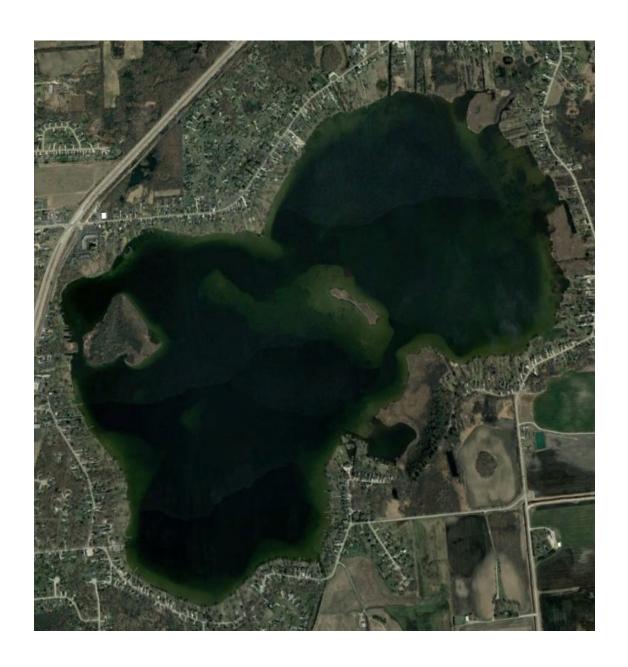
Wind Lake—Racine County, WI Aquatic Plant Survey—August, 2023 And Aquatic Plant Management Plan Update (2024-2028)



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Introduction

In August of 2023 Solitude Lake Management conducted an Aquatic Plant Survey on Wind Lake at the request of the Wind Lake Management District. This survey and report, along with the two others conducted earlier in 2020 and 2022, are intended to monitor the health of the aquatic plant community and satisfy five-year WI DNR Permitting requirements for the District's Mechanic Aquatic Plant Harvesting operations.

Methodology

The protocol for this aquatic plant survey was the same as the earlier survey. It called for the sampling of vegetation at 702 pre-determined sites within the lake. These locations were spaced apart by approximately 72 meters in north-south and east-west transects across Wind Lake using waypoints (longitude and latitude coordinates) provided by the Wisconsin Department of Natural Resources (Figure. #1).

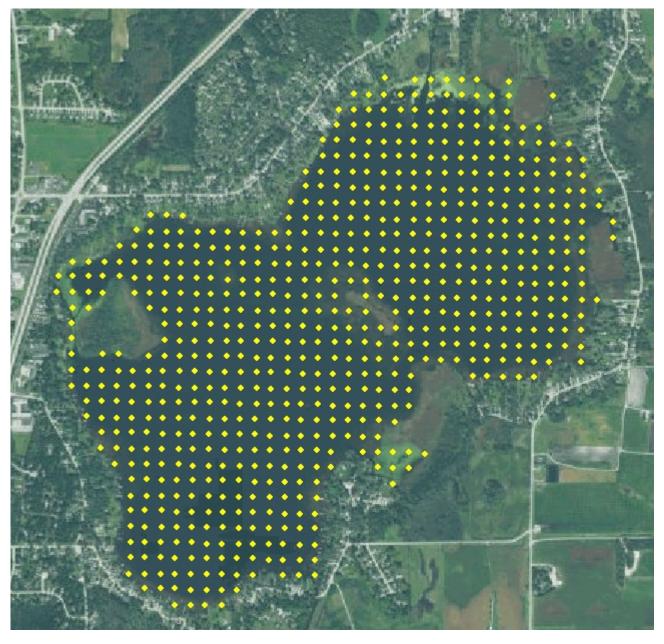
After down-loading of the waypoint coordinates onto an on -board Lowrance Hook-9 Global Positioning System (GPS, the sampling crew navigated to each of the waypoints. At each point, water depth was collected using a Lowrance Model X45 Depth Finder and recorded.

Finally, a double-sided rake head attached to a Pole (P) was lowered to the lake bottom to sample plants at depths of up to ten feet. At greater depths a rake attached to a Rope was cast out, allowed to settle on the bottom, and retrieved. Plants collected were identified to genus with species (if known). Individual plant species density (rake fullness for a single plant type) and total plant density (rake fullness for all plants) determined. This data was then recorded for each site. The rake fullness ratings are as follows:

Fullness Rating	Coverage	Description
1		Only few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2	THE PARTY OF THE P	There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover the tines.
3		The rake is completely covered and tines are not visible.

continued on page 3

Figure 1
Wind Lake—Racine County, WI
Aquatic Plant Survey Point Intercept (PI) Points



Total # PI Points: 702

Aquatic Plant Survey Results

Wind Lake continues to have a well balanced and diverse aquatic plant community, with a Floristic Quality Index (FQI) measuring in the upper quartile of Wisconsin lakes. In terms of number od species present, Wind Lake has a diverse plant population, with plant species, including 27 native species being recorded by either rake sampling or visual identification.

While consistent with earlier surveys, the number of species found has decreased slightly. The include less common species—those having a Frequency of Occurrence of 1% or less, which is detailed on the following page.

In terms of invasive species, Eurasian/hybrid water-milfoil (EWM) and Starry stonewort (SSW) continue to have a presence. Curly-leaf pondweed, while present earlier in the year, was not found during the August 2023 survey. This is not uncommon, as most plants die-off by mid-July, with some re-growth occurring on late Fall.

- Eurasian water-milfoil had a Frequency of Occurrence (FO) of 18.63%, down slightly from 21.29% (2020) and 20.05% (2017). This compares with a historical record indicating that this species had a frequency of 63.80%, nearly three times higher.
- Starry stonewort, having been found in 2017 (43 sites), was found at 88 sites in 2023 (frequency of 24.11%). This is still lower than the 110 sites where it was identified in 2020 (figure 4). Starry stonewort currently has a Frequency of Occurrence greater than that for Eurasian Watermilfoil.
- While Coontail (*Ceratophyllum demersum*) continues to be one of the highest ranked native species (in terms of abundance), it is present at about half the number of sites as compared to 2020. This suggests that it may being replaced by Starry stonewort, particularly in deeper waters (greater than 8 feet.)

A list of species found in Wind Lake during the 2023, 2020, 2017 and 2011 Point-Intecept Surveys is found on Table 1 on the following page. This is followed by a series of maps detailing the location of all exotic species observed during the survey, along with those representing the six top native species, ranked according to abundance (# sites present).

A discussion of the meaning of the Summary Statistics, Frequency of Occurrence, and Maximum Depth of Colonization begins on page 15, along with presentation of the data.

Table 1 List of Aquatic Plant Species Sampled - Wind Lake—Racine County 2023, 2020, 2017, and 2011 Point—Intercept Surveys

By Frequency of Occurrence (%) and Average Rake Density (1-3)

		20	23	20)20	20	17	20)11
Scientific name	Common Name	Freq. %	Density						
Brasenia schreberi	Watershield	٧	V	0.22	1.00	0.50	1.00	-	-
Ceratophyllum demersum	Coontail	32.6	1.75	57.65	2.0	43.81	1.78	69.90	2.10
Chara, sp.	Chara	38.36	1.81	26.39	1.43	36.88	1.89	18.00	1.20
Elodea canadensis	Elodea	0.27	2.00	0.44	1.00	0.50	1.00	6.00	1.20
Heteranthia dubia**	Waterstargrass	6.30	1.52	1.77	1.50	24.10	1.60	1.98	1.38
Lemna minor	Small duckweed	v	v	v	v	v	V	V	v
Myriophyllum sibiricum	Northern watermilfoil	2.47	1.11	-	-	v	V	1.20	1.00
Myriophyllum spicatum	Eurasian watermilfoil	18.63	1.24	21.29	1.23	20.05	1.40	63.90	1.50
Najas flexilis	Slender naiad	5.48	1.45	3.33	1.0	10.89	1.23	2.40	1.50
Najas guadalupensis	Southern naiad	-	-	0.22	1.00	0.25	1.00	-	-
Najas marina	Spiny naiad	0.27	1.00	0.22	1.00	3.22	1.23	10.80	1.70
Nitella sp,.	Nitella	0.82	1.00	2.00	1.00	12.87	1.25	-	-
Nitella obtusa	Starry Stonewort	24.11	1.51	24.83	2.13	10.64	1.98	-	-
Nuphar variagata	Spatterdock	v	v	0.22	2.00	v	V	-	-
Nymphaea odorata	White water lily	3.56	1.38	3.55	1.81	3.47	2.07	2.40	2.00
Potamogeton amplifolius	Large-leaf pondweed	0.27	1.00	0.44	1.00	6.68	1.33	-	-
Potamogeton crispus	Curlyleaf Pondweed	-	-	0.27	1.00	-	-	8.40	1.00
Potamogeton foliosus	Leafy pondweed	-	-	1.55	1.00	0.50	1.00	-	-
Potamogeton friesii	Fries' pondweed	2.74	1.20	2.00	1.00	-	-	-	-
Potamogeton gramineus	Variable pondweed	3.56	1.23	3.99	1.39	1.49	1.33	4.80	1.30
Potamogeton illoensis	Illinois pondweed	21.10	1.18	11.75	1.13	11.63	1.43	19.30	1.10
Potamogeton natans	Floating-leaf pondweed	-	-	-	-	0.50	2.00	-	-
Potamogeton nodosus	Long-leaf pondweed	4.38	1.00	2.88	1.54	1.20	1.00	1.24	1.40
Potamogeton praelongus	White-stem pondweed	0.27	2.00	v	V	0.25	1.00	3.60	1.00
Potamogeton pusillus	Small pondweed	1.37	1.00	1.11	1.00	-	-	-	-
Potamogeton richardsonii	Clasping-leaf pondweed	12.60	1.24	3.99	1.28	4.21	1.18	3.6	1.7
Potamogeton zosteriformes	Flat-stem pondweed	2.74	1.00	3.77	1.12	1.20	1.00	1.24	1.40
Ranunculus aquatilis	White water-crowfoot	0.82	1.00	-	-	-	-		
Schoenoplectus sp.,	Bulush	v	v	v	v	V	V	v	v
Stuckenia pectinata	Sago pondweed	13.42	1.2	13.08	1.17	15.10	1.23	36.1	1.0
Typha sp.,	Cattail	V	V	V	V	٧	V	V	٧
Utricularia vulgaris	Common bladderwort	0.82	1.33	=	-	0.5	1.0	-	-
Vallisneria americana	Eelgrass	53.70	1.6	42.35	1.93	45.79	1.94	47.00	1.70
Wolffia columniana	Common watermeal	V	V	0.22	1.00	٧	V	-	-
Zanichellia palustris	Horned pondweed	-	-	-	-	=	-	6.0	1.2
	Total # Species	30		30		29		23	

^{*2011} Plant Data collected by Aron & Associates

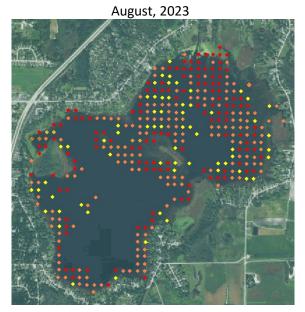
V = Visual Observation Only

^{**} Formerly Zosterella dubia

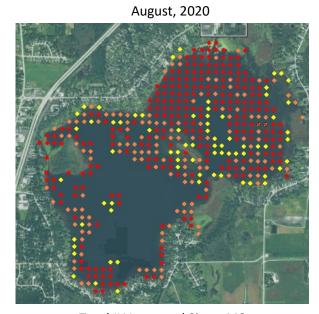
Figure 2

Wind Lake – Racine County, WI

Vegetated Survey Sites - August, 2023, 2020 and 2017

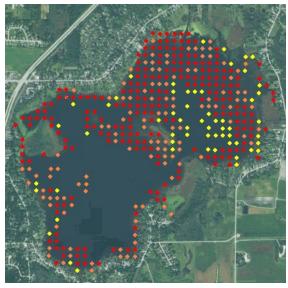


Total # Vegetated Sites: 365



Total # Vegetated Sites: 448





Total # Vegetated Sites: 404

Note: Significant disparity in number of vegetated sites can be attributed mainly to decreased water levels in 2023, which prohibited access to many sampling sites.

Rake Fullness: 1 ♦
2 ♦
3 ♦
Visual ♦

Figure 3 Wind Lake—Racine County, WI Point Intercept (PI) Points with Eurasian Water-milfoil (Myriophyllum spicatum)

of Points Present: 68

August, 2020

of Points Present: 95 (102 w/ Visuals)

August, 2017

of Points Present: 81 (82 w/ Visuals)

Figure 4

Wind Lake — Racine County, WI

Point Intercept (PI) Points with Starry Stonewort (Nitella obtusa)

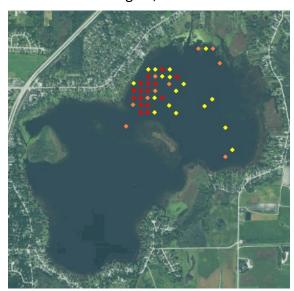
August, 2023

of Points Present: 88

August, 2020

of Points Present: 110 (111 w/ Visuals)

August, 2017



of Points Present: 43

Rake Fullness: 1 ♦
2 ♦
3 ♦
Visual ♦

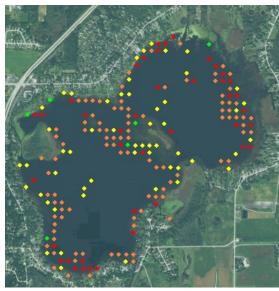
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Figure 5
Wind Lake—Racine County, WI
Point Intercept (PI) Points with Eelgrass (Vallisneria americana)

August, 2023

of Points Present: 196 (201 w Visuals)
Rank: 1

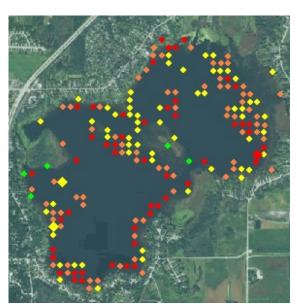
August, 2020



of Points Present: 190 (195 w Visuals)

Rank: 2

August, 2017



of Points Present: 183 (188 w Visuals)
Rank: 1

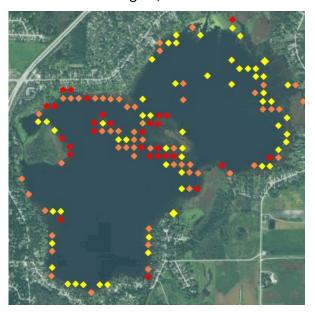
Rake Fullness: 1 ♦ 2 ♦ 3 ♦ Visual ♦

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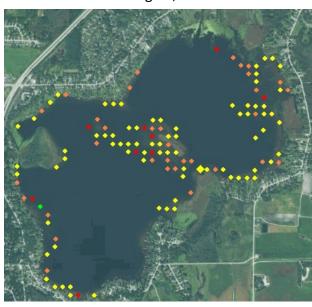
Figure 6 Wind Lake—Racine County, WI Point Intercept (PI) Points with Chara (Chara sp.,)

August, 2023



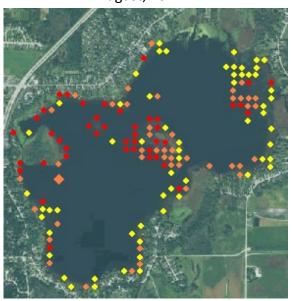
of Points Present: 140 Rank: 2

August, 2017



of Points Present: 119 (120 w Visuals)
Rank: 3

August, 2017



of Points Present: 148 Rank: 3

Rake Fullness: 1 ♦
2 ♦
3 ♦
Visual ♦

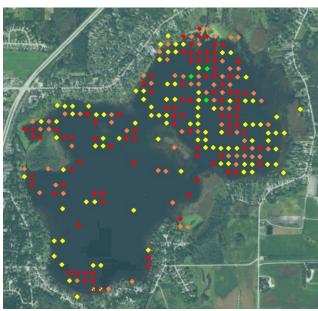
Figure 7
Wind Lake—Racine County, WI
Point Intercept (PI) Points with Coontail (*Ceratophyllum demersum*)

August, 2023

of Points Present: 119

Rank: 3

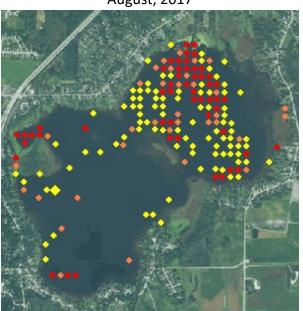
August, 2020



of Points Present: 259 (262 w Visuals)

Rank: 1

August, 2017



of Points Present: 177

Rank: 1

Rake Fullness: 1 ♦
2 ♦
3 ♦
Visual ♦

Figure 8 Wind Lake—Racine County, WI Point Intercept (PI) Points with Illinois pondweed (*Potamogeton illoensis*)

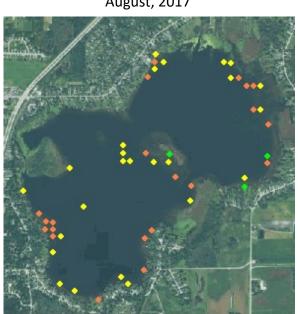
August, 2023

of Points Present: 77 (81 w Visuals) Rank: 4

August, 2020

of Points Present: 53 (67 w Visuals) Rank: 5

August, 2017



Rake Fullness: 1 ♦
2 ♦
3 ♦
Visual ♦

of Points Present: 46 (49 w Visuals)

Rank: 6

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Figure 9

Wind Lake —Racine County, WI

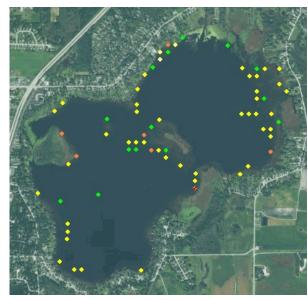
Point Intercept (PI) Points with Sago Pondweed (Stuckenia pectinate)

August, 2023

of Points Present: 49 (50 w Visuals)

Rank: 5

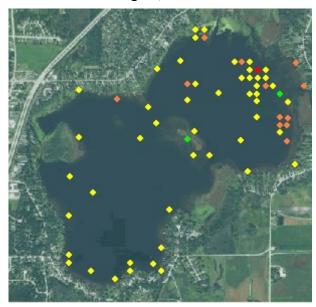
August, 2020



of Points Present: 59 (65 w Visuals)

Rank: 4

August, 2017

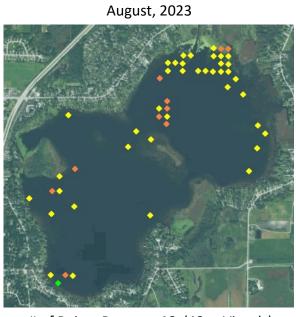


of Points Present: 61 (63 w Visuals)

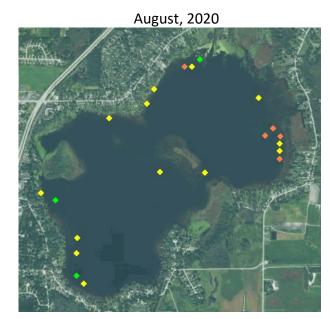
Rank: 4

Rake Fullness: 1 ♦
2 ♦
3 ♦
Visual ♦

Figure 10 Wind Lake —Racine County, WI Point Intercept (PI) Points with Clasping-leaf pondweed (*Potamogeton richardsonii*)

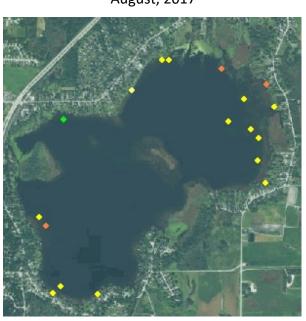


of Points Present: 46 (48 w Visuals) Rank: 6



of Points Present: 18 (21 w Visuals)
Rank: 6

August, 2017

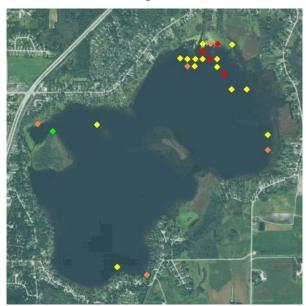


Rake Fullness: 1 ♦
2 ♦
3 ♦
Visual ♦

of Points Present: 17 (18 w Visuals))
Rank: 9

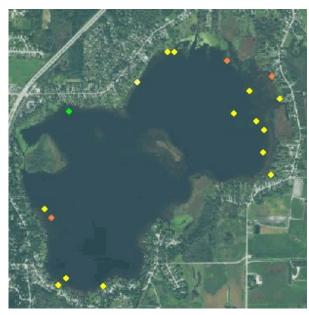
Figure 11 Wind Lake —Racine County, WI Point Intercept (PI) Points with Waterstargrass (Heteranthia dubia)

August, 2023



of Points Present: 23 (24 w Visuals) Rank: 7

August, 2020



of Points Present: 18 (21 w Visuals)

Rank: 7

August, 2017



Rake Fullness:

1 🔷

2 🔷

3

Visual 0

of Points Present: 8 (9 w Visuals)

Rank: 12

Aquatic Plant Survey Results, cont'd. from page 3

Table 2 (page 19) provides a Summary of Statistics for the 2023, 2020 and 2017 surveys (this data was not available for 2011) survey. Floristic Quality Index for the three surveys is found on Table 3 (page 20). Finally, Figure 13 (page 21) provides Depth/Colonization Charts.

A brief discussion of each of these follows:

Total # of Sites w/ Vegetation

The number of sites having vegetation in Wind Lake for 2023 was 365, much lower than the 448 in 2020 and 404 in 2017. This lower number was primarily due to low water levels that prohibited navigation to sites that had been accessible in previous years.

Total # Sites Shallower Than Maximum Depth of Plants

The number of sites shallower than the maximum depth of plants for 2023 was 329. Again, this was much lower than those recorded in 2020 (485) and 2017 (452) due to reduced water levels in Wind Lake.

Relative Frequency of Occurrence

Relative Frequency of Occurrence, presented as a percentage, is the number of sites shallower than the maximum depth that contained vegetation. In 2023, 85.08 % of the sites less than 12 feet in depth had vegetation present. This compares with 92.99% of sites less than 15 ft. in 2020, and 88.94% of sites less than 10 ft. in 2017. These indicate that much of the lake bottom contains suitable substrate and sufficient nutrients, that when combined with sunlight, will develop some form of aquatic vegetation.

Simpson Diversity Index

The Simpson Diversity Index (SDI) measures the diversity of a plant population, using the number of species surveyed and the number of species per site. The decimal scale ranges from 0 (low diversity) to 1 (high diversity). The SDI for the three surveys were 0.89 (2023), 0.86 (2020), and 0.88 (2017). These indicate that that the plant population has an above average level of diversity.

Maximum Depth of Plants

Maximum depth of plants was 12 feet for the 2023 surveys, which is fairly consistent with the 15 feet recorded for the 2020 survey and 10 ft. in 2017. It should be noted that in 2011 the maximum depth of plants in Wind Lake was 18 ft., the year following treatment with alum.

While some exceptionally clear lakes can support plant growth in waters up to 25 feet deep, turbid waters may not support much growth beyond 6-8 feet. Thus, Wind Lake falls in the average to slightly better-than-average in terms of maximum rooting depth of plants for area lakes.

Aquatic Plant Survey Results, cont'd.

Average # of Species Per Site (Shallower than maximum depth) and Average # of Species (vegetated sites only)

These values were as follows:	Aug., 2023	Aug., 2020	Aug., 2017
Avg. # Species/Site (shallower than max. depth):	2.14	2.13	2.09
Avg. # Species/ Site (vegetated sites only) :	2.52	2.30	2.35

The values for are all very similar, with the higher value in 2023 due to the number of sites that could not be accessed due to lower water levels.

The above values reflect both the native and non-native (exotic) plant populations. It should be noted that lakes with plant populations dominated my only a few species (whether native or not) will have a lower number of average species per site. While Wind Lake is dominated by Eelgrass (*Valisneria americanaa*), *Coontail* (Ceratophyllum demersum) and Chara, sp., ample space and nutrients allow for many different species at lower densities, especially in shallower, undisturbed portions of the lake where as many as 4-6 different species may be sampled from a single site.

Avg. # of Native Species/Site (shallower than max. depth) and Avg. # of Native Species/ Site (vegetated sites only)

These values were as follows:	Aug., 2023	Aug., 2020	Aug., 2017
Avg. # of Native Species/Site (shallower than max. depth):	1.98	1.93	1.88
Avg. # of Native Species/ Site (vegetated sites only) :	2.33	2.09	2.12

These statistics reflect changes in the native plant community alone, as compared to averages for the entire community, including exotics (Eurasian watermilfoil/Curly-leaf pondweed, etc.). When compared with those for the entire community (both native and exotic), it is indicateve of the amount of influence that the exotic species have on the native plant community.

While both Eurasian/hybrid water-milfoil (*Myriophyllum spicatum* or "EWM") and Starry stonewort (*Nitella obtuse or "SSW"*)) have a significant presence, this data indicated that it is not having a dramatic impact upon the overall diversity of the native plant population. That is, while individual native species may experience a decline, the overall plant community remains in a good condition. The higher values in 2023 indicate that non-native species have had a slightly lower influence than in preceding years)

Species Richness

This Statistic indicates the number of species observed (either collected by rake or identified visually). The Species Richness for the three surveys are as follows: Year #Species #Species (inc. Visuals)

Year	# Species	# Species (inc. visuals
2023	25	30
2020	28	30
2017	26	31

These statistics indicate that Wind Lake has a very diverse plant populations. By contrast, "average lakes" may have 15-20 species (or less). While individual species may decline or increase in frequency of occurrence in a given year, these are replaced by an increase of abundance of other species. Wind Lake, in spite of intense recreational use, has some fairly extensive shallow areas that are inaccessible to power boats, which provides a refuge for a number of plant species.

Floristic Quality of Index

The Floristic Quality Index (FQI) is a measure of a plant community's closeness to an undisturbed condition. Urban lakes, or those with a high level of boat traffic have lower FQI's, meaning fewer species or lacking specific native species that are often associated with undisturbed conditions.

FQI's for any particular lake are often compared to regional or state-wide averages in order to provide perspective. FQI values representing the highest value of the lowest quartile, mean and bottom of the highest quartile of all Wisconsin lakes are 16.9, 20.9, and 27.5.

The FQI for Wind Lake for the August 2023 survey is 28.15 (see Table 3, page 19). This is comparable to those in 2020 (28.98) and 2017 (29.19). The slight difference is due to both the quantity and type of species being present.

Wind Lake continues to have a very high FQI, ranking in the upper quartile of all Wisconsin lakes.

This concludes the presentation and discussion of the Aquatic Plant Survey Data collected from the August, 2023 survey and comparison to the 2020 and 2017 surveys.

An Update to the Wind Lake (2017) Lake Management Plan begins on page 22.

Table 2
Summary Statistics for August, 2023, 2020 August, 2017 Aquatic Plant Surveys*
Wind Lake —Racine County, WI

Statistic	2023	2020	2017
Total number of sites visited	609	648	650
Total number of sites with vegetation	365	448	404
Total number of sites shallower than maximum depth of plants	429	485	452
Frequency of occurrence at sites shallower than maximum depth of plants	85.08	92.99	88.94
Simpson Diversity Index	0.89	0.86	0.88
Maximum depth of plants (ft)**	12.0	15.0	10.0
Number of sites sampled using rake on Rope (R)	71	113	33
Number of sites sampled using rake on Pole (P)	376	372	144
Average number of all species per site (shallower than max depth)	2.14	2.13	2.09
Average number of all species per site (veg. sites only)	2.52	2.30	2.35
Average number of native species per site (shallower than max depth)	1.98	1.93	1.88
Average number of native species per site (veg. sites only)	2.33	2.09	2.12
Species Richness	25	28	26
Species Richness (including visuals)	30	30	31

Table 3
Floristic Quality Index (FQI) August, 2023 and August, 2017 Aquatic Plant Surveys
Wind Lake —Racine County, WI

Species	Common Name	С	2023	2020	2017
Brasenia schreberi	Watershield	6		1	1
Ceratophyllum demersum	Coontail	3	1	1	1
Chara	Muskgrasses	7	1	1	1
Elodea canadensis	Common waterweed	3	1	1	
Heteranthera dubia	Water star-grass	6	1	1	1
Myriophyllum sibiricum	Northern water-milfoil	6	1		
Najas flexilis	Slender naiad	6	1	1	
Najas guadalupensis	Southern naiad	8		1	1
Nitella	Nitella	7	1	1	
Nuphar variegate*	Spatterdock			1	
Nymphaea odorata	White water lily	6	1	1	1
Potamogeton amplifolius	Large-leaf pondweed	7	1	1	1
Potamogeton foliosus	Leafy pondweed	6		1	1
Potamogeton friesii	Fries' pondweed	8	1	1	
Potamogeton gramineus	Variable pondweed	7	1	1	1
Potamogeton illinoensis	Illinois pondweed	6	1	1	1
Potamogeton natans	Floating-leaf pondweed	5			1
Potamogeton nodosus	Long-leaf pondweed	7	1	1	1
Potamogeton praelongus	White-stem pondweed	8	1		1
Potamogeton pusillus	Small pondweed	7	1	1	1
Potamogeton richardsonii	Clasping-leaf pondweed	5	1	1	1
Potamogeton zosteriformis	Flat-stem pondweed	6	1	1	1
Ranunculus aquatilis	White water-crowfoot	8	1	1	
Stuckenia pectinata	Sago pondweed	3	1	1	1
Utricularia vulgaris	Common bladderwort	7	1		1
Vallisneria americana	Wild celery	6	1	1	1
Wolffia Columbiana*	Common watermeal	5		1	
N	21	23	23		
mean C		6.14	6.04	6.09	
FQI			28.15	28.98	29.19

CITATION: Nichols, SA. 1999. Floristic Quality Assessment of Wisconsin Lake Plant Communities with Example Applications. Journal of Lake and Reservoir Management, 15(2):133-141.

CITATION: University of Wisconsin-Madison, 2001. Wisconsin Floristic Quality Assessment (WFQA). Retrieved October 27, 2009 from: http://www.botany.wisc.edu/WFQA.asp

^{*} Both Spatterdock and Common watermeal were visual identified in earlier surveys, however, these observations are not included in the FQI statistics for those years.

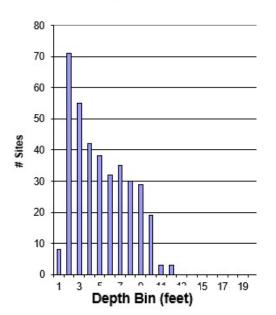
Figure 13

Depth/Colonization Chart for Wind Lake –Racine County, WI

August, 2023 Survey

DEPTH BIN (# SITES (NO ENTRY)
1	8
2	71
3	55
4	42
5	38
6	32
7	35
8	30
9	29
10	19
11	3
12	3
13	0
14	0
15	0
16	0
17	0
18	0
19	0

Maximum Depth of Plant Colonization



August, 2020 Survey

	SITES (NO ENTRY	1
1	14	
2	60	
3	43	
4	58	
5	46	
6	34	
7	38	
8	36	
9	37	
10	20	
11	31	
12	20	
13	6	
14	2	
15	3	
16	0	
17	0	
18	0	
19	0	

Maximum Depth of Plant Colonization

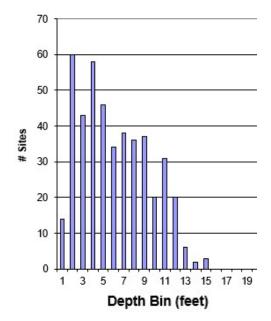
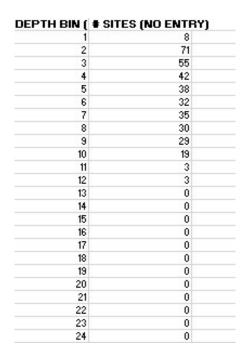
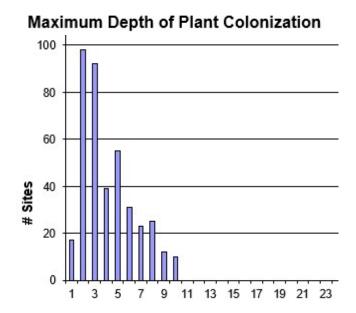


Figure 13 (continued) Depth/Colonization Chart for Wind Lake –Racine County, WI

August, 2017 Survey





Depth Bin (feet)

An Update to the Wind Lake Aquatic Plant Management Plan

Introduction

The 2018 Aquatic Plant Management Plan for Wind Lake (current) was published in December, 2017 by Aron & Associates. Chapter V of this Plan (pages 31-43) reviewed a wide range of control alternatives that were available to the District and its members. This review included the benefits, limitations, potential utility/feasibility and cost of each. Based upon this review, a Plant Management Plan was created (Chapter VI, pages 45-54) which began with a statement of Goals and Objectives to be used to accomplish each of the goals, which is, as follows:

The District desires to:

- Minimize fragments of aquatic plants that are caused by the high volume of boating traffic and natural processes.
- Control exotic and nuisance plant species and maintain recreational access for lake users by:
 - a) Using selective chemical treatments
 - b) Harvesting
 - c) Encouraging landowners to protect native species.
- Preserve and enhance the natural lake ecosystem by:
 - a) Educating landowners and lake users in lake ecology.
 - b) Working with the Town, County, and State governments to review existing ordinances and, if necessary, develop and enforce ordinances to protect Wind Lake.
 - c) Continuing to improve the watershed to protect Wind Lake.
- Identify and expand local educational efforts that the District may undertake to improve the public's understanding of lake issues by:
 - a) Distributing at least two newsletters per year.
 - b) Encouraging community involvement in lake management activities.
- Conduct in-lake management activities with the long-range goal of minimizing the management as much as possible by:
 - a) Conducting evaluations as to the success of plant management activities and the community reaction to the activities.
 - b) Tracking the annual progress of lake management activities.
 - c) Conducting water quality monitoring efforts to assist in the documentation of results.
 - d) Developing and implementing a plan for a quick response to invasive species.

The Goals and Objectives of the District remain the same for the next five years (2024-2028). With minor exceptions, which will be noted, the tools that will be implemented to achieve these goals will remain the same. While some minor changes have taken place within the Wind Lake aquatic plant community since 2018, it remains healthy and diverse. Statistics for Species Richness, Floristic Quality, and Simpson Diversity Indices are quite high and consistent with those obtained during the 2017 Plant Survey.

Aquatic Plant Management Activities 2018-2023

During 2018-2023 the Wind Lake Management District (WLMD) and Wind Lake Riparian Owners conducted the following aquatic plant management activities:

I. Mechanical Harvesting

Mechanical Harvesting was conducted in accordance with the WI DNR Permit Map located on Figure:14, (following page).

The Annual Harvesting Report submitted to the WI DNR indicates the following Efforts (Total # Hours), acreage involved and harvested plant volume, as expressed in either the number of harvested loads, or cubic feet of material provided in the Table below

Table 4

Mechanical Harvesting Efforts by Wind Lake Management District
(2018-2023)

Year	Harvesting Effort (hrs.)	Acres	Cubic Ft./Loads*
2018	104.5	ns	57*
2019	161	na	108*
2020	229.5	301	28,842
2021	184	301	27,840
2022	100	250	12,000
2023	251	150	30,375

^{*} Data provided in terms of Loads during 2018-2019

During the period of 2018-2020, the WLMD contracted for harvesting services with Clearwater Plant Harvesters of Crystal Lake, IL. WLMD purchased a harvester and began operations in June, 2021.

The District operated harvesting program has been quite effective, with some limitations due to permit conditions that must be adhered to, along with challenges presented by changing growth conditions from year to year, as well as fluctuations in water levels. Some of these will be addressed in the section entitled Recommended Plant Management Activities, 2024-2028

II. Roadside Pick Up of Aquatic Plant Debris

This program allows for the disposal of plants/fragments by riparian owners who remove them from the lake and transport them to the roadside. Fourteen pickups are scheduled between May and October prior to the start of each season.

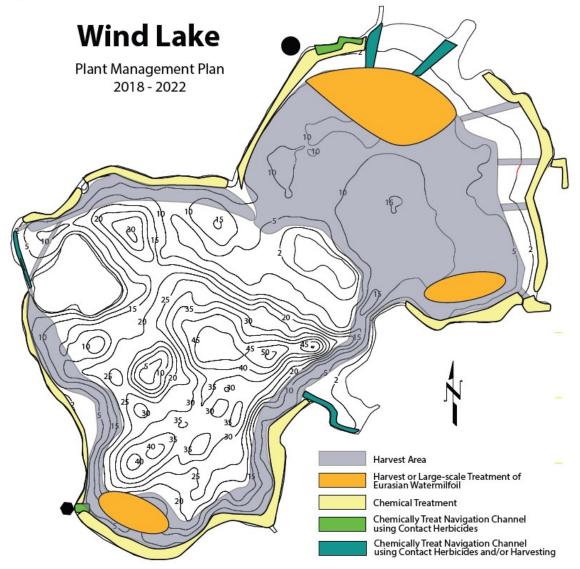
III. Chemical Treatments for Aquatic Plant/Algae Control

Chemical controls have been used from 2018 thru 2023 for the control of invasive species, such as Eurasian watermilfoil (EWM), Curly-leaf pondweed (CLP) and/or Starry stonewort (SSW). They have also been used to control native species in shallow (<3 ft.), high-use areas that have been designated as such. These Areas are detailed on the Chemical Control Permit Map found in Figure 14, following page.

Figure 14

Aquatic Plant Management Plan Map for WI DNR Harvesting Permit (2018-2023)*

* Wind Lake Aquatic Plant Management Plan, 2018 by Aron and Associates



Chemical Treatments for Aquatic Plant/Algae Control, cont'd from preceding page

Minimizing the nuisance of invasive species, that is, interference with navigation and/or reducing their abundance from one of dominance to one of presence in high-use areas is the primary objective of the invasive species control portion of the treatment program.

Similarly, control of native species is required in certain, near shore, high-use areas where their density is sufficient to significantly impede with navigation. These areas are quite shallow (<3 ft. deep), too shallow to mechanically harvest.

Treatments for algae control, while relatively common, are needed from time to time when algae mats accumulate in mats up to 30-50 ft. wide. This is most common during relatively dry, calm and sunny periods which favor the development of surface mats of algae along most of the lake shoreline. Moderate south winds can transport mats of algae from the south side of the lake to the north, creating wide-scale infestations from behind Wood's Island to the west, all the way to the Muskego Canal on the east.

Fortunately, these mats are frequently taken care of by nature when cloudy weather arrives, accompanied by strong winds and/or heavy storms that disperse these troublesome accumulations. Still, there are times when intervention is required, and the WLMD Board and the applicator attempt to limit algal treatments to only when conditions are very severe.

Figure 15 (page 26) and Table 5 (page 27) detail the locations where herbicide/algaecide treatments occurred, and the nuisances present during 2018 to 2023. Data on the acreage treated is provided as well as the products used for the varying forms of vegetation.

IV. Hand Removal

Due to the abundance of plants, combined with limited water depth, conflicts with activities including boating and swimming will occur. Rooted plants and/or plant fragments in high use areas are best controlled using hand removal. To assist in this process the District has implemented a Roadside Pick-up as discussed previously.

V. Water Quality Monitoring

The District contracts with the United States Geological Survey (USGS) to monitor lake levels, with readings taken every fifteen minutes, which is then uploaded to the USGS site at www.usgs.gov.

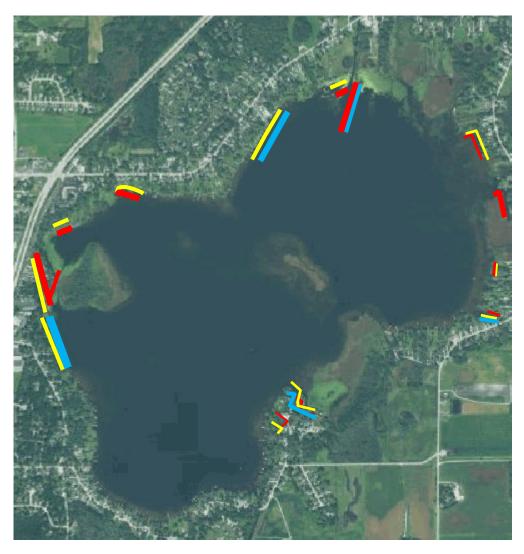
VI. Education and Information

The Wind Lake Management District maintains a website at wlmd.org. This site contains information on District meetings, projects, aquatic plants, fish, copies of District harvesting and chemical control permits, and boating regulations. Newsletters are published twice per year and copies of these are available for review on the website.

VII. Watershed Controls

This has included working with Racine County and/or the Town of Norway to develop Land Use and Storm Water Planning to minimize nutrient and sediment-rich runoff from entering the lake, as well as educating riparian owners on proper shoreline landscape procedures.

Figure 15
Location of Chemical Treatments (2018-2023) by Target Species



• Shallow water areas. Treatment required to maintain navigation, including both native and/or exotic species (inc. Starry stonewort).

Invasive Species (Eurasian watermilfoil, Curly-leaf pondweed .

Algae control occasionally required when dense, surface matting occurs.

Table 5
Chemical Treatments (2018-2023) by Target Species and Approximate Acreage Treated

Year	Curly-leaf	Eurasian	Filamentous.	Native Species	Starry
	pondweed	water-milfoil	Algae		Stonewort
2018	2.0	9.6	11.5	2.8	61.0*
2019		1.3	18.7	10.5	3.6
2020	1.75	5.5	8.0	6.75	1.0
2021	12.0	12.0		4.3	2.0
2022	3,3	5.0		14.2	2.0
2023	7.25	7.25	5.0	4.0	2.8

Herbicides/Agaecides Used and Target Species

Herbicide/Algaecide Name	Target Vegetation Types
Cutrine-Plus, Cutrine Ultra, Captain XTR	Filamentous algae, Starry Stonewort
Aquathol-K	Curly-leaf pondweed and or Broad-Spectrum control (all species) in navigational areas
Weedar 64	Control of Eurasian watermilfoil and/or Water Lily (for navigational impediments only)
Tribune	
Hydrothol 191 Algaecide	May be used in conjunction at low concentration (less than 0.3 ppm) for control of Starry stonewort)

Summary of Recommended Aquatic Plant Management Activities for Wind Lake, 2024-2028

As mentioned previously, the Wind Lake Management Plan developed in 2018 was quite comprehensive and has both successfully guided the Wind Lake Management District's lake management activities while also providing a level of protection to the lake itself.

Chapter VI of the 2018 Wind Lake Aquatic Plant Management Plan (pages 47-54) contain eleven different activities that were recommended to monitor and protect water quality, educate lake users as to the benefit of aquatic plants, and offer guidance for control of aquatic plants, when and where necessary. This section of the 2018 Plan has been placed in the Appendix (Appendix I) to serve as a reference, as it offers a great deal of information, particularly in regards to discussion of of Chemical Controls, specific instructions and considerations with Mechanical Harvesting, as well as suggestions for procedures to be implemented should new non-native species be encountered.

Table 6 (page 30) lists the recommended activities to be included in the 2024-2028 Wind Lake Management Plan, along with a reference to the Appendix where additional information from the 2018 Wind Lake Aquatic Plant Management Plan may be found. Additions or modifications to the existing (2018) Plan are highlighted below:

Additions/Modifications to the 2018 Wind Lake APM Plan

A. Mechanical Harvesting

The WLMD is considering the purchase of a second, smaller mechanical harvester. The primary reason for this is greater flexibility. While the existing (larger) harvester does suit the District's needs, it does have limitations. The primary limitation is that it requires water of a certain depth, whether it is loaded with aquatic plants or not. While harvesting is not allowed in waters less than 3 feet deep, irregular contours in depth, hazards including extensive shallow "Flats", and rock piles make transit to and from harvest areas a challenge, even with "normal" water levels. Navigation was made even more difficult by the declining water levels experienced during the 2023 summer season. The District believes a smaller, lighter harvester carrying a smaller load of plants and requiring less depth may allow for greater flexibility, as well as serving as a "Back-Up" when the larger harvester is "down" for maintenance or repairs.

A copy of the 2018-2023 Mechanical Harvesting Permit, including a Map of areas to be managed is located in Appendix II. It will need to be reviewed and updated, as necessary and attached to the 2024-2028 permit application. Appendix III is a map detailing the harvester unloading and plant disposal location, which must also be attached to future WI DNR Mechanical Harvesting permit applications

B.. Chemical Controls

Table 5, page 27 detailed areas of the lake that were commonly treated during 2018-2023, the target species present, herbicides used and acreage treated. These treatments fell within the guidelines established in the 2018 Plan (see Map on page 26 and in Appendix I, pages 48-49). Since 2018 there have been some changes in WI DNR Policies that deserve mention,. These include:

- 1) Large-scale treatments of EWM using 2,4-D herbicides must be conducted prior to July 1: Data compiled by the DNR suggests that the risk to native, non-target plant species, may be greater for treatments conducted later in the season. Therefore, treatments occurring later than July 1 will be limited to narrow lanes where significant impediments to navigation occur.
- Treatments for Starry stonewort (SSW) to be limited in scope: The WI DNR has also collected considerable data on treatments targeting SSW. Results of these treatments appear "mixed", with a limited degree of control being exhibited over the short-term (measured in weeks). Thus, DNR has established a Policy limiting treatments of this species to those for navigational access where significant impediments occur.

Chemical Controls continued from preceding page

3. "Significant impediment to navigation" defined: This covers any treatment conducted, whether for native or non-native species, for purposes of maintaining navigational access. Plant growth must be at a sufficient density, and within two feet of the water surface to be considered an impediment. Treatments will be limited to channels of sufficient width to allow for safe operation of opposing boat traffic at posted speed limits. In shallow, near-shore areas, treatments will be limited to 30-50 ft. in width.

Pages 36-39 of the 2018 Plan (Appendix V.) provides an extensive review of the need for herbicides treatments, the benefits and drawbacks/limitations of these treatments, the margin of safety involved to non-target organisms (e.g., fish/wildlife), their mode of action (Systemic vs. Contact), as well as purpose ("Spot" or Shoreline vs. Large-Scale Treatments). It also provides a review of all herbicide/active ingredients that were available when the Plan was published.

For those interested in reviewing this information, this section of the 2018 Plan has been placed in the Appendix. A Table listing the products currently in use for plant control within Wind Lake is located on Table 5 (page 27), along with pertinent information regarding their use. Additional information not covered in the earlier Plan includes:

1) The herbicide, ProcellaCOR EC. Active ingredient, Florpyrauxifen-benzyl. In use since 2018, this relatively new product has demonstrated a very high degree of control on EWM. It is a contact-type herbicide that has a rapid uptake by plants, requiring a shorter contact time with target plants. This is an advantage over slower acting herbicides (such as 2,4-D), particularly when treated waters are subject to movement/mixing with adjacent untreated.

The primary disadvantages of this product include it's relatively high cost. Costs of \$1,000.00-\$2,000.00 per acre (or more at greater depths), as compared to \$400.00-\$600.00/acre using liquid 2,4-D. While the manufacturer may provide a 90% *control guarantee of 3 years,* this only applies to contiguous, regularly-shaped areas greater than 10 acres in size. While smaller areas may be treated successfully, these will not be covered by the manufacturer's warranty.

Since the majority of herbicide treatments for EWM control consist of rather narrow, and smaller treatment areas (1-5 acres in size), with satisfactory (season-long) control provided by 2,4-D, the use of ProcellaCOR EC on Wind Lake may not be cost effective. In the event that the severity of EWM infestations in the shallower east side of Wind Lake become too great a challenge for harvesting operations, ProcellaCOR EC may prove a viable alternative, particularly if treating an area 10 acres or greater in size.

Finally, Appendix IV contains a Proposed Treatment Area Map for the 2023 season and provides some detail on what areas of the lake may be treated, potential species that may be encountered, and the purpose of the treatment (aquatic invasive species control vs. nuisance relief in shallow navigational areas).

Nutrient Management/Alum Treatment

While not a viable control for aquatic plants, as plants obtain most of their nutrients from the bottom sediments directly rather than from the water column, Wind Lake was treated with Alum (aluminum sulfate) in 1995 and 2011 to reduce Total Phosphorus concentrations.. Pre and Post Treatment Water Quality Data detailing parameters such as Total Phosphorus, Chlorophyll and Secchi Disc (Water Clarity), as reported in the 2018 Wind Lake Aquatic Plant Management Plan is found on Appendix VI. Discussion has begun on if, and when the next Alum treatment should be conducted.

It is recommended that the Wind Lake Management District investigate the initiation of a Water Quality Monitoring program that includes those parameters to help determine when the next alum treatment may be required, and assist with any Pre Treatment Monitoring that may be required by the WI DNR as part of the required permit.

Table 6 Recommended Lake Management Activities for Wind Lake 2024-2028

Activity and 2018 Plan Reference	Notes
Water Quality Monitoring (Appendix I, page 47)	Includes continued stage recorder monitoring at dam by USGS. Recommend monitoring of Total Phosphorus, Chlorophyll and Secchi Disc (water clarity), to assist in decision making in regards to timing of future alum treatment.
Physical Removal (Appendix I, page 47)	Educate and promote removal of floating plant debris in pier/swim areas by property owner. Physical Removal of rooted plants limited to 30 feet of shoreline w/o WI DNR permit approval. Removal along greater than 30 ft. of shore requires WI DNR Permit (exception for non-native species). DNR Permit is required if property is within Sensitive Area for any removal activity.
Information and Education (Appendix I, page 47)	Ongoing. Maintain wlmd.org website, informing the public about the benefits of the native plant population, identification of aquatic invasive species, limiting their spread, and the controls available, along with regulations pertaining to their use, and scheduling of District services.
Watershed Controls, Land-Use and Stormwater Planning (Appendix I, page 48)	Ongoing. Cooperate with Town and County to implement procedures that will protect water quality by minimizing sediment and nutrient inputs into the lake. Provide links on website, including WI DNR and UW -Ext that will assist riparian owners with proper landscaping along their shoreline, including fertilizer, use, natural landscaping, etc.)
Herbicide Treatments (Appendix I, pages 48-49) Appendix IV	"Spot" treatments for selective control of Curly-leaf pondweed (CLP) and/or Eurasian water-milfoil (EWM) as needed to minimize impacts upon the native plant community and recreational uses. Control of native species in established navigation lanes, as outlined in Proposed Chemical Treatment Map (Appendix IV.)
	Treat Starry stonewort (SSW) in designated navigation lanes, where present at sufficient density/height to provide a significant impediment to navigation. Most of these areas are too shallow for Harvester (< 3 ft. deep). Treat, as needed 1-3 times per summer.
Mechanical Harvesting (Appendix I, pages 49-51)	Ongoing. Mechanical harvesting and/or skimming of plants may continue, along Roadside Pick-Up of plants. Evaluate cost/benefit of second, smaller harvester to improve access to areas with limited depth.
	Familiarize equipment operators with proper harvesting procedures (Appendix I, pages DNR permit required. Application includes map of areas to be harvested and location where plants will be disposed of. Any changes will require notification of DNR and approval. Either paper or electronic copy of Mechanical Harvesting Permit must be kept aboard Harvester.
Boat Launch Activities (Appendix I, page 52)	Maintain educational signage at Public Boat launch informing public on identification of aquatic invasives species, and proper inspection/decontamination of equipment prior to and after launching of watercraft. Consider participation in Clean Boats Clean Waters (CBCW)
Aquatic Plant Monitoring New Infestations of Exotic Species Contingency Plans (Appendix I, page 52-53)	Ongoing. Includes Visual Surveys prior to any treatments. Document presence of aquatic invasive species (EWM/CLP/SSW) and/or native species (in navigational channels). Continue to closely monitor extent of SSW, particularly in northeast quadrant of lake, which is currently growing within 1-2 feet of the lake bottom, thereby not interfering with recreational use of lake.
Aluminum Sulfate (Alum) Treatment	Full PI Survey (every five years) if District wishes to maintain 5-year Harvesting Permit. Evaluate cost/Planning for future Alum Treatment based upon need— current water quality data in comparison with historical records. Consult with DNR to determine what water quality data may be required in support of future permit application

Appendix

- Appendix I. Recommendations for Lake Management Activities. 2018 Wind Lake Aquatic Plant Management Plan, Aron & Associates, pages 47-54.
- Appendix II. Wind Lake—Racine County, 2018-2023 WI DNR Mechanical Harvesting Permit
- Appendix III. Wind Lake Management District— Location of Harvester Un-loafing and Aquatic Plant Disposal Site
- Appendix IV. Map of Wind Lake Proposed Chemical Treatment Areas—2023
- Appendix V. Discussion of Chemical Control Alternatives, , 2018 Wind Lake Aquatic Plant Management Plan , Aron & Associates, Chapter V., pages 36-39.
- Appendix VII. Water Quality Data for Wind Lake, 1995-2015, 2018 Wind Lake Aquatic Plant Management Plan, Aron & Associates, page 13.

Appendix I

Recommend Lake Management Activities for Wind Lake 2018-2023

RECOMMENDATIONS

WATER QUALITY MONITORING

The District should continue to conduct water quality monitoring on Wind Lake. The stage recorder and rain gauge on the Wind Lake dam should be continued. Monitoring should continue to include nutrients as well as clarity.

HAND CONTROLS

Riparians should be encouraged to use the least intensive method to remove nuisance vegetation. This could include minimal raking and pulling. NR109 allows landowners to remove plants from an area up to 30 feet wide without a permit. The 30-foot area includes the swimming and pier areas. Landowners may manually remove Eurasian watermilfoil and curly-leaf pondweed from the remainder of their shorelines without a permit, without the use of auxiliary power. Removal of native plants beyond that allowed in the 30-foot area, will require a WDNR permit. If screens are considered by individuals, a WDNR permit will be required.

Riparians should be encouraged to allow native plants to remain. This will help prevent infestation of the areas by Eurasian watermilfoil, curly-leaf pondweed and starry stonewort. The native plants will also help stabilize the sediments.

The District should inform landowners about the importance of keeping their shorelines free of floating plant debris. Wave action can carry plant fragments into new areas, possibly aggravating nuisance conditions. Plant debris can be used in mulch piles or gardens.

The District should inform landowners about the importance of keeping their shorelines free of floating plant debris. Wave action can carry plant fragments into new areas, possibly spreading nuisance conditions. Plant debris can be used in mulch piles or gardens, or picked up in a roadside weed pickup program.

EDUCATION AND INFORMATION

The District should take steps to educate property owners regarding their activities and how they may affect the plant community in Wind Lake. Informational material should be distributed regularly to residents, landowners, and lake users and local government officials. A newsletter to landowners and residents should be part of the annual plant management budget. Topics should include information relating to lake use impacts, importance and value of aquatic plants, land use impacts, etc. Information on shoreline restoration and plantings can be provided. Publications are available that list sources of plants and methods of creating buffers. Other issues that should be addressed may include landscape practices, fertilizer use, and erosion control. Existing materials are available through the WDNR and the UWEX. Other materials should be developed as needed. The Town provides an informational materials rack in the Town Hall and should continue to stock various lake handouts.

District board members have participated in training for the Clean Boats Clean Waters programs sponsored by the WDNR.

The District should also enlist the participation of the local schools. The schools could use Wind Lake as the base for their environmental education programs. Some schools have a mandatory community service requirement that may be tapped to assist with lake management activities. Regular communication with residents will improve their understanding of the lake ecosystem and should lead to long term protection.

The District should inform residents about the lake management activities that are undertaken and the reasons behind the activities.

Appendix I - continued

WATERSHED CONTROLS

The District should continue to work to improve the quality of water runoff into Wind Lake. The watershed should be toured regularly for identification of new problems.

The District should work with the Town and County officials to encourage rigid enforcement of erosion control in the watershed and consideration of lake-friendly methods of development and road construction.

The District should develop response plans for activities upstream that impact Wind Lake:

- A plan should be developed to ensure that upstream activities include the containment of nutrient and sediment to protect Wind Lake. This should include lake restoration activities on Big Muskego Lake that could impact Wind Lake by discharging sediments downstream.
- A plan and budget should be established to be able to react to unusual events such as cattail bogs
 coming downstream during high waters. The City of Muskego has cooperated by attempting to prevent
 the discharge of bogs from Big Muskego Lake by removing them upstream of the Big Muskego Dam.

LAND USE PLANNING

Development proposals should be analyzed with the lake in mind and revised if necessary to protect the lake from damaging runoff. Long range planning should ensure that future development includes lake protection.

STORM WATER PLANNING

The District should review any new development proposals in the watershed to ensure that the lake will not be damaged by changes in flows or quality of stormwater. The Town of Norway has applied for, and received grants to assist with their land use and storm water plans. The District may work with the Town and County to develop, refine, and implement storm water ordinances. The District should work with the Town to educate residents on the importance of the use of phosphorus-free fertilizer and the state and local ordinances that requires its use.

CHEMICAL TREATMENT

- Contact herbicides may be used in limited areas to reduce nuisance levels of native plants, including shallow navigational lanes.
- Eurasian watermilfoil and curly-leaf pondweed targeted treatments:
 - May be treated with the appropriate herbicides. It should be remembered that destruction of any native plant species populations will increase potential problems from Eurasian watermilfoil.
 - Treatments should be planned to treat early enough in the season or late enough in the fall to to achieve the goals with the least amount of herbicide and resulting in the least impact to native plants.
 - Proposed chemical treatments should be developed based on the current nuisance conditions.
 - Curly-leaf pondweed treatments should be planned to try to prevent the production of turions, an important method of reproduction for the plant. These treatments would allow native plants a better opportunity for growth in the area and will reduce the nutrient release that occurs when curly-leaf pondweed dies in mid-summer.

Appendix I - continued

- · Starry stonewort targeted treatments:
 - May be treated with the appropriate herbicides. Treatments should attempt to minimize damage
 to native species, evaluating whether that risk is less than the risk of not conducting the treatment
 and allowing starry stonewort to damage the natives.
 - The district should evaluate newly developed treatment protocols for starry stonewort control when planning a treatment. The information should be used to determine timing, herbicide use and areal control.
 - Treatments should be planned to minimize bulbil development. However, this should be done with the general understanding that Starry stonewort bulbil development occurs after mid-August. This recommendation is not to suggest that funds should be spent on bulbil data collection.
 - Treatments should be planned early in the growth cycle of Starry stonewort. Do not wait until it has grown to large mounds. Treating early will increase the effectiveness and therefore the costs of the treatment.
- Wind Lake should continue to be regularly surveyed for new invasions of exotic species, including Hydrilla. If found, the plants, and a larger surrounding area should be aggressively treated to eliminate the plants. The lake should then be aggressively surveyed for at least three years to ensure the nuisance has been eliminated. The District should follow recommendations in New Infestations of Exotic Species section below.
- WDNR Administrative Rule NR 107 should be consulted for the specific requirements for conducting a treatment. The following are some of the steps that should be followed by anyone preparing to conduct chemical treatments.
 - Oomplete and submit the WDNR permit application forms. Include treatment map, area sizes and names and addresses of all affected riparian landowners.
 - Ontact a licensed firm to conduct the proposed treatment.
 - When treatment areas will be greater than 10 acres, a public notice must be placed in the local paper informing the public about the proposed treatment. This will also inform non-riparians who may be using the lake.
 - Provide a copy of the WDNR application to any riparian landowner who is adjacent to the proposed treatment areas. This may be done by direct mail, newsletter, box drops or posting on the WLMD website.
 - At the time of treatment, WDNR-approved yellow posting signs must be posted in and adjacent to treatment areas, at least every 300 feet. The signs must indicate what chemical has been used, and any use restrictions and must remain posted for at least the time of any restrictions.
 - Ourrent administrative codes should be reviewed annually to ensure compliance.

HARVESTING

- · The District may continue to use harvesting to provide relief from nuisance conditions.
- · Harvesting should not be done in areas that are treated with herbicides.
- Any harvesting done should be carefully planned to avoid native plants as much as possible.
- Harvesting may be done in the channels to provide navigational access.
- No harvesting should be done in shallow waters less than three feet deep.

Appendix I - continued

- Native plants may be harvested if necessary to open access lanes and to minimize disruption and cutting by boaters.
- The District may continue roadside pickup of plant debris.
- Educational efforts should be developed to inform the public about the benefits of a comprehensive plant management program, that gives equal consideration to fish and wildlife, while reducing recreational nuisances and unsafe situations.

WDNR Administrative Rule NR 109 should be consulted for the specific requirements for conducting harvesting. The following are some of the steps that should be followed by the District when preparing to harvest.

- Complete WDNR permit application forms. Include map, area sizes and name and addresses of all affected riparian landowners.
- Current administrative codes should be reviewed annually to ensure compliance.
- Records should be kept documenting loads and other pertinent information. The District should stress to the operators the importance of keeping accurate records.
- The District should provide operators with a copy of the harvesting permit and be sure it is read and understood, to ensure compliance with its provisions. The permit must be on board the harvester when working on the lake.
- Harvesting operators should be trained to identify target plant species.
- · Operators should not cut plants in less than three feet of water.
- The District may continue its current harvesting schedule.
- · Any turtles or game fish that may be harvested with the plants should be returned to the lake.
- · Avoid harvesting in areas with spawning fish.
- Disposal of cut plants may continue to be disposed of locally, but must be on uplands and not in or adjacent to wetlands or floodplains..
- The District should summarize its harvesting records into an annual report to provide to WDNR by November 1 of each year.
- The District should conduct PI aquatic plants surveys and review the plant management plan and operations every three to five years.
- The District should distribute informational materials to its members that include such topics as proper lawn and garden practices, land use impacts and the importance and value of aquatic plants.

General Harvesting Recommendations

The District staff should continue to harvest areas of the lake on an as needed basis, prioritizing the areas as follows:

- —Harvest main navigational channels through Eurasian watermilfoil/curly-leaf beds in open water areas.
- -Harvest secondary navigation channels in open water areas.
- —Skim surface plant debris, including wild celery.

Emphasis of the program should be to harvest plants necessary to facilitate recreational use and remove unsafe conditions, rather than simply 100% removal of plants. Focus on providing access rather than clear cutting (removal of most or all plants in an area).

Harvesting staff needs to make sure that cutter bars are kept out of the sediments and to cut at least one foot above the native plant beds, being especially careful where Chara tends to dominate the plant community. Nuisance aquatic plants, especially Eurasian watermilfoil, will likely expand their range if this recommendation is not followed.

Public acceptance and continual support are critical components to a successful program. Continue to harvest outside the piers to allow for satisfactory recreational use and public satisfaction. If chemical treatment is not used in specific areas, harvesting may be used to relieve the nuisances up to the pier zone area as long as access is not restricted by depth.

Staff should concentrate harvesting efforts on the Eurasian watermilfoil areas (especially to help reduce the amount of floaters that may be caused by boaters). Eurasian watermilfoil should be harvested before a canopy begins to form. No harvesting of areas that have only desirable native plant species.

Off-load areas should be kept free of plant debris. Any debris in the lake should be removed each time the harvester unloads.

Comprehensive and detailed records should be kept documenting:

- Date
- Hours worked including harvest and down time
- Loads harvested including plant types and densities
- Areas harvested located on a map
- Weather conditions
- ◊ Other relevant information

Schedule For Harvesting

The District should establish a schedule based on the nuisance conditions, budget and the availability of the contractor. A review of past harvesting records in conjunction with a pre-harvest survey should be conducted each spring to determine which areas need attention and which areas are undergoing a change from the previous year. If plants become a nuisance in mid-May, begin harvesting but note previous recommendations, especially with regard to fish spawning areas.

Harvested Fish & Wildlife

Care should be given to returning any captured game fish and turtles to the lake. If game fish are caught in quantities of more than a few per area, the harvesting crew should take the following actions:

- · Reduce the operating speed of the harvester to give fish a chance to flee.
- · If that does not help, then reduce cutting depth and see if problem is resolved.
- If fish are still being harvested, move to another area to work and consult with WDNR or private consultant for further recommendations.

Roadside Weed Pickup

For the past seven years, the District has conducted a road-side weed pickup program. This program allows residents to place the weeds removed from their shorelines on the roadside. The District contracts to have the material removed and taken to the disposal site. This program has been very well received by residents who no longer have to find a way to take the material to the dump.

Off-Loading and Disposal Sites

Current disposal practices should continue. The District has entered into a contract with the Town of Norway to ensure that the disposal site remains available long term. Care should be taken to keep lake areas adjacent to off-load sites clean of cut vegetation. Staff should be instructed to remove any vegetation debris immediately upon off-loading the harvester.

Insurance

The District carries insurance, however, contractors are also required to carry insurance with the District named as additional insured.

Other Activities

Other administrative records should continue to be maintained as currently done.

- The District should ensure that any contractors are complying with the WDNR permits, and all laws associated with exotic species control.
- · The District should file its annual report with WDNR in compliance with permit requirements.

BOAT LAUNCH ACTIVITIES

The District should enlist property owners, volunteers, students or hired help to remove debris regularly in the near-shore and shoreline areas, especially at the boat launches. This will minimize the amount of plant fragments that are moved by trailers and will increase the chances of noticing new invasions of exotic species.

The District should continue to pursue efforts to minimize/prevent introductions of exotic species. This can include signage at boat launches and public recreational facilities. This might include developing volunteer or staffing for launch sites to educate boaters using the sites. The WDNR currently inspects contract harvesting equipment prior to their launching to work on Wind Lake. That should continue to minimize the possibility of transferring exotic species between lakes.

NEW INFESTATIONS OF EXOTIC SPECIES

New infestations should be aggressively managed to eradicate the species from the system. Depending on the species, different levels of response may be needed. A reaction to a Hydrilla invasion, should warrant a "top level" response of closing access sites, treating the invasion and surrounding areas, and surveying the lake.

Steps should be taken to work with the Town, WDNR and Legislators to facilitate rapid response:

- The Town should be approached to develop a local ordinance that would allow the closure of all access ramps should an infestation be found.
- The Legislature should be approached to develop state laws to allow local rapid response to take place, including closing access sites.

- The WDNR should be approached to develop an emergency access plan should an infestation be found.
- Materials should be developed and produced to use in the event of an invasion. These would include
 press releases, public informational materials about the cause and effect of the invasion, and access
 site notices.
- If a new exotic species is found, the following steps should be taken immediately:
 - Take a digital photo of the plant in the setting where it was found and mark with a GPS. Then collect 5 10 intact specimens. Try to get the root system, all leaves as well as seed heads and flowers where present. Place in a Ziploc bag with no water. Place on ice.
 - Fill out form http://dnr.wi.gov/lakes/forms/3200-125-plantincident.pdf
 - Contact the DNR Aquatic Invasive Species Contact (currently Heidi Bunk, WDNR Lakes Biologist) and deliver the specimens, report, digital photo, and coordinates. Do this as soon as possible, but no later than four days after the plant is discovered. A board member and lake consultant should also be notified.
 - Upon determination of species, a coordinated response plan should be developed in consultation with the WDNR, the County, and lake consultants as needed.
 - VDNR should be contacted and requested to close the access site immediately if warranted by the species (such as Hydrilla).
 - The Town should be contacted to close all access sites.
 - The District's chemical treatment contractor should be contacted to schedule an immediate treatment of the area where the exotic was found. States with experience in reacting to new invasions recommend treating a five acre area surrounding the site.
 - A full, point-intercept survey of the lake should be conducted to determine the extent of the invasion.
 - The site should be inspected throughout the season to ensure efficacy of the treatment.
 - The survey and treatments should continue for at least three consecutive seasons to ensure eradication.
 - Surrounding lakes should be notified of the infestation and advised to begin surveying.

CONTINGENCY PLANS

The District should be prepared for changing aquatic plant conditions that may fall outside the specific recommendations in this Plant Management Plan. While the final determination will be permitted by WDNR, developing local consensus on possible solutions is often needed. In evaluating whether to treat or harvest a "new" nuisance condition, the following should be considered:

Are the plants native or exotic species?

If unsure, consult WDNR or an aquatic plant specialist to determine the species.

Is the area in shallow or deep water?

This quickly limits some of the options. Harvesting, for instance, cannot be used in water less than 3 feet deep. Different chemicals may be needed for deep water treatments.

Is the condition impeding or preventing recreational use, or is something else a factor?

Access channels may be created either by harvesting or chemical treatment. However, if water depth prevents access during a drought, chemical treatment will not open up boating access. However, chemical treatment may eliminate a filamentous algae that is causing odor problems.

Is the situation creating unsafe conditions?

Dense, stringy weeds in a beach area, for instance, could create dangerous conditions for young swimmers.

Will the considered option improve the situation long term, short term, or both?

The short term solution may eliminate the problem this summer, but make it worse in future years, while the long term solution may be the best over the long haul.

Is the considered option detrimental to fish, wildlife, or humans?

If it is, maybe there are other options to solve the problem that would be safer.

· Will the considered option increase invasion by other nuisance species?

Consider whether the option will create "bare" lakebed that will quickly be invaded by weedy species, or whether the option will protect desirable vegetation while removing the nuisance.

Appendix II

Wind Lake—Racine County

2018-2023 Mechanical Harvesting Permit

State of Wisconsin Department of Natural Resources PO Box 7921, Madison WI 53707-7921 dnr.wl.gov

Aquatic Plant Control Mechanical / Manual Permit Application Form 3200-113 (R 10/16) Page 1 of 4

Notice: Pursuant to s. 23.24, Wis. Stats., the information requested on this form is required by the
Department of Natural Resources (DNR) to permit aquatic plant control mechanical and/or manual
application. Failure to complete and submit this form will result in no permit being issued. Personally
identifiable information collected will be used for program administration and may be made available to
requesters to the extent required under Wisconsin's Open Records law (ss. 19.31 - 19.39. Wis. Stats).

For DN	R Use Only
Date Received 1/29/18	ID Number SE-2018-52-0009M
Fee Received \$300	County Code 52
Exp. Date	WBIC SAIDOO

identifiable information collected will requesters to the extent required ur								\$300	A second of	52	The second second second
requesters to the extent required th	ider wiscon	siit s O	pen records	iaw [ss. 15	.o1-1	a.aa, vvis	s. Otats.j.	Exp. Date	ລຸບລ:	WBIC 2 7617	00
Section I: Applicant Data		3417							HARTS.		
Permit Applicant Name				Applic							
Wind Lake Management District				\dashv \sqcup	Priva	te Individ	luai	Пс	ontract	or	
Applicant Mailing Address				\times							
30910 Royal Hill Rd City State ZIP Code				Lake	Lake Property Address, City, State, Zip (if different)						
				Lake	ropor	ty Addito	oo, Oity, C	rtato, zip (ii Gilloi	Citty	
Burlington WI 53105 Phone Number (Include area code) Email Address				Phone	Phone Number (include area code) Email Address						
	aronasoc@		et					1			
Individuals and organizations (e.g., L removal. Attach additional sheets if n Name	ake District, ecessary.	Lake A	ssociation, Pr			Phon	е		Email .	Address	soring
A. Wind Lk Mngt District	.,		Hill Rd, Bu		<u>v</u> _(-	202) 314	+-3234	aronasoc	wias.	liet	
В											
C											
D.											
Has a Lake Management plan been pr	rovided to the	DNR?	If Yes, date	approved	of mos	st current	copy Loc	ation of A	oplican	t file copy	
							Dis	trict offic	e		
Is this area within or adjacent to a Sen Yes No Don't Section II: Location of Aquatic	Know I	yes, li	st sites; navi nd Disposa	igational					W.O.	ng was a	
Waterbody of proposed plant remo	oval Lake S									DE	
Wind Lake Name of Firm (If sub-contracted)		8.	36	Racine	one N		vn 04 nclude are		20 (OW Section	9
			,		olle iv	aumoer (i	ricione are	a coue)			
Clearwater Harvesters Street Address				ÇI	v			100000	Is.	tate ZIP Co	nde
Oli dei Madi das				100	,				۲		,,,,
Name of 1st Plant Disposal Site (If	applicable)			1/4	1/4 1/4	Section	n Townsh	lp Range	⊕E	County	
Town Transfer Site				N		21	04		_	Racine	
Name of 2nd Plant Disposal Site (If	applicable)			1/4	1/4 1/4		n Townsh	ip Range		County	
Area(s) Proposed for Plant Removal (N	lote detalls in	permit	cover letter fo	r final perm	itted si	izes). Plea				ing for guidar	ice.
1. Length from shore 3,500 ft. x S	horeline or a	rea wid	h 3,750	ft. / 43,560		301.309	Estima	ted Acreag	e A	wg. Depth	n.
2. Length from shoreft. x Si	horeline or a	rea wid	th	ft. / 43,560	_		Estima	ted Acreag	e A	vg. Depth	ft.
3. Length from shore ft. x Si								ted Acreag		vg. Depth_	
4. Offshore Control Site Length			100.00					ft.			
5. Offshore Control Site Length	733			500 Marie 1990				mated Acre	age A	vg. Depth	ft.
TOTAL ESTIMATED ACREAGE	301	.31									

Wind Lake Management District

Aquatic Plant Control Mechanical / Manual Permit Application

Form 3200-113 (R 10/16)

Page 2 of 4

Section I	l: Location of Aquatic Plant Removal (cont.)		
What type	of aquatic plants below the Ordinary High W	ater Mark are pr		
	Emergent Submergent (above water level)	\\ \times \ \times \	loating Leaf	fee i.e. lily pads)
	•	rei) . \hookrightarrow (s	at the sunac	e i.e. iliy pads)
	II: Map & Property Ownership		1.15	and are to conflict the site of
Attach a co the bottom	opy of a lake map that includes the property(of this page. On the map, identify the follow	s) to be narveste ing required info	mation.	ed map is available, provide a sketch of the site at
	nd dimensions of each proposed plant remov			
particip In the s	pace below:	mber each riparia	an neighbor	(both project participants and non-participants).
 Name a propert 	all riparian owners, including project participa ies on the map. Attach additional sheets if ne	nts & non-partic ecessary.	pants. The r	number should correspond with the numbered
 Check 	Yes box to indicate project participants and N	No box for non-p	articipants.	
No.	Name of Riparian Neighbor	Project Participant		Control dimensions (calculated acreage)
1. See at	ttached sheets of participants	OYes	ONo _	
2		OYes	ONo _	
3,		. OYes	ONo _	
_		○Yes	O No _	
		○Yes	ONo _	
6.		○Yes	ONo_	
Check	here if separate sheets are attached identifying	additional neighb	or riparian ov	wners. Indicate project participants and/or non-participants.
Check	here if printed map attached. If no printed map,	use this space to	sketch the s	ite and provide required information.
Мар				

Wind Lake Management District

Aquatic Plant Control Mechanical / Manual Permit Application Form 3200-113 (R 10/16) Page 3 of 4

				1000000	and the second second
Section IV: Methods What mechanical or manual methods to	remove plants are propose	ed? (check all t	hat apply)		
Mechanical harvesting Rak					
Hand Pulling Cut	ting Alum			,	
If alum treatment is proposed, has a	plan been developed?	O Yes (No If yes, pleas	e include ti	ne plan with this application.
Please explain why you selected the					
because it complies with the AP	M plan, it opens up re	creational a	ccess and it reduce	s fragmen	tation
				.1	
Note: Other control methods (i.e. bottom	barriers, weed rollers, her	bicides) also n	ed DNR permits. Cont	act this office	for more details.
Section V: Fees		A. MARRINE	Self-uton and the di		
Fees are not refundable and are calculated	ed as follows:				
Check box for type of project: 1. Osingle riparian area, one property	owner. less than one acre.	\$30	.00		
multiple riparian areas, offshore co				00/acre (rour	nd up to the nearest whole acre)
If proposed removal is greater that				•	1000 - 11 10 10 10 10 10 10 10 10 10 10 10 10
			acre = \$9,060.00		
			d (max \$300.00)		\$300,00
Section VI: Reasons for Aquatic		gers-mag	PATER A PARTY	-222-670	
Purpose of Aquatic Plant Removal			nce Caused by		
Maintain navigational channel f	or common use	∐E	mergent water plants		
Maintain private access for boa	ting	⊠S.	ibmergent water plar	nts	
Maintain private access for fish	ing	⊠FI	oating water plants		
Improve swimming		_o	her		
Other					
Name of plants, if known					
Milfoil, coontail, curly-leaf, water	er lilies, eel grass				
Section VII: Integrated Pest Mana) instruction	APAGE SE	
	A. Previous	sly Done?	B. Preser	itly Proposi	od?
1. Chemical		ON ₀		_	
2. Dredging		ON ₀	OYes	⊙No	
3. Drawdown	OYes (⊙ No	OYes	⊙No	
Nutrient controls in watershed		ON ₀	OYes	⊙No	1
Nutrient controls on property	●Yes (ON ₀	OYes	⊙No	
6. Other	OYes (ON₀	○Yes	ON _o	
Note: Consider feasibility of alter this application but also helps yo	natives for each control u evaluate your investm	site. This inf	ormation not only hel	ps the dep	artment make a decision on
Describe the level of success for alte	ernative methods previous	usly used:			
Chemical	SSW control, opens		access is shallow	water	
2. Dredging	not applicable				
Dreuging Drawdown	not applicable			16 1600	
Nutrient controls in watershed				1775	
5. Nutrient controls on property	ongoing			-	
6, Other					

Wind Lake Management District

Aquatic Plant Control Mechanical / Manual Permit Application

Form 3200-113 (R 10/16)

Page 4 of 4

Section VIII: Applicants Responsibilities

- 1. The applicant has prepared a detailed map, which shows the length, width and average depth of each area proposed for the control of rooted vegetation.
- 2. The applicant understands that the Department of Natural Resources may require supervision of any aquatic plant management project involving removal. Supervision may include inspection of the proposed treatment area and/or equipment, before, during, or after removal. The applicant is required to notify the regional office 4 working days in advance of each anticipated date of plant removal with the date, time, location and size of plant removal unless the Department waives this requirement. The advance notification may be specified in your permit.
- 3. The applicant agrees to inform all operators of harvesting equipment of the conditions and terms of this permit and to insure that all operators understand and abide by those terms and conditions.
- 4. The applicant agrees to comply with all terms and conditions of this permit, if used, as well as applicable Wisconsin Administrative Rules. The required fee is attached.
- 5. Conditions related to invasive species movement. The applicant and operator agree to the following methods required under s. NR 109.05(2), Wis. Adm. Code for controlling, transporting and disposing of aquatic plants and animals, and moving water:
 - Aquatic plants and animals shall be removed and water drained from all equipment as required by s. 30.07, Wis. Stats., and ss. NR 19.055 and 40.07, Wis. Adm. Code.

I hereby certify that the above information is true and correct and that copies of the application have been provided to the appropriate parties name in Section II and that the conditions of the permit will be adhered to. All portions of this permit, map and accompanying cover

 Operator shall comply with the most recent Department-approved 'Boat, Gear, and Equipment Decontamination and Disinfection Protocol', Manual Code # 9183.1, available at http://dnr.wi.gov/topic/invasives/disinfection.html

letter must be in possession of the applicant or their agent at time of plant removal. During plant removal activities, all provisions of Visconsin Administrative Rules must be complied with, as well as the specific conditions contained in the permit cover letter. applicable/ Date Signed Applicant's Signature **DNR Use Only** Review Notes: National Heritage Inventory Review Conducted 2/14/18 Section IX: Permit to Carry Out Mechanical or Manual Removal of Aquatic Plants The foregoing application is approved. Permission is hereby granted to the applicant to mechanically or manually remove Season Year(s) aquatic plants described in the application during the season. The approval of an aquatic plant management permit may not represent an endorsement of the permitted activity, but represents that the applicant has compiled with Wisconsin Administrative Rules. State of Wisconsin Application fee if received? Department of Natural Resources For the Secretary 29Yes Regional Director or Design Date Malled

If you believe that you have a right to challenge this decision, you should know that Wisconsin statutes and administrative rule establish time periods within which requests to review Department decisions must be filed.

For Judicial review of a decision pursuant to ss. 227.52 and 227.53, Wis. Stats., you have 30 days after the decision is malled or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for review shall name the Department of Natural Resources as the respondent.

To request a contested case hearing pursuant to s. 227.42, Wis. Stats., you have 30 days after the decision is malled, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.

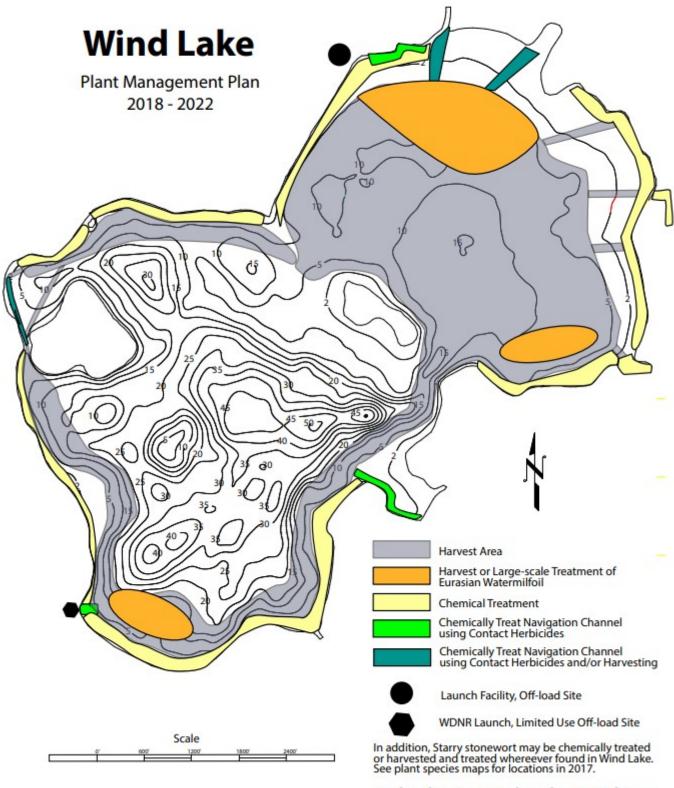
This notice is provided pursuant to s. 227.48(2), Wis. Stats.

Date Signed

Appendix II (continued)

Wind Lake—Racine Co., WI

Proposed Harvesting & Treatment Areas (2018-2022)



Updated Spring 2018 based on DNR change

Appendix III Wind Lake Management District

Location of Harvester Unloading and Plant Disposal Sites

Mechanical Harvester Unloading Site—Wind Lake Public Boat Launch (A)



Aquatic Plant Disposal Site—Town of Norway (B). Located to immediately to northeast of intersection of Malchine and East Wind Lake Rd.

Appendix IV Wind Lake—Racine Co., WI 2023 Proposed Treatment Areas*



Description	Acres
Shoreline (yellow)	138.2
Nav. Areas 1-9 (blue)**	11.5
Total	149.75

- * Areas to be inspected and treated, as needed, for control of Eurasian Watermilfoil, Curly-leaf pondweed and/or filamentous algae.
- ** Anticipate that #1, 3, 4, 5, 8, 9 may require treatment for native species as well in order to maintain navigation.

Areas known to have Starry Stonewort (SSW) that can interfere with navigation and may require treatment (either all or portion thereof) include Areas 1, 2, 6, 7 & 9. Areas in front of Public Launch and Sportsmen's will be monitored for SSW and treated, if necessary

Solitude Lake Management N173 W21440 Northwest Passage Jackson, WI 53037 (262) 674-1781 www.solitudelake.com

Appendix V

2018 Wind Lake Aquatic Plant Management Plan

Detailed Discussion on Chemical Controls and Herbicides/Algaecides Available

HAND CONTROLS

A method of aquatic plant control on a small scale is hand or manual control. This can consist of hand pulling or raking plants. A rake with a rope attached is thrown out into the water and dragged back into shore. Plants are then removed and disposed of. Skimmers or nets can be used to scrape filamentous algae or duckweed off the lake surface. These methods are more labor intensive and should be used by individuals to deal with localized plant problems such as those found around individual piers and swimming areas. Hand controls cannot include the use of auxiliary power. For instance, a boat motor cannot be used to drag a rake. Hand controls are very inexpensive when compared to other techniques. Various rakes and cutters are available for under \$100. Cutters pose risks to users because of their extreme sharpness. Although labor intensive, hand controls, especially using rakes, are effective ways to remove plants from a small area.

NR 109 allows riparian landowners to manually remove Eurasian watermilfoil and curly- leaf pondweed plants within their "riparian zone" without permits. Residents may remove other plants in a single area that is not more than 30 feet wide as measured parallel to the shoreline, including any swimming and pier areas, as long as the area is not a WDNR Sensitive Area. The 30-foot area must remain the same each year. It is illegal to remove native plants outside the 30-foot wide area without a permit.

Conclusion—Hand controls may be used by individual landowners to clear swimming areas. Landowners should be encouraged to be selective in their clearing, again focusing on Eurasian watermilfoil, curly-leaf pondweed, or starry stonewort. It should be understood that shoreline management using hand controls will continue to be a labor intensive, on-going management activity. Landowners should maintain a natural area of vegetation both on their shoreline and in the water.

Riparian landowners may manually (without any auxiliary power) remove Eurasian watermilfoil, curly-leaf pondweed or starry stonewort within their "riparian zone" without permits. Residents may remove plants in a single area that is not more than 30 feet wide, including any swimming and pier areas, as long as the area is not a WDNR Sensitive Area. However, because of the ease with which the exotic species spread, landowners should not attempt to remove native plants. Doing so will create a far worse condition when the nuisance species fill the void created by removing the native plants. Consult WDNR regarding any permits needed for removal of plants.

CHEMICAL TREATMENT

Chemical treatment of aquatic plants in lakes is governed by WDNR under Wisc. Admin Code NR107. Chemical treatment for the control of aquatic plants is one of the more controversial methods of aquatic plant control. Debate over the toxicity and long term effects of chemicals continues in many communities. Many changes have occurred over the years. Today, the half-life of the herbicides is days and weeks, rather than months and years. Instead of broadcast applications, todays treatments are targeted. Very low application rates are used today, where in the past, much higher rates were used. A WDNR permit is required prior to any chemical treatment.

With chemical treatments, the plant material impacted by the treatment dies and contributes to the sediment accumulation on the lake bed. When plants are treated, the decaying process of the plants uses oxygen. Depending on the chemical used, if too much plant material is treated at once, oxygen depletion may occur, stressing or killing fish.

Another concern about the use of chemical treatments is the ability to quickly shift a lake from one dominated by aquatic plants to one dominated by algae. This shift can occur if most or all of the vegetation is treated. The algae then use all the available nutrients, creating algal blooms.

The importance of aquatic plants to the fisheries community is another reason to use caution when conducting chemical treatment or other management activities that remove large amounts of plant material. If too much plant material is removed, fisheries food and habitat are negatively affected.

Identification of the target species is very important. Different chemicals should be used for different plant species. Dosage also affects the results. Too little chemical may stunt growth but not kill the plant. Too much chemical may negatively impact fish, amphibians, or invertebrates. If native plant communities are destroyed by chemicals, the areas may be invaded by exotic plants such as Eurasian watermilfoil and curly-leaf pondweed. The formulation of the chemical, whether liquid or granular, is a factor to consider. Another factor to consider is the contact period the chemical would have with the vegetation.

Care should be taken to alternate the chemicals used whenever possible. This will help minimize the chance of the nuisance species developing a resistance to the chemical. Currently, there are only two documented species in Florida which have developed a resistance. However, the very nature of aquatic plant control reduces the options when resistance does occur.

Chemical treatment is more selective than harvesting. Chemical treatment may also be more appropriate in some situations, especially where mono-typic stands of exotics exist in shallow water where harvesters cannot work, such as in marina areas. It may also be the method of choice to treat early infestations of Eurasian watermilfoil when hand-pulling cannot be used. When used appropriately, chemical treatment can be economical and effective.

Modern herbicides have been tested extensively. Tests include determining toxicity levels to be sure that humans, animals and fish are not affected. Test results must also show that the herbicides do not bioaccumulate in fish or other organisms and that their persistence in the environment is low. Product labels contain the requirements for use. Approved labels state that "there is reasonable certainty that the pesticide can be used with no unreasonable adverse affect on human health or the environment". Material safety data sheets are available for all herbicides approved for use in Wisconsin. Chemicals must be used according to the approved use applications listed on the labels. Application rates, as well as any use restrictions, are indicated on the product labels. Licensed applicators must follow the label requirements.

Shoreline treatments may need to be repeated at least annually. Shoreline treatments will likely not eliminate the nuisance, especially when the deep water untreated areas have high densities of Eurasian watermilfoil or starry stonewort. Invasive plant material from elsewhere in the lake may quickly re-enter the area. Shoreline treatments are usually spot treatments to alleviate a nuisance condition, whereas whole-lake treatments are usually lake restoration-based treatments.

Whole-lake treatments have been used to eliminate Eurasian watermilfoil from a lake for at least three years (Aron, 2003). Large-area treatments (greater than 10 acres) have been used to dramatically reduce curly-leaf pondweed problems. Lake Barrington in northern Illinois has been successfully treated with Sonar™ as part of a multi-faceted approach to shift the lake from one dominated entirely by curly-leaf pondweed, to one with a more diverse plant community. Long term studies of water quality and fisheries on lakes using whole-lake treatments are scarce. To date, there have been some documented negative impacts on water quality following some of the first whole-lake treatments in Wisconsin (Hauxwell et al, 2006). Whole-lake treatments are not appropriate for all lakes. Extensive studies must be conducted prior to requesting a permit for a whole-lake treatment.

Large-area treatments have been used to effectively reduce Eurasian watermilfoil and curly-leaf pondweed, without the whole-lake impacts. These treatments are done early in the season, just as the plants begin to grow, usually in early April. When both curly-leaf pondweed and Eurasian watermilfoil are present, Aquathol K has been used to target both. 2,4-D products have been used when only Eurasian watermilfoil is present.

Although "mail order" chemicals can be purchased, their use is strongly discouraged and should never be used without a permit from WDNR. They may be completely ineffective if they are used to try to treat the wrong plant species. Unregulated, uneducated use may result in overuse of a chemical and cause damage to the "good" weeds, fish and wildlife, and humans.

Prior to any chemical treatment, a permit is required from WDNR. Only Wisconsin and EPA approved herbicides may be used, following all label directions and restrictions. In most situations, herbicides may only be applied by licensed applicators certified in aquatic application by the Wisconsin Department of Agriculture, Trade, and Consumer Protection. Proper handling and application techniques must be

followed, including those to protect the applicators. All applications must comply with current laws in the State of Wisconsin.

Although individuals may apply for permits to apply aquatic herbicides, residents are strongly encouraged to work with the District on any questions or concerns about aquatic plants prior to undertaking any plant management activities.

Systemic Herbicides — Systemic herbicides are translocated throughout the entire plant, including the roots. Examples of systemic herbicides are 2,4-D, Fluridone, and trichlopyr. 2,4-D and trichlopyr are used to control Eurasian watermilfoil in localized areas. Fluridone is primarily used in Wisconsin to control Eurasian watermilfoil in whole-lake, or large area situations.

Contact Herbicides — Contact herbicides kill the exposed portions of the plant that they come into contact with. They are not translocated to roots and will only rarely kill entire plants. Herbicides with the active ingredients of diquat and endothall are common contact herbicides. Contact herbicides are frequently used to provides short-term nuisance relief. Contact herbicides may be affected by high levels of suspended sediment in the water column.

Copper Compounds — Copper sulfate is used for the control of algae. Cutrine Plus is an herbicide that uses copper as its active ingredient. This is used to control various types of algae. In some regions it can sometimes control Chara (also known as muskgrass), a more desirable algae, it is more commonly used to control filamentous, green and blue-green algae. Liquid formulations, especially the copper chelated products (those combined with other compounds that help prevent the loss of active copper from the water) are more effective. These tend to remain in solution longer, allowing more contact time between soluble copper and the algae cells. Cutrine Plus and Cleargate have no restrictions on lake use following a treatment.

Aquathol — Super K is a formulation containing the active ingredient endothall. This is a contact herbicide that prevents certain plants from producing needed proteins for growth. It is used to control certain pondweeds, coontail, and Eurasian watermilfoil. The timing of an application affects what plants are impacted. Aquathol has use restrictions including 1 day for swimming; 3 days for fish consumption and 7 to 25 days for irrigation and human and animal drinking.

Reward — Reward, previously known as Diquat, is a non-selective contact herbicide that is used to control a wide variety of plants. It is absorbed by plants and damages cell tissues. Reward kills the parts of the plants that it comes into contact with directly. Reward loses its effectiveness in muddy, silt-laden waters. If too much plant material is killed in an area, the decomposing vegetation may result in very low oxygen levels that may be harmful or fatal to fish. Areas that are treated with Reward cannot be used for activities requiring full or partial body contact for at least 24 hours after treatment. Animal consumption, irrigation, and other domestic uses require waiting at least 14 days after treatment. Reward works quickly, with results usually seen in 6 to 10 days. Reward has use restrictions including 1 day for swimming and 14 days for drinking or irrigation.

2,4-D (2,4-dichlorophenoxyacetic acid) — 2,4-D is a systemic herbicide which interferes with normal cell growth and division. Plants begin to die within a few days of liquid formulation treatments, and within a week to 10 days when granular formulations are used. The aquatic formulations of 2,4-D are only effective on certain species of aquatic plants. It is most commonly used to treat Eurasian watermilfoil. The timing and the dosage rate of an application is important to avoid impacting native plant species. Because it also impacts several desirable species including bladderwort, water lilies, and watershield, care should be taken to ensure that only the target nuisance plant species are present before treatment or that the dosage is low enough to protect natives.

2,4-D products have no swimming or fish consumption restrictions, but treated water should not be used for irrigation until herbicide residues as less than 1 ppm.

Fluridone — Fluridone is an herbicide that inhibits the plant's ability to make food. Without that ability, the plant dies. The visual symptom of the effects of fluridone is bleaching of the terminal buds, or growing points, on the plant. This herbicide requires at least 30 to 45 days of contact time to kill the plant. This prevents problems with low dissolved oxygen in treated areas. Fluridone is rapidly diluted and best used in larger treatment areas, generally 5 acres or more in size, preferably on a whole-lake basis. Prior to treatment there should be good flow data for the proposed treatment area. Rates of inflow, outflows, and ground water sources should be known prior to treatment. New fluridone formulations are effective at remaining in the water column for long periods of time, even during relatively high flow. The WDNR has questions about the long term impact of Fluridone on water quality and fisheries since most available information is anecdotal. Fluridone can be used for a range of plant control, from species specific control to general control. Fluridone achieves its selectivity by the use of varying dosages. High treatment dosages control a wide variety of aquatic plants, while low dosages maintained over long periods of time have been used to control Eurasian watermilfoil with minimal impact on native plants. A couple of important plant species, specifically naiads and elodeas are highly susceptible to Fluridone. Lakes with an abundant amount of susceptible species should carefully evaluate the use of Fluridone. Fluridone has no use restrictions except for irrigation. Irrigation restrictions range from 7 to 30 days.

Trichlopyr — Trichlopyr is a newly-approved herbicide which kills the entire plant, and is effective at treating Eurasian watermilfoil. Trichlopyr is more suited to moving water applications than slow-acting herbicides such as fluridone. Trichlopyr has a 120-day use restriction for irrigation.

Conclusion— Chemical treatment may be conducted on Wind Lake. Treatments may be undertaken by individuals or the District with WDNR approval. Native aquatic plant beds that restrict navigational access to the main lake may be treated. Changing plant conditions that create new shoreline nuisances may warrant chemical treatment. Large-area treatments may also be conducted targeting Eurasian watermilfoil, curly-leaf pondweed and starry stonewort. Any other chemical treatments conducted on Wind Lake should target exotic species and will need to be repeated regularly. It may take multiple years of management to result in any change in the density and aerial coverage.

- Eurasian watermilfoil, curly-leaf pondweed and starry stonewort may be treated with the appropriate herbicides. It should be remembered that destruction of any native plant species populations will increase potential problems from nuisance exotic species. However, native plants can be expected to decline as exotic species invade the areas.
- Treatments should be planned to treat early enough in the season to eliminate the nuisance with the least amount of herbicide and before the native plants have been impacted by dense growths of nuisance plants.
- The growth cycle of the exotic species should be a factor in the consideration of chemical treatment project.
- Large scale, open water treatments may be considered to treat large areas of Eurasian watermilfoil, curly-leaf pondweed and starry stonewort.
- · Proposed chemical treatments should be developed based on the current nuisance conditions.
- When conducted, curly-leaf pondweed and starry stonewort treatments should be planned to try to
 prevent the production of turions and bulbils, important methods of reproduction for the species. These
 treatments would allow native plants a better opportunity for growth in the area.
- Wind Lake should be regularly surveyed for new invasions of exotic species, including Hydrilla. If found, the plants, and a larger surrounding area should be aggressively treated to eliminate the plants. The lake should then be aggressively surveyed and treated for at least three years to ensure the nuisance has been eliminated.

Appendix VI Wind Lake—Racine Co., WI

Water Quality Data Pre/Post Alum Treatments (conducted in 1996 and 2011)

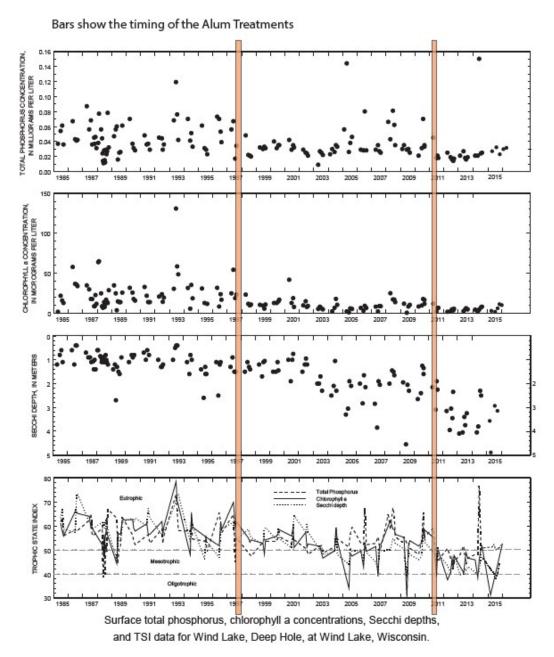


Figure 2 Wind Lake Water Quality Chart 1985 through 2015, Source: USGS