident’s dock. It was heavily prop-clipped, and there were satellite plants spreading up and down the shoreline.

Bed 12B – We didn’t find any EWM in this former bed.

Bed 13 – This dense bed was canopied in up to 9ft of water, and, although it occurred along a largely uninhabited shoreline, was prop-clipped in several areas.

Bed 13A – This low density bed occurred along a largely undeveloped shoreline.

Bed 14 – This dense shoreline bed occurred right at the end of a dock. The owners were both aware of it and concerned about it.

HDAs 15 and 16 – We saw no evidence of EWM in these former High Density Areas.

Beds 17 and 18 – These small beds were imbedded in a larger NWM bed at the outer littoral edge on the north end of the boat landing bay. Despite being at least moderately dense, their small size meant they were likely only a minor impairment.

Bed 19 – A wall of canopied and near canopied EWM plants dominated the bathy ring from 8-12ft of water in the area directly out from the boat landing. The bed extended in a nearly continuous ribbon to the southwest/west around the southern bay before disappearing near the rocky point. Due to frequent prop-clipping, we noted there were cut pieces of milfoil all through the area making this bed a likely source population for continued spread.

Bed 19A – This microbed was little more than a few clusters just northwest of the landing.

## LITERATURE CITED

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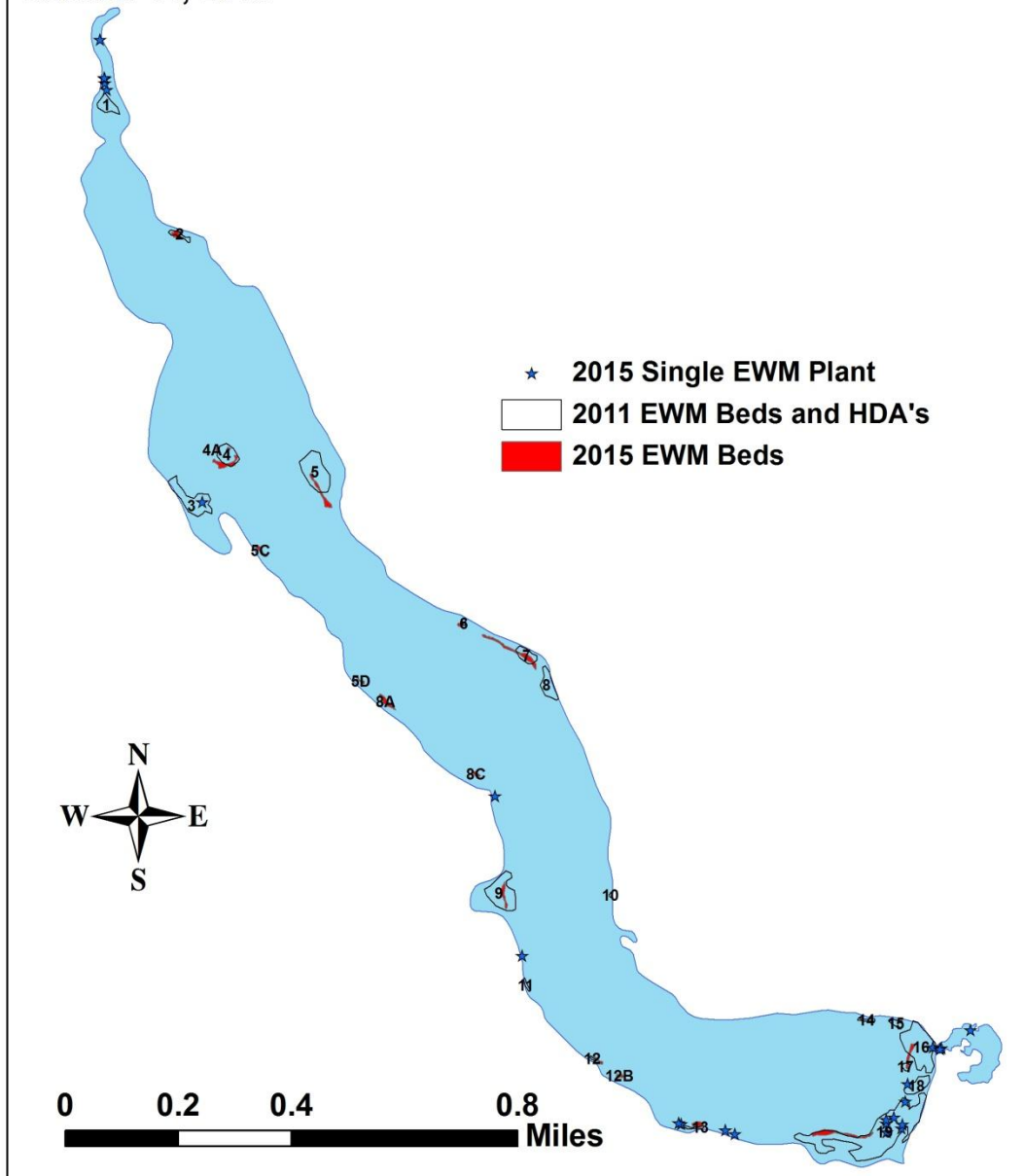
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**Appendix I: Fall 2015 and 2020 EWM Survey Maps**

# Eurasian water milfoil (*Myriophyllum spicatum*)

Fall EWM Bed Mapping Survey  
Sand Lake  
Barron County, WI  
October 11, 2015



# Eurasian water milfoil (*Myriophyllum spicatum*)

Fall EWM Bed Mapping Survey  
Sand Lake  
Barron County, WI  
October 3, 2020

