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

Onterra LLC 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

Onterra LLC 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!

Onterra LLC Lake Management Planning

Elements of an Effective Lake Management Planning Project

Data and Information Gathering

Environmental & Sociological

Planning Process

Brings it all together

Onterra LLC Lake Management Planning

Data and Information Gathering

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

Onterra LLC Lake Management Planning

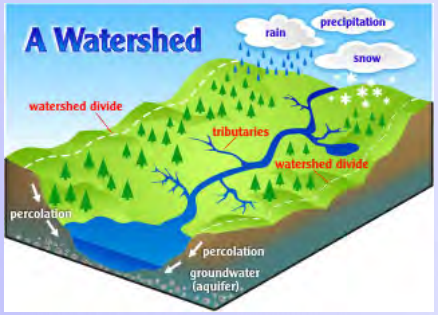
Water Quality Analysis

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

Onterra LLC Lake Management Planning

Watershed Assessment

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

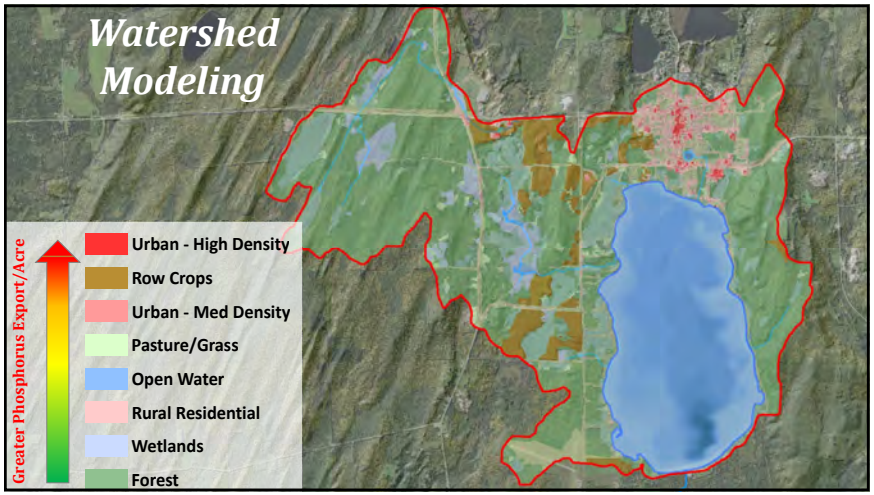


Onterra LLC Lake Management Planning

Watershed Delineation

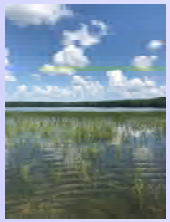
- Delineation of Watershed
- Understanding of location in Wisconsin's watersheds
- Watershed Modeling
  - Land cover
  - Phosphorus loading
  - Scenario development

Watershed Modeling



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)



Onterra LLC Lake Management Planning

Non-native Aquatic Plants

Curly-leaf Pondweed

Verified 2013

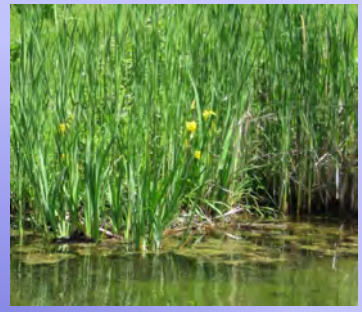
Eurasian Watermilfoil

Verified 2005

Onterra LLC Lake Management Planning

Non-native Aquatic Plants

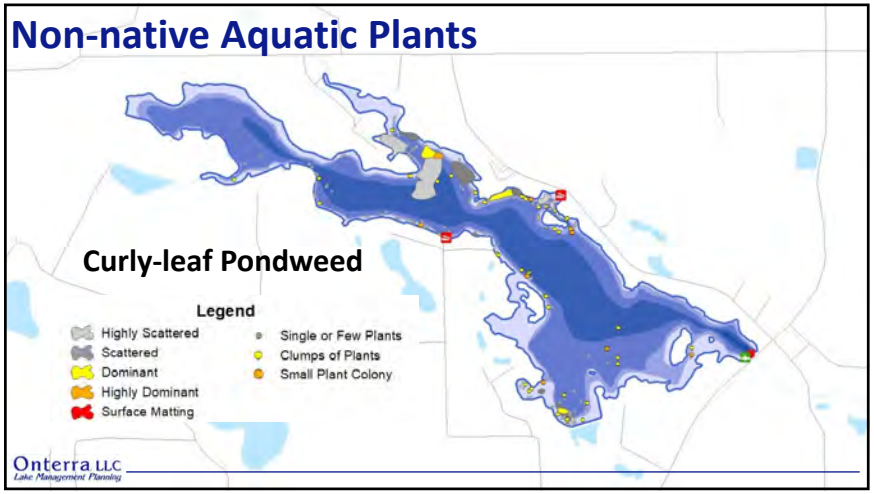
Pale Yellow Iris



Purple Loosestrife

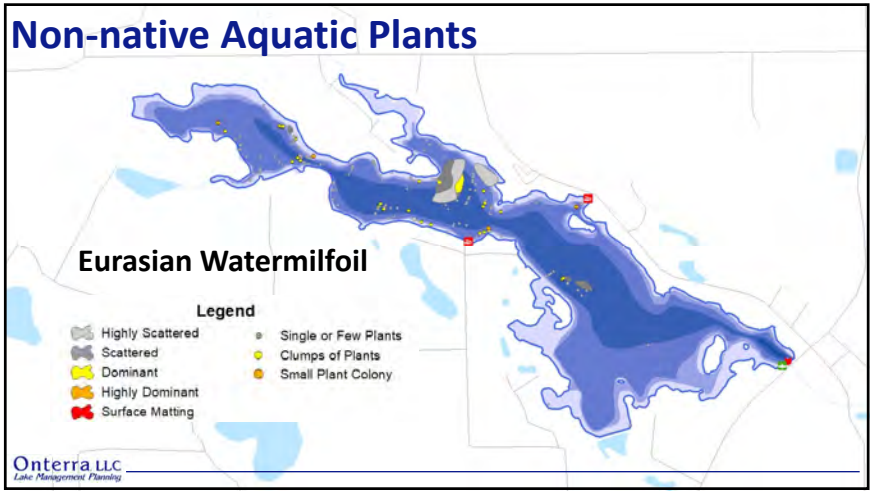
Onterra LLC Lake Management Planning

Non-native Aquatic Plants



Onterra LLC Lake Management Planning

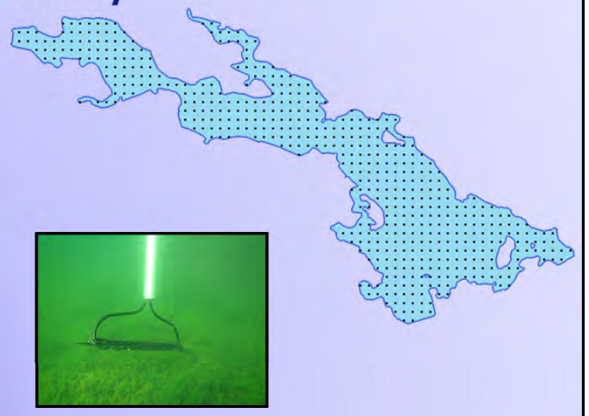
Non-native Aquatic Plants



Onterra LLC Lake Management Planning

Point-Intercept Survey

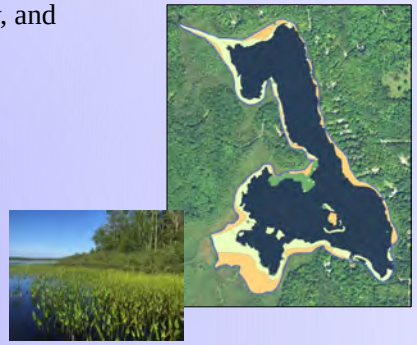
Lawrence Lake
42-meter Resolution
512 Total Points
Aron & Associates: 2005
Species List



Onterra LLC Lake Management Planning

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



Onterra LLC Lake Management Planning

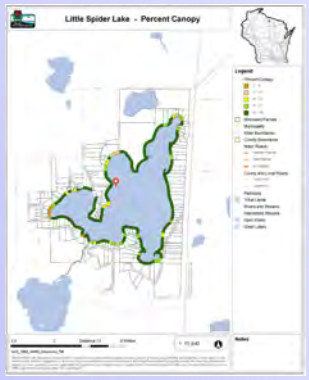
Fisheries Data Integration

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

Onterra LLC Lake Management Planning

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.



Onterra LLC Lake Management Planning

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

Onterra LLC Lake Management Planning

Planning Process

Planning Committee Meetings

Study Results (including a stakeholder survey)
Conclusions & Preliminary Options
Management Goals
Management Actions
  Timeframe
  Facilitator(s)

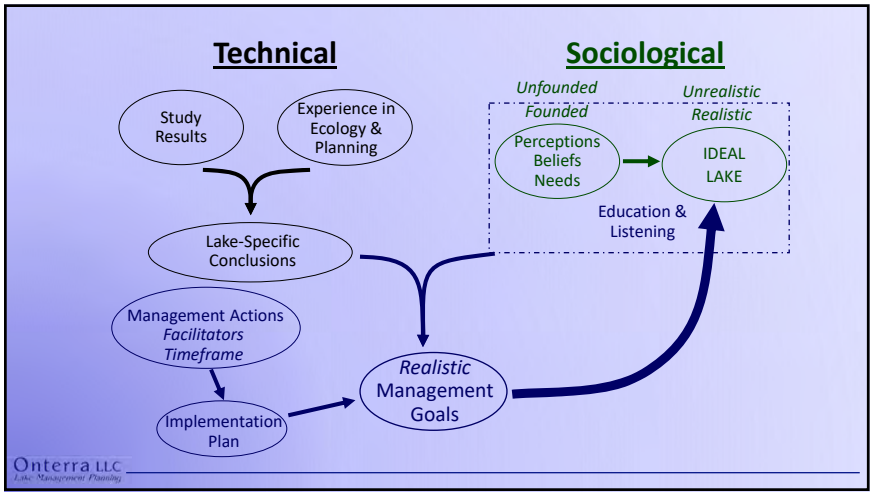
Implementation Plan

Onterra LLC Lake Management Planning

Thank You

Onterra LLC
Lake Management Planning

The Planning Process

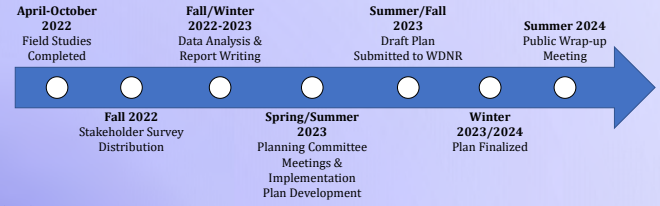


Planning Committee

- 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)

Onterra LLC Lake Management Planning

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

Onterra LLC Lake Management Planning

Presentation Outline

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

Onterra LLC Lake Management Planning

Management Planning Project Overview

Collect and compile information about Lawrence Lake

Includes both environmental & sociological

Historical & current information

Past management actions

Planning Meeting I/II
Report Sections

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 II
Implementation Plan

Onterra LLC Lake Management Planning

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.

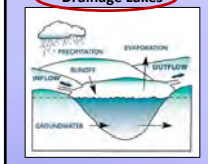
Aquatic Plant Community

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

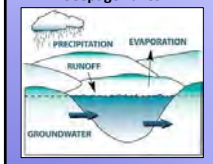
Onterra LLC Lake Management Planning

Wisconsin Lakes Natural Community Types

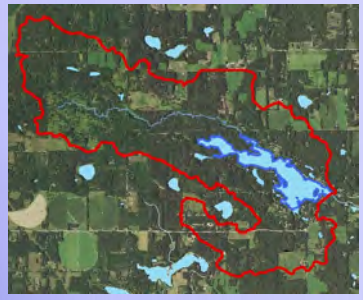
Drainage Lakes



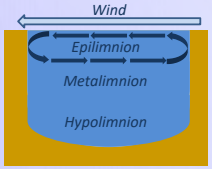
Seepage Lakes



Watershed Size
3,778 acres (5.9 sq.mi)



Depth & Stratification
Deep Stratified

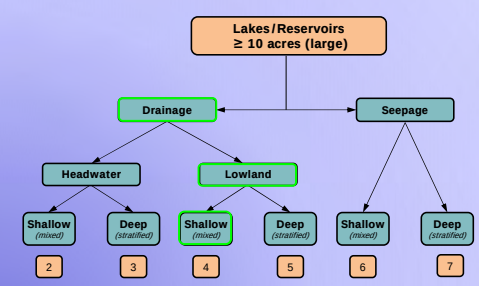


Shallow Mixed

Onterra LLC
Lake Management Planning

Natural Community Types

Categorization of lakes with similar features that influence water quality



Lawrence Lake

Ecoregions

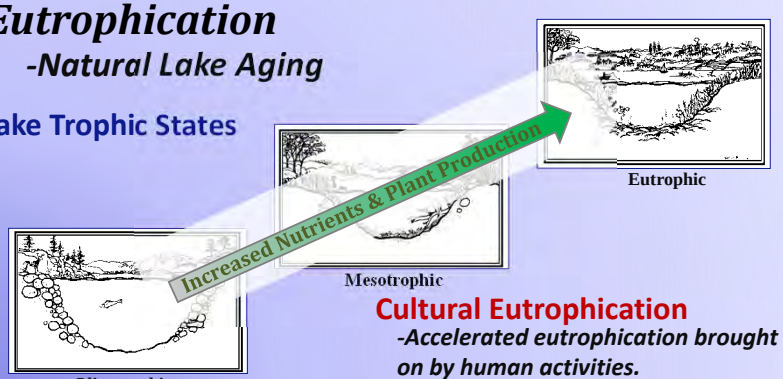
An area containing similar geology, physiography, hydrology, climate, and soils. As well as common terrestrial and aquatic fauna.

Onterra LLC
Lake Management Planning

Eutrophication

-Natural Lake Aging

Lake Trophic States



Cultural Eutrophication

-Accelerated eutrophication brought on by human activities.

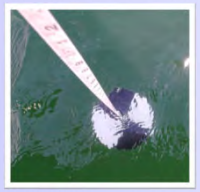
-Flowages experience this from the day they are created.

Onterra LLC
Lake Management Planning

Lake Water Quality – Trophic Parameters

↑ **Phosphorus**
Naturally occurring & essential for all life
Regulates phytoplankton biomass in **most** WI lakes
Most often 'limiting plant nutrient' (shortest supply) **N:P = 92:1**
Human activity often increases P delivery to lakes

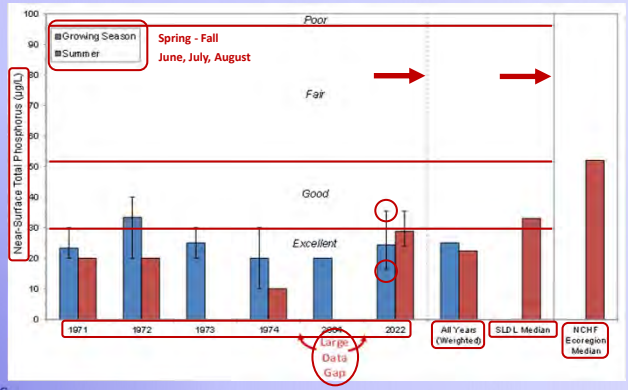
↑ **Chlorophyll-*a***
Pigment used in photosynthesis
Used as surrogate for phytoplankton biomass



↓ **Secchi Disk Transparency**
Measure of water clarity
Measured using a Secchi disk

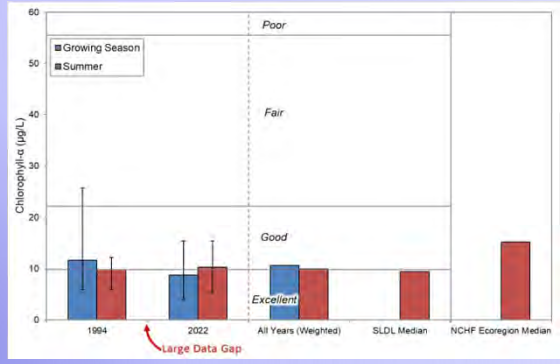
Onterra LLC
Lake Management Planning

Lawrence Lake Water Quality - Phosphorus



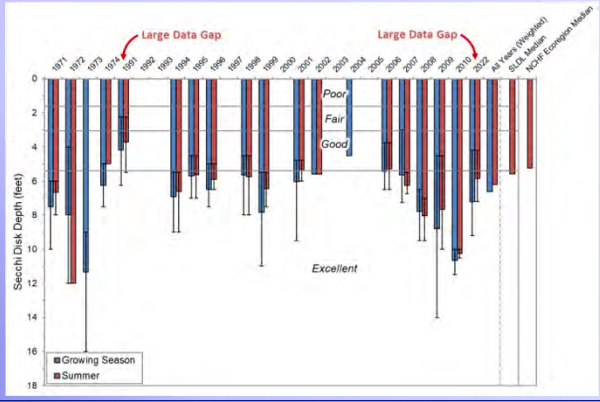
Onterra LLC Lake Management Planning

Lawrence Lake Water Quality – Chlorophyll-a



Onterra LLC Lake Management Planning

Lawrence Lake Water Quality – Clarity



Onterra LLC Lake Management Planning

Shallow Lakes are Special

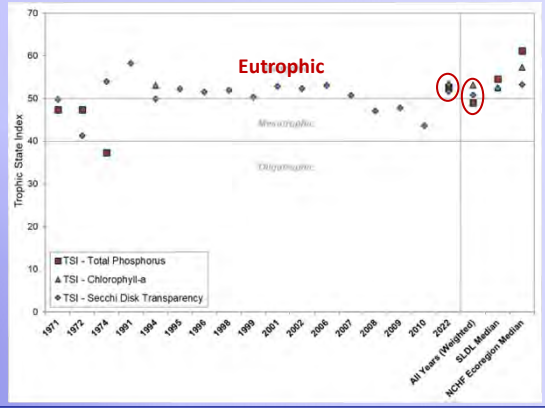
Clear State

Turbid State

Aquatic Plants are Incredibly Important

Onterra LLC Lake Management Planning

Lawrence Lake Water Quality – Trophic State

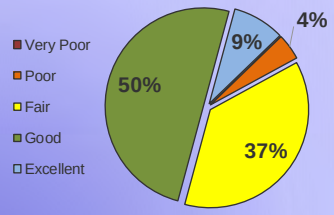


Onterra LLC
Lake Management Planning

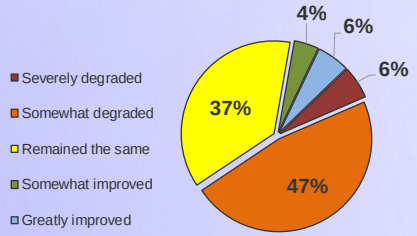
Water Quality – Stakeholder Survey Questions

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?



Onterra LLC
Lake Management Planning

Water Quality – Stakeholder Survey Questions

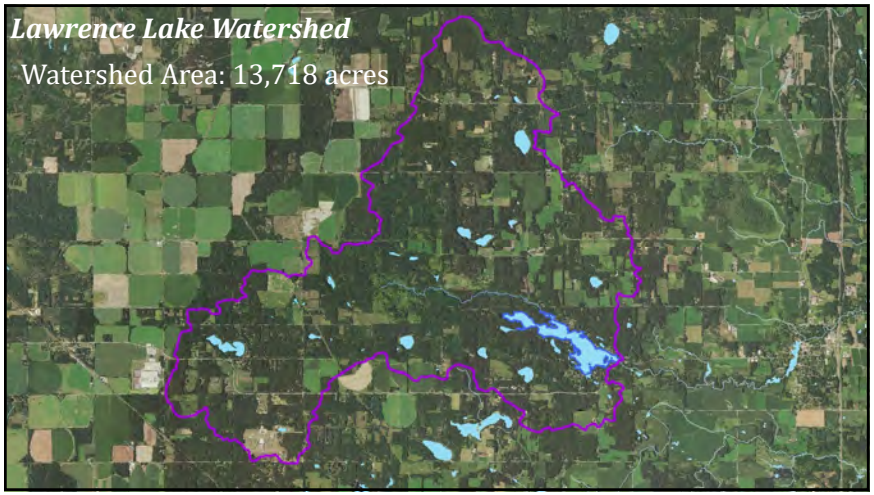
Stakeholder survey response Question #20. Which of the following answers is the single most important aspect when considering water quality?

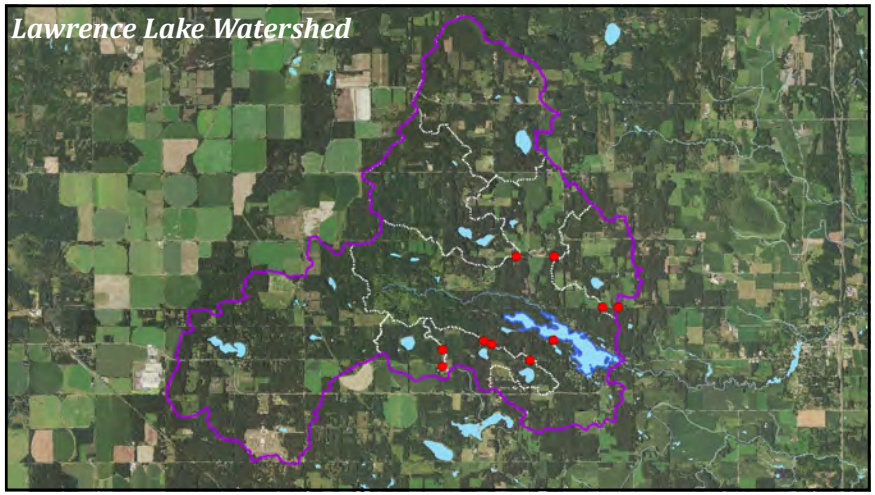
Answer Options	Response Percent	Response Count
Water clarity (clearness of water)	41%	28
Water color	3%	2
Aquatic plant growth	25%	17
Algae blooms	19%	13
Smell/odors	4%	3
Water level	1%	1
Fish kills	1%	1
Other	6%	4
answered question		69
skipped question		2

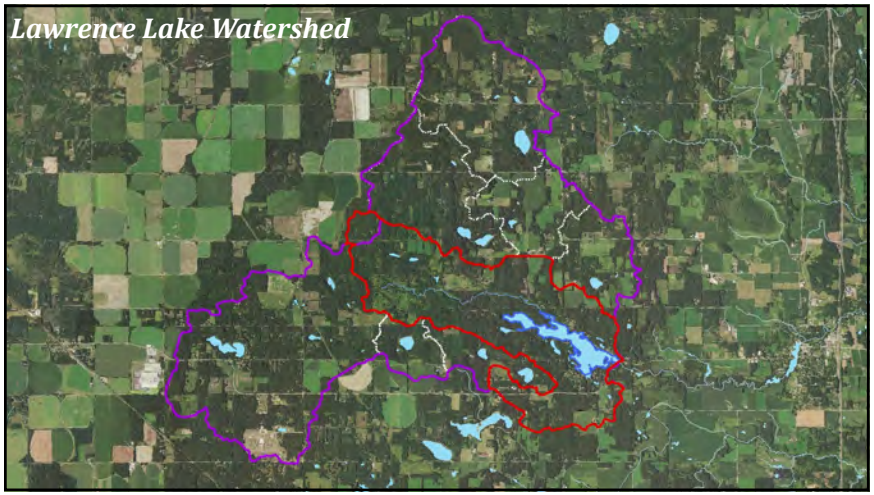
Onterra LLC
Lake Management Planning

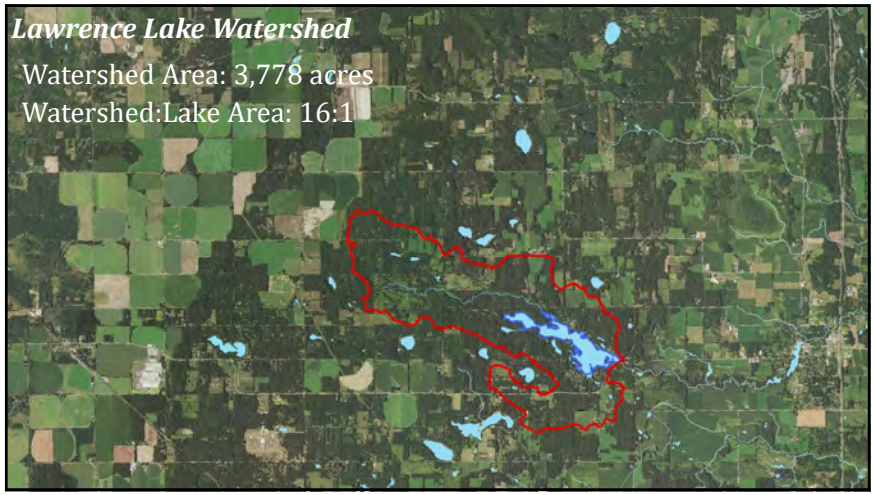
Lawrence Lake Watershed

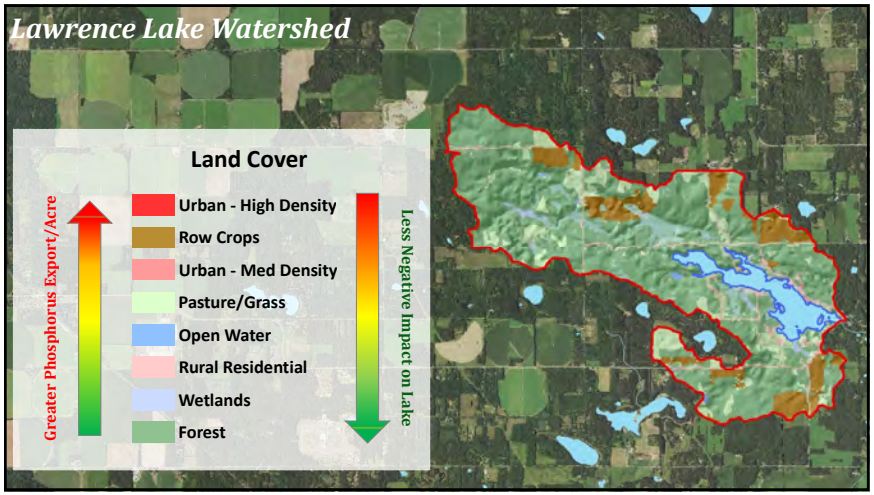
Watershed Area: 13,718 acres

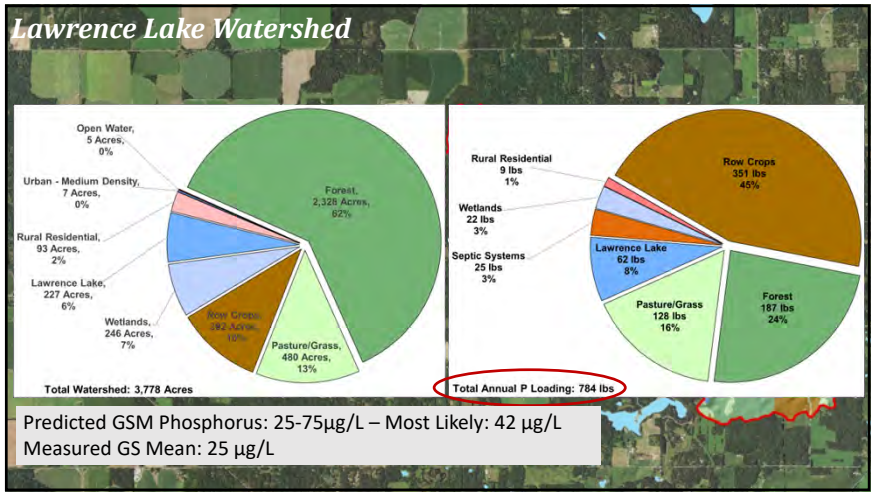


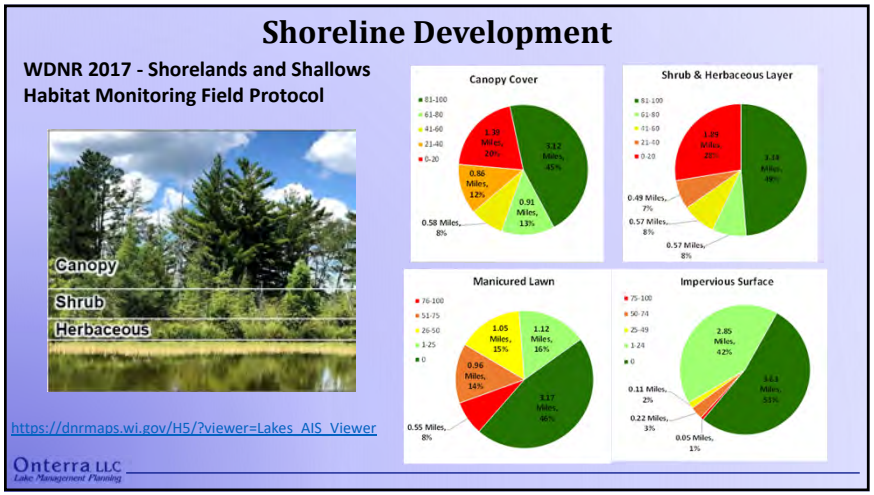

Lawrence Lake Watershed

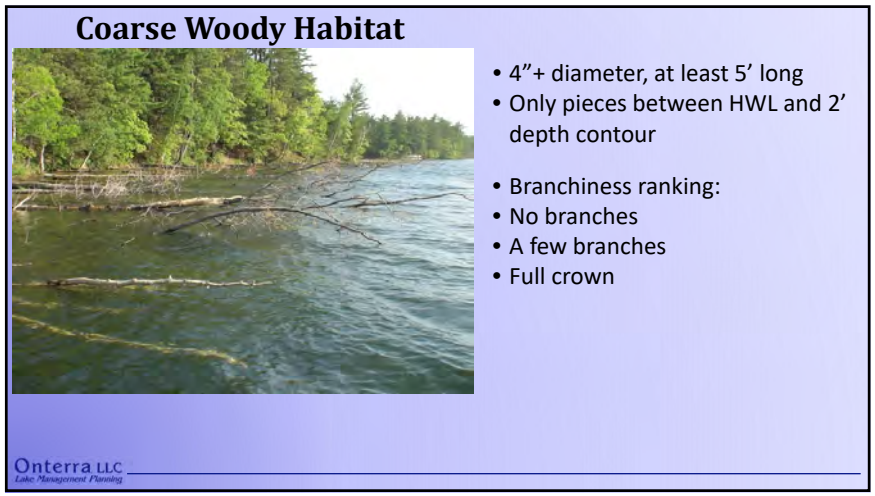

Lawrence Lake Watershed

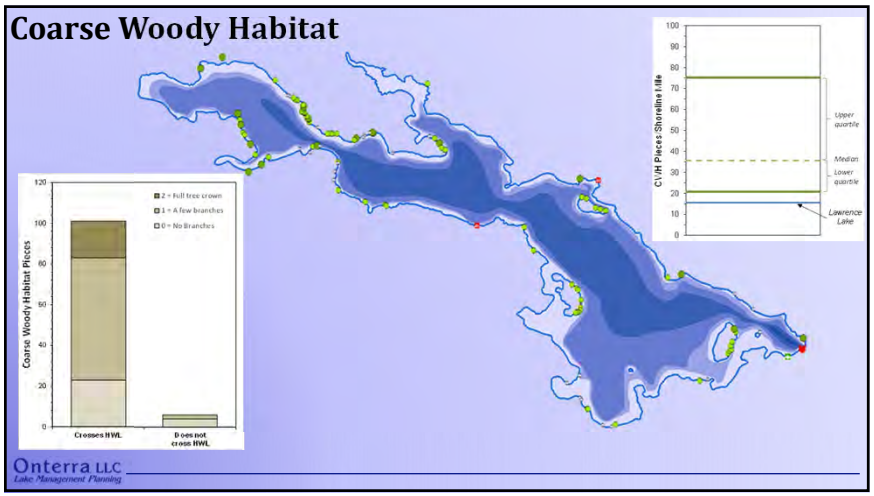

Lawrence Lake Watershed
Watershed Area: 3,778 acres
Watershed:Lake Area: 16:1

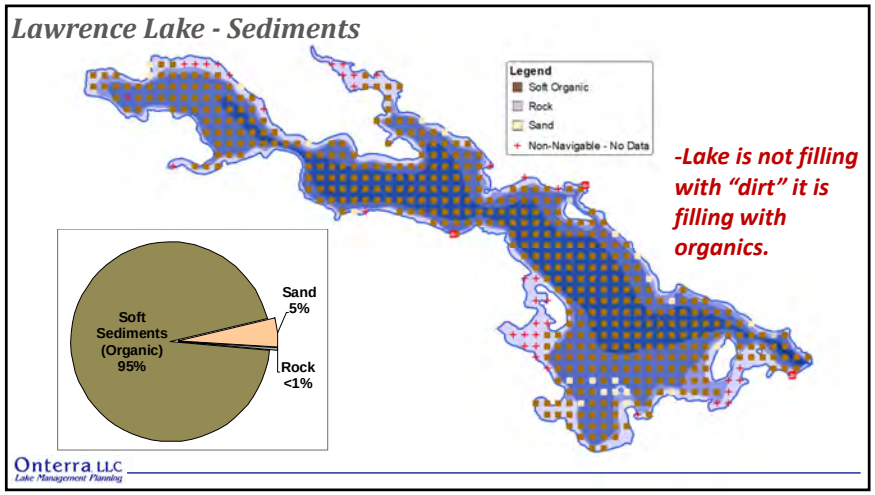

Lawrence Lake Watershed
Land Cover
Urban - High Density
Row Crops
Urban - Med Density
Pasture/Grass
Open Water
Rural Residential
Wetlands
Forest
Greater Phosphorus Export/Acre
Less Negative Impact on Lake

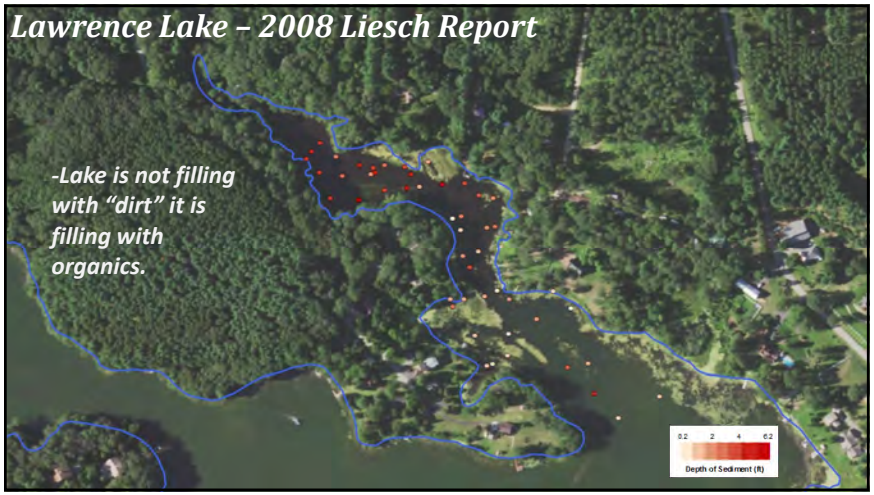

Lawrence Lake Watershed
Open Water, 5 Acres, 0%
Urban - Medium Density, 7 Acres, 0%
Rural Residential, 93 Acres, 2%
Lawrence Lake, 227 Acres, 6%
Wetlands, 246 Acres, 7%
Row Crops, 392 Acres, 10%
Pasture/Grass, 480 Acres, 13%
Forest, 2,328 Acres, 62%
Total Watershed: 3,778 Acres
Rural Residential 9 lbs 1%
Wetlands 22 lbs 3%
Septic Systems 25 lbs 3%
Lawrence Lake 62 lbs 8%
Pasture/Grass 128 lbs 16%
Row Crops 351 lbs 45%
Forest 187 lbs 24%
Total Annual P Loading: 784 lbs
Predicted GSM Phosphorus: 25-75µg/L – Most Likely: 42 µg/L
Measured GS Mean: 25 µg/L

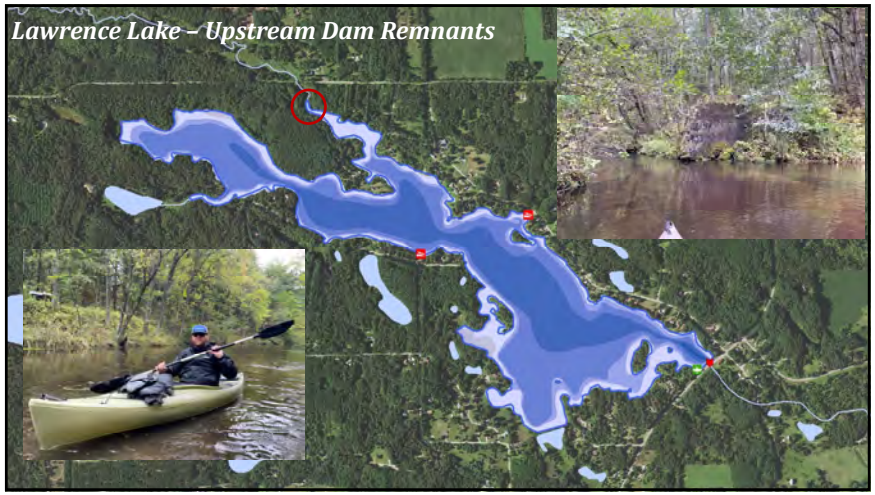

Shoreline Development
WDNR 2017 - Shorelands and Shallows Habitat Monitoring Field Protocol
Canopy
Shrub
Herbaceous
Canopy Cover
Shrub & Herbaceous Layer
Manicured Lawn
Impervious Surface
https://dnrmaps.wi.gov/H5/?viewer=Lakes_AIS_Viewer
Onterra LLC
Lake Management Planning


Coarse Woody Habitat
• 4”+ diameter, at least 5’ long
• Only pieces between HWL and 2’ depth contour
• Branchiness ranking:
• No branches
• A few branches
• Full crown
Onterra LLC
Lake Management Planning


Coarse Woody Habitat
Coarse Woody Habitat Pieces
Crosses HWL
Does not cross HWL
CWH Pieces/Shoreline Mile
Upper quartile
Median
Lower quartile
Lawrence Lake
Onterra LLC
Lake Management Planning


Lawrence Lake - Sediments
Legend
Soft Organic
Rock
Sand
Non-Navigable - No Data
-Lake is not filling with "dirt" it is filling with organics.
Soft Sediments (Organic) 95%
Sand 5%
Rock <1%
Onterra LLC
Lake Management Planning

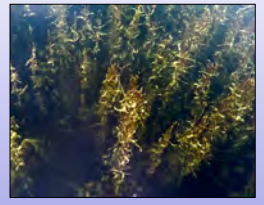

Lawrence Lake – 2008 Liesch Report
-Lake is not filling with "dirt" it is filling with organics.
Depth of Sediment (ft)


Lawrence Lake – Upstream Dam Remnants


Lawrence Lake – 2008 Liesch Report
Dredging Project Costs
Geotextile Tube Est.
Total: $595,560
Used $10/sq.yd.
Current is $15/sq.yd
Updated Total: $702,762

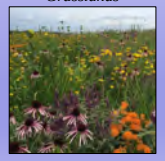
Native Aquatic Plants

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



Lake

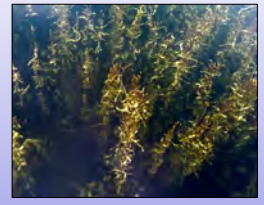
Grasslands



Forest

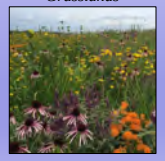
Native Aquatic Plants

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



Lake

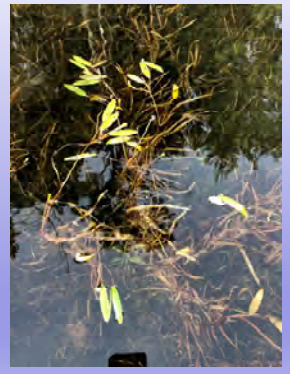
Grasslands



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	WI State Status	Coefficient of Conservatism	2022 (Onterra)
Emergent	*Carex comosa*	Bristly sedge	Native	5	I
	Eleocharis erythropoda	Bald spikerush	Native	3	I
	Iris versicolor	Northern blue flag	Native	5	I
	Juncus effusus	Soft rush	Native	4	I
	Miscanthus spp.	Silvergrass	Non-Native - Invasive	N/A	I
	Nasturtium officinale	Watercress	Non-Native - Invasive	N/A	I
	Sagittaria latifolia	Common arrowhead	Native	3	I
	Schoenoplectus acutus	Hardstem bulrush	Native	5	I
	Schoenoplectus tabernaemontani	Softstem bulrush	Native	4	X
	Scirpus cyperinus	Wool grass	Native	4	I
	Typha latifolia	Broad-leaved cattail	Native	1	I
FL	*Nuphar variegata*	Spatterdock	Native	6	I
	Nymphaea odorata	White water lily	Native	6	X
	Persicaria amphibia	Water smartweed	Native	5	I
Submergent	*Ceratophyllum demersum*	Coontail	Native	3	X
	Chara spp.	Muskgrasses	Native	7	X
	Elodea canadensis	Common waterweed	Native	3	X
	Heteranthera dubia	Water stargrass	Native	6	X
	Myriophyllum sibiricum	Northern watermilfoil	Native	7	X
	Myriophyllum spicatum	Eurasian watermilfoil	Non-Native - Invasive	N/A	X
	Najas flexilis	Slender naiad	Native	6	X
	Najas guadalupensis	Southern naiad	Native	7	X
	Potamogeton crispus	Curly-leaf pondweed	Non-Native - Invasive	N/A	X
	Potamogeton foliosus	Leafy pondweed	Native	6	X
	Potamogeton friesii	Fries' pondweed	Native	8	X
	Potamogeton illinoensis	Illinois pondweed	Native	6	X
	Potamogeton natans	Floating-leaf pondweed	Native	5	I
	Potamogeton obtusifolius	Blunt-leaved pondweed	Native	9	X
	Potamogeton praelongus	White-stem pondweed	Native	8	I
	Potamogeton pusillus	Small pondweed	Native	7	X
	Potamogeton richardsonii	Clasping-leaf pondweed	Native	5	X
	Potamogeton zosteriformis	Flat-stem pondweed	Native	6	X
	Ranunculus aquatilis	White water crowfoot	Native	8	X
	Stuckenia pectinata	Sago pondweed	Native	3	X
	Utricularia vulgaris	Common bladderwort	Native	7	X
	Vallisneria americana	Wild celery	Native	6	X
	Zannichellia palustris	Horned pondweed	Native	7	X
FF	*Lemna minor*	Lesser duckweed	Native	5	X
	Lemna trisulca	Forked duckweed	Native	6	X
	Spirodela polyrhiza	Greater duckweed	Native	5	X

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

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

Lawrence Lake
42-meter resolution
512 total points

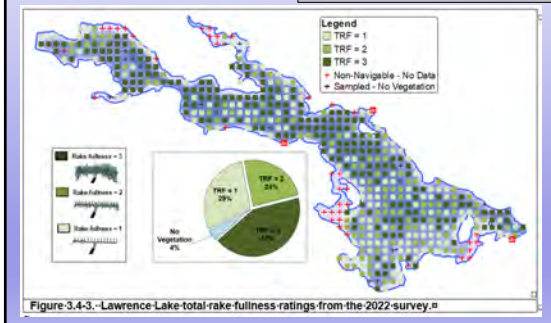
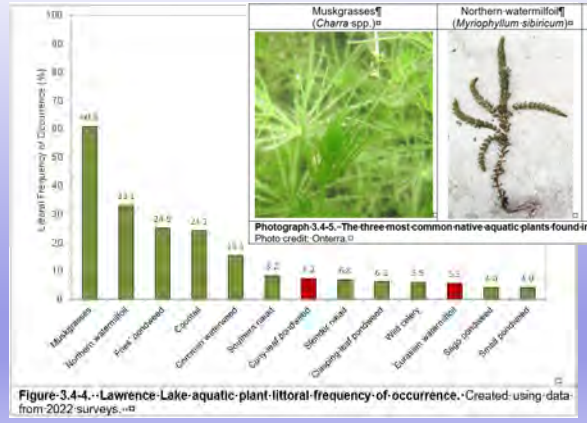


Figure 3.4-3. Lawrence Lake total rake fullness ratings from the 2022 survey.

2022 Littoral Frequency of Occurrence



Photograph 3.4-5. The three most common native aquatic plants found in Lawrence Lake in 2022. Photo credit: Onterra.

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

Floristic Quality Analysis

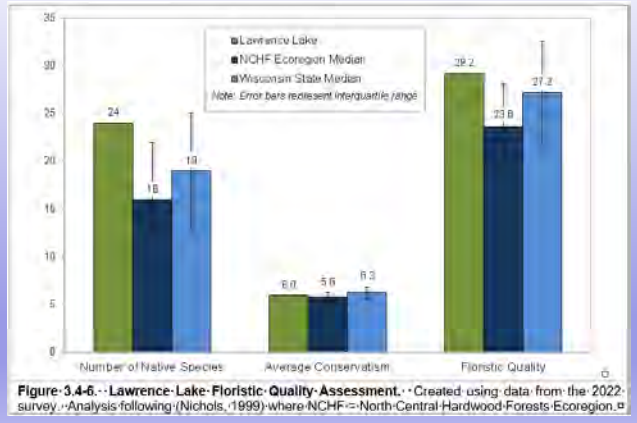


Figure 3.4-6. Lawrence Lake Floristic Quality Assessment. Created using data from the 2022 survey. Analysis following (Nichols, 1999) where NCHF = North Central Hardwood Forests Ecoregion.

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

Emergent & Floating-leaf Aquatic Plants

Types of Aquatic Plant Surveys

Quantitative

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

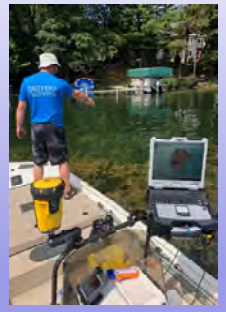
Qualitative

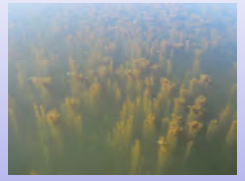
- AIS Mapping Surveys
  - Fine-scale location accuracy
  - Subjective designations

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

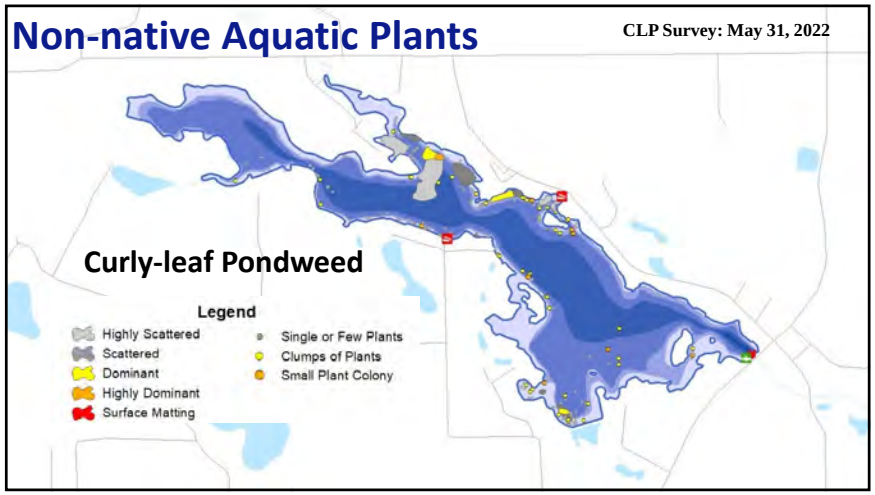
Non-Native Aquatic Plants

Curly-leaf Pondweed (CLP)

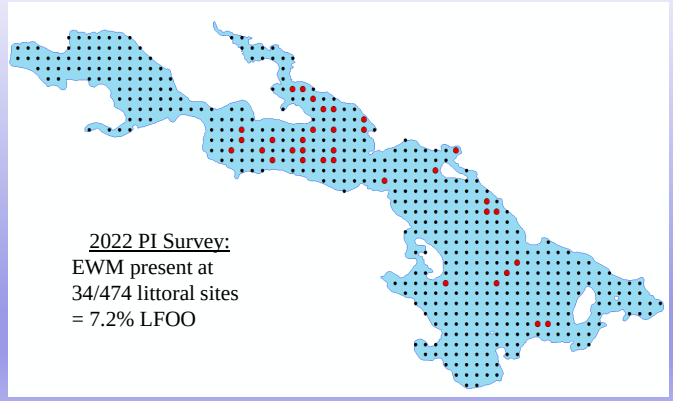
- **First "officially" documented in 1994 in Lawrence Lake**

Non-native Aquatic Plants

CLP Survey: May 31, 2022

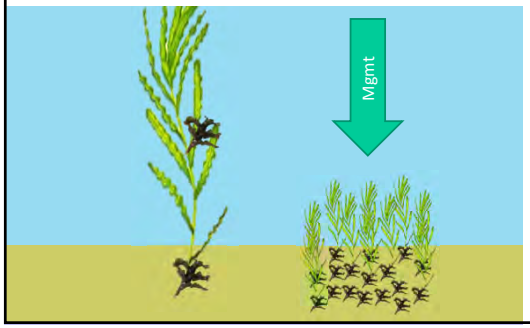


CLP Monitoring: Point-Intercept Survey



2022 PI Survey:
EWM present at
34/474 littoral sites
= 7.2% LFOO

CLP Life-Cycle & Control Strategy Philosophy

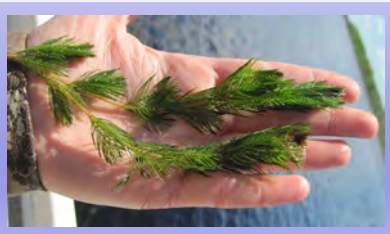


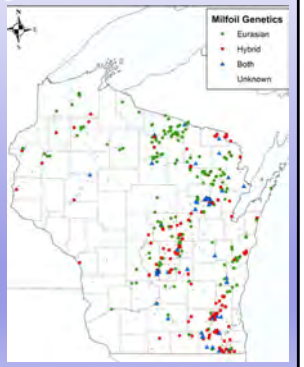
- Established populations typically have 5-10 years of viable turions in sediment
- Unless documented ecological impacts, established populations not targeted for lake-wide management
- Dies off during July on most lakes

Non-Native Aquatic Plants

Eurasian Watermilfoil

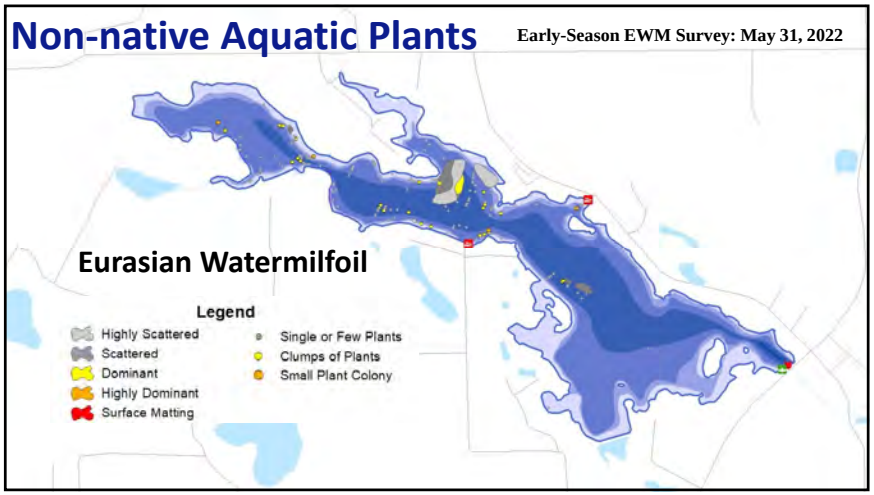
- **First "officially" documented in 2005 in Lawrence Lake**
- **DNA analysis in 2005 indicated pure-strain EWM, not hybrid. Appeared to be pure-strain in 2022**





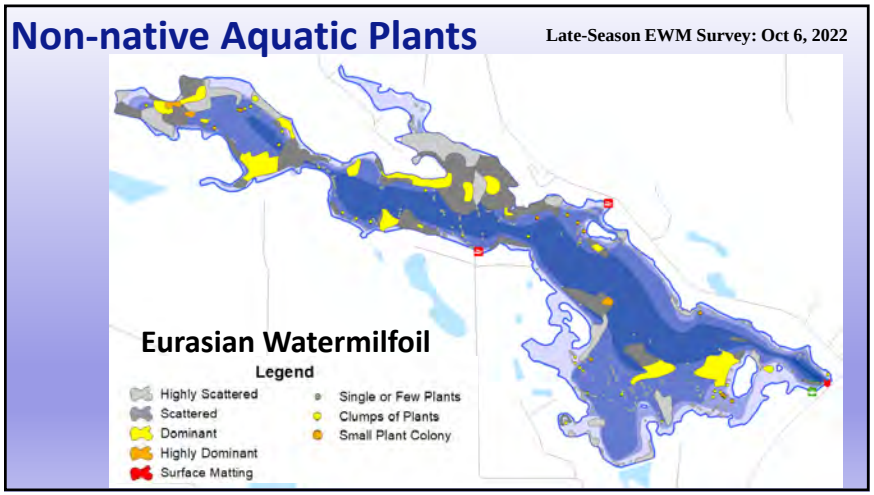
Non-native Aquatic Plants

Early-Season EWM Survey: May 31, 2022

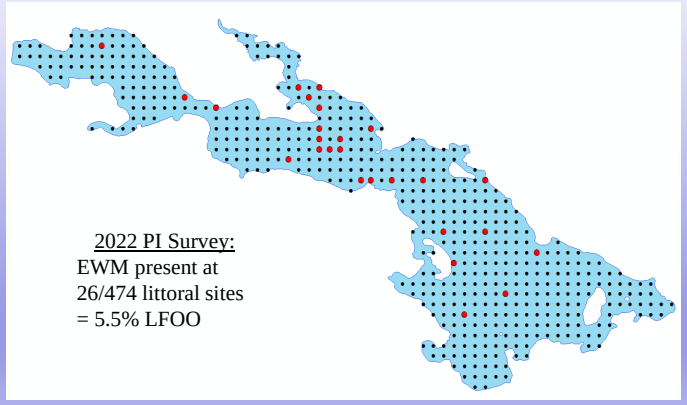


Non-native Aquatic Plants

Late-Season EWM Survey: Oct 6, 2022



EWM Monitoring: Point-Intercept Survey



2022 PI Survey:
EWM present at
26/474 littoral sites
= 5.5% LFOO

EWM Propagation

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

Auto-fragment

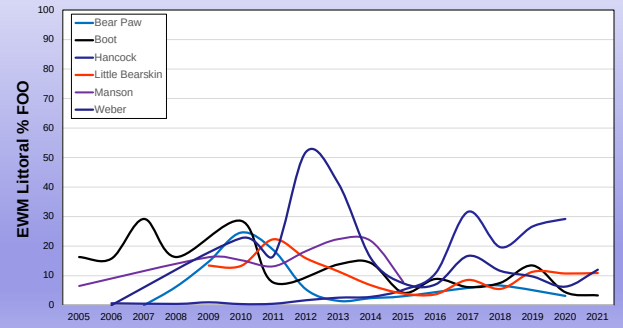
- Purposefully produced
- High energy storage
- Higher viability

Allo-fragment

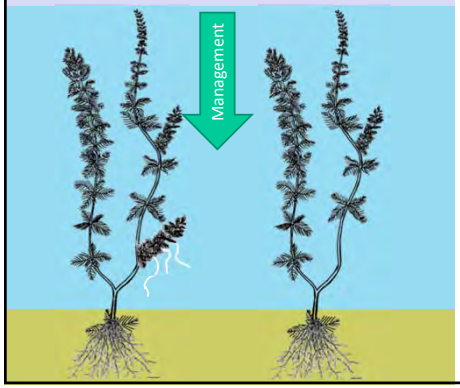
- Mechanical breakage
- Low energy storage
- Lower viability

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

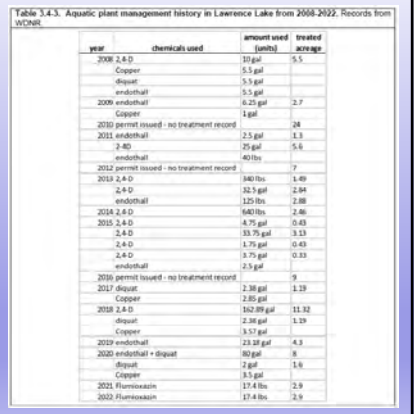


Table 3.4.5. Aquatic plant management history in Lawrence Lake from 2008-2022. Records from WDNR.

year	chemicals used	amount used (units)	treated acreage
2008	2,4-D	10 gal	5.5
	Copper	5.5 gal	
	diquat	5.5 gal	
	endothall	5.5 gal	
2009	endothall	6.25 gal	2.7
	Copper	1 gal	
2010	permit issued - no treatment record		24
2011	endothall	2.5 gal	1.3
	2-4D	25 gal	5.6
	endothall	40 lbs	
2012	permit issued - no treatment record		7
2013	2,4-D	340 lbs	1.49
	2,4-D	32.5 gal	2.84
	endothall	125 lbs	2.88
2014	2,4-D	640 lbs	2.46
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	diquat	2.38 gal	1.19
	Copper	2.85 gal	
2018	2,4-D	162.89 gal	11.32
	diquat	2.38 gal	1.19
	Copper	3.57 gal	
2019	endothall	23.18 gal	4.3
2020	endothall + diquat	80 gal	8
	diquat	2 gal	1.6
	Copper	3.5 gal	
2021	Flumioxazin	17.4 lbs	2.9
2022	Flumioxazin	17.4 lbs	2.9

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

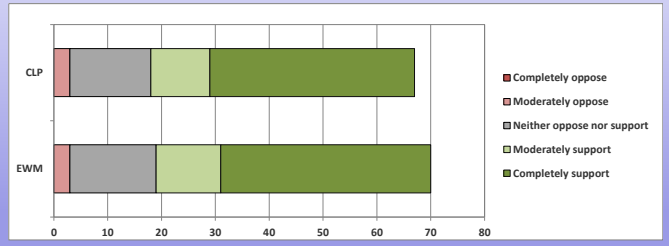
Learned that Concentration & Exposure Time (CET) is important!

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

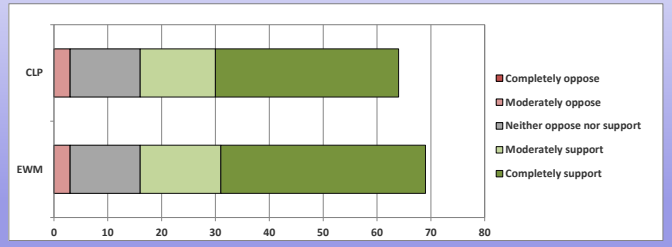
Stakeholder Survey – Invasive Plant Management

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.

Onterra LLC
Lake Management Planning

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?

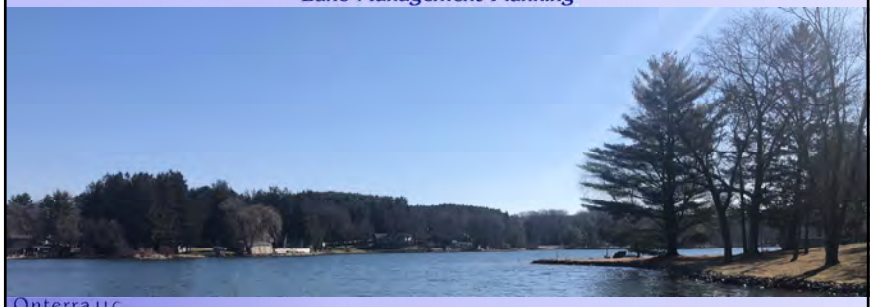
Assignment for Planning Meeting II

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

Onterra LLC
Lake Management Planning

Thank You

Onterra LLC
Lake Management Planning



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

Onterra LLC
Lake Management Planning

Management Planning Project Overview

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

Planning Meeting I/II
Report Sections

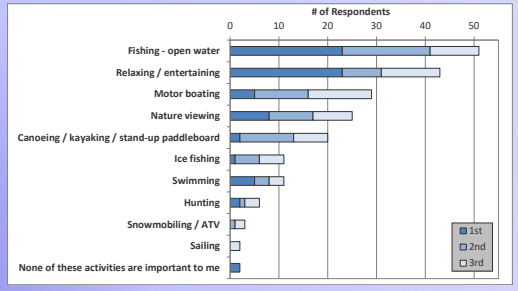
Create a realistic and implementable management plan
Challenges facing lake and LLPRD
Create goals that will address challenges
Develop actions that will meet goals
Assign timeframes & facilitators

Planning Meeting II
Implementation Plan

Onterra LLC
Lake Management Planning

Fisheries – Stakeholder Survey

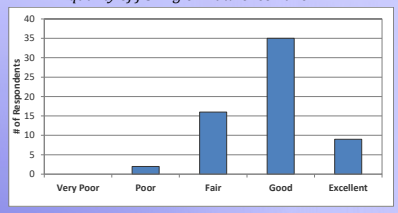
Question #8. Please rank up to three activities that are important reasons for owning your property on or near Lawrence Lake, with 1 being the most important.



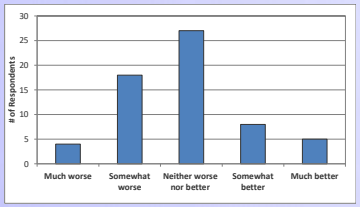
Onterra LLC
Lake Management Planning

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?



Onterra LLC
Lake Management Planning

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.

Onterra LLC
Lake Management Planning

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.

Onterra LLC
Lake Management Planning

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

Onterra LLC
Lake Management Planning

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.

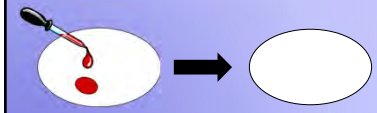
Not enough data to understand trends in aquatic plant populations.

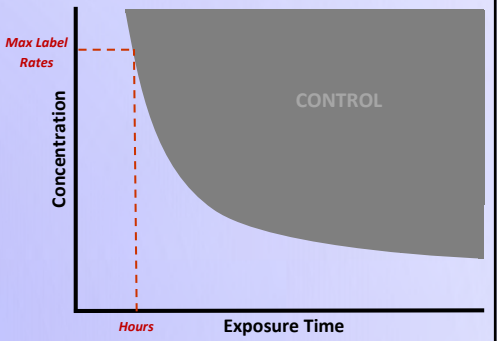
Onterra LLC

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

Onterra LLC

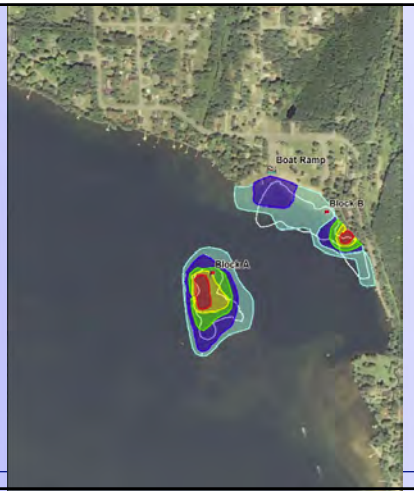
Herbicide Treatment on Lake Metonga

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

Onterra LLC

1 HAT

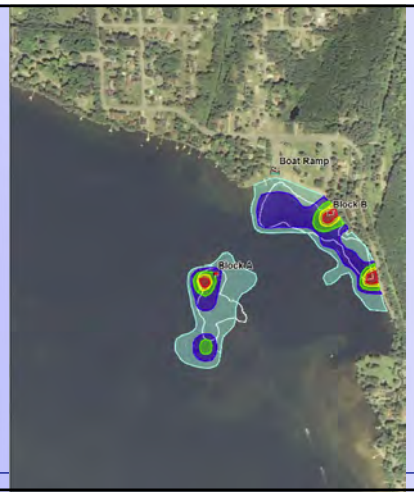
75-100%
50-75%
25-50%
10-25%
5-10%



Onterra LLC

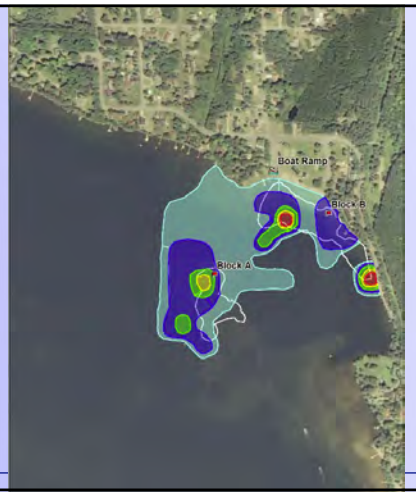
2 HAT

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



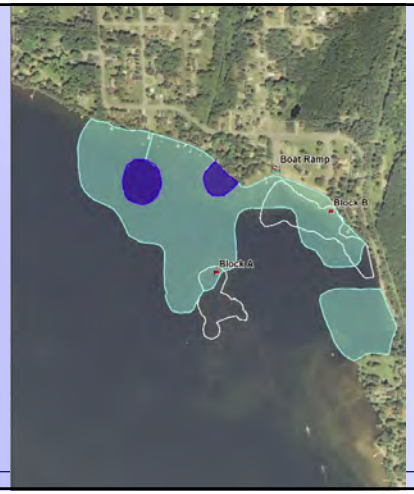
3 HAT

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



5 HAT

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

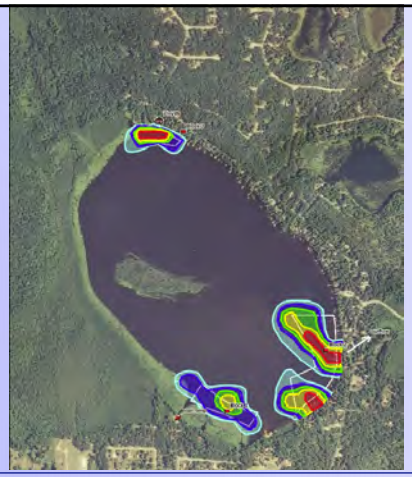


Horizontal Herbicide Mixing (Dissipation)

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

1 HAT

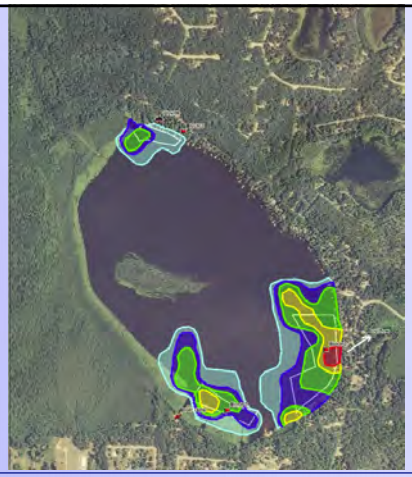
12/24 hours for mortality
- 75-100%
- 50-75%
- 25-50%
- 10-25%
- 5-10%



Onterra LLC Lake Management Planning

2.5 HAT

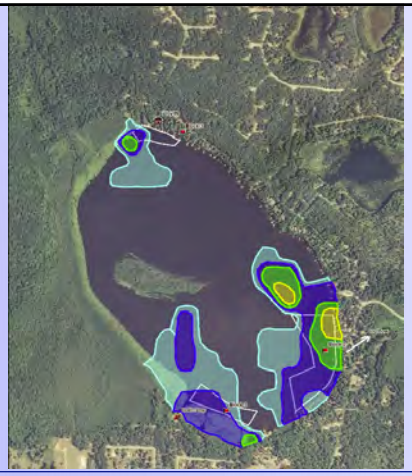
12/24 hours for mortality
- 75-100%
- 50-75%
- 25-50%
- 10-25%
- 5-10%



Onterra LLC Lake Management Planning

4 HAT

12/24 hours for mortality
- 75-100%
- 50-75%
- 25-50%
- 10-25%
- 5-10%

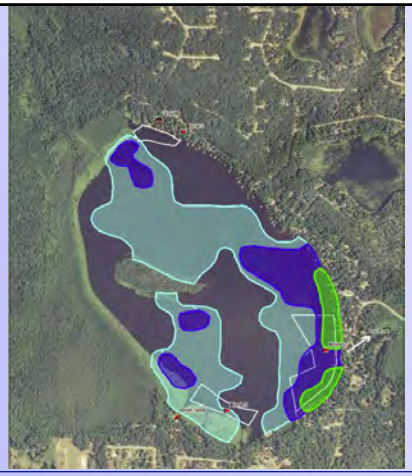


Onterra LLC Lake Management Planning

6 HAT

12/24 hours for mortality
- 75-100%
- 50-75%
- 25-50%
- 10-25%
- 5-10%

2,4-D CET needed for EWM control based upon published studies:
- **sustained 4.0 ppm for 12 hours**
- **sustained 2.0 ppm for 24 hours**
- **0.1-0.3 ppm for 6 weeks**



Onterra LLC Lake Management Planning

Spot Treatment Guidance

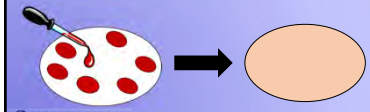
- Actual CET in the field is more difficult to predict and maintain in spot treatments due to **dissipation**
- Rapid dissipation of herbicide occurs in 1-6 HAT in many (most?) spot-treatments
- Size (large vs small), shape (broad vs thin/linear), and location (protected vs exposed) matters
- Achieving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

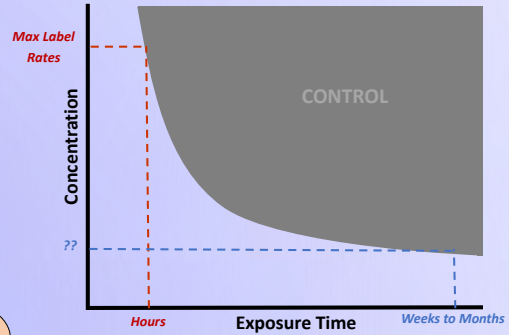
Onterra LLC

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.



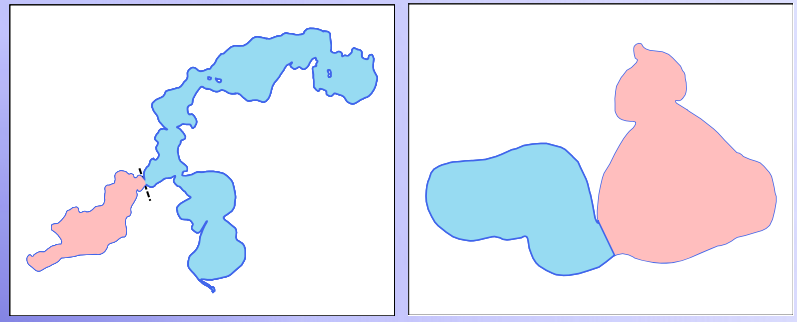


Low Concentration ► Long Exposure Time

Onterra LLC

Area of Potential Impact (AOPI)

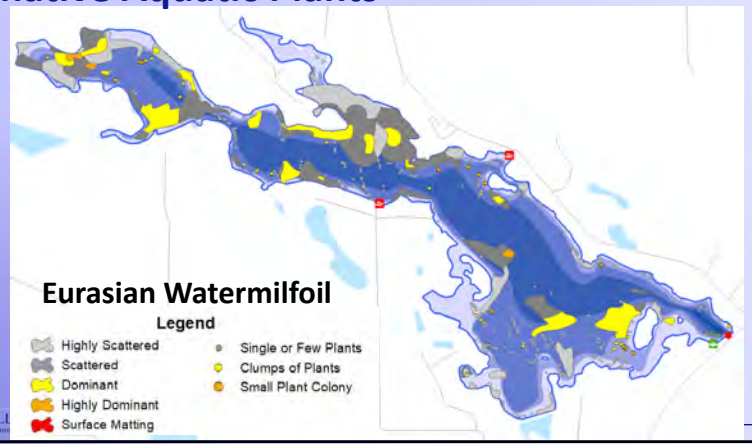
- Mixing area, reaches equilibrium - basin or bay of a lake



Onterra LLC

Non-native Aquatic Plants

Late-Season EWM Survey: Oct 6, 2022



Onterra LLC

2022 Littoral Frequency of Occurrence

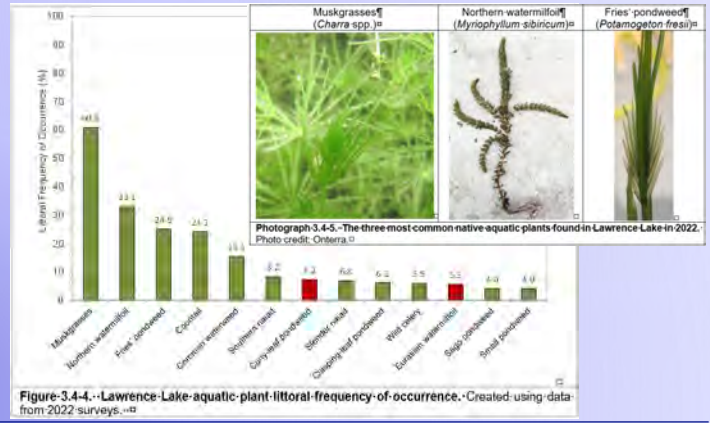
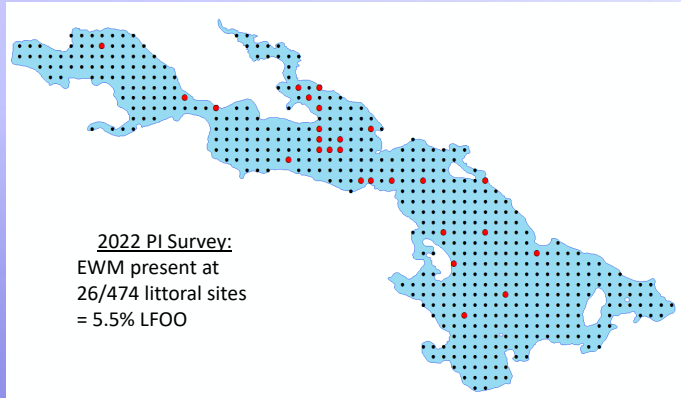


Figure 3.4-4. Lawrence Lake aquatic plant littoral frequency of occurrence. Created using data from 2022 surveys.

Photograph 3.4-5. The three most common native aquatic plants found in Lawrence Lake in 2022. Photo credit: Onterra

Onterra LLC Lake Management Planning

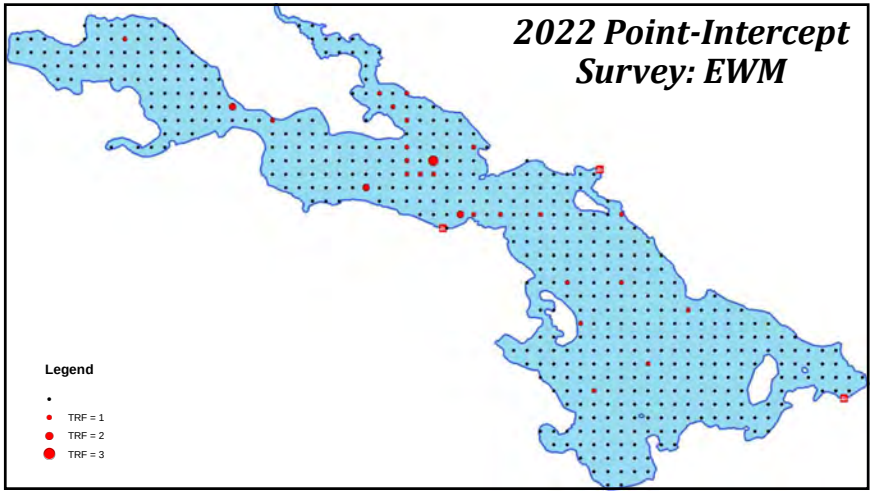
EWM Monitoring: Point-Intercept Survey



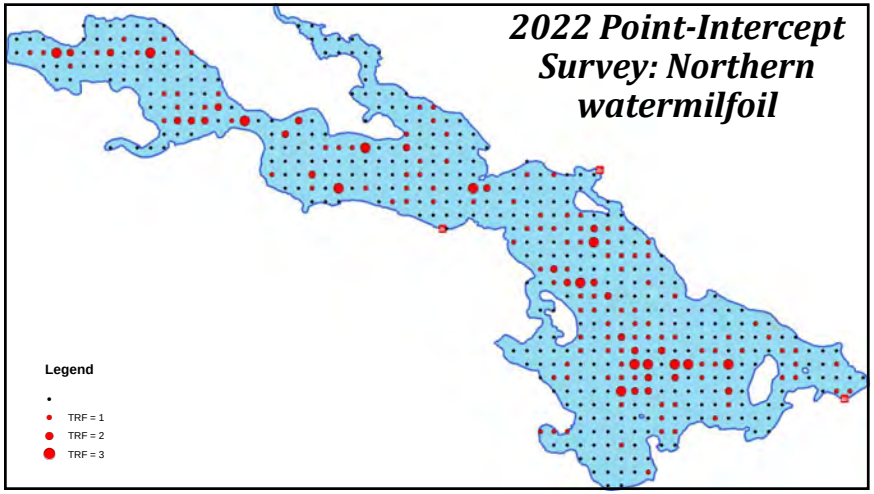
2022 PI Survey:
EWM present at
26/474 littoral sites
= 5.5% LFOO

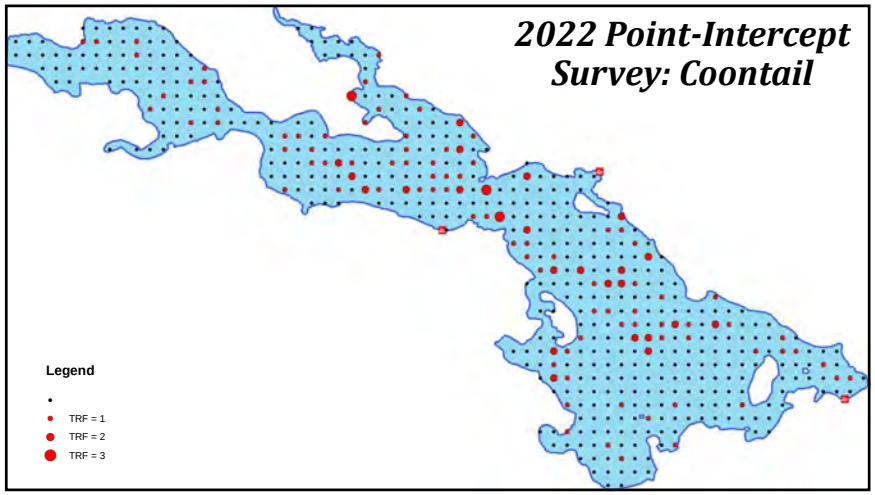
Onterra LLC Lake Management Planning

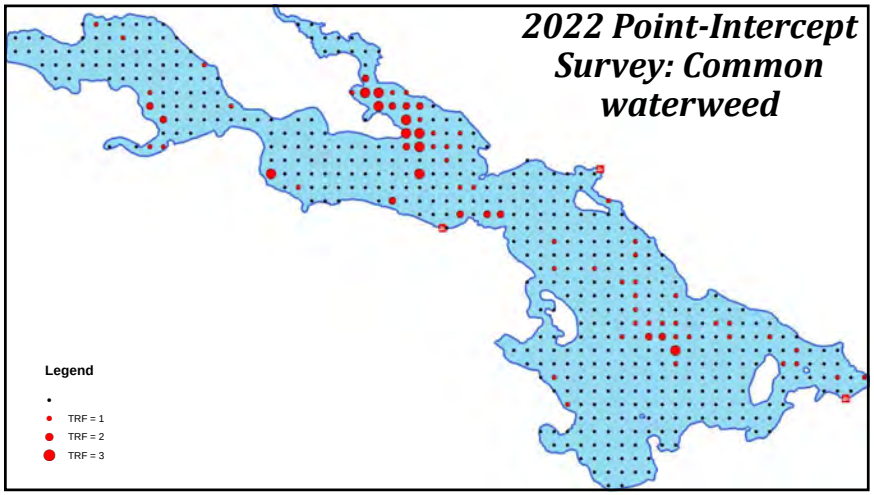
2022 Point-Intercept Survey: EWM

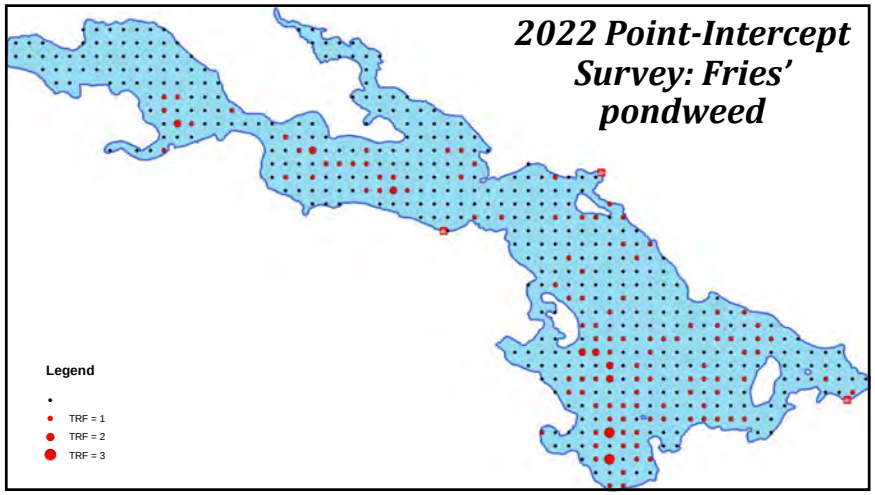


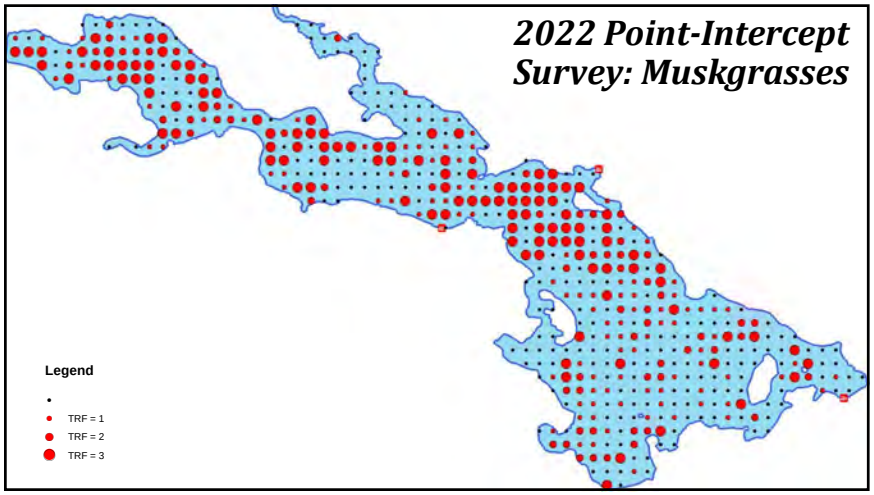
2022 Point-Intercept Survey: Northern watermilfoil




2022 Point-Intercept Survey: Coontail
Legend
TRF = 1
TRF = 2
TRF = 3


2022 Point-Intercept Survey: Common waterweed
Legend
TRF = 1
TRF = 2
TRF = 3


2022 Point-Intercept Survey: Fries' pondweed
Legend
TRF = 1
TRF = 2
TRF = 3


2022 Point-Intercept Survey: Muskgrasses
Legend
TRF = 1
TRF = 2
TRF = 3

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
- Sediment Decomposition/ Consolidation

  → *Must include significant sediment exposure over much of the growing season*
- Sediment Removal/ Channel Cutting → *Heading cutting of stream bed likely, but in-lake and downstream impacts must be considered*

Onterra LLC Lake Management Planning

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

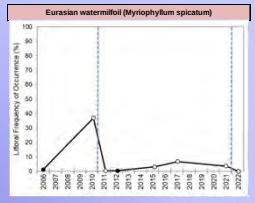
Curly-leaf pondweed response to winter drawdown has been mixed

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

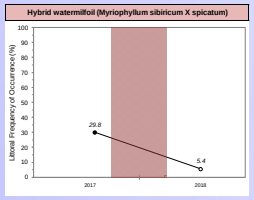
Onterra LLC Lake Management Planning

EWM/HWM Response to Winter Drawdown

Lac Sault Dore
2010-2011 & 2021-2022



Little Muskego
2017-2018

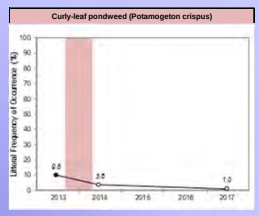


Onterra LLC Lake Management Planning

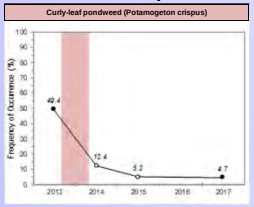
CLP Response to Winter Drawdown

Musser
2013-2014

Lake-wide



Sub-Sample

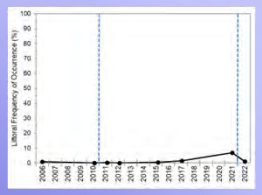


Onterra LLC Lake Management Planning

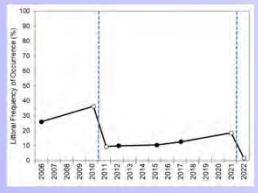
Native Plant Species Response to Winter Drawdown

Lac Sault Dore
2010-2011 & 2021-2022

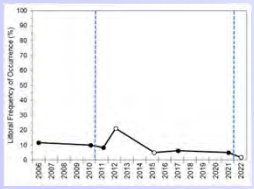
Northern Watermilfoil



Coontail



Common Waterweed



Onterra LLC
Lake Management Planning

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*

Onterra LLC
Lake Management Planning

Winter Drawdown as a Lake Management Tool on Lawrence Lake

Aquatic Invas … *but EWM &*
Management

Native Plant … *uld be*
Impacts/Nuis … *he three that*

Sediment Dec … *ter*
Consolidatior

Channel Cutti … *m waterbodies*
… *d)*

Shoreline … *e to be a*
Modification/

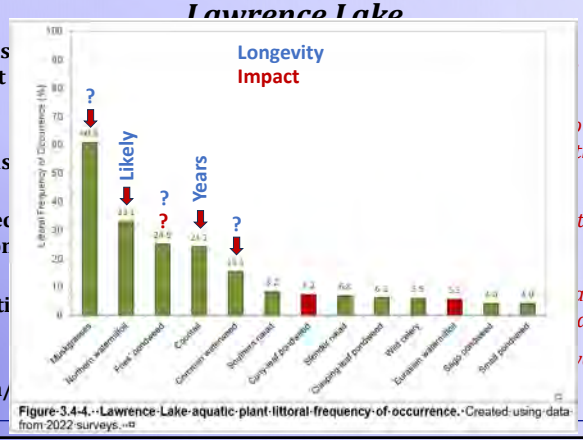


Figure 3.4-4. Lawrence Lake aquatic plant littoral frequency of occurrence. Created using data from 2022 surveys.

Onterra LLC
Lake Management Planning

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.

Onterra LLC
Lake Management Planning

Winter ***ce Lake***

Dam Funct

- Bill L. re
- This sh

Downstrea

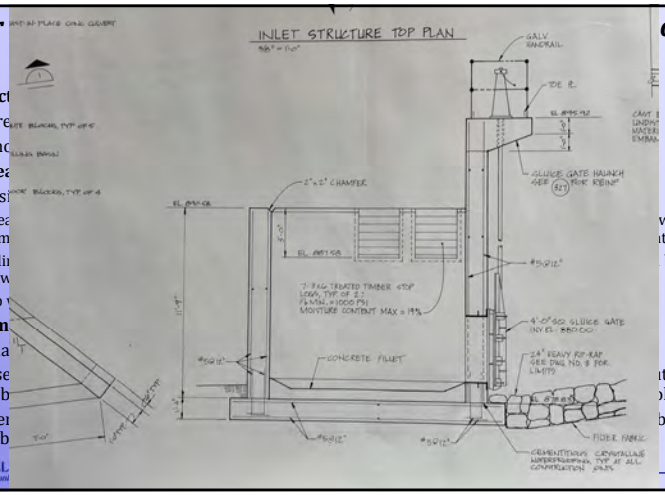
- Discuss
  - Strea from
  - Sedi draw
  - Top

wdown
terway.
by also

In-lake Im

- A partia
- Some se would b
- Sedime negligib

tting
olidation.
be

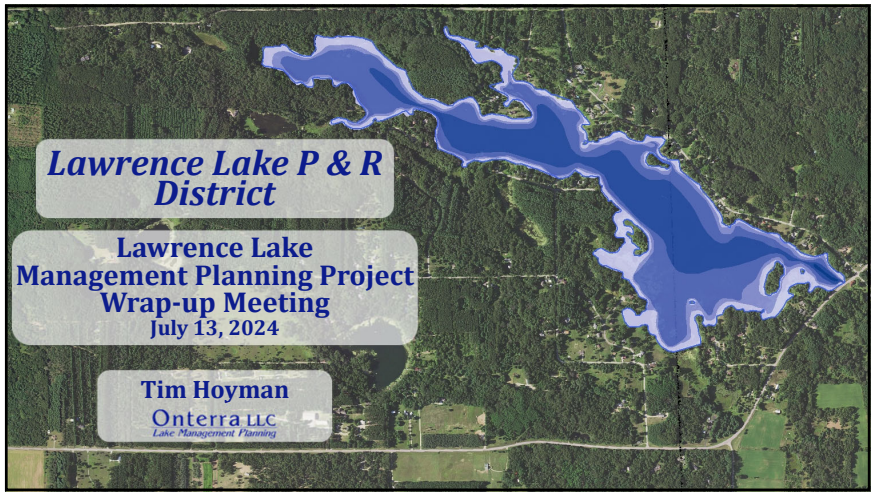


Onterra LLC
Lake Management Planning

Thank You

Onterra LLC
Lake Management Planning

Onterra LLC
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

Onterra LLC
Lake Management Planning

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 is responsible for the lake's water quality.

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

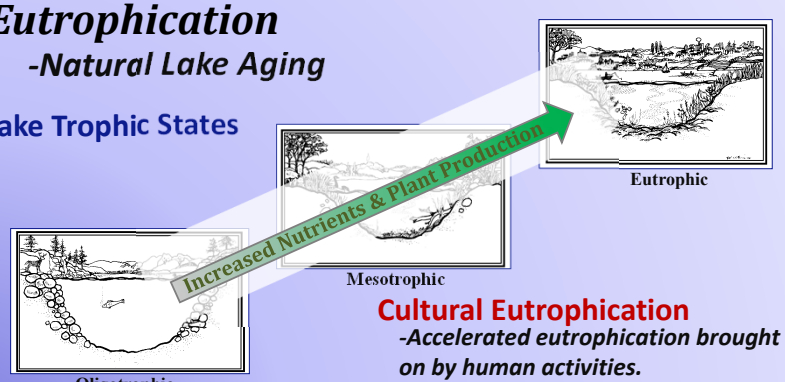
Native and non-native plants combined impact some recreational opportunities in areas of Lawrence Lake.

Not enough data to understand trends in aquatic plant populations.

Onterra LLC
Lake Management Planning

Eutrophication
-Natural Lake Aging

Lake Trophic States



Cultural Eutrophication

-Accelerated eutrophication brought on by human activities.

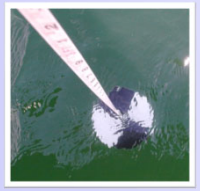
-Flowages experience this from the day they are created.

Onterra LLC Lake Management Planning

Lake Water Quality – Trophic Parameters

Phosphorus
Naturally occurring & essential for all life
Regulates phytoplankton biomass in **most** WI lakes
Most often 'limiting plant nutrient' (shortest supply) **N:P = 92:1**
Human activity often increases P delivery to lakes

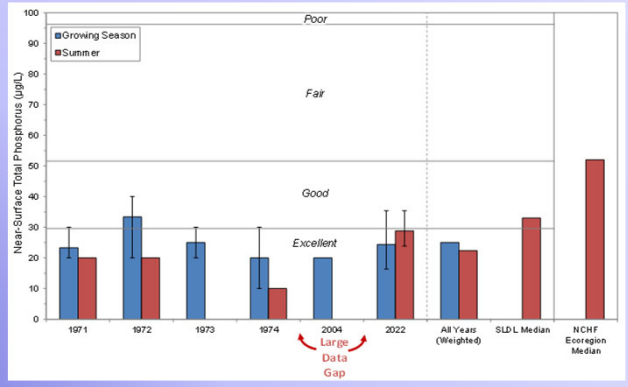
Chlorophyll-*a*
Pigment used in photosynthesis
Used as surrogate for phytoplankton biomass



Secchi Disk Transparency
Measure of water clarity
Measured using a Secchi disk

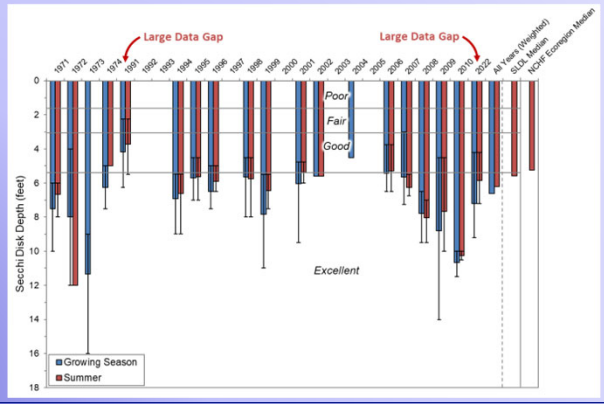
Onterra LLC Lake Management Planning

Lawrence Lake Water Quality - Phosphorus



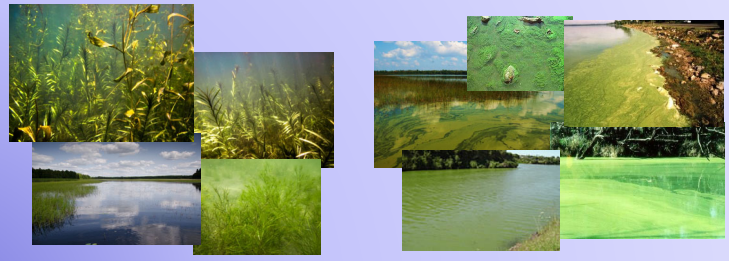
Onterra LLC Lake Management Planning

Lawrence Lake Water Quality – Clarity



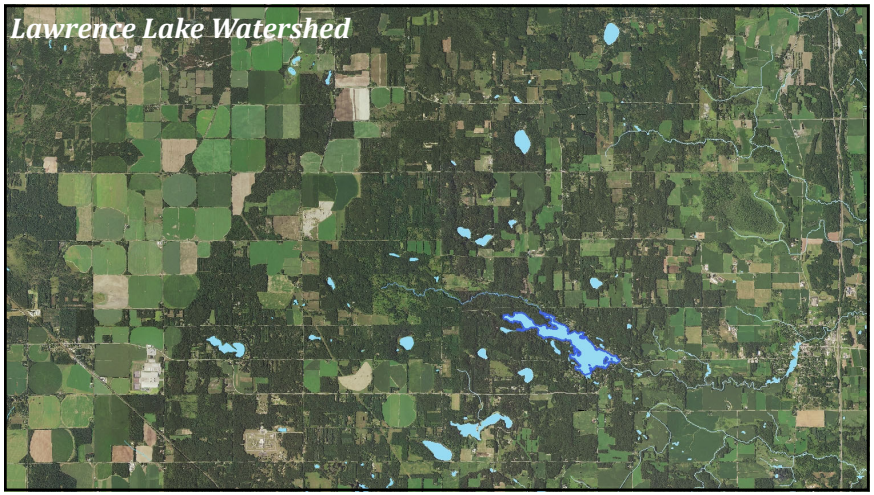
Onterra LLC Lake Management Planning

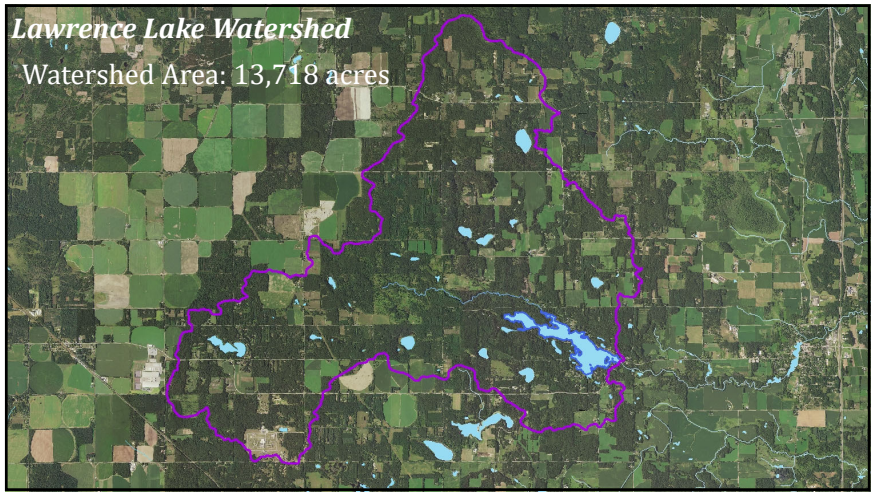
Shallow Lakes are Special

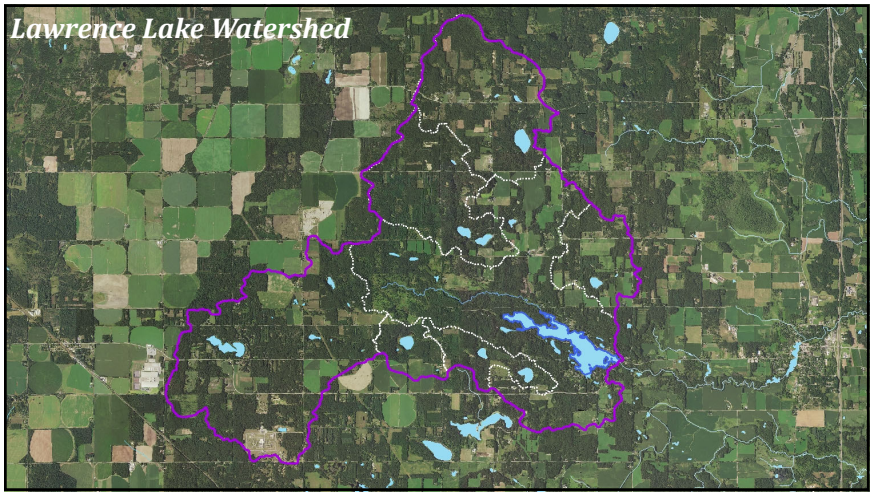


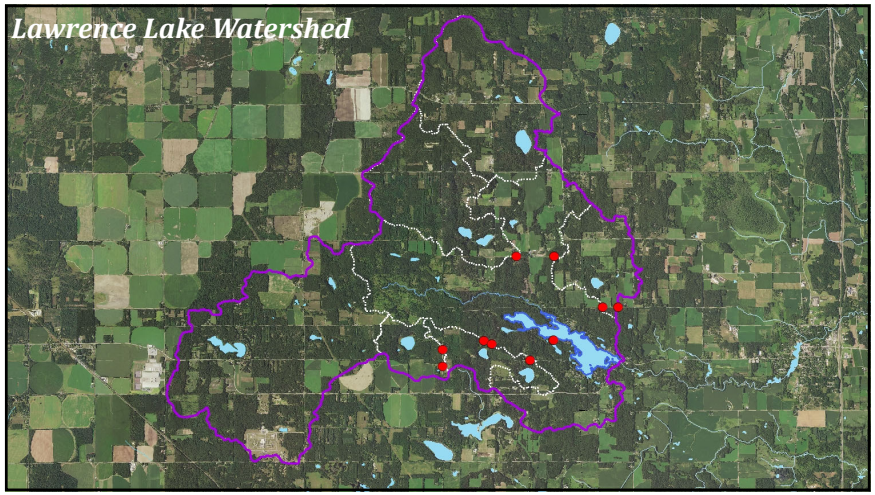
Aquatic Plants are Incredibly Important

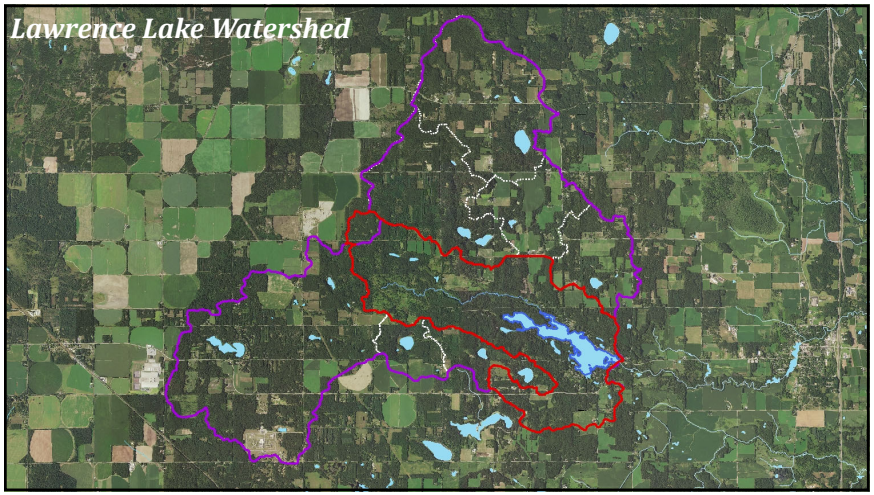
Onterra LLC
Lake Management Planning

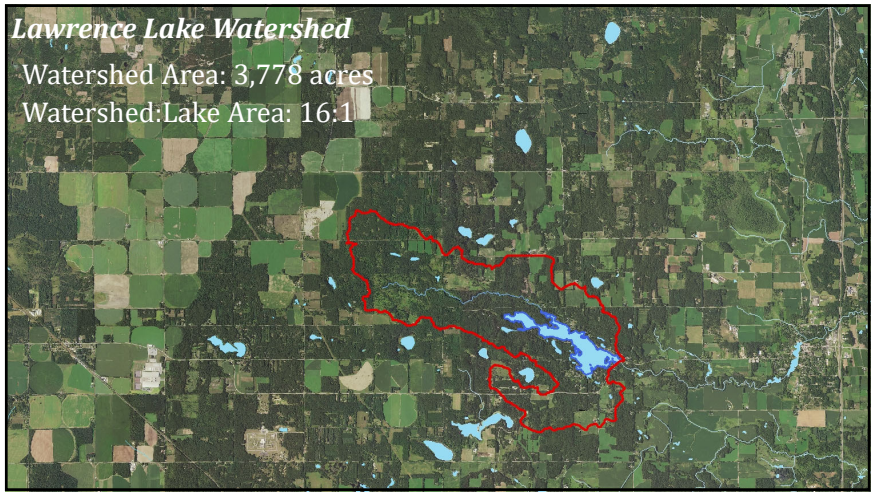


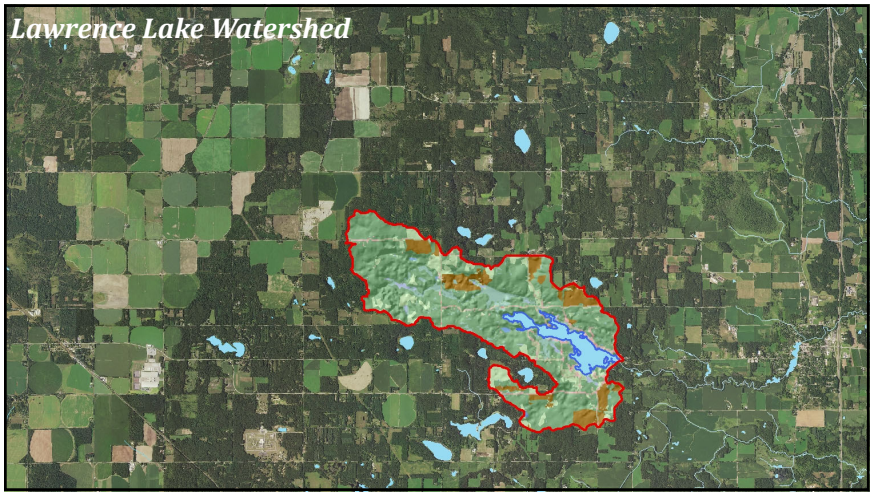


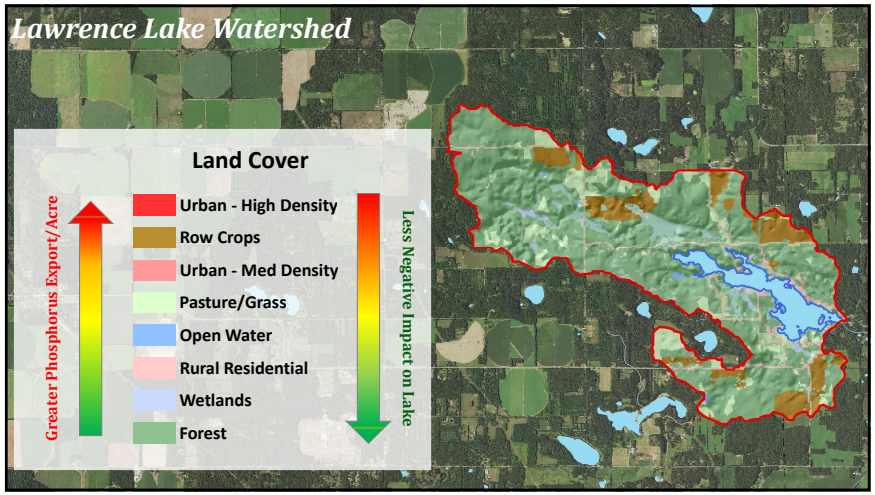


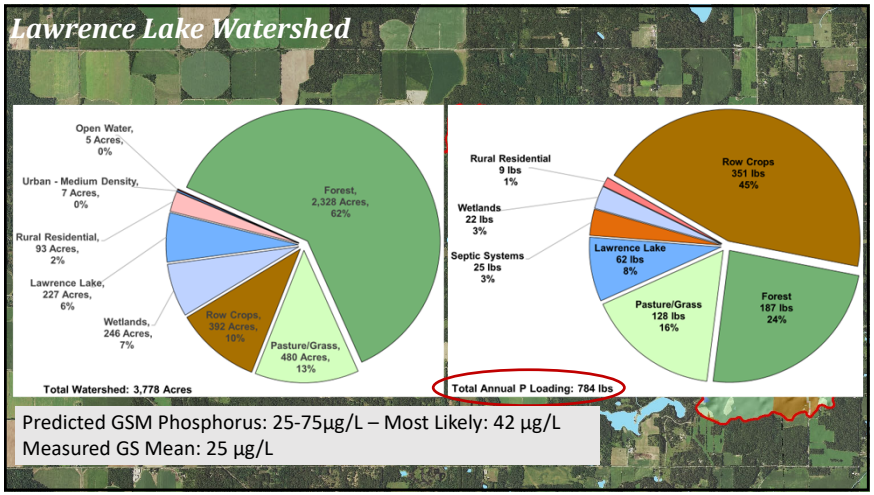

Lawrence Lake Watershed


Lawrence Lake Watershed


Lawrence Lake Watershed
Watershed Area: 3,778 acres
Watershed:Lake Area: 16:1


Lawrence Lake Watershed





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)

Onterra LLC
Lake Management Planning

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	WI State Status	Coefficient of Conservatism	2022 (Onterra)
Emergent	*Carex comosa*	Bristly sedge	Native	5	I
	Eleocharis erythropoda	Bald spikerush	Native	3	I
	Iris versicolor	Northern blue flag	Native	5	I
	Juncus effusus	Soft rush	Native	4	I
	Miscanthus spp.	Silvergrass	Non-Native - Invasive	N/A	I
	Nasturtium officinale	Watercress	Non-Native - Invasive	N/A	I
	Sagittaria latifolia	Common arrowhead	Native	3	I
	Schoenoplectus acutus	Hardstem bulrush	Native	5	I
	Schoenoplectus tabernaemontani	Softstem bulrush	Native	4	X
	Scirpus cyperinus	Wool grass	Native	4	I
	Typha latifolia	Broad-leaved cattail	Native	1	I
FL	*Nuphar variegata*	Spatterdock	Native	6	I
	Nymphaea odorata	White water lily	Native	6	X
	Persicaria amphibia	Water smartweed	Native	5	I
Submergent	*Ceratophyllum demersum*	Coontail	Native	3	X
	Chara spp.	Muskgrasses	Native	7	X
	Elodea canadensis	Common waterweed	Native	3	X
	Heteranthera dubia	Water stargrass	Native	6	X
	Myriophyllum sibiricum	Northern watermilfoil	Native	7	X
	Myriophyllum spicatum	Eurasian watermilfoil	Non-Native - Invasive	N/A	X
	Najas flexilis	Slender naiad	Native	6	X
	Najas guadalupensis	Southern naiad	Native	7	X
	Potamogeton crispus	Curly-leaf pondweed	Non-Native - Invasive	N/A	X
	Potamogeton foliosus	Leafy pondweed	Native	6	X
	Potamogeton friesii	Fries' pondweed	Native	8	X
	Potamogeton illinoensis	Illinois pondweed	Native	6	X
	Potamogeton natans	Floating-leaf pondweed	Native	5	I
	Potamogeton obtusifolius	Blunt-leaved pondweed	Native	9	X
	Potamogeton praelongus	White-stem pondweed	Native	8	I
	Potamogeton pusillus	Small pondweed	Native	7	X
	Potamogeton richardsonii	Clasping-leaf pondweed	Native	5	X
	Potamogeton zosteriformis	Flat-stem pondweed	Native	6	X
	Ranunculus aquatilis	White water crowfoot	Native	8	X
	Stuckenia pectinata	Sago pondweed	Native	3	X
	Utricularia vulgaris	Common bladderwort	Native	7	X
	Vallisneria americana	Wild celery	Native	6	X
	Zannichellia palustris	Horned pondweed	Native	7	X
FF	*Lemna minor*	Lesser duckweed	Native	5	X
	Lemna trisulca	Forked duckweed	Native	6	X
	Spirodela polyrhiza	Greater duckweed	Native	5	X

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

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

Lawrence Lake
42-meter resolution
512 total points

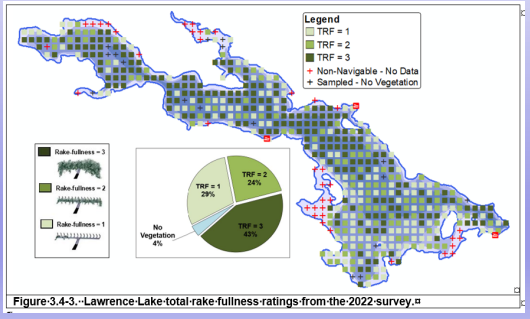
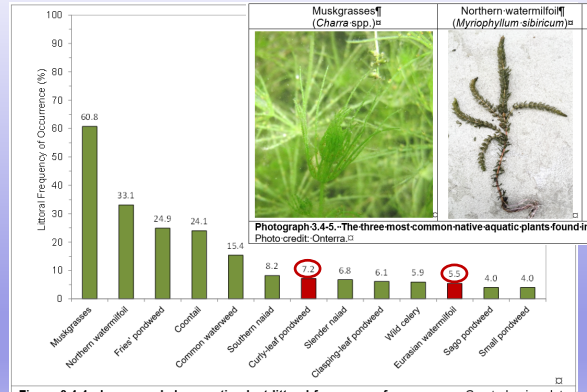
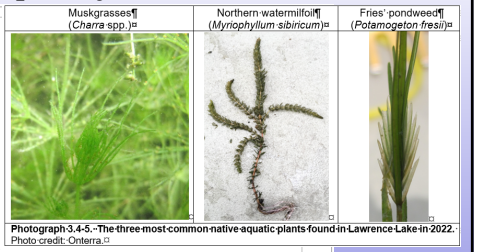


Figure 3.4-3. Lawrence Lake total rake fullness ratings from the 2022 survey.

2022 Littoral Frequency of Occurrence





Photograph 3.4-5. The three most common native aquatic plants found in Lawrence Lake in 2022. Photo credit: Onterra.

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

Floristic Quality Analysis

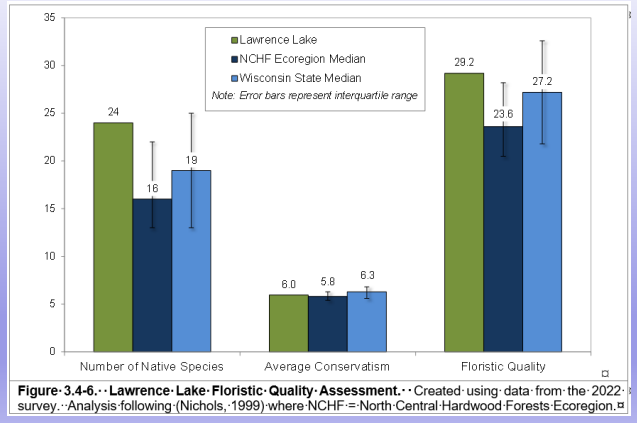
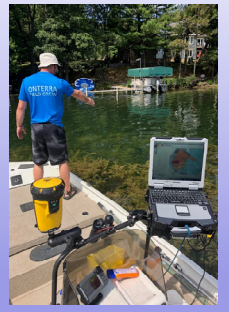


Figure 3.4-6. Lawrence Lake Floristic Quality Assessment. Created using data from the 2022 survey. Analysis following (Nichols, 1999) where NCHF = North Central Hardwood Forests Ecoregion.

Professional AIS Mapping

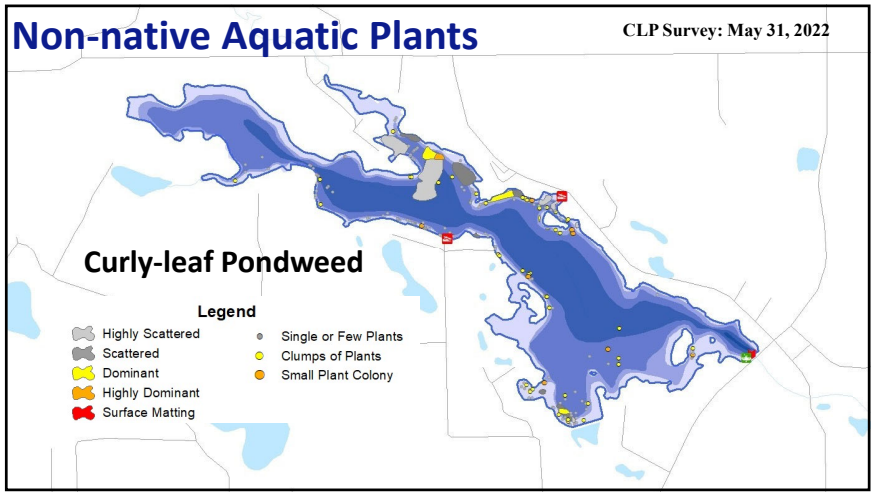
Point-Based Mapping

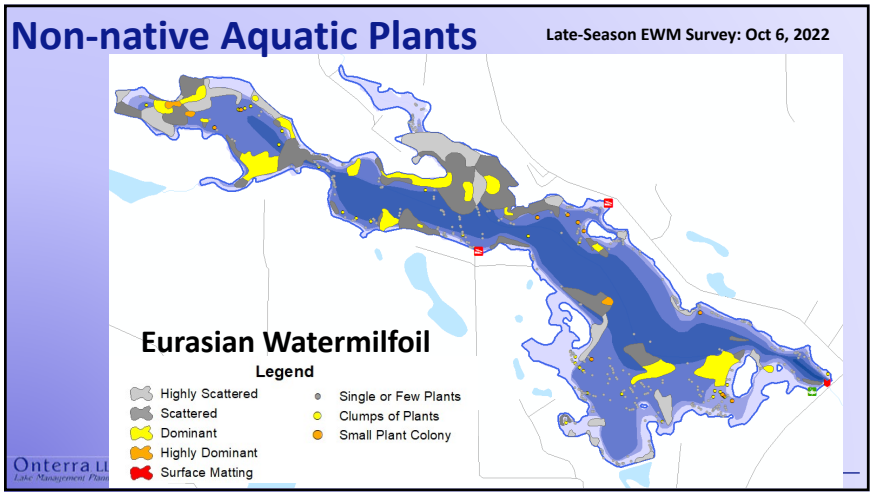
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony

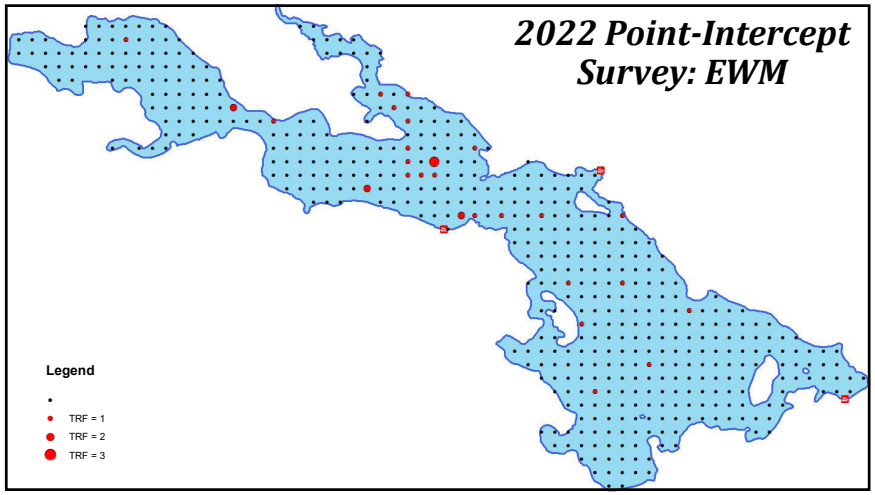


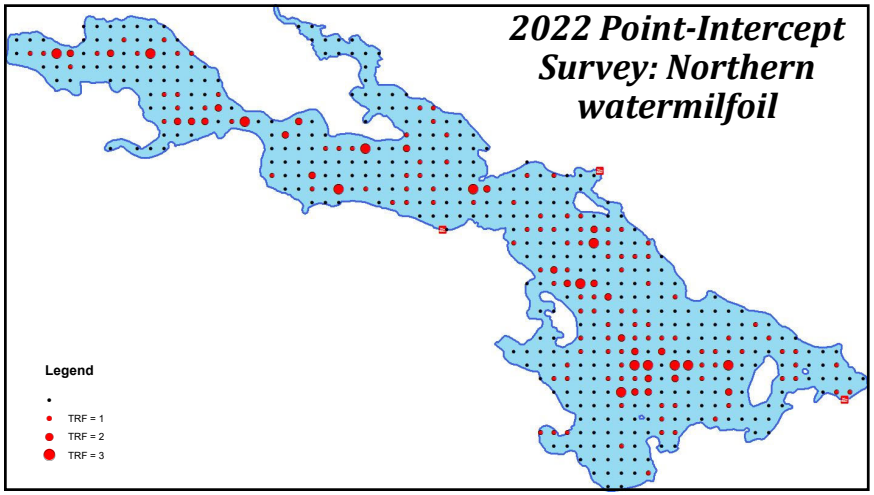
Polygon-Based Mapping

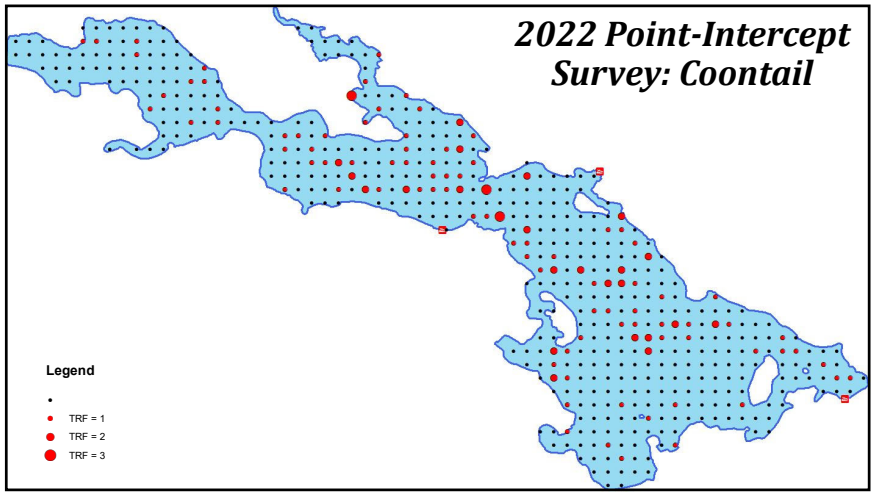
- Highly Scattered
- Scattered
- Dominant
- Highly Dominant
- Surface Matting

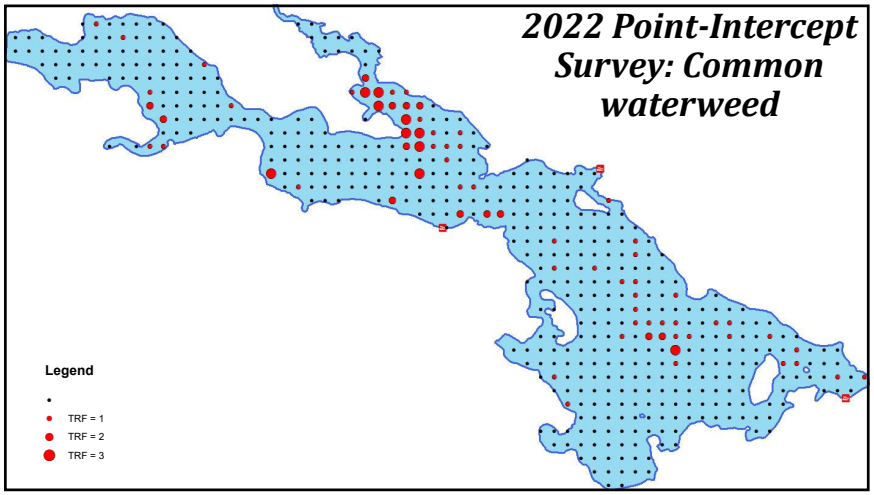

Non-native Aquatic Plants
CLP Survey: May 31, 2022
Curly-leaf Pondweed
Legend
Highly Scattered
Scattered
Dominant
Highly Dominant
Surface Matting
Single or Few Plants
Clumps of Plants
Small Plant Colony

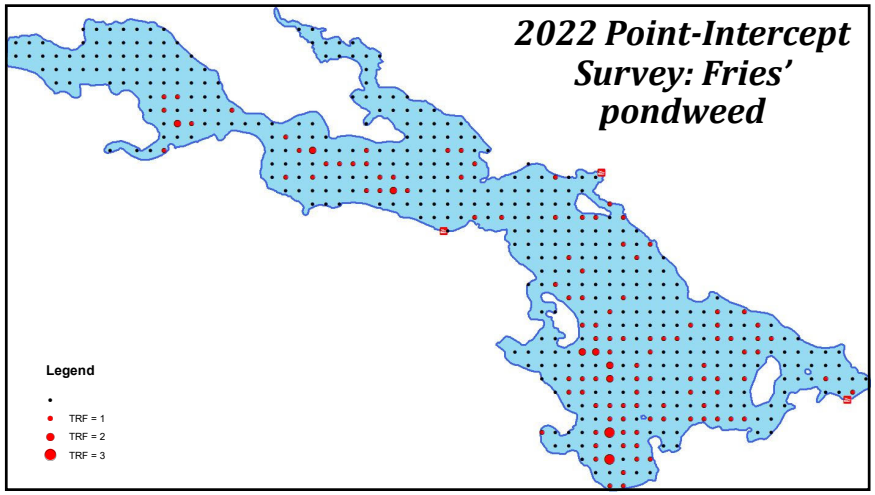

Non-native Aquatic Plants
Late-Season EWM Survey: Oct 6, 2022
Eurasian Watermilfoil
Legend
Highly Scattered
Scattered
Dominant
Highly Dominant
Surface Matting
Single or Few Plants
Clumps of Plants
Small Plant Colony

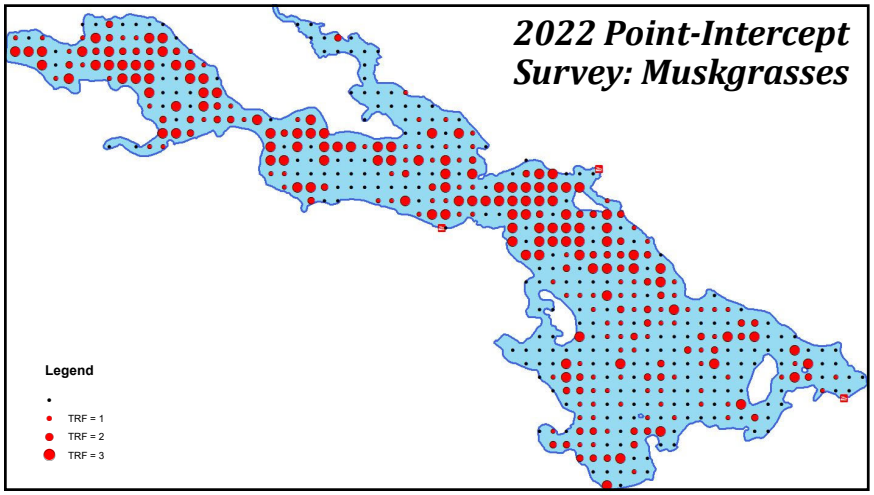

2022 Point-Intercept Survey: EWM
Legend
TRF = 1
TRF = 2
TRF = 3


2022 Point-Intercept Survey: Northern watermilfoil
Legend
TRF = 1
TRF = 2
TRF = 3


2022 Point-Intercept Survey: Coontail
Legend
TRF = 1
TRF = 2
TRF = 3

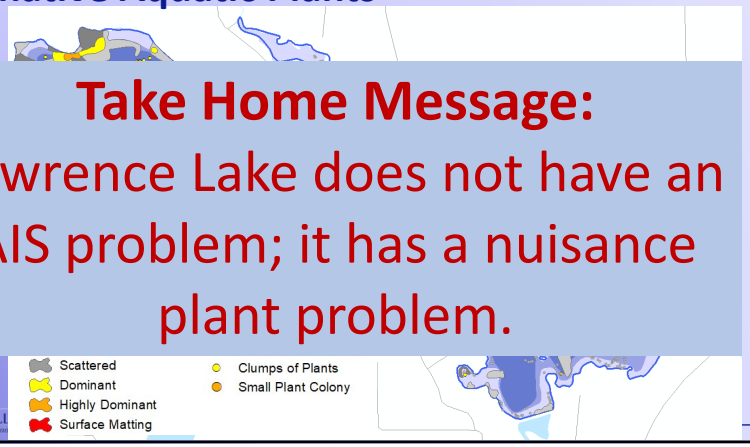

2022 Point-Intercept Survey: Common waterweed
Legend
TRF = 1
TRF = 2
TRF = 3


2022 Point-Intercept Survey: Fries' pondweed
Legend
TRF = 1
TRF = 2
TRF = 3


2022 Point-Intercept Survey: Muskgrasses
Legend
TRF = 1
TRF = 2
TRF = 3

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.

Onterra LLC Lake Management Planning

Management Goal:

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

Management Actions

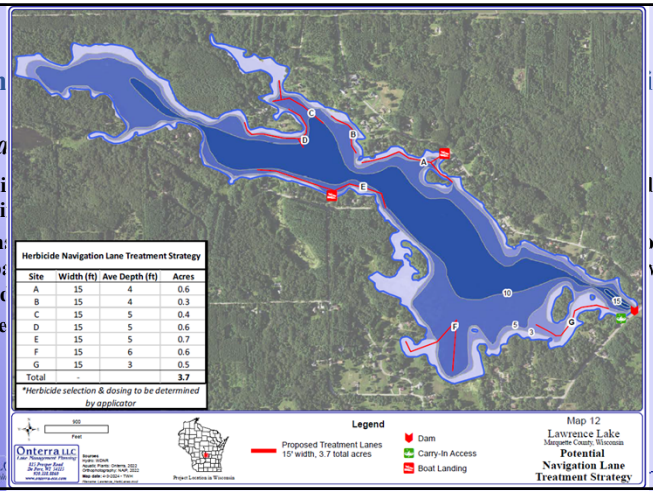
1. **Continue to maintain and update District Website.**
2. **Utilize social media and email to provide timely and relevant information to LLPRD members.**
3. **Continue to publish electronic newsletter, Larry Lake Newsletter.**
4. **Participate in annual Wisconsin Lakes & Rivers Convention.**

Onterra LLC Lake Management Planning

Main ies on

Ma

1. Utili fishi
2. Con imp the
3. Dete wn to



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:

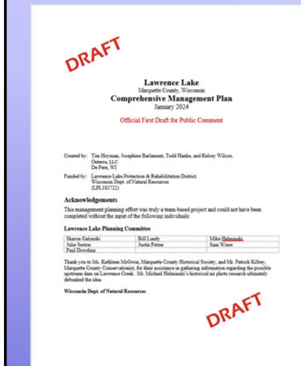
Protect and Maintain Lawrence Lake Fishery

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.

Onterra LLC
Lake Management Planning

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

Onterra LLC
Lake Management Planning

Thank You

Onterra, LLC
Lake Management Planning

Onterra LLC
Lake Management Planning

B

APPENDIX B

Stakeholder Survey Response Charts and Comments

Lawrence Lake - Anonymous Stakeholder Survey

Surveys Distributed: *235*
Surveys Returned: *71*
Response Rate: *30%*

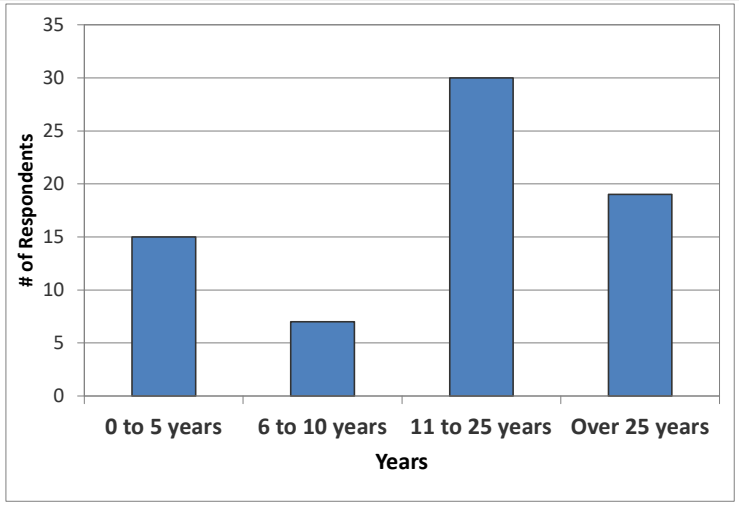
Lawrence Lake Property

1. Is your property on the lake or off the lake? If you own more than one property, please refer to the property you have owned the longest.

Answer Options	Response Percent	Response Count
On the lake	72%	51
Off the lake	28%	20
answered question		71
skipped question		0

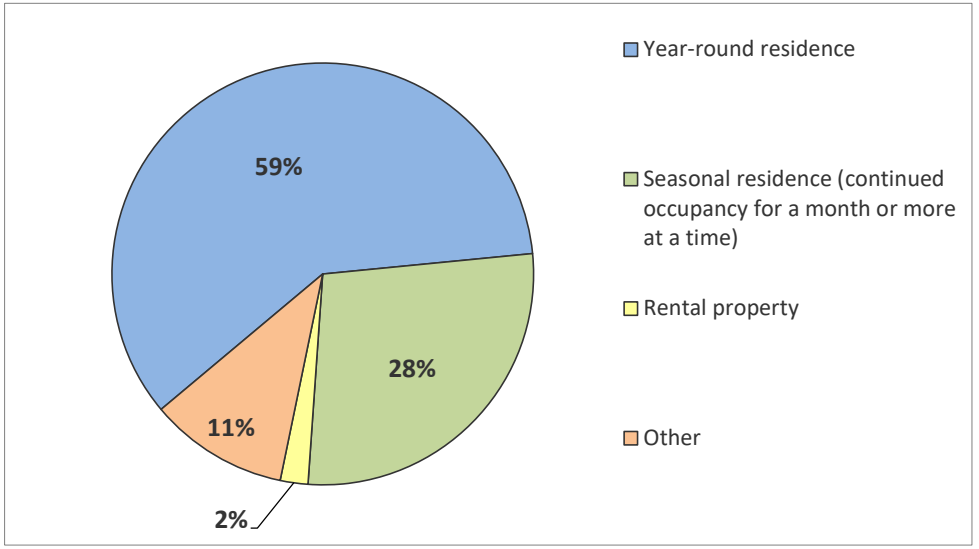
2. How many years have you owned your property on or near Lawrence Lake?

Answer Options	Answer Options	Response Percent	Response Count
0 to 5 years		21%	15
6 to 10		10%	7
11 to 25		42%	30
Over 25		27%	19
	answered question		71
	skipped question		0



3. How is your property on or near Lawrence Lake used?

Answer Options	Response Percent	Response Count
Year-round residence	39%	28
Seasonal	18%	13
Weekend,	38%	27
Rental	1%	1
Resort	3%	2
Other	7%	5
answered question		71
skipped question		0

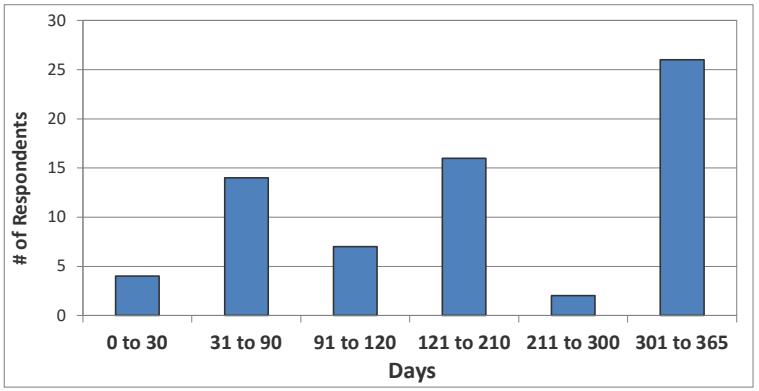


Number	"Other" responses
1	Approx 35% year
2	Having a second property very close to Lawrence Lake, we often stay for extended periods there and visit the lake daily to kayak or boat.
3	currently unoccupied but I hope to build a house there soon
4	Recreation
5	This does not matter

4. Considering the past three years, how many days each year is your property used by you or others?

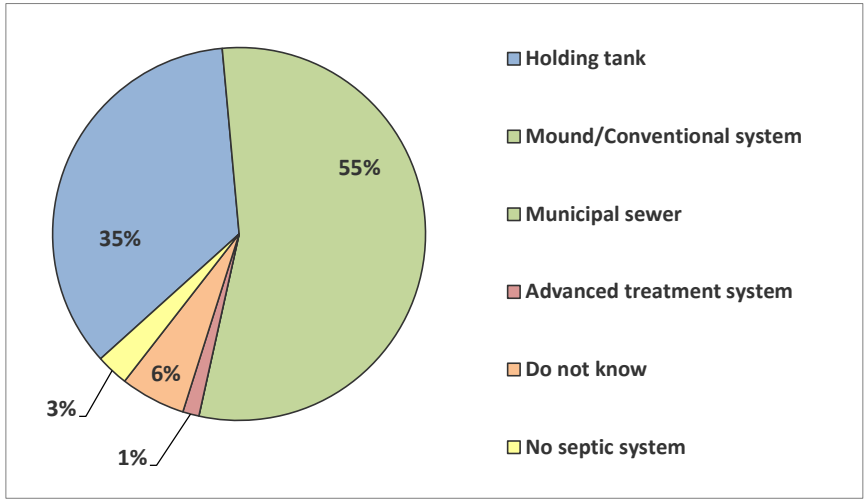
	Response Count
answered question	69
skipped question	2

Category (# of days)	Responses	%
0 to 30	4	6%
31 to 90	14	20%
91 to 120	7	10%
121 to 210	16	23%
211 to 300	2	3%
301 to 365	26	38%



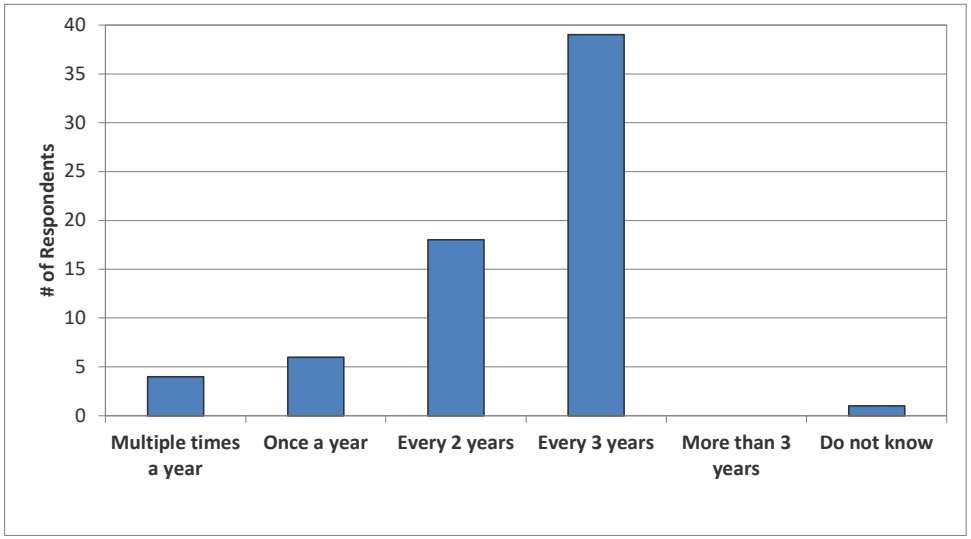
5. What type of septic system does your property have?

Answer Options	Response Percent	Response Count
Holding tank	35%	25
Mound/Conventional system	55%	39
Municipal sewer	0%	0
Advanced treatment system	1%	1
Do not know	6%	4
No septic system	3%	2
answered question		71
skipped question		0



6. How often is the septic system on your property pumped or inspected?

Answer Options	Response Percent	Response Count
Multiple times a year	6%	4
Once a year	9%	6
Every 2 years	26%	18
Every 3 years	57%	39
More than 3 years	0%	0
Do not know	1%	1
answered question		68
skipped question		3

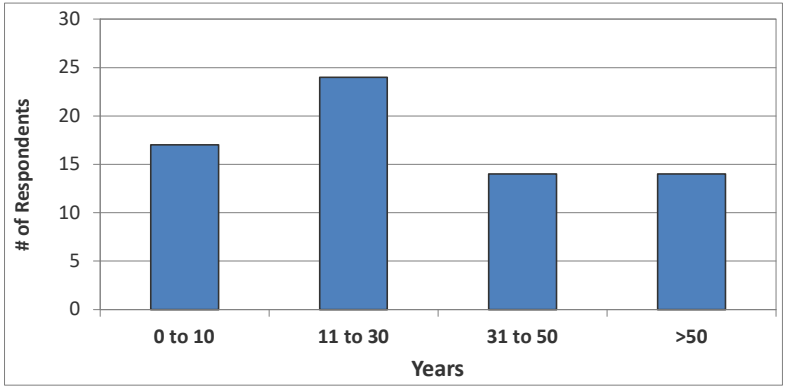


Recreational Activity on Lawrence Lake

7. How many years ago did you first visit Lawrence Lake?

Answer Options	Response Count
answered question	69
skipped question	2

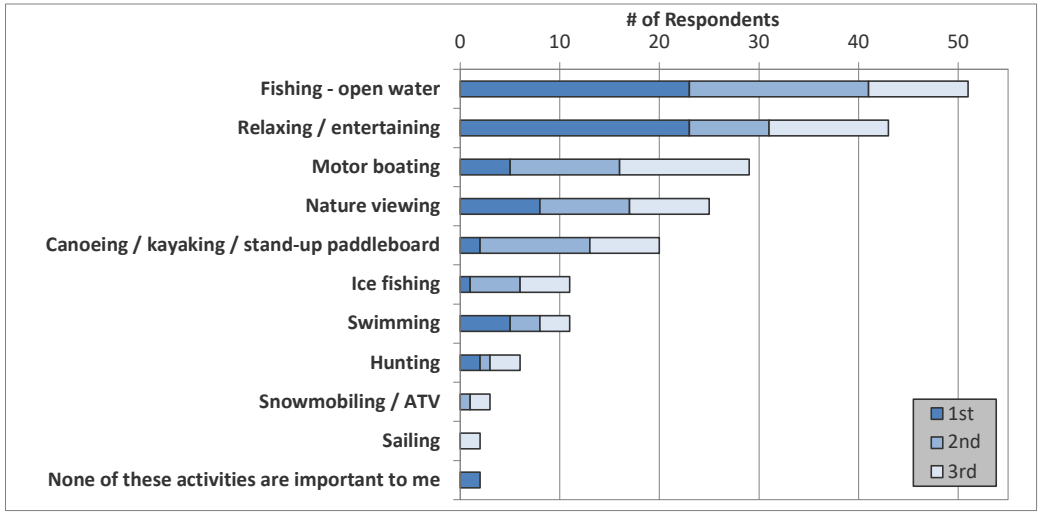
Category (# of years)	Response Percent	Response Count
0 to 10	25%	17
11 to 30	35%	24
31 to 50	20%	14
>50	20%	14



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.

Answer Options	1st	2nd	3rd	Rating	Response
Fishing - open water	23	18	10	1.75	51
Relaxing / entertaining	23	8	12	1.74	43
Motor boating	5	11	13	2.28	29
Nature viewing	8	9	8	2	25
Canoeing / kayaking / stand-up paddleboard	2	11	7	2.25	20
Ice fishing	1	5	5	2.36	11
Swimming	5	3	3	1.82	11
Hunting	2	1	3	2.17	6
Snowmobiling / ATV	0	1	2	2.67	3
Sailing	0	0	2	3	2
None of these activities are important to me	2	0	0	1	2
Other					2
			answered question		**71**
			skipped question		**0**

Number	"Other" responses
1	I have owned a parcel since I was in high school and bought
2	Also bird watching



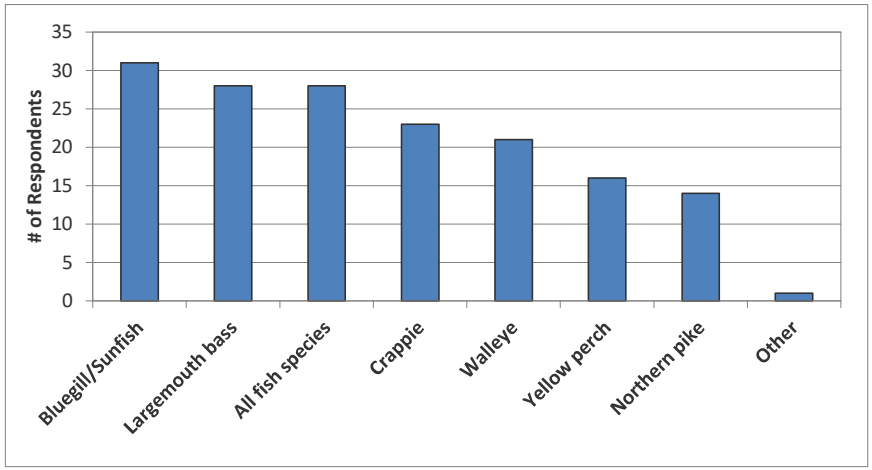
9. Have you personally fished on Lawrence Lake in the past three years?

Answer Options	Response	Response
Yes	86.8%	59
No	13.2%	9
answered question		68
skipped question		3

10. What species of fish do you try to catch on Lawrence Lake?

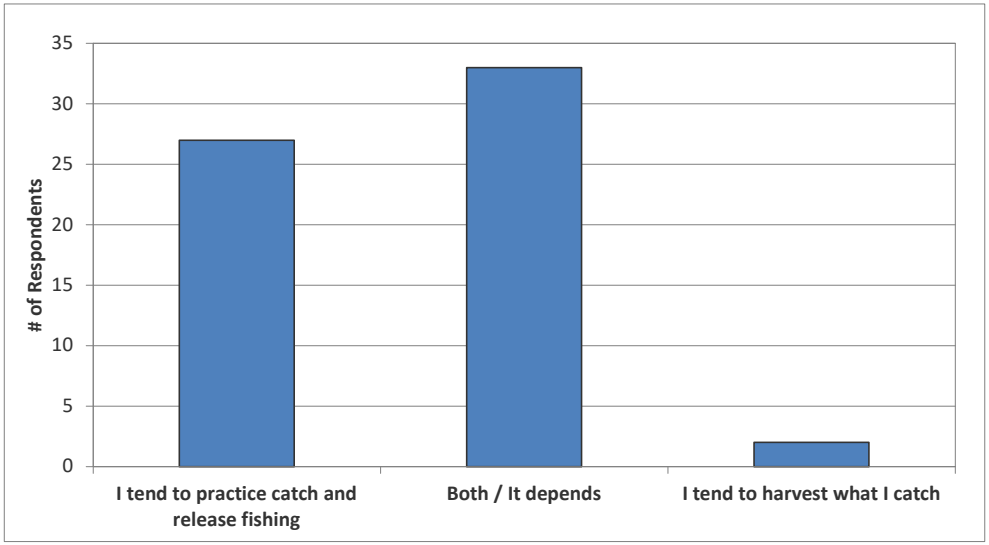
Answer Options	Response	Response
Bluegill/Sunfish	50.0%	31
Largemouth bass	45.2%	28
All fish species	45.2%	28
Crappie	37.1%	23
Walleye	33.9%	21
Yellow perch	25.8%	16
Northern pike	22.6%	14
Other	1.6%	1
answered question		62
skipped question		9

Number	"Other" responses
1	Carp



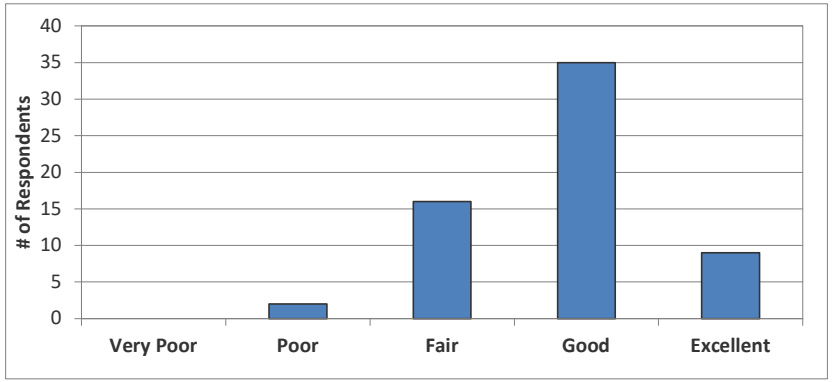
11. When fishing Lawrence Lake do you tend to practice catch and release, harvest your catch, or both?

Answer Options	Response Count
I tend to practice catch and release fishing	27
Both / It depends	33
I tend to harvest what I catch	2
answered question	**62**
skipped question	**9**



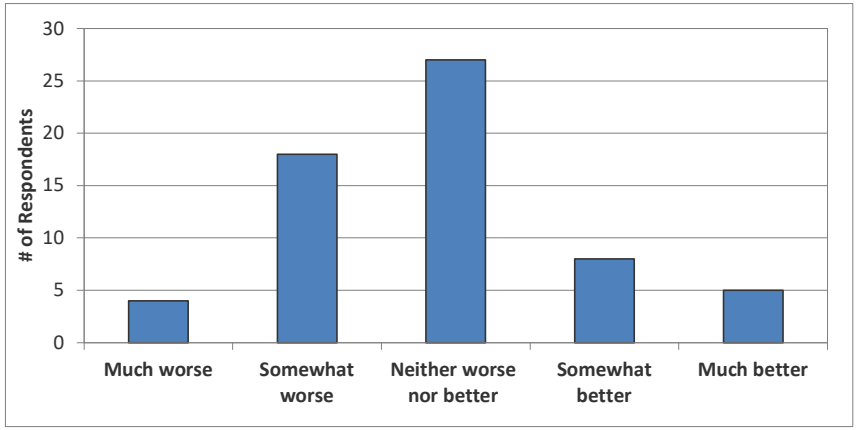
12. How would you describe the current quality of fishing on Lawrence Lake?

Answer Options	Very Poor	Poor	Fair	Good	Excellent	Response Count
	0	2	16	35	9	62
					answered question	**62**
					skipped question	**9**



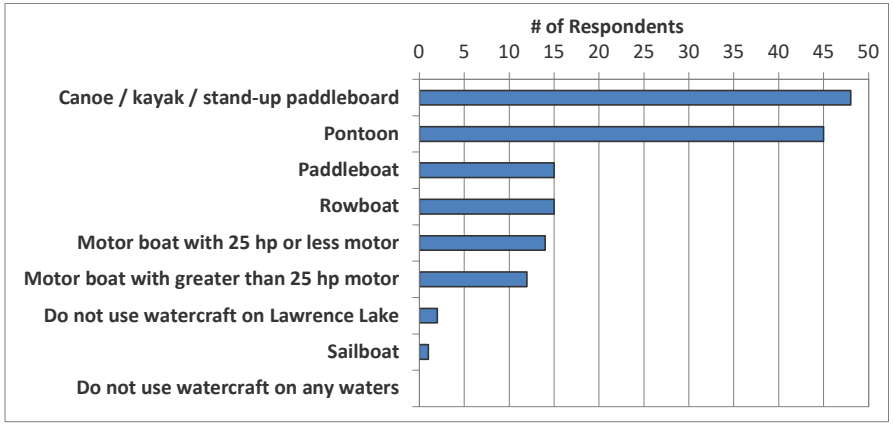
13. How would you describe the current quality of fishing on Lawrence Lake?

Answer Options	Much worse	Somewhat worse	Neither worse nor better	Somewhat better	Much better	Response Count
	4	18	27	8	5	62
					answered question	**62**
					skipped question	**9**



14. What types of watercraft do you currently use on Lawrence Lake?

Answer Options	Response Percent	Response Count
Canoe / kayak / stand-up paddleboard	68%	48
Pontoon	63%	45
Paddleboat	21%	15
Rowboat	21%	15
Motor boat with 25 hp or less motor	20%	14
Motor boat with greater than 25 hp motor	17%	12
Do not use watercraft on Lawrence Lake	3%	2
Sailboat	1%	1
Do not use watercraft on any waters	0%	0
answered question		**71**
skipped question		**0**



15. Do you use your watercraft on waters other than Lawrence Lake?

Answer Options	Response Percent	Response Count
Yes	24%	17
No	76%	54
answered question		71
skipped question		0

16. What is your typical cleaning routine after using your watercraft on waters other than Lawrence Lake?

Answer Options	Response	Response
Remove aquatic hitch-hikers (ex. - plant material, clams, mussels)	76%	13
Drain bilge	41%	7
Rinse boat	41%	7
Power wash boat	24%	4
Apply bleach	0%	0
Air dry boat for 5 or more days	47%	8
Do not clean boat	0%	0
Other	0%	0
answered question		17
skipped question		54

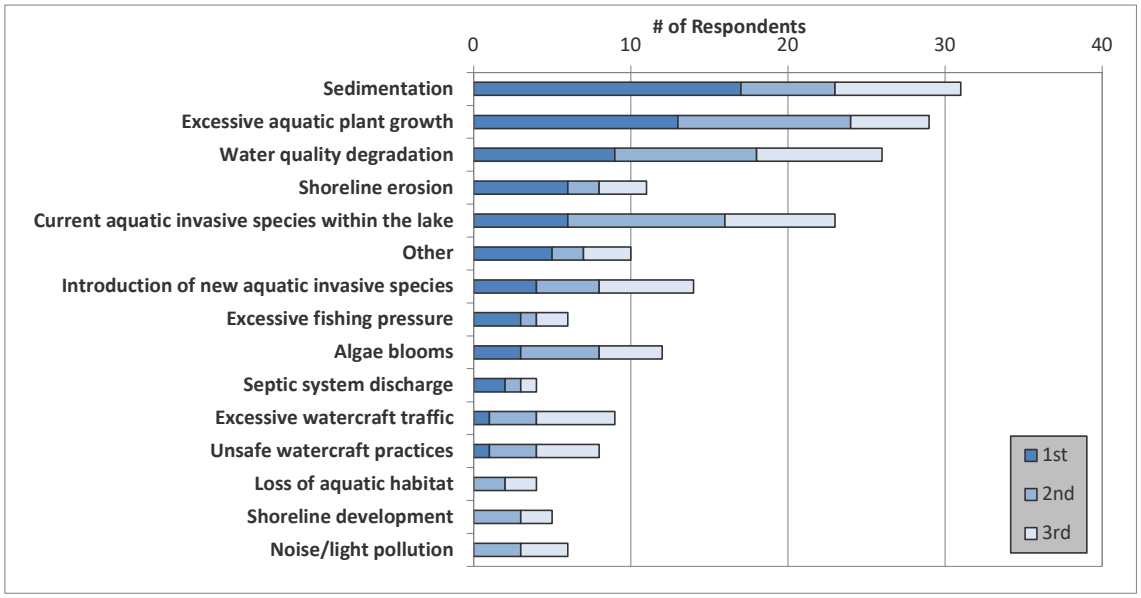
Lawrence Lake Current and Historic Condition, Health and Management

17. From the list below, please rank your top three concerns regarding Lawrence Lake, with 1 being your greatest concern.

Answer Options	1st	2nd	3rd	Response
Sedimentation	17	6	8	26
Excessive aquatic plant growth	13	11	5	4
Water quality degradation	9	9	8	11
Shoreline erosion	6	2	3	5
Current aquatic invasive species within the lake	6	10	7	14
Other	5	2	3	23
Introduction of new aquatic invasive species	4	4	6	9
Excessive fishing pressure	3	1	2	31
Algae blooms	3	5	4	8
Septic system discharge	2	1	1	6
Excessive watercraft traffic	1	3	5	29
Unsafe watercraft practices	1	3	4	12
Loss of aquatic habitat	0	2	2	4
Shoreline development	0	3	2	6
Noise/light pollution	0	3	3	10
		answered question		**70**
		skipped question		**1**

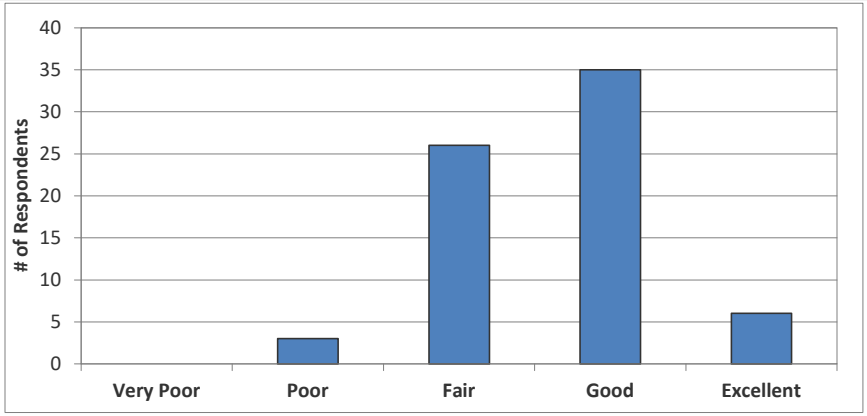
Continued on next page…

Number	"Other" responses
1	Run off of fertilizer from lake hose lawns
2	i checked "unsafe water practices" but decided to fill this in. There are too many inconsiderate people that don't know or respect the "no wake law". I wish there were lake patrols/monitors that would prosecute these people
3	My grandchildren contacted waterborne parasites and developed substantial rashes. Medication took care of it, but I'd like them to be able to swim without becoming infected.
4	guys speeding in their motor boats
5	noise/light is an issue but different category then lake care
6	Silt buildup in the inlet bay is terrible. Boats can't get in.
7	taxes
8	Geese population
9	Geese population
10	Non local opinions
11	unkept shorelines-tall grass-ugly from boating side
12	people wanting to change this great lake
13	4th would be fishing degradation
14	Seems to be more lake weeds each year
15	Blue and Green Algae
16	Water lilies choking boat movement. This is
17	around Island east side
18	Does anyone respect the no wake zones? That's most of the erosion on my shoreline.
19	shoreline erosion caused by speeding boats!



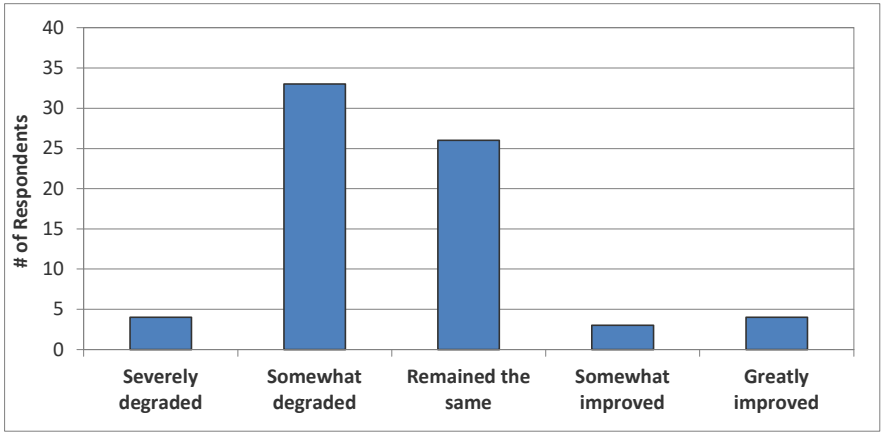
18. How would you describe the overall current water quality of Lawrence Lake?

Answer Options	Very Poor	Poor	Fair	Good	Excellent	Response Count	Weighted Average
	0	3	26	35	6	70	3.63
					answered question		70
					skipped question		1



19. How has the overall water quality changed in Lawrence Lake since you first visited the lake?

Answer Options	Severely degraded	Somewhat degraded	Remained the same	Somewhat improved	Greatly improved	Response Count
	4	33	26	3	4	70
					answered question	70
					skipped question	1



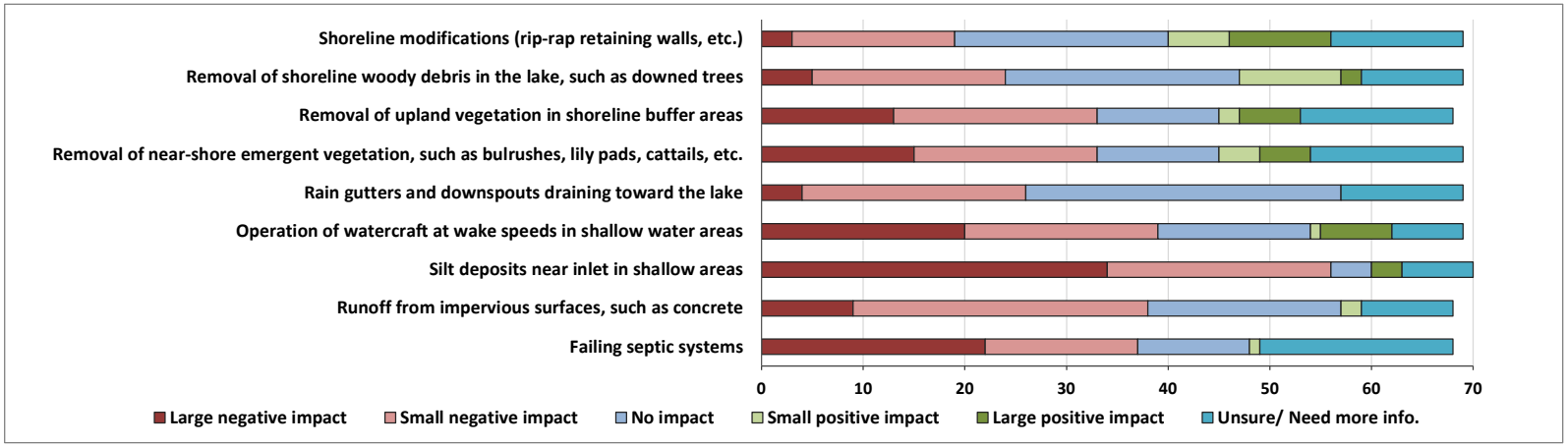
20. Which of the following would you say is the single most important aspect when considering water quality?

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**

Number	"Other" responses
1	I've been fishing the lake since the 50's and we never had a problem with scum or surface vegetation(?). Now when I fly-fish it I have to clean my line every 10-15 minutes! And when we have a hot spell, big black chunks of whatever comes floating to the surface. Its discusting
2	Silt and weeds out of control
3	Goose waste
4	Losing water depth due to sediment. we are Losing spawning sights due to all the sediment

21. Using the following scale, what impact, if any, do you believe each of the following practices have on the water quality of Lawrence Lake?

Answer Options	Large negative impact	Small negative impact	No impact	Small positive impact	Large positive impact	Unsure/ Need more info.	Weighted Average	Response Count
Failing septic systems	22	15	11	1	0	19	1.31	68
Runoff from impervious surfaces, such as concrete	9	29	19	2	0	9	1.94	68
Silt deposits near inlet in shallow areas	34	22	4	0	3	7	1.50	70
Operation of watercraft at wake speeds in shallow water areas	20	19	15	1	7	7	2.06	69
Rain gutters and downspouts draining toward the lake	4	22	31	0	0	12	2.04	69
Removal of near-shore emergent vegetation, such as bulrushes, lily	15	18	12	4	5	15	1.86	69
Removal of upland vegetation in shoreline buffer areas	13	20	12	2	6	15	1.87	68
Removal of shoreline woody debris in the lake, such as downed trees	5	19	23	10	2	10	2.35	69
Shoreline modifications (rip-rap retaining walls, etc.)	3	16	21	6	10	13	2.49	69
							answered question	70
							skipped question	1



22. Before reading the statement above, had you ever heard of

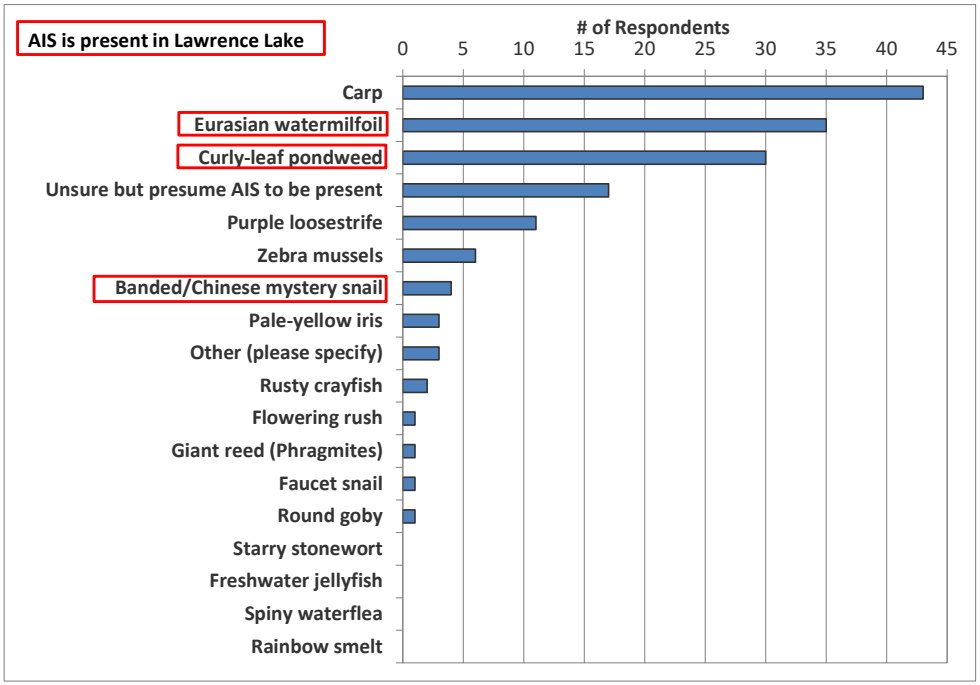
Answer Options	Response Percent	Response Count
Yes	100%	70
No	0%	0
	answered question	70
	skipped question	1

23. Do you believe aquatic invasive species are present within Lawrence Lake?

Answer Options	Response Percent	Response Count
Yes	87%	60
I think so but am not certain	0%	0
No	13%	9
	answered question	69
	skipped question	2

24. Which aquatic invasive species do you believe are present in or immediately around Lawrence Lake?

Answer Options	Response	Response
Carp	72%	43
Eurasian watermilfoil	58%	35
Curly-leaf pondweed	50%	30
Unsure but presume AIS to be present	28%	17
Purple loosestrife	18%	11
Zebra mussels	10%	6
Banded/Chinese mystery snail	7%	4
Pale-yellow iris	5%	3
Other (please specify)	5%	3
Rusty crayfish	3%	2
Flowering rush	2%	1
Giant reed (Phragmites)	2%	1
Faucet snail	2%	1
Round goby	2%	1
Starry stonewort	0%	0
Freshwater jellyfish	0%	0
Spiny waterflea	0%	0
Rainbow smelt	0%	0
answered question		60
skipped question		11



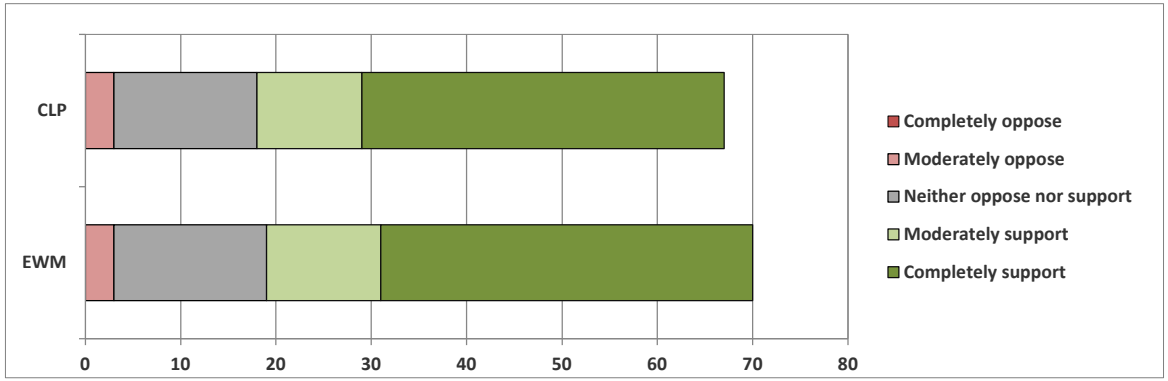
Number	"Other" responses
1	I'm not positive if the large snail population on the lake are Faucet Snails or another variety
2	We are confident there are invasive species but not sure of the proper names
3	I see some weird stuff

25. Before the present year, aquatic herbicides have been used to manage Eurasian watermilfoil (EWM) and curly-leaf pondweed (CLP) on Lawrence Lake. Professional monitoring of the aquatic plant community has also occurred during this time. Prior to reading this information, did you know that aquatic herbicides were being applied in Lawrence Lake to manage EWM and CLP?

Answer Options	EWM	CLP	Total
Yes	46	40	46
I think so but can't say for certain	9	9	11
No	13	13	14
		answered question	70
		skipped question	1

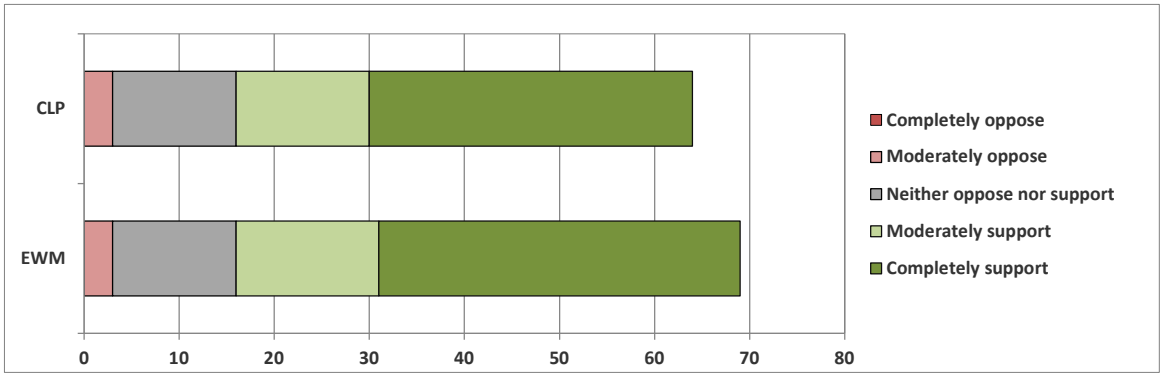
26. What is your level of support or opposition for the past use of aquatic herbicides to treat EWM and CLP in previous years?

Answer Options	Completely oppose	Moderately oppose	Neither oppose nor support	Moderately support	Completely support	Total	Weighted Average
EWM	0	3	16	12	39	70	4.24
CLP	0	3	15	11	38	67	4.25
					answered question		70
					skipped question		1



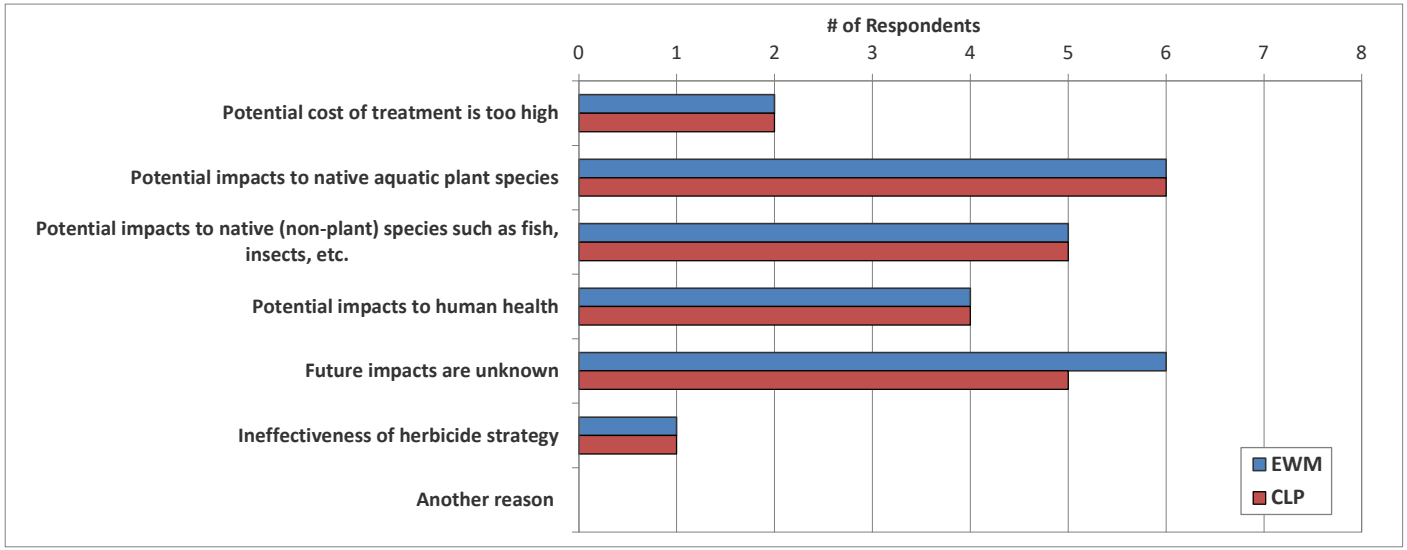
27. What is your level of support or opposition for future aquatic herbicide use to target EWM and CLP in Lawrence Lake?

Answer Options	Completely oppose	Moderately oppose	Neither oppose nor support	Moderately support	Completely support	Total	Weighted Average
EWM	0	3	13	15	38	69	4.28
CLP	0	3	13	14	34	64	4.23
					answered question		69
					skipped question		2



28. If you selected "Moderately oppose" or "Completely oppose" for Question #27, what is the reason or reasons you oppose the future use of aquatic herbicides to target EWM and CLP in Lawrence Lake?

Answer Options	EWM	CLP
Potential cost of treatment is too high	2	2
Potential impacts to native aquatic plant species	6	6
Potential impacts to native (non-plant) species such as fish, insects, etc.	5	5
Potential impacts to human health	4	4
Future impacts are unknown	6	5
Ineffectiveness of herbicide strategy	1	1
Another reason	0	0
answered question		**8**
skipped question		**63**

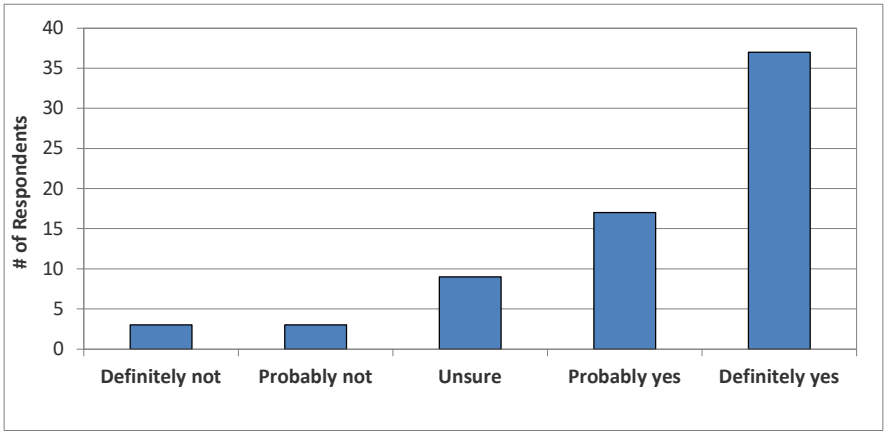


29. Before reading the above paragraph, had you ever heard of sedimentation?

Answer Options	Response Count
Yes	66
I think so but can't say for certain	3
No	0
answered question	**69**
skipped question	**2**

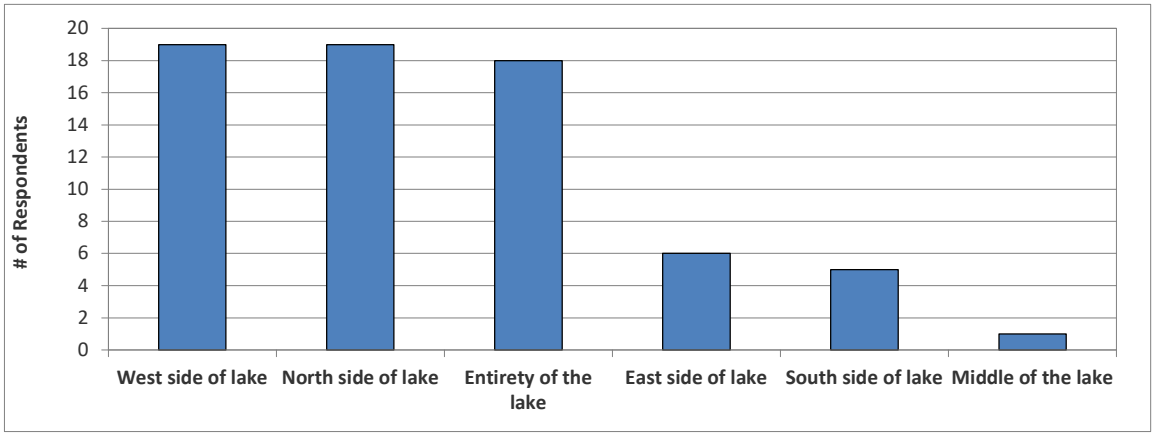
30. Do you believe sedimentation is an issue on Lawrence Lake?

	Definitely not	Probably not	Unsure	Probably yes	Definitely yes	Total	Weighted Average
Responses	3	3	9	17	37	69	4.19
						answered question	**69**
						skipped question	**2**



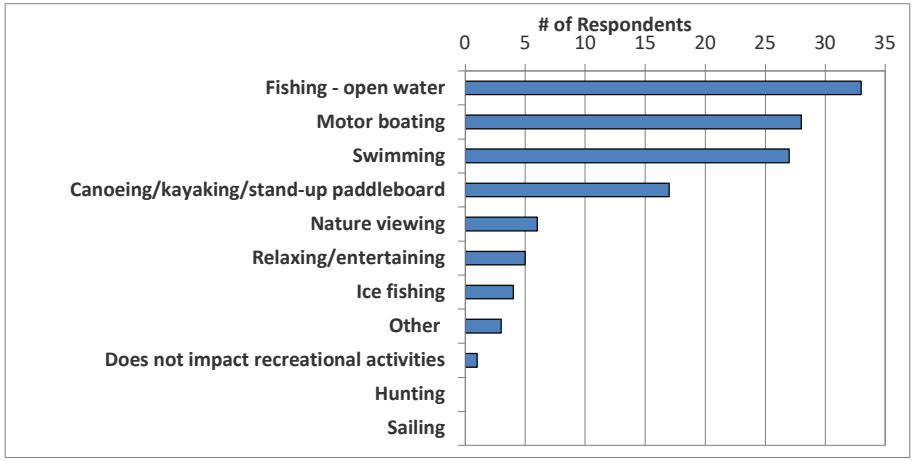
31. If you answered Probably yes or Definitely yes, where do you believe sedimentation to be an issue on Lawrence Lake?

Answer Options	Responses	
West side of lake	38%	19
North side of lake	38%	19
Entirety of the lake	36%	18
East side of lake	12%	6
South side of lake	10%	5
Middle of the lake	2%	1
answered question		**50**
skipped question		**21**



32. Which, if any, of your recreational activities on Lawrence Lake have been impacted by sedimentation?

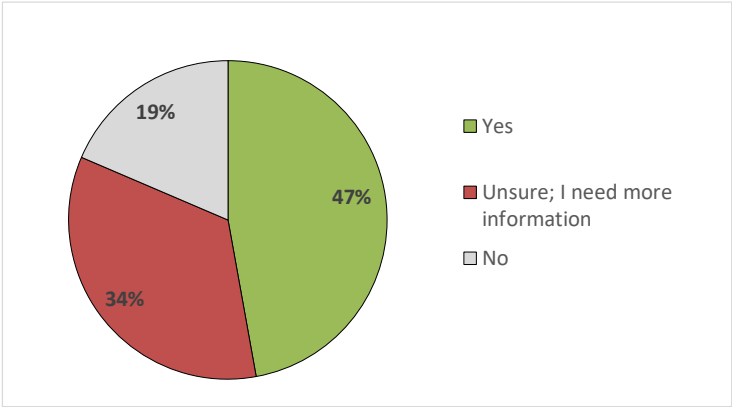
Answer Options	Responses	
Fishing - open water	61%	33
Motor boating	52%	28
Swimming	50%	27
Canoeing/kayaking/stand-up paddleboard	31%	17
Nature viewing	11%	6
Relaxing/entertaining	9%	5
Ice fishing	7%	4
Other	6%	3
Does not impact any of my recreational activities	2%	1
Hunting	0%	0
Sailing	0%	0
answered question		54
skipped question		17



Number	"Other" responses
1	I don't know
2	The previous question should have included the trout stream inlet. That is the only sediment problem and it only affects the people in that immediate area. It has been there since Bob Hunt did the stream improvement. If you want to stop the advance of more sedimentation tell the trout fishermen to STOP wading in the creek !
3	The inlet bay is the worst. Can't get boats out, fish or swim. The silt collectors can confirm that since they got stuck in it.

33. Would you support a water level drawdown on Lawrence Lake? A drawdown is an incremental reduction in water level that would take place over several days. The lake would then be refilled to normal water levels over several days. Drawdowns are one tool that can be used to address sedimentation issues.

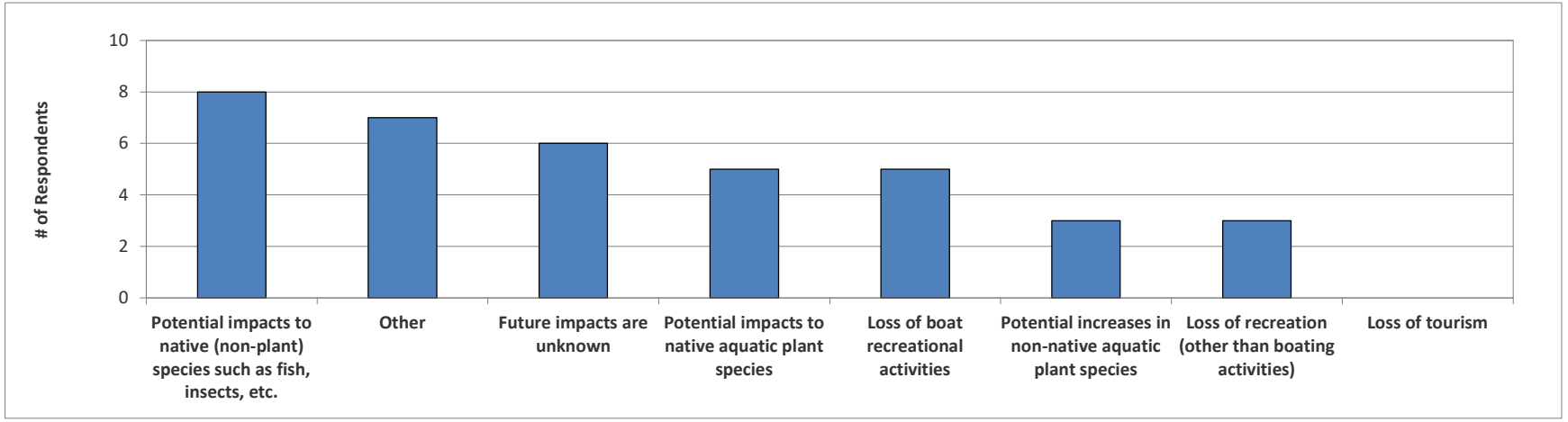
Answer Choices	Responses	
Yes	47%	33
Unsure; I need more information	34%	24
No	19%	13
answered question		**70**
skipped question		**1**



34. If you selected "No" in Question #33, what is the reason or reasons you would oppose a water level drawdown to Lawrence Lake?

Answer Choices	Responses	
Potential impacts to native (non-plant) species such as fish, insects, etc.	62%	8
Other	54%	7
Future impacts are unknown	46%	6
Potential impacts to native aquatic plant species	38%	5
Loss of boat recreational activities	38%	5
Potential increases in non-native aquatic plant species	23%	3
Loss of recreation (other than boating activities)	23%	3
Loss of tourism	0%	0
answered question		**13**
skipped question		**58**

Number	Other responses
1	Every time they lower the lake we loose shoreline and sediment builds up.
2	Water level drawdown has not been proven to remove sedimentation. Also the headwaters has always had large amounts of sedimentation.
3	There isn't o e lake that used it that proved it worked. Drawdowns don't work.
4	No gain as a result
5	It doesn't remove the problem
6	my pond is supplied by the lake level
7	Loss of property value, other lakes have tried this and it didn't work



Lawrence Lake Protection & Rehabilitation Disctrict (LLP&RD)

35. Before receiving this mailing, had you ever heard of the Lawrence Lake Protection & Rehabilitation District?

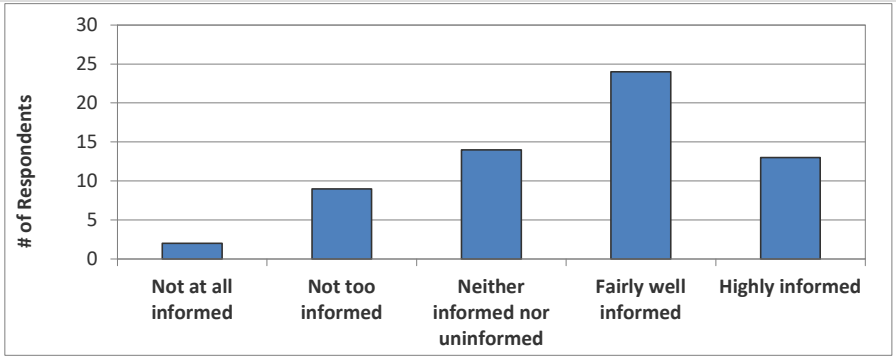
Answer Options	Answer Options	Response Percent	Response Count
Yes	Yes	90%	63
No	No	10%	7
	answered question	**16**	**70**
	skipped question	**0**	**1**

36. Were you aware the Lawrence Lake Protection & Rehabilitation District has their own website (www.lawrencelakeprdistrict.com)?

Answer Options	Response Percent	Response Count
Yes	67%	42
No	33%	21
Never been a member	0%	0
answered question		**63**
skipped question		**8**

37. How informed has (or had) the Lawrence Lake Protection & Rehabilitation District kept you regarding issues with Lawrence Lake and its management?

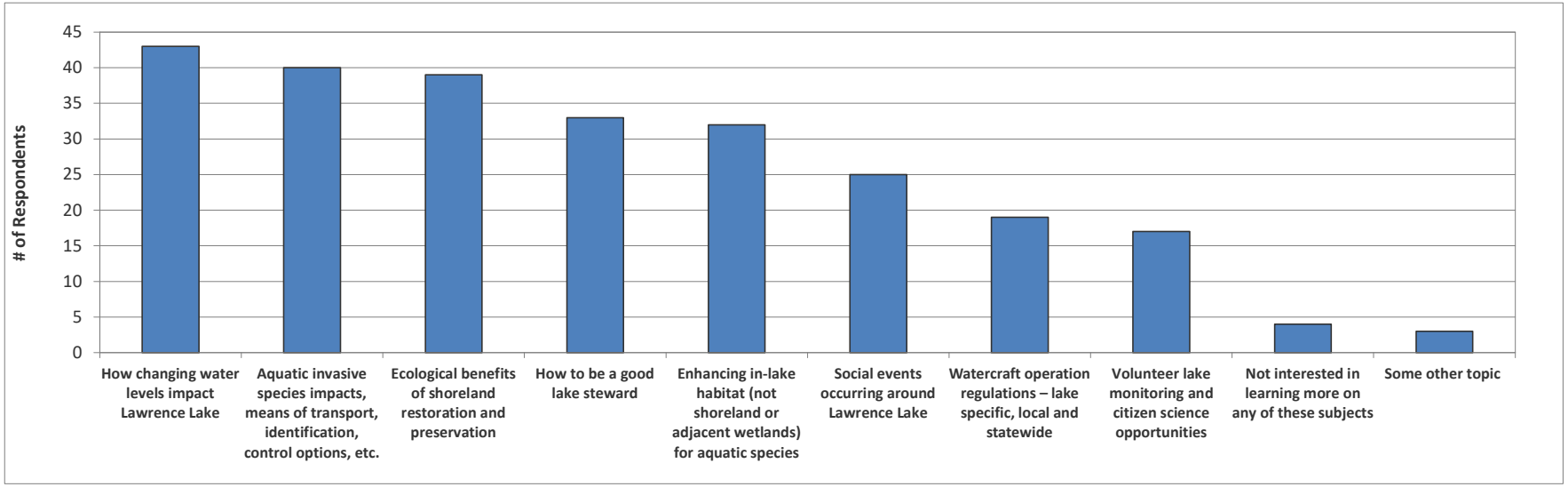
Answer Options	Not at all informed	Not too informed	Neither informed nor uninformed	Fairly well informed	Highly informed	Response Count
	2	9	14	24	13	62
					answered question	**62**
					skipped question	**9**



38. Stakeholder education is an important component of every lake management planning effort. Which of these subjects would you like to learn more about?

Answer Options	Response	Response
How changing water levels impact Lawrence Lake	67%	43
Aquatic invasive species impacts, means of transport, identification, control options, etc.	63%	40
Ecological benefits of shoreland restoration and preservation	61%	39
How to be a good lake steward	52%	33
Enhancing in-lake habitat (not shoreland or adjacent wetlands) for aquatic species	50%	32
Social events occurring around Lawrence Lake	39%	25
Watercraft operation regulations – lake specific, local and statewide	30%	19
Volunteer lake monitoring and citizen science opportunities	27%	17
Not interested in learning more on any of these subjects	6%	4
Some other topic	5%	3
answered question		**64**
skipped question		**7**

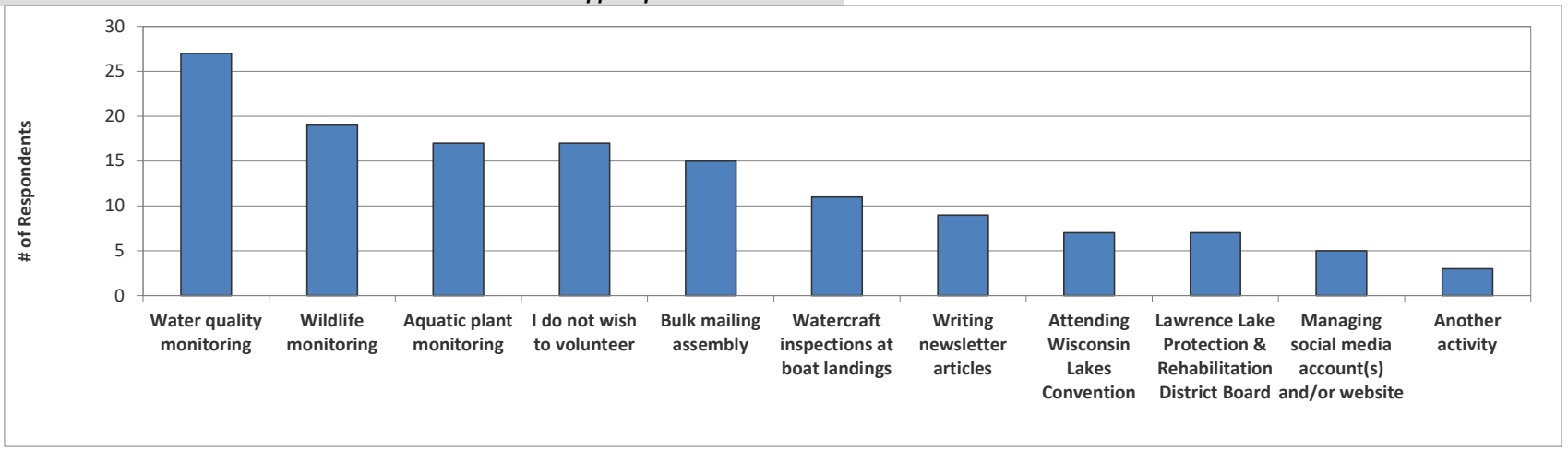
Number	"Some other topic" responses
1	History of lake management
2	Although my property is not on the shoreline, I do own a dock space near the dam. What can I do to help upkeep this property?
3	the history of lawrence lake and the old town of lawrence



39. Please note that because this survey is anonymous, your answer to this question will not be regarded as a commitment to participate, but instead will be used to gauge potential participation of stakeholders in the Lawrence Lake Protection & Rehabilitation District.The effective management of Lawrence Lake will require the cooperative efforts of numerous volunteers. Please select the activities you would be willing to participate in if the Lawrence Lake Protection & Rehabilitation District requires additional assistance.

Answer Options	Response Percent	Response Count
Water quality monitoring	44%	27
Wildlife monitoring	31%	19
Aquatic plant monitoring	27%	17
I do not wish to volunteer	27%	17
Bulk mailing assembly	24%	15
Watercraft inspections at boat landings	18%	11
Writing newsletter articles	15%	9
Attending Wisconsin Lakes Convention	11%	7
Lawrence Lake Protection & Rehabilitation District Board	11%	7
Managing social media account(s) and/or website	8%	5
Another activity	5%	3
answered question		62
skipped question		9

Number	"Another activity" responses
1	All depends on when and if I'm at the cabin
2	Although I would like to volunteer; I am unable to do so
3	I have back problems



40. Please feel free to provide written comments concerning Lawrence Lake, its current and/or historic condition and its management.

Answer Options	Response Count
	37
answered question	**37**
skipped question	**34**

Number	Response Text
1	We have heard talk of some people wanting to change the ordinance restricting water sports on Lawrence Lake. This would be a bad decision because there are many hazards of rocks and trees under the surface of the water. Lawrence Lake is very peaceful and scenic and is meant for pontoons and kayaks. Our family feels very strongly about not allowing wave runners and water sports.
2	Beautiful lake, I would like to see some sort of garbage disposal by public landings to hopefully help with litter.
3	Overall the management and Lake condition is good considering the small number of properties on the lake. Obviously the sedimentation from the DNR property, Lawrence Creek, continues to lessen the navigable stream/bay area where it discharges into the lake.
4	The Teal Bay area years ago was always sprayed every spring and more open. I am not aware it has been sprayed lately now in years & the weeds are numerous & sediment constantly filling the area. What can a person do legally to get rid of weeds? Can only rake so far and weeds are not being sprayed.
5	We need more goose control.
6	Lawrence Lake is an exceptional lake, thus the district and district members should do everything to protect it as a clean, family friendly and quiet lake. Focuses should be aquatic invasive species (Weeds, snails and clams), fertilizer usages, shoreline buffers, limiting the motor size on the lake.
7	make it a no wake lake and if people balk, make it motorless
8	I don't know enough about all the things that effect good or bad water and shoreline quality.
9	There has been an increase in AIrB&B's on Lawrence Lake!! My biggest concern is guests not knowing or following the rules of Lawrence Lake and also using my personal dock and neighbors docks without permission. What is the best way to prevent these actions. No trespassing signs have no effect.
10	sediment problem bad
11	This is a very good survey. I hope the results are shared
12	Thanks for taking the time to do this extensive survey. One concern is overpopulation and shoreline abuse that leads to damaging runoff. Unsure regarding herbicides but we must have a plan to control the invasive species.
13	The inlet bay was 12 feet when we bought our home in 1994. Now with the silt problem it's maybe 2 feet before hitting the silt. This has to be taken care of. There are homes closer to the old dam that can't even put a boat in.
14	n/a
15	why are my taxes keep going up? Can't even see the lake
16	I feel the Lawrence Lake Sports Club has and does alot for the good of the lake.
17	We keep hearing about dredging near the camp ground. We would be opposed to being taxed for this project that would increase property values of these residents, not all.

18	more citizen participation is needed
19	Thank you for taking the time to survey residents who reside on/near Lawrence Lake. I appreciate your efforts at keeping us informed.
20	We are fairly new (2 years) to Lawrence Lake and are impressed by its natural beauty. We support any efforts to keep the lake healthy. The clarity of the water is really good, and we love swimming at the island where there is sandy bottom, would hope the sand would stay with rehabilitation efforts.
21	As a local full time resident since birth. I'm concerned about new or part time residents opinion in this survey and how it might impact the outcome.
22	Our biggest concern is the silt build up from the creek coming in from the west and the algae build up on the east end.
23	for someone who has lived year around on the lake for the past 60 years the lake is by far in the best it's ever been.
24	Here is what the Board should do: 1. Adopt lake-wide no wake rules. The lake is 1/3 mile wide by 1 3/4 mile long. There is no reason to go fast on a boat -- it only stirs up sediment. If you want proof, look at the water quality mid-week when there are few boats. 2. Replace stairs on Boy Scout Island. They look terrible. 3. Put buoy on rocks line northwest of Boy Scout Island. 4. Start Ranger Rick programs at Tall Pines. 5. Water quality won't improve until lawns near lake are replaced with natural plantings which do not require fertilizer. So, the District should offer to reimburse lakefront owners for prairie plant seeds (from Prairie Nursery, in Westfield), if they plant them at the lakefront. If you want to improve water quality, the cost if worth it. 6. Get a quote on silt removal, and project the cost to owners if the project is financed with a bank loan payable over 10 years. The annual cost to each owner is less than you think.
25	I know it's very hard to control the fishing pressure this lake is receiving currently. On the ice fishing side I believe it would be best to limit the amount of "fisheree's" to one major one a year like the Lion's club/Lawrence lake sportsmen club as this "fisheree" actually use's the proceeds to protect the lake and restock it and the others do not. On the open water side limit the daily "tournaments" to two or three a year. I'm not sure how possible this is but just a thought.
26	You did not mention and I see as a problem people frequently using fertilizer on their lawns adjacent to the lakes. Prevention and education seems like an important part of decreasing the algae blooms and unwanted plant growth.
27	The build up of sediment at the headwaters Really needs to be addressed I appreciate this survey and the people behind it
28	I feel there are more weeds and weed clusters closer to shore than when we first purchased our cottage 6 years ago. It has impacted swimming and recreating off our pier.
29	I worry about sedimentation from decaying leaves and vegetation in shallow water and around the islands.
30	We are adamantly opposed to drawing down the lake. Your drawdown question was misleading. You did not specify how long the lake would stay drawn down. You implied it was only for a few days which is not what other lakes have done-more like a year. We support looking into harvesting the silt and selling it as fertilizer.
31	I appreciate everything that LLPRD is doing, and taking these additional steps in evaluating, and improving the quality and future of our lake. I applaud and support these efforts!
32	No additional comments at this time. Thanks for conducting this survey.
33	The lake was clearer and had lots of frogs years ago. We have great concerns about boat speeds and wake damage to shoreline.
34	Beautiful lake and mostly good neighbors ;) My entire family has grown up enjoying the lake and Westfield and Oxford too! I have lost a wonderfully terraced yard due to erosion caused mostly by big boats going to fast. Ive tried but can't find a solution. I am very happy with the lake association and hope to be able to get more involved.
35	I applaud the board members commitment to the lake!!
36	We have seen other lakes have weed cutters. Would that be something that would help ours?
37	My wish would be to control aquatic plant growth. It clouds the water, clogs boat propellers, inhibits swimming, is unsightly and on occasion, creates unpleasant odors. It also interferes with the use of my dock for boating and swimming.