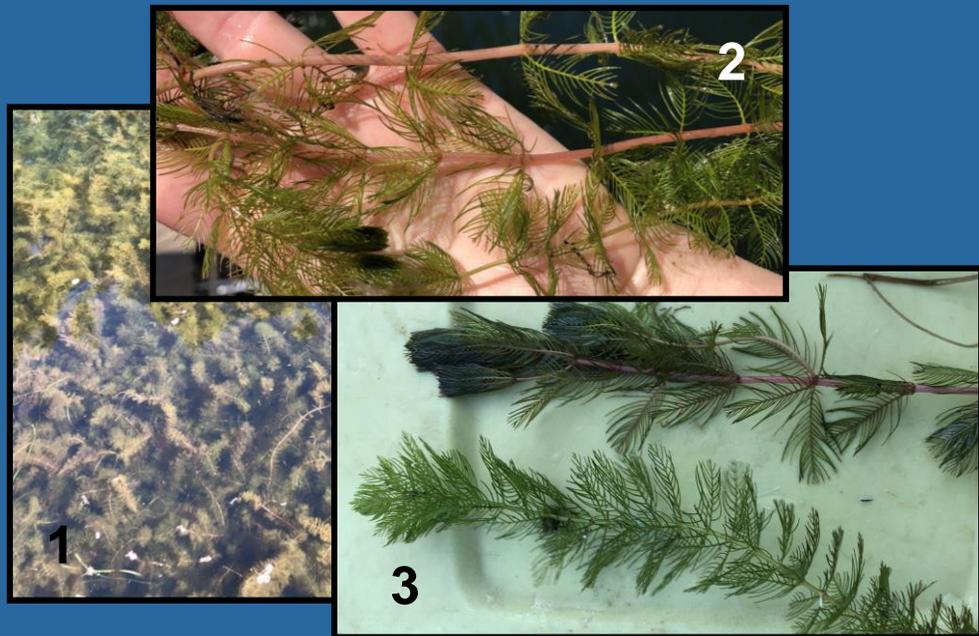


2021 Eurasian Watermilfoil Surveys

Round & Little Round Lakes, Sawyer County, WI

- Surveys Completed September 3-5th, 2021 –
- Report Completed December 2021 -



Project initiated & funded in part by:
Round Lakes Property Owners Association

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Surveys & report completed by:
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Survey assistance from AEM Aquatic Consulting

Photos from Cover Page: 1) A dense bed of canopied Eurasian watermilfoil found in Edgewater Bay (bed ED-A21, 0.3 acres) 2) Eurasian watermilfoil sample collected from Edgewater Bay. 3) Eurasian watermilfoil (top) and northern water milfoil (bottom, native) collected from Blue Island Bay.

ABSTRACT

Round and Little Round Lakes, Sawyer County, Wisconsin were surveyed at targeted Eurasian watermilfoil (*Myriophyllum spicatum*, EWM) locations. The surveys occurred September 3-5th, 2021. Overall, the surveys were intended to assess the efficacy of herbicide control in 2019, 2020, and 2021 at several locations and map existing or new EWM beds/polygons for future management. Methods of the survey followed WDNR guidelines including delineation of EWM beds while boating around the perimeter. Survey points at 20-meter grid resolution within those EWM beds were sampled using a double-sided rake on a telescopic pole and all species were recorded along with water depth and substrate. Samples of EWM were collected from 15 locations for genetic analysis to detect hybrid milfoil. Results of the genetic analysis are expected in early 2022.

A total of 74 beds of EWM were delineated in Round & Little Round Lakes in 2021 ranging in size from 0.71 acres down to 0.02 acres. Estimates of EWM in Round Lake were 11.5 acres in 2021, 4.7 acres in 2020, and 15.0 acres in 2019. Estimates of EWM in Little Round Lake were 1.9 acres in 2021, 0.3 acres in 2020, and 1.9 acres in 2019. Herbicide treatments occurred in Round Lake at 3.5 acres in 2021, 10.3 acres in 2020, and 21.9 acres in 2019. Herbicide treatment occurred in Little Round Lake at 3.2 acres in 2020 and 4 acres in 2019.

All 11 EWM beds treated in 2021 were treated with ProcellaCOR. Eight of the EWM beds were successfully controlled while 3 treatments were unsuccessful (i.e., EWM beds were mapped in Sept. 2021 in the same locations where treatment occurred in June 2021). Volunteers collected water samples at two treatment areas to monitor herbicide concentration for 24 hours after treatment. EWM was successfully controlled in these two areas even though one area had significantly lower herbicide concentrations.

Diver assisted suction harvesting (DASH) was done for two days in July 2021 at two locations in Little Round Lake totaling 0.06 acres. EWM control at these locations was successful in 2021.

Using the EWM Control Guidance Criteria from the 2020 Aquatic Plant Management Plan for Round Lakes, EWM control at 32 beds of EWM is under consideration for 2022.

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INTRODUCTION

The Round Lake Property Owners Association (RLPOA) was awarded an Aquatic Invasive Species Grant from the Wisconsin Department of Natural Resources (WDNR) in March 2021 (Grant # ACEI25321). This report is intended to fulfill the following grant-related requirements:

- Pre/post-treatment surveys of Eurasian watermilfoil in Round and Little Round Lakes on September 3-5th, 2021 to gauge efficacy of herbicide treatments 2019-2021. The surveys also monitor effectiveness of diver assisted suction harvesting (DASH) used to control certain areas of EWM in Little Round Lake in 2021.
- Collection of 15 EWM samples for genetic analysis by Montana State University. Results of the genetic analysis are expected in the first quarter of 2022.
- Herbicide monitoring results from 2 locations treated with ProcellaCOR. Water samples were collected by volunteers.

Study Site

Round Lake is a seepage lake located in Sawyer County, Wisconsin with a surface area of 3,324 acres. The maximum depth is 74 feet and the mean depth is 33 feet. Connected by a narrow channel to the south is Little Round Lake, also considered a seepage lake with a surface area of 179 acres, maximum depth of 38 feet and mean depth of 12 feet. Although the lakes have their own unique Water Body Identification Code (WBIC, Round 2395600, Little Round 2395500), they are sometimes referred to as the Round Chain and the Round Lake Property Owners Association serves both lakes. The lakes are situated approximately 7 miles east of Hayward, Wisconsin (Figure 1). Water clarity for Little Round Lake is clear. Little Round Lake is considered mesotrophic and has abundant vegetation. Water clarity for Round Lake is very high and the lake is considered oligotrophic with low nutrients and sparse vegetation.

Figure 1 – Round & Little Round Lakes EWM Map



METHODS

Field Methods

Field methods followed the Draft Aquatic Plant Treatment Evaluation Protocol document from Wisconsin Department of Natural Resources¹. Survey locations and strategy were done in consultation with the WI DNR and RLPOA. Dense stands of EWM were targeted and boundaries were visually determined from a boat and mapped while navigating along the bed perimeter. Each EWM bed was named with the first two letters of the location and assigned a letter identifier followed by the year (e.g., ED-A21 located in Edgewater Bay). Locations of sparse EWM (i.e., no more abundant than native species and spread out) were captured but not included in polygons or acreage estimates because the EWM was not dense enough to be mapped as a bed. Within the EWM beds a sampling grid of 20-meter-spaced points was created and then points were sampled. A double-sided rake head on a telescopic pole was used to sample each point for EWM & aquatic plant rake fullness, depth, and dominant sediment type (muck, rock, or sand). The rake fullness rating for total coverage of plants on the rake and a separate rake fullness rating for each species present were recorded (Figure 2). Any survey points that were inaccessible were recorded as such and no sample was taken. Aquatic plants found within 6 feet of the sample point but not found on the rake were counted as visual observations. Plant identification was verified using Skawinski (2018)².

Figure 2 – Rake Fullness Illustration

Rating	Coverage	Description
1		Few plants
2		Plants cover length of the rake but not tines
3		Rake completely covered, tines not visible

EWM samples were also collected from 15 locations spread throughout Round & Little Round Lakes. Methods for sample collection, preservation, and shipment followed those provided by Montana State University.³ The samples were then mailed to Dr. Ryan Thum's lab at MSU.

Chi-Squared Tests

A chi-squared test of Richardson's Bay & Hinton Bay was completed to assess the efficacy of herbicide treatment. Chi-squared tests help determine whether there is a significant difference between two years by comparing the number of sites a particular plant species was found those two years. The alpha, or Type I, error rate was set at 0.05, meaning there is a 5% chance of claiming there is a significant change when no real change has occurred.

Map Development

Aquatic plant survey data were uploaded to an open source geographic information systems (GIS) program known as QGIS⁴ for map creation.

¹ Updated October 1, 2016. <https://dnr.wi.gov/lakes/plants/research/>.

² Skawinski, P.M. 2018. Aquatic Plants of the Upper Midwest: A photographic field guide to our underwater forests. Third Edition.

³ https://www.montana.edu/thumlab/Genetic-Identifications/Watermilfoil_Drying.html

⁴ QGIS Development Team, 2020. QGIS Geographic Information System. Open Source Geospatial Foundation Project. <http://qgis.osgeo.org>.

RESULTS

Table 1 - Round Lakes EWM Acreage & Management Summary 2018-2021

ROUND EWM ACRES				
	2018	2019	2020	2021
Hinton Bay	1.468	9.51	0.02	0.36
Southwest Round	0.781	1.36	1.49	1.82
Musky Bay	3.094	1.81	0.22	1.63
Blue Island & NE	0.101	2.30	2.11	2.53
Northwest	2	0.02	0.33	2.00
Richardsons	19.006	0.00	0.50	3.11
TOTALS	26.45	15.00	4.65	11.46

LITTLE ROUND EWM ACRES			
2018	2019	2020	2021
5.512	1.9	0.343	1.913

ROUND HERBICIDE ACRES				
	2018	2019	2020	2021
Hinton Bay	0	2.5	5.27	0
Southwest Round	0	0	1	1.1
Musky Bay	1.5	1	2.5	0
Blue Island & NE	0	0	1	0.93
Northwest	3.45	0	0.5	0
Richardsons	6	18.35	0	0.69
TOTALS	10.95	21.85	10.27	2.72

LITTLE ROUND HERBICIDE ACRES			
2018	2019	2020	2021
0	4	3.22	0

ROUND DASH ACRES				
	2018	2019	2020	2021
Hinton Bay	1.417	0	0	0
Southwest Round	0.781	0	0	0
Musky Bay	3.094	0	0	0
Blue Island & NE	0.101	0	0	0
Northwest	0	0	0	0
Richardsons	0	0	0	0
TOTALS	5.393	0	0	0

LITTLE ROUND DASH ACRES			
2018	2019	2020	2021
3.999	0	0	0.07

Figure 3 – EWM Acreages by Location 2019-2021

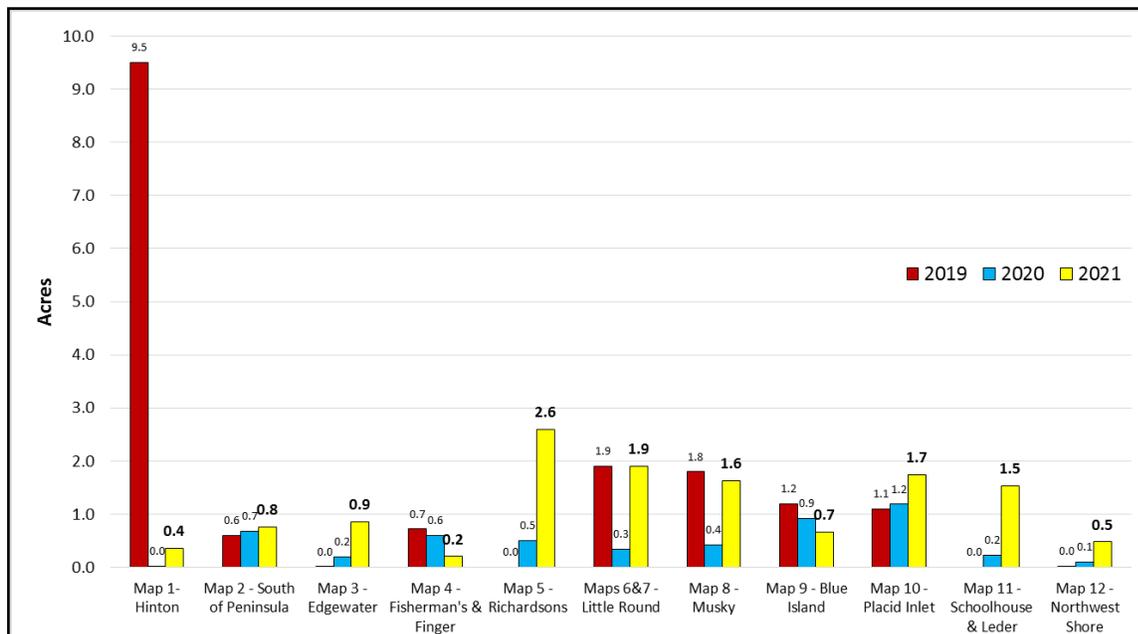


Table 2 – Round & Little Round EWM Bed List, 2021

September 2021 EWM Beds								EWM Control Guidance Criteria						
Size Ranking	Location	EWM Bed	Area(ac)	Depth	Height*	Density	Avg. Rakefull	Size	Density	Traffic	Impairment	Habitat	Survey Data	TOTAL SCORE
1	Schoolhouse	SC-A21	0.713	5	At	High	0.9	v	v	v		v	v	5
2	Placid	PL-B21	0.626	10	At	High	2.33	v	v			v	v	4
3	Placid	PL-S19	0.575	7	Near	Moderate	1	v	v			v	v	4
4	Placid	PL-T19	0.542	10	Near	High	2.2	v	v	v		v	v	5
5	Blue Island	BI-B21	0.515	12	Near	High	2.6	v	v			v	v	4
6	Leder	LE-C21	0.430	4	Near-At	Low	1.6	v	v			v	v	4
7	Musky North	MU-H21	0.371	7	Near	Moderate	1.4	v	v	v	v	v	v	6
8	Richardson's	RI-K21	0.370	7	Near	High	2	v	v	v	v	v	v	6
9	Marina	MA-B21	0.362	7	At	Mod-High		v	v		v	v	v	5
10	Edgewater	ED-A21	0.330	8.5	Below-Near	Mod-High	0.6	v	v			v	v	4
11	Richardson's	RI-I21	0.327	4.5	Near-At	Low-Mod	1	v	v	v	v	v	v	6
12	Musky North	MU-G21	0.311	7	Near	Mod-High	1.3	v	v			v	v	4
13	Richardson's	RI-A21	0.299	10	Below-At	Moderate	1.33	v	v		v	v	v	5
14	Richardson's	RI-C21	0.292	8	Below-At	Moderate	1.5	v	v		v	v	v	5
15	Little Round	LR-B21	0.268	6	Near-At	Moderate	2	v	v	v	v	v	v	6
16	Musky South	MU-D21	0.260	12	At	High	3	v	v			v	v	4
17	Musky South	MU-C21	0.258	10	Below	Moderate	1.5	v	v		v	v	v	5
18	Richardson's	RI-L21	0.248	5	Near-At	Moderate	NA	v	v	v	v	v	v	6
19	Northwest	NW-B21	0.247	10	Below	Moderate	1.67	v	v			v	v	4
20	Little Round	LR-L21	0.232	12	At	High	1.25	v	v			v	v	4
21	Peninsula	PE-U20	0.223	7	Below	High	1.5	v	v			v	v	4
22	Richardson's	RI-J21	0.214	4.5	Near-At	High	3	v	v	v		v	v	5
23	Little Round	LR-D21	0.206	5	At	Moderate	NA	v	v			v	v	4
24	Little Round	LR-K21	0.184	8	At	High	1	v	v			v	v	4
25	Northwest	NW-A21	0.183	7	At	High	1.5	v	v	v		v	v	5
26	Leder	LE-B21	0.178	4.5	At	Low	0.67	v	v		v	v	v	5
27	Little Round	LR-H21	0.176	5	At	Moderate	NA	v	v			v	v	4
28	Little Round	LR-F21	0.170	5	At	Moderate	NA	v	v	v	v	v	v	6
29	Hinton	HI-A21	0.170	7	Below	Low	0.5	v	v			v	v	4
30	Little Round	LR-N21	0.168	5	Near	Low	1.2	v	v			v	v	4
31	Richardson's	RI-M21	0.159	10	Below	Moderate	NA	v	v	v	v	v	v	6
32	Edgewater	ED-D21	0.155	5	At	Moderate	2	v	v		v	v	v	5
33	Blue Island	BI-A21	0.151	8	Near	Moderate	1.66	v	v			v	v	4
EWM Beds >0.15 acres listed above and EWM Beds <0.15 acres listed below														
34	Musky South	MU-A21	0.148	8	Near	Moderate	1			v		v	v	3
35	Edgewater	ED-C21	0.144	9	At	Dense	3		v			v	v	3
36	Peninsula	PE-EE19	0.141	12	Near	High	2.5		v	v		v	v	4
37	Musky North	MU-F21	0.141	10	Near	High	2.5		v	v			v	3
38	Little Round	LR-G21	0.140	5	At	Mod-High	3		v			v	v	3
39	Richardson's	RI-E21	0.134	9	Near-Below	Moderate	NA		v	v			v	3
40	Finger Bar	FI-I20	0.131	12	Below	Moderate	1.5		v	v			v	3
41	Richardson's	RI-D21	0.120	9	Below-At	Moderate	0		v				v	2
42	Richardson's	RI-F21	0.120	6	Near	Low	0		v	v			v	3
43	Schoolhouse	SC-B21	0.105	6	Near	Moderate	1		v				v	2
44	Leder	LE-A21	0.101	6	Near	Moderate	1.5		v				v	2
45	Marina	MA-A21	0.099	5	At	Mod-High			v	v	v		v	4
46	Hinton	HI-B21	0.097	5	Near	Low	0.33		v				v	2
47	West Shore	WE-BB19	0.096	5	Near	High	0		v				v	2
48	Walleye Bar	WA-DD19	0.090	6	At	High	3		v			v	v	3
49	Edgewater	ED-B21	0.085	6	At	Dense	1		v				v	2
50	Peninsula	PE-A21	0.083	9	Below	Moderate	1		v	v			v	3
51	Richardson's	RI-G21	0.081	6	Near	Low	1		v	v			v	3
52	Lovejoy	LO-A21	0.081	7	At	High	2		v	v		v	v	4
53	Little Round	LR-A21	0.079	5	At	Moderate	NA		v				v	2
54	Finger Bar	FI-KK19	0.073	12	At	High	1		v				v	2
55	Little Round	LR-C21	0.072	6	At	Moderate	1		v				v	2
56	Peninsula	PE-B21	0.070	8	Below	Moderate	NA		v	v			v	3
57	Richardson's	RI-O21	0.068	10	Below	Low	NA		v	v			v	3
58	Little Round	LR-E21	0.066	5	At	Moderate	NA		v				v	2
59	Richardson's	RI-N21	0.065	7	Below	Moderate	NA		v	v			v	3
60	Peninsula	PE-D21	0.060	11	Near	High	3		v			v	v	3
61	Little Round	LR-M21	0.056	6	At	High	0.5		v	v			v	3
62	Musky North	MU-P20	0.054	10	Near	High	3		v	v		v	v	4
63	Richardson's	RI-H21	0.054	6	Near	Moderate	NA		v	v			v	3
64	West Shore	WE-CC19	0.053	10	Below	Moderate	1		v				v	2
65	Richardson's	RI-B21	0.052	13	Near	Moderate	2		v			v	v	3
66	Little Round	LR-I21	0.049	6	Near	Moderate	NA		v				v	2
67	Peninsula	PE-S20	0.049	6	Near	Moderate	1		v	v			v	3
68	Musky South	MU-B21	0.048	4	At	High	1		v				v	2
69	Northwest	NW-R19	0.046	10	Near	Moderate	3		v			v	v	3
70	Little Round	LR-J21	0.045	8	Near	High	3		v				v	2
71	Lovejoy	LO-B21	0.043	7	At	High	NA		v				v	2
72	Hinton	HI-C21	0.039	8	Near	High	NA		v				v	2
73	Musky North	MU-E21	0.038	7	Near	Moderate	NA		v	v			v	3
74	Hinton	HI-D21	0.038	7	Near	Low	1		v				v	2
75	Peninsula	PE-C21	0.037	8	Below	Moderate	NA		v	v			v	3
76	Hinton	HI-H20	0.016	10	Below	Low	NA		v				v	2

Map 1 – Hinton Bay

There was 0.36 acres of EWM in Hinton Bay in 2021 compared to 0.02 acres 2020, and 9.5 acres in 2019.

The survey of Hinton Bay in 2021 was done at all areas and points treated since 2019. There were 106 sample points in 2021 and EWM was found at 10 sample points (9.4% littoral frequency) and visually observed at another 8 sample points. Chi-squared tests showed that 2021 EWM occurrence was statistically higher in EWM compared to 2020 when EWM was found at 2 of 117 sample points (1.7% littoral frequency), which were the same points sampled in 2021. Chi-squared tests also showed that EWM occurrence in 2021 was significantly lower than 2019 when EWM was found at 61 of 109 sample points within EWM beds (56% littoral frequency).

ProcellaCOR in Hinton Bay

EWM bed M19 (1.25 acres) was treated with ProcellaCOR (PCOR)⁵ on July 10th, 2020. Within bed M19 there were 19 sample points. In 2019, there were 11 sample points with EWM. EWM was not detected in M19 when surveyed in August 2020 (same year of treatment). Only one small segment of EWM was detected at one sample point in M19 when surveyed in September 2021 (1 year after treatment). There was one native species (fern pondweed) that was statistically lower in 2021 compared to pre-treatment in 2019. There were 3 native species (slender naiad, water celery, & small nitella) that were statistically higher in 2021 compared to pre-treatment in 2019.

Areas Proposed for Herbicide in 2022 Grant Application

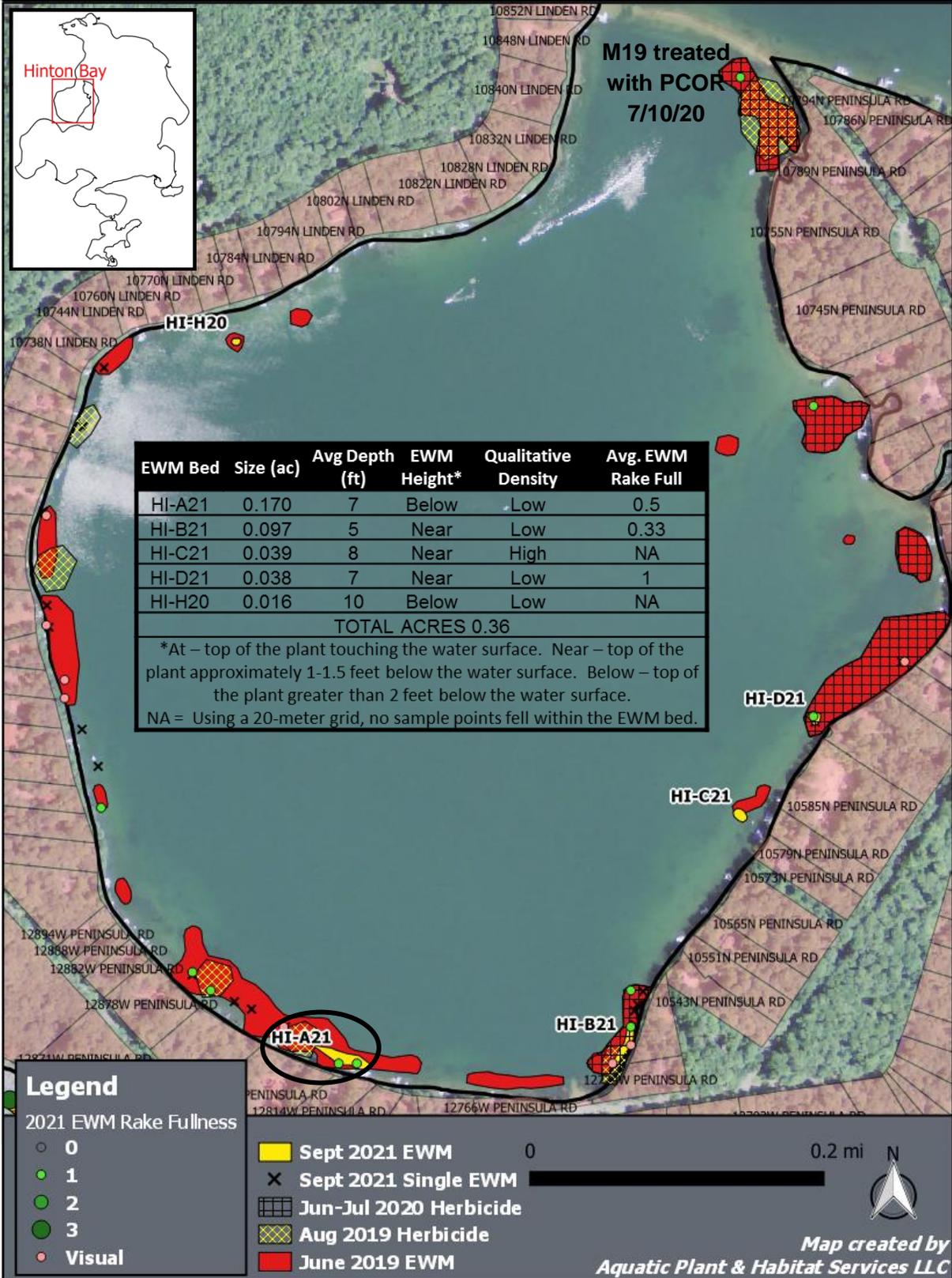
EWM bed HI-A21 is proposed for herbicide treatment in 2022 based on criteria in Figure 5.

Recent Management in Hinton Bay

- 2019 contact herbicide at 6 locations (2.5 ac)
- 2020 herbicide at 5 locations (5.77 ac).
Location M19 was with PCOR

⁵ PCOR is a new herbicide that was first used in Wisconsin in 2019 at test sites. Ongoing research is helping lake managers understand the efficacy of PCOR in controlling EWM and the potential impacts, if any, to native species.

Map 1- Hinton Bay, Round Lake, Sawyer County, Wisconsin Eurasian Watermilfoil Occurrence & Management 2019-2021



EWM Bed	Size (ac)	Avg Depth (ft)	EWM Height*	Qualitative Density	Avg. EWM Rake Full
HI-A21	0.170	7	Below	Low	0.5
HI-B21	0.097	5	Near	Low	0.33
HI-C21	0.039	8	Near	High	NA
HI-D21	0.038	7	Near	Low	1
HI-H20	0.016	10	Below	Low	NA
TOTAL ACRES 0.36					
*At – top of the plant touching the water surface. Near – top of the plant approximately 1-1.5 feet below the water surface. Below – top of the plant greater than 2 feet below the water surface. NA = Using a 20-meter grid, no sample points fell within the EWM bed.					

Legend

2021 EWM Rake Fullness

- 0
- 1
- 2
- 3
- Visual

- Sept 2021 EWM
- × Sept 2021 Single EWM
- ▨ Jun-Jul 2020 Herbicide
- ▩ Aug 2019 Herbicide
- June 2019 EWM

0 0.2 mi N

Map created by
Aquatic Plant & Habitat Services LLC

Maps 2, 3, & 4 – Southwest Region

The Southwest region of Round Lake is separated into Maps 2, 3, & 4. There were 16 beds of EWM in the entire region ranging in size from 0.04 to 0.33 acres with a total acreage of 1.82. The largest beds of EWM were in Edgewater Bay (Map 3) and South of the Peninsula (Map 2).

Recent Management in SW Region

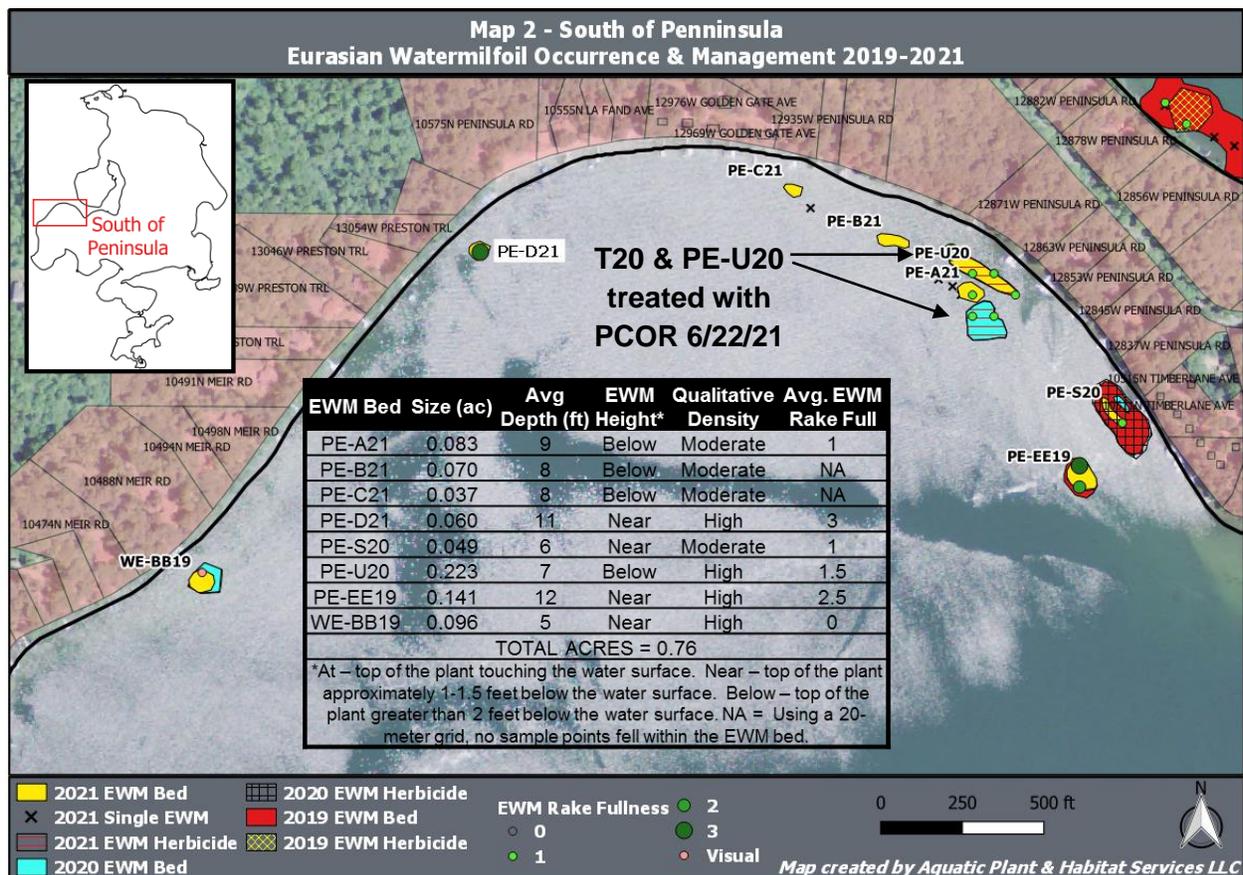
- 2020 Herbicide Treatment in 2 locations (1 acre)
- 2021 PCOR Treatment in 3 locations (Map 2 U20 & T20, Map 4 G20)

ProcellaCOR in Southwest Region

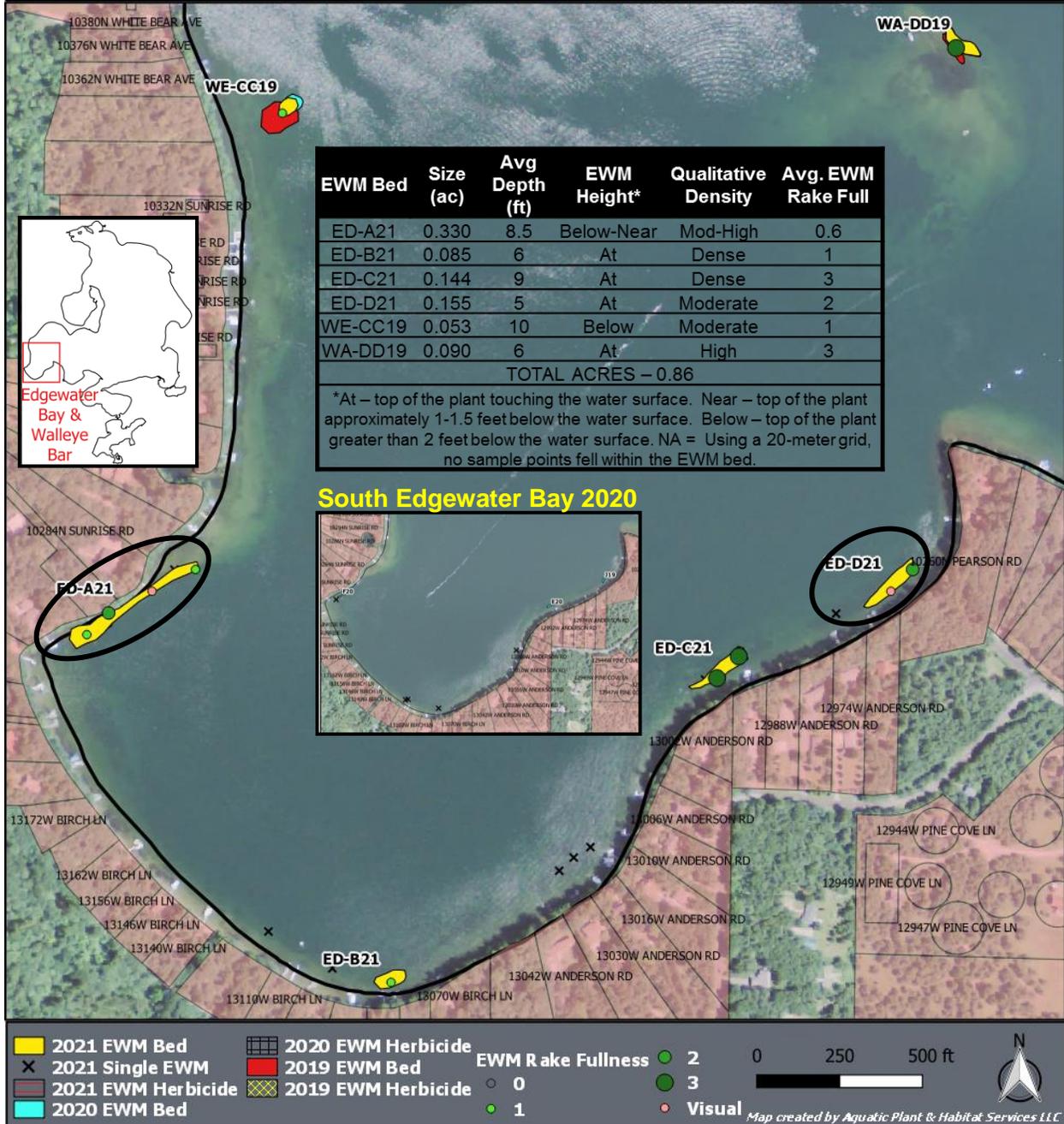
EWM beds T20 & U20 (both 0.25 ac.), and G20 (0.6 ac.) were treated with PCOR (see footnote 5) in late June, 2021. Although EWM was found at 2 sample points within T20 in Sept. 2021, it was low density and not growing near the surface nor causing impairment. The EWM growing at U20 (now PE-U20) was growing near the surface and at high density. Although EWM in bed G20 (map 4) was found at half of the sample points, it was not observed in high density or visible enough from the lake surface to delineate a bed. In conclusion, PCOR treatment was successful at T20, somewhat successful at G20, and unsuccessful at PE-U20 in controlling EWM the same year of treatment. None of the EWM beds treated with PCOR had enough sample points (due to their small size) for a chi-squared test.

Areas Proposed for Herbicide in 2022 Grant Application

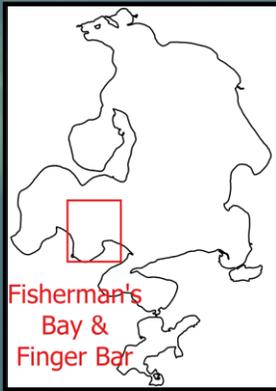
EWM beds PE-U20, ED-A21, and ED-D21 are proposed for herbicide treatment in 2022 based on criteria in Figure 5.



Map 3 - Edgewater Bay Eurasian Watermilfoil Occurrence & Management 2019-2021



Map 4 - Fisherman's Bay & Finger Bar Eurasian Watermilfoil Occurrence & Management 2019-2021



EWM Bed	Size (ac)	Avg Depth (ft)	EWM Height*	Qualitative Density	Avg. EWM Rake Full
FI-I20	0.131	12	Below	Moderate	1.5
FI-KK19	0.073	12	At	High	1
TOTAL ACRES – 0.20					

*At – top of the plant touching the water surface. Near – top of the plant approximately 1-1.5 feet below the water surface. Below – top of the plant greater than 2 feet below the water surface.



2021 EWM Bed	2020 EWM Herbicide	EWM Rake Fullness	2	0 250 500 ft	
2021 EWM Herbicide	2019 EWM Bed	0	3		
2020 EWM Bed	2019 EWM Herbicide	1	Visual		

Map created by Aquatic Plant & Habitat Services LLC

Map 5 – Richardson’s Bay & Marina Bay

In Richardson’s Bay, there was 2.6 acres of EWM in 2021, 0.5 acres in 2020, and zero acres in 2019, which was the same year as the whole-bay herbicide treatment. In addition to the 2.6 acres in Richardson’s Bay in 2021, there was 0.51 acres of EWM in Marina Bay yielding a total of 3.11 acres in Map 5.

Point-intercept surveys of Richardson’s Bay were done from 2018 through 2021 to track EWM occurrence as well as native plant species occurrence before and after the whole-bay herbicide treatment in 2019. **The reduction in EWM from 2018 at 10 sample points to 9 sample points in 2021 was not statistically significant. The increase of EWM from 2 sample points in 2020 compared to 9 sample points in 2021 was statistically significant.** There were five native aquatic plant species that significantly increased between 2018 and 2021 not including filamentous algae (variable pondweed, wild celery, water marigold, perfoliate pondweed, and white-stem pondweed). There were two species that significantly decreased between 2018 and 2020 (horned pondweed and clasping-leaf pondweed). There were three native species that significantly increased between 2020 and 2021 in addition to the non-native Eurasian watermilfoil (water star-grass, variable pondweed, and wild celery). There were two species that significantly decreased between 2020 and 2021 (slender naiad and nitella).

ProcellaCOR in Richardson’s Bay

EWM beds V20 (0.25 ac.), W20 (0.04 ac.), and X20 (0.40 ac.) were treated with PCOR (see footnote 5) in late June 2021. No EWM was found growing in X20 or V20. EWM was found growing at W20 in high enough density that a new bed was delineated (RI-F21, 0.12 ac). In conclusion, PCOR treatment was successful at V20 and W20 but unsuccessful at W20 in controlling EWM the same year of treatment. Herbicide concentration monitoring was done at X20 and the results are covered on page 26. None of the EWM beds treated with PCOR had enough sample points (due to their small size) for a chi-squared test.

Areas Proposed for Herbicide in 2022 Grant Application

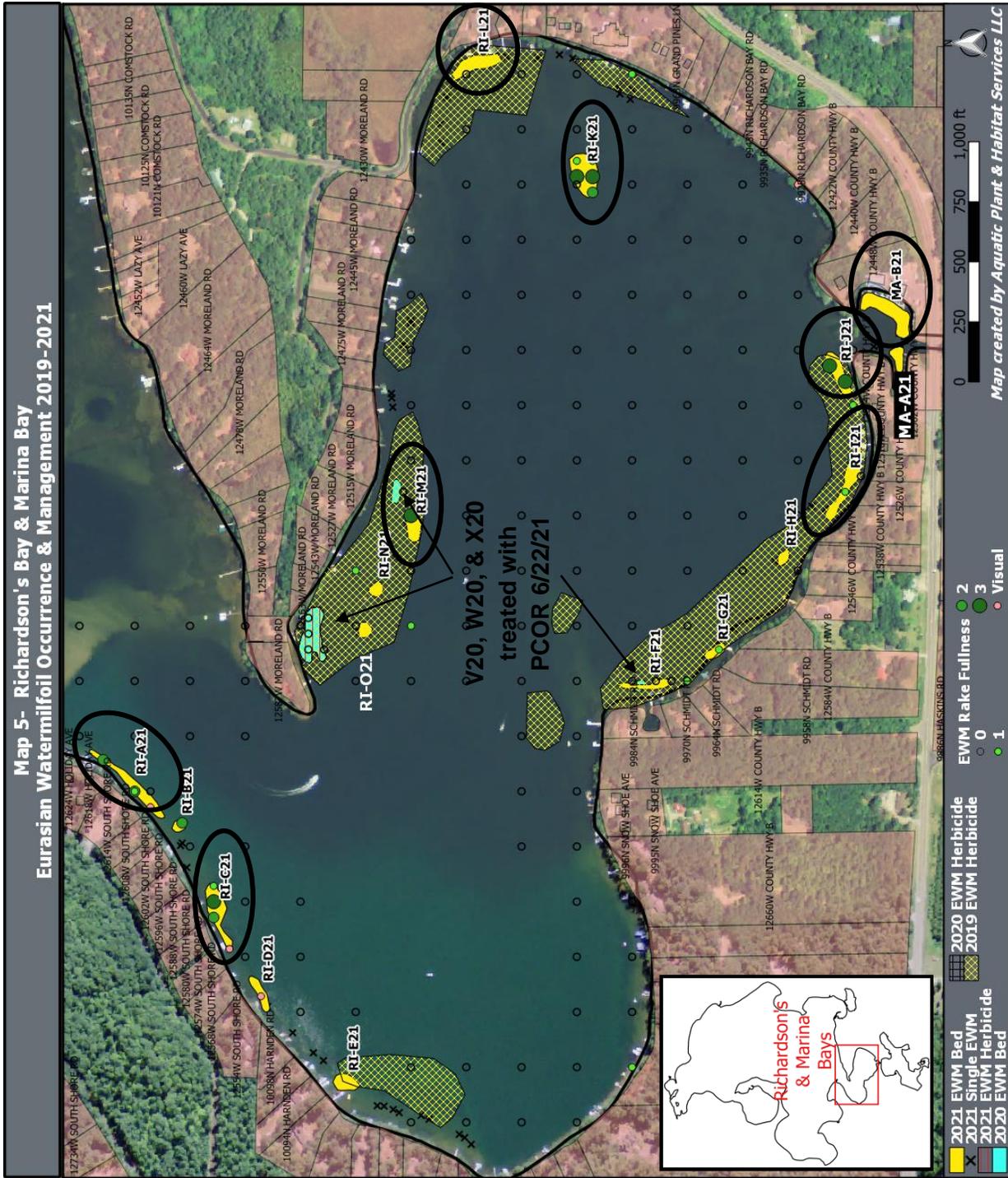
There are 8 EWM beds circled in Map 5 being proposed for herbicide treatment in 2022 based on criteria in Figure 5.

EWM Bed	Size (ac)	Avg Depth (ft)	EWM Height*	Qualitative Density	Avg. EWM Rake Full
RI-A21	0.299	10	Below-At	Moderate	1.33
RI-B21	0.052	13	Near	Moderate	2
RI-C21	0.292	8	Below-At	Moderate	1.5
RI-D21	0.120	9	Below-At	Moderate	0
RI-E21	0.134	9	Near-Below	Moderate	NA
RI-F21	0.120	6	Near	Low	0
RI-G21	0.081	6	Near	Low	1
RI-H21	0.054	6	Near	Moderate	NA
RI-I21	0.327	4.5	Near-At	Low-Mod	1
RI-J21	0.214	4.5	Near-At	High	3
RI-K21	0.370	7	Near	High	2
RI-L21	0.248	5	Near-At	Moderate	NA
RI-M21	0.159	10	Below	Moderate	NA
RI-N21	0.065	7	Below	Moderate	NA
RI-O21	0.068	10	Below	Low	NA
MA-A21	0.148	5	At	Mod-High	NA
MA-B21	0.362	7	At	Mod-High	NA
TOTAL ACRES = 3.11					
*At – top of the plant touching the water surface. Near – top of the plant approximately 1-1.5 feet below the water surface. Below – top of the plant greater than 2 feet below the water surface. NA = Using a 20-meter grid, no sample points fell within the EWM bed.					

Recent Management in Richardson’s Bay

- 2019 whole-bay herbicide treatment
- 2021 PCOR Treatment in 3 locations (0.69 acres)

Map 5- Richardson's Bay & Marina Bay
Eurasian Watermilfoil Occurrence & Management 2019-2021



Maps 6 & 7 – Little Round Lake

Little Round Lake is separated into a northern and southern map. There was a total of 1.9 acres of EWM in 2021 compared to 0.34 acres in 2020 and 1.9 acres in 2019. The 1.9 acres of EWM is among 14 beds ranging in size from 0.05 to 0.27 acres. The three largest beds were LR-B21 and LR-D21 located in the southwestern area of the lake and LR-L21 in the north central region.

There were two areas in northern Little Round Lake where diver assisted suction harvesting (DASH) was used to control EWM in 2021 on July 13-14, 2021. Those areas are labeled in Map 6 and included EE20 (0.04 acres) and an area north of LR-N21 (0.02 acres). Approximately 2 months later when the areas were surveyed, EWM was observed but in very low abundance and not dense enough to delineate EWM beds in those areas.

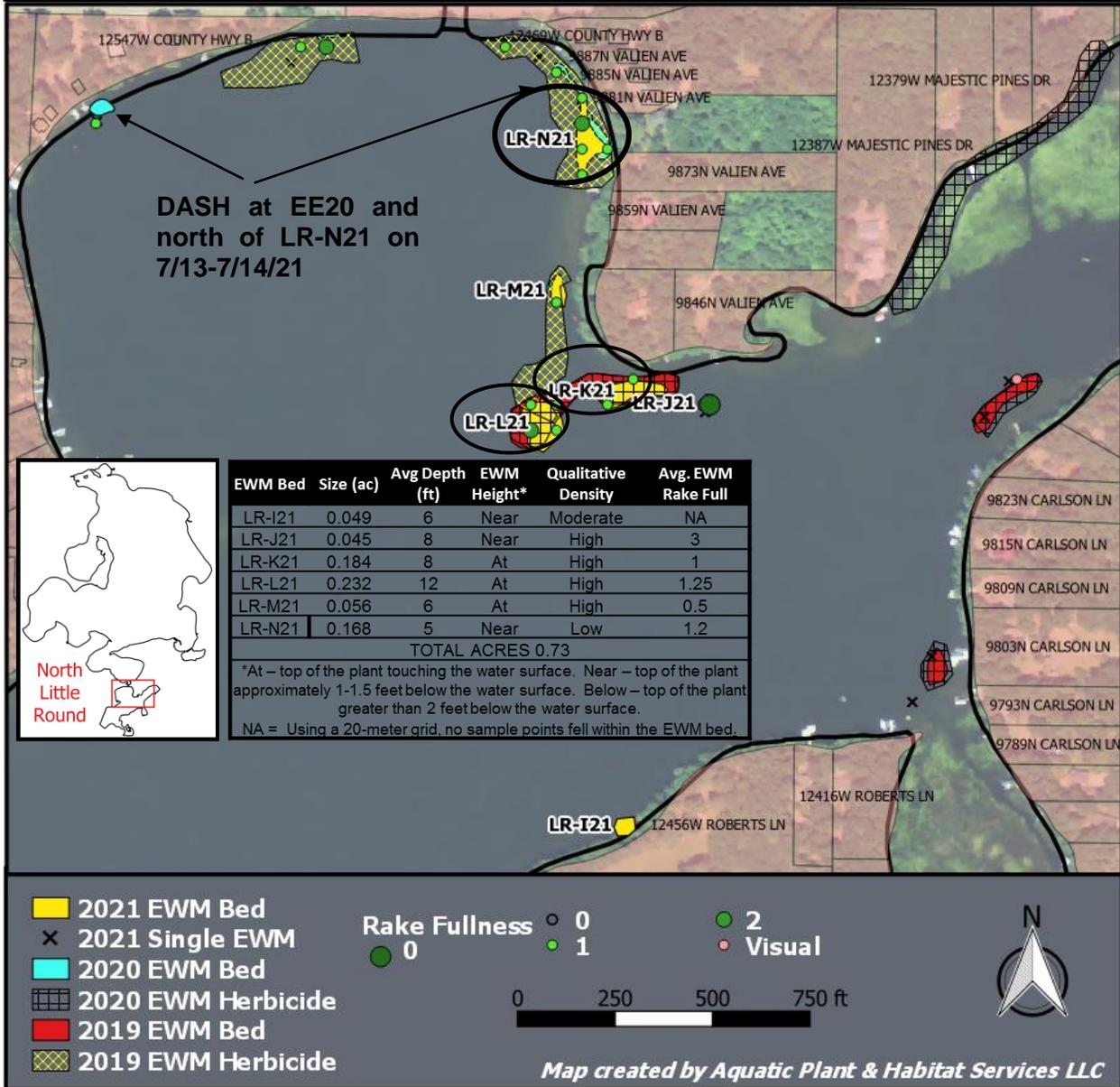
Areas Proposed for Herbicide & DASH in 2022 Grant Application

There are 7 EWM beds circled in Maps 6 and 7 being proposed for herbicide treatment in 2022 based on criteria in Figure 5. Following herbicide treatment of these beds, DASH will be used to "mop up" EWM plants or clumps that remain. This use of integrated pest management is intended as a trial in Little Round Lake to determine whether herbicide closely followed by DASH will improve EWM control in those areas. If time allows, other small beds of EWM in Little Round Lake may be targeted for DASH control.

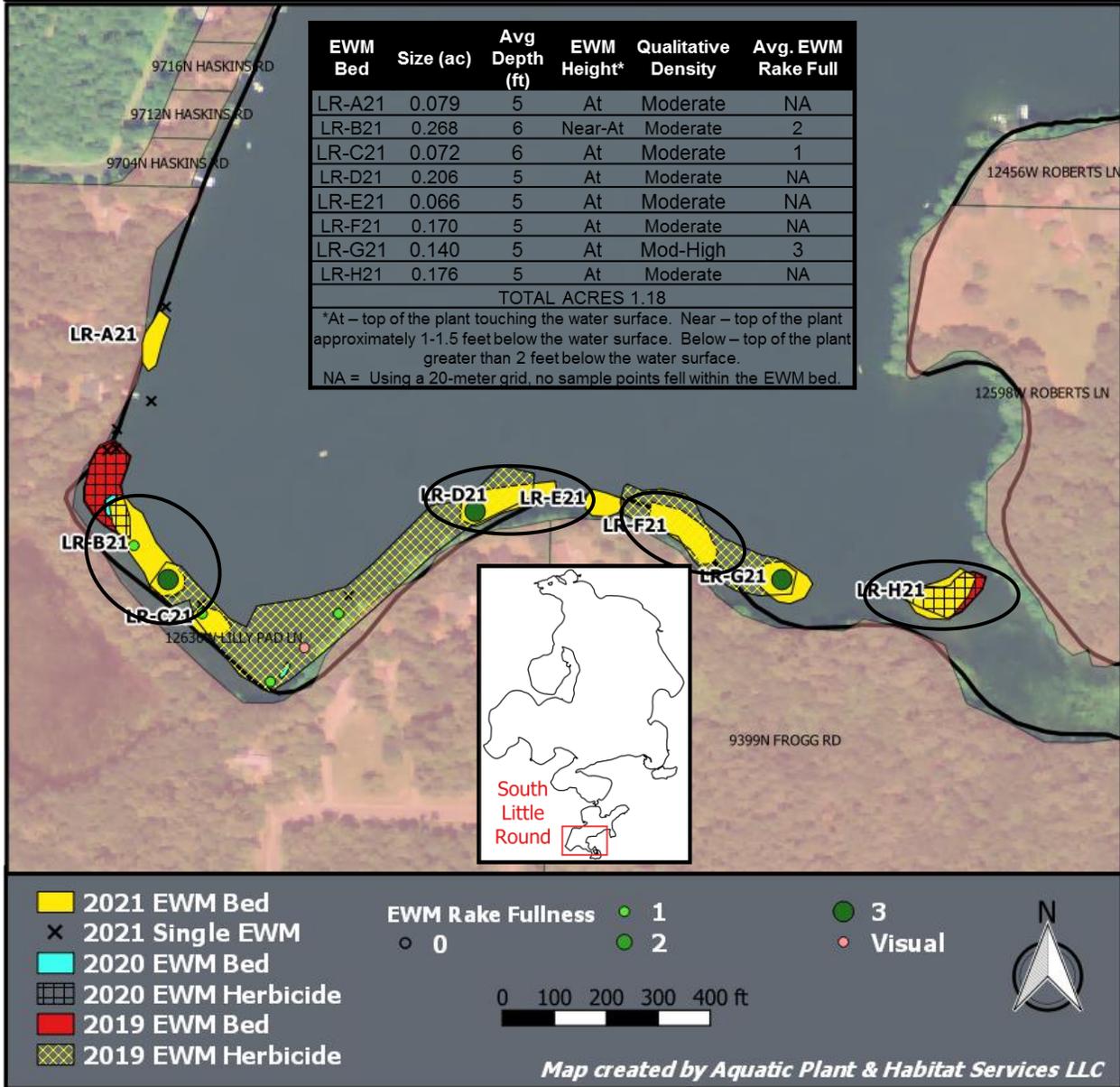
Recent Management in Little Round Lake

- 2019 herbicide treatment at 5 locations (4 acres)
- 2020 herbicide treatment at 6 locations (3.22 acres)
- 2021 DASH at 2 locations (0.06 acres)

Map 6 - Northern Little Round Lake Eurasian Watermilfoil Occurrence & Management 2019-2021



Map 7 - Northern Little Round Lake Eurasian Watermilfoil Occurrence & Management 2019-2021



Map 8 – North & South Musky Bay

There was a total of 1.63 acres of EWM in 2021 compared to 0.42 acres in 2020 and 1.8 acres in 2019. The 1.63 acres in 2021 was among 9 beds ranging in size from 0.04 to 0.37 acres. The largest beds of EWM are in northern Musky Bay at beds MU-G21 and MU-H21.

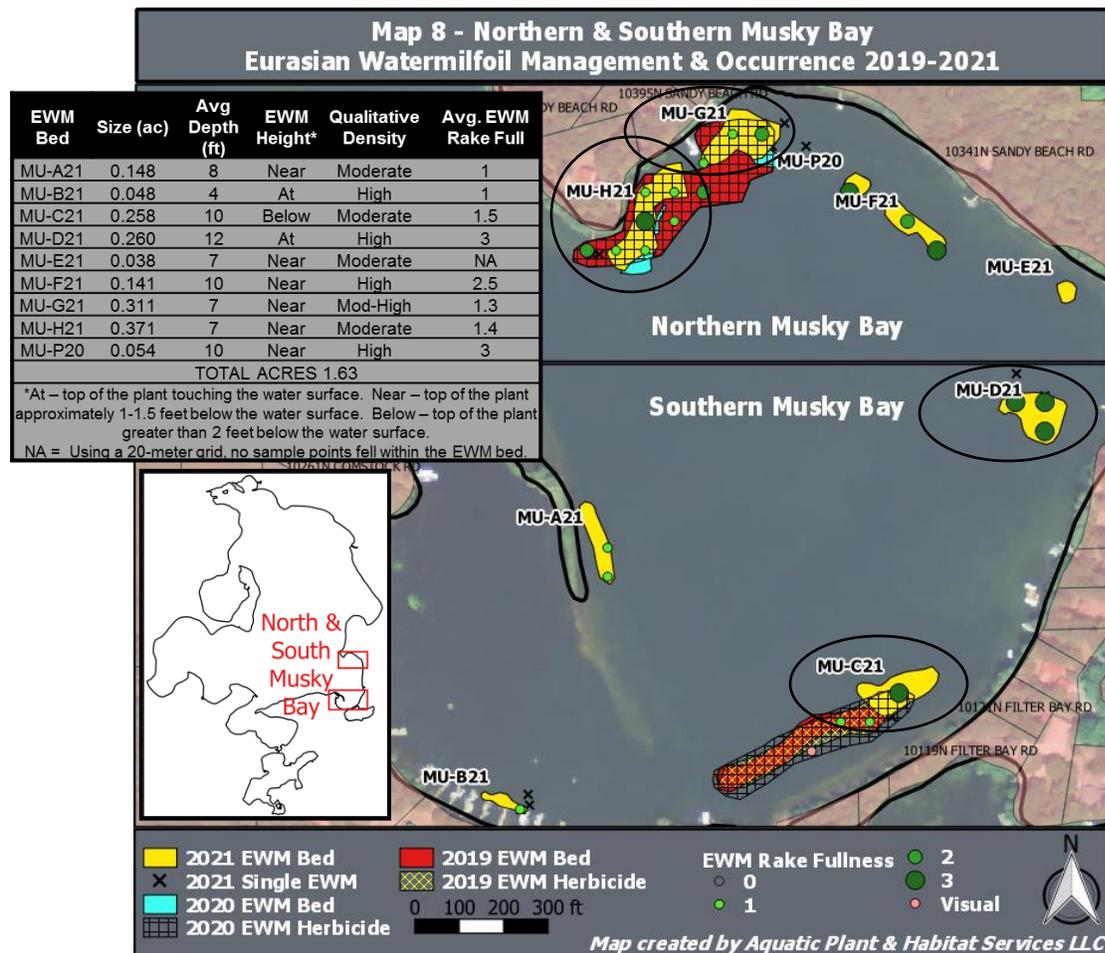
There was no herbicide treatment or DASH to control EWM in Musky Bay in 2021 due to the low EWM acreage in 2020. Four new beds of EWM that were not previously detected were mapped in 2021 including MU-D21, which was very dense EWM canopied in 12 feet of water. The other new beds of EWM were MU-A2, MU-E21, and MU-F21 all of moderate-to-high density.

Areas Proposed for Herbicide in 2022 Grant Application

There are 4 EWM beds circled in Map 8 being proposed for herbicide treatment in 2022 based on criteria in Figure 5.

Recent Management in Musky Bay

- 2019 herbicide treatment at 1 location (1 acre)
- 2020 herbicide treatment at 2 locations (2.5 acres)



Map 9 – Blue Island Bay & Sandy Beach

In Blue Island Bay, there was a total of 0.67 acres of EWM in 2021, 0.92 acres in 2020, and 1.2 acres in 2019. There were two beds of EWM in 2021 at sizes of 0.15 and 0.52 acres.

There were two newly documented beds of EWM in the Sandy Beach area which is located near the east-central shoreline of Round Lake. These beds of EWM are 0.04 and 0.08 acres in size.

ProcellaCOR in Blue Island Bay

EWM beds A20 (0.27 ac.), B20 (0.39 ac.), C20 (0.18 ac.) and D20 (0.09 ac., currently labeled BI-A21) were treated with PCOR (see footnote 5) in late June 2021. Although EWM was found at 1 sample point in each of A20, B20, and C20 in September 2021, the EWM was low density or a few single plants and not growing near the surface nor causing impairment. The EWM growing at BI-A21 (previously D20) was canopied and at high density. In conclusion, PCOR treatment was successful at A20, B20, and C20 but unsuccessful at BI-A21 in controlling EWM the same year of treatment. Herbicide concentration monitoring was done at C20 and the results are covered on page 26. None of the EWM beds treated with PCOR had enough sample points (due to their small size) for a chi-squared test.

Areas Proposed for Herbicide in 2022 Grant Application

EWM beds BI-A21 and BI-B21 are proposed for herbicide treatment in 2022 based on criteria in Figure 5.

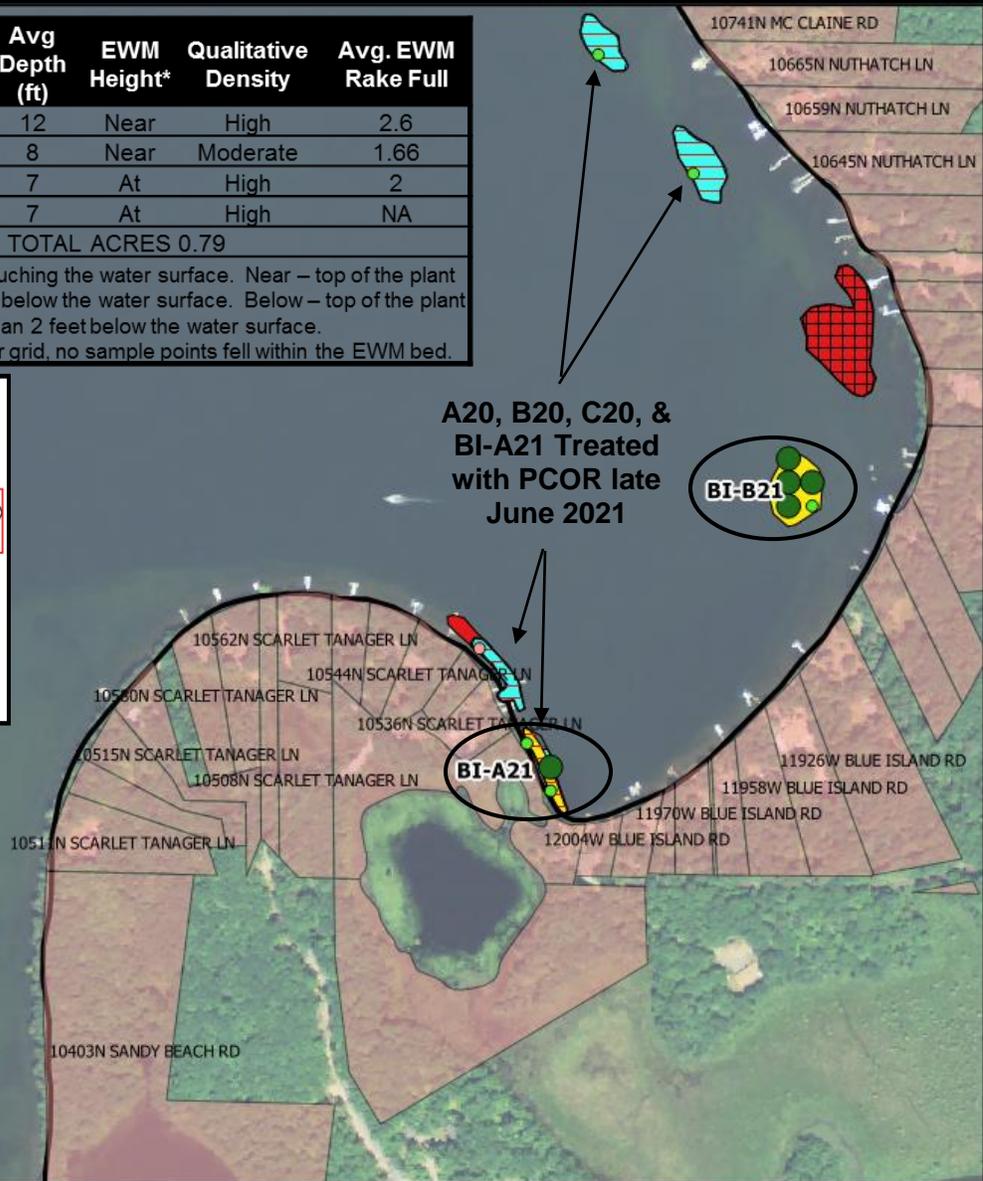
Recent Management in Blue Island Bay

- 2020 herbicide treatment at one location (1.0 acre)
- 2021 herbicide treatment at 4 locations (0.93 acres)

Map 9 - Blue Island Bay & Sandy Bar Eurasian Watermilfoil Occurrence & Management 2019-2021

EWM Bed	Size (ac)	Avg Depth (ft)	EWM Height*	Qualitative Density	Avg. EWM Rake Full
BI-B21	0.515	12	Near	High	2.6
BI-A21	0.151	8	Near	Moderate	1.66
SA-A21	0.081	7	At	High	2
SA-B21	0.043	7	At	High	NA
TOTAL ACRES 0.79					

*At – top of the plant touching the water surface. Near – top of the plant approximately 1-1.5 feet below the water surface. Below – top of the plant greater than 2 feet below the water surface.
NA = Using a 20-meter grid, no sample points fell within the EWM bed.



2021 EWM Bed	2020 EWM Herbicide	EWM Rake Fullness	2
2021 Single EWM	2019 EWM Bed	0	3
2021 EWM Herbicide	2019 EWM Herbicide	1	Visual
2020 EWM Bed			

0 250 500 750 ft

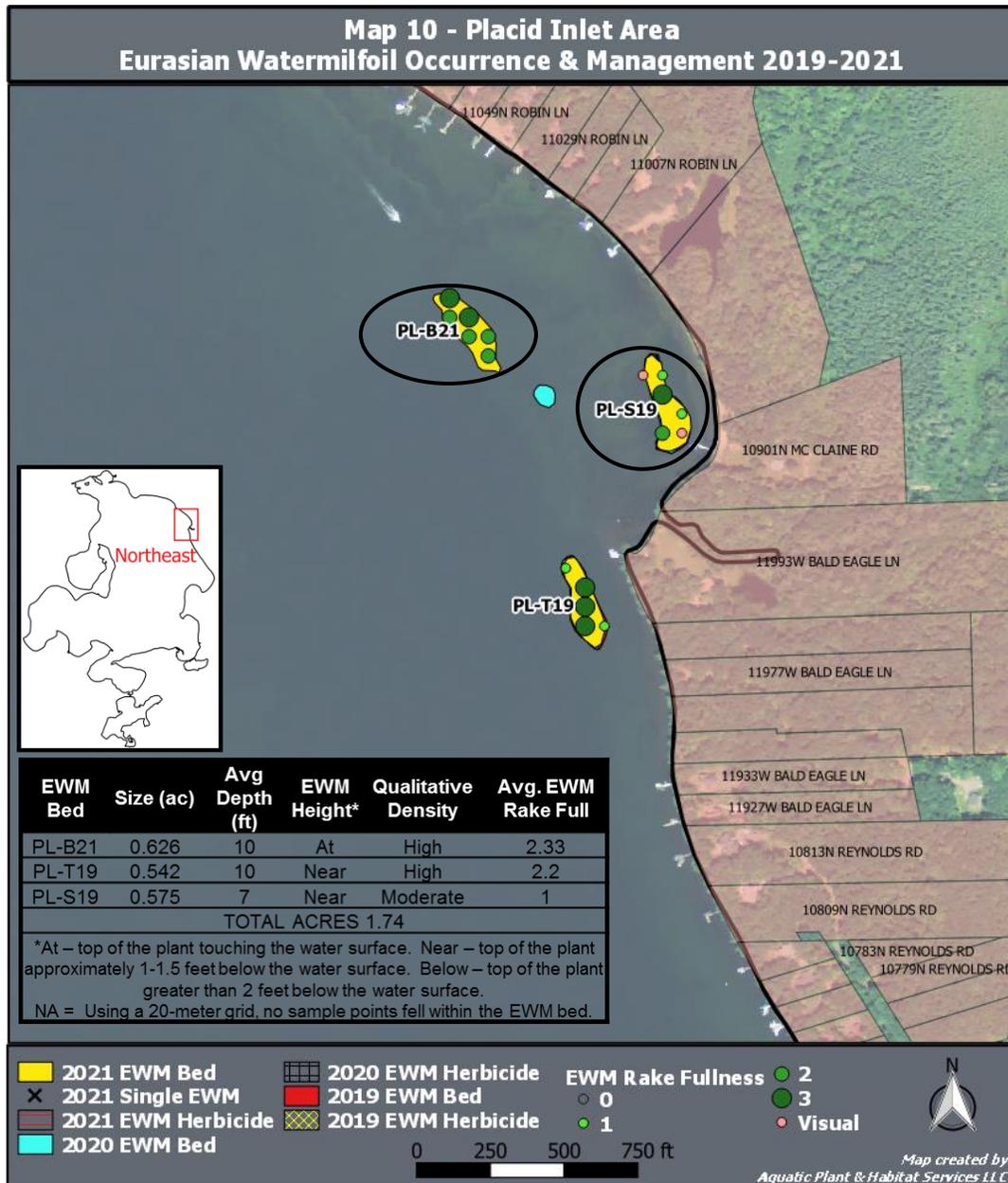
Map created by
Aquatic Plant & Habitat Services LLC

Map 10 – Placid Inlet Area

In the far northeast region of the lake, also labeled in this report as the Placid Inlet area, there was a total of 1.74 acres of EWM in 2021, 1.19 acres in 2020, and 1.10 acres in 2019. There were two beds of EWM in 2021 at sizes of 0.15 and 0.52 acres. Two beds have stayed about the same size since they were first delineated in 2019 (PL-S19 and PL-T19). PL-B21 was a new EWM bed in 2021 and was 0.63 acres of high density EWM canopied at the lake surface.

Areas Proposed for Herbicide in 2022 Grant Application

EWM beds PL-B21 and PL-S19 are proposed for herbicide treatment in 2022 based on criteria in Figure 5.



Map 11 – Schoolhouse & Leder Bays

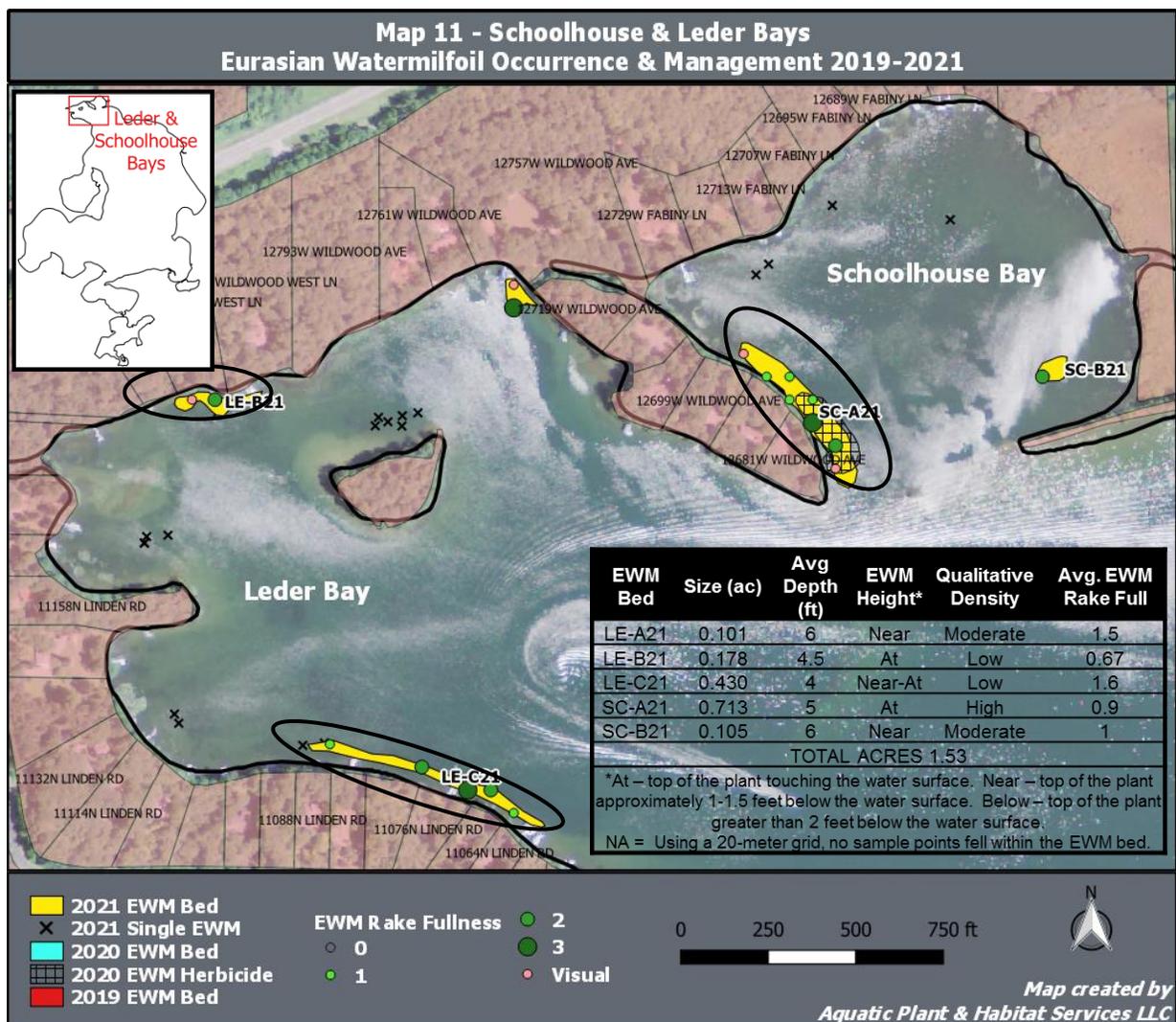
EWM was at 1.53 acres in this area of the lake in 2021 compared to 0.23 acres in 2020 and zero acres in 2019 although single EWM plants or clumps were noted that year. There were 5 beds of EWM ranging in size from 0.10 acres to 0.71 acres.

Areas Proposed for Herbicide in 2022 Grant Application

EWM beds SC-A21, LE-B21, and LE-C21 are proposed for herbicide treatment in 2022 based on criteria in Figure 5.

List 1 – Recent Management in Schoolhouse & Leder Bays

- 2020 herbicide treatment (0.5 acres)

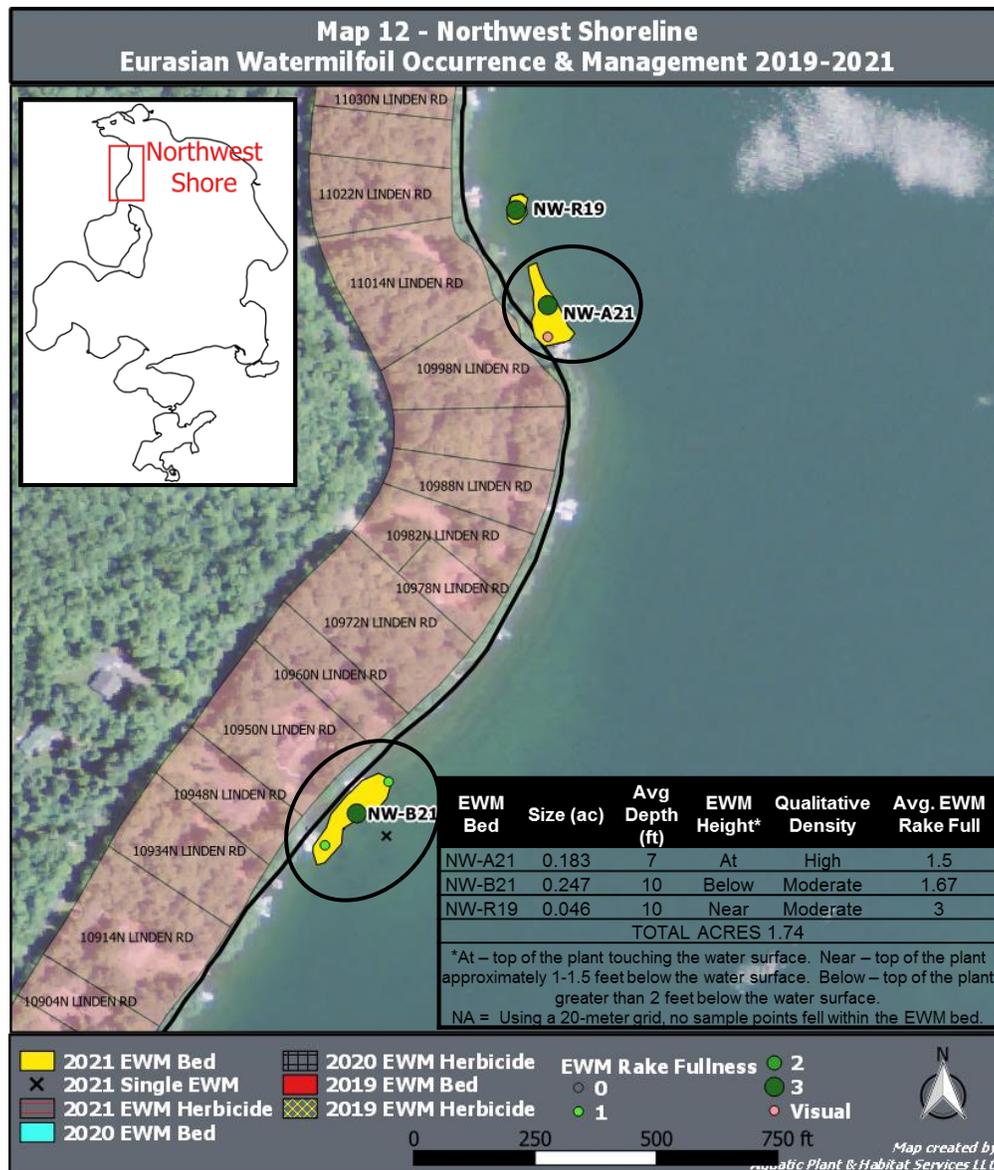


Map 12 – Northwest Round Lake

EWM was at 0.48 acres in this area of the lake in 2021 compared to 0.10 acres in 2020 and 0.02 acres in 2019. There were 3 beds of EWM ranging in size from 0.05 acres to 0.25 acres. NW-R19 has remained the same size and density since 2019. NW-A21 was first delineated in 2020 (then labeled K20) and has grown in size.

Areas Proposed for Herbicide in 2022 Grant Application

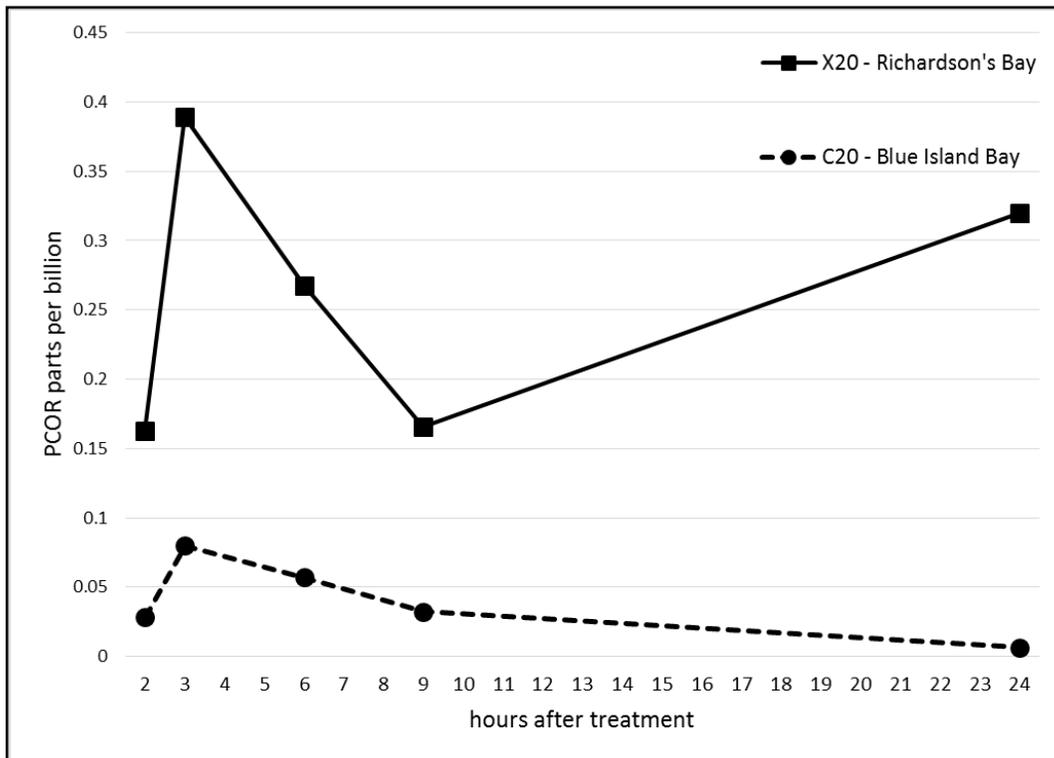
EWM beds NW-A21 and NW-B21 are proposed for herbicide treatment in 2022 based on criteria in Figure 5.



ProcellaCOR Monitoring Results

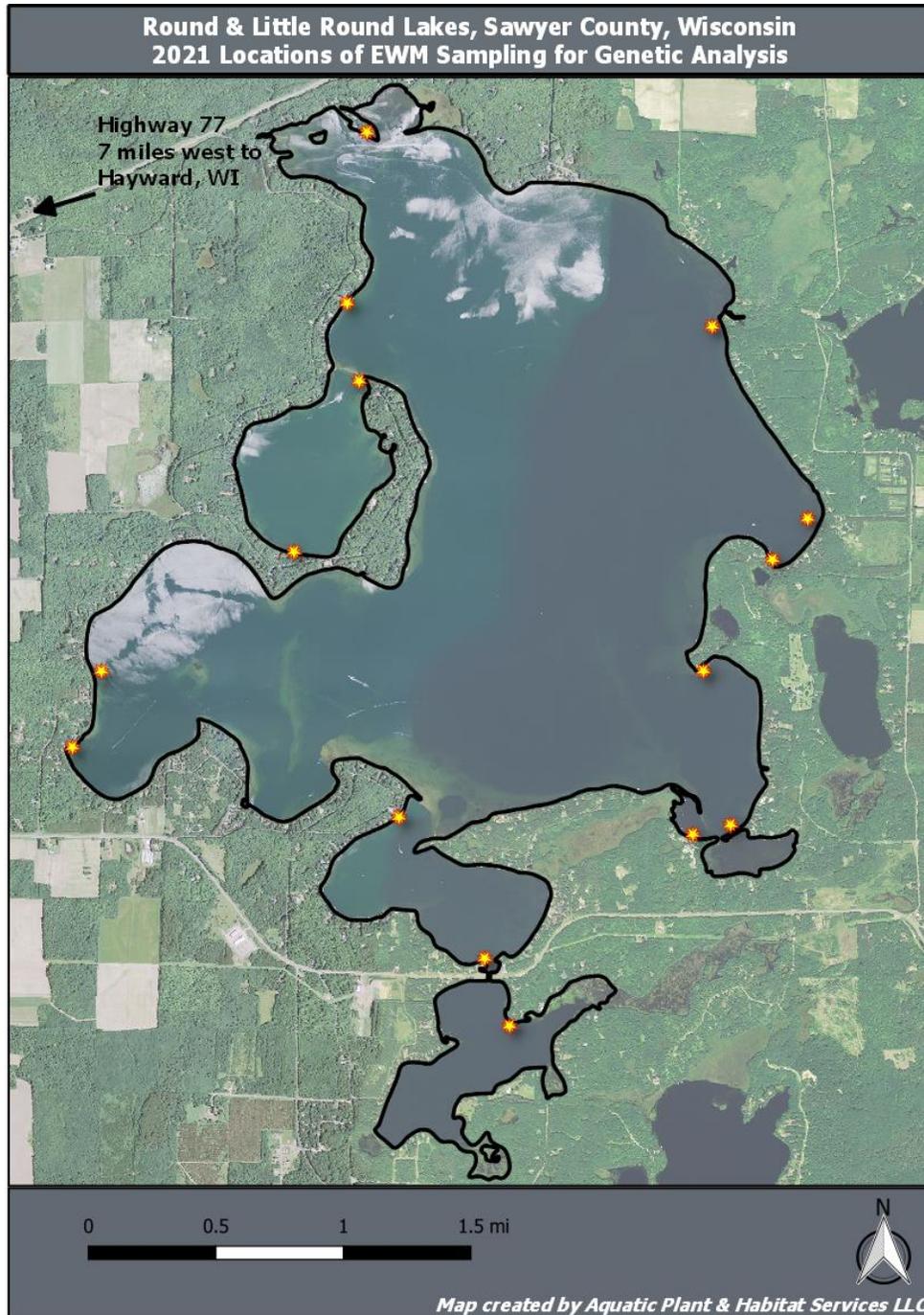
Two locations were sampled after herbicide treatment in 2021 to monitor concentrations of the herbicide ProcellaCOR. Volunteers collected samples at 2, 3, 6, 9, and 24 hours after treatment (HAT), preserved the samples and sent them to a laboratory for analysis. The results are illustrated in Figure 4. The concentrations found in the Richardson Bay treatment area (X20) were about 5 times that of the concentrations found at the Blue Island Bay treatment area (C20). This may have been because X20 was more protected and larger in size whereas C20 was smaller and covered a narrow strip of EWM between shore and a steeply sloped lake bottom. Even though the concentrations of PCOR was very different for both sites, the control of EWM in 2021 was perceived as successful at these two locations because EWM was not detected at X20 and only one occurrence of EWM was recorded at C20.

Figure 4 – PCOR Monitoring Results



EWM Sampling for Genetic Analysis

During the EWM survey, samples were collected for DNA genetic analysis to detect whether hybrid watermilfoil (Eurasian X northern watermilfoil) is present. Existence of hybrid watermilfoils is a recent phenomenon but evidence suggests that traditional herbicides used for EWM, especially 2,4-D, are not as effective in killing hybrid watermilfoils. Results of the genetic analysis are expected in the first quarter of 2022 and will help guide management going forward.



DISCUSSION

Aquatic Plants are Necessary for Healthy Lakes

Aquatic plants serve important functions in lake systems. They provide structural habitat for small invertebrates that are an important food source for juvenile game fish and adult panfish. Plants also provide structural habitat for juvenile and small fish to hide from predators and vice versa as larger predators may lurk in the shadows of plants in wait of forage. Aquatic plants also provide foraging and/or hiding structure for reptiles, amphibians, and waterfowl. The shorelines of lakes are buffered from wave action when aquatic plants absorb some of the wave energy. Aquatic plants are important consumers of nutrients that would otherwise be available for nuisance algal growth. For these reasons, a healthy and diverse aquatic plant community should be protected and valued.

Prioritizing EWM Control

Unfortunately, complete EWM eradication is not a realistic goal. Identifying EWM locations, bed size, density, and plant height helps prioritize management actions. One strategy is to target locations that are of greatest impact to recreation where EWM is most dense with plants near the surface or canopied. This strategy also addresses human-induced fragmentation (i.e. boat motors sever plants and fragments grow new plants). This method of prioritization may call for leaving locations of low density EWM growing well below the surface for close monitoring and future control when the EWM bed becomes larger, taller, or resources are available. These small and scattered colonies would be most appropriate for DASH or volunteer SCUBA divers to remove during organized EWM removal events. Below is a table copied from the 2020 Aquatic Plant Management Plan to help prioritize EWM control efforts for 2022.

Figure 5 – Eurasian Watermilfoil Control Guidance

Criteria for Prioritizing Eurasian Watermilfoil Control					
SIZE	DENSITY	TRAFFIC	IMPAIRMENT	HABITAT	SURVEY DATA
<ul style="list-style-type: none"> •Is the bed size >0.15 acres (6,500 sq ft)? 	<ul style="list-style-type: none"> •Is EWM the dominant species? •Is EWM rake fullness >2 on average? 	<ul style="list-style-type: none"> •Is the EWM in an area of high boat traffic? (especially marina, restaurant, resort, thoroughfare) 	<ul style="list-style-type: none"> •Is this area causing beneficial use impairment? (aquatic plants prevent activities such as angling, boating, swimming, or other navigation /recreation) 	<ul style="list-style-type: none"> •Is EWM the dominant species to the detriment of native plant species? •Would the proposed treatment have limited impact on native plants. 	<ul style="list-style-type: none"> •Has a pre-treatment survey been completed using standardized methods to document location, size, density, and height?
<p>HOW TO USE THESE CRITERIA – Answer the 6 questions for a particular bed of EWM. If the answer is “yes” for most questions (ideally 4 or more), then that bed of EWM may be considered high priority for control actions. For beds of EWM with fewer “yes” answers, control actions can still be considered but perhaps that area is not the highest priority. This graphic is meant to help the RLPOA prioritize where control actions should take place in any given year. Areas that do not receive attention in a given year may be considered higher priority the following year.</p>					