

Aquatic Plants

Loon Lakes



LakeCounty

Health Department and
Community Health Center



Aquatic Plant Management

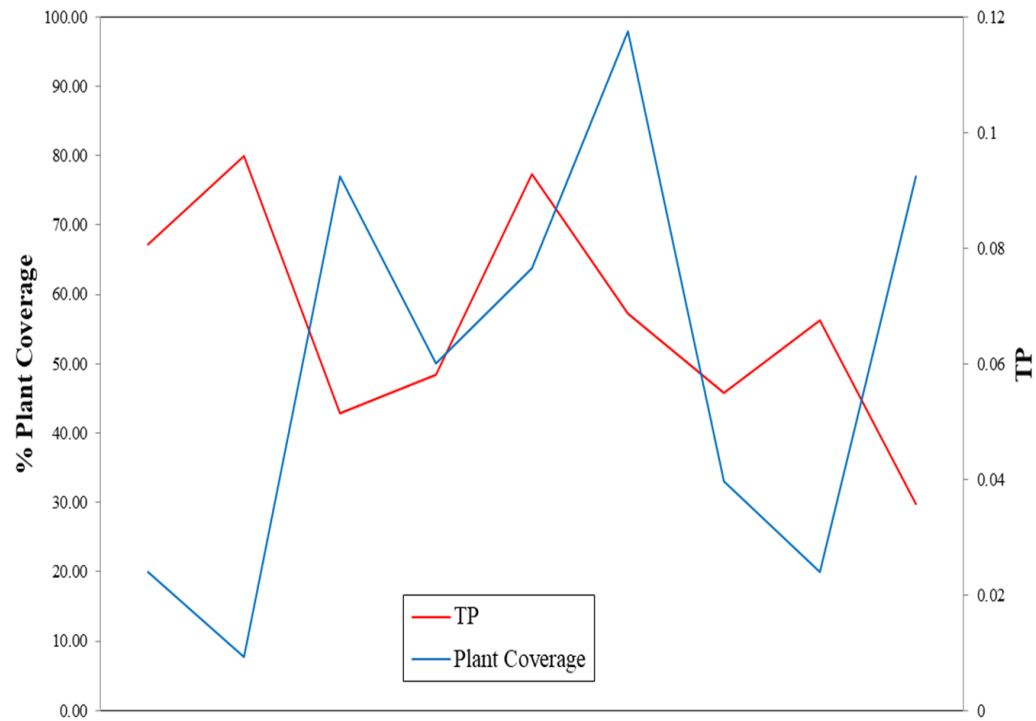


Why Manage **Invasive** Aquatic Plants?

- Native Aquatic Plants = Healthy Lake
- Invasive plants can take over a lake
- **Excessive** herbicide application can lead to a lake with no plants and severe algae bloom
- It can be **challenging to reverse** a lake from algae dominated to plant dominated system.

Aquatic Plants and Total Phosphorus

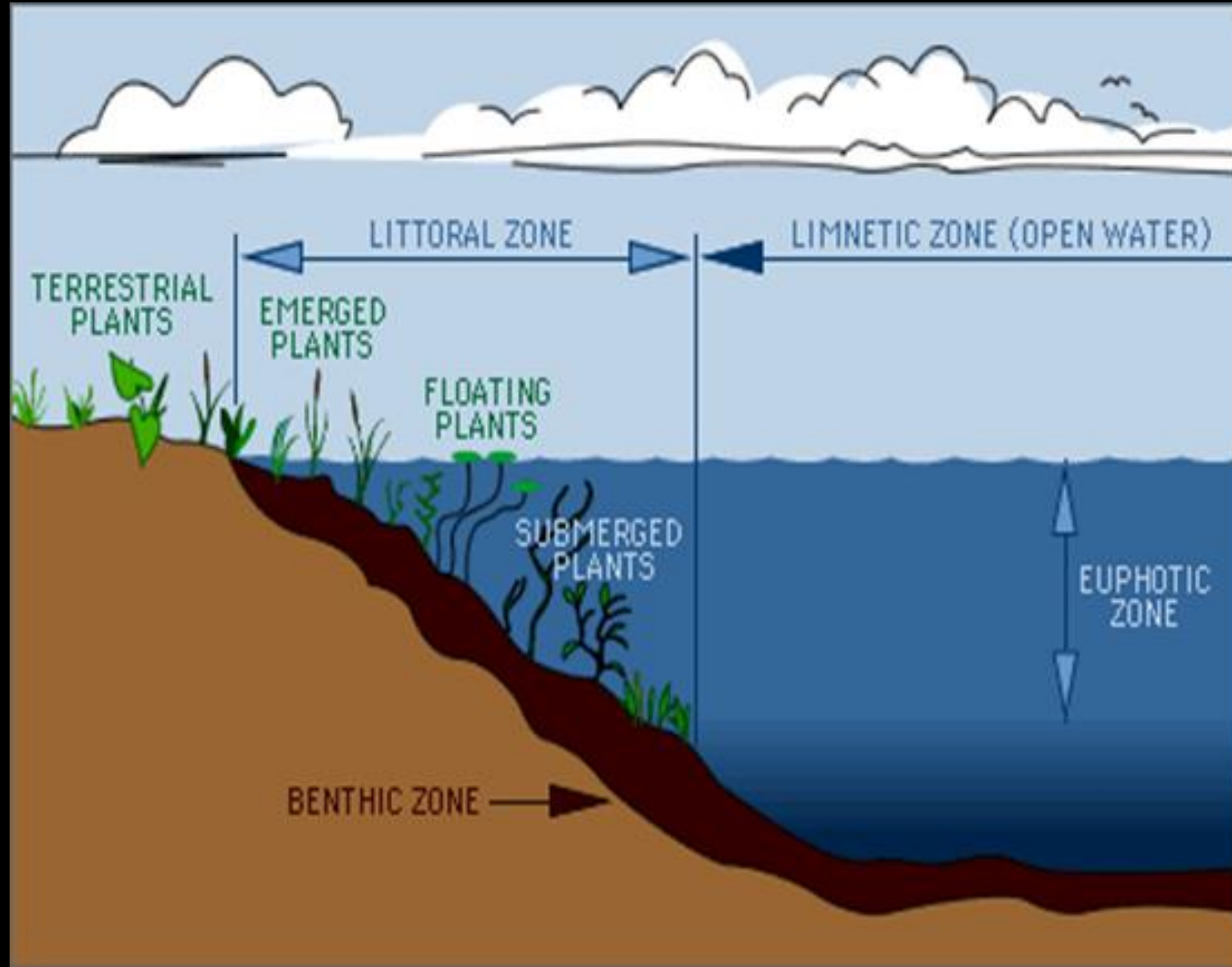
Total Phosphorus (TP) VS % Plant Coverage

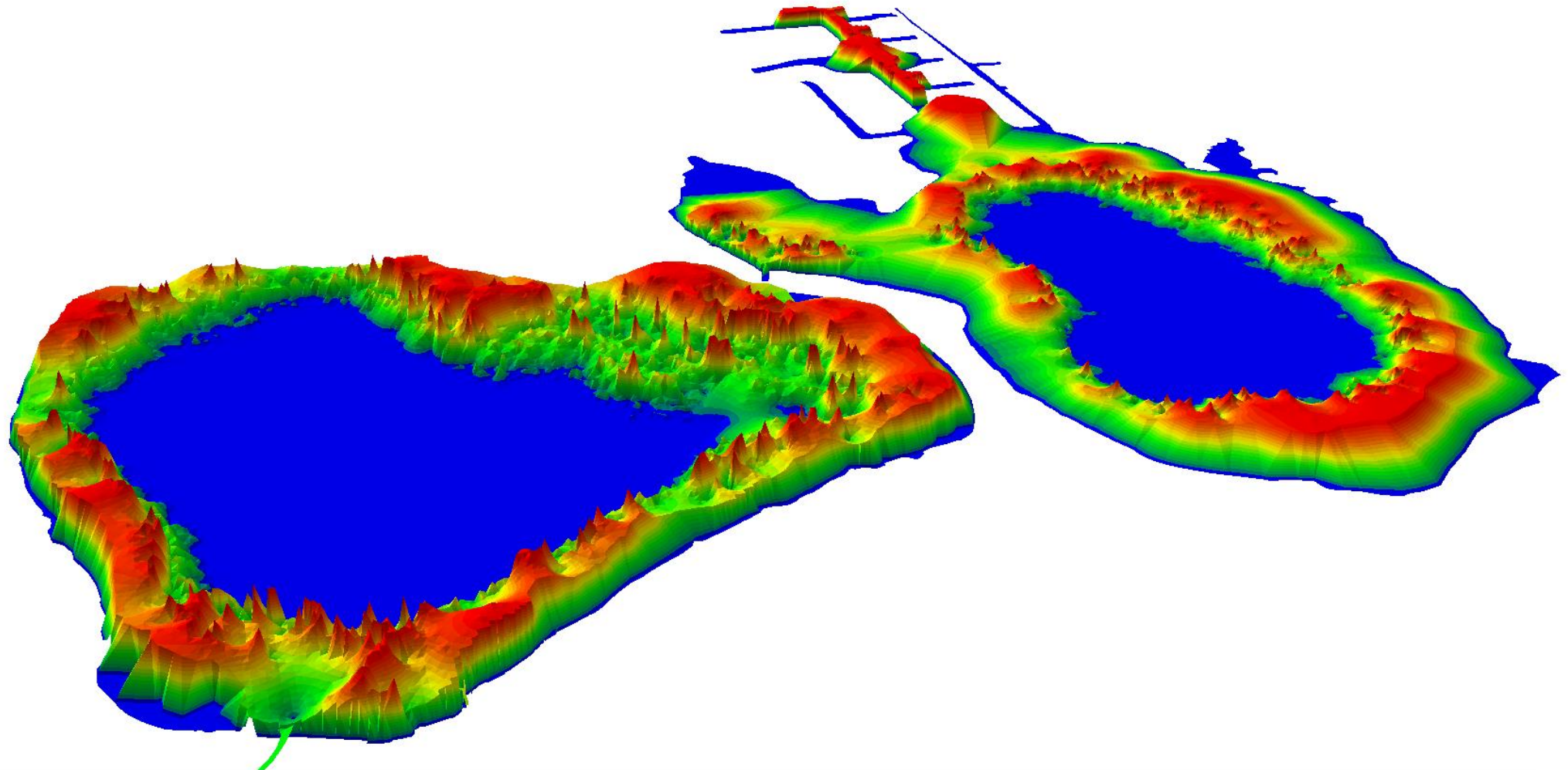
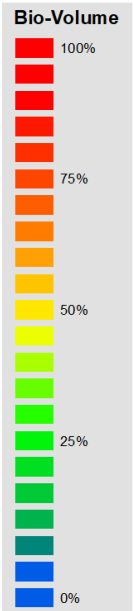




Littoral Zone

- Emergent
 - Filter runoff
 - Reduce Erosion
 - Spawning areas
- Floating-Leaved
 - Shade and refuge
- Submersed
 - Create oxygen
 - Compete with algae
 - Reduce turbidity





Littoral Zone

Invasive / Non-Native Aquatic Plant

- Eurasian Watermilfoil
- Curlyleaf Pondweed
- Hydrilla
- Brazilian Elodea
- Starry Stonewort



KEY FEATURES:

LEAF: WHORLED ALONG STEM 14-20 PAIRS OF THREADLIKE LEAFLETS, ALL APPROXIMATELY SAME LENGTH

STEM: LONG, WEAK, MORE THAN 7' LONG, BRANCHING AT WATER SURFACE

FLOWER: 4 PARTED SPIKE , NO WINTER BUDS PRESENT



KEY FEATURES:

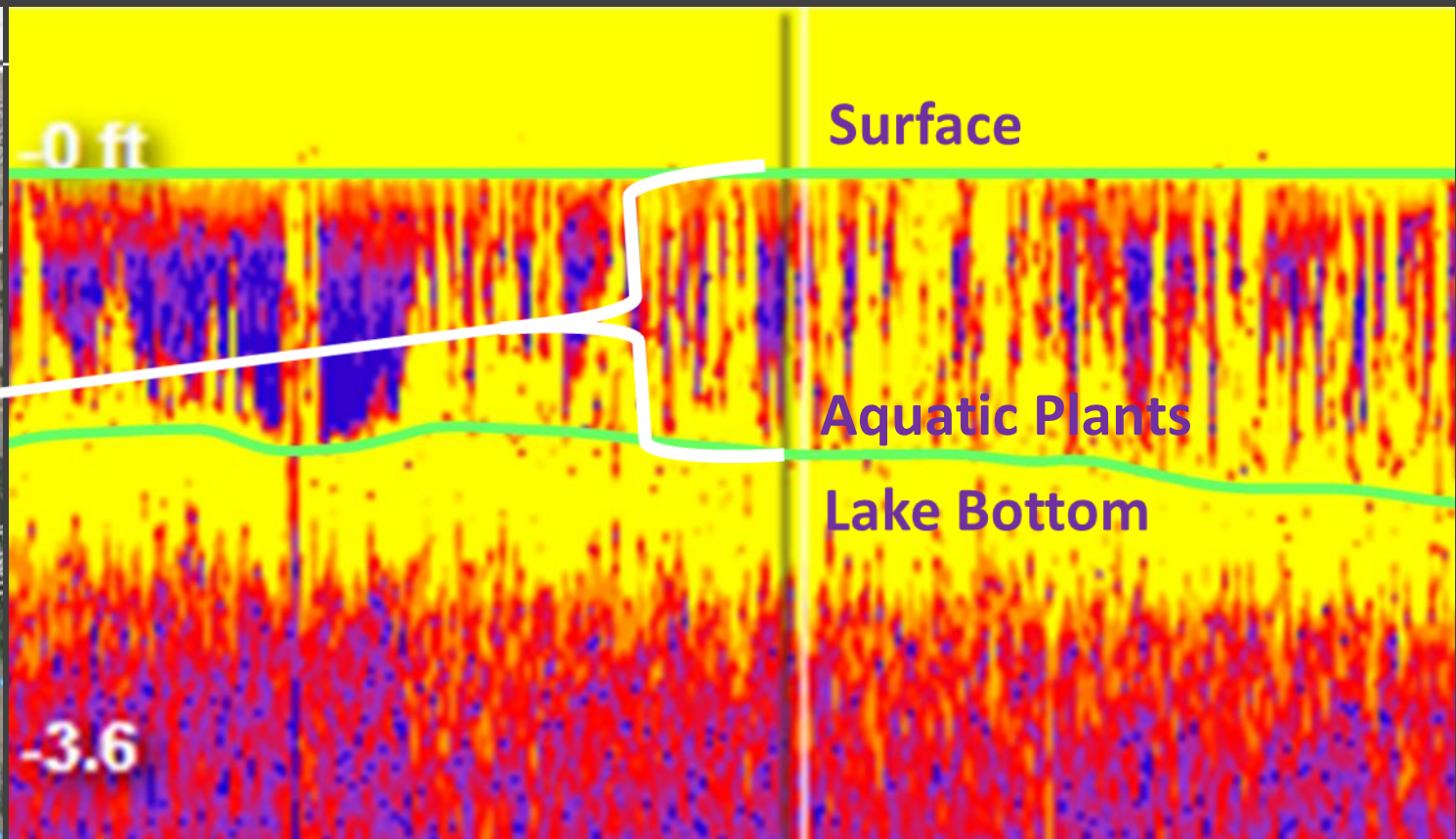
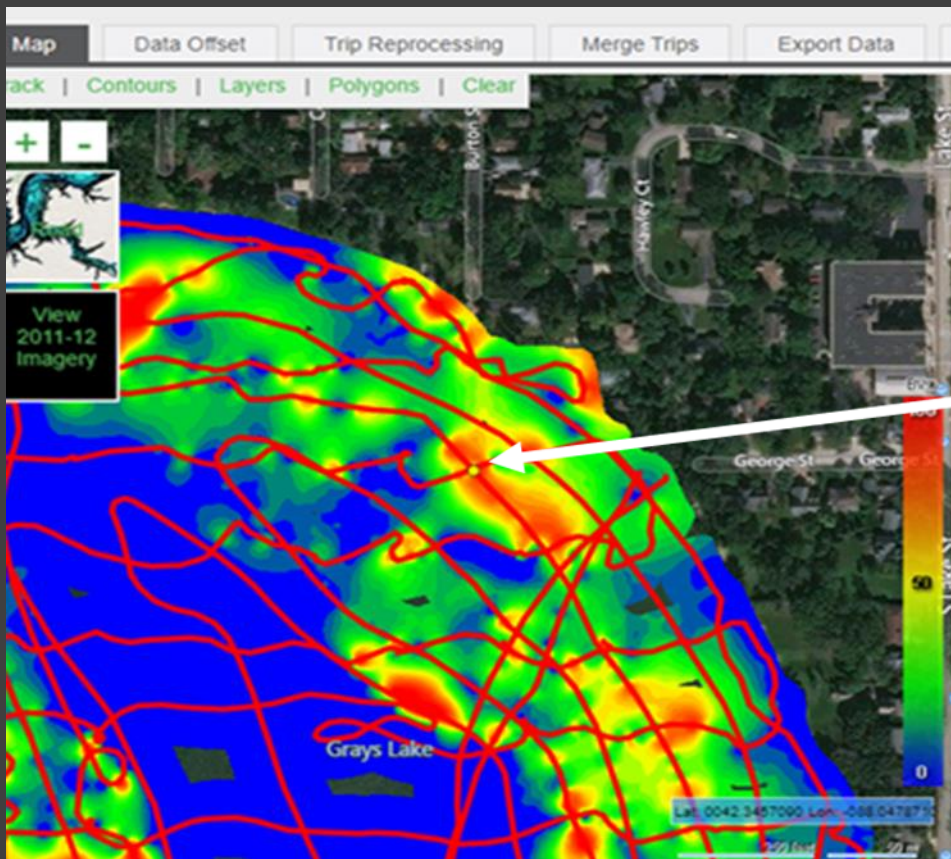
LEAF: ALTERNATE, ENTIRE WITH PROMINENT MIDVIEN , STALKLESS, CURLY TOOTHED EDGE, OBLONG, NO FLOATING LEAVES, STIPULES FUSED AT BASE

PLANT: CAPABLE OF GROWING OVER WINTER EMERGING EARLY SPRING BEFORE MOST SPECIES, COMPLETES CYCLE BEFORE MID-JULY, STEMS SLIGHTLY FLAT, SLENDER RHIZOMES

FLOWER: SMALL GREEN BROWN FLOWERS ON CURVED SPIKE ABOVE WATER;



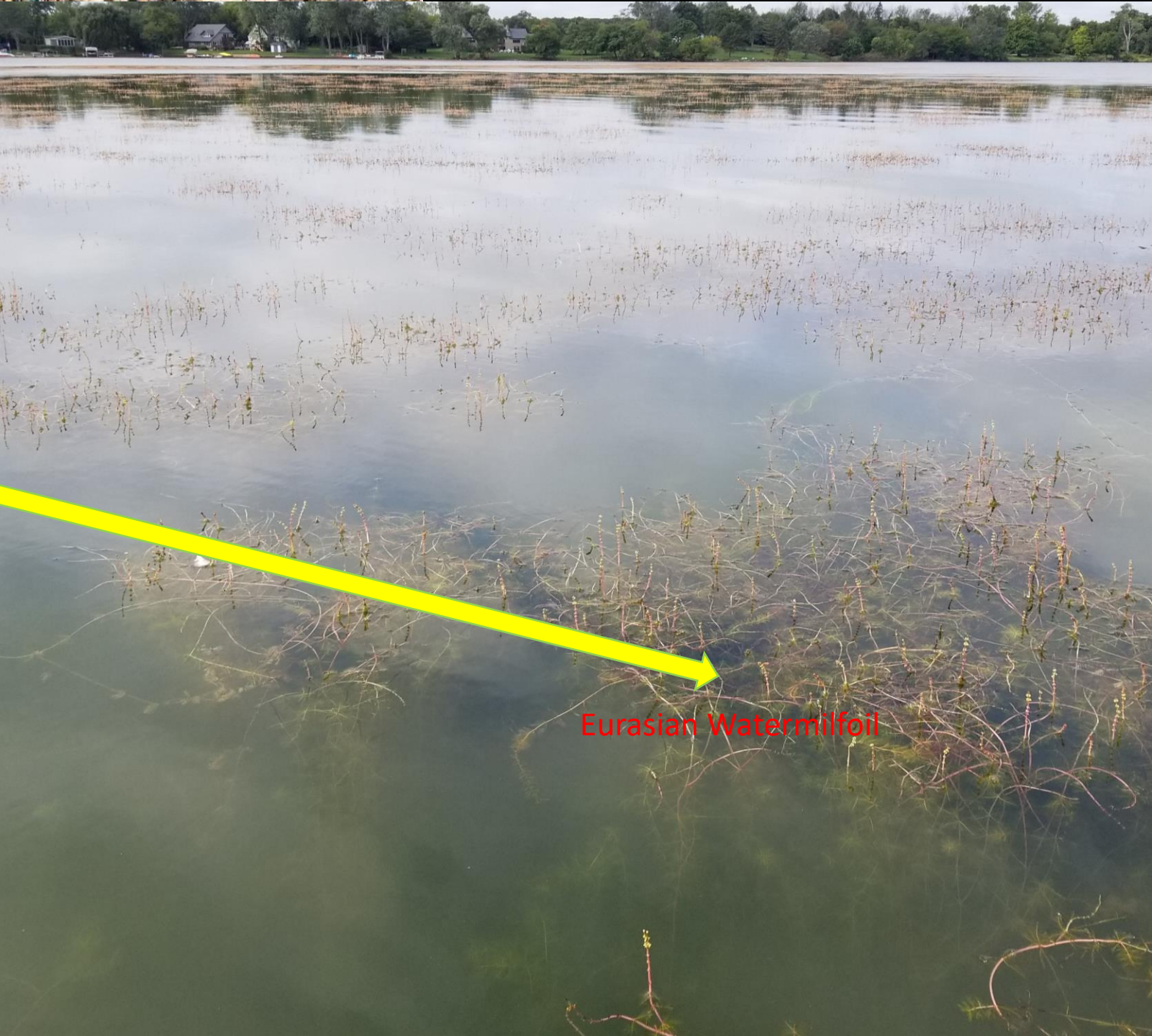
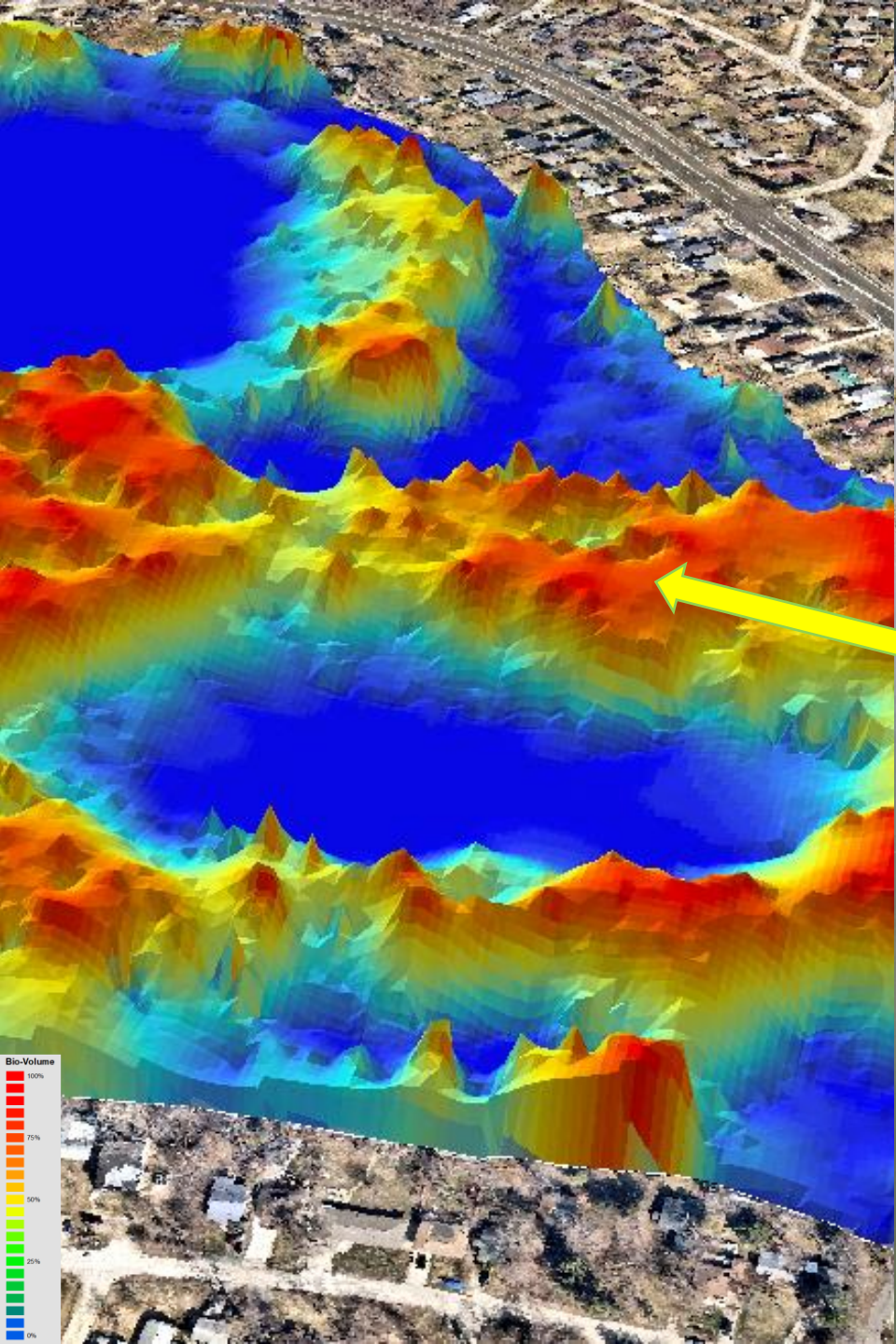




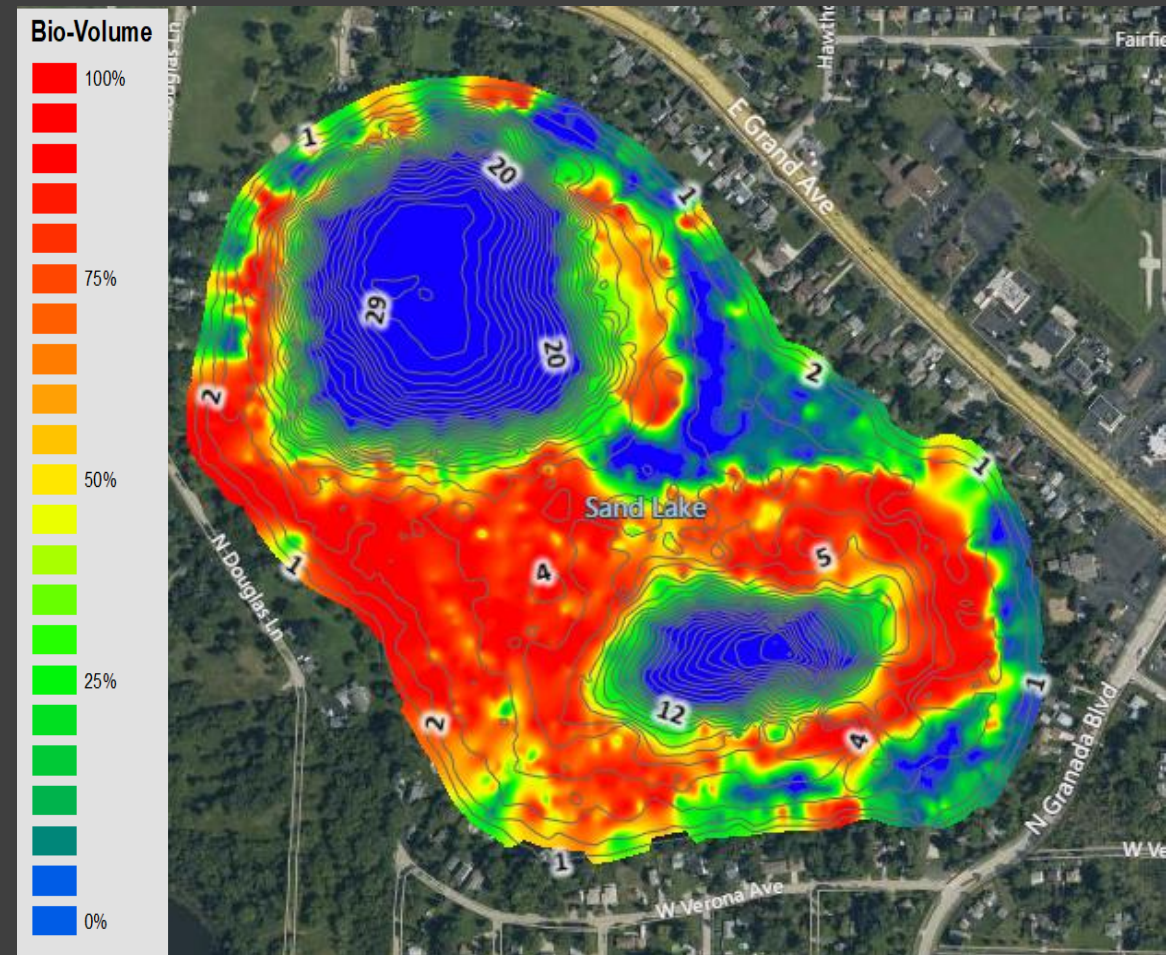
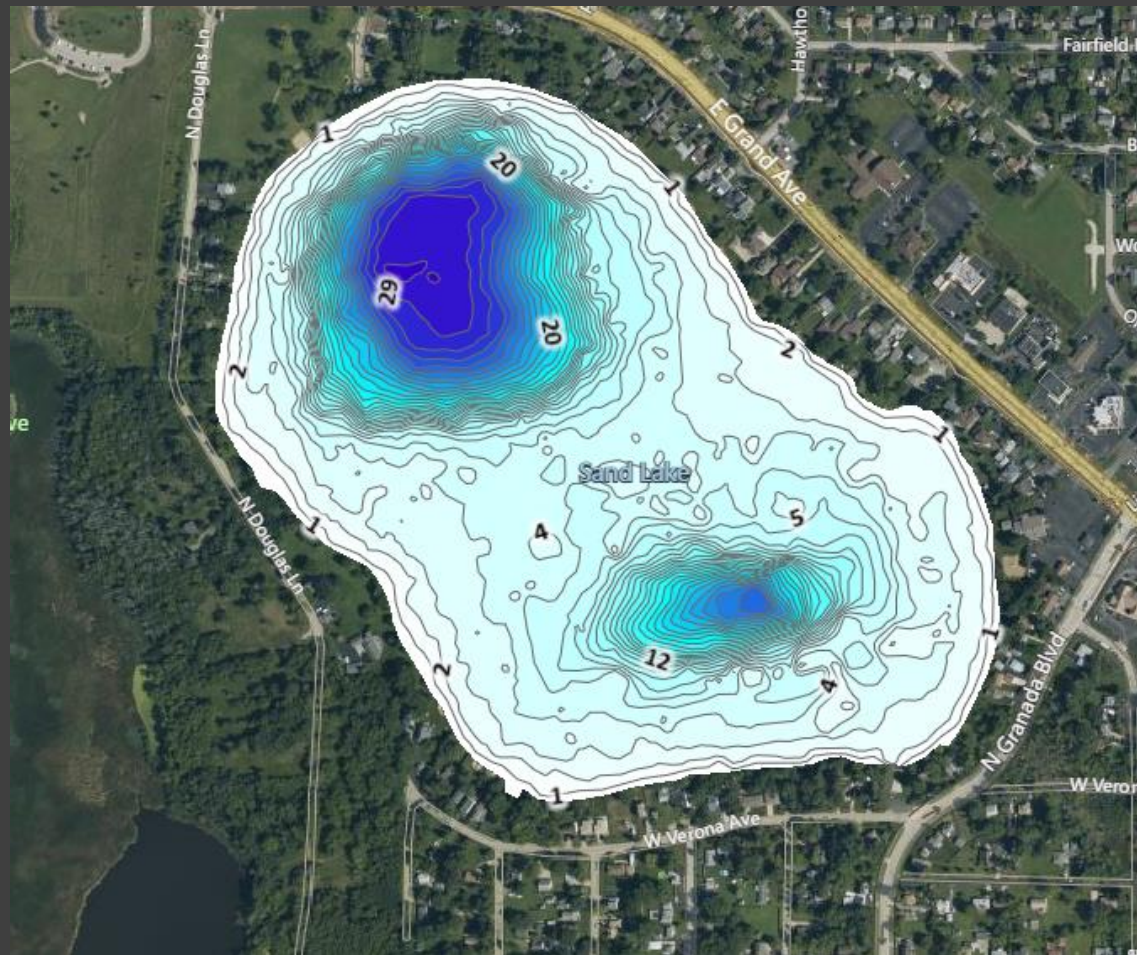
Row	Longitude	Latitude	BioVolume
1	-88.0509	42.34598	0.2783016
2	-88.051	42.34598	0.3690929
3	-88.0511	42.34598	0.3610182
4	-88.0512	42.34598	0.2162302
5	-88.0513	42.34598	0.1077656
6	-88.0508	42.34592	0.172948
7	-88.0509	42.34592	0.1762844
8	-88.051	42.34592	0.2937523
9	-88.0511	42.34592	0.561735
10	-88.0512	42.34592	0.09118619



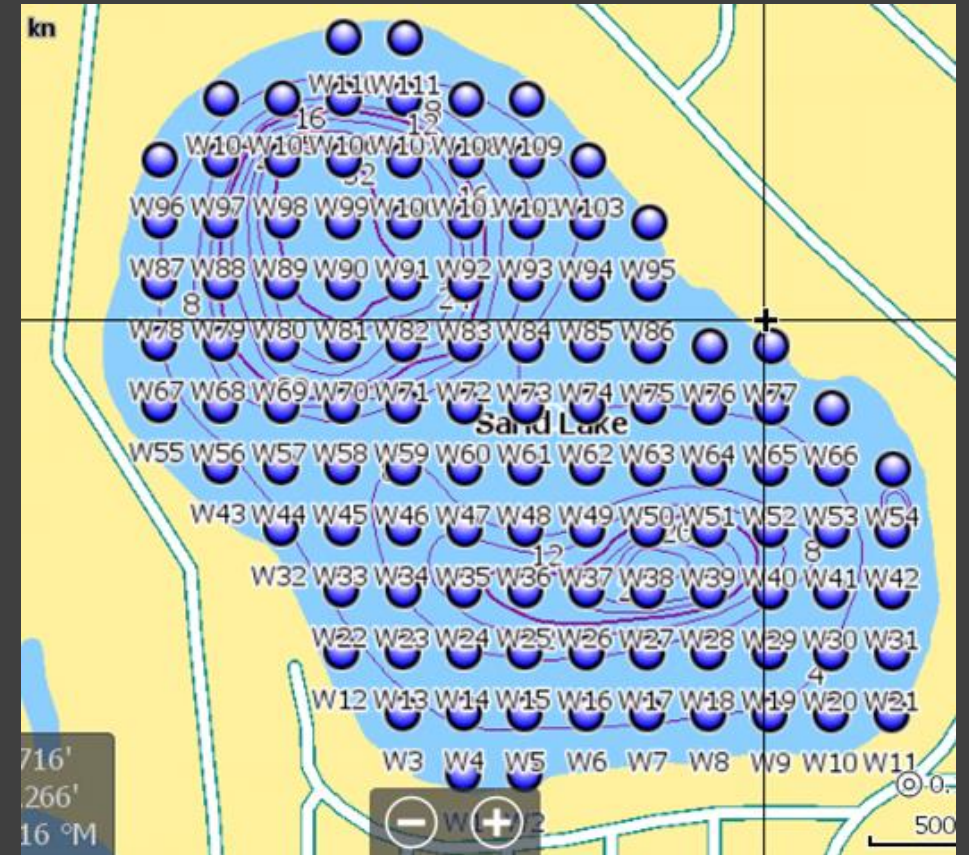
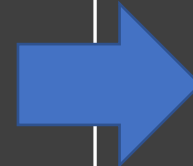
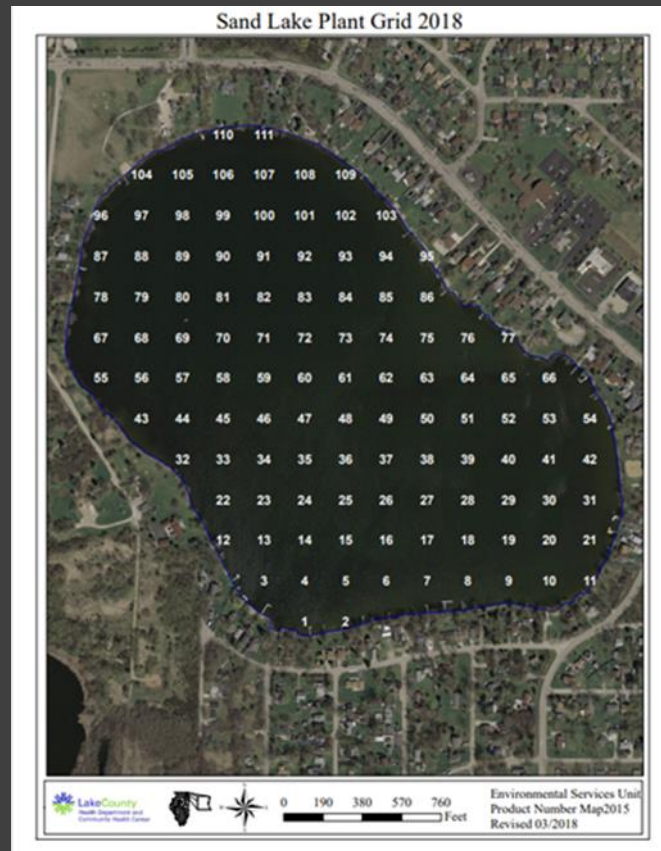
BioBase BioVolume



Upload the file to BioBase



Aquatic Plant Survey -Plant Grid









60m Grid transferred to a GPS-Sonar



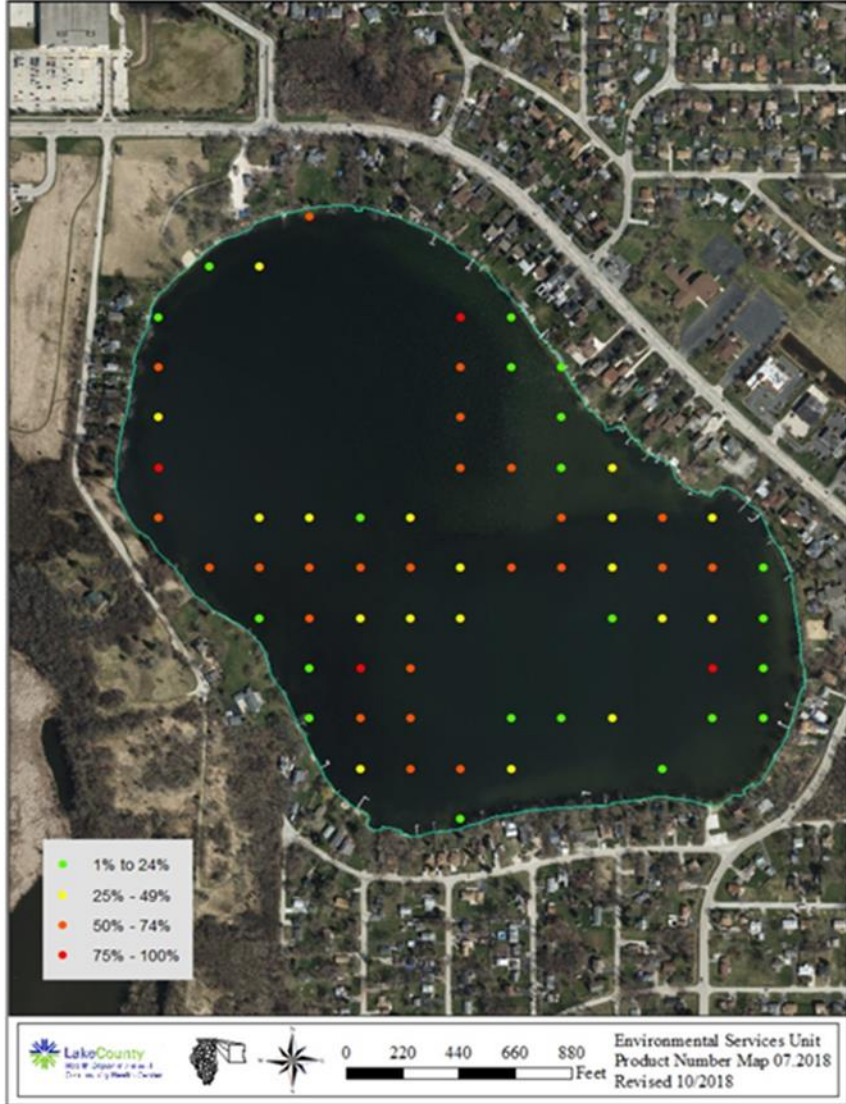
Figure 1. Abundance Ratings

Abundance ratings are given from 0-5. Conditions of the ratings are described below:

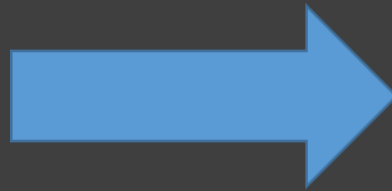
<u>Rating</u>	<u>Coverage</u>	<u>Description</u>
0		<ul style="list-style-type: none"> ➤ No plants on rake head
1		<ul style="list-style-type: none"> ➤ A few plants on rake head
2		<ul style="list-style-type: none"> ➤ Obviously less than 1/2 ➤ Uniform cover toward base
3		<ul style="list-style-type: none"> ➤ Rake head is about 1/2 full ➤ Can easily see top of rake head
4		<ul style="list-style-type: none"> ➤ Obviously more than 1/2 full ➤ Not overflowing ➤ Can barely see top of rake head
5		<ul style="list-style-type: none"> ➤ Overflowing ➤ Cannot see top of rake head

0=no plants, 1 => 0 - 10%, 2 => 10 - 40%, 3 => 40 - 60%, 4 => 60 - 90%, 5 => 90%.

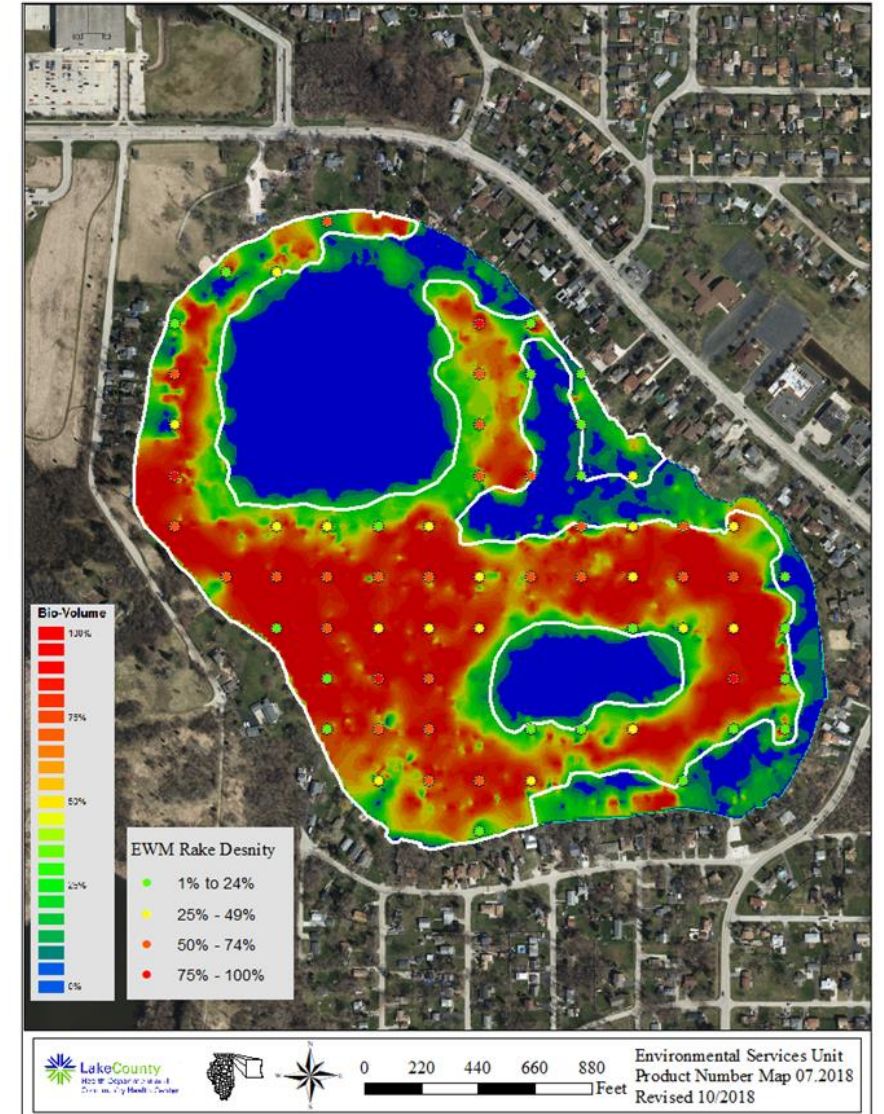
Sand Lake EWM Rake Density July 2018



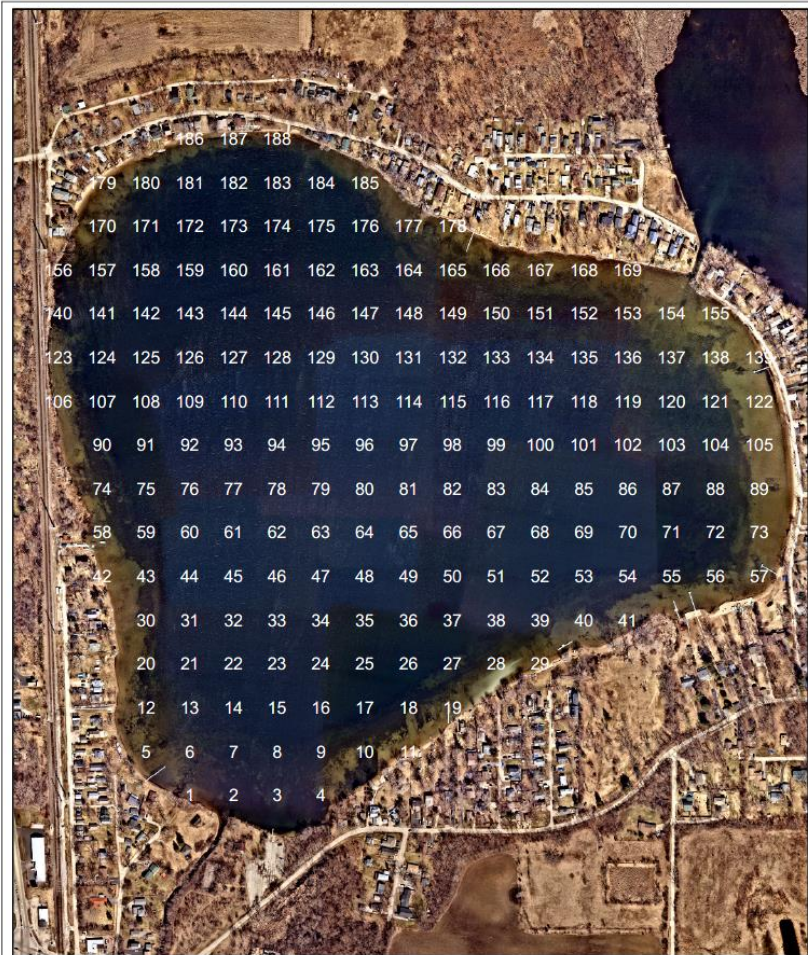
“aquatic plant sampling method collects data on the occurrence of aquatic plant species in lakes, but does not collect information on plant biomass”



Sand Lake BioVolume & EWM Rake Density July 2018



West Loon Lake Plant Grid 2022



0 300 600 900 Feet

Ecological Services
Product Number LC2021
Revised 12/2021

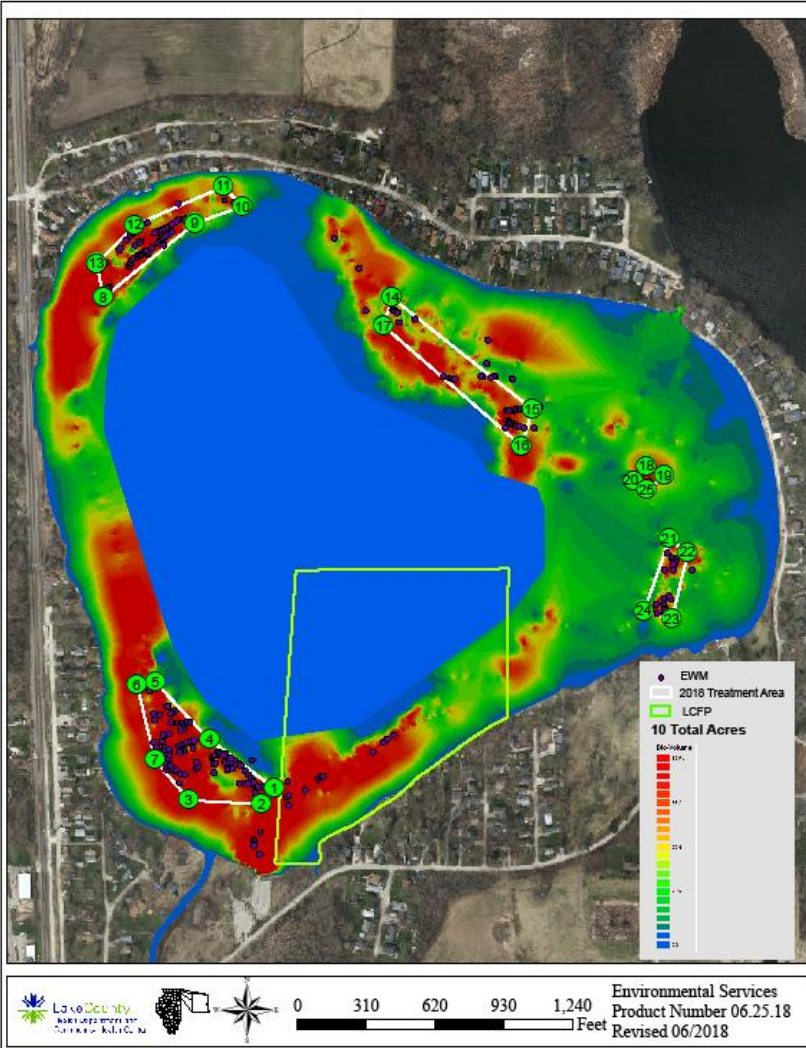
East Loon Lake Plant Grid 2022



0 300 600 900 1,200 Feet

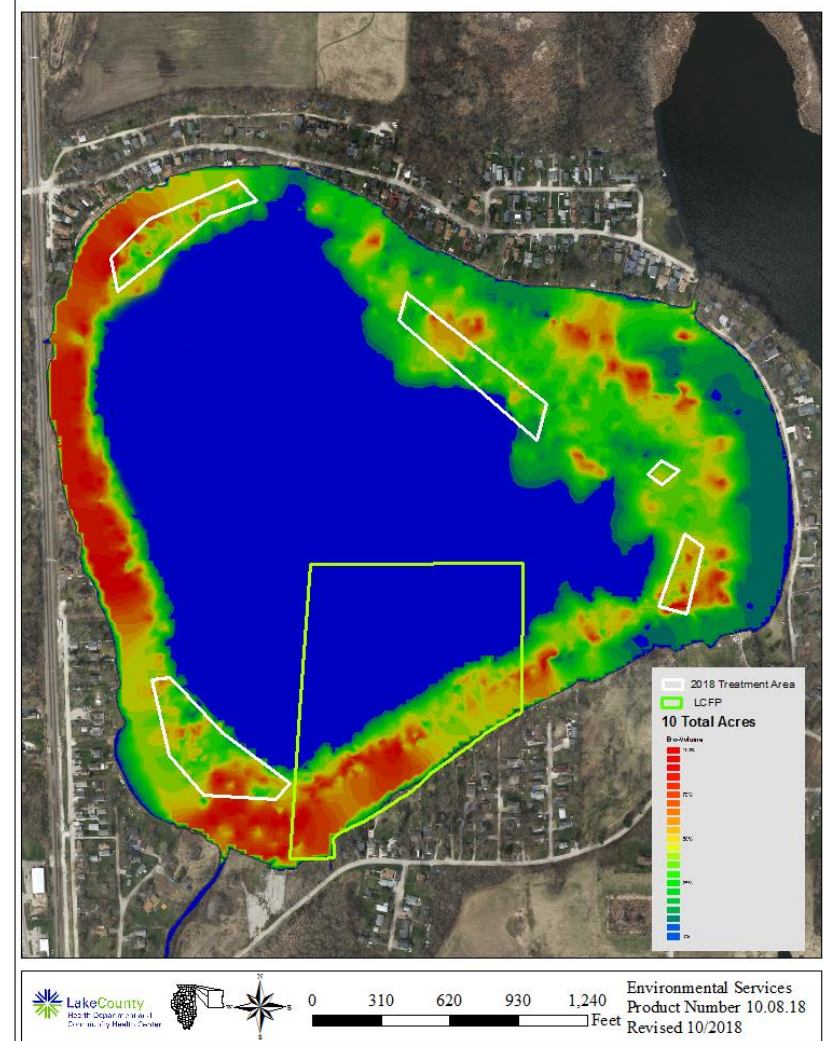
Ecological Services
Product Number LC2021
Revised 05/22

2018 West Loon Lake Treatment Site



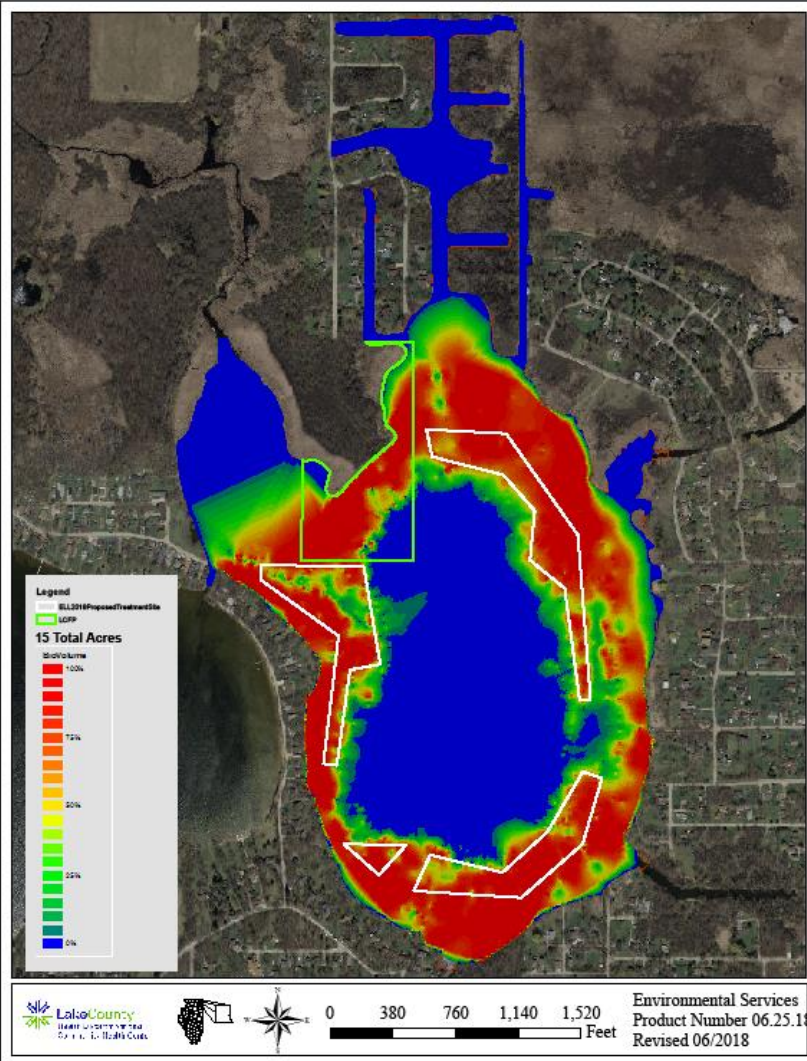
EWM Pre-Treatment

West Loon Lake Post Treatment BioVolume Survey 2018



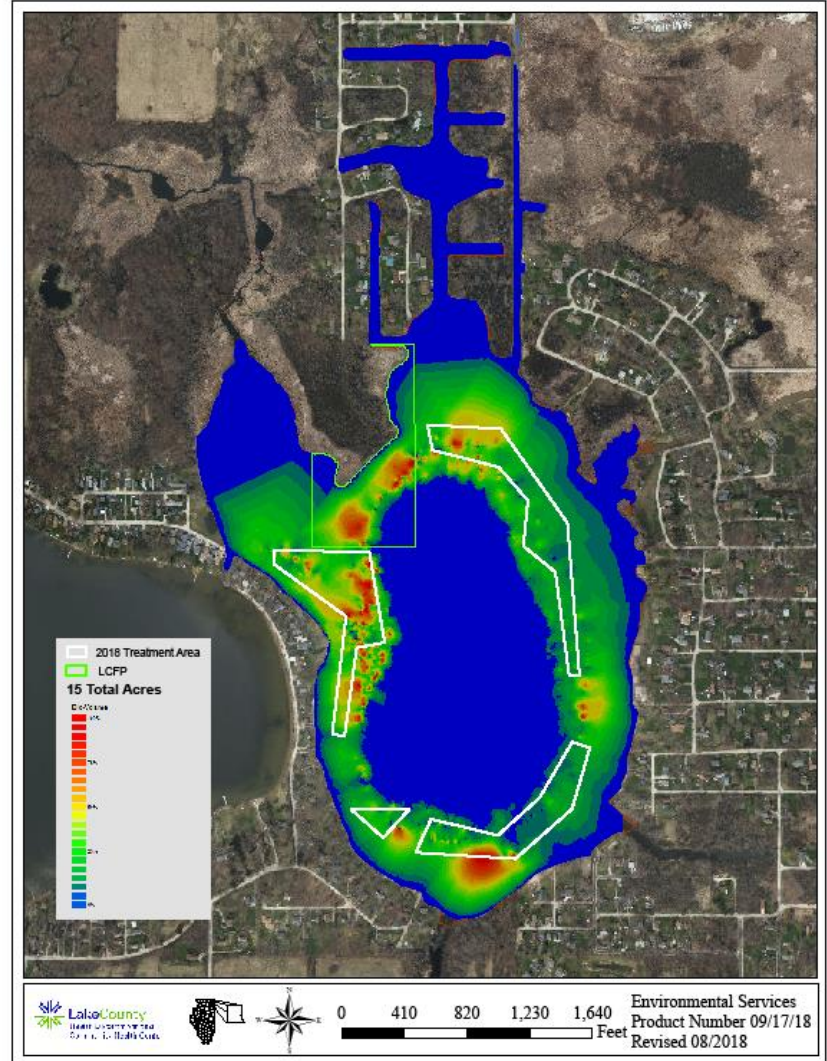
EWM Post-Treatment

2018 East Loon Lake EWM Proposed Treatment Site



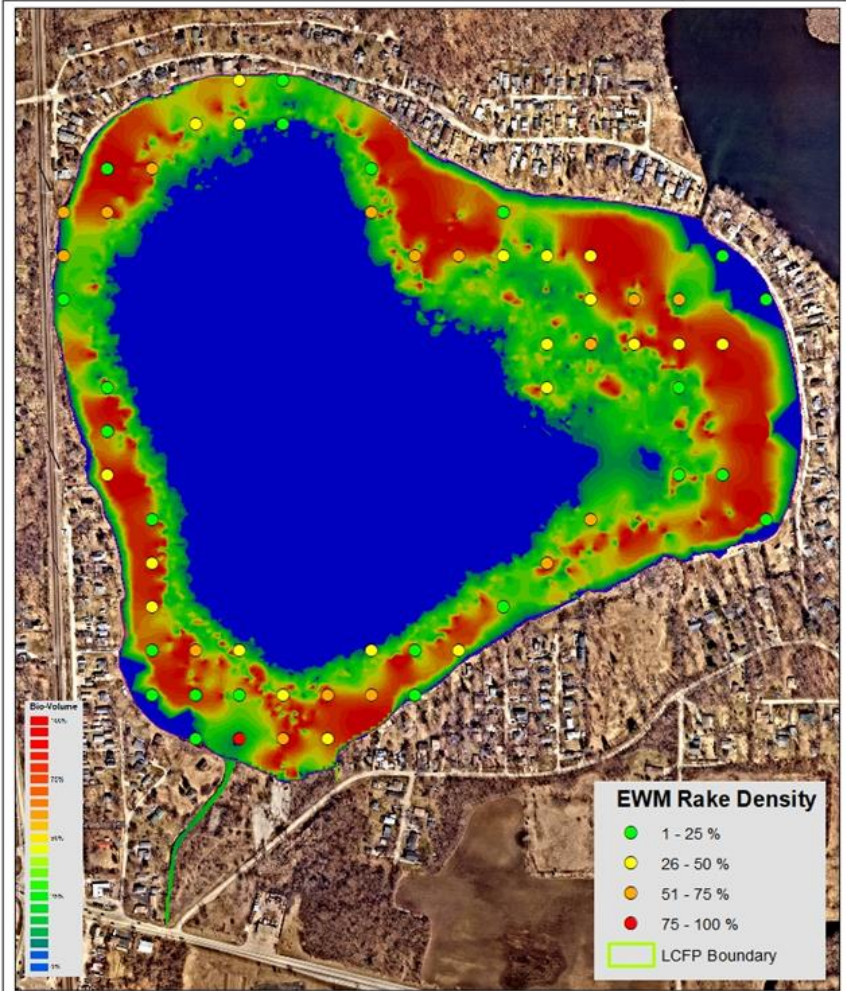
EWM Pre-Treatment

2018 East Loon Lake Post Treatment Bio Volume



EWM Post-Treatment

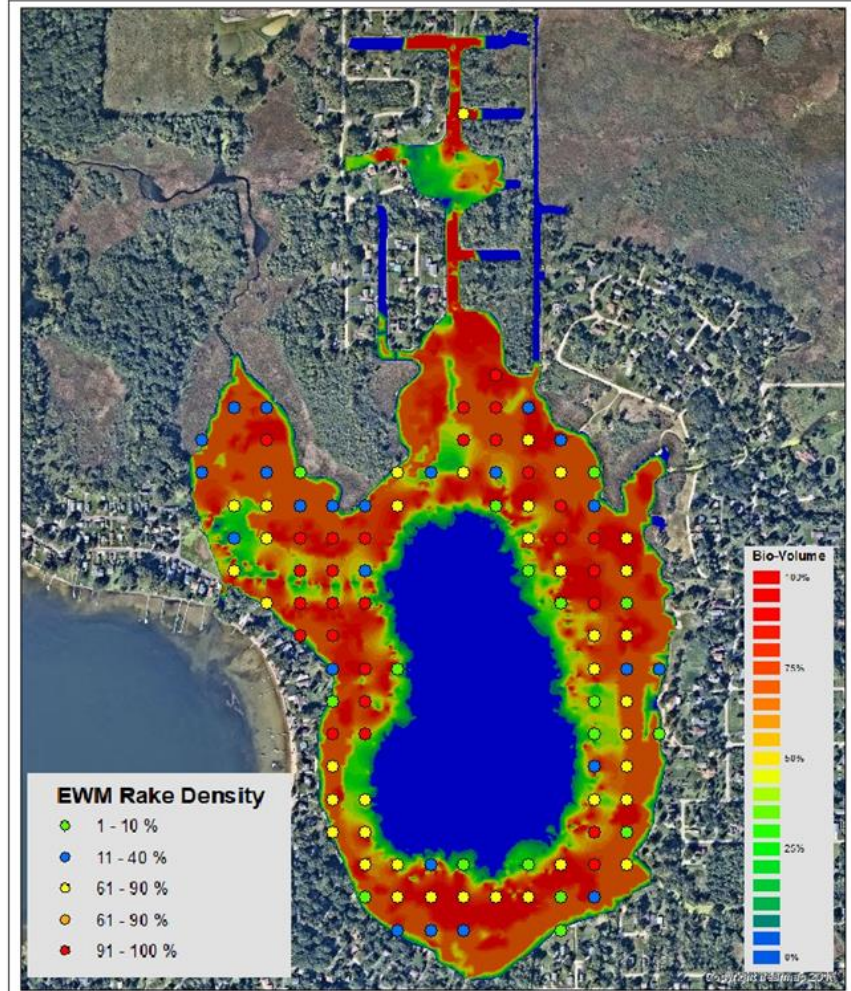
W. Loon Lake EWM and BioVolume Survey 2022



0 300 600 900 Feet

Ecological Services
Product Number LC2022
Revised 08/2022

East Loon Lake EWM Rake Density and Bio-Volume 2022



0 300 600 900 1,200 Feet

Ecological Services
Product Number LC2022
Revised 12/22

WEST LOON LAKE AQUATIC PLANT TABLE 2022

AQUATIC VEGETATION SPECIES FOUND AT THE 188 SAMPLING SITES ON WEST LOON LAKE, AUGUST 2022

Plant Density	American Pondweed	Chara	Coontail	Curlyleaf Pondweed	Elodea	Eurasian Watermilfoil	Flatstem Pondweed	Illinois Pondweed	Sago Pondweed
Absent	172	140	149	186	184	128	176	168	186
Present	7	20	16	1	1	23	7	15	2
Common	5	17	20	0	3	20	5	2	0
Abundant	4	11	3	0	0	16	0	3	0
Dominant	0	0	0	1	0	1	0	0	0
% Plant Occurrence	8.5	25.5	20.7	1.1	2.1	31.9	6.4	10.6	1.1

Plant Density	Slender Naiad	Southern Naiad	Star Duckweed	Vallisneria	Whitestem Pondweed	Watermeal	Water Stargrass	White Water Lily
Absent	181	186	182	147	187	184	158	176
Present	7	2	2	19	1	3	10	8
Common	0	0	4	21	0	0	15	2
Abundant	0	0	0	1	0	1	5	1
Dominant	0	0	0	0	0	0	0	1
% Plant Occurrence	3.7	1.1	3.2	21.8	0.5	2.1	16.0	6.4

DISTRIBUTION OF RAKE DENSITY ACROSS ALL SAMPLING SITES

Rake Density (coverage)	# of Sites	% of Sites
No Plants	45	24
>0-10%	23	12
10-40%	26	14
40-60%	44	23
60-90%	3	2
>90%	0	0
Total Sites with Plants	96	51
Total # of Sites	188	100

EAST LOON LAKES AQUATIC PLANT TABLE 2022

AQUATIC VEGETATION SPECIES FOUND AT THE 203 SAMPLING SITES ON EAST LOON LAKE, AUGUST 2022

Plant Density	American Pondweed	Bladderwort	Chara	Coontail	Duckweed	Elodea	Eurasian Watermilfoil	Largeleaf Pondweed
Absent	201	196	200	93	195	190	96	202
Present	0	1	1	29	3	8	17	0
Common	1	6	1	55	4	5	24	1
Abundant	1	0	1	21	1	0	38	0
Dominant	0	0	0	5	0	0	28	0
% Plant Occurrence	1.0	3.4	1.5	54.2	3.9	6.4	52.7	0.5

Plant Density	American Lotus	Southern Naiad	Star Duckweed	Vallisneria	Whitestem Pondweed	Watermeal	Water Stargrass	White Water Lily
Absent	201	200	152	193	200	127	167	149
Present	0	2	11	5	2	10	15	8
Common	1	1	27	5	1	26	16	15
Abundant	1	0	6	0	0	23	4	25
Dominant	0	0	7	0	0	17	1	6
% Plant Occurrence	1.0	1.5	25.1	4.9	1.5	37.4	17.7	26.6

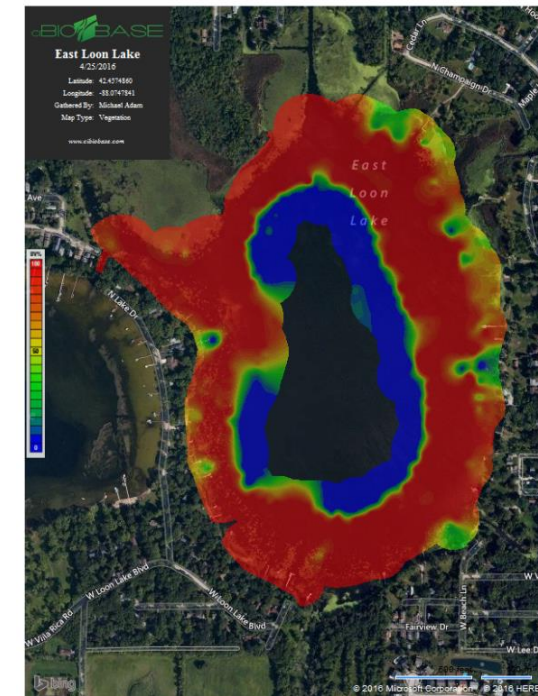
AQUATIC VEGETATION SPECIES FOUND AT THE 203 SAMPLING SITES ON EAST LOON LAKE, AUGUST 2022

Rake Density (coverage)	# of Sites	% of Sites
No Plants	45	22
>0-10%	8	4
10-40%	14	7
40-60%	51	25
60-90%	53	26
>90%	17	8
Total Sites with Plants	143	70
Total # of Sites	203	100

Sample	Lake	Lake Lat.	Lake Long.	Location v	Site Lat.	Site Long.	State	County	Date Collected	Collector/Report to?	Microsatellite strain
MYR-1218	East Loon Lake	42.45339	-88.071	11	42.45016	-88.0747	IL	Lake	5/16/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1218	East Loon Lake	42.45339	-88.071	16	42.45015	-88.0711	IL	Lake	5/16/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1218	East Loon Lake	42.45339	-88.071	22	42.45069	-88.0725	IL	Lake	5/16/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1218	East Loon Lake	42.45339	-88.071	27	42.45124	-88.0762	IL	Lake	5/16/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1218	East Loon Lake	42.45339	-88.071	45	42.45177	-88.0703	IL	Lake	5/16/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1218	East Loon Lake	42.45339	-88.071	46	42.45232	-88.0769	IL	Lake	5/16/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1218	East Loon Lake	42.45339	-88.071	69	42.4534	-88.0761	IL	Lake	5/16/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1218	East Loon Lake	42.45339	-88.071	76	42.45339	-88.071	IL	Lake	5/16/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1219	East Loon Lake	42.45339	-88.071	91	42.45448	-88.0761	IL	Lake	5/16/2022	Gerard Urbanozo	H-MYR-12182
MYR-1219	East Loon Lake	42.45339	-88.071	114	42.45557	-88.0791	IL	Lake	5/16/2022	Gerard Urbanozo	H-MYR-12191
MYR-1219	East Loon Lake	42.45339	-88.071	125	42.45555	-88.071	IL	Lake	5/16/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1219	East Loon Lake	42.45339	-88.071	131	42.4561	-88.0769	IL	Lake	5/16/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1219	East Loon Lake	42.45339	-88.071	142	42.45665	-88.0791	IL	Lake	5/16/2022	Gerard Urbanozo	H-MYR-12194
MYR-1219	East Loon Lake	42.45339	-88.071	147	42.45664	-88.0754	IL	Lake	5/16/2022	Gerard Urbanozo	H-MYR-12182
MYR-1219	East Loon Lake	42.45339	-88.071	163	42.45717	-88.0725	IL	Lake	5/16/2022	Gerard Urbanozo	H-MYR-12182
MYR-1219	East Loon Lake	42.45339	-88.071	170	42.45772	-88.0739	IL	Lake	5/16/2022	Gerard Urbanozo	H-MYR-12182
MYR-1219	East Loon Lake	42.45339	-88.071	182	42.4588	-88.0747	IL	Lake	5/16/2022	Gerard Urbanozo	H-MYR-12182
MYR-1219	East Loon Lake	42.45339	-88.071	185	42.45879	-88.0725	IL	Lake	5/16/2022	Gerard Urbanozo	H-MYR-12182
MYR-1220	East Loon Lake	42.45339	-88.071	188	42.45933	-88.0732	IL	Lake	5/16/2022	Gerard Urbanozo	H-MYR-12182
MYR-1220	East Loon Lake	42.45339	-88.071	202	42.4642	-88.0739	IL	Lake	5/16/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1277	West Loon Lake			3	42.44856	-88.0864	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1277	West Loon Lake			2	42.44856	-88.0871	IL	Lake	8/15/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1277	West Loon Lake			10	42.4491	-88.0849	IL	Lake	8/15/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1277	West Loon Lake			12	42.44965	-88.0886	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1277	West Loon Lake			28	42.45017	-88.0827	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1277	West Loon Lake			54	42.45125	-88.0805	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1277	West Loon Lake			57	42.45124	-88.0783	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1277	West Loon Lake			72	42.45179	-88.0791	IL	Lake	8/15/2022	Gerard Urbanozo	FAIL
MYR-1278	West Loon Lake			74	42.45235	-88.0893	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1278	West Loon Lake			86	42.45233	-88.0805	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1278	West Loon Lake			90	42.45289	-88.0893	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1278	West Loon Lake			106	42.45343	-88.09	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1278	West Loon Lake			119	42.45341	-88.0805	IL	Lake	8/15/2022	Gerard Urbanozo	E-MISGP-1863
MYR-1278	West Loon Lake			121	42.45341	-88.0791	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1278	West Loon Lake			148	42.4545	-88.0842	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1278	West Loon Lake			150	42.45449	-88.0827	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1278	West Loon Lake			171	42.45559	-88.0885	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1278	West Loon Lake			182	42.45612	-88.0871	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1279	West Loon Lake			183	42.45612	-88.0863	IL	Lake	8/15/2022	Gerard Urbanozo	H-MYR-12191
MYR-1279	West Loon Lake			185	42.45612	-88.0849	IL	Lake	8/15/2022	Gerard Urbanozo	FAIL

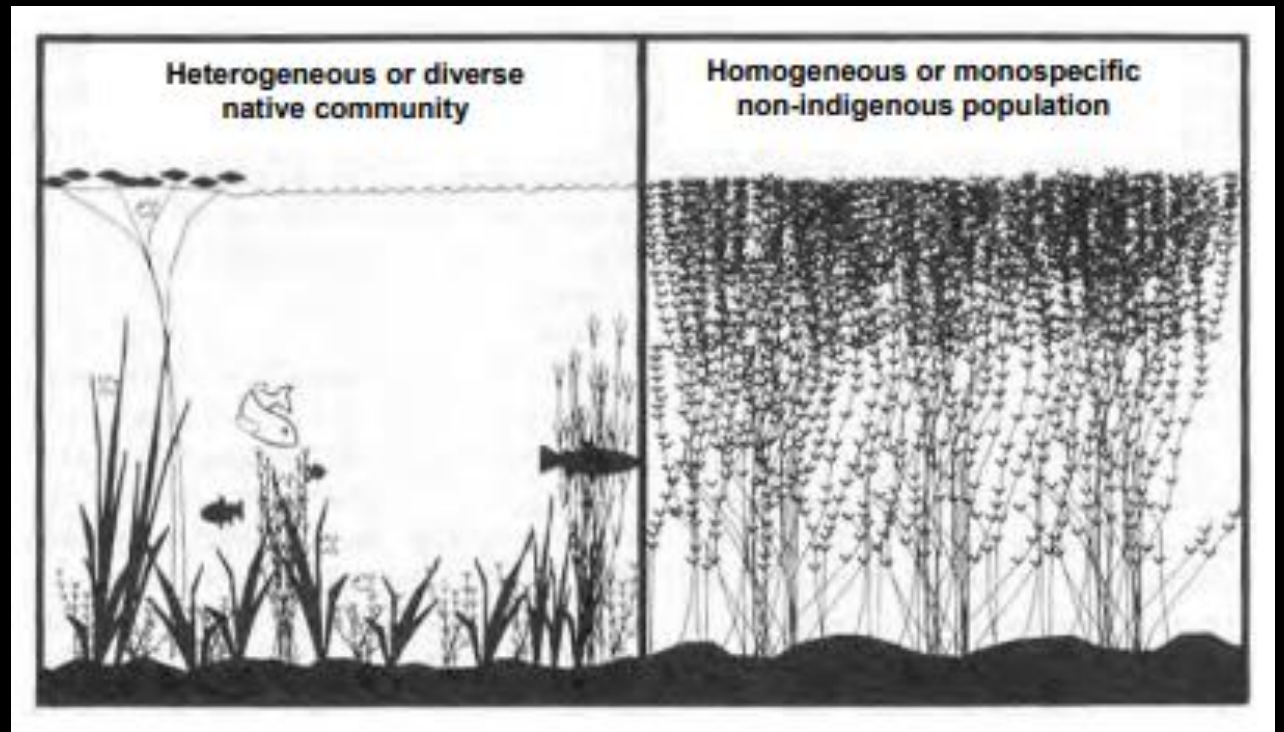
Hybrid Eurasian Watermilfoil

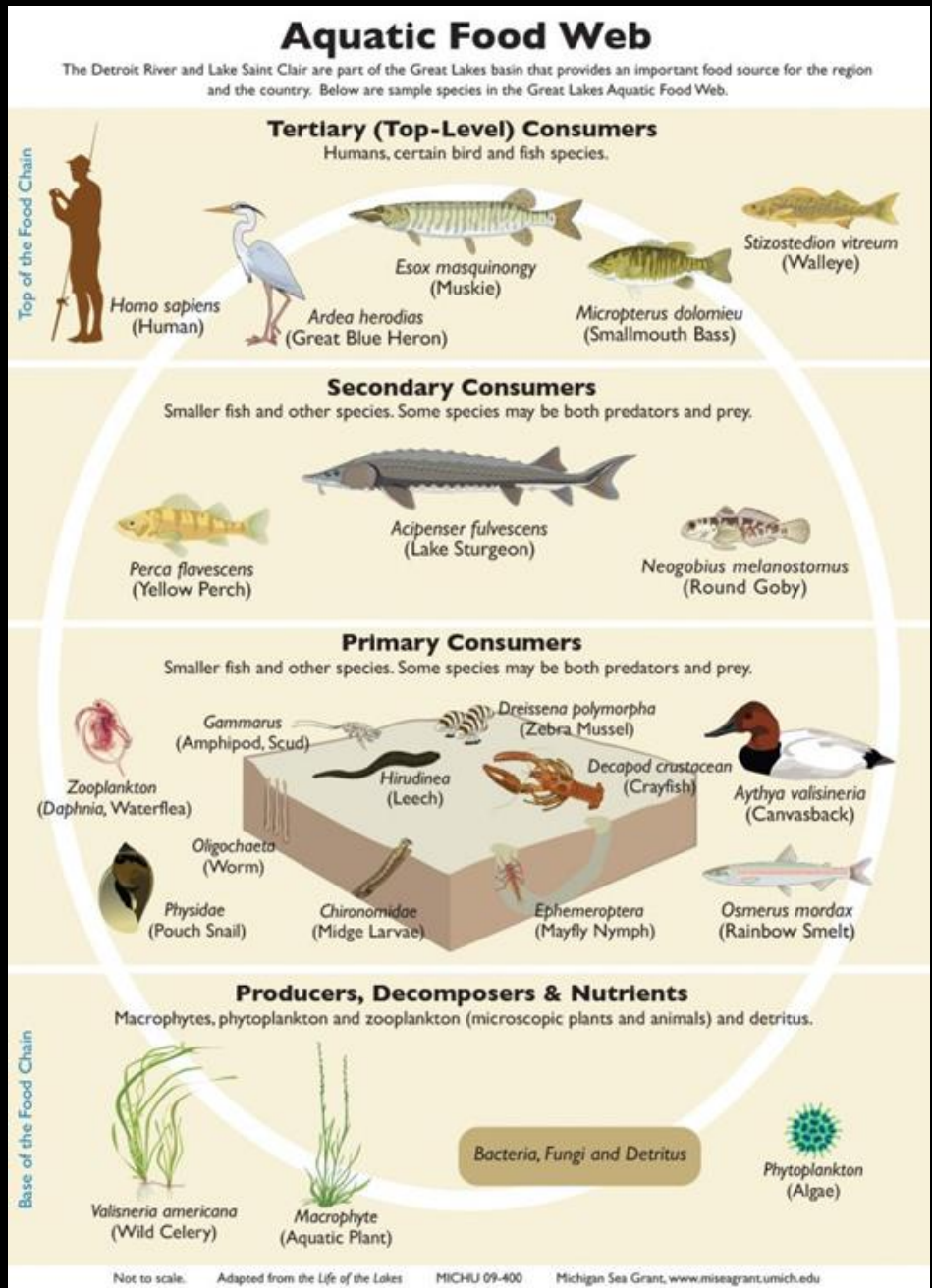
- The prefixes “E” and “H” stand for Eurasian and hybrid, respectively.
- E-MISGP-1863 is also a widespread Eurasian strain that we have found in many locations in several states (IL, IN, MI, NY, OH, WI).



Native vs Non-Native Invasive Aquatic Plant

- Abundance of some fish declines with increased plant densities.
- Excessive growth of Aquatic Plants promotes high population of small fish – Stunted.
- Aquatic plants serve as habitats that support prey (insects and crustaceans) for YOY fish.
- The abundance and diversity of aquatic fauna eaten by small fish are higher in a native plant community.
- Rapid removal affects food sources.
- Habitats with moderate amounts of aquatic vegetation provide the optimal environment for many fish.
- Increase extinction rate of rare and threatened species.
- Interfere with boating and fishing activity.







Fish	Plant Affinity	Life Stage				Relationship	
		Larvae	Juvenile	Adult	Spawn	Forage	Predator avoidance
Bluegill sunfish	High	X	X	X	X	X	X
Common carp	High	X	X	X	X	X	X
Largemouth bass	High	X	X	X	X	X	X
Musky	High	X	X	X	X	X	X
Northern Pike	High	X	X	X	X	X	X
Black crappie	Moderate		X	X	X	X	X
Smallmouth bass	Moderate		X	X		X	X
Yellow perch	Moderate	X	X			X	X
White crappie	Low		X			X	X
Salmon, trout	Low		X				X
Shad	Low	X					X
Walleye	Low		X	X		X	X

How do plants impact fish?

- Plants provide critical structure to aquatic habitats.
- Plants influence growth of fish by enhancing fish diversity, feeding, growth, and reproduction.
- Plants influence spawning. The structure provided by plant beds are important to fish reproduction.
- Plants influence the physical environment. Aquatic plants can change water temperatures and available oxygen in habitats.



Fernleaf Pondweed



White Water Crowfoot

Aquatic Plant	Year						
	2003	2008	2010	2011	2012	2013	2022
American Lotus			X	X	X	X	X
American Pondweed	X	X	X	X	X	X	X
Bladder wort	X	X	X	X	X	X	X
Chara		X	X	X	X	X	X
Coontail	X	X	X	X	X	X	X
Curlyleaf Pondweed	X	X	X	X	X	X	
Duckweed	X	X	X	X	X	X	X
Elodea		X	X	X	X	X	X
Eurasian Water milfoil	X	X	X	X	X	X	X
Fernleaf Pondweed							
Flatstem Pondweed	X	X	X	X	X	X	
Floatingleaf Pondweed		X		X	X	X	
Grass-leaved Pondweed			X	X			
Grass-leaved Arrowhead				X			
Giant Duckweed		X	X	X		X	
Illinois Pondweed	X	X		X	X	X	
Largeleaf Pondweed	X	X	X	X	X	X	X
Leafy Pondweed	X	X					
Northern Water milfoil	X			X	X		
Sago Pondweed	X	X	X	X	X	X	
Small Pondweed				X	X		
Slender Naiad	X	X	X	X			
Southern Naiad			X	X	X	X	X
Spatterdock	X	X		X		X	
Spirynaiad		X					
Star Duckweed	X	X	X	X	X	X	X
Vallisneria	X	X	X	X	X	X	X
Variable Pondweed					X		
Water Marigold							
Watermeal	X	X	X	X	X	X	X
Water Stargrass	X	X	X	X	X	X	X
WhiteWater Crowfoot					X		
Whitestem Pondweed					X		X
WhiteWater Lily	X	X	X	X	X	X	X
Total	19	23	21	27	25	22	16



Leafy Pondweed



Water Marigold



Small Pondweed

West Loon Lake	Year					
Aquatic Plant	2003	2008	2010	2011	2012	2022
American Pondweed	X		X	X	X	X
Bladderwort	X			X		
Chara	X	X	X	X	X	X
Coontail		X	X	X	X	X
Curlyleaf Pondweed	X	X	X	X	X	X
Duckweed	X	X	X	X	X	
Elodea		X	X	X	X	X
Eurasian Watermilfoil	X	X	X	X	X	X
Flatstem Pondweed	X	X	X	X	X	X
Floatingleaf Pondweed	X	X	X	X	X	
Grass-leaved Arrowhead			X	X		
Grass-leaved Pondweed	X		X			
Giant Duckweed				X		
Illinois Pondweed	X	X	X	X	X	X
Largeleaf Pondweed	X	X	X	X	X	
Leafy Pondweed	X					
Northern Watermilfoil	X		X		X	
Sago Pondweed	X	X	X	X	X	X
Small Pondweed	X					
Slender Naiad	X		X	X	X	X
Southern Naiad			X	X		X
Star Duckweed		X	X	X		X
Vallisneria	X	X	X	X	X	X
Variable Pondweed				X	X	
Watermeal			X	X	X	X
Water Stargrass	X	X	X	X	X	X
White Water Crowfoot	X	X		X	X	
White-stem Pondweed					X	X
White Water Lily	X	X	X	X	X	X
Total	20	16	22	24	21	17



(C) Paul Skawinski, 2009

Leafy Pondweed

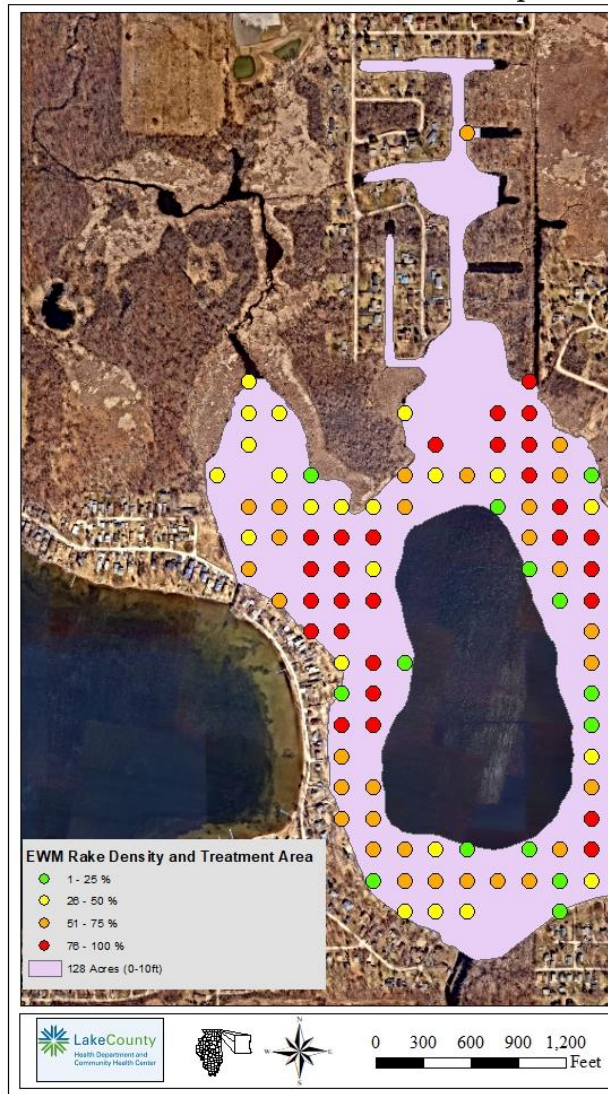


White Water Crowfoot



Bladderwort

E. Loon Lake Eurasian Watermilfoil Proposed Treatment Area



REQUEST FOR PROPOSALS (RFP)

HERBICIDE APPLICATION FOR THE CONTROL OF EURASIAN WATERMILFOIL IN EAST AND WEST LOON LAKES

LAKE COUNTY, ILLINOIS

1. GENERAL DESCRIPTION OF WORK

The work described herein involves application of herbicide products in East and West Loon Lakes where the invasive aquatic plant species, Eurasian Watermilfoil (EWM) has reached nuisance levels and is causing negative consequences to the lakes' native plant communities.

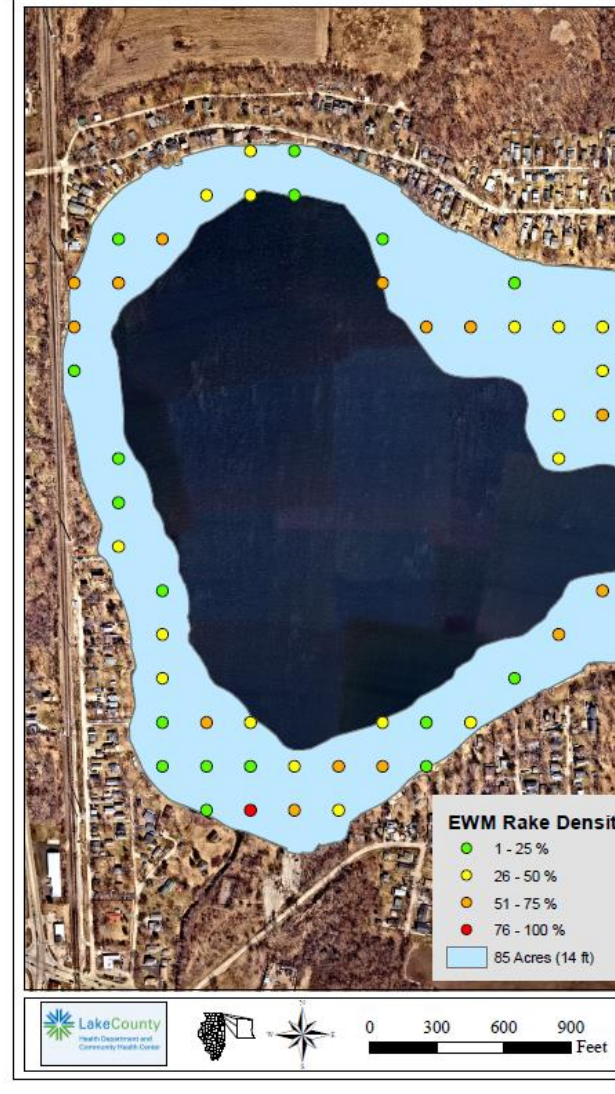
A 2022 survey found EWM growing in East Loon and West Loon Lakes at approximately 128 acres and 85 acres respectively. The Loon Lakes Management Association (LLMA) seeks proposals to chemically control the EWM for the 2023 season.

2. DETAILED DESCRIPTION OF WORK

The successful contractor shall complete the following tasks:

- A. Perform a whole lake herbicide treatment in the affected areas (see attached maps) using Florpyrauxifen-Fenzl *ProcellaCor*. Indicate cost and how much product will be used per surface acre or on a volumetric rate, on proposal form. Price will include follow up assessments using HPLC / FasTEST. Price will

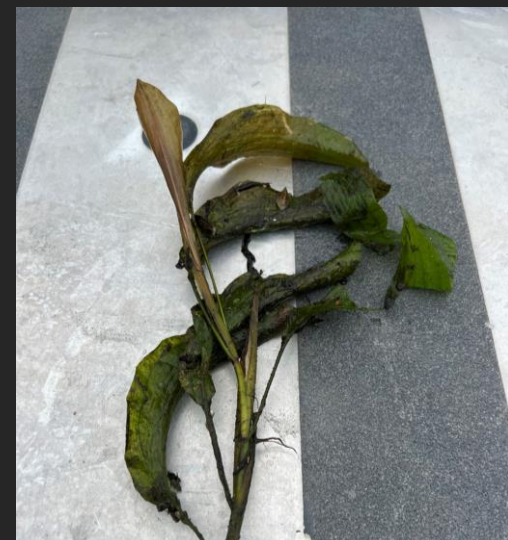
W. Loon Lake Eurasian Watermilfoil Proposed Treatment Area



ProcellaCOR

- November 22, 2021 – Whole Lake treatment plan started.
- February 7, 2022 – LLMA requests IDNR approval to use an alternative herbicide to treat EWM
- September 23, 2022- LCFP Support Letter for the whole lake treatment.
- November 2022 – Request for Proposal Finalized and sent out to LCFP and IDNR for approval.
- November 2022 – 14 RFP's sent out and 5 responded with proposals.
- January 2023 – 2 LC SMC Grants awarded to LLMA!
- January 2023 – Clarke Aquatics / Solitude was selected by LLMA to apply ProcellaCOR.
- March 1, 2023 Contract signed with Clarke Aquatics / Solitude.
- May 12, 2023 - Solitude Lake Management EWM growth survey.
- May 15, 2023 – ProcellaCOR applied to East and West Loon Lakes.
- May 31, 2023 / September 8, 2023 – Post-treatment Survey









LakeCounty

Health Department and
Community Health Center

Questions ?

