A

APPENDIX A

Public Participation Materials

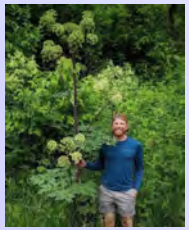
Presentation Outline

- Onterra, LLC
- Why Create a Lake 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
  - Four full-time field technicians
  - Four summer interns



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  - Science and planning

Onterra LLC Lake Management Planning

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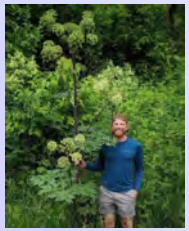
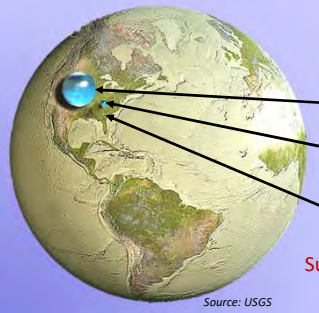
  - Four summer interns
- Services
  - Science and planning
- Philosophy
  - Promote realistic planning
  - Assist, not direct



Onterra LLC Lake Management Planning

Why create a lake management plan?

- Where does the Spider Lake ecosystem fall in a global context?



Surface Freshwater is Rare!

Source: USGS

Onterra LLC Lake Management Planning

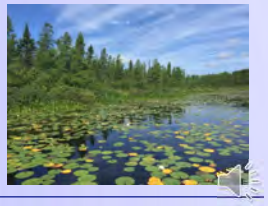
Why create a lake management plan?

- Freshwater ecosystems:
  - Provide vast environmental services
  - High species richness
  - Vulnerable to degradation

Onterra LLC Lake Management Planning

Why create a lake management plan?

- Spider Lake:
  - Preserve ecological function to maintain cultural services
  - Discover strategies for minimizing negative impacts
  - Provides a snapshot of the lake's current status or health
  - Fosters realistic expectations and dispels any misconceptions



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
  - Paleocore Collection & Analysis
  - Watershed Assessment
  - Shoreland Assessment (Iron County)
  - Aquatic Plant Surveys
  - Fisheries data integration
  - Stakeholder Survey

Onterra LLC Lake Management Planning

Water Quality Analysis

Phosphorus

Chlorophyll-*a*

Secchi Disk Transparency

Onterra LLC Lake Management Planning

Water Quality Analysis

Phosphorus

Naturally occurring & essential for all life
Regulates phytoplankton biomass in most WI lakes
Most often 'limiting plant nutrient' (shortest supply)
Human development often increases P delivery to lakes

Chlorophyll-*a*

Secchi Disk Transparency

Onterra LLC Lake Management Planning

Water Quality Analysis

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Human development often increases P delivery to lakes

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

Secchi Disk Transparency

Onterra LLC
Lake Management Planning

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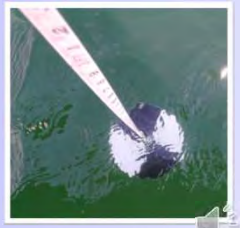
Human development often increases P delivery to lakes

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

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

Secchi Disk



Onterra LLC
Lake Management Planning

Water Quality Analysis

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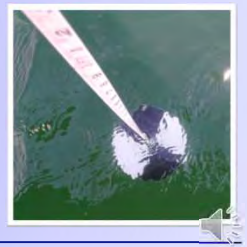
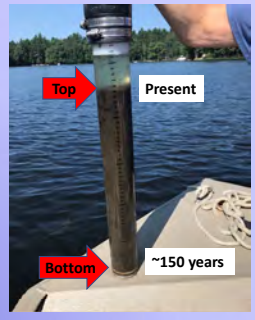
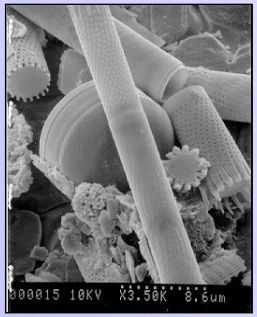


Onterra LLC
Lake Management Planning

Paleocore Collection & Analysis



Sediment core



Diatoms

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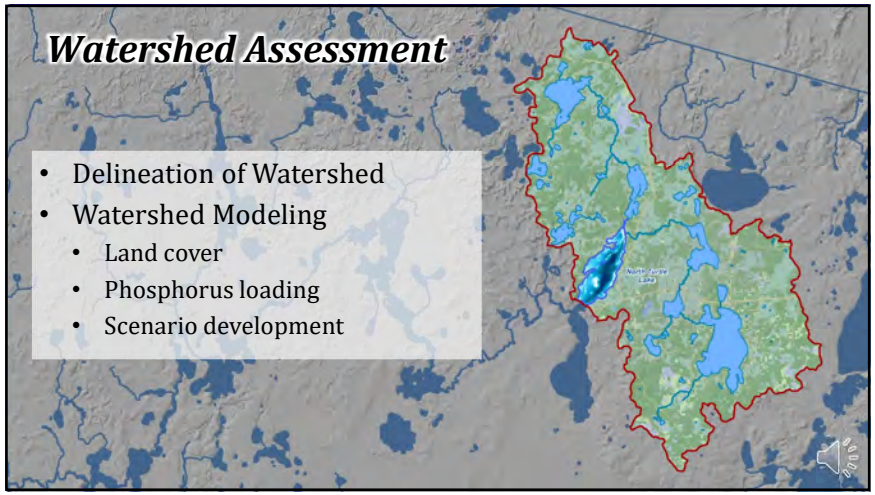
Lake Management Planning

Watershed Assessment

- Delineation of Watershed
- Watershed Modeling
  - Land cover
  - Phosphorus loading
  - Scenario development



Shoreland Assessment

- Transition zone between land and water
- Important to maintain as much natural shoreline zone as possible
- Completed by Iron County

Completely Developed

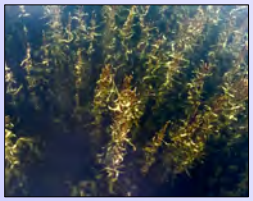
Range

Completely Natural

Onterra LLC Lake Management Planning

Native Aquatic Plants

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



Lake

Grasslands

Forest

Onterra LLC Lake Management Planning

Native Aquatic Plants

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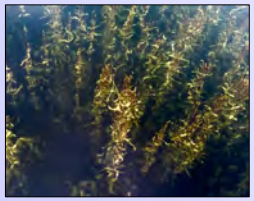


Lake

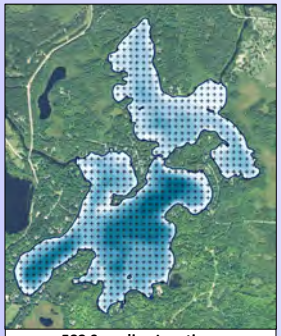
Grasslands

Forest

Onterra LLC Lake Management Planning

Point-Intercept Survey

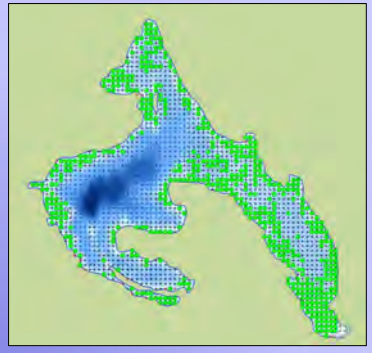
- Grid-based survey
- Determine abundance of each species
- Compare to other lakes
- Compare the same lake over time

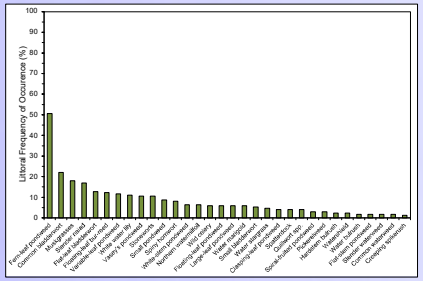


582 Sampling Locations
50-meter Resolution

Onterra LLC
Lake Management Planning

Point-Intercept Survey



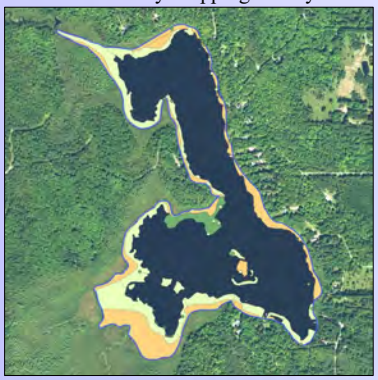


Onterra LLC
Lake Management Planning

Emergent & Floating-leaf Plant Communities

- Important communities for habitat, water quality, and shoreland stabilization
- Often negatively impacted by shoreland development

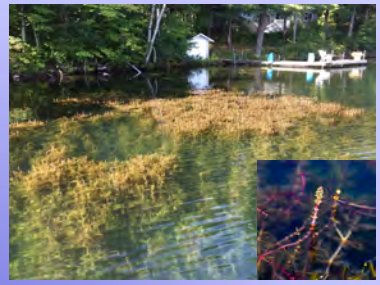
Community Mapping Survey



Onterra LLC
Lake Management Planning

Non-Native Aquatic Plants

Eurasian Watermilfoil

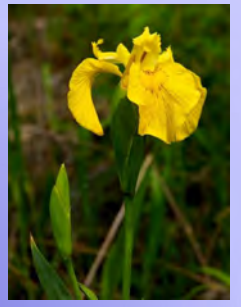


Curly-leaf Pondweed

Onterra LLC
Lake Management Planning

Non-Native Aquatic Plants

Pale-yellow Iris



Purple Loosestrife

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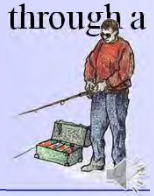
Fisheries Data Integration

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

Onterra LLC

Stakeholder Survey

- Survey includes Spider Lake Association members & 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

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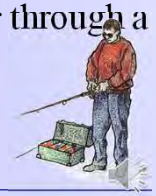

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Planning Process

Planning Committee Meetings

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

↓

Implementation Plan

Onterra LLC

Thank You

Spider Lake Association Email:
spiderlakehours@gmail.com
Subject Line: Information Meeting Presentation
Include name(s) of individuals who viewed this presentation

Spider Lake, Iron County
Project Update
August 2020

Submitted by: Brenton Butterfield, Lake Ecologist, Onterra, LLC

With the help of a Lake Management Planning Grant totaling nearly $18,000 through the Wisconsin Department of Natural Resources, a project is underway to create a lake management plan for Spider Lake (Figure 1). The lake management plan will contain historical and current data from the lake as well as provide guidance for its management by integrating stakeholder perceptions and goals with what is ecologically beneficial for the lake. Onterra, LLC, a lake management planning firm out of De Pere and Madison, assisted the Spider Lake Association of Iron County, Inc. (SLAIC) in applying for the grant and will guide them through the planning process.

Figure 1. Spider Lake, Iron County, Wisconsin.

Baseline studies are being completed in 2020 aimed at assessing the health of Spider Lake. These baseline studies were focused on evaluating the lake's aquatic plant community, water quality, and watershed. In addition, perceptions of lake stakeholders will also be gathered through the distribution of a stakeholder survey. While all of the study results cannot be presented here, some of the highlights from surveys already completed are discussed. As is discussed further, numerous field studies were carried out on Spider Lake in 2020. A wealth of data were collected over the past four months, and analyses of these data are currently underway. This update intends to bring the SLAIC up-to-speed on the scientific studies that have occurred, provide some initial observations on the ecology of Spider Lake, and provide a rough timeline for the remaining actions that will be taken as a part of this planning project.

Since May of 2020, staff from Onterra and volunteers from the SLAIC have sampled phosphorus and chlorophyll from Spider Lake three times, while water clarity has been measured 18 times to date. Figure 2 displays summer 2020 (June-August) average values for total phosphorus (primary nutrient controlling algal growth), chlorophyll-*a* (a measure of free-floating algal abundance), and Secchi disk depth (a measure of water clarity). Also displayed are the long-term averages calculated using available historical data going back to 1998, most of which has been collected by SLAIC volunteers.

The long-term averages for all three of these parameters fall within the *excellent* category for Wisconsin's deep lowland drainage lakes (Figure 2). The average summer phosphorus concentration in 2020 of 15.3 µg/L was *excellent* and near the long-term average of 15.0 µg/L. The average summer chlorophyll-*a* concentration of 5.5 µg/L straddled the threshold between *excellent* and *good* and was slightly above the long-term average of 3.4 µg/L. The summer of 2020 in northern Wisconsin saw above average temperatures and precipitation (Midwestern Regional Climate Center 2020), and may be why algal levels were slightly elevated. However,

the 2020 chlorophyll-*a* concentrations are still considered low and well below the concentration where nuisance algal blooms are a concern.

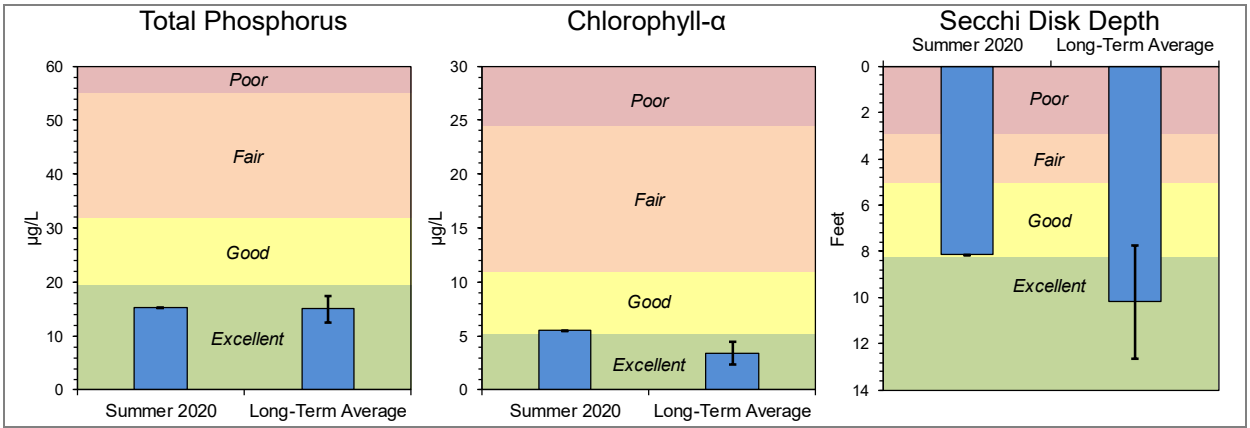


Figure 2. Spider Lake average 2020 summer (June – August) and long-term summer average values for total phosphorus, chlorophyll-α, and Secchi disk depth. Index thresholds are for Wisconsin's deep lowland drainage lakes. Error bars represent one standard deviation. Created using data collected by both Onterra and SLAIC volunteer monitors. Long-term average calculated using historical data from 1998-2020.

Given chlorophyll-*a* concentrations were slightly higher in 2020, the average summer Secchi disk depth was also slightly lower at 8.1 feet compared to the long-term average of 10.2 feet (Figure 2). The increase in precipitation may also have resulted in more tannins being delivered to the lake from wetlands within its watershed, creating browner and darker water. Summer 2020 water clarity still straddled the threshold between *good* and *excellent* for Wisconsin's deep lowland drainage lakes. In the coming months, Onterra ecologists will continue to analyze water quality data from these lakes to look for potential anomalies and/or trends over time, as well as additional water quality parameters collected as part of this project.

All aquatic plant surveys were conducted as scheduled in 2020. In August, Onterra ecologists completed the whole-lake point-intercept survey Spider Lake. The point-intercept survey is a grid-based survey designed to assess the aquatic plant community of the lake at a lake-wide level, and allows for comparisons to other lakes and within the same lake over time. The emergent and floating-leaf community mapping survey was also completed by Onterra in August. The purpose of the aquatic plant community mapping survey is to map the floating-leaf (e.g., water lilies) and emergent species (e.g., cattails and bulrushes) that grow within the lake and are typically under-represented in the point-intercept survey.

Preliminary data from these surveys indicates that Spider Lake harbors a species-rich native aquatic plant community, with 57 native plant species recorded. To put this into perspective, the average number of native aquatic plant species located on ten nearby Town of Winchester lakes was 39. A number of the native plant species located in Spider Lake are rare and considered sensitive to environmental disturbance (Figure 3), and their presence indicates high-quality conditions. These data will be used to compare Spider Lake's aquatic plant community to other lakes within the region and the state.

The non-native, invasive aquatic plants of Eurasian watermilfoil (*Myriophyllum spicatum*) and curly-leaf pondweed (*Potamogeton crispus*) **were not** located in Spider Lake during the 2020 surveys, indicating the ongoing efforts being undertaken by the SLAIC to prevent these and other

invasive species from entering these lakes continue to be effective. Onterra ecologists did locate isolated occurrences of purple loosestrife (*Lythrum salicaria*), an invasive wetland plant species, in shoreland areas around the lake (Figure 4). Locations of these occurrences were provided the SLAIC for their ongoing control efforts of this species.

Figure 3. Example of some of the environmentally-sensitive native aquatic plant species located in Spider Lake in 2020. Their presence indicates high-quality environmental conditions. Photo credit Onterra.

In addition to the previously discussed water quality and aquatic plant community, Onterra ecologists are continuing to analyze data from Spider Lake's watershed and a sediment core collected in 2020 to determine how the lake's water quality has changed over the past 150 years. The final product for this project will be a comprehensive management plan for Spider Lake, which will be comprised of two primary sections: 1) the results, discussion, and conclusions regarding the studies completed on these lakes along with the historical information that has been compiled, and 2) an implementation plan.

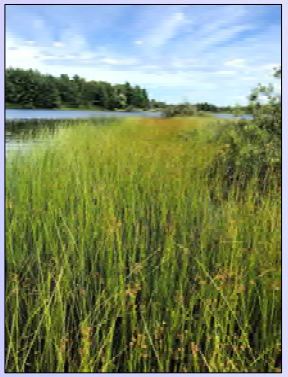
Figure 4. Purple loosestrife, a non-native invasive wetland plant on the shores of Spider Lake. Photo credit Onterra.

The implementation plan will not be a list of recommendations created by Onterra for the association, but it will be a plan based upon management goals with specific actions aimed at meeting those goals. Onterra's role is to facilitate the development of a realistic plan with the association. Onterra staff will be working with a planning committee comprised of Spider Lake stakeholder representatives to develop the draft management plan. A critical set of information for the development of the plan by the committee will be the results of the stakeholder survey. The survey is currently under development and should be distributed to lake property owners this fall. The survey results will be used during the planning process by the planning committee to assist in creating the lake management plan.

The planning committee will meet with Onterra staff, likely next spring or early summer, to learn about the lake and assemble a management plan aimed at protecting this important resource. It is important to remember that the resulting plan will be the SLAIC's plan for managing and protecting Spider Lake. The plan will include management goals and actions, not only for the lake, but likely also for the association with the intent of building the association's capacity to manage and protect the lake as needed. A full draft of the management plan will be ready for review by the planning committee ahead of next year's meeting.

Planning I Meeting Agenda

- Management Planning Project Overview
- Study Results
  - Water Quality
  - Watershed
  - Paleoecology
  - Shoreland Condition
  - Aquatic Plants
  - Fisheries Data Integration
  - Conservation Opportunity Areas
- "Big Picture" Conclusions
- Planning Meeting II: AIS Management & Goal Development



Onterra LLC Lake Management Planning

Management Planning Project Overview

- First management plan developed for Spider Lake
- Current project designed to assess the overall status of the lake
- Collect & analyze data – completed
  - Technical & sociological
- Construct long-term & useable plan

Onterra LLC Lake Management Planning

Management Plan Outline

Planning Meeting I

- 1.0 Introduction
- 2.0 Stakeholder Participation
- 3.0 Study Results
  - 3.1 Water Quality
  - 3.2 Watershed
  - 3.3 Paleoecology
  - 3.4 Shoreland Condition
  - 3.5 Aquatic Plants
  - 3.6 Aquatic Invasive Species
  - 3.7 Fisheries Data Integration
  - 3.8 Conservation Opportunity Areas
- 4.0 Summary & Conclusions

Planning Meeting II

- 5.0 Implementation Plan
- 6.0 Methods
- 7.0 Literature Cited

Onterra LLC Lake Management Planning

Summary of General Project Results

Water Quality

- Overall, water quality is *excellent* for a deep lowland drainage lake in Wisconsin
- Measured increase in phosphorus and decrease in water clarity from 2004-2020; no trend in chlorophyll
- Likely the result of increases in precipitation and input of dissolved organic matter (DOM)

Watershed & Immediate Shoreline

- Watershed is in overall excellent condition– primarily comprised of intact forests & wetlands
- Majority of shoreland zone contains little to no development; but, there are areas for improvement

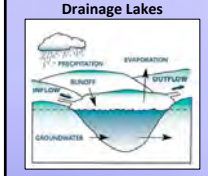
Aquatic Plant Community

- Native plant community is of exceptional quality; high number of species present as well as number of rare and sensitive species
- Purple loosestrife only non-native species observed

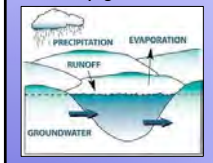
Onterra LLC Lake Management Planning

Wisconsin Lakes Natural Community Types

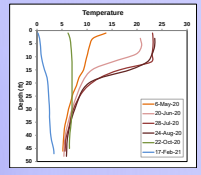
Drainage Lakes



Seepage Lakes

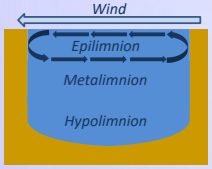


Watershed Size
>4 sq mi: Lowland

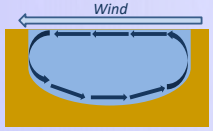


Depth & Stratification

Deep Stratified



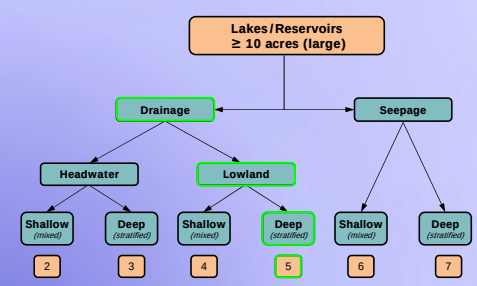
Shallow Mixed



Onterra LLC Lake Management Planning

Natural Community Types

Categorization of lakes with similar features that influence water quality



Ecoregions

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

Onterra LLC Lake Management Planning

Introduction to Lake Water Quality

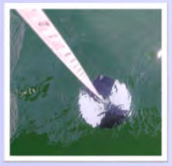
Phosphorus
Naturally occurring & essential for all life
Regulates phytoplankton biomass in most WI lakes
Most often 'limiting plant nutrient' (shortest supply)
Human development often increases P delivery to lakes

N:P Ratio: 31:1 – Phosphorus

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

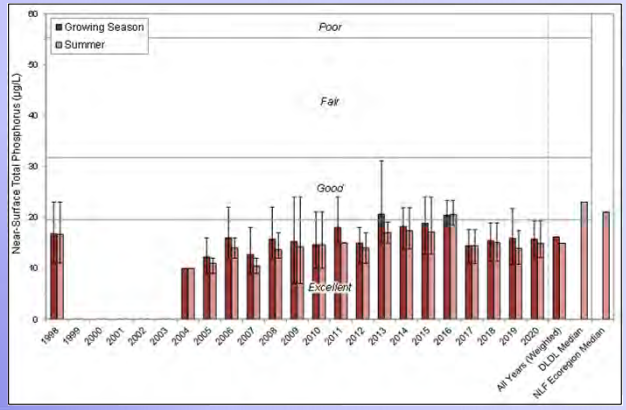
Secchi Disk Transparency
Measure of water clarity
Measured using a Secchi disk

Sampling Location



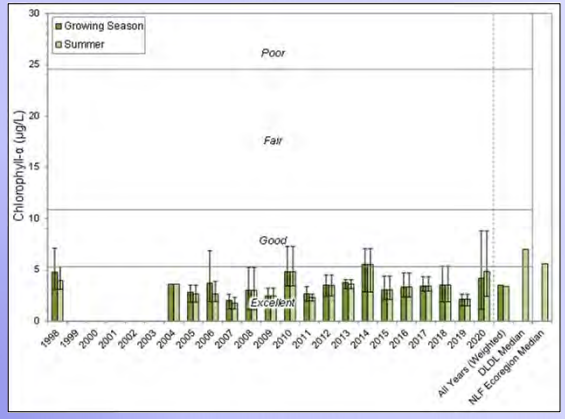
Onterra LLC Lake Management Planning

Near-Surface Total Phosphorus



Onterra LLC Lake Management Planning

Chlorophyll-α



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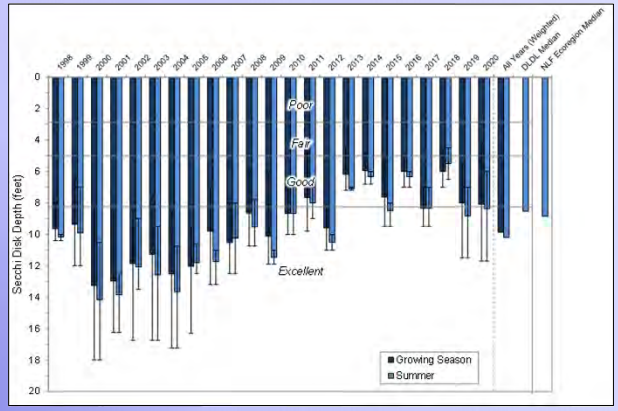
Secchi Disk Depth



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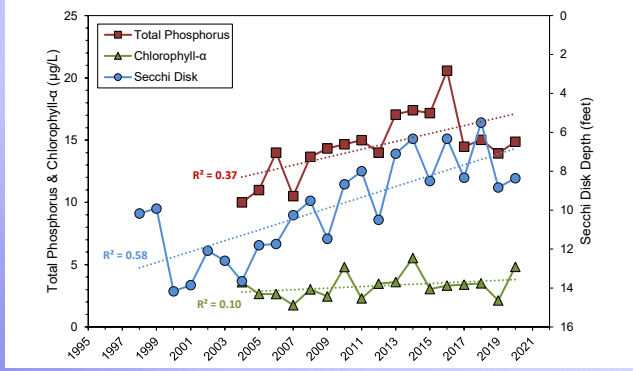
Water Quality Trends



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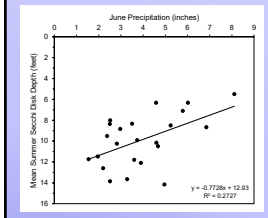
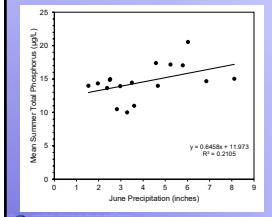
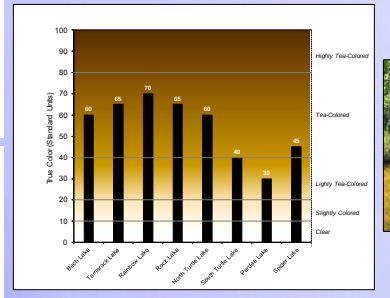
Dissolved Organic Matter & Precipitation







Dissolved Organic Matter

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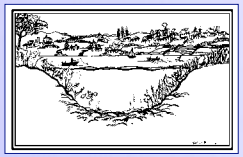
Eutrophication

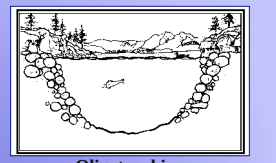
-Natural Lake Aging

Lake Trophic States



Eutrophic

Mesotrophic



Oligotrophic

Cultural Eutrophication

-Accelerated eutrophication brought on by human activities.

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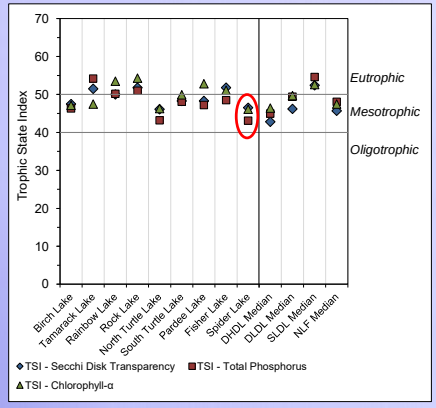
Trophic State Index



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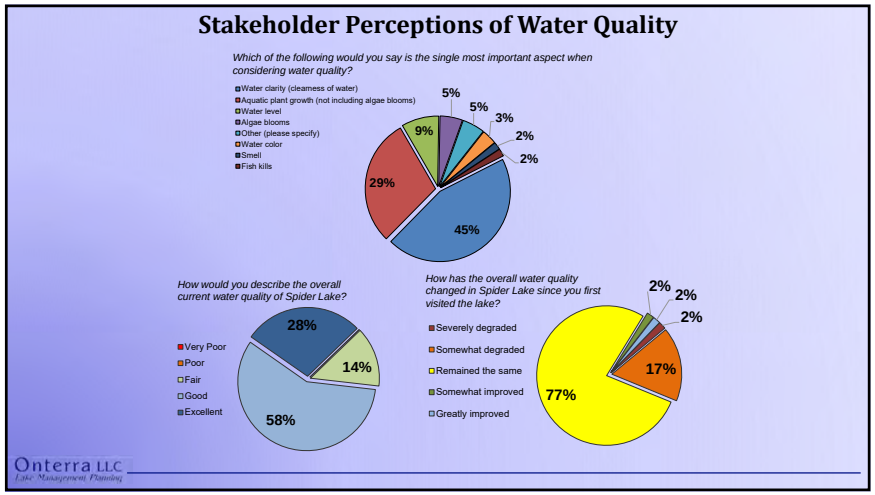
Stakeholder Perceptions of Water Quality
Which of the following would you say is the single most important aspect when considering water quality?
Water clarity (clearness of water)
Aquatic plant growth (not including algae blooms)
Water level
Algae blooms
Other (please specify)
Water color
Smell
Fish kills
5%
5%
3%
2%
2%
9%
29%
45%
How would you describe the overall current water quality of Spider Lake?
Very Poor
Poor
Fair
Good
Excellent
28%
14%
58%
How has the overall water quality changed in Spider Lake since you first visited the lake?
Severely degraded
Somewhat degraded
Remained the same
Somewhat improved
Greatly improved
2%
2%
2%
17%
77%
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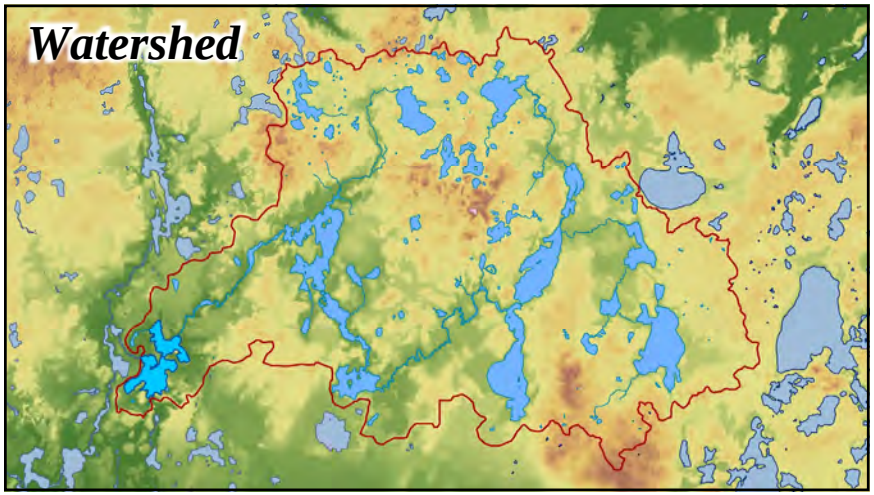
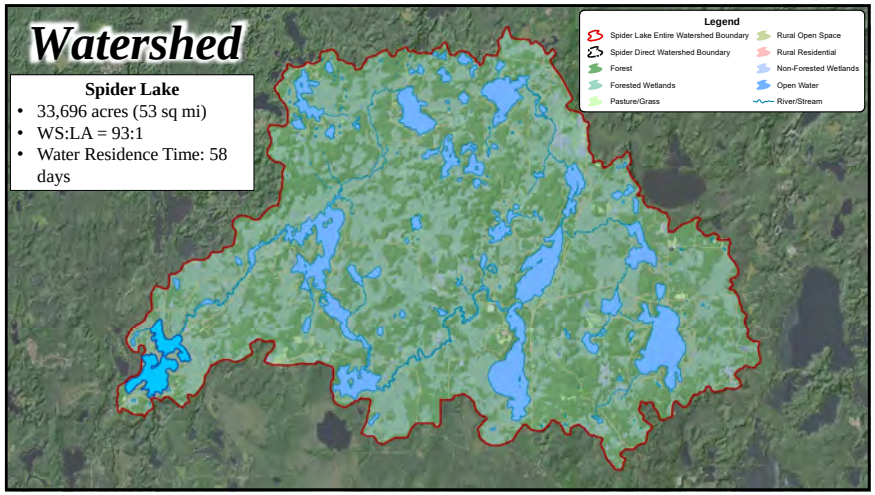
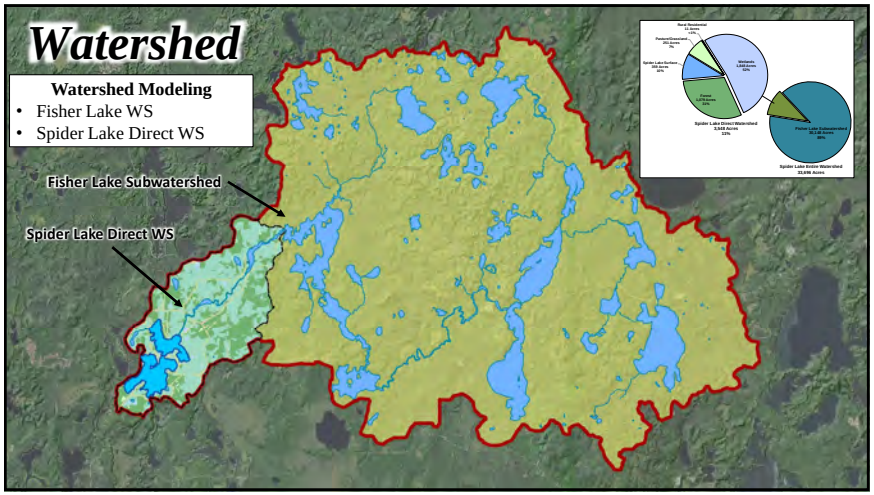

Watershed


Watershed
Spider Lake
33,696 acres (53 sq mi)
WS:LA = 93:1
Water Residence Time: 58 days
Legend
Spider Lake Entire Watershed Boundary
Spider Direct Watershed Boundary
Forest
Forested Wetlands
Pasture/Grass
Rural Open Space
Rural Residential
Non-Forested Wetlands
Open Water
River/Stream


Watershed
Watershed Modeling
Fisher Lake WS
Spider Lake Direct WS
Fisher Lake Subwatershed
Spider Lake Direct WS

Phosphorus Loading

Annual Potential Phosphorus Load from Watershed: **2,589 pounds**

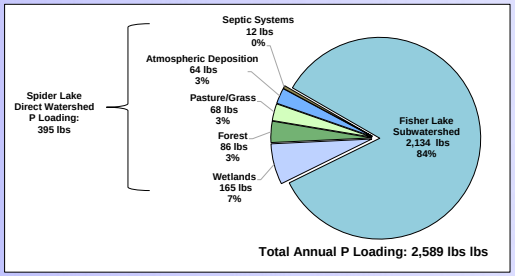
Predicted In-Lake Growing Season TP Concentration: **19.0 µg/L**

Measured In-Lake Growing Season TP Concentration: **16.1 µg/L**

Phosphorus loading is slightly over-estimated

Actual annual load likely closer to **2,100 pounds**

Indicates no unaccounted sources of phosphorus



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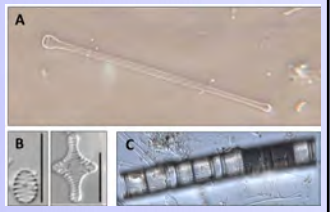
Paleoecology

- Fossilized diatoms in sediment core used to determine if and how water quality has changed over ~150 years
- Diatom communities in top and bottom were relatively similar indicating water quality has not changed significantly

Spider Lake	Diatom-Inferred Phosphorus (µg/L)
Top Core Section	20
Bottom Core Section	20



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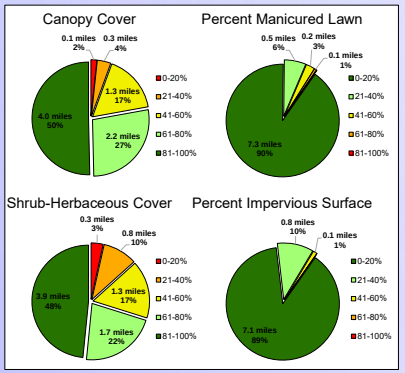
Shoreline Development



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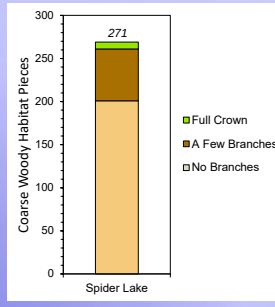
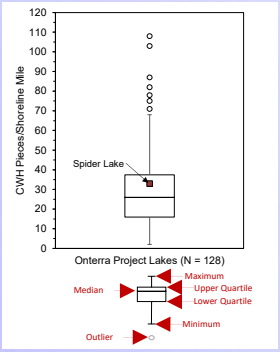
Coarse Woody Habitat





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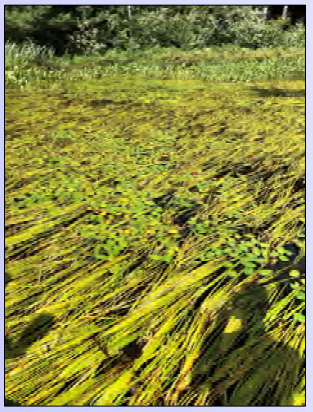
Aquatic Plant Surveys

- Assess both non-native & native species
- Three surveys completed in 2020
  - Early-Season AIS Survey
  - Whole-lake Point-Intercept Survey
  - Emergent/Floating-leaf Community Mapping Survey



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Plant Data Overview

- 59 native plant species recorded
- 1 non-native plant species recorded
  - Purple loosestrife
- Max Rooting Depth: 10 feet

Scientific Name	Common Name	Growth Form	WI State Status	Coefficient of Conservatism	2020 (Ontera)
Acorus americanus	Sweetflag	E	Native	7	X
Alisma	Water plantain	E	Native	3	X
Brasenia schreberi	Watershield	FL	Native	7	X
Carex comosa	Bristly sedge	E	Native	5	I
Carex lasiocarpa	Narrow-leaved woolly sedge	E	Native	9	I
Carex utriculata	Common yellow lake sedge	E	Native	3	X
Ceratophyllum demersum	Coontail	S	Native	3	X
Ceratophyllum echinatum	Spiny hornwort	S	Native	10	X
Chara spp.	Muskgrasses	S	Native	7	X
Cladium mariscoides	Smooth sawgrass	E	Native	10	X
Comarum palustre	Marsh cinquefoil	E	Native	8	X
Dulichium arundinaceum	Three-way sedge	E	Native	9	I
Eleocharis acicularis	Needle spikerush	E/S	Native	5	X
Eleocharis palustris	Creeping spikerush	E	Native	6	X
Eleocharis robbinsii	Robbins' spikerush	E	Native - Special Concern	10	I
Equisetum fluviatile	Water horsetail	E	Native	7	X
Equisetum fluviatile	Water horsetail	S	Native	7	X
Heteranthera dubia	Water stargrass	S	Native	6	X
Isoetes spp.	Quillwort spp.	S	Native	8	X
Lythrum salicaria	Purple loosestrife	E	Non-Native - Invasive	N/A	I
Myriophyllum heterophyllum	Various-leaved watermilfoil	S	Native	7	X
Myriophyllum sibiricum	Northern watermilfoil	S	Native	7	X
Najas flexilis	Slender naiad	S	Native	6	X
Nitella spp.	Stoneworts	S	Native	7	X
Nuphar spp.	Spatterdocks	FL	Native	6	X
Nymphaea odorata	White water lily	FL	Native	6	X
Pontederia cordata	Pickerelweed	E	Native	9	X
Potamogeton amplifolius	Large-leaf pondweed	S	Native	7	X
Potamogeton berchtoldii	Slender pondweed	S	Native	7	X
Potamogeton epihydrus	Ribbon-leaf pondweed	S	Native	8	X
Potamogeton friesii	Fries' pondweed	S	Native	8	I
Potamogeton gramineus	Variable-leaf pondweed	S	Native	7	X
Potamogeton natans	Floating-leaf pondweed	S	Native	5	I
Potamogeton pectinatus	Sago pondweed	S	Native	3	X
Potamogeton pusillus	Small pondweed	S	Native	7	X
Potamogeton richardsonii	Clasping-leaf pondweed	S	Native	5	X
Potamogeton robbinsii	Fern-leaf pondweed	S	Native	8	X
Potamogeton spirillus	Spiral-fruited pondweed	S	Native	8	X
Potamogeton vaseyi	Vasey's pondweed	S	Native - Special Concern	10	X
Potamogeton x haynesii	Haynes' pondweed	S	Native	N/A	X
Potamogeton zosteriformis	Flat-stem pondweed	S	Native	6	X
Ranunculus aquatilis	White water crowfoot	S	Native	8	X
Sagittaria cristata	Crested arrowhead	E/S	Native	9	I
Sagittaria latifolia	Common arrowhead	E	Native	3	X
Sagittaria rigida	Stiff arrowhead	E	Native	8	I
Schoenoplectus acutus	Hardstem bulrush	E	Native	5	X
Schoenoplectus tabernaemontani	Softstem bulrush	E	Native	4	I
Scolpus cyperinus	Wool grass	E	Native	4	I
Spirogyra americanum	American bunched	E	Native	8	I
Spirogyrum americum var. *acuale*	Short-stemmed bur-reed	FL/E	Native	8	X
Spirogyrum eurycarpum	Common bur-reed	E	Native	10	I
Spirogyrum fluctans	Floating bur-reed	FL	Native	10	I
Spirogyrum natans	Little bur-reed	E/S	Native	9	I
Stuckenia pectinata	Sago pondweed	S	Native	3	X
Typha latifolia	Broad-leaved cattail	E	Native	1	I
Utricularia intermedia	Flat-leaf bladderwort	S	Native	9	X
Utricularia minor	Small bladderwort	S	Native	10	X
Utricularia vulgaris	Common bladderwort	S	Native	7	X
Vallisneria americana	Wild celery	S	Native	6	X
Zizania palustris	Northern wild rice	E	Native	8	I

X = Located during point-intercept survey; I = Incidentally located
E = Emergent; FL = Floating-leaf; FL/E = Floating-leaf & Emergent; S = Submergent; S/E = Submergent & Emergent

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Whole-Lake Point-Intercept Surveys

Spider Lake
50-meter resolution
582 total points

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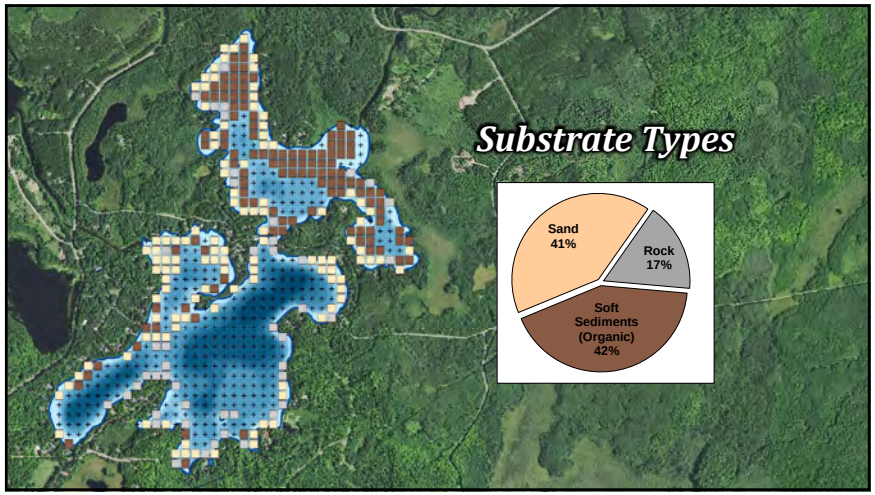
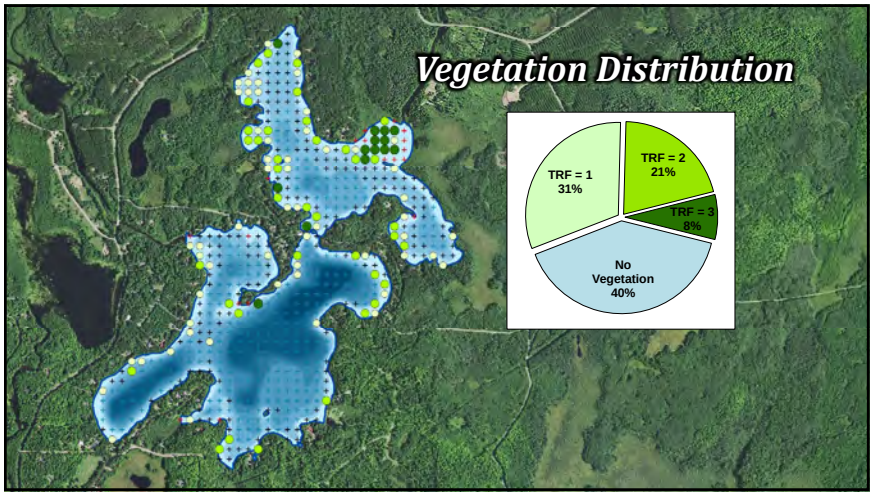
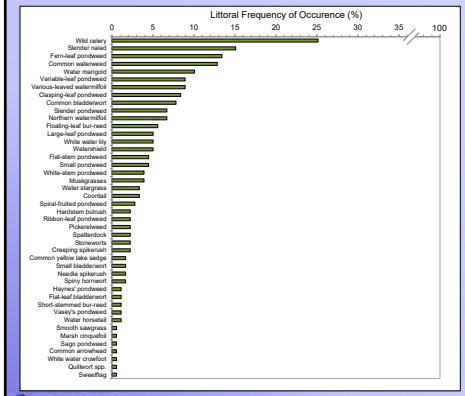
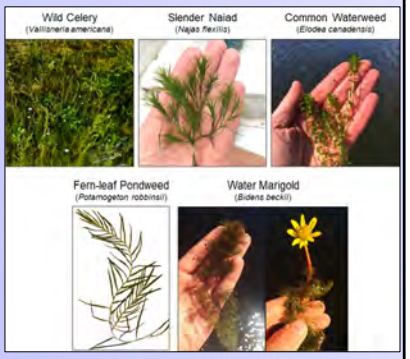




Littoral Frequency of Occurrence





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Other Plants of Interest

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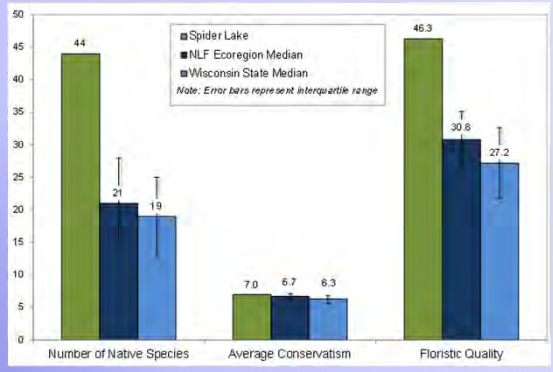
Floristic Quality Analysis



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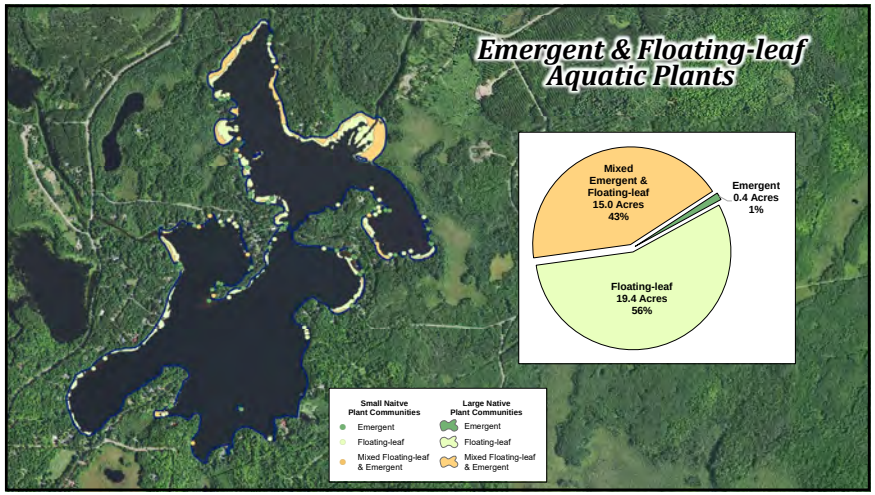
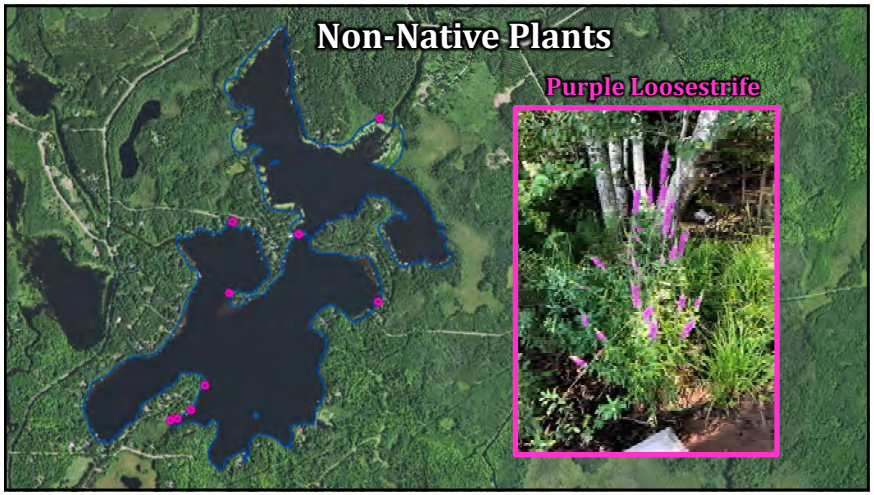
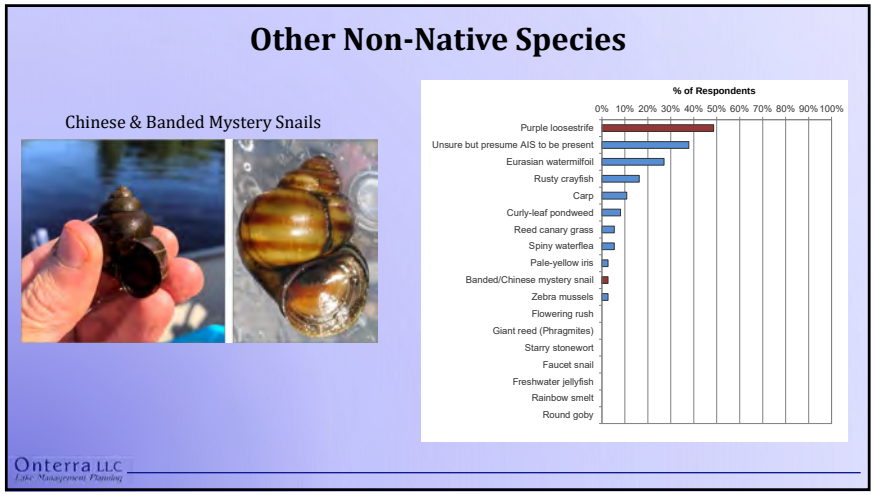
Emergent & Floating-leaf Aquatic Plants


Emergent & Floating-leaf Aquatic Plants
Mixed Emergent & Floating-leaf 15.0 Acres 43%
Emergent 0.4 Acres 1%
Floating-leaf 19.4 Acres 56%
Small Native Plant Communities
Emergent
Floating-leaf
Mixed Floating-leaf & Emergent
Large Native Plant Communities
Emergent
Floating-leaf
Mixed Floating-leaf & Emergent


Non-Native Plants
Purple Loosestrife


Other Non-Native Species
Chinese & Banded Mystery Snails
% of Respondents
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Purple loosestrife
Unsure but presume AIS to be present
Eurasian watermilfoil
Rusty crayfish
Carp
Curly-leaf pondweed
Reed canary grass
Spiny waterflea
Pale-yellow iris
Banded/Chinese mystery snail
Zebra mussels
Flowering rush
Giant reed (Phragmites)
Starry stonewort
Faucet snail
Freshwater jellyfish
Rainbow smelt
Round goby
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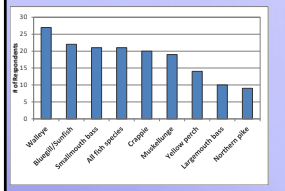
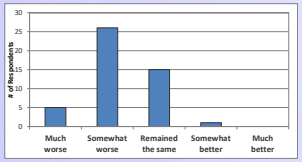
Fisheries

Fisheries – Stakeholder Survey

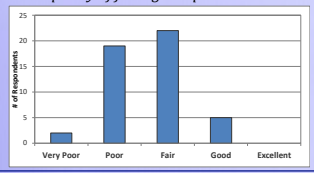
What species of fish do you like to catch in Spider Lake?



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



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



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Fisheries – Population Trends

Walleye Abundance
- 1998 = 2.7/acre; 2007 = 1.6/acre; 2013 = 1.3/acre; 2019 = 1.1/acre
- Stocking of walleye to begin in 2021

Muskellunge
- Balanced size structure
- Sustained 100% through natural reproduction

Northern Pike Abundance
- Size structure was skewed towards smaller fish

Largemouth & Smallmouth Bass
- Smallmouth bass more prevalent; balanced size structure
- Largemouth population appears to be small

Panfish
Bluegill and crappie show balanced size structure; yellow perch skewed smaller

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Native American Spear Harvest
- Spider is located within Ceded Territory (Treaty of 1842).
- Tribal and State authorities establish *total allowable catch* (TAC) based on population estimates (typically 35% for walleye & 27% for muskellunge)
- The total allowable catch number may be reduced based on confidence in population estimates: *safe harvest level*
- Tribal community claims percentage of safe harvest level, or *declaration*
- Bag limits for hook and line anglers set to accommodate declaration
- Can only harvest two walleye over 20 inches per night – one between 20 and 24" and one any size over 20"

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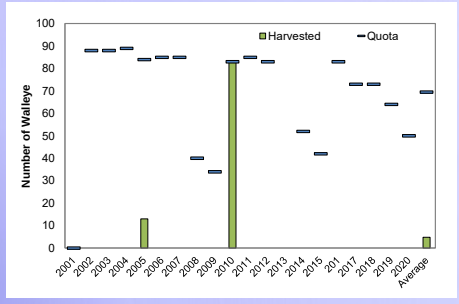
Fisheries – Walleye Harvest



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Spider Lake Conservation Opportunity Areas (COAs)

- 2.5% of water on Earth is freshwater – 0.01% is available in lakes and rivers
- Biodiversity loss is **5 times faster** in freshwater ecosystems when compared to terrestrial and marine systems
- Nine COAs delineated in Spider Lake based on aquatic plant community & shoreland assessments
  - Intent is to encompass and highlight the full spectrum of native species and natural community diversity present in Spider Lake
  - Capture areas where NHI-listed species were located
  - Capture areas of highest plant species richness and diversity
  - Capture suite of substrate types in the lake (cobble/rock, sand, organic)
  - Proximity to natural shorelines and coarse woody habitat abundance

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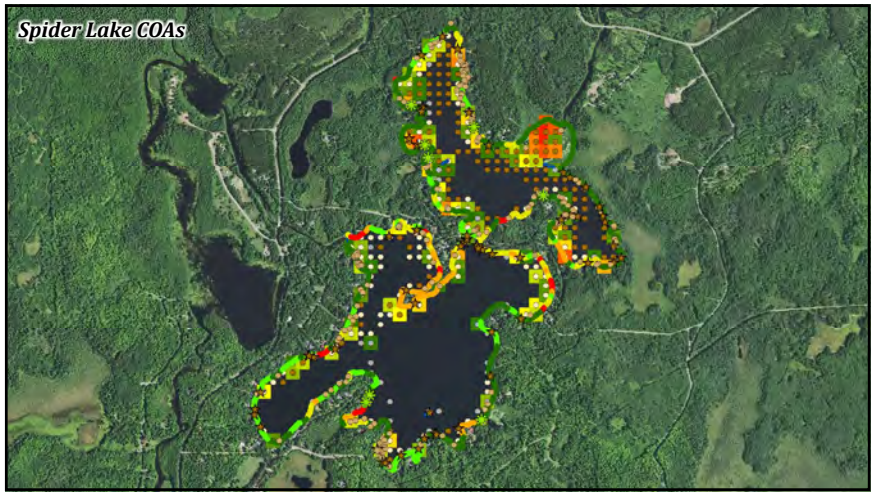
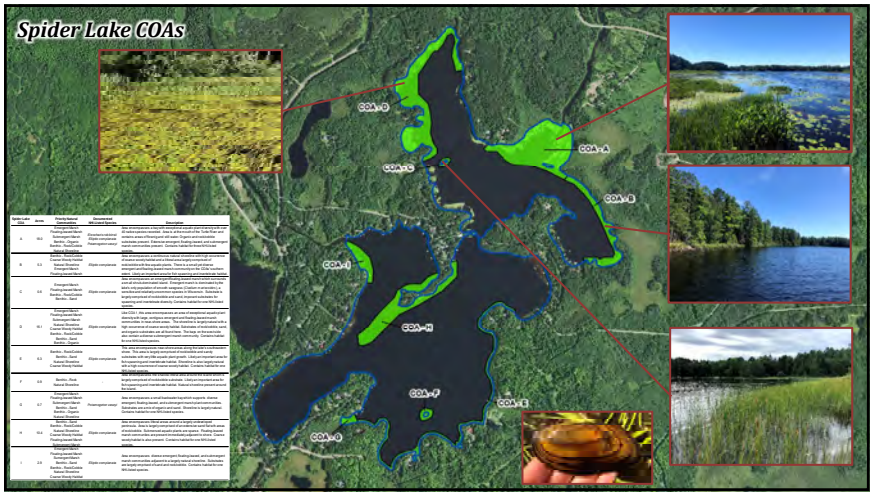
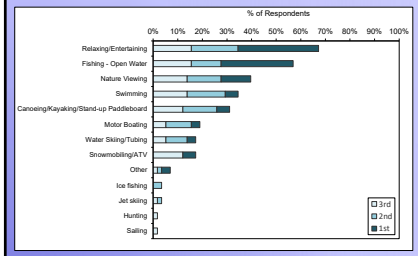




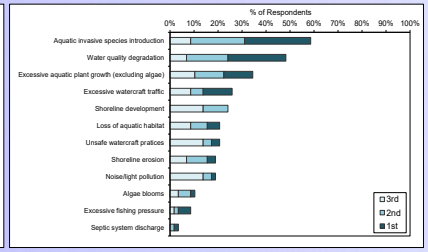
Stakeholder Survey Results

- 166 surveys distributed
- 58 returned (35% response rate – not statistically valid)

Rank up to three activities that are important reasons for owning property on or near Spider Lake.



Please rank your top three concerns regarding Spider Lake.



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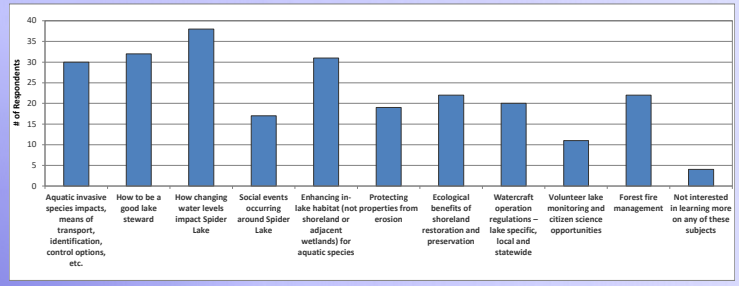
Stakeholder Survey Results

Which of these subjects would you like to learn more about?



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Big Picture Conclusions

Water Quality

- Overall, parameters assessed indicate Spider Lake's water quality is excellent for a deep lowland drainage lake in Wisconsin
- Increasing trend in phosphorus, decreasing trend in water clarity. Likely due to increase in Dissolved Organic Matter from higher precipitation
- Water quality has remained largely unchanged over the past ~100 years

Watershed

- Large watershed that's mainly comprised of natural land cover types
- No unaccounted sources of phosphorus detected

Aquatic Plant Community

- Native aquatic plant community is of exceptional quality
- High number of native species & sensitive species
- Large areas of emergent and floating-leaf plant communities
- No non-native submersed species located (e.g., Eurasian watermilfoil)

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Planning Meeting II

Primary Objective: Create implementation plan framework

Steps to Achieve Objective:

1. Discuss challenges facing the lake and the 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

Assignment for Planning Meeting II

1. Create list of challenges facing lake and lake group – keep for meeting
2. Review stakeholder survey results
3. Send potential report section edits and questions to Brenton

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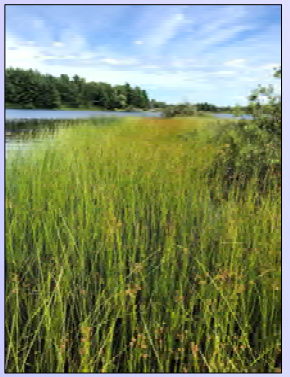
Presentation Outline

- Project Goals
- Overall Study Conclusions
- Key Study Results
- Management Goals & Actions
- Questions



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Management Planning Update Project Overview

- Collect & analyze both technical and sociological data
- Update & Construct long-term & useable plan

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Data and Information Gathering

- **Study Components**
  - Water Quality Analysis
  - Paleocore Collection & Analysis
  - Watershed Delineation & Modeling
  - Aquatic Plant Surveys
  - Shoreland Assessment (Iron County)
  - Fisheries Data Integration
  - Stakeholder Survey

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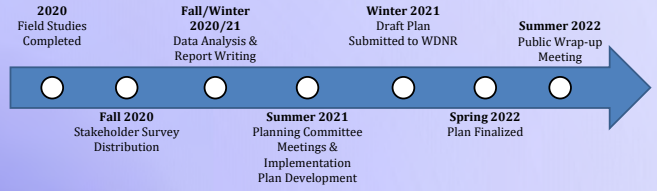
Project Timeline



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Summary of General Project Results

Water Quality

- Overall, water quality is *excellent* for a deep lowland drainage lake in Wisconsin
- Measured increase in phosphorus and decrease in water clarity from 2004-2020; no trend in chlorophyll
- Likely the result of increases in precipitation and input of dissolved organic matter (DOM)

Watershed & Immediate Shoreline

- Watershed is in overall excellent condition– primarily comprised of intact forests & wetlands
- Majority of shoreland zone contains little to no development; but, there are areas for improvement

Aquatic Plant Community

- Native plant community is of exceptional quality; high number of species present as well as number of rare and sensitive species
- Purple loosestrife only non-native species observed

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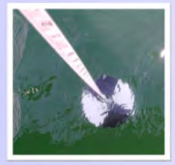
Introduction to Lake Water Quality

Phosphorus
Naturally occurring & essential for all life
Regulates phytoplankton biomass in most WI lakes
Most often 'limiting plant nutrient' (shortest supply)
Human development often increases P delivery to lakes
N:P Ratio: 31:1 – Phosphorus

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

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

Sampling Location



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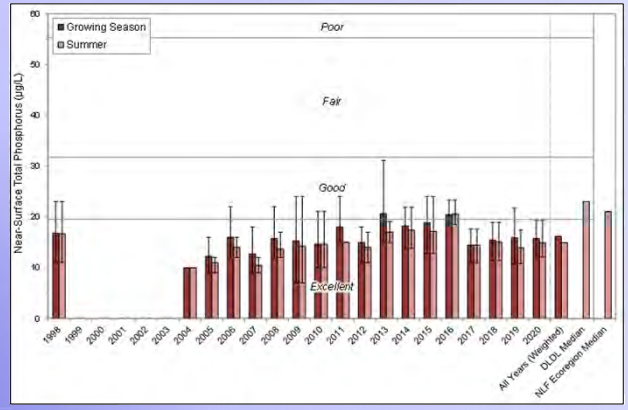
Near-Surface Total Phosphorus



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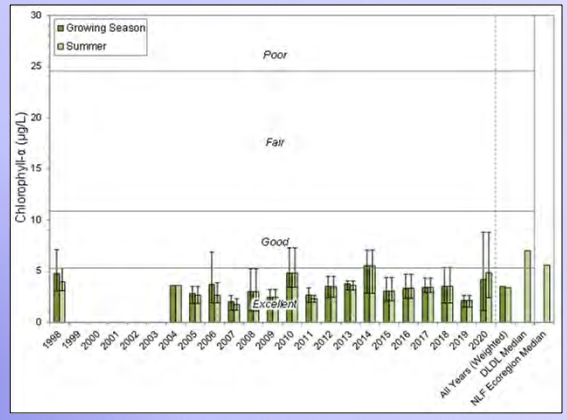
Chlorophyll-α



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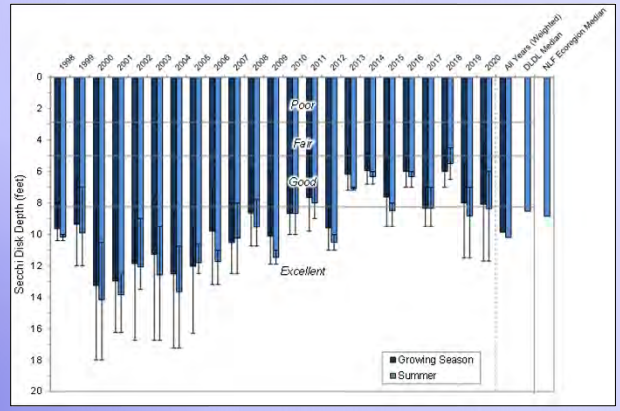
Secchi Disk Depth



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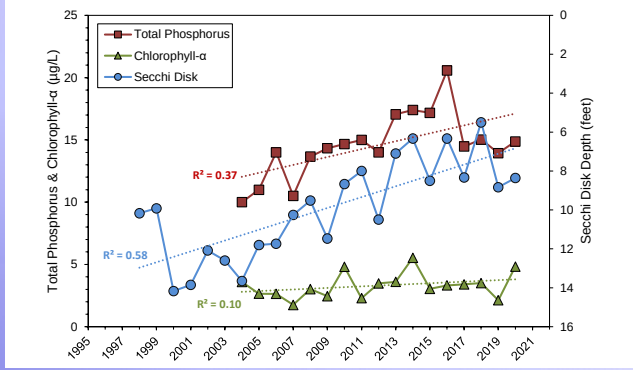
Water Quality Trends



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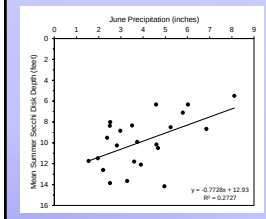
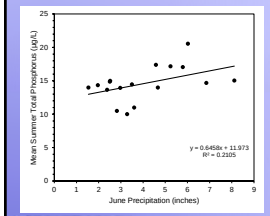
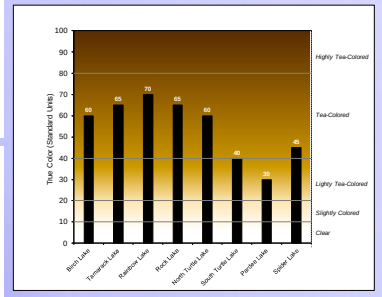
Dissolved Organic Matter & Precipitation







Dissolved Organic Matter

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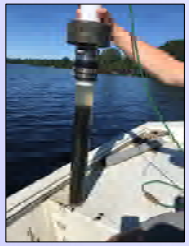
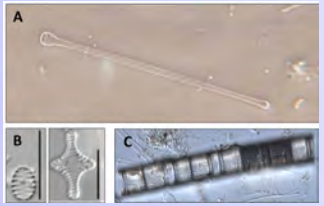
Paleoecology

- Fossilized diatoms in sediment core used to determine if and how water quality has changed over ~150 years
- Diatom communities in top and bottom were relatively similar indicating water quality has not changed significantly



Spider Lake	Diatom-Inferred Phosphorus (µg/L)
Top Core Section	20
Bottom Core Section	20



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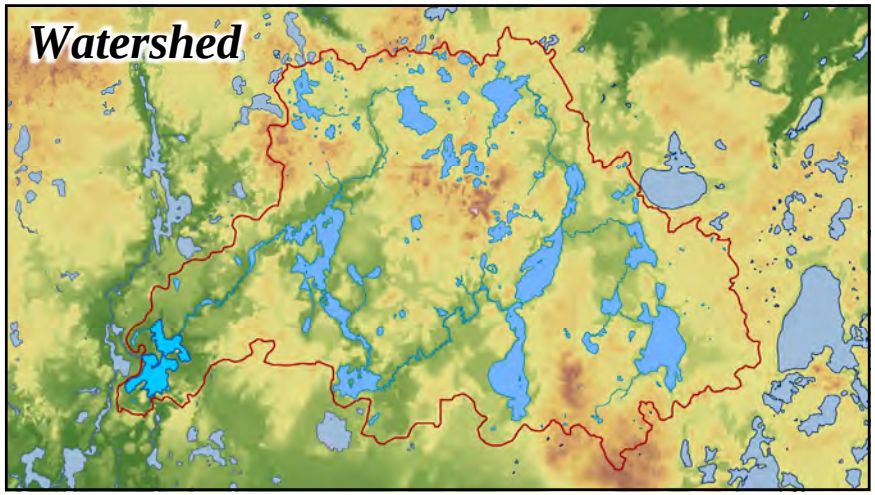
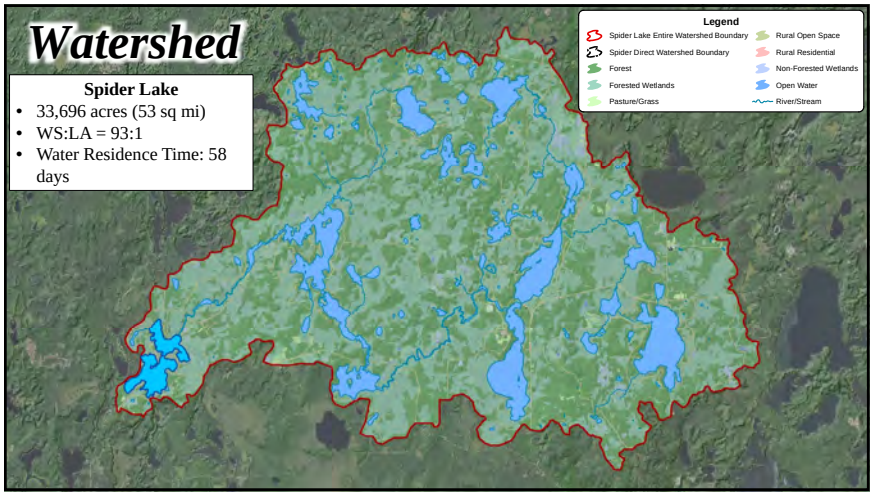
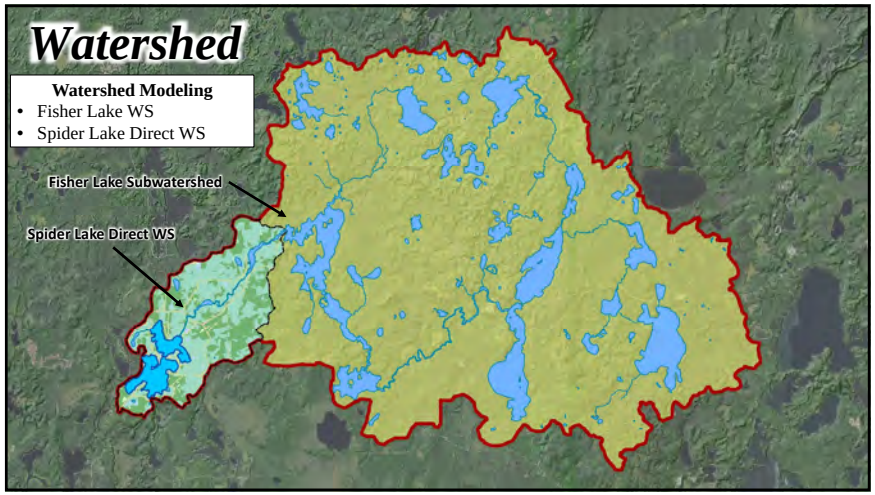
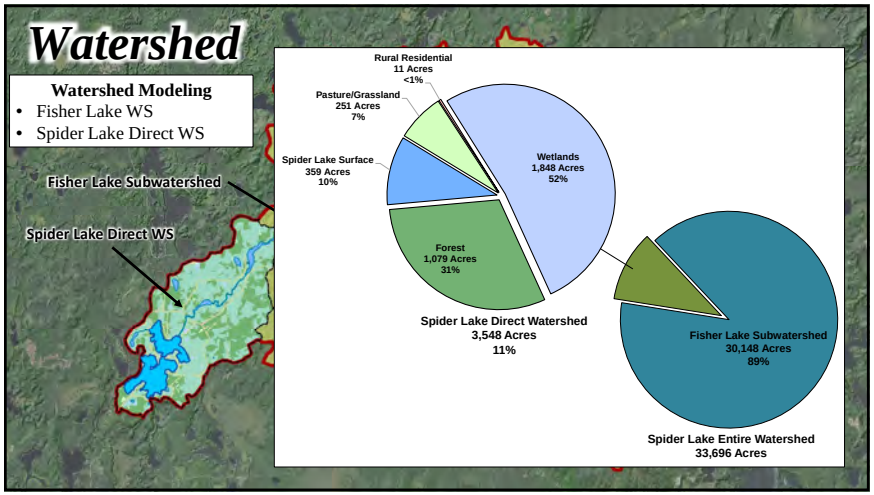
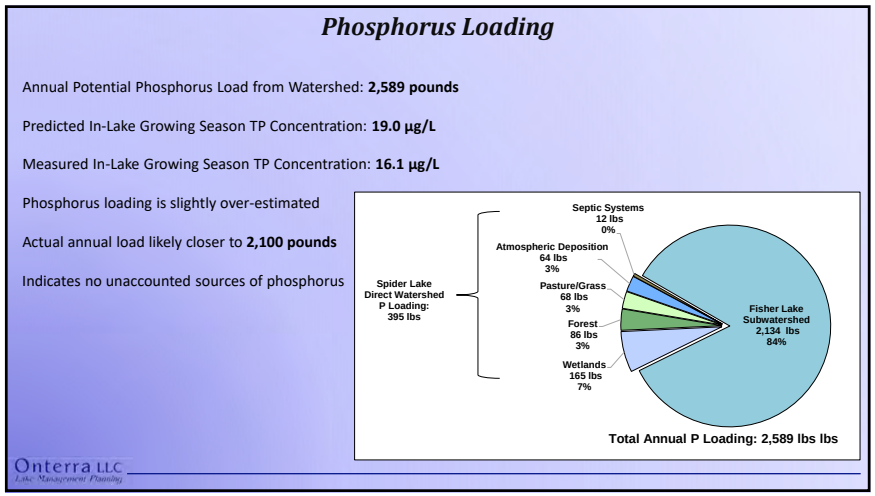





Watershed
Watershed Modeling
• Fisher Lake WS
• Spider Lake Direct WS
Fisher Lake Subwatershed
Spider Lake Direct WS


Watershed
Watershed Modeling
• Fisher Lake WS
• Spider Lake Direct WS
Fisher Lake Subwatershed
Spider Lake Direct WS
Rural Residential
11 Acres
<1%
Pasture/Grassland
251 Acres
7%
Spider Lake Surface
359 Acres
10%
Wetlands
1,848 Acres
52%
Forest
1,079 Acres
31%
Spider Lake Direct Watershed
3,548 Acres
11%
Fisher Lake Subwatershed
30,148 Acres
89%
Spider Lake Entire Watershed
33,696 Acres


Phosphorus Loading
Annual Potential Phosphorus Load from Watershed: 2,589 pounds
Predicted In-Lake Growing Season TP Concentration: 19.0 µg/L
Measured In-Lake Growing Season TP Concentration: 16.1 µg/L
Phosphorus loading is slightly over-estimated
Actual annual load likely closer to 2,100 pounds
Indicates no unaccounted sources of phosphorus
Spider Lake Direct Watershed P Loading: 395 lbs
Septic Systems 12 lbs 0%
Atmospheric Deposition 64 lbs 3%
Pasture/Grass 68 lbs 3%
Forest 86 lbs 3%
Wetlands 165 lbs 7%
Fisher Lake Subwatershed 2,134 lbs 84%
Total Annual P Loading: 2,589 lbs lbs
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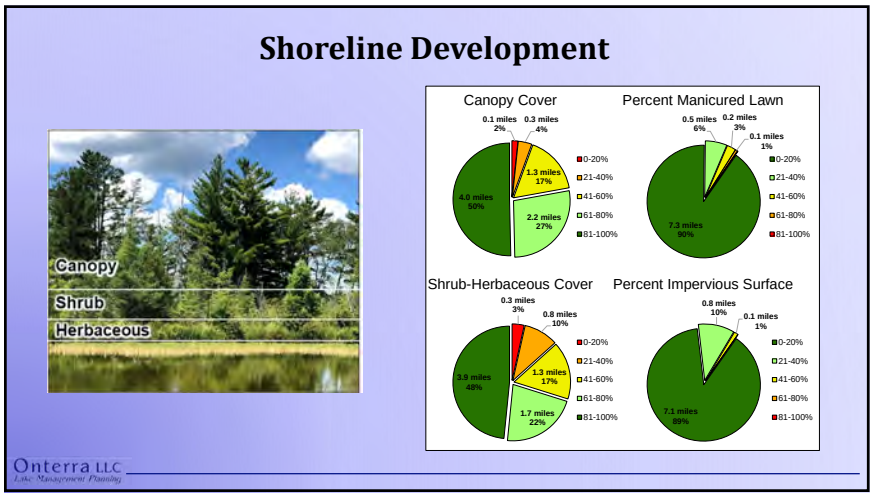
Shoreline Development
Canopy
Shrub
Herbaceous
Canopy Cover
0.1 miles 2%
0.3 miles 4%
1.3 miles 17%
4.0 miles 50%
2.2 miles 27%
Percent Manicured Lawn
0.5 miles 6%
0.2 miles 3%
0.1 miles 1%
7.3 miles 90%
0-20%
21-40%
41-60%
61-80%
81-100%
Shrub-Herbaceous Cover
0.3 miles 3%
0.8 miles 10%
1.3 miles 17%
3.9 miles 48%
1.7 miles 22%
Percent Impervious Surface
0.8 miles 10%
0.1 miles 1%
7.1 miles 88%
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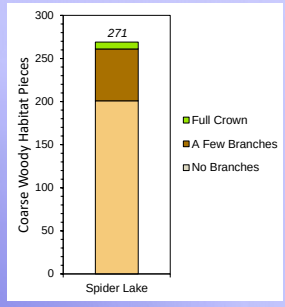
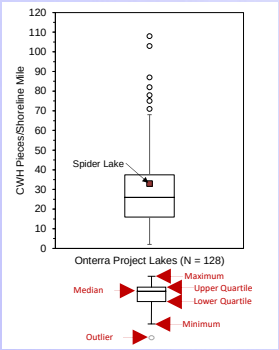
Coarse Woody Habitat





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Management Goal: Protect Current Water Quality Conditions

Management Actions

1. **Continue and expand monitoring of Spider Lake's water quality through the WDNR Citizens Lake Monitoring Network (CLMN) program.**
2. **Promote the conservation of undeveloped and the restoration of highly developed shoreland areas on Spider Lake to protect and enhance habitat, reduce erosion, and protect water quality.**

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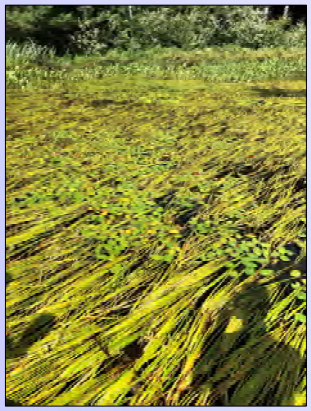
Aquatic Plant Surveys

- Assess both non-native & native species
- Three surveys completed in 2020
  - Early-Season AIS Survey
  - Whole-lake Point-Intercept Survey
  - Emergent/Floating-leaf Community Mapping Survey



Onterra LLC Lake Management Planning

Plant Data Overview

- 59 native plant species recorded
- 1 non-native plant species recorded
  - Purple loosestrife
- Max Rooting Depth: 10 feet

Scientific Name	Common Name	Growth Form	WI State Status	Coefficient of Conservatism	2020 Presence
Acorus americanus	Sweetflag	E	Native	7	X
Bidens beckii	Water marigold	S	Native	8	X
Brasenia schreberi	Watershield	FL	Native	7	X
Carex comosa	Bristly sedge	E	Native	6	I
Carex lasiocarpa	Narrow-leaved woolly sedge	E	Native	7	I
Carex utriculata	Common yellow lake sedge	E	Native	7	X
Ceratophyllum demersum	Coontail	S	Native	3	X
Ceratophyllum echinatum	Spiny hornwort	S	Native	10	X
Chara spp.	Muskgrasses	S	Native	7	X
Cladium mariscoides	Smooth sawgrass	E	Native	10	X
Comarum palustre	Marsh cinquefoil	E	Native	8	X
Dulichium arundinaceum	Three-way sedge	E	Native	9	I
Eleocharis acicularis	Needle spikerush	S/E	Native	5	X
Eleocharis palustris	Creeping spikerush	E	Native	6	X
Eleocharis robbinsii	Robbins' spikerush	E	Native - Special Concern	10	I
Elodea canadensis	Common waterweed	S	Native	3	X
Equisetum fluviatile	Water horsetail	E	Native	7	X
Heteranthera dubia	Water stargrass	S	Native	6	X
Isoetes spp.	Quillwort spp.	S	Native	8	X
Lythrum salicaria	Purple loosestrife	E	Non-Native - Invasive	N/A	I
Myriophyllum heterophyllum	Various-leaved watermilfoil	S	Native	7	X
Myriophyllum sibiricum	Northern watermilfoil	S	Native	7	X
Najas flexilis	Slender naiad	S	Native	6	X
Najas guadalupensis	Southern naiad	S	Native	6	X
Nuphar variegata	Spatterdock	FL	Native	6	X
Nymphaea odorata	White water lily	FL	Native	6	X
Pontederia cordata	Pickerelweed	E	Native	9	X
Potamogeton amplifolius	Large-leaf pondweed	S	Native	7	X
Potamogeton berchtoldii	Slender pondweed	S	Native	7	X
Potamogeton epihydrus	Ribbon-leaf pondweed	S	Native	8	X
Potamogeton friesii	Fries' pondweed	S	Native	8	I
Potamogeton gramineus	Variable-leaf pondweed	S	Native	7	X
Potamogeton natans	Floating-leaf pondweed	S	Native	5	I
Potamogeton praelongus	White-stem pondweed	S	Native	8	X
Potamogeton pusillus	Small pondweed	S	Native	7	X
Potamogeton richardsonii	Clasping-leaf pondweed	S	Native	6	X
Potamogeton robbinsii	Fern-leaf pondweed	S	Native	8	X
Potamogeton spirillus	Spiral-fruited pondweed	S	Native	8	X
Potamogeton vaseyi	Vasey's pondweed	S	Native - Special Concern	10	X
Potamogeton x haynesii	Haynes' pondweed	S	Native	N/A	X
Potamogeton zosteriformis	Flat-stem pondweed	S	Native	6	X
Ranunculus aquatilis	White water crowfoot	S	Native	8	X
Sagittaria graminea	Grass-leaved arrowhead	S/E	Native	9	I
Sagittaria latifolia	Common arrowhead	E	Native	3	X
Sagittaria rigida	Stiff arrowhead	E	Native	8	I
Schoenoplectus acutus	Hardstem bulrush	E	Native	5	X
Schoenoplectus tabernaemontani	Softstem bulrush	E	Native	4	I
Scirpus cyperinus	Wool grass	E	Native	4	I
Sparganium americanum	American bur-reed	E	Native	8	I
Sparganium emersum var. *acaule*	Short-stemmed bur-reed	FL/E	Native	8	X
Sparganium eurycarpum	Common bur-reed	E	Native	5	I
Sparganium fluctuans	Floating-leaf bur-reed	FL	Native	10	X
Sparganium natans	Little bur-reed	S/E	Native	9	I
Stuckenia pectinata	Sago pondweed	S	Native	3	X
Typha latifolia	Broad-leaved cattail	E	Native	1	I
Utricularia intermedia	Flat-leaf bladderwort	S	Native	9	I
Utricularia vulgaris	Small bladderwort	S	Native	10	X
Vallisneria americana	Common bladderwort	S	Native	7	X
Wolffia columbiana	Wild celery	S	Native	6	X
Zizania palustris	Northern wild rice	E	Native	8	I

I = Located on lake during point-intercept survey, I = Incidentally located
E = Emergent, FL = Floating-leaf, FL/E = Floating-leaf & Emergent, S = Submergent, S/E = Submergent & Emergent

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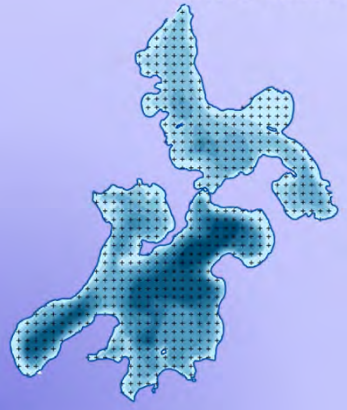
Whole-Lake Point-Intercept Surveys



Spider Lake
50-meter resolution
582 total points

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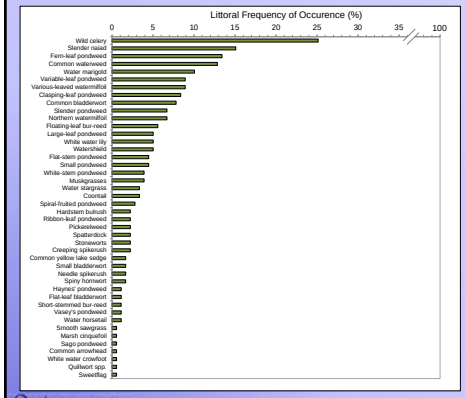
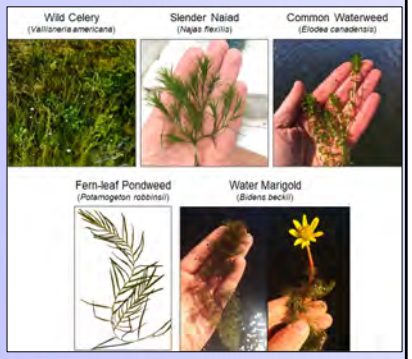
Littoral Frequency of Occurrence





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Other Plants of Interest

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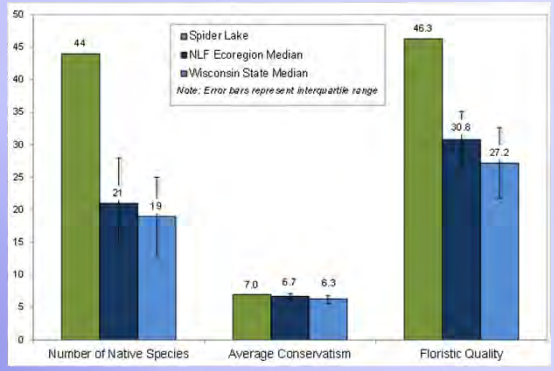
Floristic Quality Analysis



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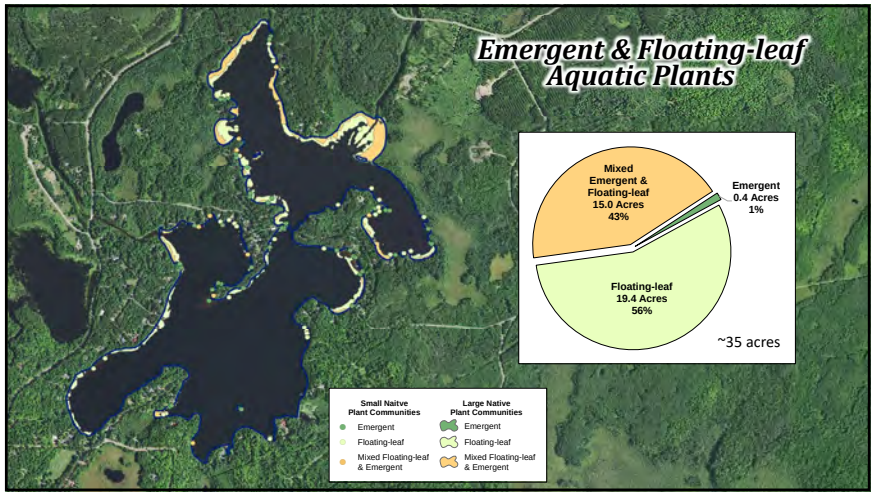
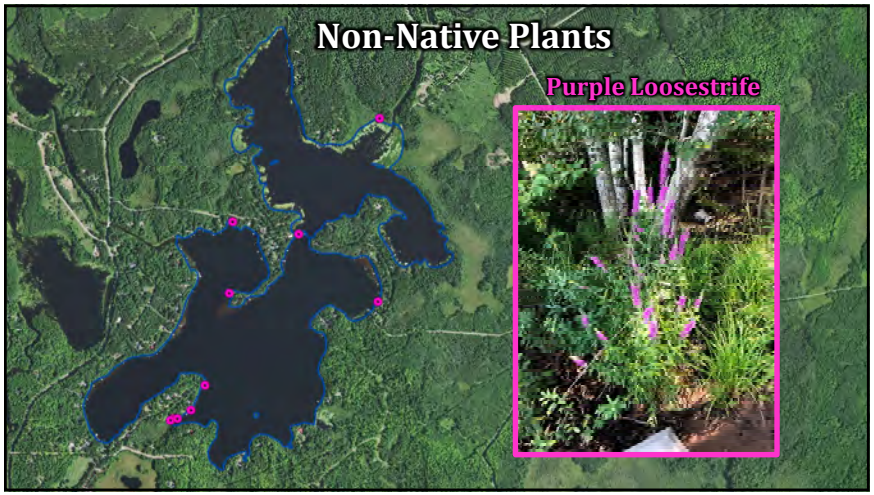
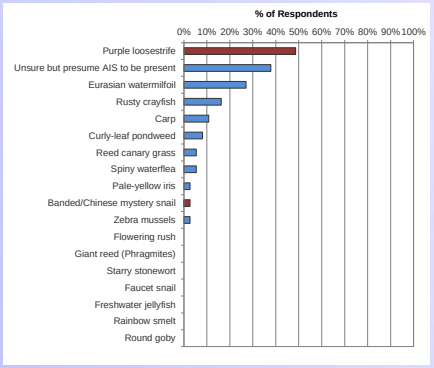




Other Non-Native Species

Chinese & Banded Mystery Snails



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Management Goal:

Control Existing & Prevent New Introductions of Aquatic Invasive Species to Spider Lake

Management Actions

1. **Recruit and coordinate volunteers to initiate annual monitoring for invasive species at public and private boat launches around Spider Lake.**
2. **Activate aquatic invasive species rapid response plan upon discovery of a new infestation.**
3. **Consider utilizing professional ecologists for periodic, lake-wide invasive species monitoring.**
4. **Monitor and control purple loosestrife within the immediate shoreland zone of Spider Lake.**
5. **SLA to work with owners of private boat launches on Spider Lake regarding aquatic invasive species education and prevention.**
6. **SLA to investigate installing/improving aquatic invasive species signage at most frequently-used boat launches and along the Turtle River between Oxbow and Spider Lakes.**

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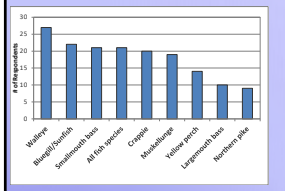
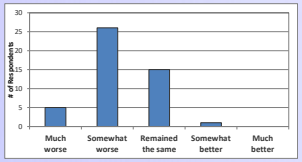
Fisheries – Stakeholder Survey

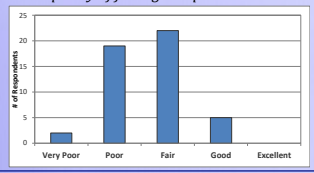
What species of fish do you like to catch in Spider Lake?



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



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



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Fisheries – Population Trends

Walleye Abundance
- 1998 = 2.7/acre; 2007 = 1.6/acre; 2013 = 1.3/acre; 2019 = 1.1/acre
- Stocking of walleye to begin in 2021

Muskellunge
- Balanced size structure
- Sustained 100% through natural reproduction

Northern Pike Abundance
- Size structure was skewed towards smaller fish

Largemouth & Smallmouth Bass
- Smallmouth bass more prevalent; balanced size structure
- Largemouth population appears to be small

Panfish
Bluegill and crappie show balanced size structure; yellow perch skewed smaller

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Management Goal:
Conserve & Enhance Spider Lake as a Fishery Resource

Management Actions

1. **Work with WDNR fisheries managers, other Turtle River Chain of Lakes Associations, and the Iron County Lakes and Rivers Alliance to conserve and enhance the fishery of Spider Lake.**

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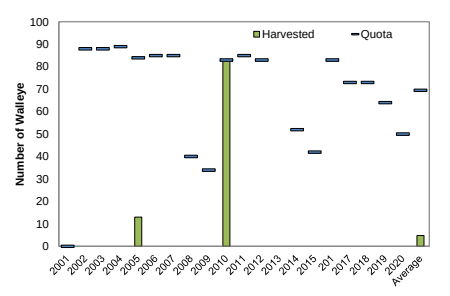
Native American Spear Harvest
- Spider is located within Ceded Territory (Treaty of 1842).
- Tribal and State authorities establish *total allowable catch* (TAC) based on population estimates (typically 35% for walleye & 27% for muskellunge)
- The total allowable catch number may be reduced based on confidence in population estimates: *safe harvest level*
- Tribal community claims percentage of safe harvest level, or *declaration*
- Bag limits for hook and line anglers set to accommodate declaration
- Can only harvest two walleye over 20 inches per night – one between 20 and 24" and one any size over 20"

Onterra LLC Lake Management Planning

Fisheries – Walleye Harvest



Onterra LLC Lake Management Planning

Spider Lake Conservation Opportunity Areas (COAs)

- 2.5% of water on Earth is freshwater – 0.01% is available in lakes and rivers
- Biodiversity loss is **5 times faster** in freshwater ecosystems when compared to terrestrial and marine systems
- Nine COAs delineated in Spider Lake based on aquatic plant community & shoreland assessments
  - Intent is to encompass and highlight the full spectrum of native species and natural community diversity present in Spider Lake
  - Capture areas where NHI-listed species were located
  - Capture areas of highest plant species richness and diversity
  - Capture suite of substrate types in the lake (cobble/rock, sand, organic)
  - Proximity to natural shorelines and coarse woody habitat abundance

Onterra LLC Lake Management Planning

Additional Management Goal:

Increase SLA's Capacity to Communicate with Lake Stakeholders & Facilitate Partnerships with Other Management Entities

Management Actions

1. **Promote the conservation and enjoyment of Spider Lake through stakeholder education.**
2. **Continue and enhance SLA's involvement with other entities that manage aspects of Spider Lake and other conservation groups.**

Onterra LLC Lake Management Planning

Big Picture Conclusions

Water Quality

- Overall, parameters assessed indicate Spider Lake's water quality is excellent for a deep lowland drainage lake in Wisconsin
- Increasing trend in phosphorus, decreasing trend in water clarity. Likely due to increase in Dissolved Organic Matter from higher precipitation
- Water quality has remained largely unchanged over the past ~100 years

Watershed

- Large watershed that's mainly comprised of natural land cover types
- No unaccounted sources of phosphorus detected

Aquatic Plant Community

- Native aquatic plant community is of exceptional quality
- High number of native species & sensitive species
- Large areas of emergent and floating-leaf plant communities
- No non-native submersed species located (e.g., Eurasian watermilfoil)

Onterra LLC
Lake Management Planning

B

APPENDIX B

Riparian Stakeholder Survey Response Charts & Comments

Spider Lake - Anonymous Stakeholder Survey

Surveys Distributed: 166
Surveys Returned: 58
Response Rate: 35%

Spider Lake Property

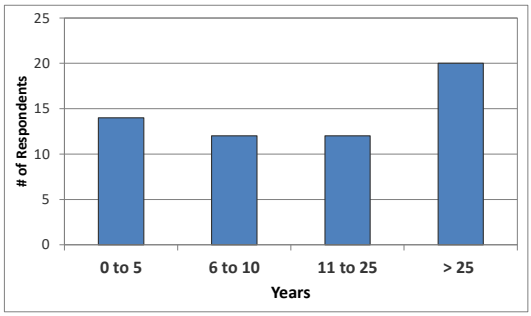
1. Is your property on the lake or off the lake? Please select one choice.

Answer Options	Response Percent	Response Count
On the lake	96.6%	56
Off the lake	3.5%	2
answered question		58
skipped question		0

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

Answer Options	Response Count
	58
answered question	58
skipped question	0

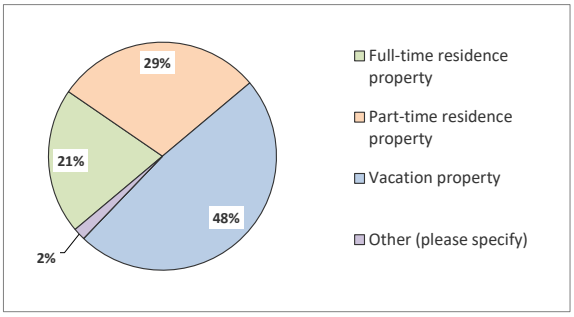
Category (# of years)	Responses	% Response
0 to 5	14	24%
6 to 10	12	21%
11 to 25	12	21%
> 25	20	34%



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

Answer Options	Response Percent	Response Count
Full-time residence property	20.7%	12
Part-time residence property	29.3%	17
Vacation property	48.3%	28
Resort property	0.0%	0
Rental property	0.0%	0
Other (please specify)	1.7%	1
answered question		58
skipped question		0

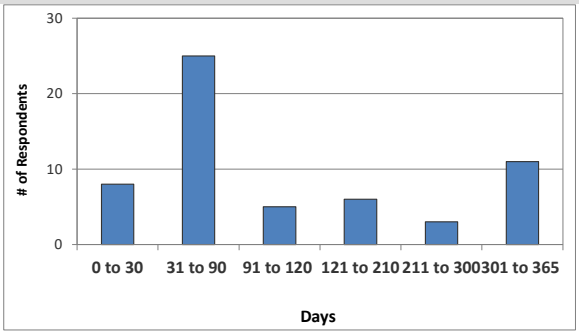
Number	Other (please specify)
1	Vacant lot



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

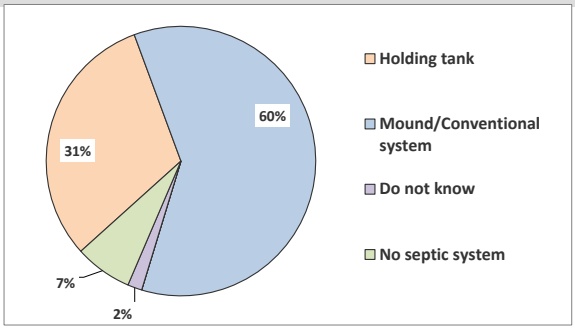
Answer Options	Response Count
	58
answered question	58
skipped question	0

Category (# of days)	Responses	
0 to 30	8	14%
31 to 90	25	43%
91 to 120	5	9%
121 to 210	6	10%
211 to 300	3	5%
301 to 365	11	19%



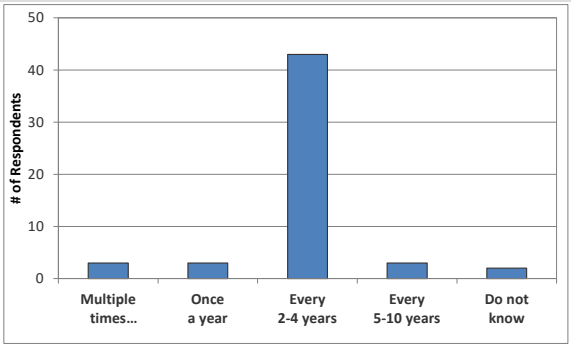
5. What type of septic system does your property have?

Answer Options	Response Percent	Response Count
Holding tank	31.0%	18
Mound/Conventional system	60.3%	35
Municipal sewer	0.0%	0
Advanced treatment system	0.0%	0
Municipal sewer	0.0%	0
Do not know	1.7%	1
No septic system	6.9%	4
answered question		58
skipped question		0



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

Answer Options	Response Percent	Response Count
Multiple times a year	5.6%	3
Once a year	5.6%	3
Every 2-4 years	79.6%	43
Every 5-10 years	5.6%	3
Do not know	3.7%	2
answered question		54
skipped question		4

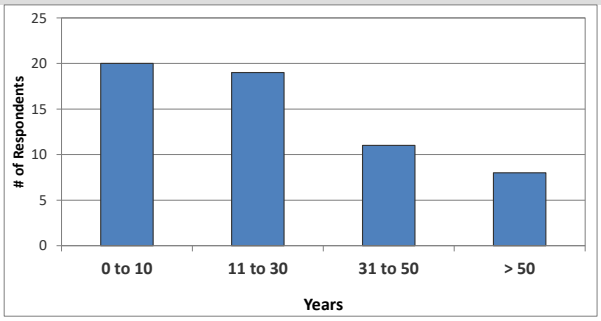


Recreational Activity on Spider Lake

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

Answer Options	Response Count
	58
answered question	58
skipped question	0

Category (# of years)	Responses	% Response
0 to 10	20	34%
11 to 30	19	33%
31 to 50	11	19%
> 50	8	14%



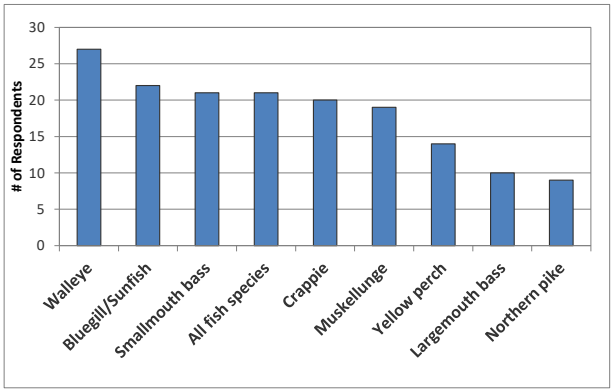
8. Have you personally fished on Spider Lake in the past three years?

Answer Options	Response Percent	Response Count
Yes	82.5%	47
No	17.5%	10
answered question		57
skipped question		1

9. What species of fish do you like to catch on Spider Lake?

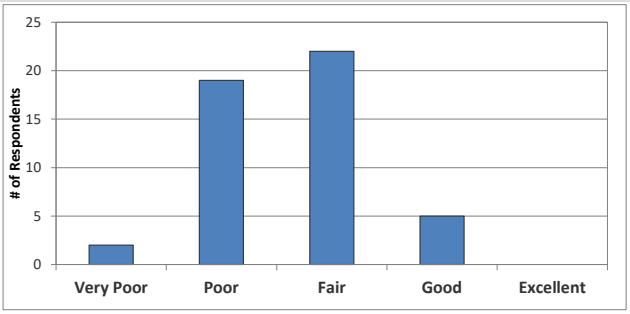
Answer Options	Response Percent	Response Count
Walleye	57.5%	27
Bluegill/Sunfish	46.8%	22
Smallmouth bass	44.7%	21
All fish species	44.7%	21
Crappie	42.6%	20
Muskellunge	40.4%	19
Yellow perch	29.8%	14
Largemouth bass	21.3%	10
Northern pike	19.2%	9
Other	2.1%	1
answered question		47
skipped question		11

Number	Other (please specify)
1	But I never catch anything😀



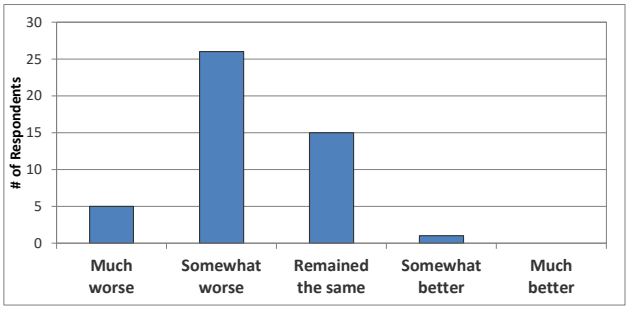
10. How would you describe the current quality of fishing on Spider Lake?

Answer Options	Very Poor	Poor	Fair	Good	Excellent	Response Count
	2	19	22	5	0	48
					answered question	48
					skipped question	10



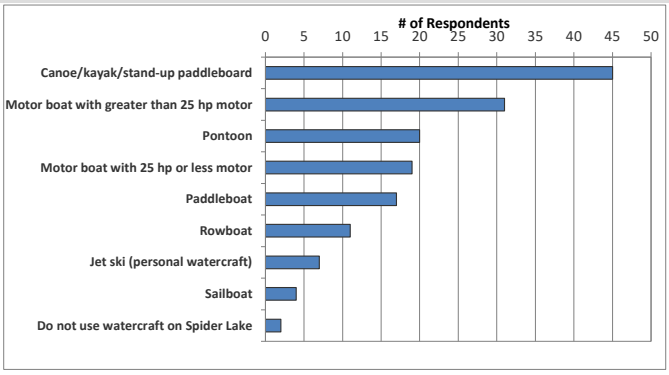
11. How has the quality of fishing changed on Spider Lake since you have started fishing the lake?

Answer Options	Much worse	Somewhat worse	Remained the same	Somewhat better	Much better	Response Count
	5	26	15	1	0	47
					answered question	47
					skipped question	11



12. What types of watercraft do you currently use on Spider Lake?

Answer Options	Response Percent	Response Count
Canoe/kayak/stand-up paddleboard	79.0%	45
Motor boat with greater than 25 hp motor	54.4%	31
Pontoon	35.1%	20
Motor boat with 25 hp or less motor	33.3%	19
Paddleboat	29.8%	17
Rowboat	19.3%	11
Jet ski (personal watercraft)	12.3%	7
Sailboat	7.0%	4
Do not use watercraft on Spider Lake	3.5%	2
Jet boat	0.0%	0
Do not use watercraft on any waters	0.0%	0
answered question		57
skipped question		1



13. Do you use your watercraft on waters other than Spider Lake?

Answer Options	Response Percent	Response Count
Yes	40.0%	22
No	60.0%	33
answered question		55
skipped question		3

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

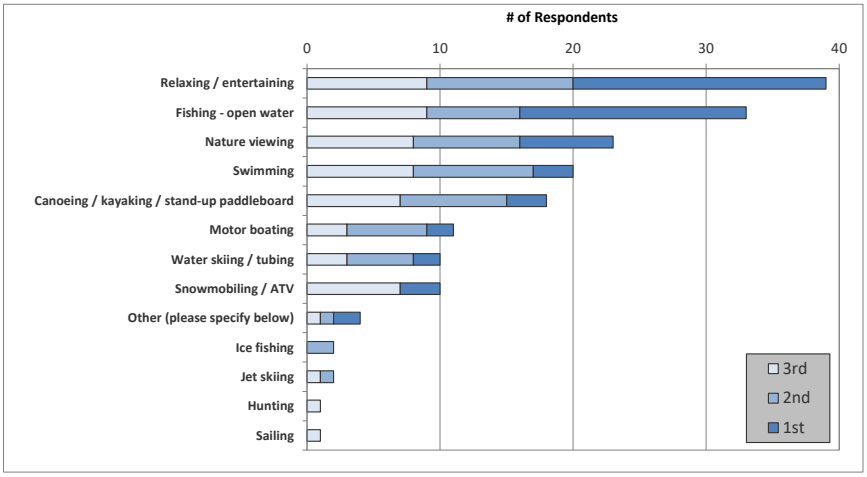
Answer Options	Response Percent	Response Count
Remove aquatic hitchhikers (ex. plant material, clams, mussels)	60.0%	12
Drain bilge	35.0%	7
Rinse boat	25.0%	5
Power wash boat	10.0%	2
Apply bleach	15.0%	3
Air dry boat for 5 or more days	65.0%	13
Do not clean boat	15.0%	3
Other		5
answered question		20
skipped question		38

Number	Other (please specify)
1	Don’t go to other lakes
2	only use 1 kayak on other waters. It's kept clean. Other watercraft stay only on Spider Lake.
3	Don’t use in other lakes
4	Washed between fishing trips
5	we only use our kayaks on other lakes, pontoon boat only used on Spider Lake

15. For the list below, rank up to three activities that are important reasons for owning your property on Spider Lake, with 1 being the most important.

Answer Options	1st	2nd	3rd	Weighted Average	Response Count
Relaxing / entertaining	19	11	9	1.74	39
Fishing - open water	17	7	9	1.76	33
Nature viewing	7	8	8	2.04	23
Swimming	3	9	8	2.25	20
Canoeing / kayaking / stand-up paddleboard	3	8	7	2.22	18
Motor boating	2	6	3	2.09	11
Water skiing / tubing	2	5	3	2.1	10
Snowmobiling / ATV	3	0	7	2.4	10
Other (please specify below)	2	1	1	1.75	4
Ice fishing	0	2	0	2	2
Jet skiing	0	1	1	2.5	2
Hunting	0	0	1	3	1
Sailing	0	0	1	3	1
None of these activities are important to me	0	0	0	0	0
			answered question		**58**
			skipped question		**0**

Number	"Other" responses
1	Skiing/snowshoeing/bike/hike
2	Snow Skiing, Cross-Country Skiing
3	peace, privacy and quiet
4	tranquility, beauty,

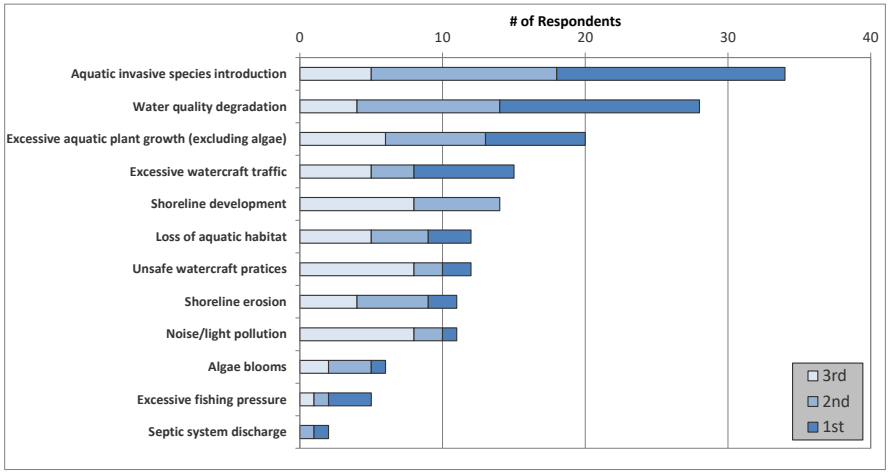


Spider Lake Current and Historic Condition, Health and Management

16. From the list below, please rank your top three concerns regarding Spider Lake, with the 1st being your top concern.

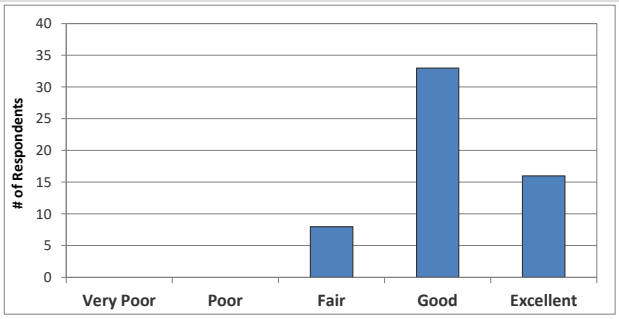
Answer Options	1st	2nd	3rd	Response Count
Aquatic invasive species introduction	16	13	5	34
Water quality degradation	14	10	4	28
Excessive aquatic plant growth (excluding algae)	7	7	6	20
Excessive watercraft traffic	7	3	5	15
Shoreline development	0	6	8	14
Loss of aquatic habitat	3	4	5	12
Unsafe watercraft pratices	2	2	8	12
Shoreline erosion	2	5	4	11
Noise/light pollution	1	2	8	11
Algae blooms	1	3	2	6
Excessive fishing pressure	3	1	1	5
Septic system discharge	1	1	0	2
Other (please specify)	1	0	1	2
			answered question	**58**
			skipped question	**0**

Number	"Other" responses
1	Lack of game fish population
2	3. Too many musky eating other fish.
3	Water level seems very low



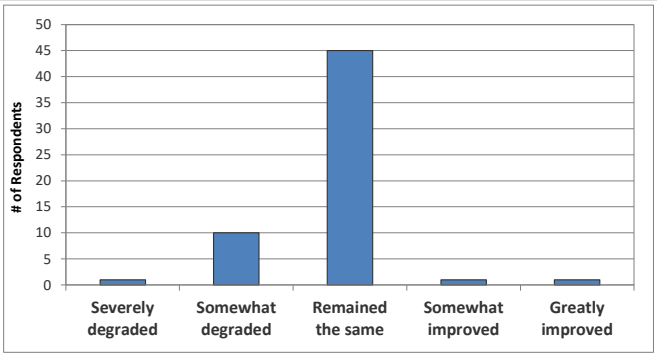
17. How would you describe the overall current water quality of Spider Lake?

Answer Options	Answer Options	Very Poor	Poor	Fair	Good	Excellent	Response Count
		0	0	8	33	16	57
						answered question	**57**
						skipped question	**1**



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

Answer Options	Severely degraded	Somewhat degraded	Remained the same	Somewhat improved	Greatly improved	Response Count
	1	10	45	1	1	58
					answered question	58
					skipped question	0



19. 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)	44.8%	26
Water color	3.5%	2
Aquatic plant growth (not including algae blooms)	29.3%	17
Algae blooms	5.2%	3
Smell	1.7%	1
Water level	8.6%	5
Fish kills	1.7%	1
Other (please specify)	5.2%	3
answered question		58
skipped question		0

Number	"Other" responses
1	clarity/color confusion - non-clear water can't be seen through - isn't that because it's colored??
2	Keeping invasive species out of the lake
3	phosphate levels

20. Before reading the statement above, had you ever heard of aquatic invasive species?

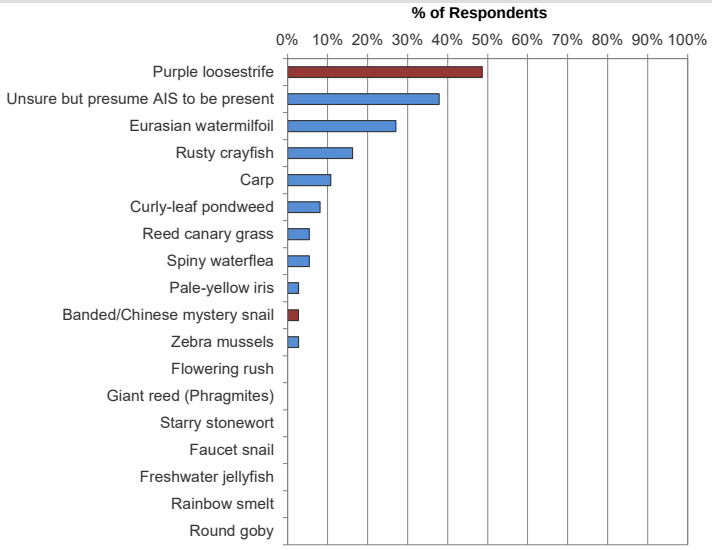
Answer Options	Response Percent	Response Count
Yes	98.2%	55
No	1.8%	1
answered question		56
skipped question		2

21. Do you believe aquatic invasive species are present within Spider Lake?

Answer Options	Response Percent	Response Count
Yes	31.0%	18
I think so but am not certain	32.8%	19
No	36.2%	21
answered question		58
skipped question		0

22. Which aquatic invasive species do you believe are in Spider Lake?

Answer Options	Response Percent	Response Count
Purple loosestrife	48.7%	18
Unsure but presume AIS to be present	37.8%	14
Eurasian watermilfoil	27.0%	10
Rusty crayfish	16.2%	6
Carp	10.8%	4
Curly-leaf pondweed	8.1%	3
Reed canary grass	5.4%	2
Spiny waterflea	5.4%	2
Pale-yellow iris	2.7%	1
Banded/Chinese mystery snail	2.7%	1
Zebra mussels	2.7%	1
Flowering rush	0.0%	0
Giant reed (Phragmites)	0.0%	0
Starry stonewort	0.0%	0
Faucet snail	0.0%	0
Freshwater jellyfish	0.0%	0
Rainbow smelt	0.0%	0
Round goby	0.0%	0
Other (please specify)	0.0%	0
answered question		**37**
skipped question		**21**



Spider Lake Association (SLA)

23. Before receiving this mailing, have you ever heard of the SLA?

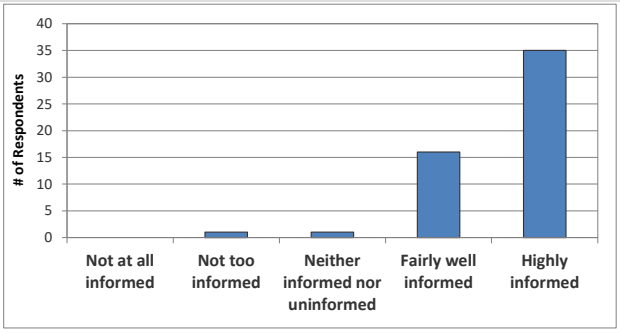
Answer Options	Response Percent	Response Count
Yes	98.3%	57
No	1.7%	1
answered question		**58**
skipped question		**0**

24. What is your membership status with the SLA?

Answer Options	Response Percent	Response Count
Current member	89.3%	50
Former member	3.6%	2
Never been a member	7.1%	4
answered question		**56**
skipped question		**2**

25. How informed has (or had) the SLA kept you regarding issues with Spider Lake and its management?

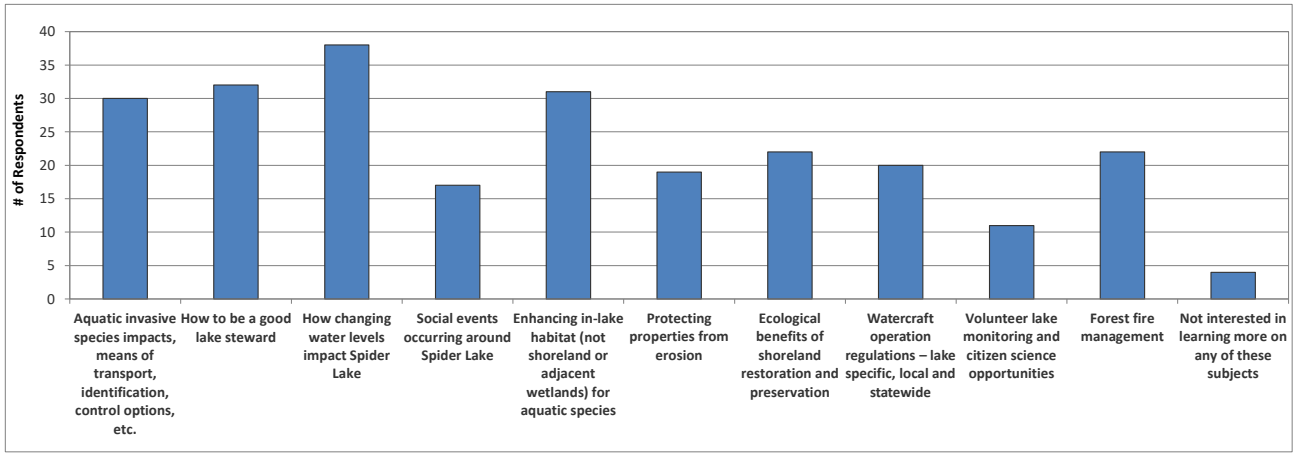
Answer Options	Not at all informed	Not too informed	Neither informed nor uninformed	Fairly well informed	Highly informed	Response Count
	0	1	1	16	35	53
answered question						**53**
skipped question						**5**



26. 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 Percent	Response Count
Aquatic invasive species impacts, means of transport, identification, control options, etc.	52.6%	30
How to be a good lake steward	56.1%	32
How changing water levels impact Spider Lake	66.7%	38
Social events occurring around Spider Lake	29.8%	17
Enhancing in-lake habitat (not shoreland or adjacent wetlands) for aquatic species	54.4%	31
Protecting properties from erosion	33.3%	19
Ecological benefits of shoreland restoration and preservation	38.6%	22
Watercraft operation regulations – lake specific, local and statewide	35.1%	20
Volunteer lake monitoring and citizen science opportunities	19.3%	11
Forest fire management	38.6%	22
Not interested in learning more on any of these subjects	7.0%	4
Some other topic (please specify)	8.8%	5
	answered question	**57**
	skipped question	**1**

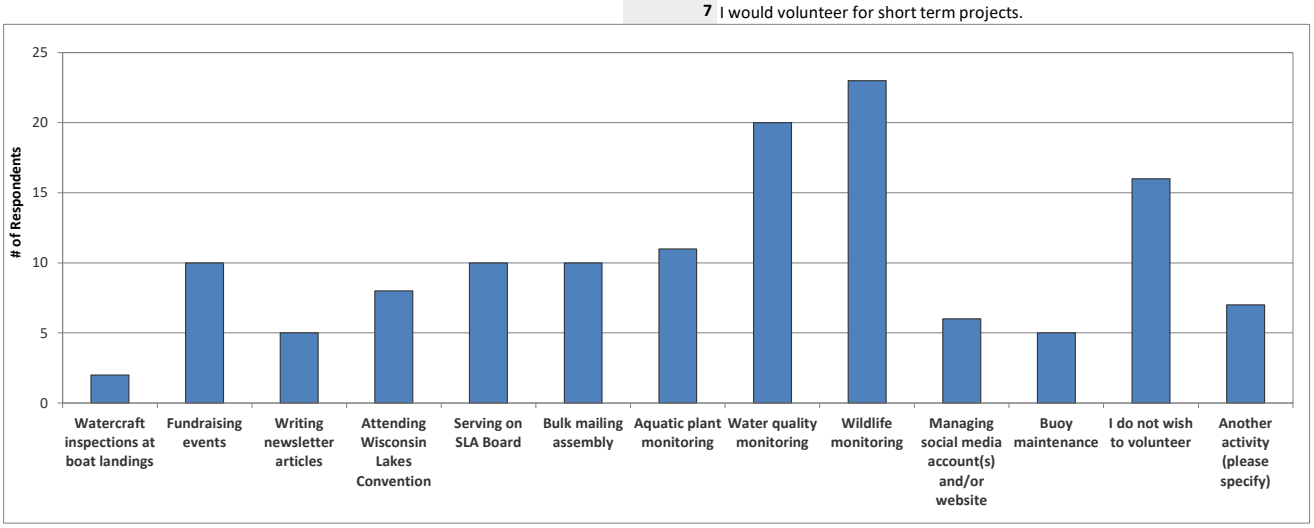
Number	Other (please specify)
1	Why are we creating a lake management plan? It would seem such a plan could be used as justification by some to limit the use of the lake by others. Since "what is our next step" isn't possible to answer until the plan exists, what have been the next steps on other WI lakes where a management plan was created?
2	public dock maintenance
3	Walleye stocking
4	Fish surveys and status
5	Fishery Management Updates



27. The effective management of Spider Lake will require the cooperative efforts of numerous volunteers. Please circle the activities you would be willing to participate in if the SLA requires additional assistance.

Answer Options	Response Percent	Response Count
Watercraft inspections at boat landings	3.6%	2
Fundraising events	17.9%	10
Writing newsletter articles	8.9%	5
Attending Wisconsin Lakes Convention	14.3%	8
Serving on SLA Board	17.9%	10
Bulk mailing assembly	17.9%	10
Aquatic plant monitoring	19.6%	11
Water quality monitoring	35.7%	20
Wildlife monitoring	41.1%	23
Managing social media account(s) and/or website	10.7%	6
Buoy maintenance	8.9%	5
I do not wish to volunteer	28.6%	16
Another activity (please specify)	12.5%	7
answered question		**56**
skipped question		**2**

Number	Other (please specify)
1	I believe in personal responsibility and therefore I would not inspect watercraft at landings and would think feelings would get hurt by someone doing such a power grab. As a lakefront property owner wh visits often but unscheduled times I would be open to most any activity that can be performed when I happen to be there.
2	Firewise program activities
3	We aren't there enough, but hope to in the future and could volunteer at that point.
4	Perhaps in the future i would be interested when retired.
5	Not there enough to do much volunteering.
6	I am not there often enough to volunteer but as I near retirement I hope to volunteer more time
7	I would volunteer for short term projects.



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

Answer Options	Response Count
answered question	23
skipped question	35

Number	Response Text
1	watercraft operations regulations
2	Would like to see more social events for lake residents. I think there should be restriction on the size of boat motors allowed in the lake. Additionally, “no wake zones” should be enforced around the lake. You have to lift your boat out of the water to prevent it from being damaged by excessive and frequent wakes.
3	Would be interested in more of a fish management program and stocking.
4	Interested in improved fishing - stocking the lake again. Improvements in safe watercraft practices on the lake. Preserving loon habitat.
5	I think the SLA management team is doing an excellent job in the stewardship of our lake’s health
6	Thanks to the association and everyone with the concern and making these efforts to improve the lake ecosystem. We feel lucky there are those who can do this while we are only occassional visitors there.
7	There are several boats on Spider Lake that are too large (in size and horsepower) for the size of the lake, causing massive wakes, excessive noise and disruption of our lake's water fowl. Would like to consider having a boat size/HP limit implemented.
8	Thank you to all board members, committee members and volunteers for your work in making Spider Lake a great place.
9	I feel comfortable swimming in this lake. I hope it never becomes unsafe to do that.
10	Thank you to the current and past board members for all that they do!
11	Wish there weren’t any jet skis
12	Low water levels by my property a concern along with increasing plant growth and mucky bottom.
13	lake weeds seem to be growing more aggressively, lake bottom muck has gotten thicker at shore over the years. Curious if this is from runnoff, boat traffic or both. Fishing for Walleye is terrible but bass fishing has improved substantially. Panfish populations seem to have improved over the years. Overall the lake is beautiful and offers a variety activities and is well managed. I mostly fish the lake but do not object to watercraft/tubing/jetski use as it is meant for recreation.
14	Protecting our lake is of critical importance to us, and we want the Association to be proactive in taking actions to do that.
15	I have been going to Spider Lake since I was 5 years old and love the property that we still enjoy. I would like to see the fishing improve, especially Walleye! One other thing that I have noticed in recent years, is boaters lack of respect to fishermen in the evenings. They come too close (usually pontoon boats) and seem oblivious to what they are doing.
16	I think SL is doing a good job.
17	Thank You for the Survey and Lake Management Plan efforts.
18	I'd like to see a history of the resorts once on the lake and information regarding if the lake was used by Native Americans (as the Flambeau Trail is close by) and any logging history that was on the lake.
19	My primary concerns are the declining fishery and the increased average size of speed boats.
20	Feel like we are updated regularly by the lake association. Fishing production has gone down over the last 7 years I’ve fished there. This year there’s considerably more algae growth on my shore station than in years past.
21	Would like to see more stocking of walleyes. More good cabbage growth. Also return of select choosing trees to be dropped in water to create more cover for fish species.
22	Very fearful of aquatic invaders plant and species. Health and beauty of lake needs to be preserved. Grateful to SLA for keeping us informed.
23	We have a hand full of properties that have no buffer to the lake and have removed vegetation between their home and the lake shore.

C

APPENDIX C

Water Quality Data

Spider Lake, Iron Cty.

	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1998	4	9.6	3	10.2	4	4.8	3	4.0	4	16.8	3.0	16.7
1999	12	9.4	6	9.9	0		0		0		0.0	
2000	15	13.3	6	14.2	0		0		0		0.0	
2001	9	13.0	5	13.9	0		0		0		0.0	
2002	9	11.9	6	12.1	0		0		0		0.0	
2003	8	11.3	5	12.6	0		0		0		0.0	
2004	9	12.5	5	13.7	1	3.6	1	3.6	1	10.0	1.0	10.0
2005	6	12.0	3	11.8	4	2.8	3	2.7	4	12.3	3.0	11.0
2006	7	9.8	3	11.7	4	3.7	3	2.6	4	16.0	3.0	14.0
2007	4	10.5	2	10.3	3	2.0	2	1.8	4	12.8	2.0	10.5
2008	4	8.6	3	9.5	3	3.0	3	3.0	4	15.8	3.0	13.7
2009	4	10.1	3	11.5	3	2.4	3	2.4	4	15.3	3.0	14.3
2010	3	8.7	3	8.7	3	4.8	3	4.8	3	14.7	3.0	14.7
2011	4	7.6	2	8.0	3	2.7	2	2.3	4	18.0	2.0	15.0
2012	4	9.6	2	10.5	3	3.5	2	3.5	4	15.0	2.0	14.0
2013	4	6.2	2	7.1	3	3.7	2	3.6	4	20.6	2.0	17.1
2014	4	5.9	3	6.3	3	5.5	3	5.5	4	18.3	3.0	17.4
2015	4	7.6	3	8.5	3	3.0	3	3.0	4	18.9	3.0	17.2
2016	4	6.0	3	6.3	3	3.3	3	3.3	4	20.4	3.0	20.6
2017	3	8.3	3	8.3	3	3.4	3	3.4	3	14.5	3.0	14.5
2018	3	6.0	2	5.5	3	3.5	3	3.5	4	15.4	3.0	15.0
2019	4	8.0	3	8.8	3	2.1	3	2.1	4	15.9	3.0	13.9
2020	24	8.1	16	8.4	6	4.2	4	4.8	6	15.8	4.0	14.9
2021	16	8.9	12	9.6	3	2.1	3	2.1	4	16.0	3.0	15.4
All Years (Weighted)		9.8		10.1		3.4		3.3		16.2		15.0
DLDL Median				8.5				7.0				23.0
NLF Ecoregion Median				8.9				5.6				21.0

D

APPENDIX D

Point-Intercept Aquatic Macrophyte Survey Data

Lake	Spider Lake
County	Iron
Date	8/11/2020, 8/13/2020

Species	Common Name	Life Form	Present?	FOC Vegetated Sites	FOC Littoral Zone	Relative FOC
Vallisneria americana	*Wild celery*	S	*1*	*42.1*	*25.1*	*12.5*
Najas flexilis	*Slender naiad*	S	*1*	*25.2*	*15.1*	*7.5*
Potamogeton robbinsii	*Fern-leaf pondweed*	S	*1*	*22.4*	*13.4*	*6.7*
Elodea canadensis	*Common waterweed*	S	*1*	*21.5*	*12.8*	*6.4*
Bidens beckii	*Water marigold*	S	*1*	*16.8*	*10.1*	*5.0*
Potamogeton gramineus	*Variable-leaf pondweed*	S	*1*	*15.0*	*8.9*	*4.5*
Myriophyllum heterophyllum	*Various-leaved watermilfoil*	S	*1*	*15.0*	*8.9*	*4.5*
Potamogeton richardsonii	*Clasping-leaf pondweed*	S	*1*	*14.0*	*8.4*	*4.2*
Utricularia vulgaris	*Common bladderwort*	S	*1*	*13.1*	*7.8*	*3.9*
Potamogeton berchtoldii	*Slender pondweed*	S	*1*	*11.2*	*6.7*	*3.3*
Myriophyllum sibiricum	*Northern watermilfoil*	S	*1*	*11.2*	*6.7*	*3.3*
Sparganium fluctuans	*Floating-leaf bur-reed*	FL	*1*	*9.3*	*5.6*	*2.8*
Potamogeton amplifolius	*Large-leaf pondweed*	S	*1*	*8.4*	*5.0*	*2.5*
Nymphaea odorata	*White water lily*	FL	*1*	*8.4*	*5.0*	*2.5*
Brasenia schreberi	*Watershield*	FL	*1*	*8.4*	*5.0*	*2.5*
Potamogeton zosteriformis	*Flat-stem pondweed*	S	*1*	*7.5*	*4.5*	*2.2*
Potamogeton pusillus	*Small pondweed*	S	*1*	*7.5*	*4.5*	*2.2*
Potamogeton praelongus	*White-stem pondweed*	S	*1*	*6.5*	*3.9*	*1.9*
Chara spp.	*Muskgrasses*	S	*1*	*6.5*	*3.9*	*1.9*
Heteranthera dubia	*Water stargrass*	S	*1*	*5.6*	*3.4*	*1.7*
Ceratophyllum demersum	*Coontail*	S	*1*	*5.6*	*3.4*	*1.7*
Potamogeton spirillus	*Spiral-fruited pondweed*	S	*1*	*4.7*	*2.8*	*1.4*
Schoenoplectus acutus	*Hardstem bulrush*	E	*1*	*3.7*	*2.2*	*1.1*
Potamogeton epihydrus	*Ribbon-leaf pondweed*	S	*1*	*3.7*	*2.2*	*1.1*
Pontederia cordata	*Pickerelweed*	E	*1*	*3.7*	*2.2*	*1.1*
Nuphar variegata	*Spatterdock*	FL	*1*	*3.7*	*2.2*	*1.1*
Nitella spp.	*Stoneworts*	S	*1*	*3.7*	*2.2*	*1.1*
Eleocharis palustris	*Creeping spikerush*	E	*1*	*3.7*	*2.2*	*1.1*
Carex utriculata	*Common yellow lake sedge*	E	*1*	*2.8*	*1.7*	*0.8*
Utricularia minor	*Small bladderwort*	S	*1*	*2.8*	*1.7*	*0.8*
Eleocharis acicularis	*Needle spikerush*	S/E	*1*	*2.8*	*1.7*	*0.8*
Ceratophyllum echinatum	*Spiny hornwort*	S	*1*	*2.8*	*1.7*	*0.8*
Potamogeton x haynesii	*Haynes' pondweed*	S	*1*	*1.9*	*1.1*	*0.6*
Utricularia intermedia	*Flat-leaf bladderwort*	S	*1*	*1.9*	*1.1*	*0.6*
Sparganium emersum var. acaule	*Short-stemmed bur-reed*	FL/E	*1*	*1.9*	*1.1*	*0.6*
Potamogeton vaseyi	*Vasey's pondweed*	S	*1*	*1.9*	*1.1*	*0.6*
Equisetum fluviatile	*Water horsetail*	E	*1*	*1.9*	*1.1*	*0.6*
Cladium mariscoides	*Smooth sawgrass*	E	*1*	*0.9*	*0.6*	*0.3*
Comarum palustre	*Marsh cinquefoil*	E	*1*	*0.9*	*0.6*	*0.3*
Stuckenia pectinata	*Sago pondweed*	S	*1*	*0.9*	*0.6*	*0.3*
Sagittaria latifolia	*Common arrowhead*	E	*1*	*0.9*	*0.6*	*0.3*
Ranunculus aquatilis	*White water crowfoot*	S	*1*	*0.9*	*0.6*	*0.3*
Isoetes spp.	*Quillwort spp.*	S	*1*	*0.9*	*0.6*	*0.3*
Acorus americanus	*Sweetflag*	E	*1*	*0.9*	*0.6*	*0.3*
			0			

Incidentals			
Species	**Common Name**	**Life Form**	**Present?**
Carex comosa	Bristly sedge	E	I
Carex lasiocarpa	Narrow-leaved woolly sedge	E	I
Dulichium arundinaceum	Three-way sedge	E	I
Eleocharis robbinsii	Robbins' spikerush	E	I
Lythrum salicaria	Purple loosestrife	E	I
Potamogeton friesii	Fries' pondweed	S	I
Potamogeton natans	Floating-leaf pondweed	S	I
Sagittaria graminea	Grass-leaved arrowhead	S/E	I
Sagittaria rigida	Stiff arrowhead	E	I
Schoenoplectus tabernaemontani	Softstem bulrush	E	I
Scirpus cyperinus	Wool grass	E	I
Sparganium americanum	American bur-reed	E	I
Sparganium eurycarpum	Common bur-reed	E	I
Sparganium natans	Little bur-reed	S/E	I
Typha latifolia	Broad-leaved cattail	E	I
Zizania palustris	Northern wild rice	E	I

E

APPENDIX E

Fisheries Reports and Data Summaries

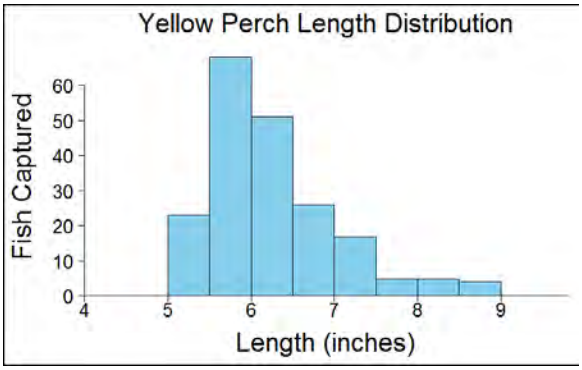
WISCONSIN DNR
FISHERIES INFORMATION SHEET

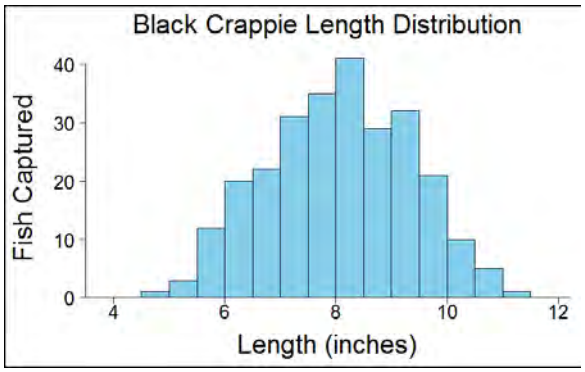
LAKE: SPIDER LAKE **COUNTY:** IRON **YEAR:** 2019

Spider Lake is a 359-acre drainage lake with stained water and a maximum depth of 49 feet. In 2019, the Wisconsin DNR conducted an early spring fyke-netting survey, an early spring electrofishing survey to complete a walleye population estimate, a late-spring fyke-netting survey to assess the muskellunge population, and a late-spring electrofishing survey to assess bass and panfish populations.

Yellow Perch

During the targeted early-spring fyke-netting survey, crews sampled a total of 199 yellow perch at a moderate rate of 6.2/net-night. Yellow perch ranged in length from 5.0”- 8.8” and averaged 6.2”. These results suggest that yellow perch are currently at low-moderate densities and most individuals are relatively small.



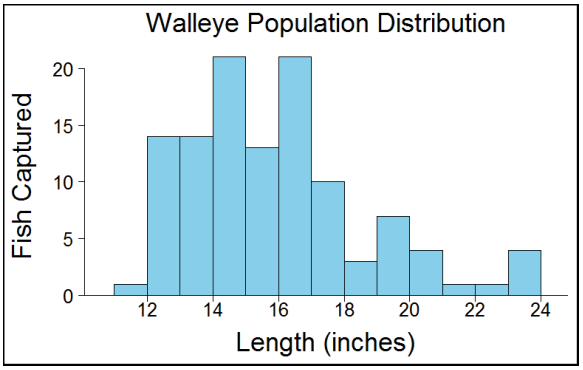


Black Crappie

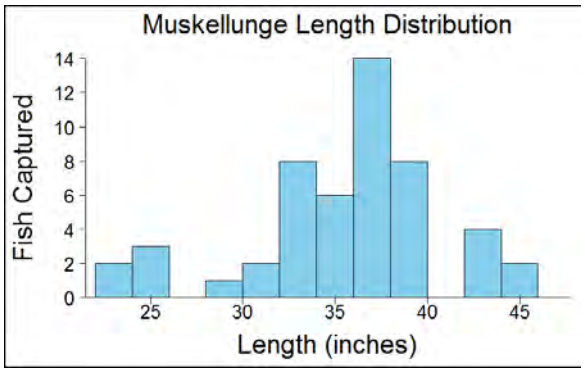
During a targeted late-spring fyke-netting survey, crews sampled a total of 1,331 black crappies at a moderate rate of 14.9/net-night. A subsample of these individuals ranged in length from 4.5”-11.2” and averaged 8.0”. These results suggest that black crappies are currently at moderate densities and the population exhibits a balanced size structure.

Walleye

During the spring walleye population estimate, we captured a total of 114 walleyes ranging in length from 11.1” – 23.8” and averaging 15.8”. The population was estimated to have 370 individuals or 1.1 fish/acre. These results suggest that walleyes are currently present at low densities and most individuals are relatively small.

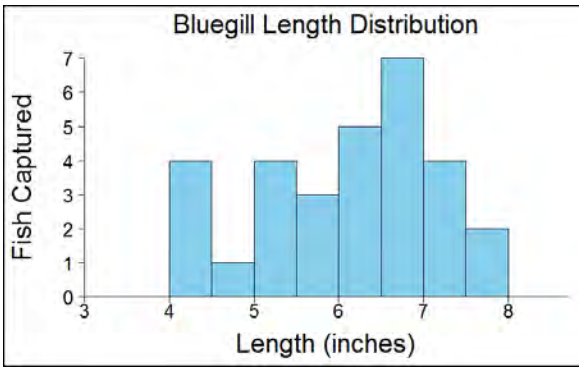


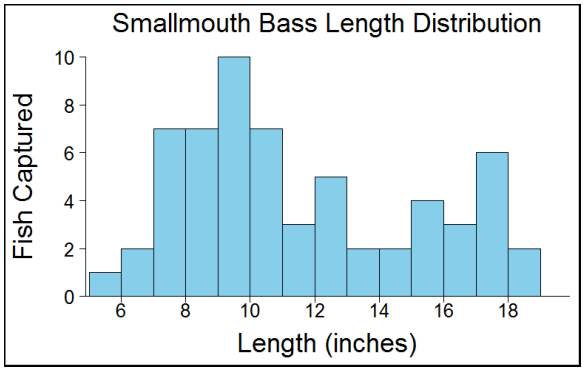
WBIC: 2306300



Muskellunge
During the targeted, late-spring fyke-netting survey and early-spring fyke-netting survey, crews sampled a total of 50 muskellunge at moderate rates of 0.6/net-night and 1.9/mile, respectively. Muskellunge ranged in length from 23.5”- 45.7” and averaged 35.6”. These results suggest that muskellunge are currently present in moderate densities and the population exhibits a balanced size structure.

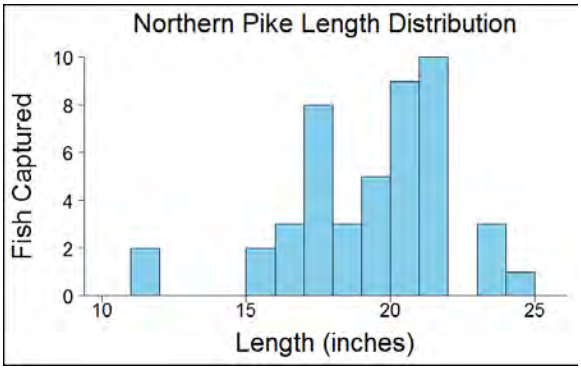
Bluegill
During the targeted late-spring electrofishing survey, crews sampled a total of 30 bluegills at a moderate rate of 30.0/mile. Bluegills ranged in length from 4.0”- 7.7” and averaged 6.0”. These results suggest that bluegills are currently at moderate densities and the population exhibits a balanced size structure.





Smallmouth Bass
During the targeted late-spring electrofishing survey, crews sampled a total of 61 smallmouth bass at a moderate rate of 15.3/mile. Smallmouth bass ranged in length from 5.9”-18.9” and averaged 11.6”. These results suggest that smallmouth bass are currently at moderate densities and the population exhibits a balanced size structure with some quality size individuals present.

Northern Pike
During the early-spring fyke-netting survey, crews sampled a total of 46 northern pike at a low rate of 1.4/net-night. Northern pike ranged in length from 11.6”-24.1” and averaged 20.0”.



WISCONSIN DNR
FISHERIES INFORMATION SHEET

For questions or additional information, contact:

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Wisconsin Department of Natural Resources
5291 State House Circle
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WBIC: 2306300

Summary of Fishery Surveys
Spider Lake, Iron County, 2013

Survey Description

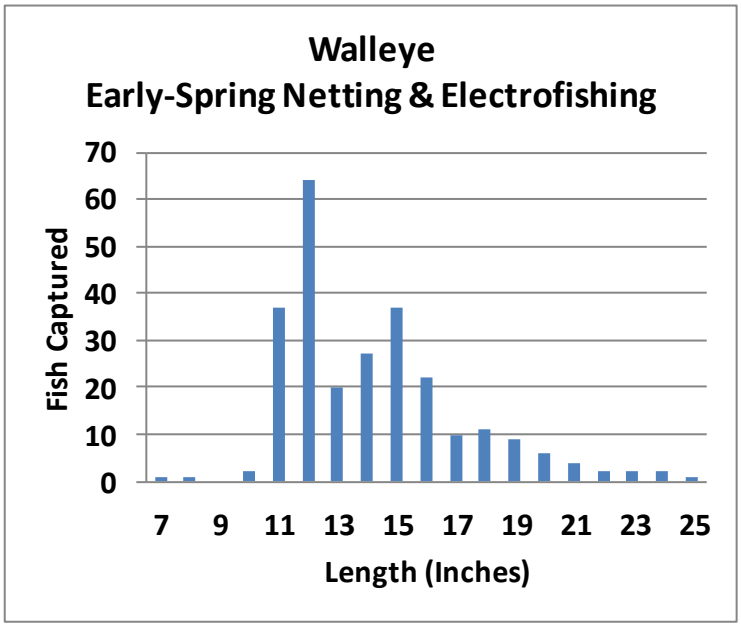
The Mercer DNR Fisheries Management Team conducted the following fishery surveys on Spider Lake in 2013: early-spring fyke netting (May 10 – May 14; 22 net-nights of sampling effort) and electrofishing (May 14; 7.1 miles of shoreline surveyed), late-spring electrofishing (May 29; 6.0 miles of shoreline surveyed), and an early-summer fyke netting survey (June 10 – June 12; 8 net-nights of sampling effort). Walleye were the primary species targeted during the early-spring surveys, however, samples of the muskellunge, northern pike, and yellow perch populations were also obtained. Bass and panfish populations were targeted for assessment during the late-spring electrofishing survey, and the early summer netting survey provided supplemental information about the panfish populations. Quality, preferred, and memorable sizes referenced in this summary are based on standard proportions of world record lengths developed for each species by the American Fisheries Society.

Habitat Characteristics

Spider Lake is a 352-acre drainage lake (maximum and mean depths of 49 and 17 feet, respectively) with light brown-stained water and moderately high water clarity (Secchi disk transparency measurements averaging around 11 feet; WDNR citizen lake monitoring data 1998-2013). A public boat landing is available at the end of Pitt Road where the Turtle River inlet enters the lake. The littoral zone (near-shore area where light is able to penetrate to the lake bottom) substrates are comprised primarily of gravel, sand, and muck with aquatic vegetation primarily limited to shallow bays. Nutrient analyses (e.g., phosphorus) have typically shown that Spider Lake is moderately productive (mesotrophic).

Walleye

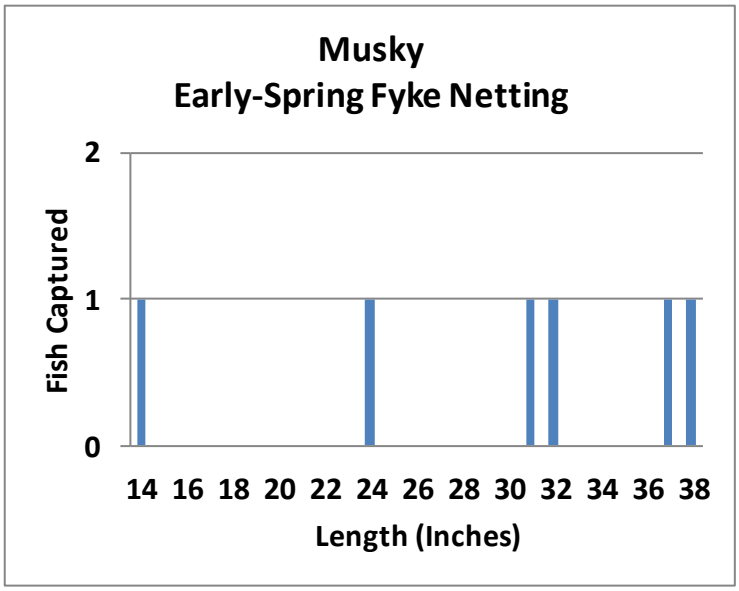
Adult Population Estimate = 1.3/acre	
Quality Size ≥ 15”	41%
Preferred Size ≥ 20”	7%
Memorable Size ≥ 25”	<1%



We captured 258 individual walleyes during the early-spring netting and electrofishing surveys at rates of 10.7/net-night and 16.9/mile, respectively. Using mark-recapture techniques, the population estimate for adult walleye in 352-acre Spider Lake was 473 fish, or 1.3 fish per surface acre of water. The Spider Lake walleye population has been sustained solely through natural reproduction since 1969, however, the adult walleye density (1.3 fish per acre) is below the typical northern Wisconsin range for naturally-reproducing populations (2—5 adults per acre). The size structure of the population is considered good, and it is indicative of a population that is sustained through natural reproduction.

Muskellunge

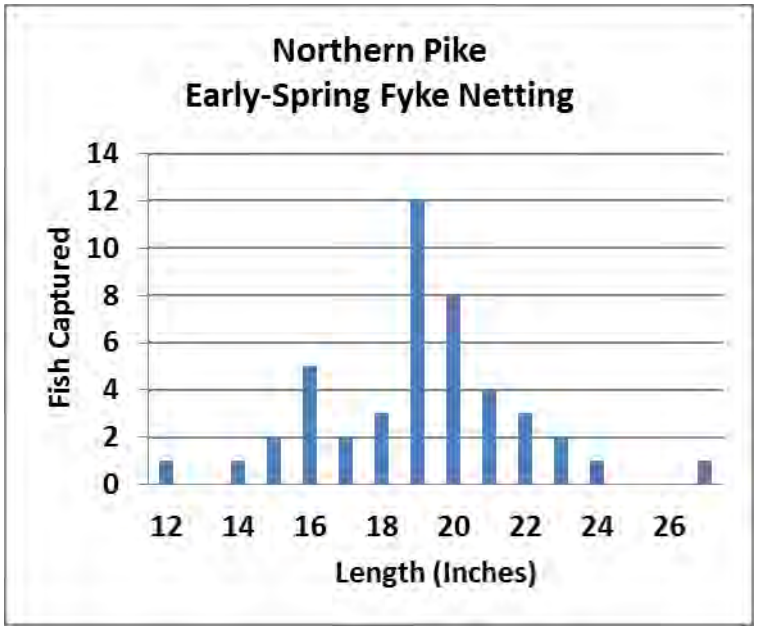
Captured 0.2 per net-night ≥ 20”	
Quality Size ≥ 30”	80%
Preferred Size ≥ 38”	20%
Memorable Size ≥ 42”	0%



Muskellunge were not targeted during the early-spring netting survey (too early for optimal capture rates, and sampling occurred in spawning habitats not typically selected by muskellunge), however, fish ≥ 20 inches were captured at a low rate (0.2 per net-night). Although few fish were captured, the size structure of the sample matches our moderate expectations knowing that the fishery is sustained through natural reproduction. Undoubtedly, some larger musky also reside in Spider Lake.

Northern Pike

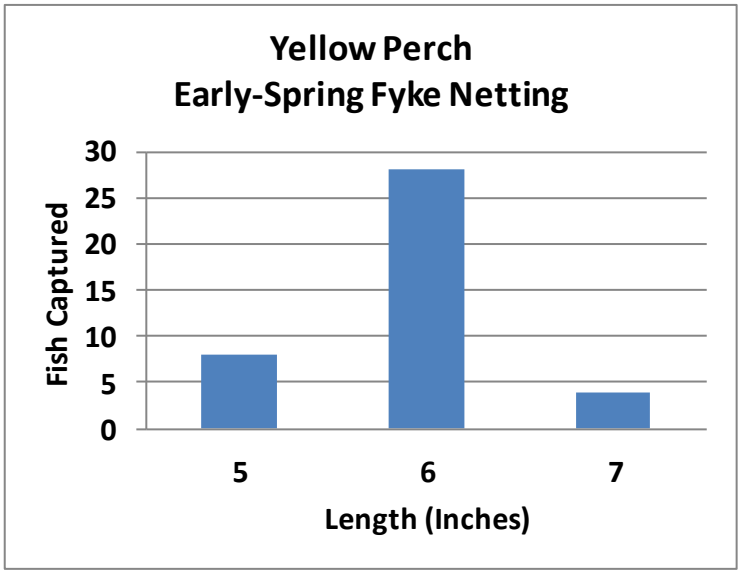
Captured 2.1 per net-night ≥ 14”	
Quality Size ≥ 21”	25%
Preferred Size ≥ 28”	0%



Although our nets were not set specifically to target northern pike, we caught them at a low-to-moderate rate during the early-spring netting survey. Size distribution in our sample was considered fair and is comparable to pike size structure parameters from similar lake-types.

Yellow Perch

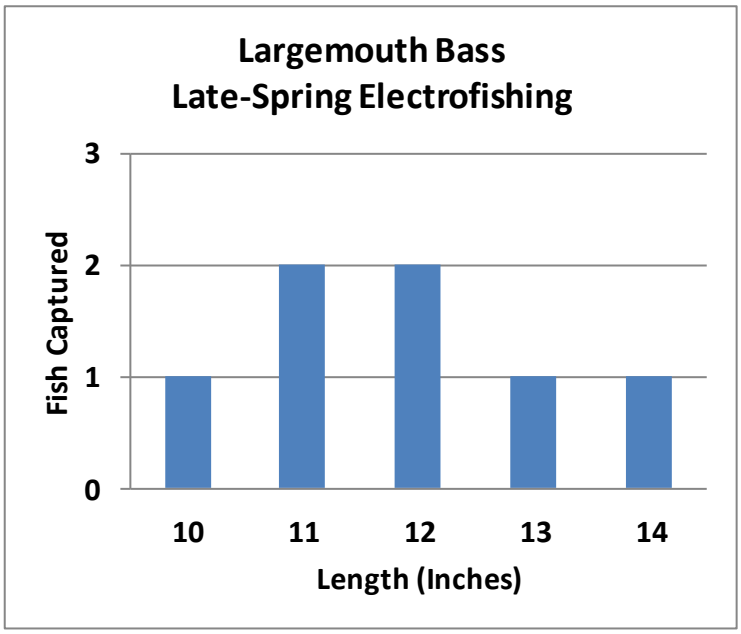
Captured 6 per net-night ≥ 5”	
Quality Size ≥ 8”	0%
Preferred Size ≥ 10”	0%



Yellow perch ≥ 5 inches were captured at a low rate of 6 per net-night during the early-spring fyke netting survey. Size structure of the population sample is considered very poor, with no fish observed above quality size. In support of these findings on the yellow perch population, the late-spring electrofishing and early-summer fyke netting surveys yielded similar results.

Largemouth Bass

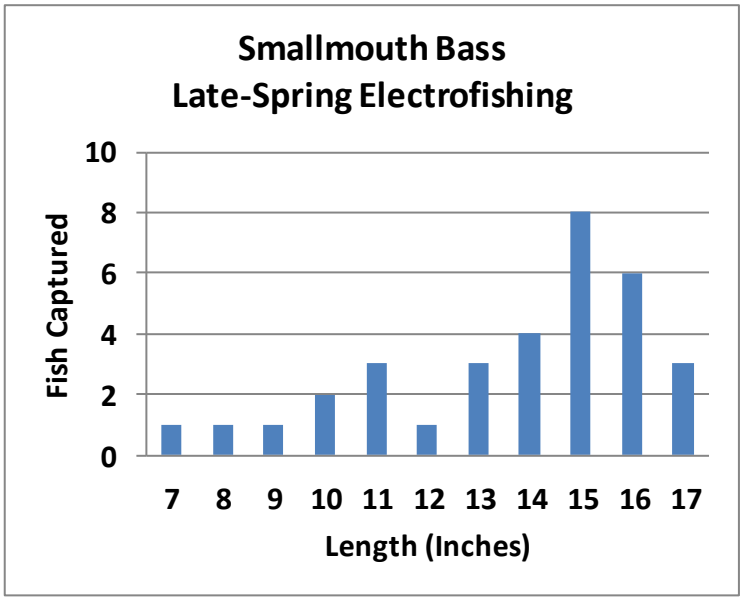
Captured 1.2 per mile ≥ 8”	
Quality Size ≥ 12”	57%
Preferred Size ≥ 15”	0%



Largemouth bass ≥ 8 inches were captured at a low rate of 1.2 per mile during the late-spring electrofishing survey. Size structure of the population sample is considered poor, with no fish observed at preferred size.

Smallmouth Bass

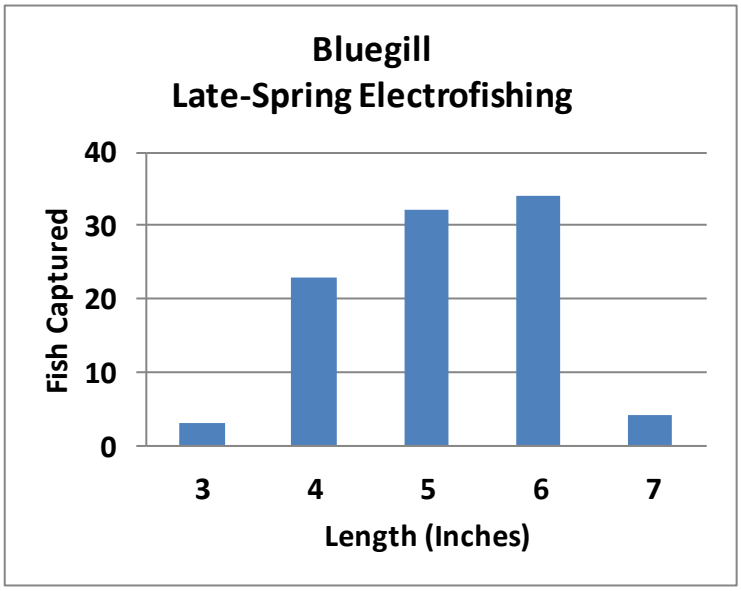
Captured 5.5 per mile ≥ 7”	
Quality Size ≥ 11”	85%
Preferred Size ≥ 14”	64%
Memorable Size ≥ 17”	9%



Smallmouth bass ≥ 7 inches were captured at a moderate rate of 5.5 per mile during the late-spring electrofishing survey. Size structure of the population sample is considered very good, with nearly two-thirds of the fish observed at, or above, preferred size.

Bluegill

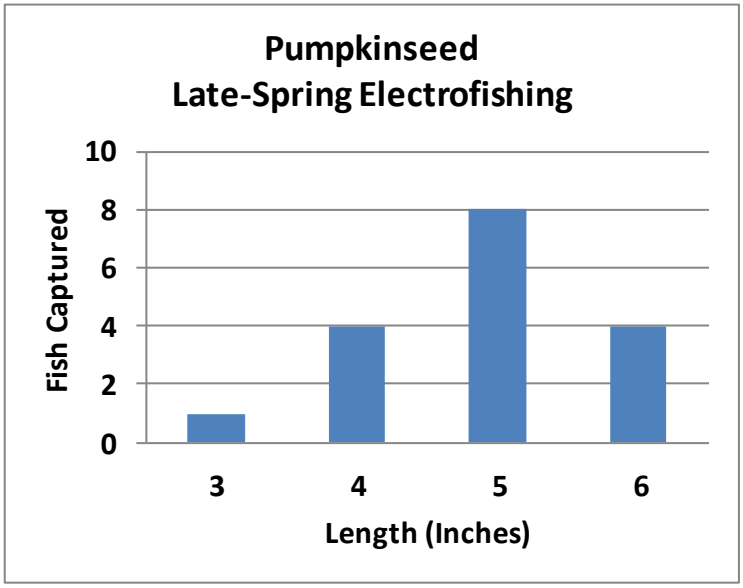
Captured 64 per mile ≥ 3”	
Quality Size ≥ 6”	40%
Preferred Size ≥ 8”	0%



Bluegill ≥ 3 inches were captured at a moderate rate of 64 per mile during the late-spring electrofishing survey. The size distribution of our sample was fair; however few fish exceeded 7 inches in length. Bluegill ≥ 3 inches were captured at a relatively-high rate (144 per net-night) during the early-summer fyke netting survey, which differs somewhat from the results of the late-spring electrofishing survey; however, the size distributions of bluegill captured during the two surveys were nearly identical.

Pumpkinseed

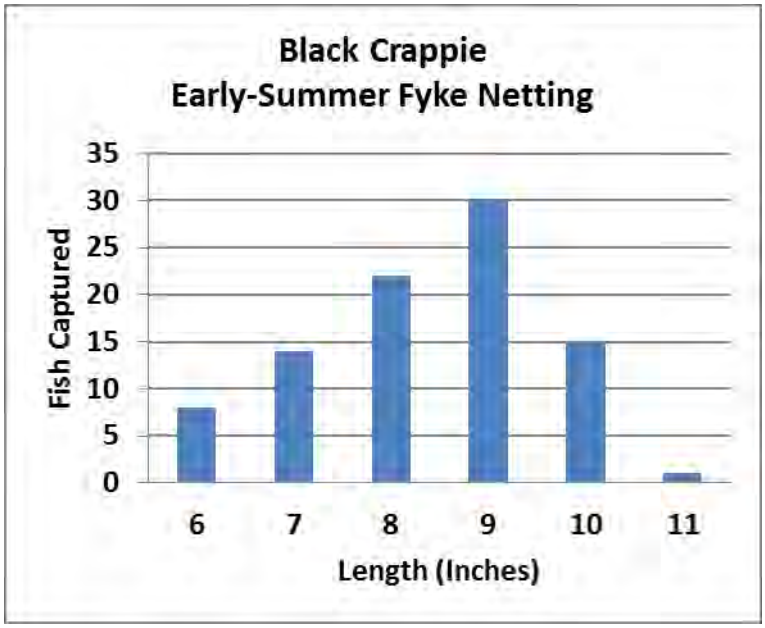
Captured 11 per mile ≥ 3”	
Quality Size ≥ 6”	24%
Preferred Size ≥ 8”	0%



Pumpkinseed ≥ 3 inches were captured at a low rate of 11 per mile during the late-spring electrofishing survey. The size structure of the population sample was poor, with no fish being of an acceptable size to anglers. In support of these findings on the pumpkinseed population, the early-summer fyke netting survey yielded similar results.

Black Crappie

Captured 13 per net-night ≥ 5”	
Quality Size ≥ 8”	76%
Preferred Size ≥ 10”	18%



Black crappie were captured at a moderate rate (13 per net-night) during the early-summer fyke netting survey. Early-summer fyke netting may not be the best time for obtaining a representative sample of the crappie population, but our sample does reveal there are some crappies in Spider Lake of an acceptable size to anglers. In support of these findings, we also captured crappie at a moderate rate (20 per mile) during the late-spring electrofishing survey.

Conclusions

Spider Lake contains a diverse, and relatively healthy, fish community. However, it appears that walleye and panfish populations may be enhanced through a minor adjustment. We have proposed that the current walleye regulation at Spider Lake (no minimum length limit, but only 1 fish over 14 inches may be harvested) revert back to the statewide minimum length limit (15 inches). The daily bag limit would remain at 5. If approved, the new length limit would take effect in spring of 2016.

Historical survey records indicate that Spider Lake had a strong, self-sustaining walleye population. Surveys conducted between the 1950s and late 1990s/early 2000s portrayed a walleye-dominant system characterized by high numbers of walleye (sustained by consistent natural reproduction) and low numbers of panfish. However, since the early to mid-2000s, the walleye population in Spider Lake has been reproducing at lower levels, and the current density of adult walleye (1.3 per acre) is now estimated to be about half of what it was in 1998 (2.7 per acre). Therefore, the current walleye regulation, which focuses harvest on smaller, younger fish, is counterproductive to maintaining a density high enough to sustain quality walleye fishing and to reliably control panfish.

Because of its walleye-dominant history, Spider Lake has been selected to serve as one of several important “reference lakes” in a formal evaluation of strategies to rehabilitate declining walleye populations in northern Wisconsin. Spider Lake was chosen as a project lake because it has favorable habitat for walleye reproduction and a fish community suited well for survival of young walleyes. Walleyes have not been stocked in Spider Lake since 1969; and as a result of its

"reference" role in the regional evaluation, walleyes will not be stocked in the near future. (Before we can conclude that stocking has or has not worked elsewhere, we must know if walleye populations have changed for other reasons in several reference lakes, including Spider, that are not stocked.) It appears that young walleyes naturally produced in 2012 will contribute significantly to the future adult population, provided they are not harvested prematurely. Being part of this evaluation will ensure more frequent monitoring of the population, including annual fall surveys to determine juvenile survival. The evaluation will be reviewed in five years to determine if the objectives are being met. If so, Spider will continue to serve as a reference lake. If not, we may at that time consider implementing additional strategies (e.g., stocking) to rehabilitate the population if the proposed rule-change alone does not produce the desired results. Because the new rule would not be implemented until 2016 (if approved), anglers are encouraged to use some discretion when it comes to harvesting walleye (i.e., release some currently legal-sized fish < 14 inches voluntarily).

Muskellunge are naturally recruiting in Spider Lake and have not been stocked since 1995. The survey results presented here are not intended to provide a thorough evaluation of the muskellunge population. However, in addition to this survey, other recent surveys and angler reports suggest that the muskellunge population remains healthy and is self-sustaining.

Spider Lake smallmouth bass offer anglers a high-quality fishing opportunity. Moderate numbers and a size distribution comprised primarily of larger fish suggest that anglers will have to put in a little effort to find smallmouth, but they will likely be rewarded with preferred-size fish. We captured few largemouth bass in Spider Lake.

Panfish populations appear to have increased in Spider Lake since the early 2000s. Survey statistics on bluegill now indicate that numbers may be so high that competition for food hinders growth rate and ultimate size attainment. (Growth analyses are needed to confirm this suspicion). Overabundant, slow-growing panfish populations with poor size distributions are typically a sign of insufficient predation. Re-establishment of a higher density of walleye (effective predators on small panfishes) in Spider Lake should help to reduce bluegill density and improve the overall quality of the panfishery. Size-selective angler harvest of perch combined with predation by esocids (muskellunge and northern pike) on the largest perch may be limiting perch size distribution. Anglers are encouraged to practice selective harvest strategies [e.g., voluntarily releasing some of the larger, rarer bluegills (> 7 inches), while harvesting some of the more abundant ones (< 6.5 inches)] in order to help improve panfishing quality in Spider Lake.

Rock bass, yellow bullhead, shorthead redhorse, white sucker, golden shiner, bluntnose minnow, logperch, mottled sculpin, and johnny darter were other species captured during our surveys.

Survey Data Collected and Analyzed By: Lawrence Eslinger, Jason Folstad, and Jim Zarzycki
Special Thanks to John & Cheri Stratte of Pine Forest Lodge
Report By: Lawrence Eslinger, Fisheries Biologist, Iron County, 1/15/14
Edited and Approved By: Dave Neuswanger, Fisheries Supervisor, Hayward Field Unit, 1/28/14

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APPENDIX F

Report Comment Response Document

Comments to Spider Lake Comprehensive Management Plan (3/3/2022)

WDNR Official Comments: Madeline Mathes (Water Resources Management Specialist) & WDNR Fisheries Staff

Comment Key:
Responses in blue by Brenton Butterfield (Onterra)
Responses in red by Andrew Senderhauf (Onterra)

The department has had time to review the Spider Lake Comprehensive Management Plan Draft. Thanks everyone for the time and effort, the overall product looks good. Here are some questions, concerns, and feedback we have put together.

1) In the recommendation section it is mentioned that in 2021 *Galerucella* beetles were released in the southern bay to help control purple loosestrife populations. Is there any data to report on this yet? It also says that SLA volunteers removed the plant in some areas. Was this successful? If there is any data/reporting on these control methods, it would be beneficial to add it. The following has been added to management action 2d, "*Iron County staff plan to inspect the southern bay in the summer of 2022 to assess the effectiveness of the beetles. Volunteers dug out purple loosestrife plants in other areas around Spider Lake in 2021, and volunteers will be creating a database to document their inspection and removal efforts. The SLA also tries to educate riparian property owners about purple loosestrife on their property to increase inspection and removal efforts.*"
2) There is a mention of the vulnerability of the rare, native elliptio mussel and the importance of protecting the benthic environment where they live. Are there any measure taken to conserve this rare species? For example, educating riparian owners about this. Onterra will be creating an article for the SLA to distribute in their newsletter to educate riparian owners on the presence of the mussel and actions they can take to protect it.
3) Page 38 says that the paleoecological results will be available summer of 2021. Are these results available? We are still checking with the lab to get these results.
4) On page 7 it talks about the kickoff meeting -we are wondering if there were any questions/comments and if there were any, if you could provide what they were and the responses to them. No questions were submitted to Onterra regarding the kick-off meeting presentation.
5) Requirements for public review- there is a minimum of 21 days that a plan must be publicly accessible for review/comment. Has this occurred yet? The SLA will be posting the final draft on the website to fulfill this requirement.

   The term "In-Lake Conservation Opportunity Area (COA) was changed to "Area of Special Conservation Interest (ASCI) based on commentary from Squash Lake (Oneida County) Management Planning Update Report.

The following comments come from the fisheries department:

1) Page 80 – fish stocking (although this language is used throughout the section)– 'Stocking of walleye is tentatively scheduled to begin in 2021' – this language implies a beginning without an end, which may promote a false sense of future plans. We would recommend rephrasing to

something on the order of: 'Walleyes were stocked in 2021. Future stocking decisions will be based on stocking evaluation surveys and adult population assessments conducted by WDNR fisheries management.' Change made

2) Page 84 – fish population trends: Walleye – 'Spider Lake has historically produced strong, naturally sustaining walleye populations…Walleye stocking is set to begin in 2021.'
    a. We've never documented what we would consider a strong adult population. Naturally self-sustaining, yes, but we would recommend rephrasing to 'Spider lake has historically provided a higher density walleye fishery'. The population is still naturally self-sustaining, and we think the language: 'historically produced strong' promotes unrealistic perceptions (none of the data we have shows Spider being a 'strong' walleye fishery; 3/acre is the regional average for NR fisheries and we've never even documented that in Spider). Change made
    b. Here we have the same concern with 'walleye stocking is set to begin in 2021'. See #1 above for my concern and recommendation. Change made
3) Page 90 – 'Walleye population estimates are set to continue in 2021 and 2022 with walleye stocking schedule to begin in 2021 as well' – this is inaccurate. We will not be conducting walleye population estimates in 2021 or 2022; We would recommend redacting this sentence altogether. The following sentence states that bass/panfish populations are rising – We don't think that we have the data to show rising bass or panfish populations, thus should be rephrased or redacted to more accurately reflect the fisheries data that we do have. Changes made

Comments by Mike Shouldice (Spider Lake Association)

Brenton,
Here are a number of edits/suggestions:
5.0 add "volunteer engagement" to the sentence that starts, "The Implementation Plan is a living..." Change has been made

Perhaps volunteer recruitment, communication and management is its own Management Action
My thought here is the implementation plan is ambitious and will require hundreds of volunteer hours annually. Each management action should include an estimate of the range of volunteer hours required, ie. Volunteer hours required 20-40 hours. I think it would be difficult to estimate the hours beforehand. Perhaps these can be added as time goes on and an idea of how many hours spent for each task is determinted.

Management Action 1b: last sentance first paragraph should read, "Educational Materials...will be made available to inform..." I'm suggesting we won't create our own materials. The fourth paragraph first sentance should read: "The Shoreland Committee will encourage Spider Lake property..." Created was changed to provided.

Management Action 2c: add a 2nd Action Step that reads," A budget of potential expenditures and revenue sources will be created, presented to the membership. Add a 3rd action step: Create a list of qualified professionals, their expertise. Take note of engagements that have been undertaken in northern Wisconsin. Change has been made

Management Action 2d: Description, second paragraph should read, "The SLA will continue working with Iron County...SLA is working with Iron County to monitor the effectiveness of the Galerucella beetles that were released in the southern bay in July 2021." Change has been made

Management Action 2f: Description second paragraph should add upstream Turtle River site around Shay's Dam and/or at the county boat landing where the river enters Spider Lake. Change has been made

Management Action 4a: add two additional partners: Other Turtle River Chain of Lakes Associations and Iron County Lakes and Rivers Allliance Change has been made

Comments from Bill Ortlieb (Spider Lake Association)

Two things caught my eye:

1) On the table on page 10, the Wisconsin Lakes entry appears to be truncated. Change has been made

2) The draft references Map 14 several times but I cannot find Map 14 in this document or the original LMP document. Map 14 has been included.

Comments from Public Comment Period

"It would have been more helpful if the report was numbered like the owner's manual in my car with the section number 1st and the page within each section 2nd. This is a benefit for first time users." Change has been made.