Eurasian Water-milfoil (*Myriophyllum spicatum*) Late Summer Bed Mapping Survey Minong Flowage - (WBIC: 2692900) Washburn and Douglas Counties, Wisconsin



Dense mat of EWM in channel southeast of Pogo's 9/24/22

September 2022 EWM Beds

# **Project Initiated by:**

Minong Flowage Association, Lake Education and Planning Services, LLC and the Wisconsin Department of Natural Resources





Wall of Northern wild rice east of Smith's Bridge 9/24/22

# Survey Conducted by and Report Prepared by:

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# **INTRODUCTION:**

The Minong Flowage (WBIC 2692900) is a 1,564-acre eutrophic/mesotrophic drainage lake located in north-central Washburn County and south-central Douglas County, Wisconsin in the Towns of Minong and Wascott (T42N R13W) (Figure 1). It reaches a maximum depth of 21.5ft near the dam on the far south end and has an average depth of approximately 9ft. The bottom is predominately sand and sandy muck in the south basin and organic muck in the northern bays. Secchi disc readings from 1994-2021 (the most recent year available) have ranged from 2-6ft and averaged 3.9ft (WDNR 2022). This poor to very poor clarity produced a littoral zone that extended to a maximum of 11ft in 2022.



Figure 1: 2022 September EWM Beds

# **BACKGROUND AND STUDY RATIONALE:**

Eurasian water-milfoil (*Myriophyllum spicatum*) (EWM) was first identified in the Minong Flowage in 2002. From 2009-2011, the Minong Flowage Association (MFA), under the direction of Dave Blumer (Lake Education and Planning Services, LLC - LEAPS), actively managed the infestation using herbicide treatments and manual removal as outlined in the flowage's Wisconsin Department of Natural Resources (WDNR) approved Aquatic Plant Management Plan (APMP). Chemical treatments were suspended in 2012, but the 5ft drawdown to repair the dam in spring 2013 and extended period of freezing over the winter appeared to have killed all surviving terrestrial EWM beds. The subsequent refill in spring 2014 also eliminated most surviving aquatic individuals as the flowage's stained water prevented sufficient light penetration to allow these plants to survive.

Following this initial drawdown, EWM quickly began recolonizing shallow habitats that were now largely devoid of any native plants/competition. During our fall 2014 EWM bed mapping survey, we found just ten beds totaling 14.02 acres; but, by fall 2015, this had grown to 11 beds covering 90.36 acres. In 2016, the MFA used herbicides to treat a single EWM bed that covered 26.90 acres in the WDNR boat landing bay on the

flowage's east side. Although this area remained clear throughout the rest of the growing season, our 2016 fall mapping survey found 24 EWM beds covering 125.58 acres scattered throughout the rest of the flowage. This total jumped to 27 beds but shank to 112.88 acres in 2017 before ballooning to 31 beds covering 141.88 acres in 2018 (9.07% of the flowage's surface area). Inexplicably, the August 2019 survey documented a sharp decline in both the number and coverage of beds (25 beds/85.27 acres/5.45% of the surface area). We also noted the EWM appeared to be in very poor health with many plants presenting blackened stems and only a whorl or two of green leaflets (see cover of 2019 report). As in 2018 and 2019, because most of these beds occurred in the northeast bays, it was ultimately decided **NOT** to do any active management on the flowage in 2020. However, in order to track EWM's coverage and to determine if levels would justify a future drawdown or other management, LEAPS, the MFA, and the WDNR requested a EWM bed mapping survey on August 30, 2020. This survey found 28 beds again covering 112.13 acres (7.17% of the surface area). More worrying, plants were beginning to appear at depths greater than 5ft in areas where EWM hadn't been present in numbers since active management was initiated in 2009. Because of this, it was decided that another drawdown to freeze out EWM would occur over the winter of 2021-2022. In fall 2021, immediately prior to the drawdown, we mapped 34 beds that covered 205.85 acres (13.16% of the surface area). To evaluate the effectiveness of the drawdown, we were asked to complete a bed mapping survey at the end of the 2022 growing season. This report is the summary analysis of that survey conducted on September 24, 2022.

#### **METHODS:**

During the bed mapping survey, we searched the flowage's visible littoral zone. By definition, a "bed" was determined to be any area where we visually estimated that Eurasian water-milfoil 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. Once located, we motored around the perimeter of the area 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 maximum 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

# **RESULTS AND DISCUSSION:** September Eurasian Water-milfoil Bed Mapping Survey:

During the September 2022 survey, it was immediately apparent to us that the second drawdown did not provide the hoped for reset of the Eurasian water-milfoil population as the first drawdown had. Ultimately, we mapped 19 beds totaling 116.13 acres or 7.43% of the flowage's surface area (Figure 3) (Appendix I). Although this was a decline of 89.72 acres (-43.59%) from the 34 EWM beds covering 205.85 acres (13.16% surface area) we found immediately prior to the drawdown, there were still large upstream areas covered by EWM beds (Table 1). The 2022 total was also higher than the 28 beds on 112.13 acres (7.17% coverage) we mapped in 2020 (Table 2).

Most of the decline in coverage seen post-drawdown came from the southern basin where plants were seldom found in water deeper than 5ft in 2021. In the northern bays, EWM seemed to have continued its deepwater expansion almost uninterrupted. Unfortunately, we also noted floating fragments were abundant throughout the entire flowage as upstream boat traffic was regularly prop-clipping beds. Although most of these beds were still only causing minor impairment to watercraft, most were trending towards moderate impairment (Table 1). Specifically, we noted residents in these northern bays that have had minimal EWM for more than a decade were often forced to cut through canopied or near canopied beds to access open water.



Figure 3: Late Summer/Fall EWM Beds 2021 and 2022

Table 1:	Late Summer	<b>Eurasian Wat</b>	er-milfoil Be	d Mapping S	Summary			
Minong Flowage, Washburn and Douglas Counties								
September 19, 2021 and September 24, 2022								
2021	2021 22 4	Est Dalas Danas/	Denth Densel	NT* 4*				

Red Number	2022	2021	2021-22 Acreage	Est. Rake Range/	Depth Range/	Navigation	2022 Field Notes	
Deu Tumber	Area (acres)	Area	Change	Mean Rake Full.	Mean Depth	Impairment		
1	0.36	1.91	-1.55	<1-3; 2	4-9; 7	Minor	Too narrow to be moderate impairment.	
1AAA	0.04	0	0.04	<<<1-1;1	4-8; 6	None	Too narrow to be impair; cont. clusters of plants.	
1AA	0.15	0.40	-0.25	<<<1-3; 2	4-8; 6	Minor	Too narrow to be moderate impairment.	
1A	0.61	1.00	-0.39	<<<1-3; 2	4-8; 6	Minor	Too narrow to be moderate impairment.	
1B	0	0.61	-0.61	<<<1	4-8; 6	None	Only a few plants seen.	
2	0	1.75	-1.75	<<<1	4-8; 6	None	Only a few plants seen.	
3 (A/AA/B)	0	11.59	-11.59	<<<1	4-8; 6	None	Only a few plants seen.	
4 and 4A	3.79	3.33	0.46	<<<1-3; 2	5-9;7	Minor	Too narrow to be moderate impairment.	
4B and 4C	0.50	0	0.5	<<<1-2; 1	5-9; 8	Minor	Narrow shoreline ribbon.	
5	0	0.78	-0.78	0	-	None	No EWM seen.	
5A, B, C, D	0	0.83	-0.83	0	-	None	No EWM seen.	
6 and 6A	0.18	8.58	-8.40	<<<1-2; 1	6-8; 7	Minor	Microbed in middle of navigation channel.	
7 and 7AA	0	4.43	-4.43	<<<1	3-6; 4	None	Only a few plants seen.	
7A	0	4.48	-4.48	<<<1	2-7;5	None	Only a few plants seen.	
7B	0.04	3.37	-3.33	1-2; 1	4-6; 5	Minor	Microbed – plants prop-clipped.	
8	0.17	2.42	-2.25	1-2; 1	4-8; 6	Minor	Surviving area of former bed on deepwater edge.	
9, 10, and 11	0	0	0	0	-	None	No EWM seen.	
11A and 11B	0	0.36	-0.36	0	-	None	No EWM seen.	
11C	0.09	0	0.09	<<<1-2; 1	5-10; 7	None	Narrow shoreline ribbon.	
12	0	0	0	0	-	None	No EWM seen.	
13	6.29	5.25	1.04	<<<1-3; 2	4-11; 8	Moderate	Entire bay merging into a canopied mat.	
13A	0	0.61	-0.61	<<<1	4-6; 6	None	A few scattered plants along the channel.	
14	1.37	1.22	0.15	<<<1-2; 1	4-11; 7	Minor	Narrow shoreline ribbon.	
15	1.50	0.75	0.75	<<<1-3; 2	4-11; 7	Minor	Prop-clipped EWM filled channel by Pogo's.	
15A	0.41	0.93	-0.52	<<<1-1;1	5-10; 6	Minor	Narrow shoreline ribbon.	
15B and 15C	3.87	3.01	0.86	<<<1-3; 2	5-10; 8	Moderate	Merging into solid bed.	
16 and 16A/B	68.59	90.74	-22.15	<<<1-3; 2	4-10; 8	Moderate	Merging into solid mat in many areas.	
17	0	27.87	-27.87	<<<1	2-5;4	Minor	Only a few plants seen.	
18 and 18A/B	28.16	19.20	8.96	<<<1-3; 1	5-10; 8	Minor	Highly var. – Patches of dense EWM throughout.	
19	0	5.23	-5.23	<<<1	2-5; 3	None	Only a few plants seen.	
20, 21, and 22	0	5.16	-5.16	<<<1	2-5; 3	None	Only a few plants seen.	
Total	116.13	205.85	-89.72					

# Table 2: Late Summer/Fall Eurasian Water-milfoil Bed Mapping Summary<br/>Minong Flowage, Washburn and Douglas Counties<br/>2016-2022

Ded	2022	2021	2020	2019	2018	2017	2016	2022
Bea Normhan	Area in	Change in						
Number	Acres	Acreage						
1	0.36	1.91	1.69	1.71	1.72	1.62	1.40	-1.55
1AAA	0.04	0	0	0.07	0	0	0	0.04
1AA	0.15	0.40	0.28	0.31	0.32	0.23	0.33	-0.25
1A	0.61	1.00	0.79	0.50	0.56	0.22	0.81	-0.39
1B	0	0.61	0.43	0.47	0.68	0.47	0.48	-0.61
2	0	1.75	0.90	0.63	1.77	1.66	1.80	-1.75
3 (A/AA/B)	0	11.59	2.91	2.81	2.74	3.20	4.61	-11.59
4 and 4A	3.79	3.33	1.39	0.62	1.14	0.09	1.05	0.46
4B and 4C	0.50	0	0	0	0	0	0	0.5
5	0	0.78	0.05	0.30	0.42	0.15	0.30	-0.78
5A, B, C, D	0	0.83	0.14	0.29	0.66	0.27	1.49	-0.83
6 and 6A	0.18	8.58	5.79	6.84	11.50	1.06	0	-8.40
7 and 7AA	0	4.43	1.95	1.34	2.19	0	0	-4.43
7A	0	4.48	3.23	2.38	3.48	2.41	0.75	-4.48
7B	0.04	3.37	2.98	2.48	2.73	1.50	1.46	-3.33
8	0.17	2.42	2.31	2.13	2.10	1.55	0.76	-2.25
9, 10, and 11	0	0	0	0	0	0	0	0
11A and 11B	0	0.36	0	0	0	0	0	-0.36
11C	0.09	00	0	0	0	0	0	0.09
12	0	0	0	0	0	0	0	0
13	6.29	5.25	2.62	1.53	2.56	3.11	0.85	1.04
13A	0	0.61	0.45	0	0.31	0.45	0	-0.61
14	1.37	1.22	0.29	0	0.67	0.47	0.31	0.15
15	1.50	0.75	0	0	0	0	0	0.75
15A	0.41	0.93	0	0	0.22	0.18	0.10	-0.52
15B and 15C	3.87	3.01	0.86	0.56	1.49	0.88	0.09	0.86
16 and 16A/B	68.59	90.74	51.30	32.80	58.54	54.45	75.32	-22.15
17	0	27.87	25.08	21.99	29.05	26.05	24.27	-27.87
18 and 18A	28.16	19.20	5.36	4.68	10.73	8.00	7.61	8.96
19	0	5.23	0.20	0.12	3.21	3.51	1.80	-5.23
20, 21 and 22	0	5.16	1.12	0.70	3.10	1.37	0	-5.16
Total	116.13	205.85	112.13	85.27	141.88	112.88	125.58	-89.72

## **Descriptions of Current and Former Eurasian Water-milfoil Beds:**

Bed 1 – Eurasian water-milfoil on the outer edges of the east side of the sandbar near the dam survived the drawdown, and we noted plants were already recolonizing in water <5ft deep.

Bed 1AAA – More a cluster of clusters than a true bed, this group of plants was established in the finger bay northeast of Bed 1.

Beds 1A and 1AA – Similar to Bed 1, most EWM in this area was killed by the drawdown, but deepwater plants survived and were recolonizing the area.

Beds 1B and 2 – We didn't see any surviving EWM in these shallow bays.

Beds 3, 3A and 3B - After merging into a nearly continuous bed of moderate density in 2021, EWM in this area was almost completely eliminated by the drawdown. The few rooted plants we saw were in water over 5ft deep or appeared to be new sprouts that had only recently established.

Beds 4 and 4A – The EWM bed just north of the county park and campground appeared to have survived the drawdown and continued its expansion into deep water. Although we have never mapped the "pond" by the campground as it's not technically part of the flowage and we were instructed not to during our original surveys, we noted that EWM now rings this entire area as well in depths from 4-10ft.

Beds 4B and 4C – These two newly established beds were both narrow shoreline ribbons that were expanding into deep water.

Bed 5 – We saw no surviving plants on either of these sand bars.

Beds 5A-D – All EWM in these former low-density beds appeared to have been killed by the drawdown.

Beds 6, 6A, 7, and 7AA – All areas of the WDNR landing bay that were mapped in 2021 appeared to have been eliminated by the drawdown as we saw no evidence of surviving EWM in the shallow areas of the bay. However, just northwest of the 2021 border of Bed 6, we found a small deepwater bed that survived the drawdown and was now being propclipped by boats leaving the landing area.

Beds 7A, 7B, and 8 – The drawdown appeared to have eliminated all of Bed 7A and most of Beds 7B and 8. Unfortunately, on the outer edge of each, we found a small patch that was beginning to recolonize the shallow sand flats. Both of these microbeds also had numerous prop-clipped plants as boaters tended to motor right through them on their way in and out from the WDNR landing.

Beds 9, 10, 11, and 12– We found no evidence of EWM in these former beds.

Beds 11A and 11B – We saw no evidence of EWM between or around the exposed and sunken central sand islands where we documented pioneer patches in 2021.

Bed 11C – Similar to Beds 4B and 4C, this narrow ribbon of plants along the shore appeared to be recently established in deep water.

Bed 13 – The majority of the bay was a moderate impairment as the bed continued to expand into deeper and deeper water. We found plants were regularly canopied in more than 10ft and were growing right up to the river channel boundary (see report cover).

Bed 13A – Most EWM in this shallow area appeared to have been killed by the drawdown, and we only saw a few plants in the deeper areas right next to the river channel.

Bed 14 – This bed survived the drawdown on the deepwater edge. We noted it was expanding downstream and simultaneously recolonizing shallow areas.

Bed 15 – We found EWM had expanded through most of the side bay and channel immediately south of the CTH T Bridge by Pogo's. Plants were prop-clipped throughout, and we noted there were floating fragments everywhere.

Beds 15A, 15B, and 15C – In the "Thumb Bay" and the shorelines northwest and northeast of the bay, EWM survived the drawdown and was expanding in areas outside the immediate river channel into water over 6ft deep.

Bed 16 – The drawdown eliminated EMW in shallow areas on the north end of Serenity Bay, but plants survived in deep water areas throughout most of the southern half. Along the southern shoreline, residents were likely experiencing minor to moderate impairment, but clusters of plants in deeper water were merging into canopied beds. In the rest of the south end, we found plants in up to 11ft – something we haven't seen since the initial active management program began in 2009.

Beds 17 and 18 – North of the river channel on the north end of Serenity Bay and extending to the northwest, we found the drawdown eliminated almost all EWM in these shallow areas. Northern wild rice (*Zizania palustris*) was growing throughout the stump fields in Bed 17 at the highest densities we have seen in more than a decade.

Bed 18B – Moderately dense and canopied EWM continued to expand east of the island that forms the western boundary of Serenity Bay. Plants were still variable in density; especially when they were in water from 7-10ft., but they seemed to be rapidly radiating out from dense core beds and merging into surface mats.

Beds 19, 20, 21, and 22 - East of Smith's Bridge, Northern wild rice had taken over most of the delta. The only EWM seen was a few scattered plants located in the river channels. Outside of these areas, all milfoil plants seem to have been killed by the drawdown.

## LITERATURE CITED

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- WDNR. [online]. 2022. Minong Flowage Citizen Lake Water Quality Monitoring Database. Available from <u>http://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2692900&page=waterquality</u> (2022, September).

Appendix I: 2015-2022 Late Summer/Fall Eurasian Water-milfoil Bed Maps















