

A


APPENDIX A

Public Participation Materials



Presentation Outline


- Onterra, LLC
- Why Create a Management Plan?
- Elements of a Lake Management Planning Project
 - Data & Information
 - Planning Process



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Lake Management Planning

Onterra, LLC

- Founded in 2005
- Staff
 - Three full-time ecologists
 - One part-time paleoecologist
 - Three full-time field technicians
 - Five summer interns
- Services
 - Science and planning
- Philosophy
 - Promote realistic planning
 - Assist, not direct




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Lake Management Planning

Why create a lake management plan?

- Preserve/restore ecological function to ensure cultural services
- To create a better understanding of lake’s positive and negative attributes.
- To discover ways to minimize the negative attributes and maximize the positive attributes.
- Snapshot of lake’s current status or health.
- Foster realistic expectations and dispel any misconceptions.

A goal without a plan is just a wish!



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Elements of an Effective Lake Management Planning Project

Data and Information Gathering

Environmental & Sociological

Planning Process

Brings it all together



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Data and Information Gathering

- Study Components
 - Water Quality Analysis
 - Watershed Assessment
 - Aquatic Plant Surveys
 - Fisheries Data Integration
 - Shoreland & CWH Assessment
 - Stakeholder Survey



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Water Quality Analysis

- General water chemistry (current & historical)
- Nutrient analysis
 - Lake trophic state (Eutrophication)
 - Limiting plant nutrient
- Supporting data for watershed modeling



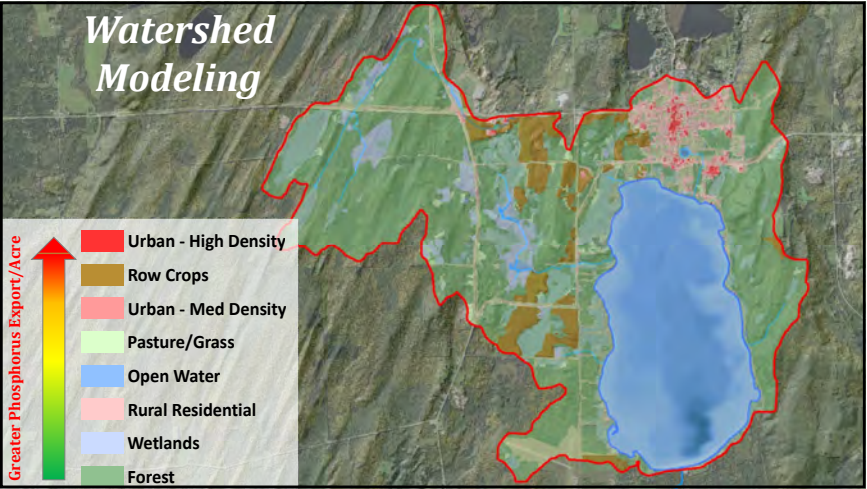
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Watershed Assessment

- Geographic area within which all water drains to a common point



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Aquatic Plant Surveys

- Concerned with both native and non-native plants
- Multiple surveys used in assessment
 - Early-Season AIS Survey (CLP, PYI, EWM)
 - Point-intercept survey
 - Emergent & floating-leaf community mapping
 - Late-Season AIS Survey (EWM)

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Non-native Aquatic Plants

Curly-leaf Pondweed

Verified 2013


Eurasian Watermilfoil

Verified 2005


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Non-native Aquatic Plants

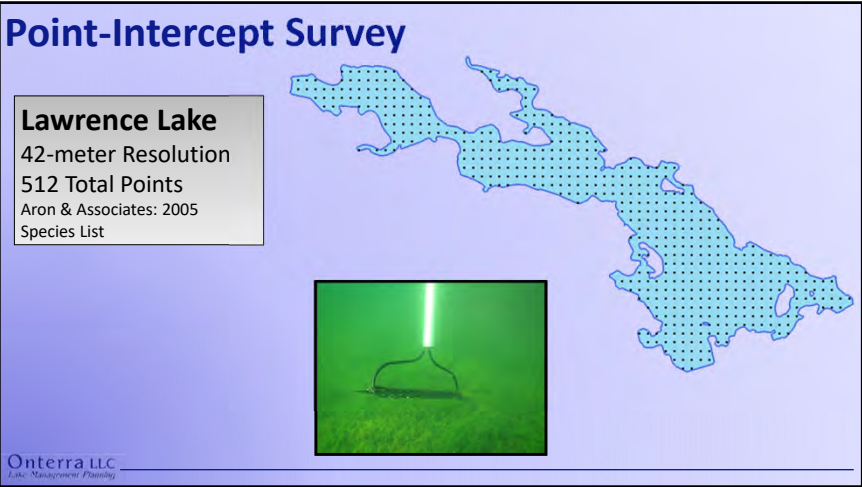
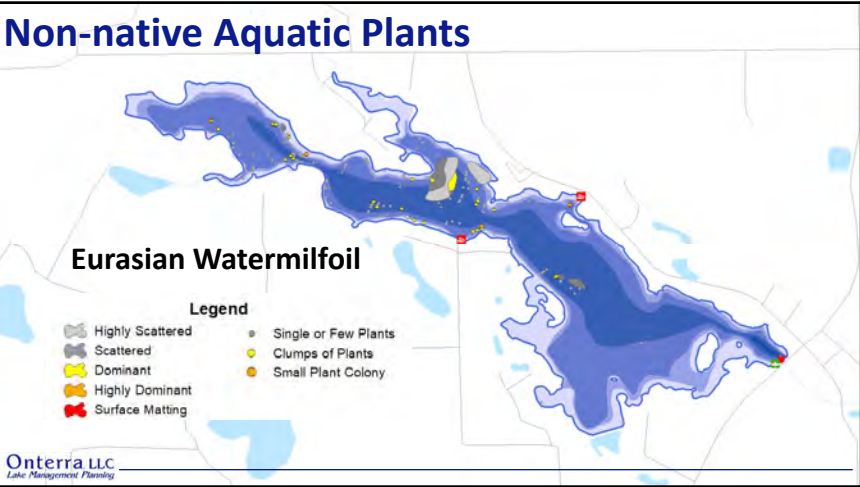
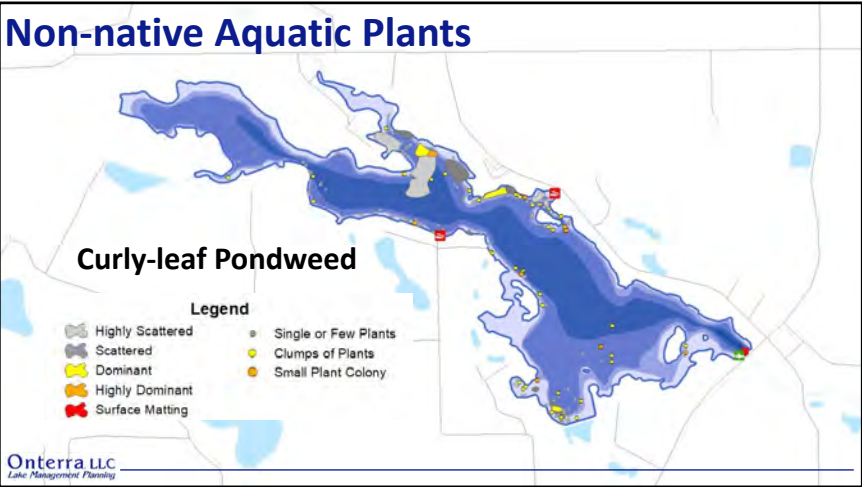
Pale Yellow Iris



Purple Loosestrife







Emergent & Floating-leaf Plant Community Mapping Survey

- Important for habitat, water quality, and shoreland stabilization
- Negatively impacted by shoreland development
- Ecological indicator communities
- Sub-meter GPS delineation
- Separation by community type
- Identification of dominant species



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Fisheries Data Integration

- No fish sampling completed
- Assemble data from WDNR, USGS, & USFWS
- Fish survey results summaries (if available)
- Use information in planning as applicable



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Shoreland Assessment

- Shoreland area is important for buffering runoff and provides valuable habitat for aquatic and terrestrial wildlife.
- EPA National Lakes Assessment results indicate shoreland development has greatest negative impact to health of our nation's lakes.
- Assessment uses WDNR protocol considers vegetative cover, maintained lawn, shoreline protection, impervious surfaces, and other shoreland development indicators.
- Coarse woody habitat is also assessed.



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Stakeholder Survey

- Survey includes primarily riparian property owners
- Standard survey used as base
 - Planning committee potentially develops additional questions and options
 - Must not lead respondent to specific answer through a "loaded" question
- Survey must be approved by WDNR



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Planning Process

Planning Committee Meetings

Study Results (including a stakeholder survey)
Conclusions & Preliminary Options

Management Goals
Management Actions
Timeframe
Facilitator(s)

↓

Implementation Plan



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Thank You

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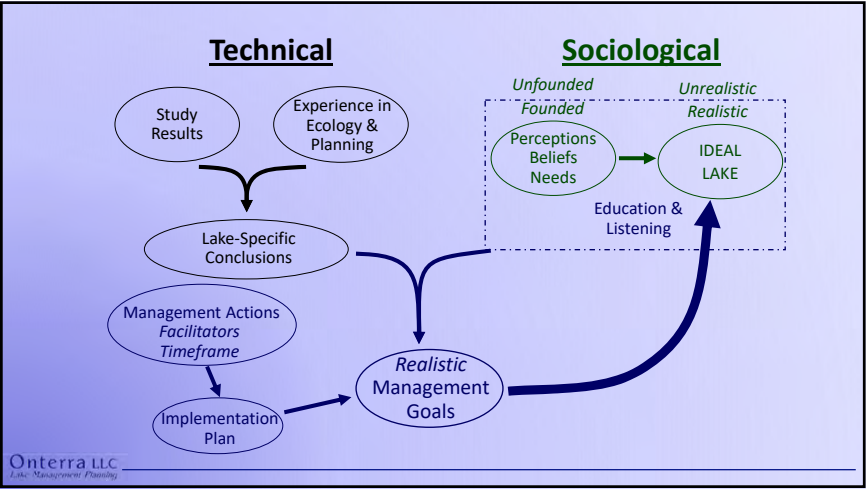


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The Planning Process



...it's not as easy as you may think.

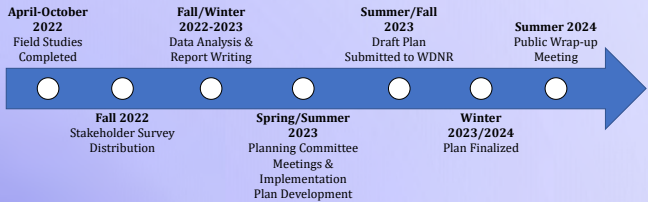


Planning Committee

- Role
 - Provide perspective as Lawrence Lake stakeholder representatives
 - Gain understanding of Lawrence Lake ecosystem and communicate with others
- Responsibilities
 - Stakeholder survey development (this summer)
 - Review draft result sections
 - Two planning meetings (2023)
 - Review/approve entire draft report
- Remember to record time spent on project activities (form provided)

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Project Timeline



- Next steps
 - Josephine will be in touch soon regarding the stakeholder survey
 - Committee works with her to finalize survey – fall distribution
 - Field work completed through early 2023

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Presentation Outline

- Lake Management Planning Project Overview
- Meeting Objective
- Study Results
 - Water Quality
 - Watershed
 - Shoreland Condition
 - Sediment
 - Aquatic Plants
- “Big Picture”
- Planning Meeting II

A photograph of a small motorboat with two people on a calm lake under a clear blue sky. The shoreline with trees is visible in the background.

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Lake Management Planning

Management Planning Project Overview

Collect and compile information about Lawrence Lake
*Includes both environmental & sociological
Historical & current information
Past management actions*

Create a realistic and implementable management plan
*Challenges facing lake and LLPRD
Create goals that will address challenges
Develop actions that will meet goals
Assign timeframes & facilitators*

Planning Meeting I/II
Report Sections

Planning Meeting II
Implementation Plan

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Summary of Project Results

Water Quality

- Very little water quality data are available for Lawrence Lake.
- Water quality is considered *Good* to *Excellent*.
- Lake is considered productive (Eutrophic).

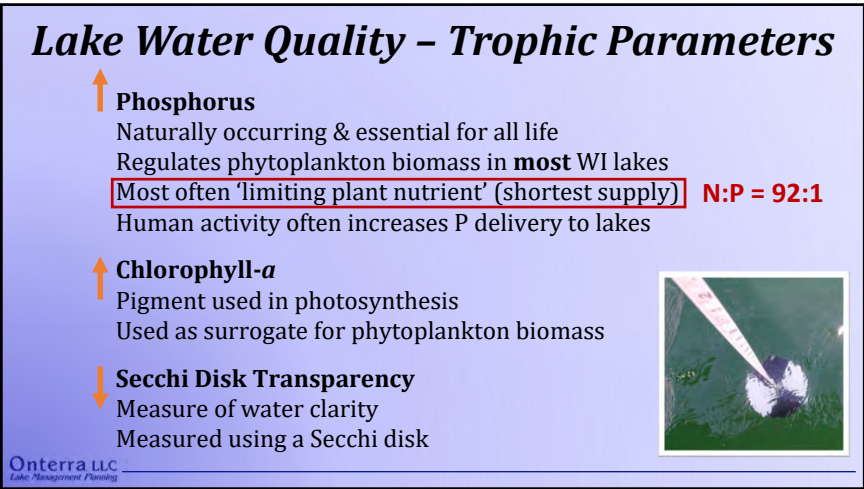
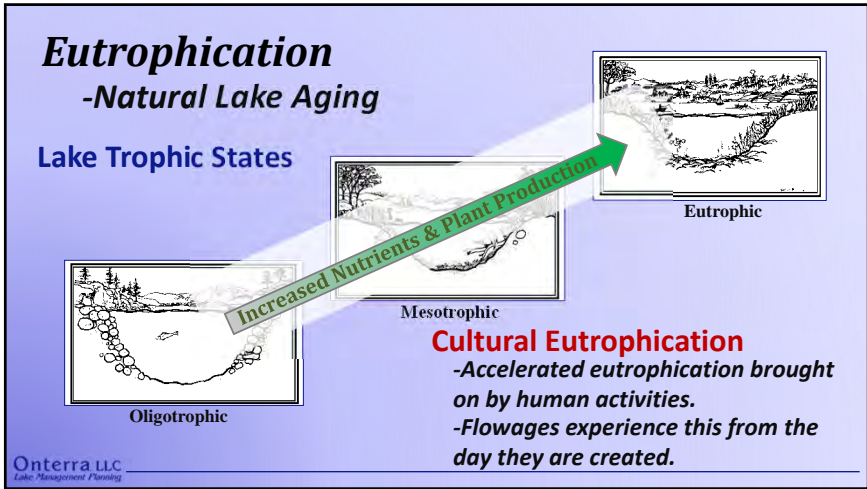
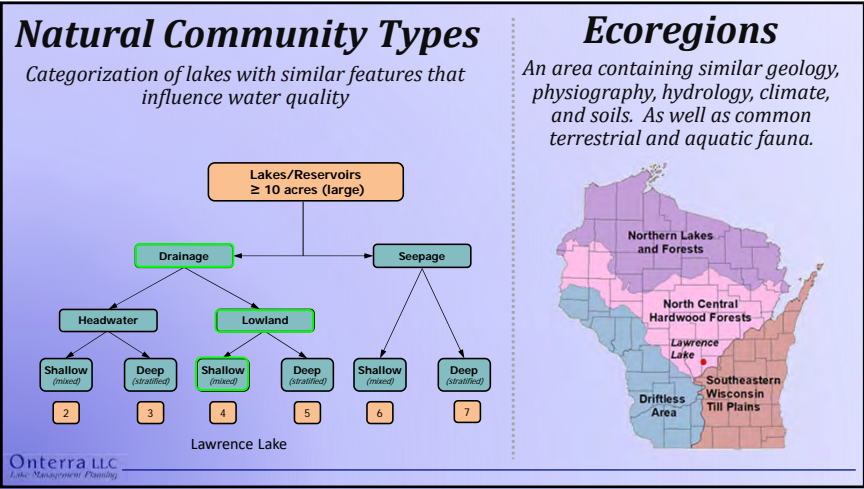
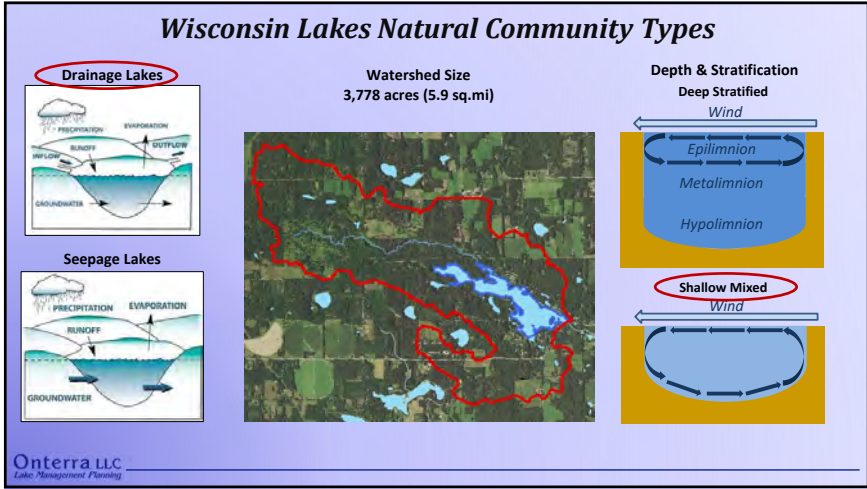
Watershed

- Full surface watershed is over 3½ times the size of the watershed that actually feeds Lawrence Lake.
- Watershed is in pretty good condition, especially for a lake in Central Wisconsin.
- Near-watershed is good to excellent in regards to habitat potential.

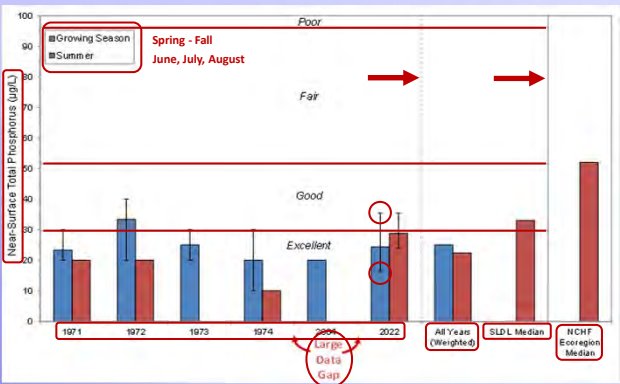
Aquatic Plant Community

- Native aquatic plant community is of high quality
- EWM and CLP are established in the lake, moderate populations

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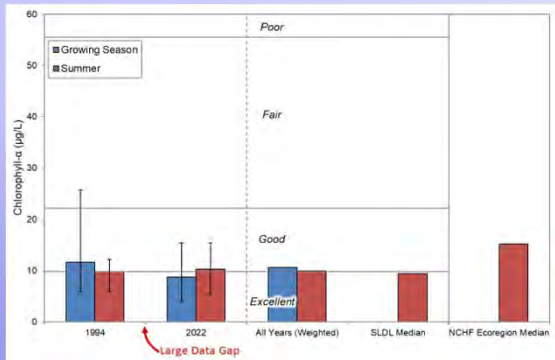


Lawrence Lake Water Quality - Phosphorus



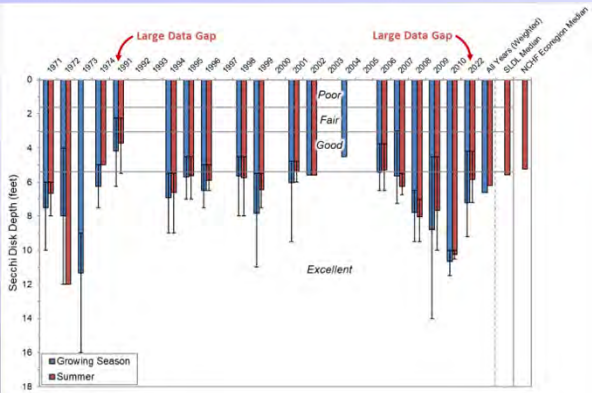
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Lawrence Lake Water Quality - Chlorophyll-a



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Lawrence Lake Water Quality - Clarity



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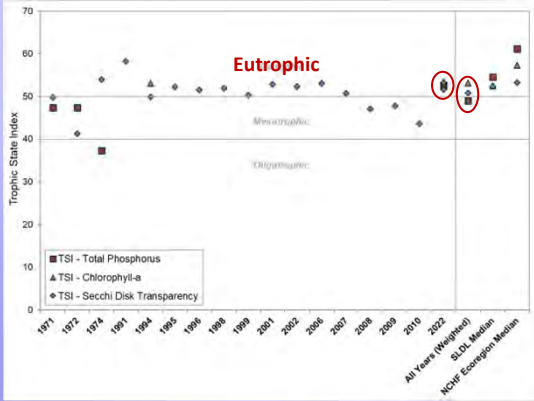
Shallow Lakes are Special



Aquatic Plants are
Incredibly Important

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Lawrence Lake Water Quality – Trophic State

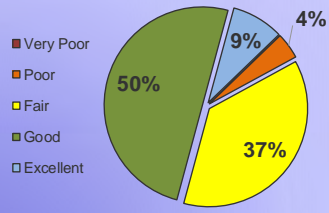


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Lake Management Planning

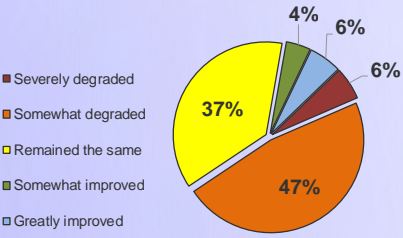
Water Quality – Stakeholder Survey Questions

Please Note: 235 Surveys Distributed, 71 Surveys Returned: 30% Response Rate

Stakeholder survey response Question #18. How would you describe the overall current water quality of Lawrence Lake?



Stakeholder survey response Question #19. How has the overall water quality changed in Lawrence Lake since you first visited the lake?



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Water Quality – Stakeholder Survey Questions

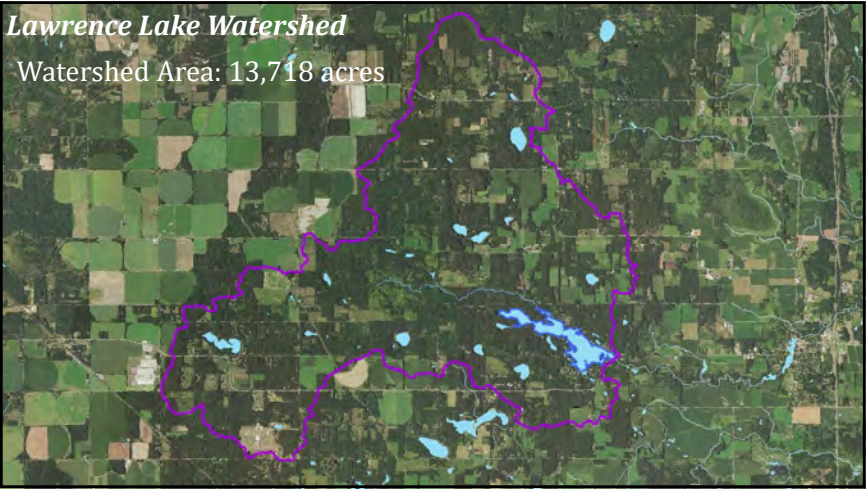
Stakeholder survey response Question #20. Which of the following answers is the single most important aspect when considering water quality?

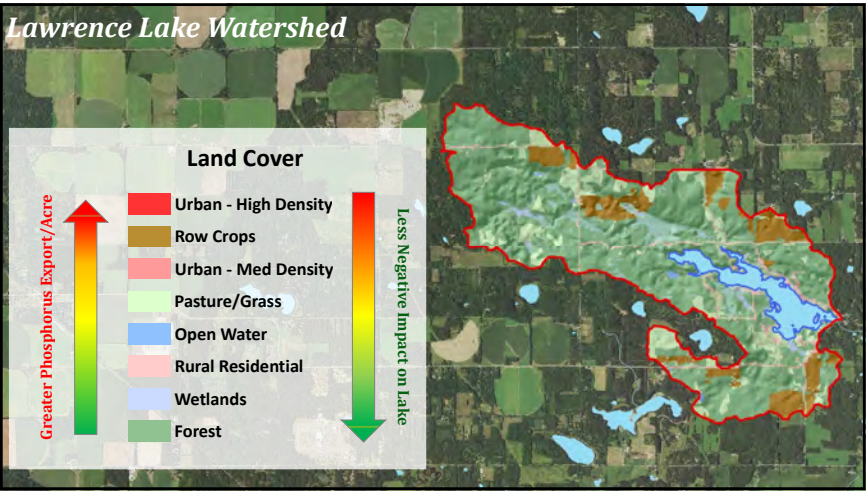
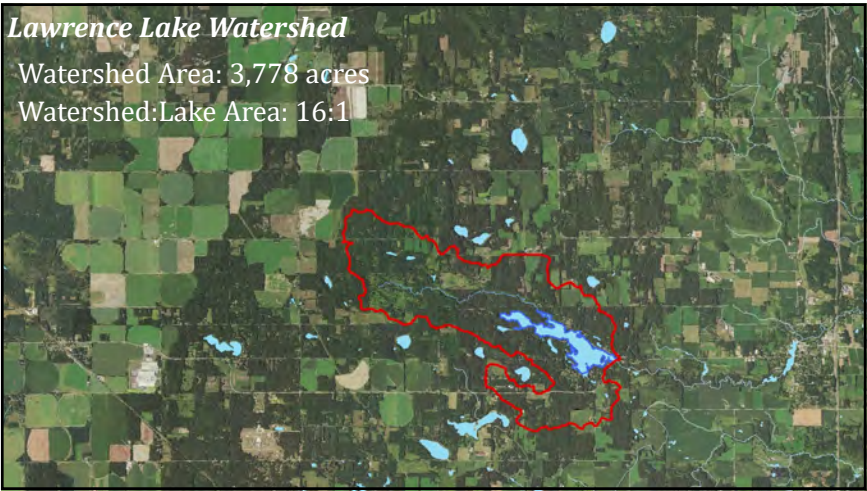
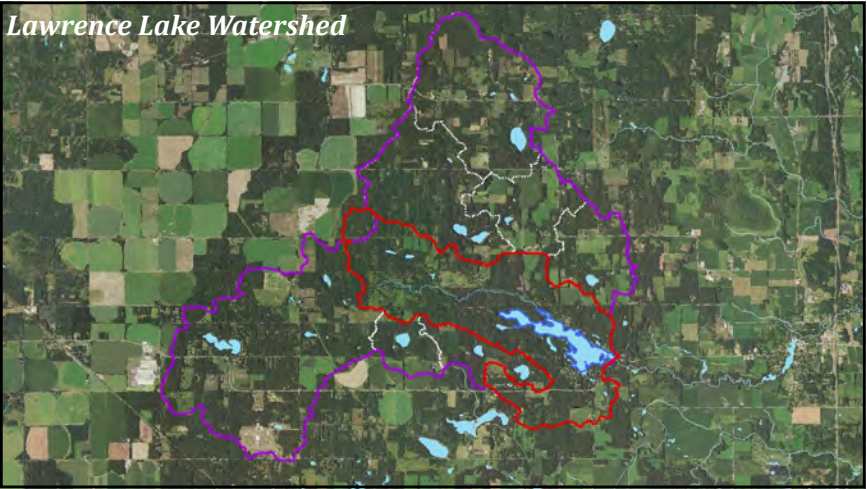
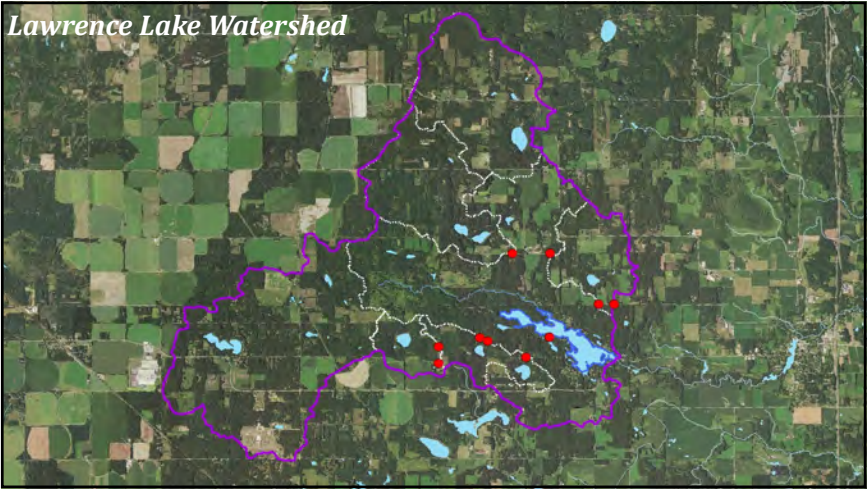
Answer Options	Response Percent	Response Count
Water clarity (clearness of water)	41%	28
Water color	3%	2
Aquatic plant growth	25%	17
Algae blooms	19%	13
Smell/odors	4%	3
Water level	1%	1
Fish kills	1%	1
Other	6%	4
answered question		69
skipped question		2

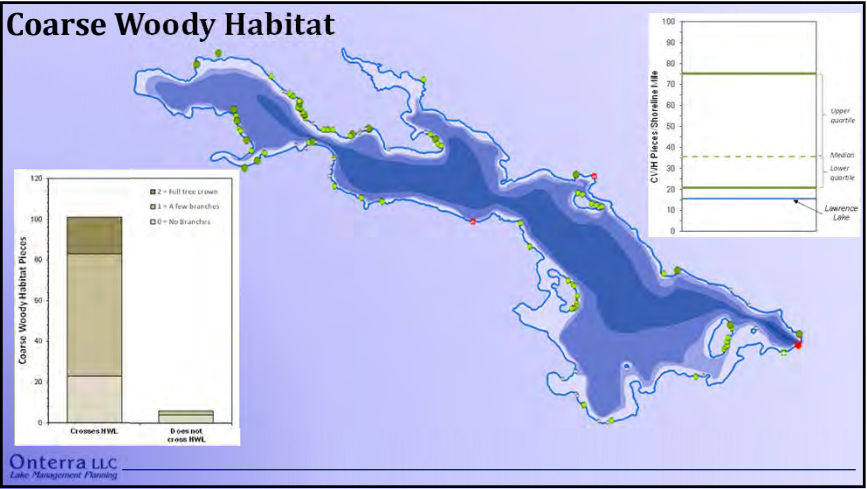
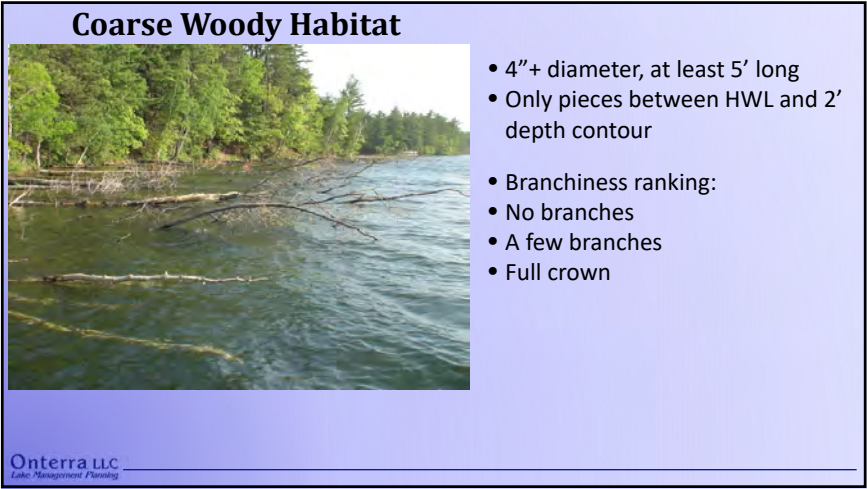
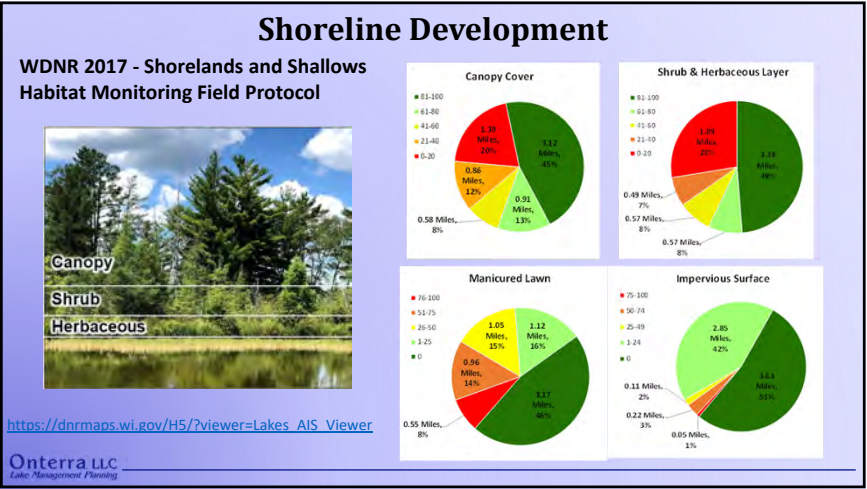
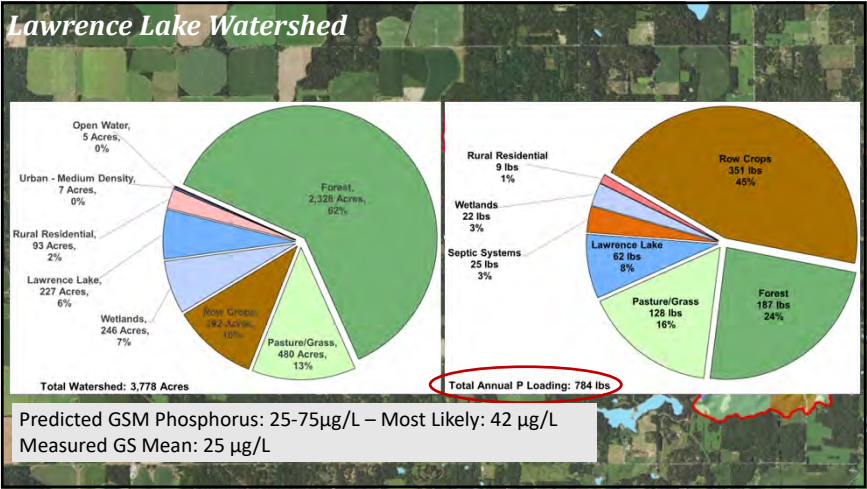
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Lake Management Planning

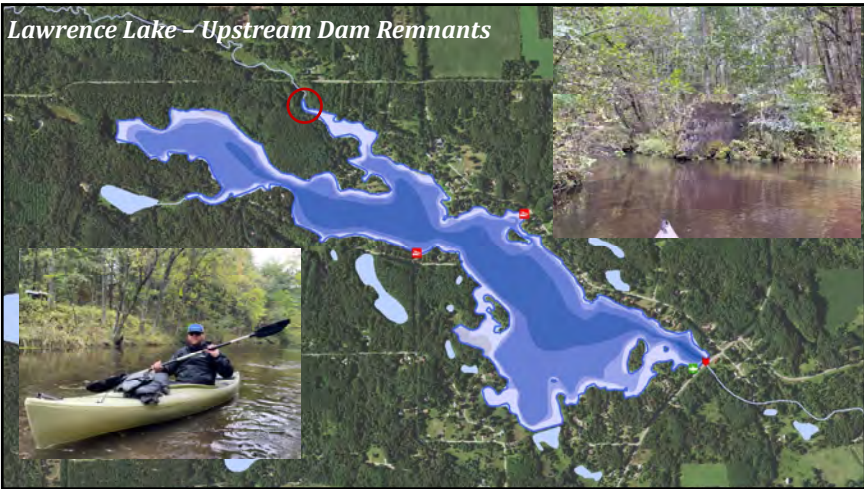
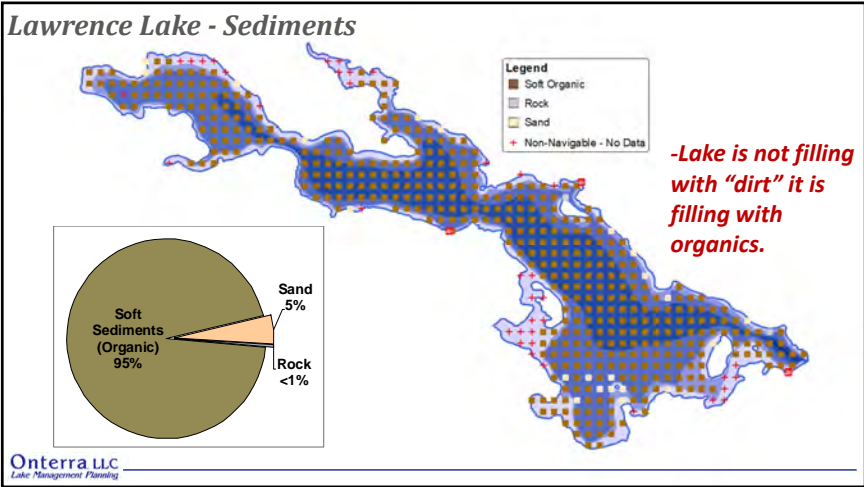
Lawrence Lake Watershed

Watershed Area: 13,718 acres



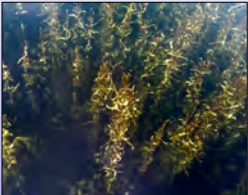






Native Aquatic Plants

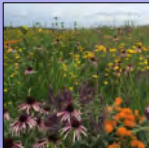
- Foundation of the lake ecosystem
- Provide oxygen, food, and shelter
- Improve water quality
- Stabilize bottom and shoreline sediments



Lake

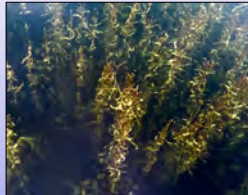
Grasslands

Forest



Native Aquatic Plants

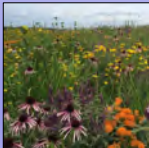
- Foundation of the lake ecosystem
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Lake

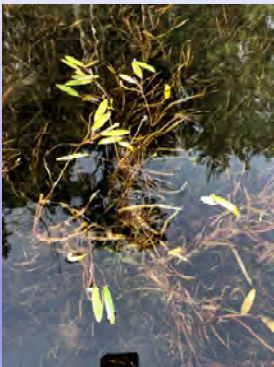
Grasslands

Forest



Aquatic Plant Surveys

- Assess both non-native & native species
- Four surveys completed in 2022
 - Early-Season AIS Survey (CLP focus)
 - Whole-lake Point-Intercept Survey
 - Emergent/Floating-leaf Community Mapping Survey
 - Late-Season EWM Mapping Survey



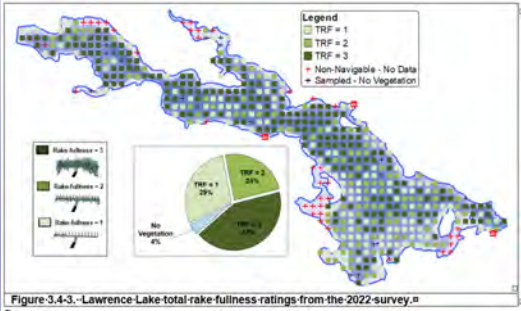
Plant Data Overview

- 40 aquatic plant species recorded in 2022 surveys
- 4 non-native species
 - Eurasian watermilfoil
 - Curly-leaf pondweed
 - Silvergrass (shoreland)
 - Watercress
- Max Rooting Depth in 2022: 15' – entire lake considered littoral

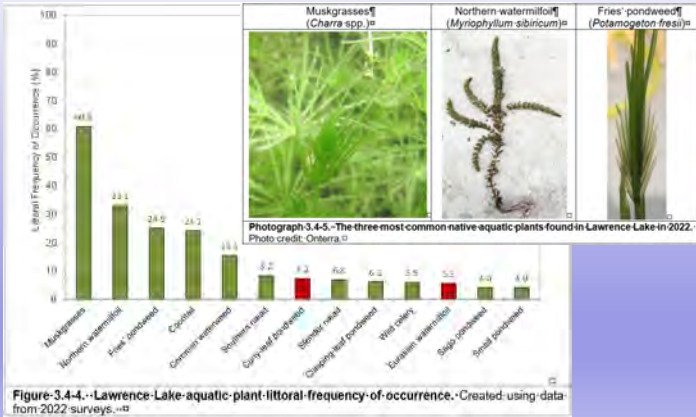
Table 3.4-2. Aquatic plant species located in Lawrence Lake during the 2022 surveys.						
Growth Form	Scientific Name	Common Name	W1 Basis Status	Coefficient of Conservation	2022	
Emergent	Carex comosa	Blisly sedge	Native	5	I	
	Eleocharis acicularis	Salt spikerush	Native	3	I	
	Eleocharis obtusa	Spikerush	Native	5	I	
	Juncus effusus	Soft rush	Native	4	I	
	Microsphaera spp.	Silvergrass	Non-Native - Invasive	N/A	I	
	Najas spp.	Watercress	Non-Native - Invasive	N/A	I	
	Sagittaria arifolia	Common arrowhead	Native	3	I	
	Scheuchzeria palustris	Hardstem bulrush	Native	5	I	
	Scheuchzeria palustris	Softstem bulrush	Native	4	X	
	Scirpus cyperinus	Wool grass	Native	4	I	
	Typha latifolia	Broad-leaved cattail	Native	1	I	
	Hypericum perforatum	St. John's wort	Native	6	I	
	Najas spp.	Watercress	Native	6	X	
	Potamogeton amplifolius	Water smartweed	Native	5	I	
	Potamogeton amplifolius	Water smartweed	Native	5	I	
Submergent	Ceratophyllum demersum	Cornel	Native	3	X	
	Ceratophyllum demersum	Cornel	Native	7	X	
	Elodea canadensis	Common waterweed	Native	3	X	
	Elodea canadensis	Common waterweed	Native	6	X	
	Myriophyllum spicatum	Northern watermilfoil	Native	7	X	
	Myriophyllum spicatum	Northern watermilfoil	Non-Native - Invasive	N/A	X	
	Najas spp.	Watercress	Native	6	X	
	Najas spp.	Watercress	Native	7	X	
	Potamogeton amplifolius	Curly-leaf pondweed	Non-Native - Invasive	N/A	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	8	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	5	I	
	Potamogeton foliosus	Leafy pondweed	Native	9	X	
	Potamogeton foliosus	Leafy pondweed	Native	8	I	
FP	Lemna minor	Lesser duckweed	Native	5	X	
	Lemna minor	Lesser duckweed	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	
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	Sagittaria arifolia	Common arrowhead	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	6	X	

Whole-Lake Point-Intercept Survey: July 7, 2022

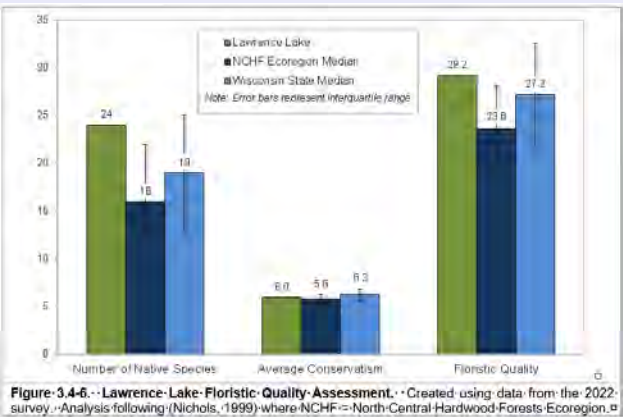
Lawrence Lake
42-meter resolution
512 total points



2022 Littoral Frequency of Occurrence

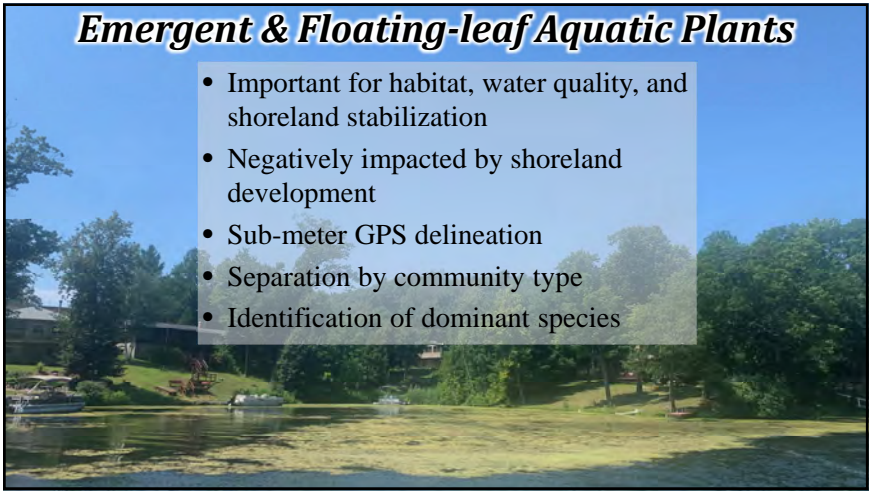


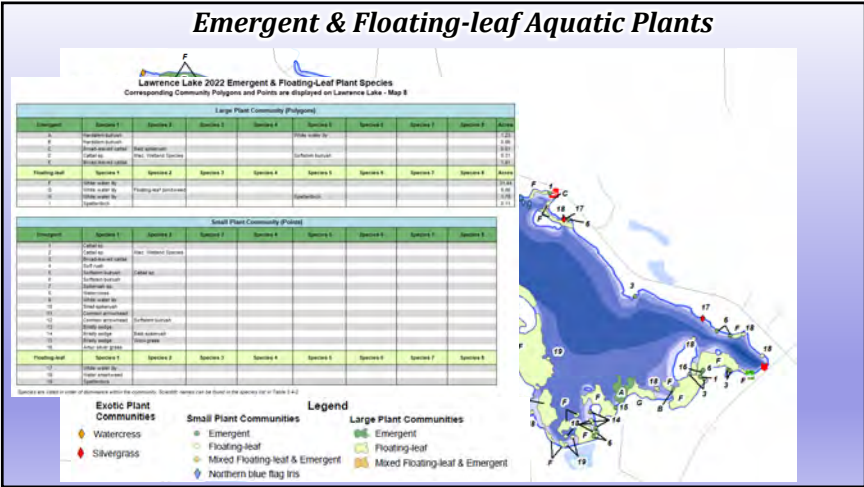
Floristic Quality Analysis



Emergent & Floating-leaf Aquatic Plants

- Important for habitat, water quality, and shoreland stabilization
- Negatively impacted by shoreland development
- Sub-meter GPS delineation
- Separation by community type
- Identification of dominant species






Types of Aquatic Plant Surveys


Quantitative

- Point-Intercept Survey
 - Numeric & systematic
 - Applied at various scales

Qualitative

- AIS Mapping Surveys
 - Fine-scale location accuracy
 - Subjective designations






Professional AIS Mapping


Point-Based Mapping

- Single or Few Plants
- Clumps of Plants
- Small Plant Colony



Polygon-Based Mapping


- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting

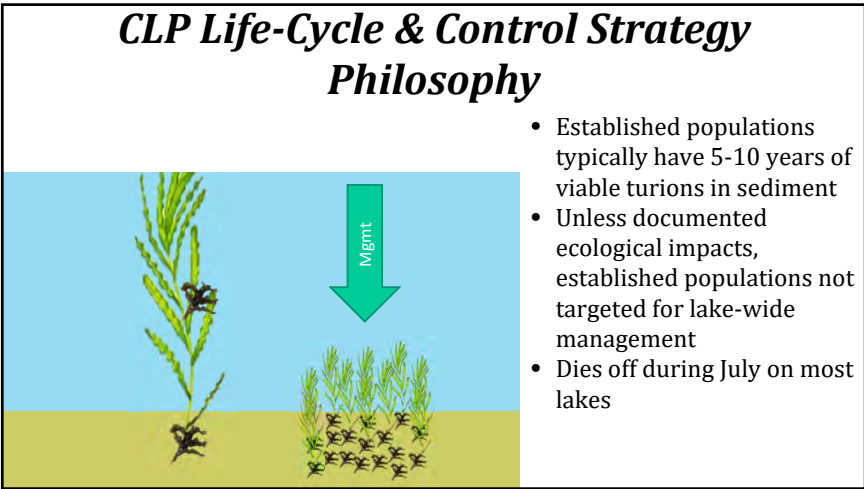
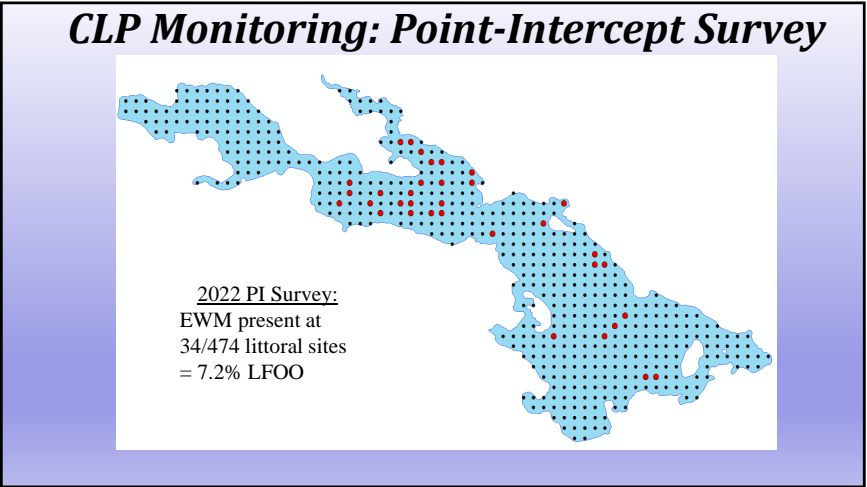
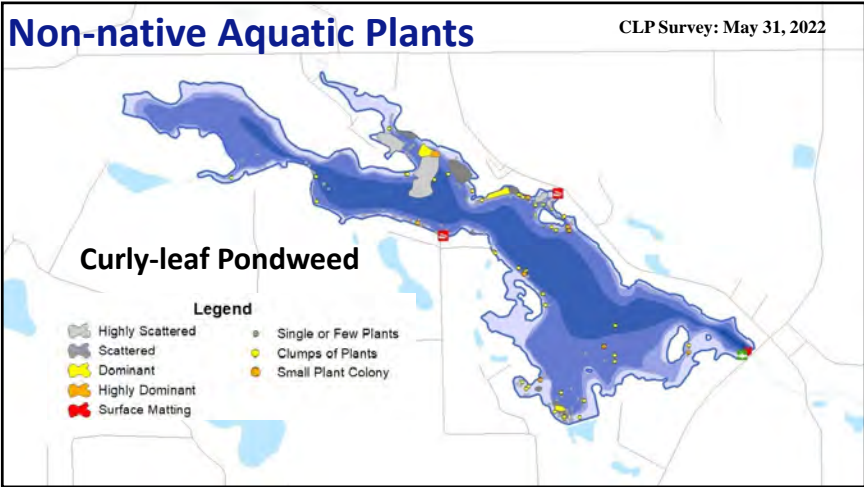


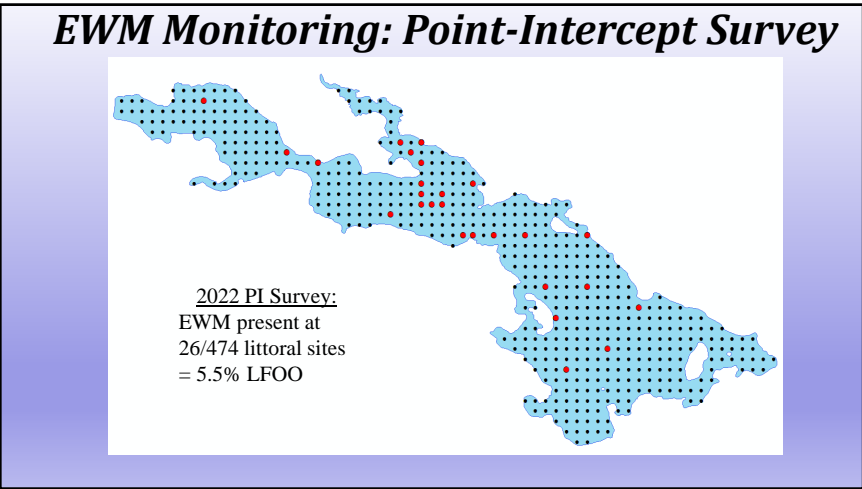
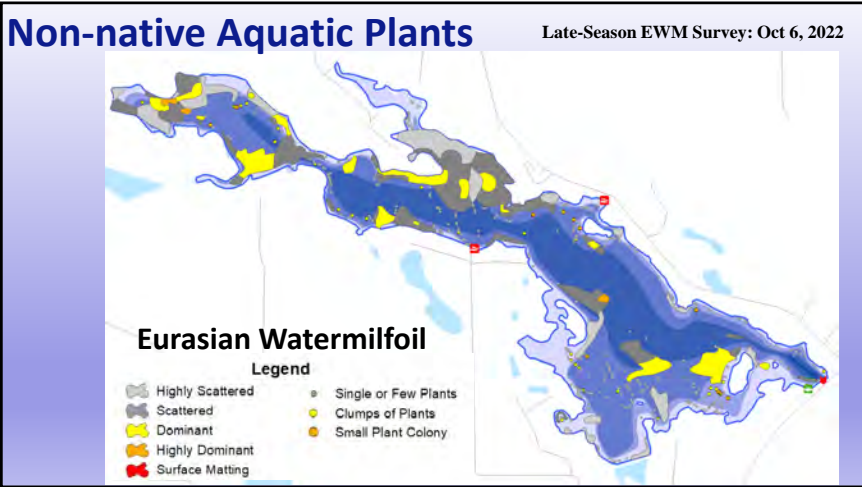
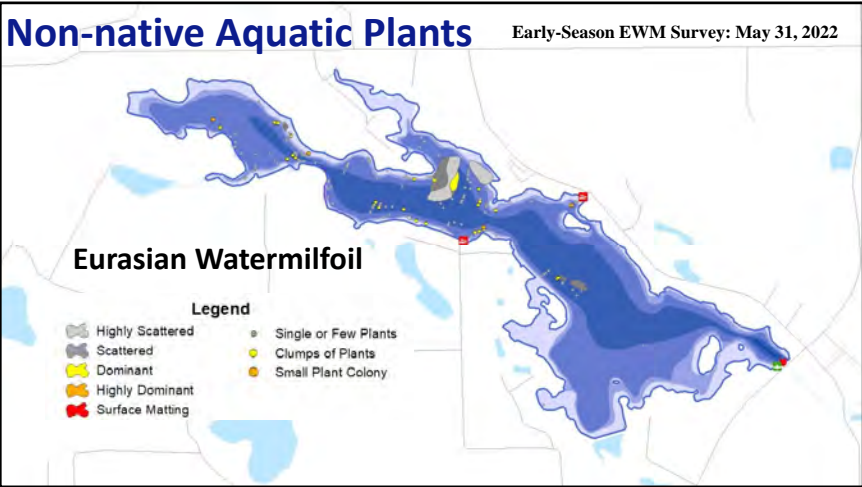
Non-Native Aquatic Plants

Curly-leaf Pondweed (CLP)

- First "officially" documented in 1994 in Lawrence Lake







EWM Propagation

- Produces seed, but low viability
- Spread primarily through fragments, a vegetative clone

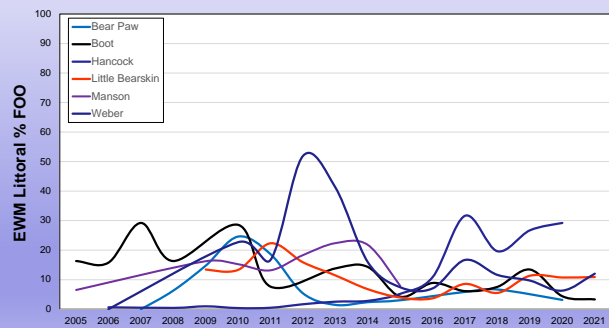
Auto-fragment

- Purposefully produced
- High energy storage
- Higher viability

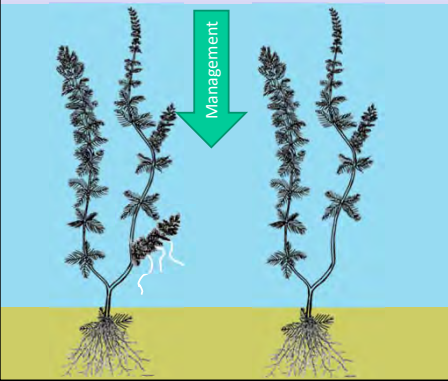
Allo-fragment

- Mechanical breakage
- Low energy storage
- Lower viability

WDNR EWM Long-Term Monitoring Trends
NLF Ecoregion – Unmanaged



EWM Life-Cycle & Control Strategy Philosophy



- Herbicide needs to translocate to root crown (*hard to kill with herbicides*)
- Hand-harvesting that extracts roots is effective (*extremely time intensive*)
- Mechanical harvesting can minimize nuisance conditions (*spread to new areas not a concern for established populations*)

Recent Aquatic Plant Management in Lawrence Lake

- WDNR records available back to 2008
- Management also occurred prior to 2008 with herbicides
- Nearly annual herbicide treatments
- Targeting CLP, EWM, and nuisance native plant growth

Table 3.4.3. Aquatic plant management history in Lawrence Lake from 2008-2022. Records from WDNR.

year	chemicals used	amount used (units)	treated acreage
2008 2,4-D		10 gal	5.5
	Copper	5.5 gal	
	disposal	5.5 gal	
	endothall	5.5 gal	
2009 endothall		6.25 gal	2.7
	Copper	1 gal	
2010 permit issued - no treatment record			28
2011 endothall		2.5 gal	1.3
	2,4-D	25 gal	5.6
	endothall	40 lbs	
2012 permit issued - no treatment record			7
2013 2,4-D		140 lbs	1.49
	2,4-D	15.5 gal	2.84
	endothall	125 lbs	2.88
2014 2,4-D		140 lbs	2.86
2015 2,4-D		4.75 gal	0.43
	2,4-D	33.75 gal	3.13
	2,4-D	1.75 gal	0.43
	2,4-D	3.75 gal	0.33
	endothall	2.5 gal	
2016 permit issued - no treatment record			9
2017 disposal		2.38 gal	1.19
	Copper	2.85 gal	
2018 2,4-D		162.89 gal	11.32
	disposal	2.38 gal	1.19
	Copper	3.57 gal	
2019 endothall		23.28 gal	4.3
2020 endothall + disposal		82 gal	8
	disposal	2 gal	1.8
	Copper	3.5 gal	
2021 Fluorfenacin		17.4 lbs	2.9
2022 Fluorfenacin		17.4 lbs	3.9

AIS Management Perspectives

1. No Coordinated Active Management (Let Nature Take its Course)

- Focus on education and manual removal by property owners
- Lake group does not lead or sponsor management efforts
- Continue monitoring

2. Minimize navigation and recreation impediment (Nuisance Mgmt)

- May be accomplished through herbicide treatment, hand harvesting, and/or mechanical harvesting
- Prioritize areas based on human use & AIS density
- Set triggers (thresholds) of implementation and tolerance

3. Reduce AIS Population on a lake-wide level (Population Mgmt)

- Would rely on herbicide treatment (risk assessment)
- Will not “eradicate” AIS
- IPM Plan (follow-up actions)
- Set triggers (thresholds) of implementation and tolerance

Best Management Practices (BMPs)

- A “placeholder” term to represent the management option that is currently supported by the latest science and policy
- Definition evolves over time
 - Pre 2010 - small spot treatments with granular products
 - Early 2010s - larger spot treatments with liquid products
 - Mid 2010s – whole-lake treatments, spot treatments with herbicide combos, hand-harvesting/DASH
 - Current– whole-lake/basin approaches, nuisance maintenance vs population management, mechanical harvesting, limno-curtains, new herbicides, human tolerance, integrated pest management (IPM) strategies

Learned that Concentration & Exposure Time (CET) is important!

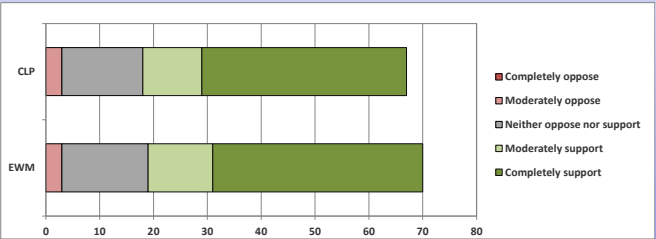
Integrated Pest Management (IPM)

Using a combination of methods that are more effective when applied collectively as part of defined strategy than when conducted separately



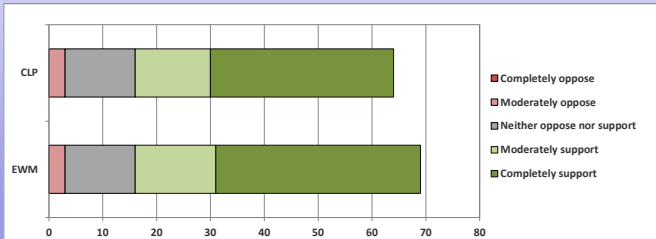
Stakeholder Survey – Invasive Plant Management

Question 26: What is your level of support or opposition for the past use of aquatic herbicides to treat EWM and CLP in previous years?



Stakeholder Survey – Invasive Plant Management

Question 27: What is your level of support or opposition for future aquatic herbicide use to target EWM and CLP in Lawrence Lake?



Overarching Conclusions

Lawrence Lake’s water quality is good to excellent, but nitrogen levels may be elevated and should be monitored.

Lack of historical water quality data made watershed and water quality assessment difficult and less beneficial to the planning project.

Lawrence Lake’s watershed contains mostly good quality land cover and responsible for the lake’s water quality.

Aquatic invasive plants, while present, are likely not impacting lake ecology.

Native and non-native plants combined impact some recreational opportunities in areas of Lawrence Lake.

Not enough data to understand trends in aquatic plant populations.

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Planning Meeting II

Primary Objective: Create implementation plan framework

Steps to Achieve Objective:

1. Discuss challenges facing lake and lake group
2. Convert challenges to management goals
3. Create management actions to meet management goals
4. Determine timeframes and facilitators to carry out actions

Items Remaining to Discuss:

- Fisheries
- Herbicide Use 101?
- Drawdown?

Assignment for Planning Meeting II

1. Email list of challenges facing lake and lake group (just to Tim)
2. Review stakeholder survey results
3. Send potential report section edits and questions to Tim

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Thank You

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Lawrence Lake P & R District


Lawrence Lake Management Planning Project Planning Meeting II
August 1, 2023

Tim Hoyman & Todd Hanke
Onterra LLC
Lake Management Planning



Presentation Outline

- Planning Project Overview/Meeting Objective
- Review Summary of Project Results
- Fisheries Information
- “Big Picture”
- Aquatic Invasive Management 101
- Drawdown Discussion
- Challenges Discussion
- Development of Goals and Actions
- Next Steps



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Management Planning Project Overview

Collect and compile information about Lawrence Lake
*Includes both environmental & sociological
Historical & current information
Past management actions*

Create a realistic and implementable management plan
*Challenges facing lake and LLPRD
Create goals that will address challenges
Develop actions that will meet goals
Assign timeframes & facilitators*

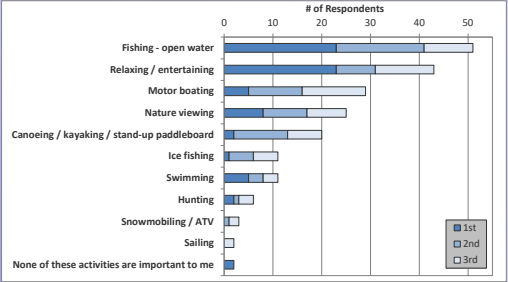
Planning Meeting I/II
Report Sections

Planning Meeting II
Implementation Plan

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Fisheries – Stakeholder Survey

Question #8. Please rank up to three activities that are important reasons for owning your property on or near Lawrence Lake, with 1 being the most important.

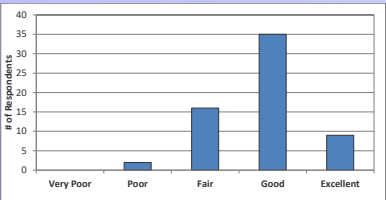


Activity	1st	2nd	3rd
Fishing - open water	48	12	2
Relaxing / entertaining	42	10	2
Motor boating	30	10	2
Nature viewing	25	10	2
Canoeing / kayaking / stand-up paddleboard	20	10	2
Ice fishing	10	5	2
Swimming	10	5	2
Hunting	5	5	2
Snowmobiling / ATV	5	5	2
Sailing	5	5	2
None of these activities are important to me	5	5	2

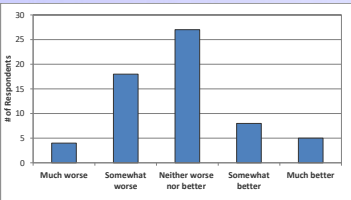
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Fisheries – Stakeholder Survey

How would you describe the current quality of fishing on Lawrence Lake?



How has the quality of fishing changed on Lawrence Lake since you have started fishing the lake?



Fisheries

Lawrence Lake has received extensive and repeated stocking efforts of multiple species (walleye, yellow perch, black crappie) over the last 20 years.

Records show northern pike stocking between 1972-1997.

Walleye and yellow perch stocking almost annually since 2008, 2-4.5K walleye and 3-6K perch each year.

Crappie stocking between 2009-2018. 3-6K most years.



Fisheries

An electrofishing survey targeting bass and panfish was conducting in spring of 2023 by WDNR and results should be available in early 2024.

Lawrence Lake provides a diverse fishery with multiple species of fish for anglers to pursue.

Shoreland study showed limited coarse woody habitat (i.e. downed trees/branches in the lake).

Overall, Lawrence Lake stakeholders seem pleased with the state of the fishery.



Summary of Project Results

Water Quality

- Very little water quality data are available for Lawrence Lake.
- Water quality is considered *Good* to *Excellent*.
- Lake is considered productive (Eutrophic).

Watershed

- Full surface watershed is over 3½ times the size of the watershed that actually feeds Lawrence Lake.
- Watershed is in pretty good condition, especially for a lake in Central Wisconsin.
- Near-watershed is good to excellent in regards to habitat potential.

Aquatic Plant Community

- Native aquatic plant community is of high quality
- EWM and CLP are established in the lake, moderate populations

Overarching Conclusions

Lawrence Lake’s water quality is good to excellent, but nitrogen levels may be elevated and should be monitored.

Lack of historical water quality data made watershed and water quality assessment difficult and less beneficial to the planning project.

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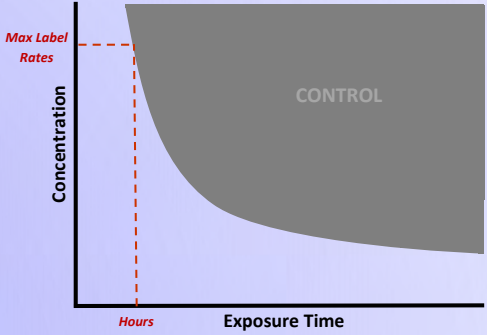
Native and non-native plants combined impact some recreational opportunities in areas of Lawrence Lake.

Not enough data to understand trends in aquatic plant populations.

Ecological Definitions of Herbicide Treatment

Spot Treatment:

Herbicide applied at a scale where dissipation will not result in significant lake wide concentrations; impacts are anticipated to be localized to in/around application area.



High Concentration ► Short Exposure Time

Herbicide Treatment on Lake Metonga

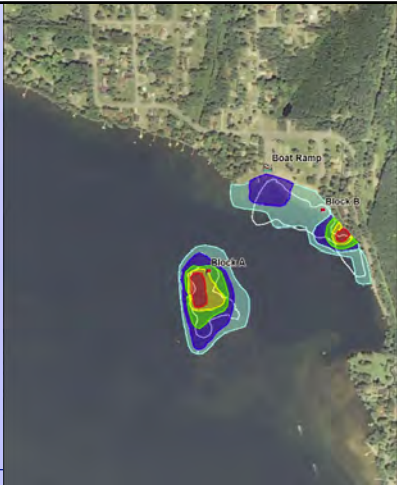


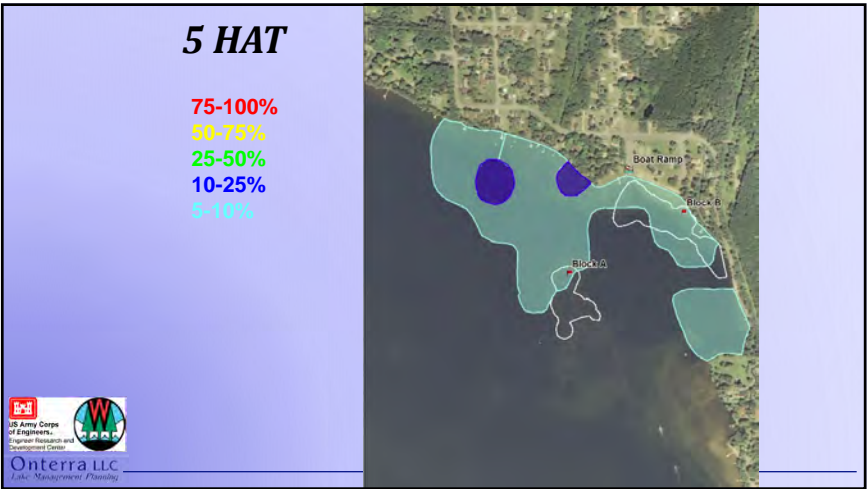
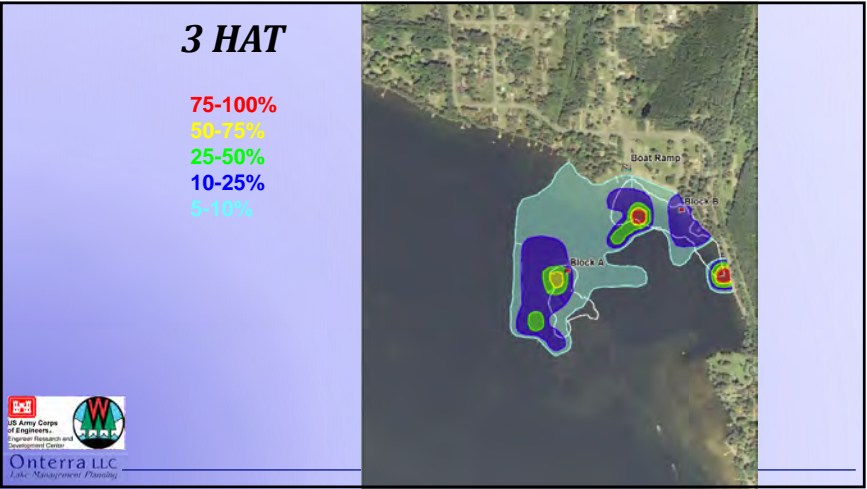
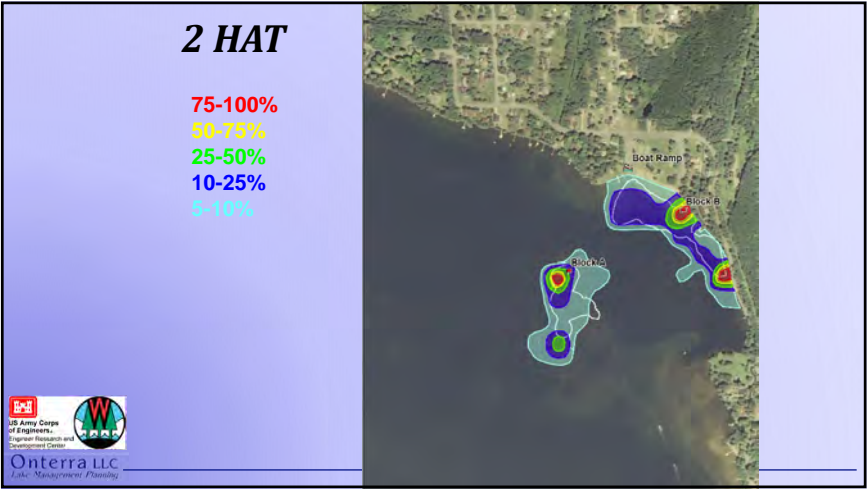
- Tracer Dye (Rhodamine WT)
- A-15 (south) ~ 3 acres
- B-15 (north) ~ 5 acres



1 HAT

- 75-100%
- 50-75%
- 25-50%
- 10-25%
- 5-10%

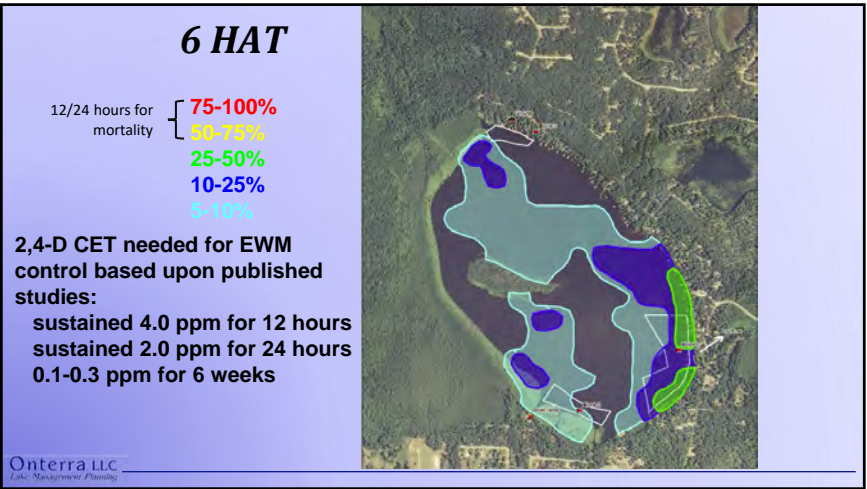
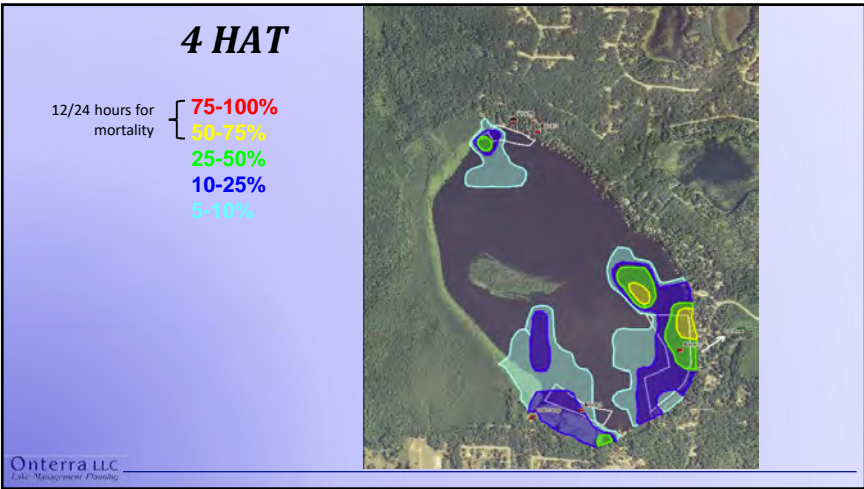
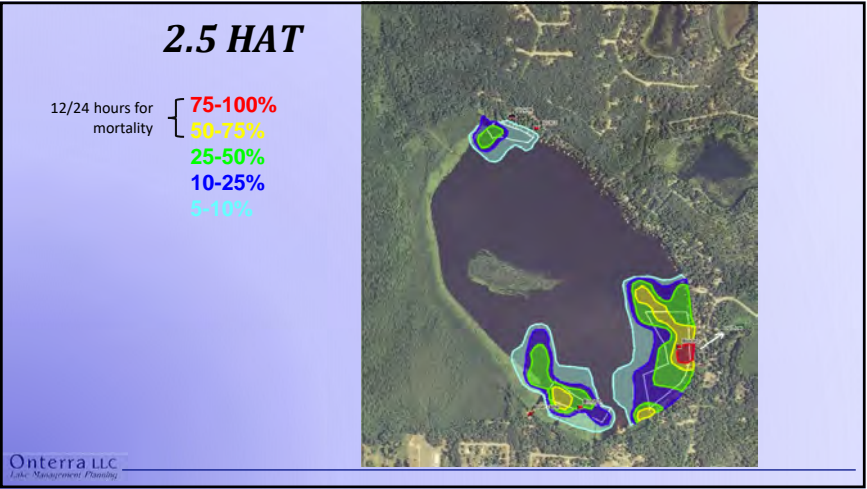
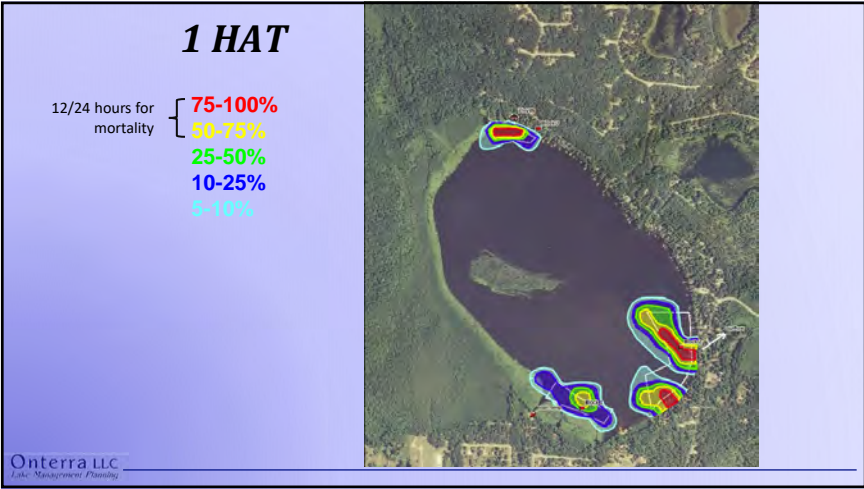




Horizontal Herbicide Mixing (Dissipation)

- ~25 acres of 305 acre lake (8%)
- Tracer Dye (Rhodamine WT) Survey

US Army Corps of Engineers
Engineer Research and Development Center
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Spot Treatment Guidance

- Actual CET in the field is more difficult to predict and maintain in spot treatments due to **dissipation**
- Rapid dissipation of herbicide occurs in 1-6 HAT in many (most?) spot-treatments
- Size (large vs small), shape (broad vs thin/linear), and location (protected vs exposed) matters
- Achieving EWM population suppression for at least 2 summers is definition of success

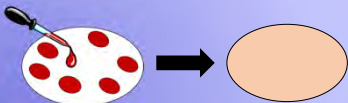


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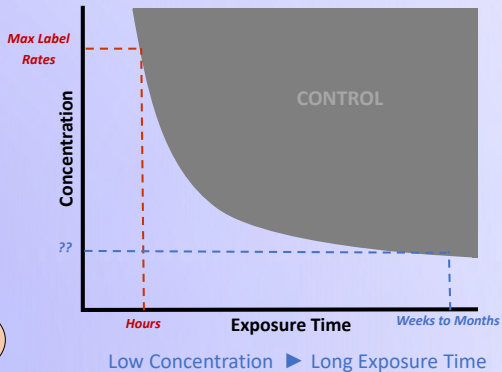
Ecological Definitions of Herbicide Treatment

Whole-Lake/Basin Treatment:

Herbicide applied at a scale where dissipation will result in significant lake wide concentrations; impacts are anticipated to be on a lake-wide scale.

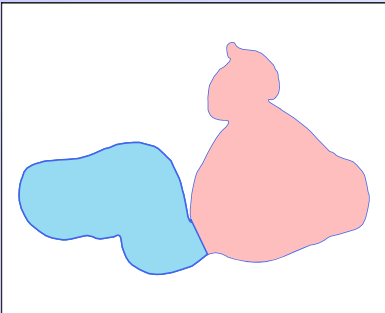
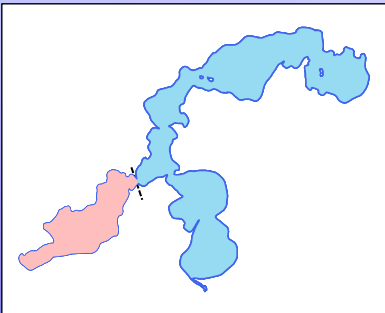


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Area of Potential Impact (AOPI)

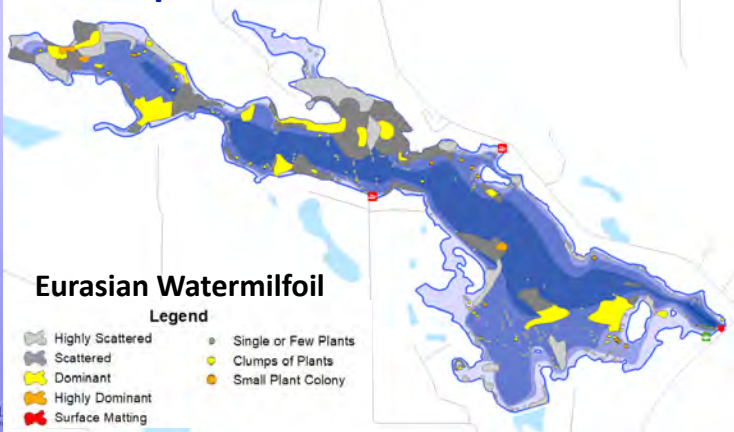
- Mixing area, reaches equilibrium - basin or bay of a lake



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Non-native Aquatic Plants

Late-Season EWM Survey: Oct 6, 2022



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2022 Littoral Frequency of Occurrence

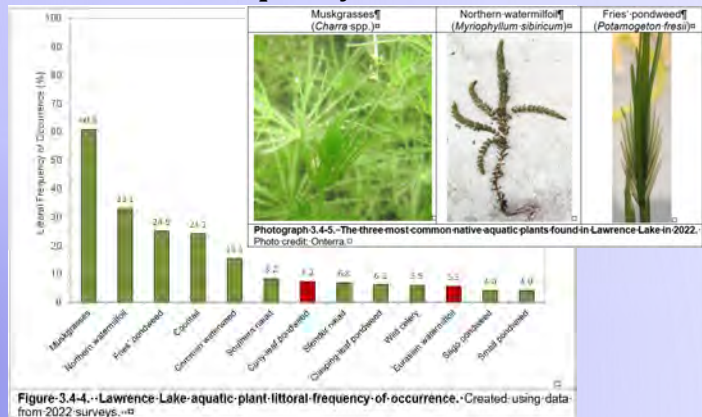
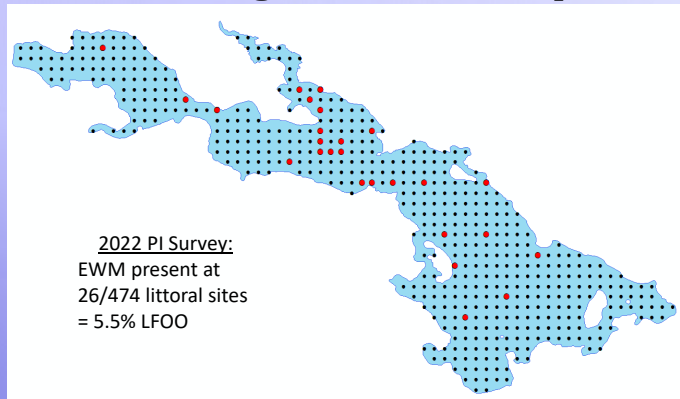
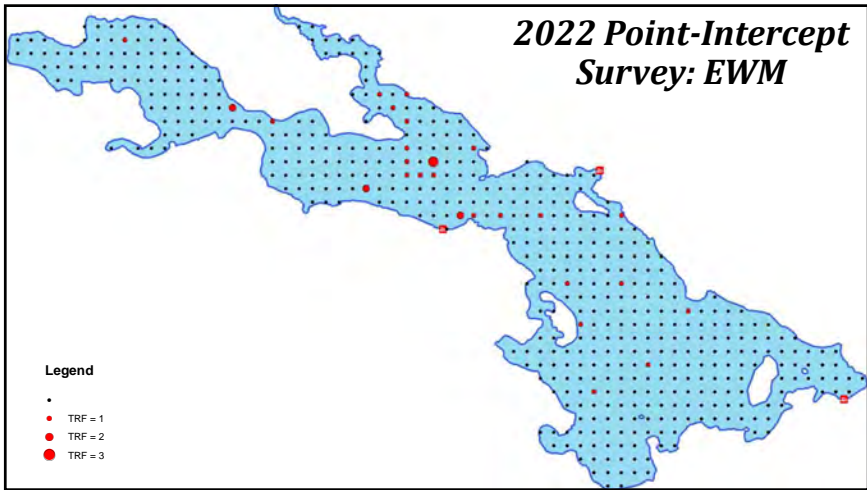


Figure 3.4-4. Lawrence Lake aquatic plant littoral frequency of occurrence. Created using data from 2022 surveys.

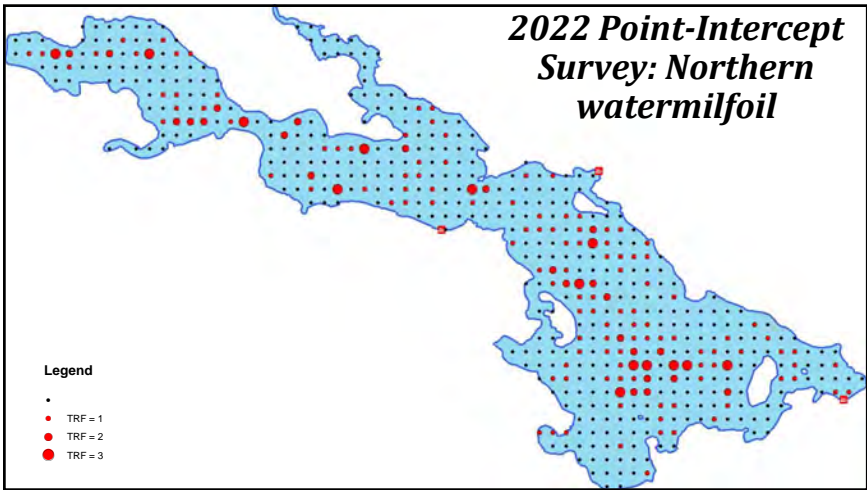
EWM Monitoring: Point-Intercept Survey

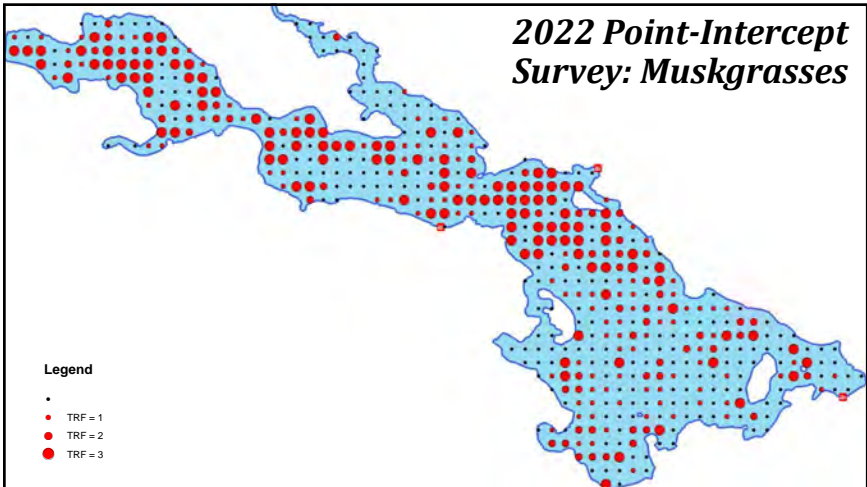
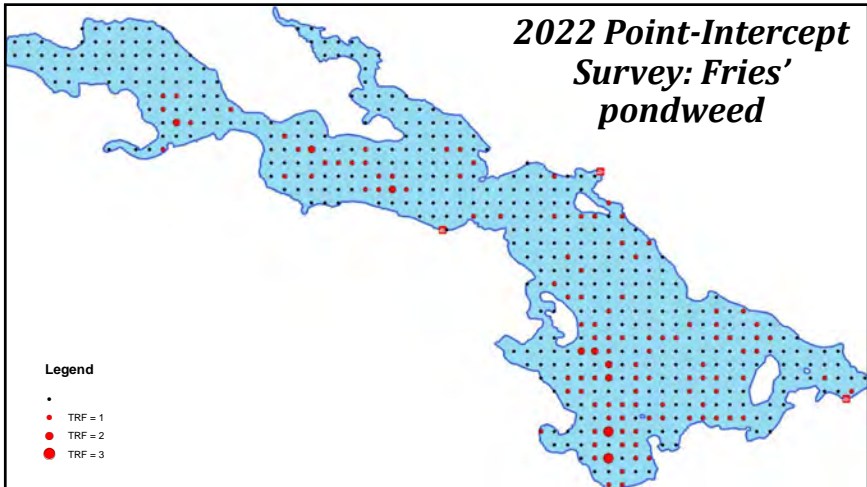
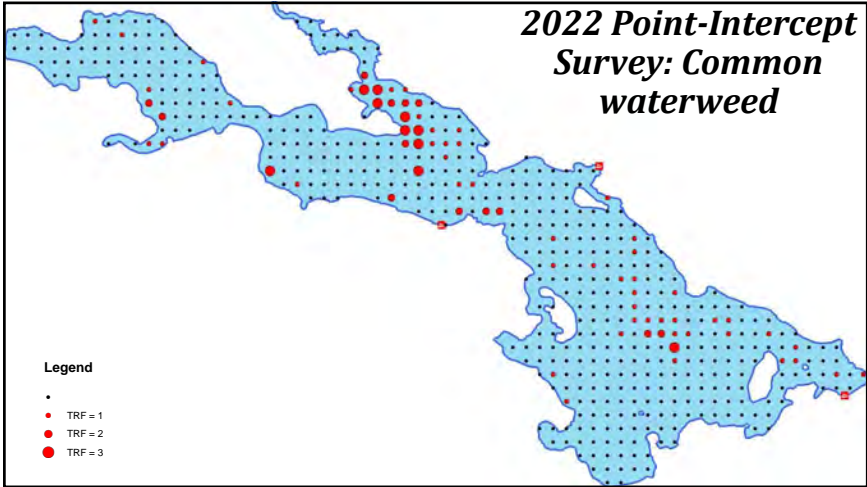
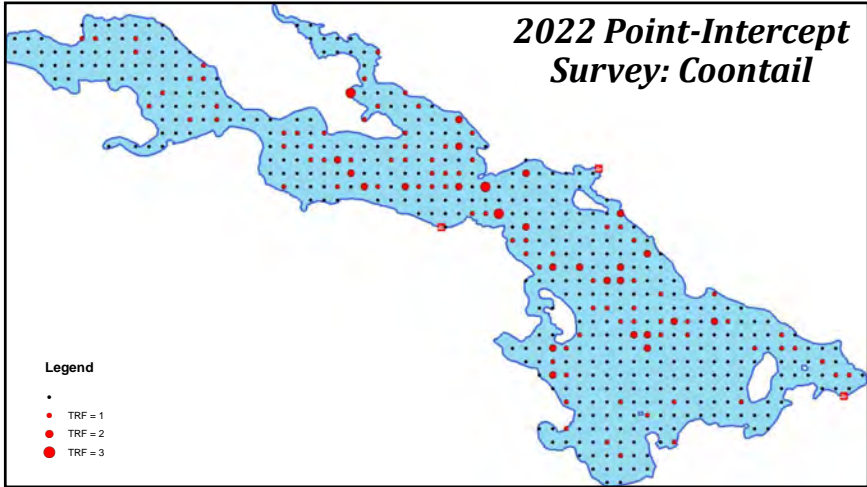


2022 Point-Intercept Survey: EWM



2022 Point-Intercept Survey: Northern watermilfoil





Drawdown as a Lake Management Tool

Why do lake groups utilize drawdowns?

Aquatic Invasive Plant Management

→ *Winter drawdowns typically work well*

Native Plant Restoration/Enhancement

→ *Must include significant sediment exposure over much of the growing season*

Sediment Decomposition/Consolidation

Sediment Removal/Channel Cutting

→ *Heading cutting of stream bed likely, but in-lake and downstream impacts must be considered*

AIS Management

Eurasian watermilfoil is susceptible to winter drawdowns

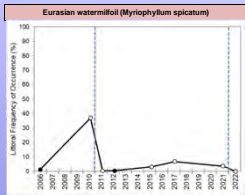
- Dewatered roughly Labor Day to Memorial Day
- To be impacted, complete dewatering is required for desiccation (i.e. drying out) or freezing
 - Insufficient drawdowns (i.e. not deep enough) can exacerbate EWM populations

Curly-leaf pondweed response to winter drawdown has been mixed

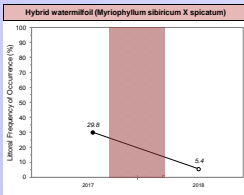
- Impact during spring of re-watering has been documented
- Unclear if impacts to sediment turions occurs

EWM/HWM Response to Winter Drawdown

**Lac Sault Dore
2010-2011 & 2021-2022**



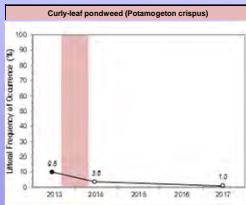
**Little Muskego
2017-2018**



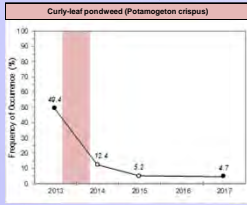
CLP Response to Winter Drawdown

**Musser
2013-2014**

Lake-wide

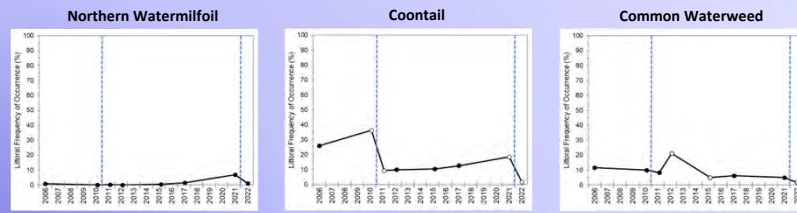


Sub-Sample



Native Plant Species Response to Winter Drawdown

Lac Sault Dore
2010-2011 & 2021-2022



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Winter Drawdown as a Lake Management Tool on Lawrence Lake

Aquatic Invasive Plant Management

→ Lawrence does not have an AIS Issue, but EWM & CLP would be impacted

Native Plant
Impacts/Nuisance Relief

→ Four of five most abundant plants would be impacted, but unsure of longevity of the three that would be impacted

Sediment Decomposition/ Consolidation

→ *Very limited - inches at best with winter drawdown*

Channel Cutting

→ *Very likely, but in-lake and downstream waterbodies may be impacted (could be minimized)*

Shoreline Modification/Dredging

→ Permitting required and it would have to be a cold & dry winter

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Winter Drawdown as a Lake Management Tool on Lawrence Lake

Aquatic Invas Management

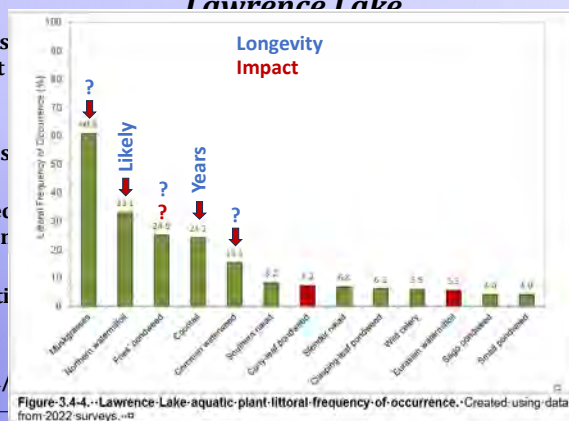
Native Plant Impacts/Nuis

Sediment Dec Consolidation

Channel Cutoff

Shoreline Modification/

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Winter Drawdown as a Lake Management Tool on Lawrence Lake - Additional Considerations

Dam Function – Can the dam structure accommodate a drawdown?

- Bill L. reports sluice gate is dysfunctional, so drawdown may be limited to 3-feet.
- This should be investigated and corrected.

Downstream Impacts – Would Westfield Creek and Westfield Millpond be impacted?

- Discussions with WDNR staff (Johnson, Bolha, and Nickel) included:
 - Streams following dams often become sediment starved and widen out unnaturally. A metered drawdown from the upstream flowage may provide habitat and morphology improvements to downstream waterway.
 - Sediment moving from Lawrence Lake may impact Westfield Millpond, but this could be minimized by also drawing down Westfield at the same time as Lawrence.
 - Top vs. bottom release (warm vs. cold) must be considered based upon timing of drawdown.

In-lake Impacts – Would completing a partial drawdown have positive impacts?

- A partial drawdown would likely impact the vegetation in Inlet Bay and cause less nuisance.
- Some sediment loss would likely occur in Inlet Bay, but it may be minimal because channel cutting would be minimal and winter drawdowns do not facilitate much sediment compaction/consolidation.
- Sediments removed due to channelization would likely buildup in deep part of lake, but may be negligible.

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Winter

Dam Function

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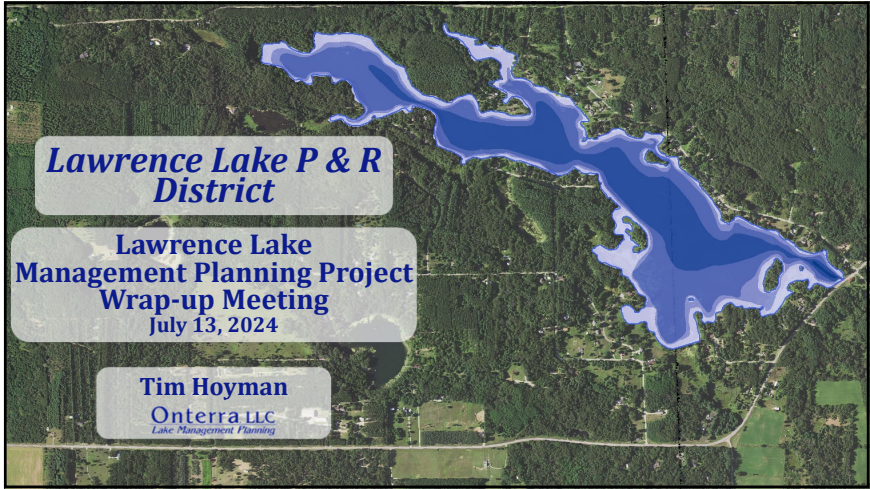
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Thank You

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Historical & current information
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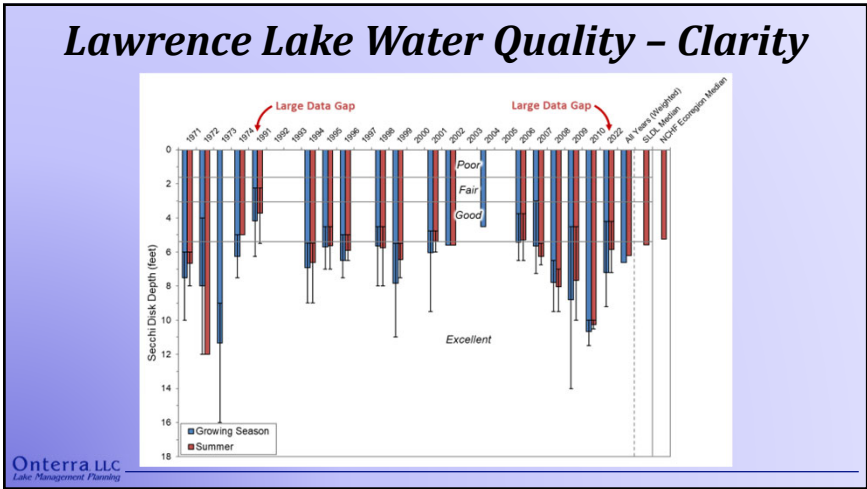
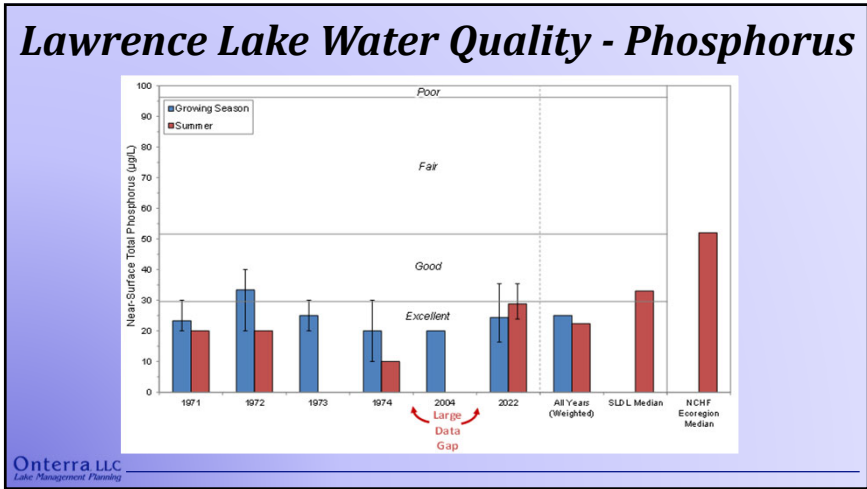
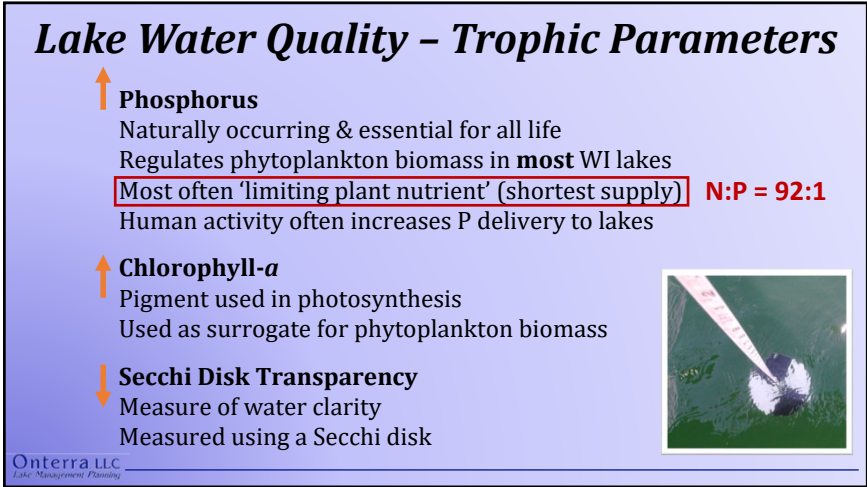
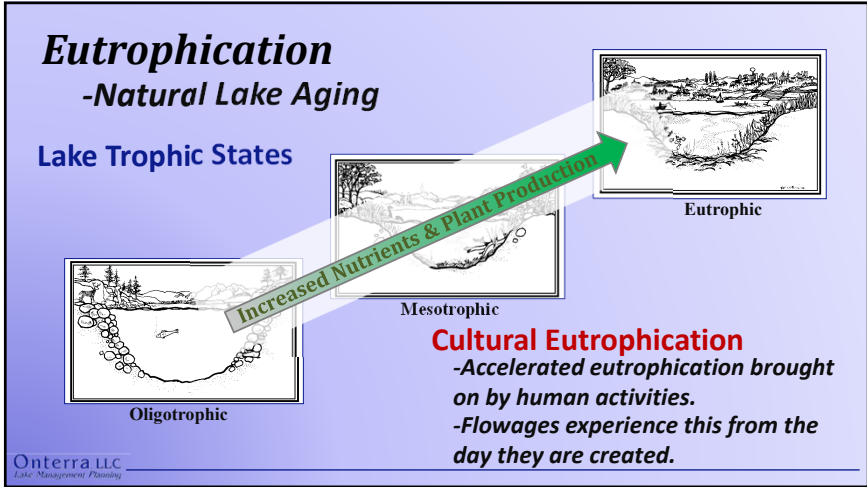
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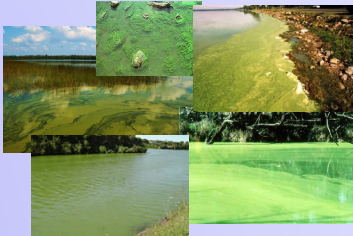


Shallow Lakes are Special

Clear State

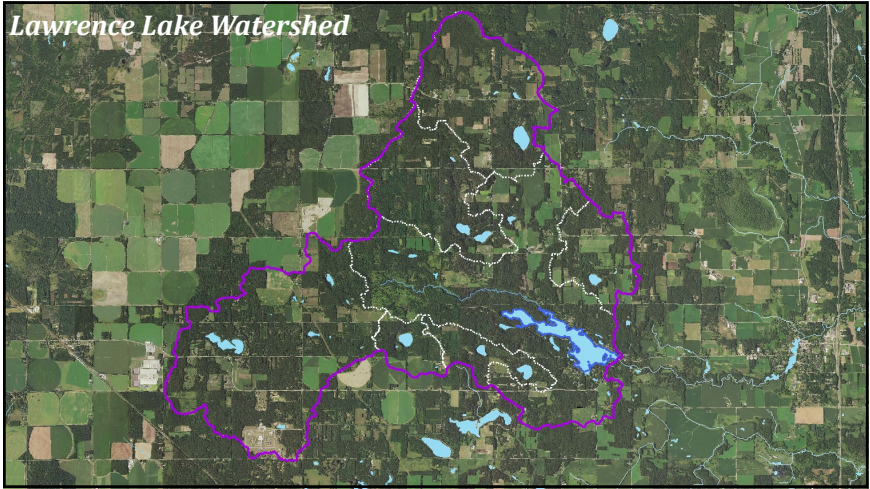
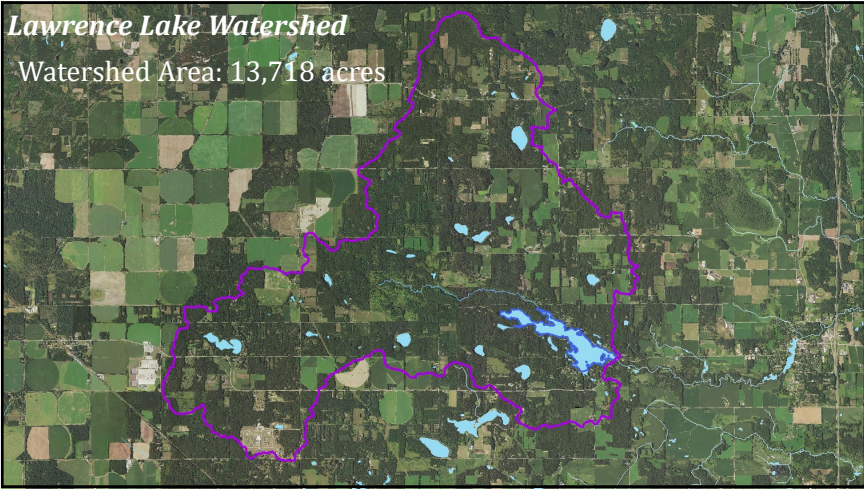
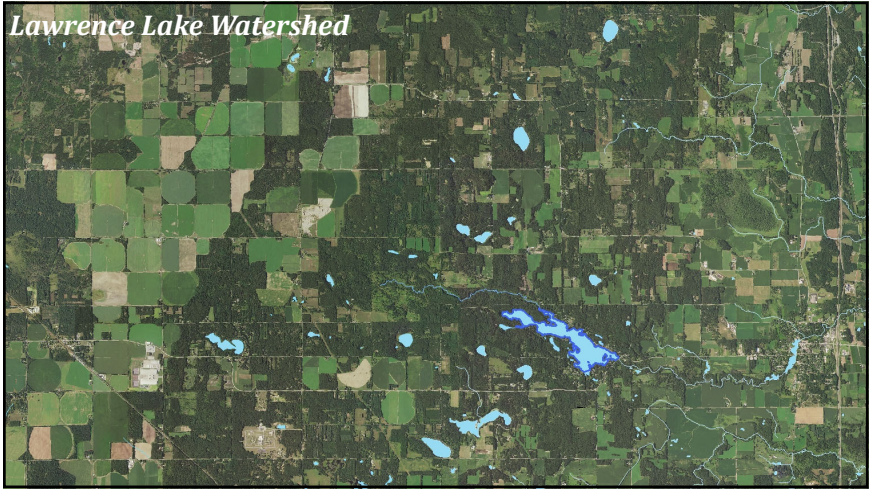


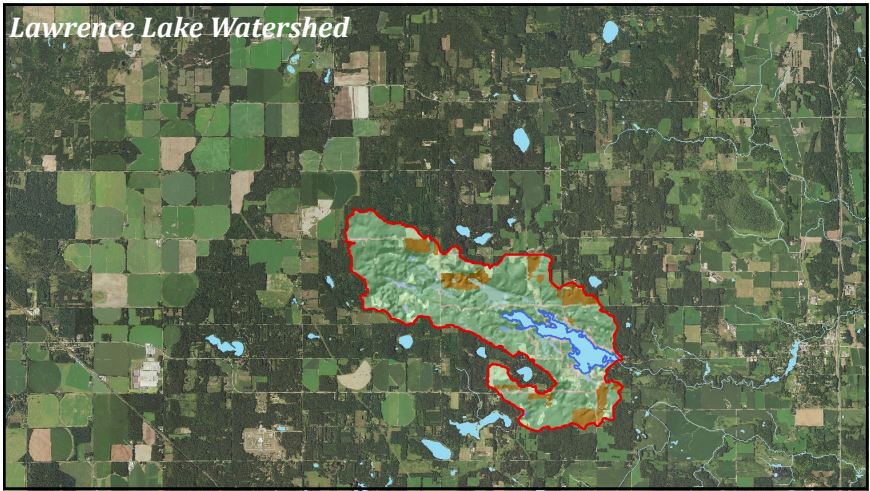
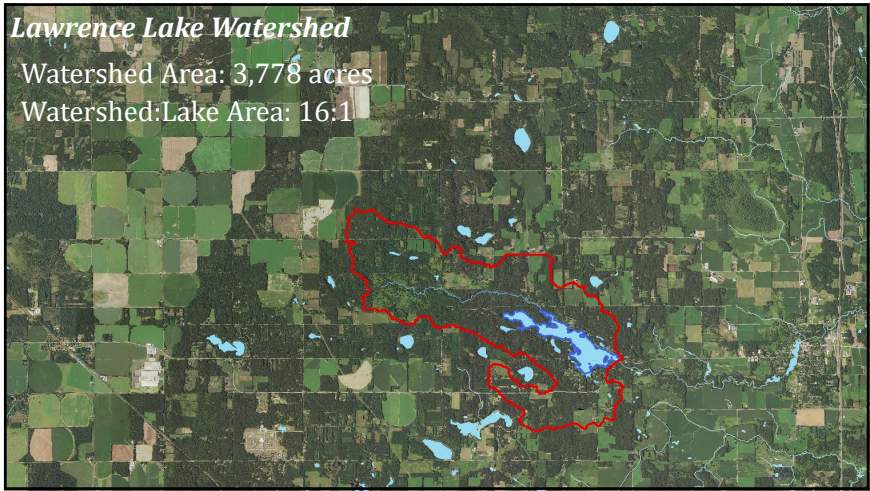
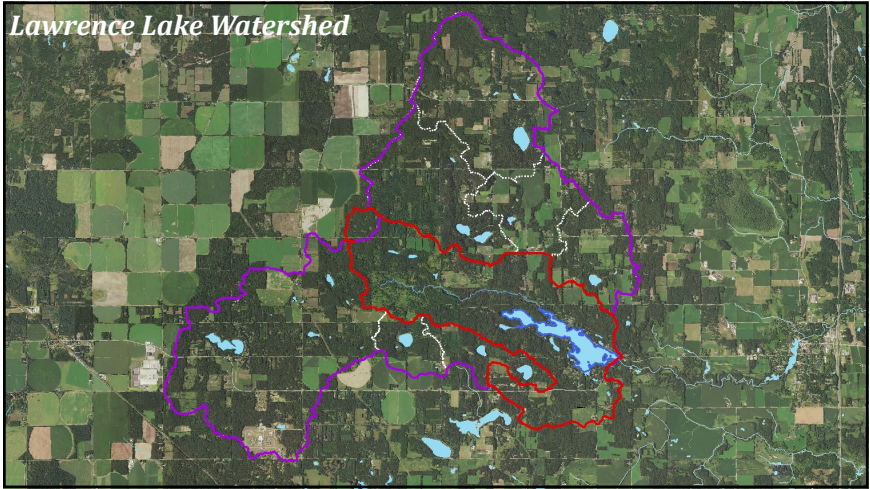
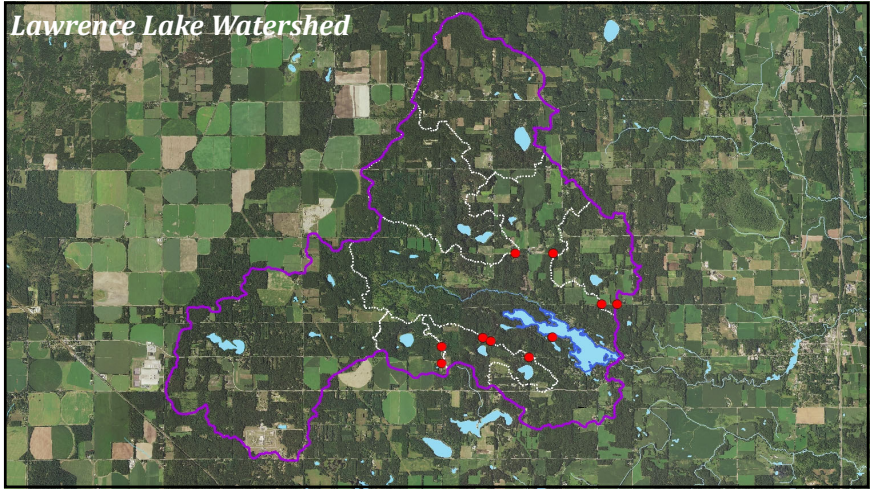
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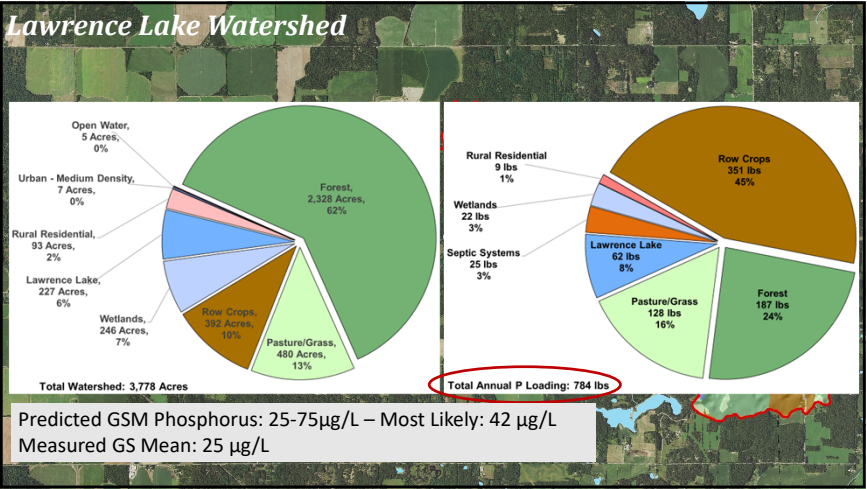
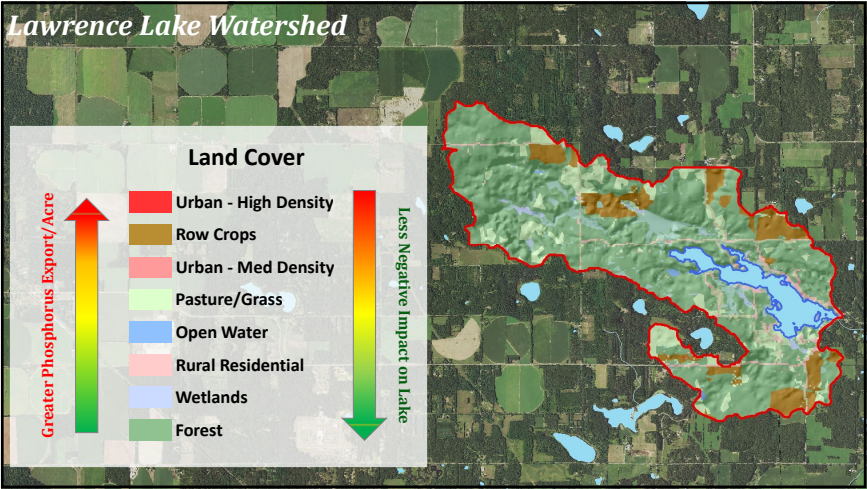


Aquatic Plants are Incredibly Important

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Aquatic Plant Surveys

- Assess both native and non-native populations
- Numerous surveys completed
 - Early-Season AIS Survey (Focus on CLP)
 - Whole-Lake Point-Intercept Survey (Quantitative - All plants)
 - Emergent/Floating-Leaf Community Mapping Survey
 - Late-Season AIS Survey (Focus on EWM)

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Plant Data Overview

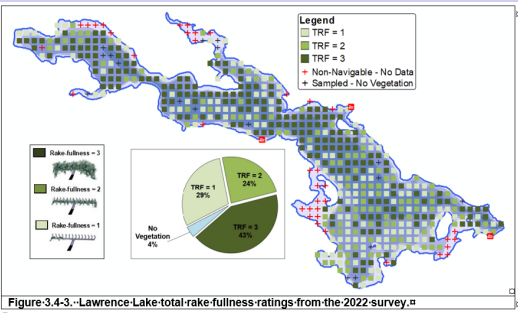
- 40 aquatic plant species recorded in 2022 surveys
- 4 non-native species
 - Eurasian watermilfoil
 - Curly-leaf pondweed
 - Silvergrass (shoreland)
 - Watercress
- Max Rooting Depth in 2022: 15' – entire lake considered littoral

Growth Form	Scientific Name	Common Name	WI Data Status	Coefficient of Conservation (Onterra)	2022	
Emergent	Carex comosa	Blisly sedge	Native	5	I	
	Echinochloa crusgalli	Spillwort	Native	3	I	
	Hydrocotyle sphenoloba	Spillwort	Native	3	I	
	Juncus effusus	Soft rush	Native	4	I	
	Microstegium app.	Silvergrass	Non-Native - Invasive	N/A	I	
	Najas spp.	Watercress	Non-Native - Invasive	N/A	I	
	Sagittaria arifolia	Common arrowhead	Native	3	I	
	Scheuchzeria palustris	Hardstem bulrush	Native	5	I	
	Scheuchzeria palustris	Softstem bulrush	Native	4	X	
	Scirpus cyperinus	Wool grass	Native	4	I	
	Typha latifolia	Broad-leaved cattail	Native	1	I	
	FL	Najas spp.	Spillwort	Native	6	I
		Najas spp.	White water lily	Native	6	X
		Najas spp.	Water smartweed	Native	5	I
		Ceratophyllum demersum	Coontail	Native	3	X
Cladophora		Cladophora	Native	7	X	
Elodea canadensis		Common waterweed	Native	3	X	
Hydrocotyle sphenoloba		Spillwort	Native	6	X	
Myriophyllum spicatum		Northern watermilfoil	Native	7	X	
Myriophyllum spicatum		Eurasian watermilfoil	Non-Native - Invasive	N/A	X	
Najas spp.		Spillwort	Native	6	X	
Najas spp.		Spillwort	Native	7	X	
Potamogeton amplifolius		Curly-leaf pondweed	Non-Native - Invasive	N/A	X	
Potamogeton foliosus		Leafy pondweed	Native	6	X	
Potamogeton foliosus		Leafy pondweed	Native	6	X	
Potamogeton foliosus		Leafy pondweed	Native	6	X	
Submergent	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
	Potamogeton foliosus	Leafy pondweed	Native	6	X	
FF	Lemna minor	Lesser duckweed	Native	5	X	
	Lemna trisulca	Greater duckweed	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	3	X	
	Lemna minor	Lesser duckweed	Native	5	X	
	Lemna trisulca	Greater duckweed	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	3	X	
	Lemna minor	Lesser duckweed	Native	5	X	
	Lemna trisulca	Greater duckweed	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	3	X	
	Lemna minor	Lesser duckweed	Native	5	X	
	Lemna trisulca	Greater duckweed	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	3	X	
	Lemna minor	Lesser duckweed	Native	5	X	
	Lemna trisulca	Greater duckweed	Native	6	X	
	Sagittaria arifolia	Common arrowhead	Native	3	X	

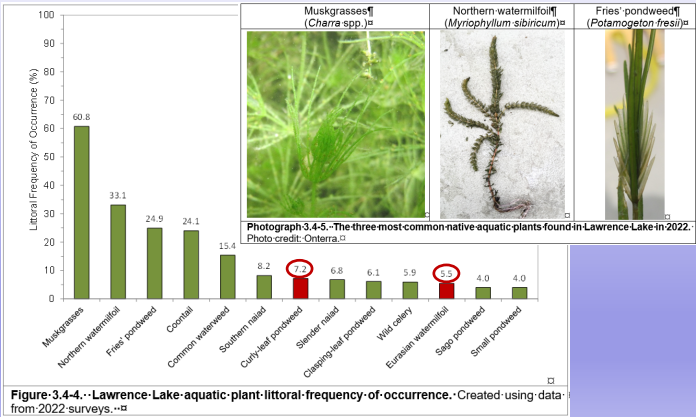
FL = Floating Leaf; FL-E = Floating Leaf and Emergent; SE = Submergent and Emergent; FF = Free Floating
X = Located on lake during point-intercept survey; I = Incidental Species

Whole-Lake Point-Intercept Survey: July 7, 2022

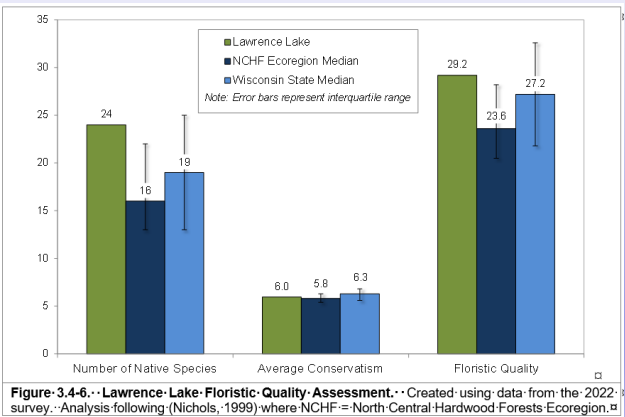
Lawrence Lake
42-meter resolution
512 total points



2022 Littoral Frequency of Occurrence



Floristic Quality Analysis

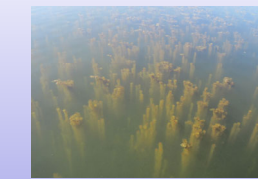
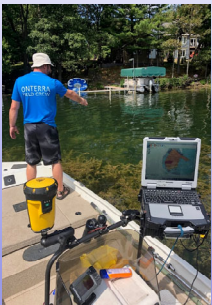


Professional AIS Mapping



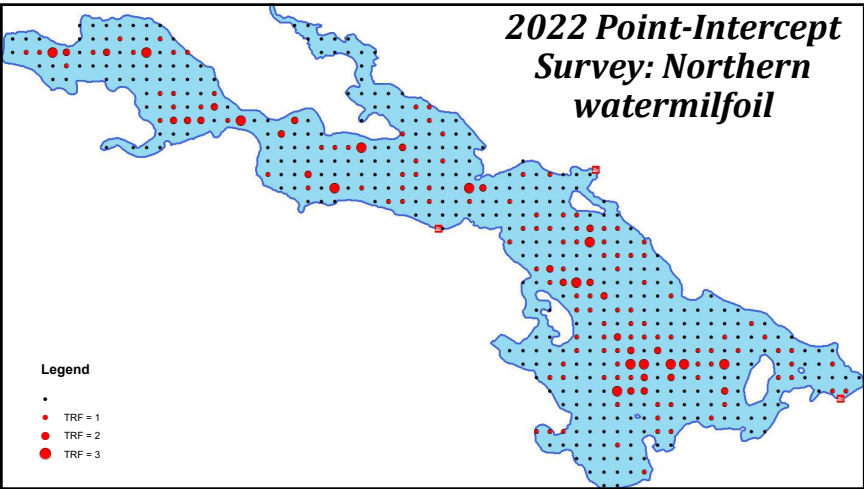
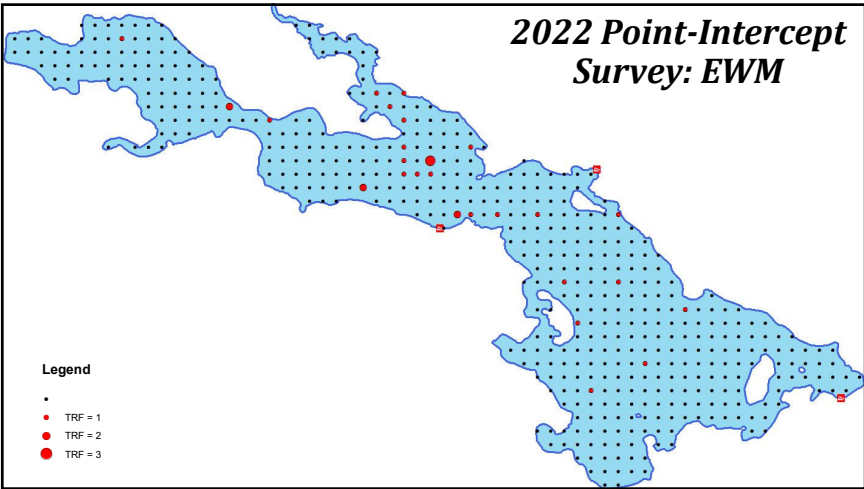
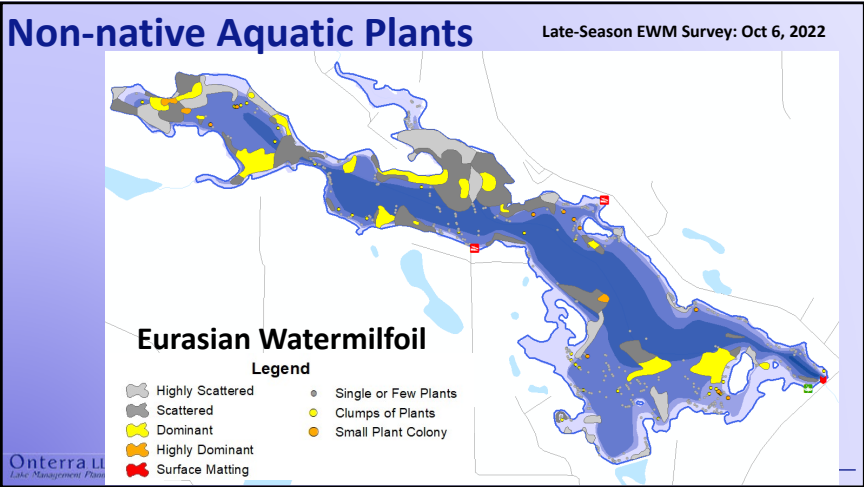
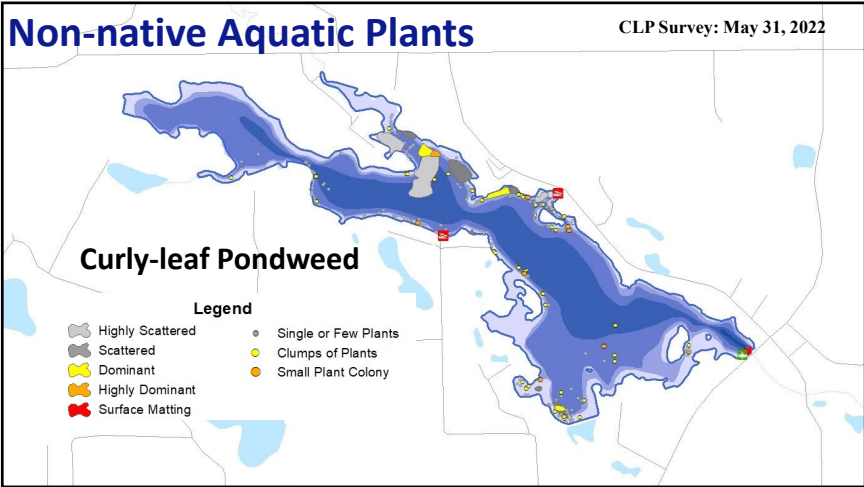
Point-Based Mapping

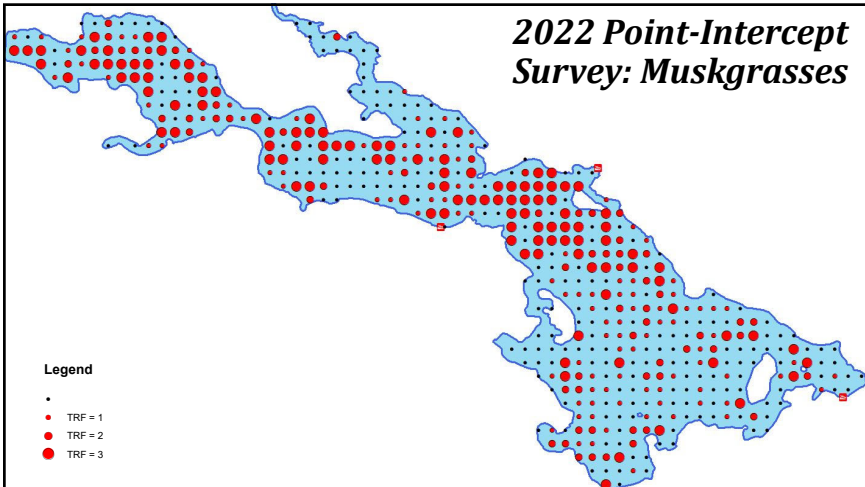
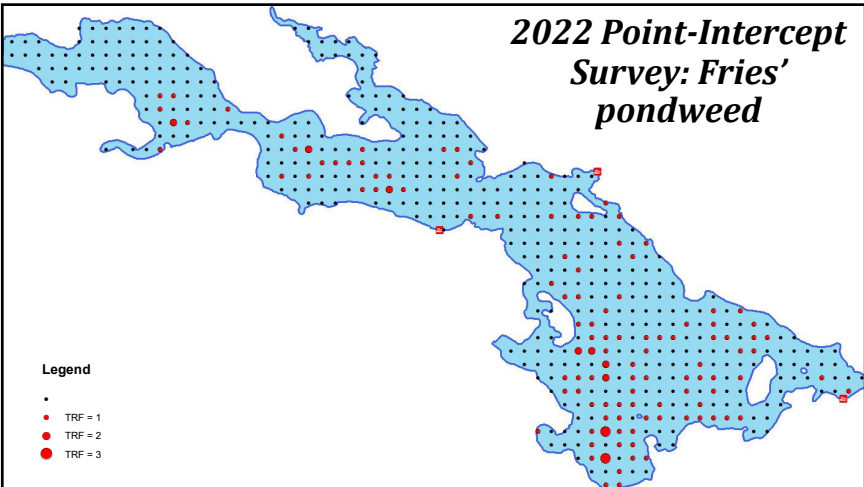
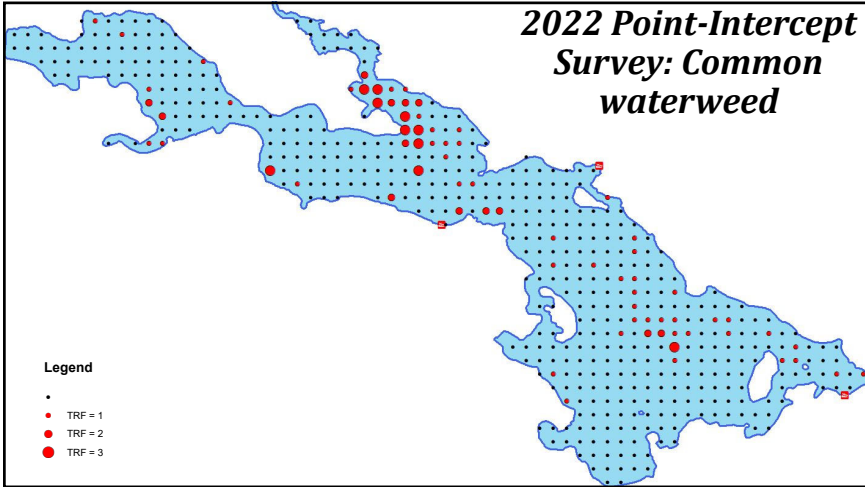
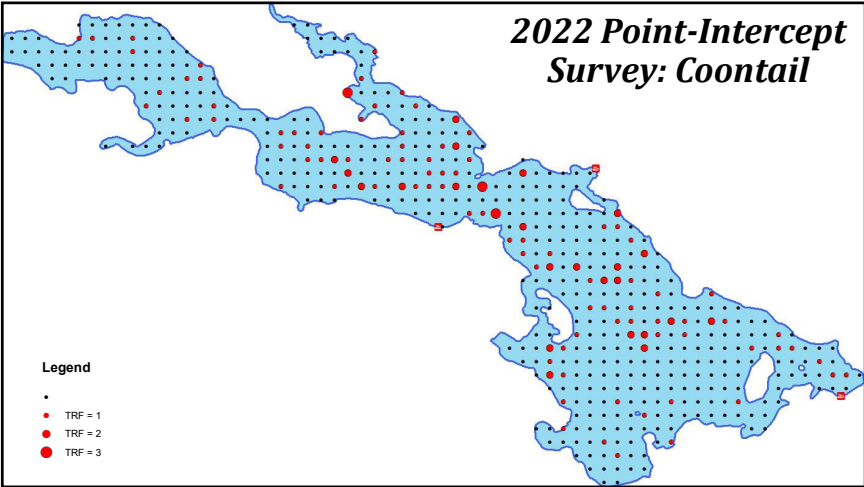
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony



Polygon-Based Mapping

- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting





Non-native Aquatic Plants

Late-Season EWM Survey: Oct 6, 2022

Take Home Message:

Lawrence Lake does not have an AIS problem; it has a nuisance plant problem.

Scattered

Dominant

Highly Dominant

Surface Matting

Clumps of Plants

Small Plant Colony

Onterra LLC

Lake Management Planning

Management Goal:

Continue Informing District Members about Lawrence Lake, Lake Management, and District Business.

Management Actions

1. Continue to maintain and update District Website.

2. Utilize social media and email to provide timely and relevant information to LLPRD members.

3. Continue to publish electronic newsletter, Larry Lake Newsletter.

4. Participate in annual Wisconsin Lakes & Rivers Convention.

Onterra LLC

Lake Management Planning

Main

Map

1. Utili

2. Con

3. Dete

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Herbicide Navigation Lane Treatment Strategy

Site	Width (ft)	Ave Depth (ft)	Acres
A	15	4	0.6
B	15	4	0.3
C	15	5	0.4
D	15	5	0.6
E	15	5	0.7
F	15	6	0.6
G	15	3	0.5
Total	-	-	3.7

*Herbicide selection & dosing to be determined by applicator

Map 12

Lawrence Lake

Mapaine County, Wisconsin

Potential

Navigation Lane

Treatment Strategy

Legend

Proposed Treatment Lanes

15' width, 3.7 total acres

Dam

Carry-In Access

Boat Landing

Onterra LLC

Lake Management Planning

Management Goal:

Maintain Consistent Environmental Database for Lawrence Lake

Management Actions

1. Monitor water quality through WDNR Citizens Lake Monitoring Network.

2. Conduct periodic quantitative vegetation monitoring on Lawrence Lake.

Onterra LLC


Lake Management Planning

Management Goal:

Protect and Maintain Lawrence Lake Fishery

Management Actions

1. Maintain open line of communication with Wisconsin Department of Natural Resources fisheries staff.
2. Enhance Lawrence Lake fishery through proper stocking and coarse woody habitat additions.



Lawrence Lake Comprehensive Management Plan

Official First Draft



Public Review Period

Official First Draft will be posted on LLPRD website during week of July 15th.

www.lawrencelakeprdistrict.com

Written comments will be accepted through August 9, 2024 at:

PO Box 233
Westfield, WI 53964
or
llprd.233@gmail.com



Thank You

Onterra LLC

Lake Management Planning



