

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



EWM reestablishing among the rice in the Totagatic Inlet 8/30/20



August 2020 EWM Beds

Project Initiated by:

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



Japanese knotweed – a new exotic species found on the flowage 8/30/20

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August 30, 2020

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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 S13 SW NE). 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 1994-2019 (the most recent year available) have ranged from 2-6ft and averaged 4.1ft (WDNR 2020). This poor to very poor clarity produced a littoral zone that extended to a maximum of 7ft in 2020.



Figure 1: 2019 August 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 the 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 shrank 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 (Figure 1) documented a sharp decline in both the number and coverage of beds (25 beds/85.27

acres/5.45% of the flowage’s 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 report is the summary analysis of that survey.

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.

<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

RESULTS AND DISCUSSION:

August Eurasian Water-milfoil Bed Mapping Survey:

During the August 2020 survey, we located and mapped 28 Eurasian water-milfoil beds that covered 112.13 acres or 7.17% of the flowage's surface area (Figure 3) (Appendix I). This was an increase of 26.86 acres (+31.50%) from the 2019 survey when we mapped 25 beds totaling 85.27 acres (5.45% coverage) (Table 1). It was, however, still **-20.97%** below the 2018 fall survey when we mapped 31 beds totaling 141.88 acres (9.07% coverage) (Table 2).

Most of the increase in coverage seen in 2020 came from low density EWM filling in gaps and expanding along the edges of previously identified beds in the northeast bays. Despite these increases, many plants in these bays again seemed dormant or nearly so.

Conversely, in the bays south of the CTH T bridge and in the south basin, we documented a general uptick in plant health with most beds showing active canopied growth. This was accompanied by a noticeable increase in floating fragments which were common to abundant; especially near the county campground and in the beds in and around the WDNR boat landing bays. Regardless of the location, EWM plants continued to be absent at most depths over 4ft.

The majority of the flowage's EWM beds were likely causing at least minor and occasionally moderate impairment to watercraft (Table 1). Fortunately, most of the densest areas occurred among the stump fields in the northeast bays or along shorelines that have few residents. Perhaps the biggest concern we can think of with a continued policy of "no active management" is in the WDNR landing bay and the beds located near the entrance to this bay as there is a real danger that the flowage will continue to be a source populations for new infestations on nearby lakes if visiting boaters miss a milfoil fragment on their boats or trailer after running through these beds.

Japanese knotweed is an aggressive exotic species that can be difficult to control once established. We noted a small cluster of plants along the shoreline of a brown house along the north shoreline just east of the "T" when leaving the south basin at GPS DD coordinates N46.16724 W91.92250 (see picture on the front cover of this report). Ideally, these plants should be located and removed yet this fall before they can set seed and spread further.

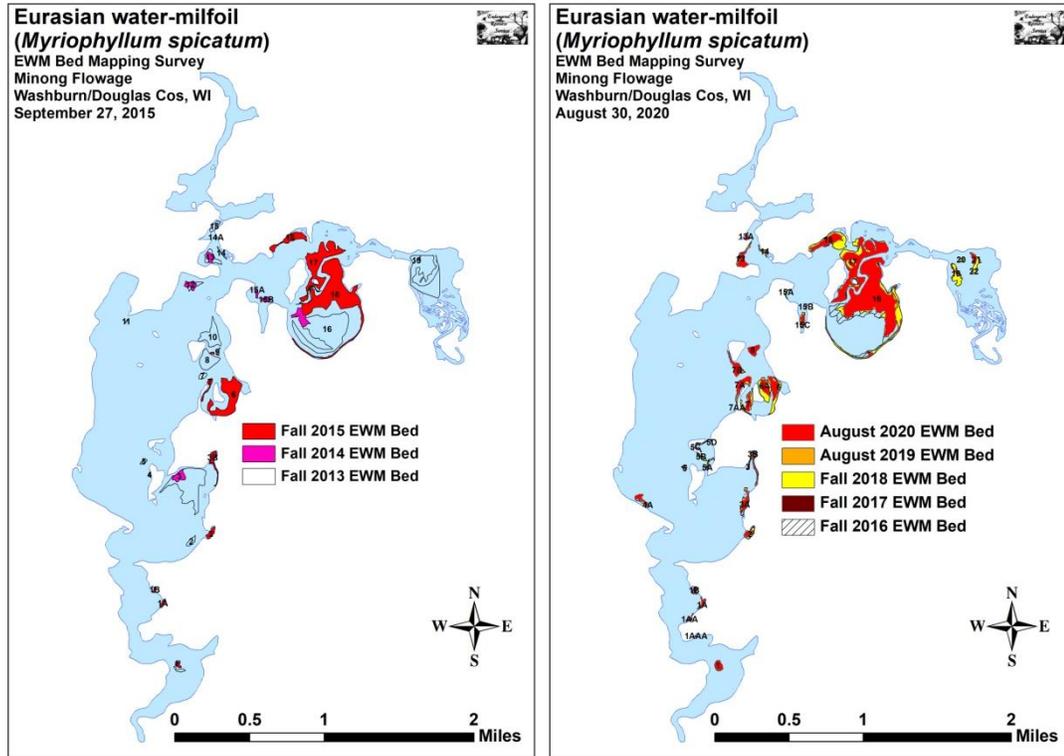


Figure 3: Late Summer/Fall EWM Beds 2013-2015 and 2016-2020

**Table 1: Late Summer Eurasian Water-milfoil Bed Mapping Summary
Minong Flowage, Washburn and Douglas Counties
August 14, 2019 and August 30, 2020**

Bed Number	2020 Area in acres	2019 Area in acres	Change in Acreage	Est. Rake Range/ Mean Rake Full.	Depth Range/ Mean Depth	Navigation Impairment	2020 Field Notes
1	1.69	1.71	-0.02	2-3; 2	2-5; 4	Moderate	Similar to last year, but plants seem sickly.
1AAA	0	0.07	-0.07	<<<1	2-4; 3	None	Only a few plants seen
1AA	0.28	0.31	-0.03	<1-2; 1	2-5; 4	Minor	Mixed with NWM
1A	0.79	0.50	0.29	<1-3; 1	2-5; 4	Minor	Mixed with NWM
1B	0.43	0.47	-0.04	1-3; 2	2-4; 3	Moderate	Mixed with Coontail and NWM
2	0.90	0.63	0.27	<<1-1; 1	2-3; 3	Minor	Mixed with Coontail; patchy
3 and 3B	1.16	0.97	0.19	<<1-2; 2	2-4; 3	Minor	Monotypic except in the bay – natives mixed in
3A and 3AA	1.75	1.84	-0.09	<<1-2; 1	2-4; 3	Minor	Nearly monotypic
4	0	0	0	0	-	None	No EWM found.
4A	1.39	0.62	0.77	<1-2; 2	3-5; 4	Moderate	Monotypic; many prop clipped
5	0.30	0.30	-0.25	<1-1; 1	3-4; 4	Minor	Monotypic
5A, B, C, D	0.14	0.29	-0.15	<<1-2; 1	2-3; 3	None	Regular low density towers; also NWQM
6 and 6A	5.79	6.84	-1.05	<<1-1; 1	2-4; 4	Minor	Regular plants along channel; many prop clipped
7 and 7AA	1.95	1.34	0.61	<<1-2; 1	2-5; 4	Minor	Increasing regular towers; mixed with pondweeds
7A	3.23	2.38	0.85	1-3; 2	2-5; 4	Minor	Monotypic; too close to shore to be a sig. issue
7B	2.98	2.48	0.50	<1-3; 3	2-5; 4	Moderate	Canopied mat; many prop trails
8	2.31	2.13	0.18	1-3; 3	3-5; 4	Moderate	Canopied mat; mixed with Coontail
9, 10, and 11	0	0	0	0	-	None	No EWM found.
12	0	0	0	0	-	None	No EWM found.
13	2.62	1.53	1.09	<<1-3; 2	2-6; 4	Moderate	Becoming a canopied mat at the core
13A	0.45	0	0.45	<<<1-2; <1	2-5; 4	None	More of a HDA; dominated by pondweeds
14	0.29	0	0.29	<1-2; 2	2-4; 3	Minor	EWM/HWM/NWM in one canopied bed
15	0	0	0	0	-	None	No EWM found.
15A	0	0	0	0	-	None	No EWM found
15B and 15C	0.86	0.56	0.30	<<<1-1; <1	3-5; 4	None	More of a HDA; dominated by Coontail
16 and 16A/B	51.30	32.80	18.50	<<<1-3; 1	2-5; 5	Moderate	Fragmented on south shoreline; native competition
17	25.08	21.99	3.09	<<<1-2; <1	2-5; 4	Minor	Stump field – now just an HDA among rice
18 and 18A	5.36	4.68	0.68	<<<1-3; 2	3-5; 4	Moderate	Fragmented in deeper water; mixed with natives
19	0.20	0.12	0.08	<<1-1; 1	2-3; 3	Minor	EWM scattered among rice/other natives
20, 21, and 22	1.12	0.70	0.42	<<1-3; 2	2-3; 3	Moderate	EWM reestablishing among rice beds
Total	112.13	85.27	+26.86				

**Table 2: Late Summer/Fall Eurasian Water-milfoil Bed Mapping Summary
Minong Flowage, Washburn and Douglas Counties
2014-2020**

Bed Number	2020 Area in Acres	2019 Area in Acres	2018 Area in Acres	2017 Area in Acres	2016 Area in Acres	2015 Area in Acres	2014 Area in Acres	2020 Change in Acreage
1	1.69	1.71	1.72	1.62	1.40	0.50	0.32	-0.02
1AAA	0	0.07	0	0	0	0	0	-0.07
1AA	0.28	0.31	0.32	0.23	0.33	0	0	-0.03
1A	0.79	0.50	0.56	0.22	0.81	0.58	0	0.29
1B	0.43	0.47	0.68	0.47	0.48	0.31	0	-0.04
2	0.90	0.63	1.77	1.66	1.80	1.40	0	0.27
3 and 3B	1.16	0.97	1.27	1.27	2.55	1.96	4.10	0.19
3A and 3AA	1.75	1.84	1.47	1.93	2.06	0	0	-0.09
4	0	0	0	0	0	0	0	0
4A	1.39	0.62	1.14	0.09	1.05	0	0	0.77
5	0.05	0.30	0.42	0.15	0.30	0	0	-0.25
5A, B, C, D	0.14	0.29	0.66	0.27	1.49	0	0	-0.15
6 and 6A	5.79	6.84	11.50	1.06	0	16.39	0	-1.05
7 and 7AA	1.95	1.34	2.19	0	0	1.23	0	0.61
7A	3.23	2.38	3.48	2.41	0.75	0	0	0.85
7B	2.98	2.48	2.73	1.50	1.46	0	0	0.50
8	2.31	2.13	2.10	1.55	0.76	0.18	0	0.18
9, 10, and 11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	1.90	0
13	2.62	1.53	2.56	3.11	0.85	0	1.57	1.09
13A	0.45	0	0.31	0.45	0	0	0	0.45
14	0.29	0	0.67	0.47	0.31	0	0.05	0.29
15	0	0	0	0	0	0	0	0
15A	0	0	0.22	0.18	0.10	0	0.57	0
15B and 15C	0.86	0.56	1.49	0.88	0.09	0	0.85	0.30
16 and 16A/B	51.30	32.80	58.54	54.45	75.32	43.08	4.58	18.50
17	25.08	21.99	29.05	26.05	24.27	19.43	0	3.09
18 and 18A	5.36	4.68	10.73	8.00	7.61	5.30	0	0.68
19	0.20	0.12	3.21	3.51	1.80	----	0.10	0.08
20	0	0	0.31	0.14	0	0	0	0
21 and 22	1.12	0.70	2.79	1.23	0	0	0	0.42
Total	112.13	85.27	141.88	112.88	125.58	90.36	14.02	+26.86

Descriptions of Current and Former Eurasian Water-milfoil Beds:

Bed 1 – Eurasian water-milfoil covered the entire sandbar near the dam. Although the area was essentially unchanged from 2019, plants did not appear to be as healthy as in the past.

Beds 1A and 1AA – EWM in these southern side bays was patchy and mixed with native species; especially Northern water-milfoil (*Myriophyllum sibiricum*).

Bed 1B – Although this bed was also mixed with NWM, it was dominated by EWM in 2020. Scattered patches of Coontail (*Ceratophyllum demersum*) were mixed in making the entire area a moderate impairment.

Bed 2 – We found EWM was scattered among moderately dense beds of Coontail. Plants were more widespread than in 2019, but the mean density declined.

Beds 3, 3A and 3B – Low to moderate density EWM occurred in much of the immediate shoreline area. In the northeast bay, EWM became patchy where it mixed with Spatterdock (*Nuphar variegata*) and White water lily (*Nymphaea odorata*).

Beds 4 and 4A – EWM was not present on either side of the southernmost island, but there continues to be a bed just north of the county park and campground. It was moderately dense and full of prop-trails as people accessed their campsites on the southern shoreline.

Bed 5 – This monotypic bed shrunk inward, and we didn't see any plants in 5ft of water.

Beds 5A-D – 5A, 5B, and 5D had only a handful of plants and looked like they potentially froze out. Bed 5C also retracted with only low density regular towers at the core of the area.

Beds 6, 6A, 7, and 7AA – EWM around the island in the WDNR landing bay was regular but patchy, and it was often mixed with native pondweeds – especially Large-leaf pondweed (*Potamogeton amplifolius*) and Ribbon-leaf pondweed (*Potamogeton epihydrus*). We also noted that many plants in the main navigation channel leading away from the dock toward the Swift Nature Camp were prop-clipped. South and west of the island, Bed 7 was more dense than in 2019, although it was also mixed with significant amounts of native pondweeds; especially Flat-stem pondweed (*Potamogeton zosteriformis*).

Beds 7A, 7B, and 8 – All three of these beds had numerous prop trails through them as boaters, who are potentially visiting the flowage and don't know the beds exist, tend to motor right through them on their way out from the WDNR landing.

Beds 9, 10, 11, 12, 15, 15A, and 15B – We found no EWM in these former beds.

Bed 13 – EWM was absent near shore in areas that had been solid in the past – presumably due to winterkill. However, the bay experienced a general thickening, and there were patches where the bed was becoming a canopied mat and at least a moderate impairment.

Bed 13A – EWM was again scattered in this bay southwest of Pogo’s making it more of a High Density Area than a true bed. The plant community was dominated by Coontail and native pondweeds.

Bed 14 – We again documented apparent Hybrid water-milfoil scattered among true EWM and true NWM in canopied beds stretching around the point. There were also significant amounts of Coontail and native pondweeds in the area.

Bed 15C – In the “Thumb Bay”, Coontail continued to be the dominant plant, and we found most EWM was located in a narrow central area. Even here, plants were barely continuous making it more of a High Density Area.

Bed 16 – EWM was absent from the majority of the south shoreline of Serenity Bay with the exception of Beds 16A and 16B although they were both only a minor impairment at worst. The main bed among the stumps continued to be patchy, but EWM was again present at very low density in most areas that had reverted to open water in 2019. Interestingly, beds of Short-stemmed bur-reed (*Sparganium emersum*) were abundant throughout the north end of Serenity Bay, and their floating tape-like leaves appeared to be outcompeting EWM in many areas.

Bed 17 – After having expanded to the west and northwest in 2018, this bed pulled back to 2016 levels in 2019 and 2020. The milfoil appeared to be struggling to compete with the rice which had increased in density so much that the area was no longer a true EWM bed.

Bed 18 – After having almost merged with Bed 17 in 2018, we had a hard time finding any EWM plants in water over 4ft deep during the 2019 and 2020 surveys. EWM also disappeared from most nearshore areas. Collectively, the area was a moderate impairment with canopied mats of EWM mixed in with canopied beds of native species; especially Coontail.

Bed 19 – EWM was reestablishing on the northeastern edge of this former bed with most individuals found outside the rice beds. EWM still occurred at low densities, but they looked much healthier than the sickly blackened plants we found here in 2019.

Bed 20 – We again saw no evidence of EWM in this former microbed.

Beds 21 and 22 – EWM was reestablishing among the rice in Bed 21. Although the area covered was still down, plants were denser and healthier than the scattered sickly individuals we documented on the 2019 report cover. We saw no evidence of EWM in the area formerly covered by Bed 22.

LITERATURE CITED

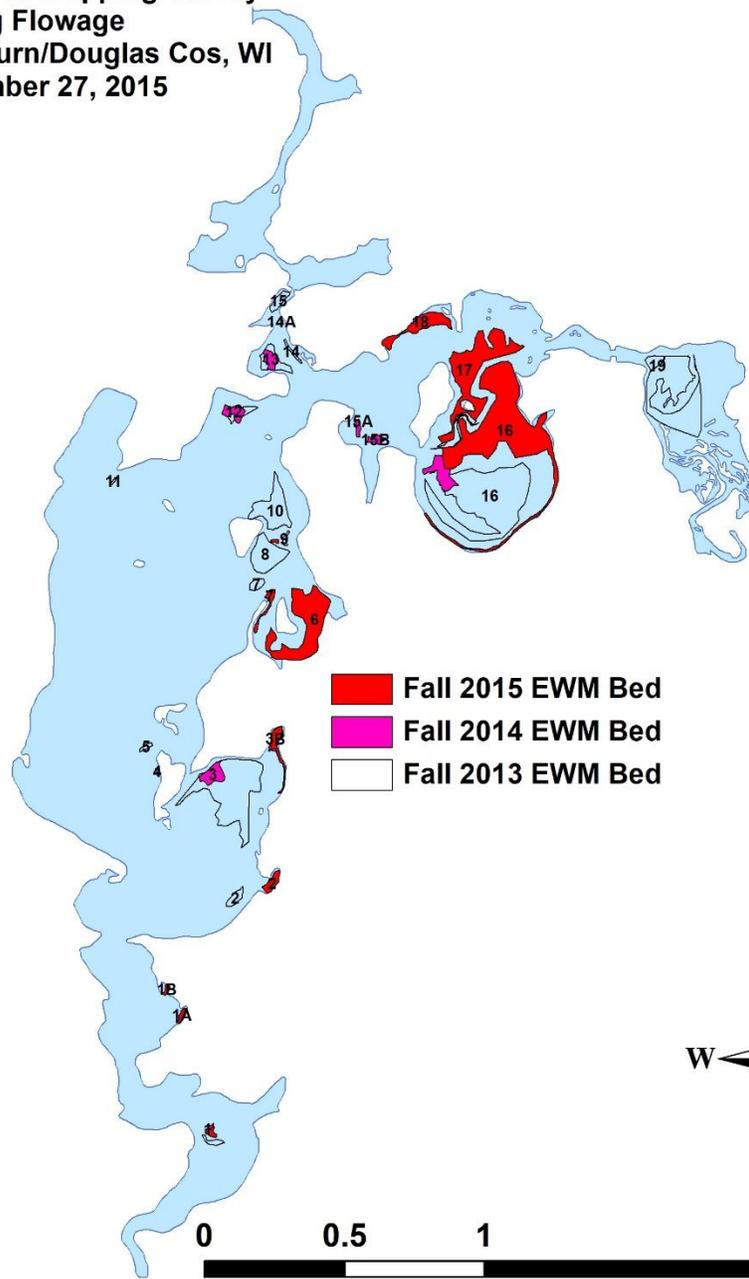
Pokorny, N., C. Busch, L. Sather, and C. Holt. [online]. 1966. Minong Flowage Map. Available from <http://dnr.wi.gov/lakes/maps/DNR/2692900a.pdf> (2020, September).

WDNR. [online]. 2020. Minong Flowage - Citizen Lake Water Quality Monitoring Database. Available from <http://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2692900&page=waterquality> (2020, September).

Appendix I: 2015-2020 Late Summer/Fall Eurasian Water-milfoil Bed Maps

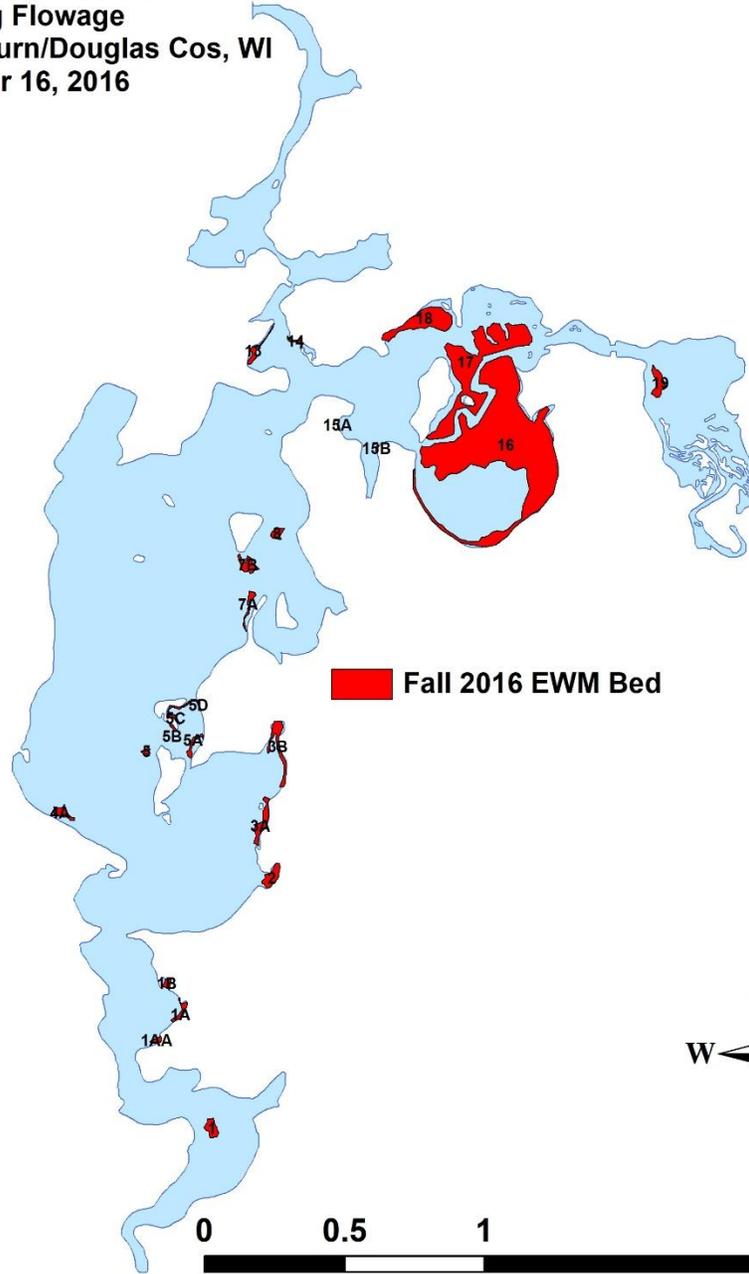
Eurasian water-milfoil (*Myriophyllum spicatum*)

EWM Bed Mapping Survey
Minong Flowage
Washburn/Douglas Cos, WI
September 27, 2015



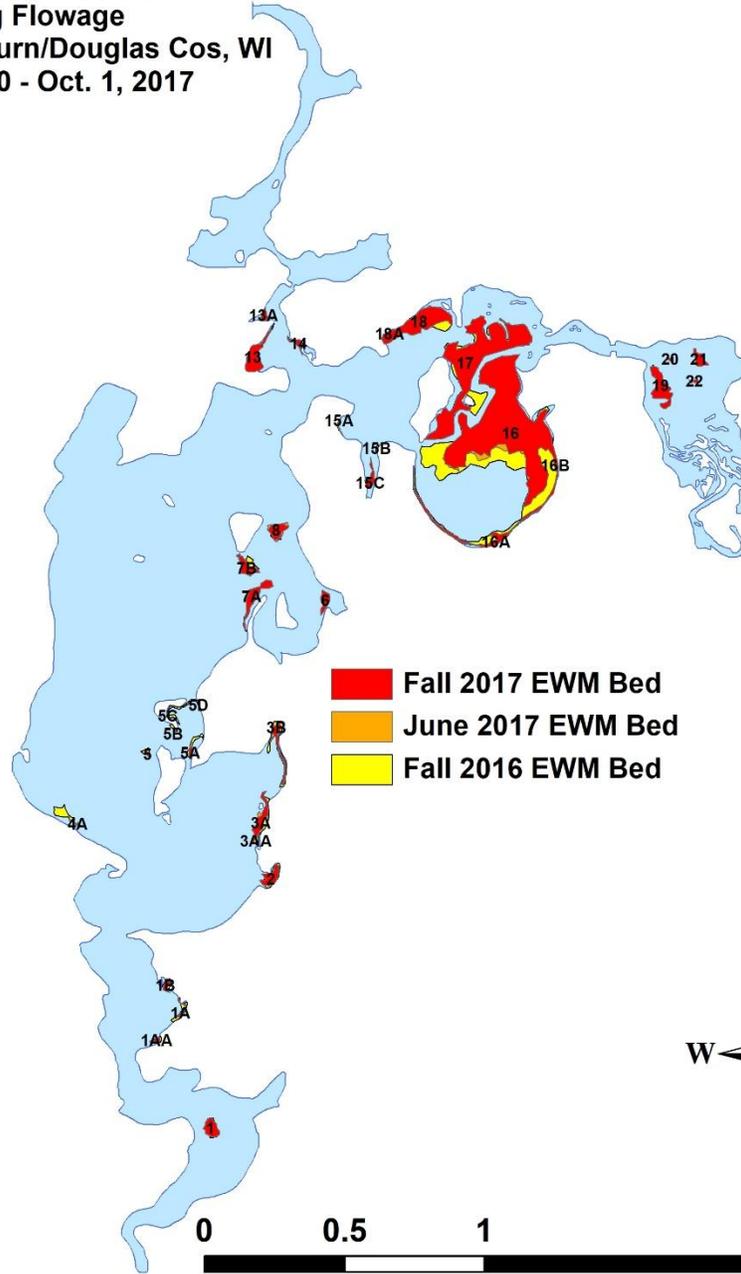
**Eurasian water-milfoil
(*Myriophyllum spicatum*)**

**EWM Bed Mapping Survey
Minong Flowage
Washburn/Douglas Cos, WI
October 16, 2016**



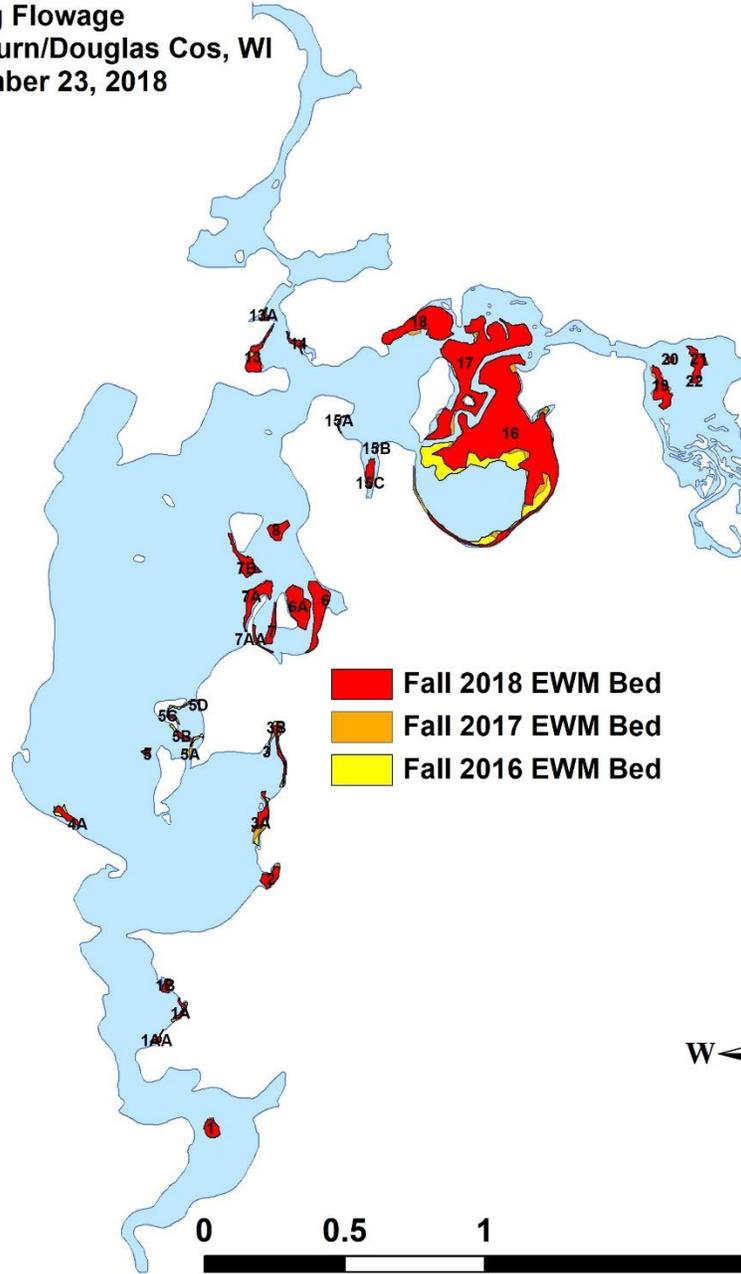
Eurasian water-milfoil (*Myriophyllum spicatum*)

EWM Bed Mapping Survey
Minong Flowage
Washburn/Douglas Cos, WI
Sept. 30 - Oct. 1, 2017

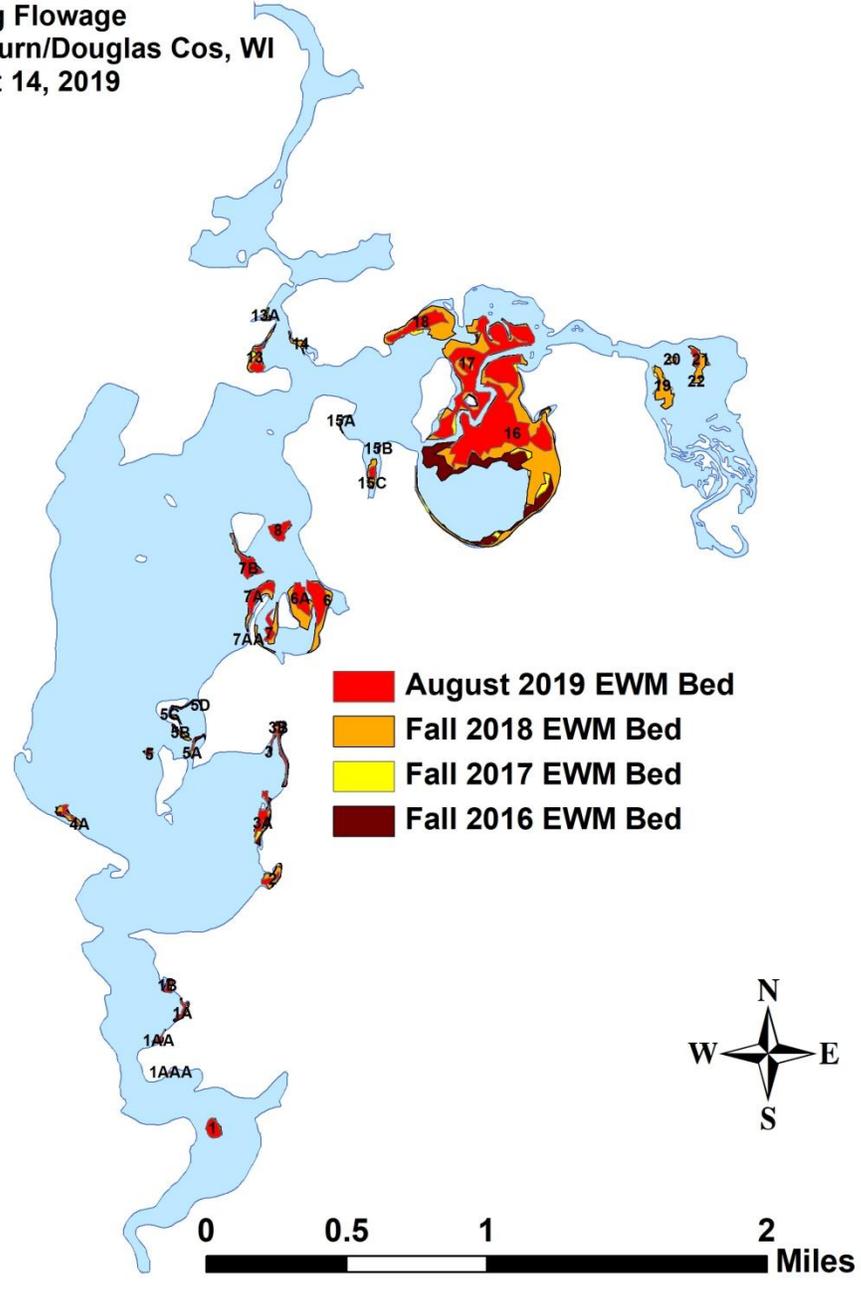


Eurasian water-milfoil (*Myriophyllum spicatum*)

EWM Bed Mapping Survey
Minong Flowage
Washburn/Douglas Cos, WI
September 23, 2018



Eurasian water-milfoil
(*Myriophyllum spicatum*)
EWM Bed Mapping Survey
Minong Flowage
Washburn/Douglas Cos, WI
August 14, 2019



Eurasian water-milfoil (*Myriophyllum spicatum*)

EWM Bed Mapping Survey
Minong Flowage
Washburn/Douglas Cos, WI
August 30, 2020

