State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
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WISCONSIN
DEPT. OF NATURAL RESOURCES

August 1, 2024

Tracy Arnold
Portage County LWCD
1462 Strongs Avenue
3rd Floor
Stevens Point WI 54481

Subject: Approval of lake management plans

Dear Tracy:

After review of the six lake management plans, being duly noticed to the public, approved by the local government, lake associations/districts, and the LWCD as described below, the Department has approved the following plans:

McDill Pond

- *Updated plan approved by McDill Inland Lake Protection and Rehabilitation District -February 23, 2023*
- *Village of Whiting acknowledges receipt of 2023 Updated plan -June 13, 2023*
- *Updated plan approved by City of Stevens Point-April 3, 2023*
- *Updated plan approved by Portage County Land Conservation-February 24, 2023*
- *Updated plan submitted to WI DNR- February 24, 2023*

Sunset Lake

- *Updated plan approved by Sunset Lake Association-April 12, 2023*
- *Updated plan approved by Town of New Hope-April 19, 2023*
- *Updated plan approved by Portage County Land Conservation-May 30, 2023*
- *Updated plan submitted to WI DNR- May 30, 2023*

Springville Pond

- *Updated plan approved by Springville Pond Management Committee-July 12, 2023*
- *Updated plan approved by Village of Plover-July 12, 2023*
- *Updated plan approved by Portage County Land Conservation-July 14, 2023*
- *Updated plan submitted to WI DNR- July 14, 2023*

Lake Jacqueline

- *Updated plan approved by Lake Jacqueline Protection and Rehabilitation District-August 20, 2023*
- *Updated plan approved by Town of Sharon-October 10, 2023*
- *Updated plan approved by Portage County Land Conservation-October 11, 2023*
- *Updated plan submitted to WI DNR- October 11, 2023*

Tree Lake

- *Updated plan approved by Tree Lake Association-July 30, 2023*
- *Updated plan approved by Town of Alban-August 7, 2023*
- *Updated plan approved by Portage County Land Conservation-August 10, 2023*

- *Updated plan submitted to WI DNR- August 10, 2023*

Lake Helen

- *Updated plan approved by Lake Helen Protection and Rehabilitation District-July 26, 2023*
- *Updated plan approved by Town of Alban-August 7, 2023*
- *Updated plan approved by Portage County Land Conservation-August 10, 2023*
- *Updated plan submitted to WI DNR- August 10, 2023*

It is important to understand that although a lake management plan has been approved, permits may be required for any of the recommended management options described. It is also important to remember that proposed management options, that are not specifically mentioned in the aforementioned plans, would need plan approval before submitting a Surface Water Grant - Implementation (SWGI) application(s). Implementation grants can be very helpful to applicants provided the management proposals are well described in an approved plan and show a high likelihood of success.

Your work with this endeavor was superb. I commend you and others' efforts to the commitment of sound watershed ecosystem management planning and look forward to assisting with implementation opportunities.

A sincere thank you,
Scott Provost

Scott Provost, P.S.S.
Water Quality Expert
WDNR
Wisconsin Rapids, WI
715.315.0329

cc: Anna Mares – Eau Claire; Jennifer Jefferson – Central Office (via email)

2023 UPDATE

Lake Jacqueline Management Plan

Portage County, Wisconsin

Plan approved by the Lake Jacqueline Management Planning Committee on

Adopted by Lake Jacqueline Lake District on

Adopted by Town of Sharon on

Adopted by Portage County on

Adopted by Wisconsin Department of Natural Resources

Updated Plan approved by Lake Jacqueline Protection and Rehabilitation District :	August 20, 2023
Updated Plan approved by Town Sharon:	October 10, 2023
Updated Plan approved by Portage County Land Conservation Department:	October 11, 2023
Updated Plan approved by Wisconsin Department of Natural Resources:	Submitted to WI DNR October 11, 2023 Approved by WI DNR August 1, 2024

A special thanks to all those who helped to create the Lake Jacqueline Management Plan and provided the necessary data in the Portage County Lake Study.

Lake Jacqueline Management Planning Committee Members and Resources

Lake Jacqueline Management Planning Committee
Jack Adams-Lake District Chair
Bill Burse-Lake District Treasurer
Betty Burse
Dick Mason

Wisconsin Department of Natural Resources
Scott Provost-Water Resources Mgmt

UW-Stevens Point
Nancy Turyk-Center for Watershed Science/Education
Jen McNelly-Center for Watershed Science/Education
Linda Stoll-Center for Land Use Education

Golden Sands RC&D
Paul Skawinski-Regional AIS Coordinator
Kaycie Stushek

Portage County
Randy Slagg-Conservation Technician

Portage County Lake Study Researchers/Authors

Becky Cook Water Quality/Watersheds
Dr. Paul McGinley – Water Quality/Watersheds
Dr. Byron Shaw – Water Quality/Watersheds and Upland Sensitive Areas
Dick Stephens – Water Quality/Watersheds and Upland Sensitive Areas
Nancy Turyk – Water Quality/Watersheds/Final Report
Dr. Glenn Bowles – Near Shore Summary
Dr. Alan Haney – Upland Sensitive Areas
Dr. Vince Heig – Upland Sensitive Areas
Dr. Kent Hall Upland Sensitive Areas

Dr. Bob Bell - Algae
Dr. Robert Freckmann – Aquatic Plants and Upland Sensitive Areas
Dr. Tim Ginnett – Birds
Brad Bulin (Graduate Student) – Birds
Dr. Ron Crunkilton – Fish
Steve Bradley (Portage County Conservationist) – Land Use Coverages/Watersheds
Lynn Markham – Planning Assistance
Mike Hansen – Portage County Planning Assistance
Dr. Erik Wild – Reptiles and Amphibians/Near Shore Habitat
Rori Paloski (Graduate Student) – Reptiles and Amphibians/Near Shore Habitat

Lake Jacqueline Management Plan 2023 Update Participants

Lake Jacqueline Residents
Pam Riggs-Chair
Kevin Hujet

Portage County
Tracy Arnold-Conservation Technician
Jen McNelly-Water Resource Specialist

Golden Sands
Kendra Kundinger, Executive Director
Chris Hamerla, Regional AIS Coordinator

Wisconsin Department of Natural Resources
Scott Provost-Water Resources Mgmt
Colton Hutchinson-Water Resources Mgmt
Lucas Koenig-Fisheries Biologist

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Glossary: https://www.co.portage.wi.gov/DocumentCenter/View/3943/Lake-Management-Plans-Glossary

Staff Resource Directory: https://www.co.portage.wi.gov/DocumentCenter/View/3942/Lake-Management-Plans-Directory

List of Goals

<u>Goal 1</u>- Through sustainable management practices, improve the in-lake habitat along with the size and quality in order to have a balanced and healthy fish community.

<u>GOAL 2</u>- Maintain the diversity and quality of native aquatic plants and prevent the establishment of invasive aquatic species through the sustainable management of aquatic plants for fish and wildlife habitat.

<u>Goal 3</u>– Maintain and improve water quality.

<u>Goal 4</u>–Create, restore and protect healthy, stable shoreland habitats near and around Lake Jacqueline. This goal will be achieved when 60% of the shoreline is vegetated.

<u>Goal 5</u>- Continue electric motor only rules for boating on Lake Jacqueline .

<u>Goal 6</u>- Keep the information and resources within the Lake Jacqueline Lake Management Plan current and up to date.

Introduction

Lake Jacqueline is located in the Town of Sharon in Portage County. It is valued by those who use and enjoy the lake for its natural beauty, peace and tranquility, wildlife viewing, and many recreational opportunities including fishing, swimming, canoeing/kayaking and walking.

The purpose of this management plan is to provide guidance, to protect current desirable conditions, address existing problems and prevent future problems that may be detrimental to the Lake Jacqueline ecosystem. This management plan was written as part of the second phase of the Portage County Lakes Project. The first phase of the Portage County Lakes Study involved data collection from Lake Jacqueline and 28 other lakes throughout the county. The study provided information on water quality, shoreline development, amphibian habitat, fisheries, aquatic plants, and other parameters.

This plan was developed by a committee of interested citizens, local organizations, and professionals. Prior to the current lake plan development a citizen survey was conducted to gather information on citizens' values, opinions, and perceived issues with Lake Jacqueline. The survey was sent to 62 residences within the Lake Jacqueline watersheds and was available online where any interested person could take the survey. Twenty-two citizen surveys were returned for a response rate of 35%. The members of the Lake Jacqueline management planning committee met to learn about topics related to the lake and develop this lake management plan.

Who can use this plan, and how can it be used?

- **Individuals**: Individuals can use this plan to learn about the lake they love and their connection to it. People living near Lake Jacqueline can have the greatest influence on the lake by understanding and choosing lake-friendly options to manage their land and the lake.
- **Lake Jacqueline Protection & Rehabilitation District:** This plan provides citizens with a well thought-out plan for the lake and lists options that can easily be prioritized. Annual review of the plan will also help members to realize their accomplishments. Resources and funding opportunities for lake management activities are made more available by placement of goals into the lake management plan, and the organization can identify partners to help achieve their goals for Lake Jacqueline.
- **Neighboring lake groups, sporting and conservation clubs**: Neighboring groups with similar goals for lake stewardship can combine their efforts and provide each other with support, improve competitiveness for funding opportunities, and make efforts more enjoyable.
- **Nearby municipalities**: Municipalities can consider the visions, wishes, and goals documented in this lake management plan when considering municipal-level management planning or decisions within the watershed that may affect the lake.
- **Portage County:** County professionals will better know how to identify needs, provide support, base decisions, and allocate resources to assist in lake-related efforts documented in this plan. This plan can also inform county board supervisors in decisions

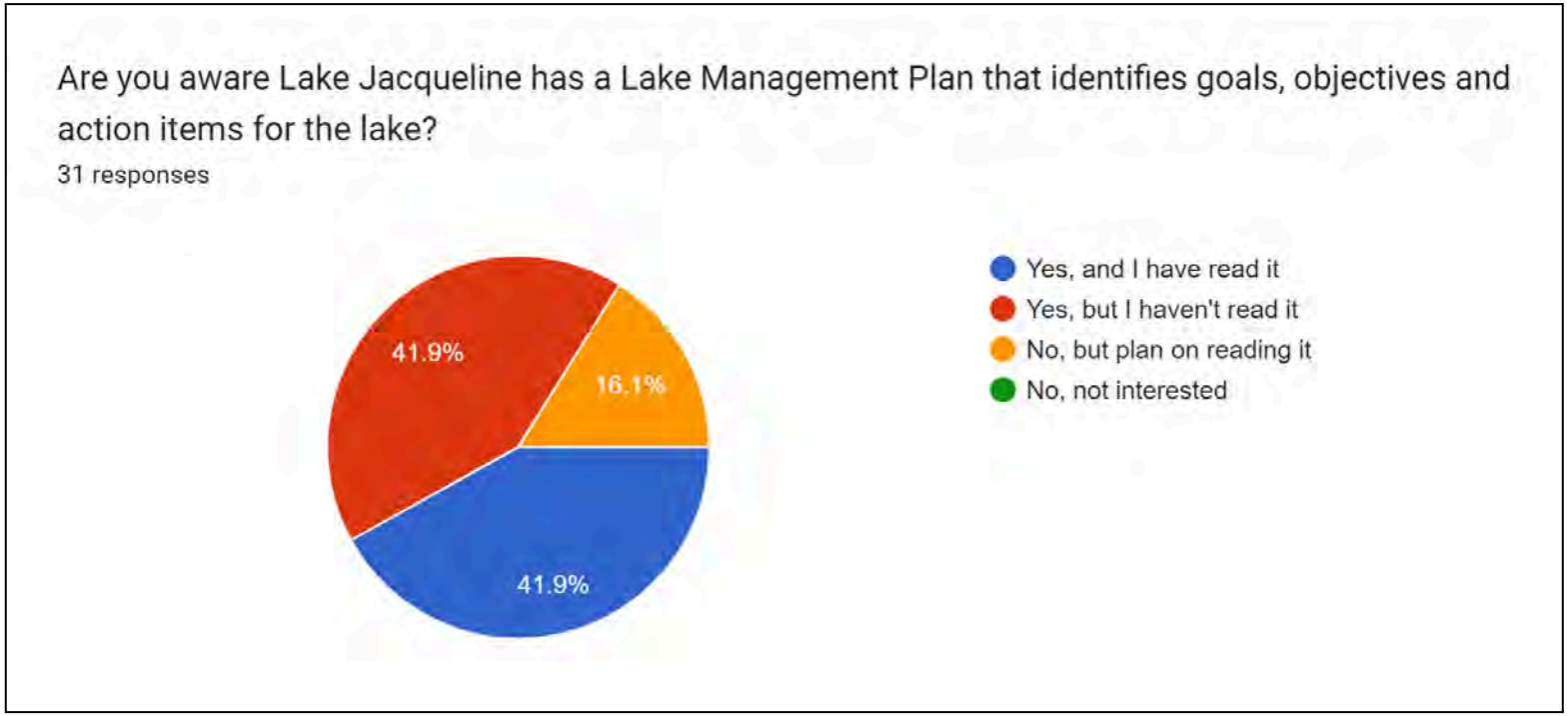
related to Portage County lakes, streams, wetlands and groundwater.

- **Wisconsin Department of Natural Resources**: Professionals working with lakes in Portage County can use this plan as guidance for management activities and decisions related to the management of the resource, including the fishery, and invasive species. Lake management plans help the Wisconsin Department of Natural Resources to identify and prioritize needs within Wisconsin's lake community, and decide where to apply resources and funding. A well thought-out lake management plan increases an application's competitiveness for state funding– if multiple Portage County lakes have similar goals in their lake management plans, they can join together when seeking grant support to increase competitiveness for statewide resources.

2023 UPDATE

A resident survey was conducted in 2023. This survey was approved by the WI DNR prior to sending it out. Lake Jacqueline Protection and Rehabilitation District took the lead on sending the resident survey. The resident survey was hybrid, being available both electronically and hardcopy if requested. All results from the resident survey were put into a document and shared with the Lake Jacqueline residents. The results will also be shared throughout this lake management plan update. For a full copy please reach out to the District board members.

Results from the 2023 Resident Survey



Goals, Objectives and Actions

The following goals, objectives, and actions were derived from the values and concerns of the members of the Lake Jacqueline Planning Committee including local citizens and are based on the science used to assess Lake Jacqueline and its ecosystem. Implementing the goals, objectives, and actions of the Lake Jacqueline Management Plan should protect the scenic beauty, peacefulness, recreational opportunities, and water quality for current and future generations. These goals are intended to be met through education, encouragement, actions, and incentives.

Resources that are listed within the plan include primary organizations or individuals that would be able to provide information, suggestions, services and/or support to accomplish an action.

A management plan is a living document that changes over time to meet the current needs, challenges, and desires. **The goals, objectives, and actions listed in this plan will be reviewed and updated with any necessary changes by the Lake Jacqueline planning committee, Lake Jacqueline Lake District, interested citizens, and representatives from municipalities and agencies with the assistance of UWSP and Portage County. Updates will be provided to the Towns of Sharon, Portage County, the Wisconsin DNR, and any other entity adopting the plan.**

Although each lake is different, to ensure a lake management plan considers the many aspects associated with a lake, the Wisconsin Department of Natural Resources requires that a comprehensive lake management plan address, at a minimum, a list of topics that affect the character of a lake, whether each topic has been identified as a priority or as simply something to preserve. These topics comprise the chapters in this plan. For the purposes of this plan, the chapters have been grouped as follows:

In-Lake Habitat and a Healthy Lake

Fish Community—fish species, abundance, size, important habitat and other needs

Aquatic Plant Community—habitat, food, health, native species, and invasive species

Critical Habitat—areas of special importance to the wildlife, fish, water quality, and aesthetics of the lake

Landscapes and the Lake

Water Quality and Quantity—water chemistry, clarity, contaminants, lake levels

Shorelands—habitat, erosion, contaminant filtering, water quality, vegetation, access

Watershed Land Use—land use, management practices, conservation programs

People and the Lake

Recreation—access, sharing the lake, informing lake users, rules

Communication and Organization—maintaining connections for partnerships, implementation, community involvement Updates and Revisions—continuing the process

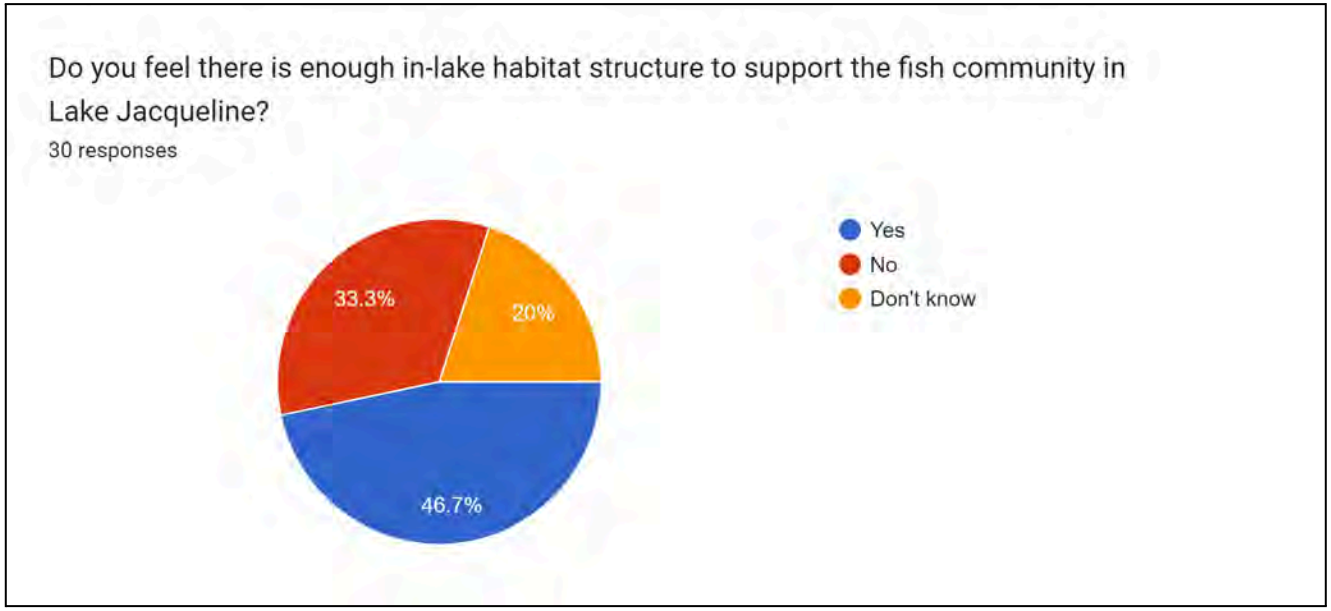
Governance—protection of the lake, constitution, state, county, local municipalities

In-Lake Habitat and a Healthy Lake

Many lake users value Lake Jacqueline for its fishing, wildlife, and good water quality. These attributes are all interrelated; the health of one part of the lake system affects the health of the rest of the plant and animal community, the experiences of the people seeking pleasure at the lake, and the quality and quantity of water in the lake. Habitat is the structure for a healthy fishery and wildlife community. It can provide shelter for some animals and food for others.

Lake habitat occurs within the lake, along all of its shorelands, and even extends into its watershed for some species. Many animals that live in and near the lake are only successful if their needs – food, a healthy environment, and shelter – are met. Native vegetation including wetlands along the shoreline and adjacent to the lake provides habitat for safety, reproduction, and food, and can improve water quality and balance water quantity. Some lake visitors such as birds, frogs, and turtles use limbs from trees that are sticking out of the water for perches or to warm themselves in the sun. Aquatic plants infuse oxygen into the water and provide food and shelter for waterfowl, small mammals, and people. The types and abundance of plants and animals that comprise the lake community also vary based on the water quality, and the health and characteristics of the shoreland and watershed. Healthy habitat in Lake Jacqueline includes the aquatic plants, branches, and tree limbs above and below the water.

Results from the 2023 Resident Survey



The Fish Community

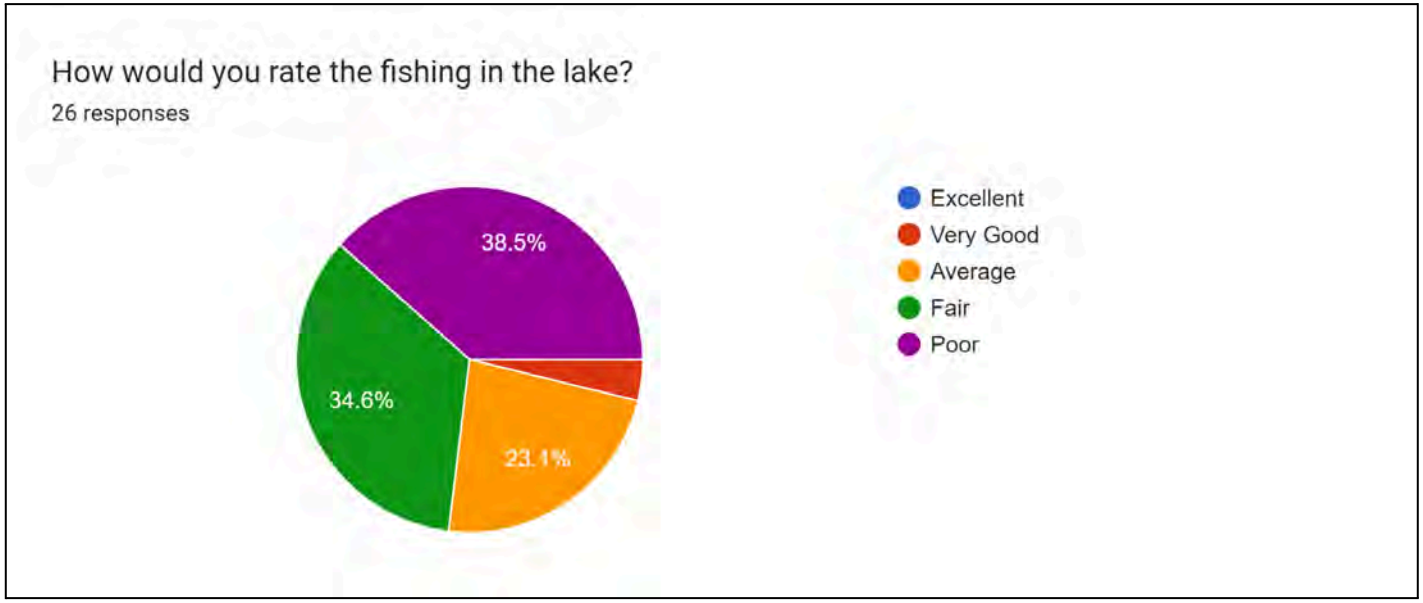
A balanced fish community has a mix of predator and prey species, each with different food, habitat, nesting substrate, and water quality needs in order to flourish. Activities in and around a lake that can affect a fishery may involve disturbances to the native aquatic plant community or substrate, excessive additions of nutrients or harmful chemicals, removal of woody habitat, shoreline alterations, and/or an imbalance in the fishery. Shoreland erosion can cause sediment to settle onto the substrate, causing the deterioration of spawning habitat. Habitat can be improved by allowing shoreland vegetation to grow, minimizing the removal of aquatic plants, providing fallen trees or limbs in suitable areas, and protecting wetlands and other areas of critical habitat.

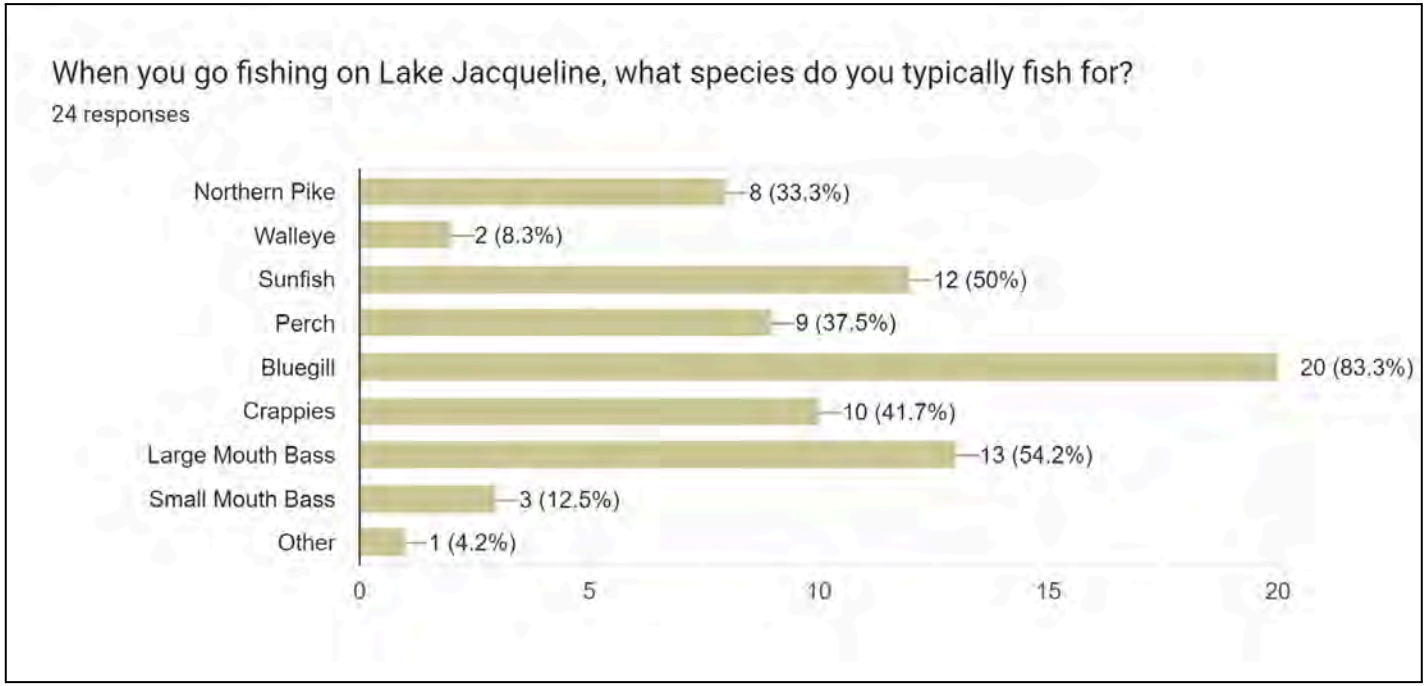
People are an important part of a sustainable fish community; their actions on the landscape and the numbers and sizes of fish taken out of the lake can influence the entire lake ecosystem. Putting appropriate fishing regulations in place and adhering to them can help to balance the fishery with healthy prey and predatory species, can be adjusted as the fish community changes, and can provide for excellent fishing.

Managing a lake for a balanced fishery can result in fewer expenses to lake stewards and the public. While some efforts may be needed to provide a more suitable environment to meet the needs of the fish, they usually do not have to be repeated on a frequently recurring basis. Protecting existing habitat such as emergent, aquatic, and shoreland vegetation, and allowing trees that naturally fall into the lake to remain in the lake are free of cost. Alternatively, restoring habitat in and around a lake can have an up-front cost, but the effects will often continue for decades. Costs in time, travel, and other expenses are associated with routine efforts such as fish stocking and aeration. Ideally, a lake contains the habitat, water quality, and food necessary to support the fish communities that are present within the lake and provide fishing opportunities for people without a lot of supplemental effort and associated expenses to maintain these conditions.

Fish communities are an important part of any healthy lake ecosystem and are a source of pleasure for many. According to survey respondents fishing is the most popular activity on Lake Jacqueline. Respondents also felt that fishing on Lake Jacqueline is currently average or fair, but that quality has declined. These users feel that the fisheries of Lake Jacqueline need quality habitat, vegetative cover, and good water quality in order to improve fisheries in Lake Jacqueline.

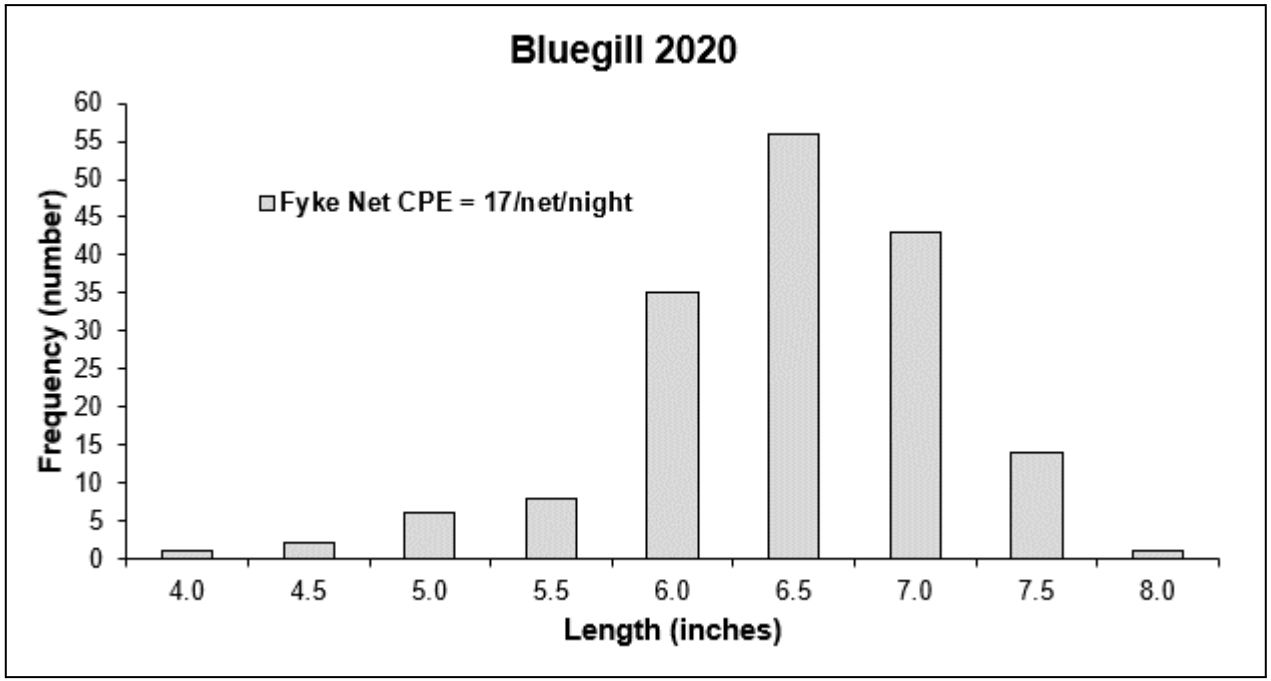
Healthy lake ecosystems are valuable natural resources for all lake users. It is important to maintain a good fishery so that anglers and families are able to catch fish now and for many generations. Fishing is one of the top recreational activities on Lake Jacqueline and is valued by lake users. The majority of the land owners felt that fishing in Lake Jacqueline was average and had stayed the same or declined. Fish communities will be protected and improved by maintaining and improving the quality of in-lake and shoreline habitat, aquatic plant communities, and good water quality. Lake Jacqueline was dominated by black bull head and silver shiners until a grant was received from Fish American to install an aeration system to prevent winter kill in 1991. To date the Lake has not had a winter kill. Lake Jacqueline is a small shallow lake that cannot have a lot of outside fishing pressure, to maintain a fishery of Bass and Northern Pike. To maintain the fisher a larger size for bass of 18 inch, with a bag limit one, Northern Pike was set at 32 inches and a bag limit of one. Our members promote catch and release.


How would you rate the fishing in the lake?
26 responses
38.5%
34.6%
23.1%
Excellent
Very Good
Average
Fair
Poor


When you go fishing on Lake Jacqueline, what species do you typically fish for?
24 responses
Northern Pike
8 (33.3%)
Walleye
2 (8.3%)
Sunfish
12 (50%)
Perch
9 (37.5%)
Bluegill
20 (83.3%)
Crappies
10 (41.7%)
Large Mouth Bass
13 (54.2%)
Small Mouth Bass
3 (12.5%)
Other
1 (4.2%)
0
5
10
15
20

Data from the WI DNR Fisheries Biologist for winter kill investigation in 2020

(Fyke netting catch per effort (CPE) is shown in catch per net per night. We also captured one largemouth bass.)



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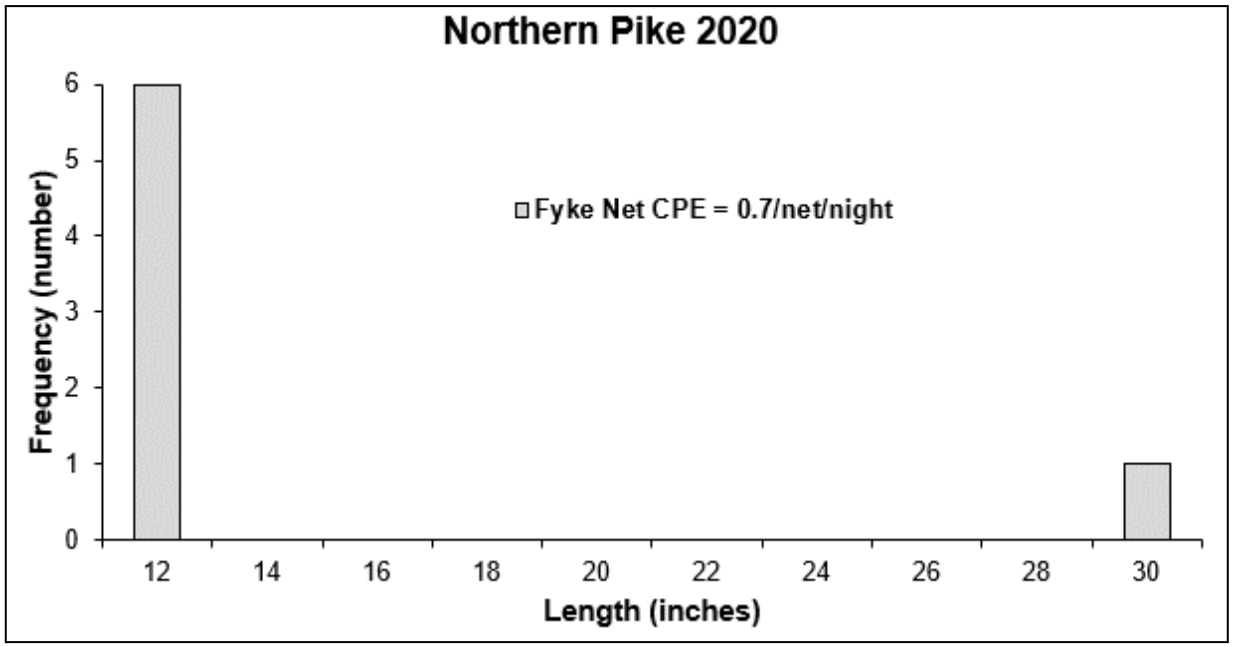

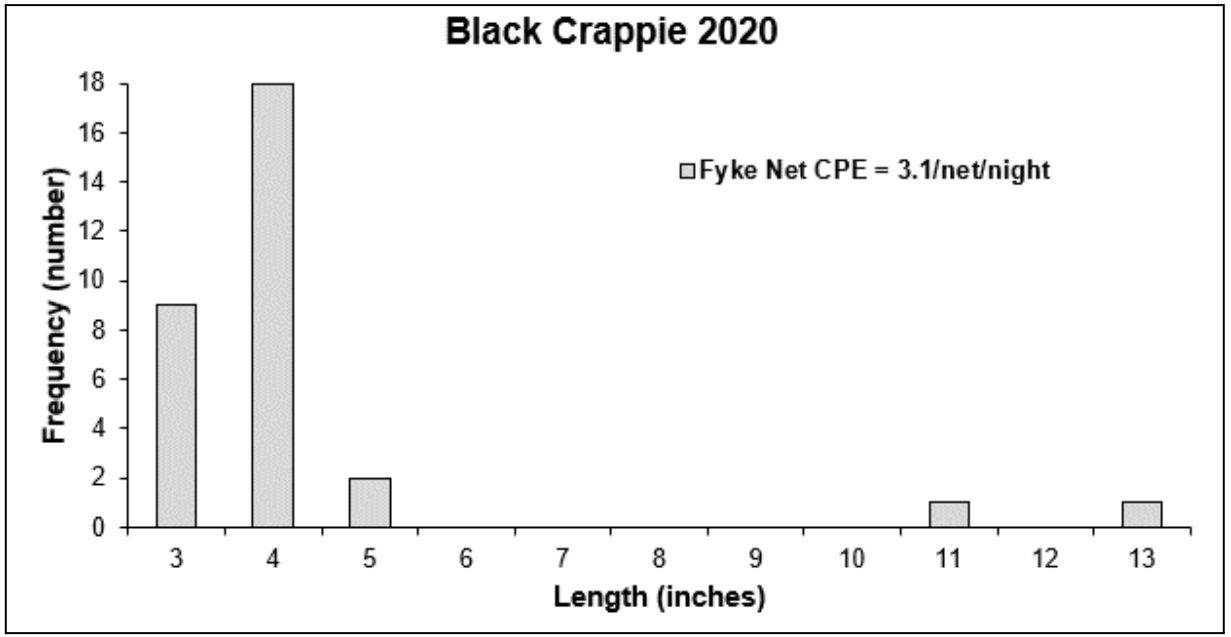

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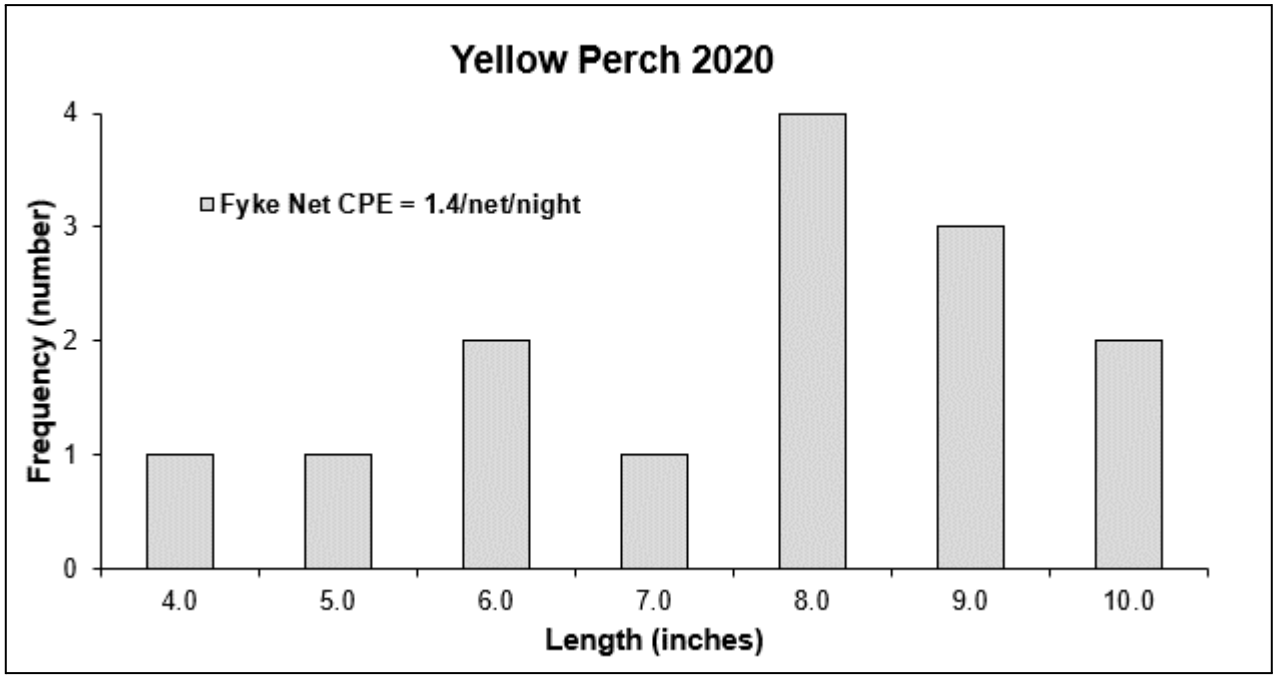


Lake Jacqueline Stocking Data from the WI DNR Fisheries Biologist from 1985-2016

YEAR	SPECIES	AGE CLASS	NUMBER STOCKED	AVG LENGTH (in.)
2016	NORTHERN PIKE	YEARLING	83	12
2015	YELLOW PERCH	ADULT	333	9
2014	BLACK CRAPPIE	ADULT	725	6
2013	BLACK CRAPPIE	LARGE FINGERLING	850	5
2012	BLACK CRAPPIE	SMALL FINGERLING	900	4
2012	NORTHERN PIKE	LARGE FINGERLING	182	12
2011	FATHEAD MINNOW	ADULT	200	3
2011	NORTHERN PIKE	LARGE FINGERLING	181	12
2011	BLACK CRAPPIE	LARGE FINGERLING	1100	3
2010	NORTHERN PIKE	LARGE FINGERLING	85	11
2010	YELLOW PERCH	LARGE FINGERLING	556	4
2009	YELLOW PERCH	YEARLING	2500	4
2008	YELLOW PERCH	LARGE FINGERLING	111	
2007	YELLOW PERCH	FALL YEARLING	1000	6
1996	LARGEMOUTH BASS	FINGERLING	6000	2.3
1994	LARGEMOUTH BASS	FINGERLING	1000	3
1993	LARGEMOUTH BASS	FINGERLING	2000	2
1992	LARGEMOUTH BASS	FINGERLING	2000	1
1985	LARGEMOUTH BASS	FINGERLING	4000	1

Goal 1

Through sustainable management practices, improve the in-lake habitat along with the size and quality in order to have a balanced and healthy fish community.

Objective 1.1: Improve shallow water fish habitat through fish sticks/tree falls and near shore habitat of Lake Jacqueline

Actions	Lead person/group	Start/end dates	Resources
Develop in-lake habitat through the Healthy Lakes and Rivers grant for fish, macroinvertebrates, and amphibians.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	WI DNR
Provide information at annual meetings about why fish habitat is needed and what can be done to improve habitat.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	WI DNR

Objective 1.2: Work with WI DNR to determine lake-specific fisheries goals.

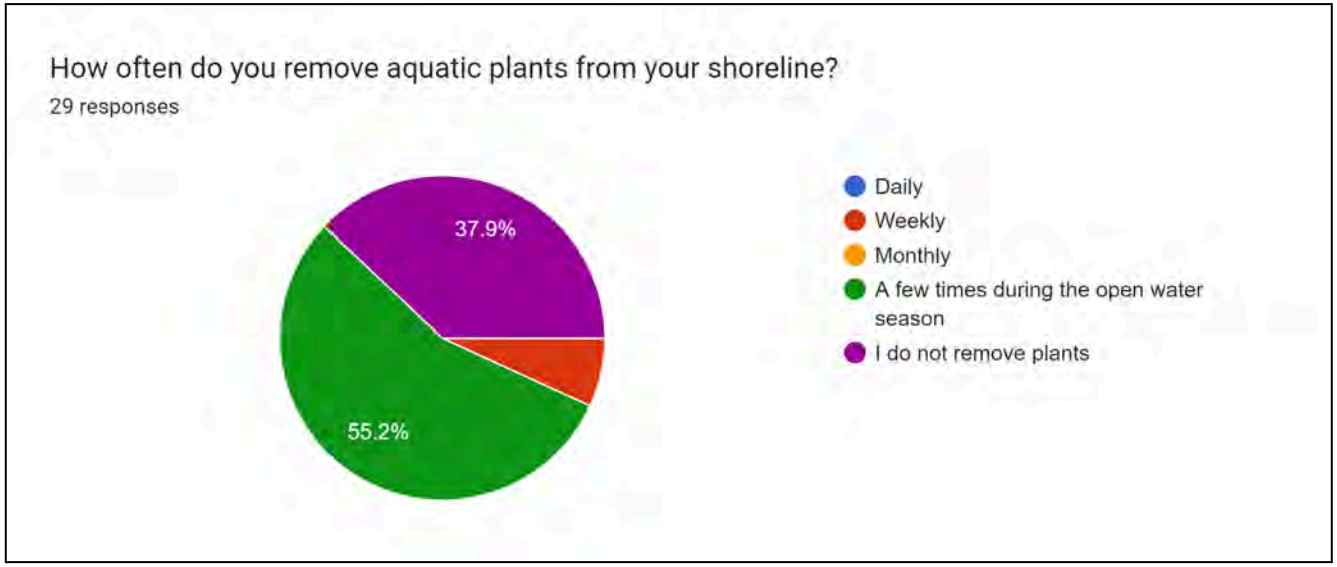
Actions	Lead person/group	Start/end dates	Resources
WI DNR will conduct a fish survey on Lake Jacqueline	Lake Jacqueline Protection and Rehabilitation District	Next survey 2032	WI DNR
Work with WI DNR using local lake data to develop lake-specific fishery recommendations.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	WI DNR
Work with WI DNR to get recommendations about fish stocking and if it makes sense for Lake Jacqueline	Lake Jacqueline Protection and Rehabilitation District	Ongoing	WI DNR

The Aquatic Plant Community

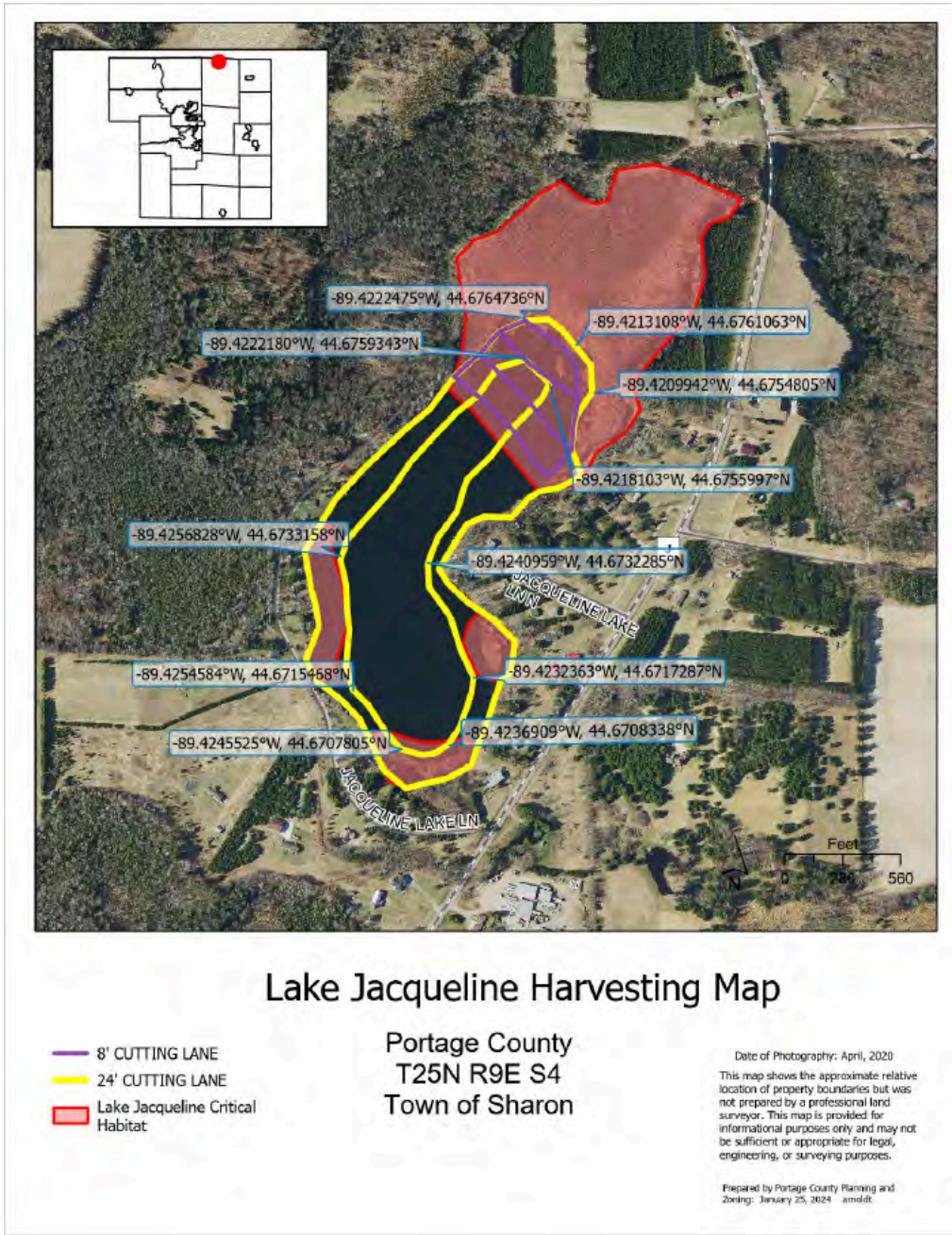
Fish and other aquatic and water dependent terrestrial life depend on aquatic plants for habitat, food, and spawning areas. Healthy aquatic plant communities also limit the establishment of invasive aquatic species along with a vigilant watch to prevent invasive species from entering and becoming established in Lake Jacqueline. The families of lake residents and users enjoy Lake Jacqueline's fishery and wildlife. Healthy, native communities of aquatic plants are important to provide habitat, food, and oxygen for fish and wildlife. The residents of Jacqueline Lake feel that native aquatic plants play an important role in a healthy ecosystem. The majority of survey respondents felt that the presence of aquatic plants was essential to maintaining the water quality and water clarity of Lake Jacqueline. Dense vegetation in some parts of the lake has been a problem for years. The aquatic plants continue to inhibit recreation and contribute to organic sediment deposition which can lead to oxygen depletion. In 1992 the Lake District applied to the waterway's commission for a weed harvesting system suited for Lake Jacqueline, which was approved. They have developed a harvesting plan that allows recreation and lanes for fishing. This system is labor intensive and costly effort by the Lake District.

Healthy native aquatic plant communities are an essential part of a lake ecosystem. Fish and other aquatic and terrestrial life depend on aquatic plants for habitat, food, and spawning areas. Aquatic plants also provide protection for a lake by preventing the establishment of invasive aquatic species and protecting sediment from wind and boating disturbance. Lake Jacqueline residents and lake users value native aquatic vegetation for these benefits. In a citizen survey of Lake Jacqueline residents and users, respondents indicated interest in learning more about native aquatic vegetation and their benefits. A healthy community of aquatic plants within Lake Jacqueline will be maintained through information opportunities and sustainable lake management practices.

Results from the 2023 Resident Survey



Proposed harvest map for Lake Jacqueline 2024



Goal 2

Maintain the diversity and quality of native aquatic plants and prevent the establishment of invasive aquatic species through the sustainable management of aquatic plants for fish and wildlife habitat.

Objective 2.1: Minimize disturbed areas of native aquatic vegetation.

Actions	Lead person/group	Start/end dates	Resources
Provide information on the Lake JacquelinFacebook page and the annual meeting about the value of native aquatic plants and the consequences of removing native plant communities.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Extension Lakes Portage County Land Water Conservation Department
Host speakers on aquatic plants.	Lake Jacqueline Protection and Rehabilitation District	Annual Meeting	Golden Sands RC&D WI DNR Extension Lakes
Conduct a plant survey of Lake Jacqueline a minimum of every five years. Pursue grant opportunities to help off-set the cost of the survey.	Lake Jacqueline Protection and Rehabilitation District	Every 5 years or more often Last done 2018	Golden Sands RC&D WI DNR Consultant

Objective 2.2: Prevent the introduction of aquatic invasive species into Jacqueline Lake.

Actions	Lead person/group	Start/end dates	Resources
Update the aquatic plant management plan to include the results of the aquatic plant survey.	Lake Jacqueline Protection and Rehabilitation District	2019	WI DNR Consultant
Maintain updated aquatic invasive species rapid response plan.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	WI DNR Golden Sands RC&D
Educate Lake District members on the Rapid Response Plan and the presence of AIS in nearby lakes.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	WI DNR Golden Sands RC&D

Aquatic Invasive Species (AIS)

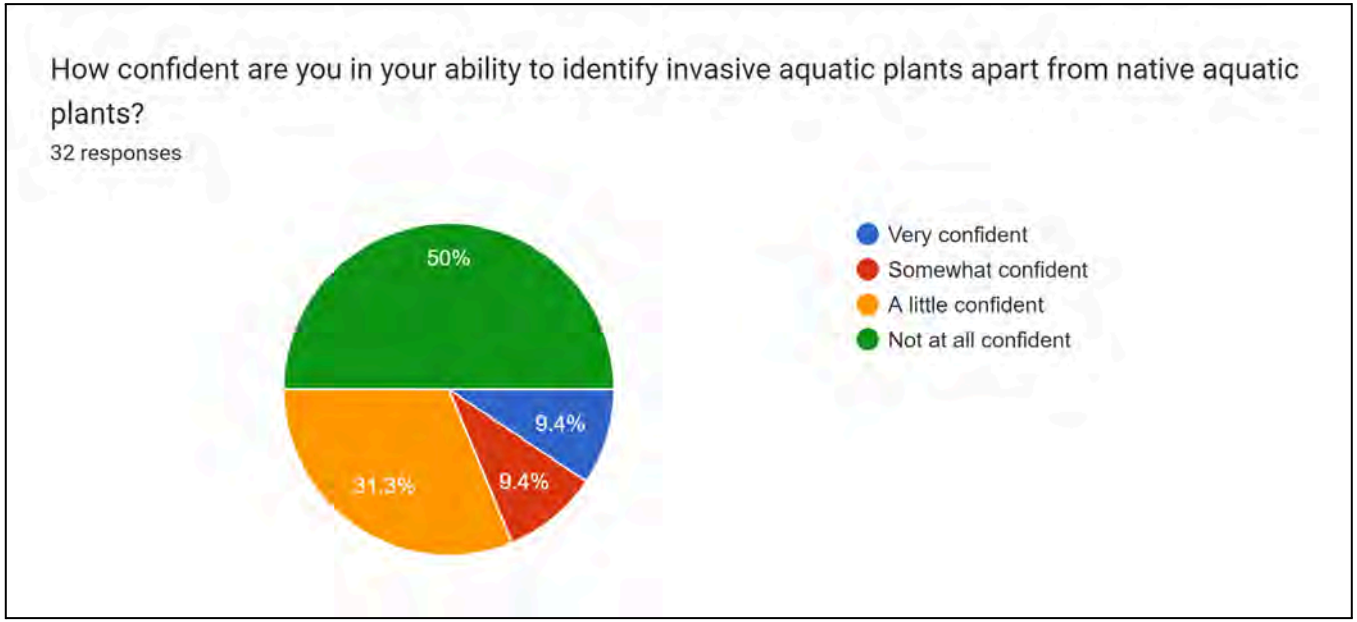
Aquatic invasive species are non-native aquatic plants and animals that are most often unintentionally introduced into lakes by lake users. This most commonly occurs on trailers, boats, equipment, and from the release of bait. In some lakes, aquatic invasive plant species can exist as a part of the plant community, while in other lakes populations explode, creating dense beds that can damage boat motors, make areas non-navigable, inhibit activities like swimming and fishing, and disrupt the lakes' ecosystems. Learning how to identify AIS, monitoring, and quick removal can help to prevent new AIS from becoming established in Lake Jacqueline.

***General recommendations for managing and preventing the spread of AIS*:**

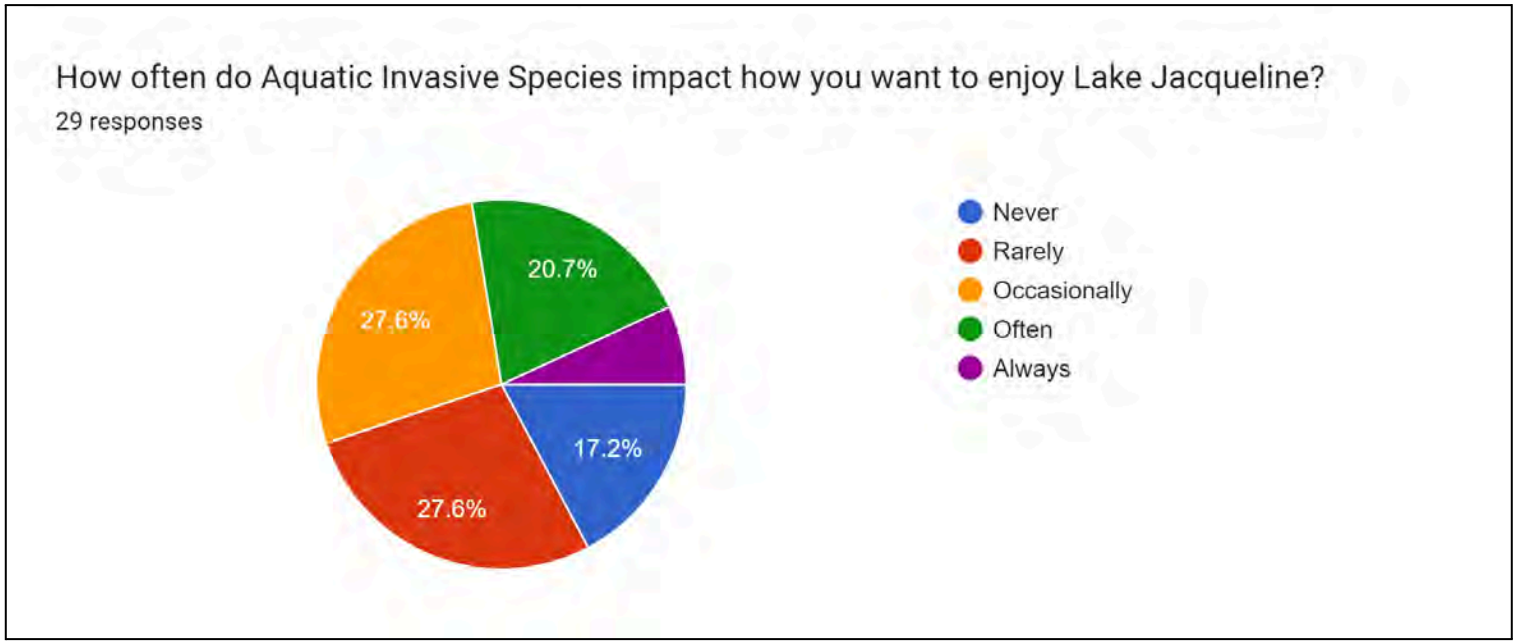
Reducing nutrients that travel across the landscape and into the lake can help lessen excessive plant growth. Algal blooms can be avoided by maintaining a healthy amount of native aquatic plants. Denuding the lakebed can increase potential for AIS establishment, while sediment can add phosphorus to the water which may lead to increased algal growth.

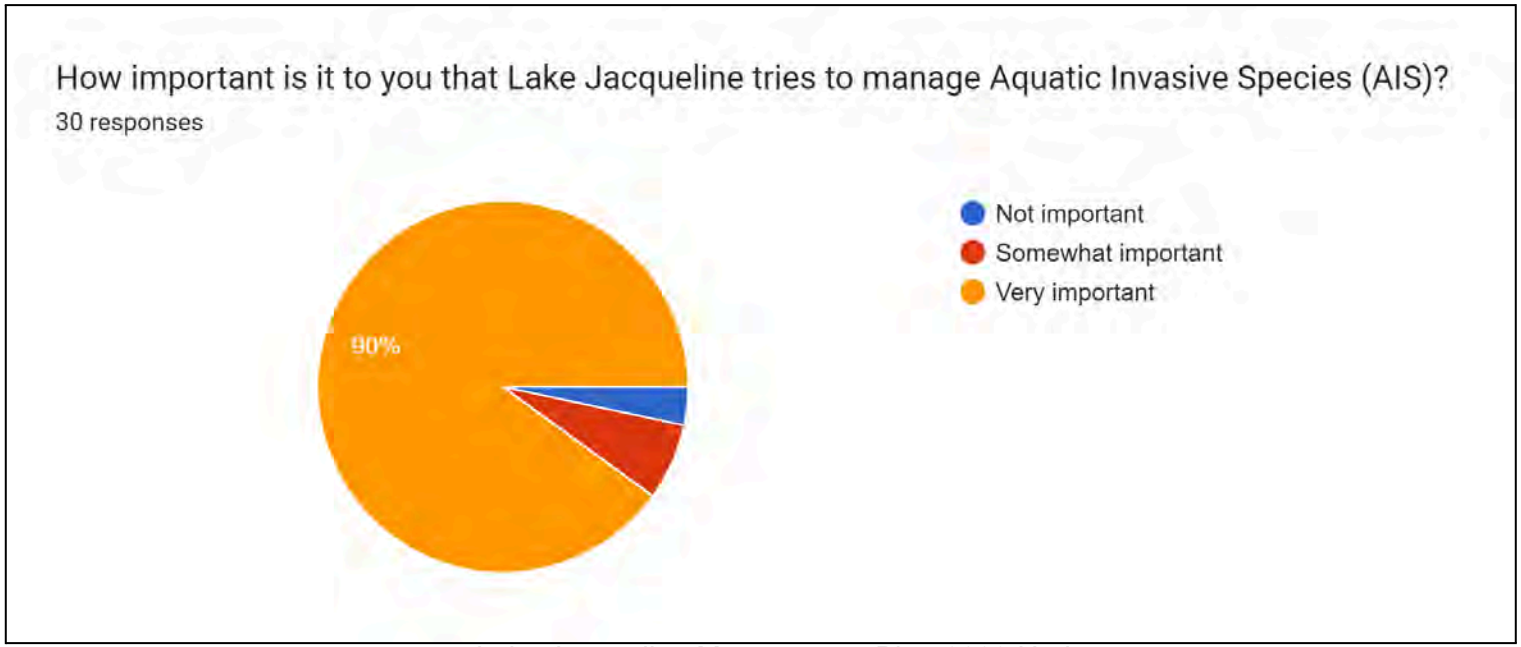
AIS can be better managed if routine monitoring is done annually (or more frequently) by volunteers trained in AIS identification and proper removal methods. If other AIS are found or suspected, lake users/residents can refer to the AIS Rapid Response Plan for instructions. Monitoring efforts can be coordinated with the Lake Jacqueline Protection and Rehabilitation District , local lake citizens, Golden Sands RC&D and WDNR aquatic plant biologists.

Results from the 2023 Resident Survey



Results from the 2023 Resident Survey





Aquatic Plant Management Strategies

General recommendations:

* Reduce nutrients traveling to the lake from the landscape
* Avoid increasing algal blooms by maintaining a healthy amount of aquatic plants
* Don't denude the lakebed
* Increases potential for aquatic invasive species establishment
* Sediments can add phosphorus to the water which may lead to increased algal growth
* Choose options that are appropriate for your lake's situation
* Monitor and adjust your strategies if you are not making headway!

List of Aquatic Plant Management Options (selection of options varies with situation):

No Action	
ADVANTAGES	LIMITATIONS
No associated cost	May not be effective in obtaining aquatic plant management objectives
Least disruptive to lake ecosystem	

Manual Removal-training is recommended-Permit is not required	
ADVANTAGES	LIMITATIONS
Can target specific plants-with proper training	Removes near-shore wildlife and fish habitat
Can be effective in controlling small EWM/HWM infestations	Opens up areas where other AIS can become established
No associated cost	If EWM/HWM are not removed properly, could worsen the problem

	Training required for proper identification/removal methods

Manual Removal, Diver-Assisted (With or Without Suction)-training is recommended-permit is not required	
ADVANTAGES	LIMITATIONS
Can be used in deeper areas	Costs associated with hiring a diver may be comparable to chemical treatment expenses
Can target specific plants with proper training	Currently an experimental treatment-not readily available
Can be effective in controlling small EWM/HWM infestations	If EWM/HWM are not pulled properly, could worsen the problem
May be useful in helping to remove upper root mass	

Chemical Treatment with Contact Herbicide (Early Season) – Permit required	
ADVANTAGES	LIMITATIONS
May reduce EWM/HWM for a time	Usually not fully effective in eradicating target species
Treatment not needed as frequently	Contaminants may remain in sediment
	Does not remove dead vegetation, which depletes oxygen and releases nutrients, adds to build-up of muck
	Extra nutrients may spur additional aquatic plant and algae growth
	May negatively affect native vegetation
	Effects on lake ecosystem not fully understood
	Can open up areas once taken up by natives for AIS to colonize again

	Can be costly

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	Effects on lake ecosystem not fully understood
	Can open up areas once taken up by natives for AIS to colonize again
	Can be costly

Aquatic Invasive Species Rapid Response Plan

Survey/Monitor

Learn to survey/monitor the lake from:

Water Resources Management Specialist	Portage County Aquatic Invasive Species (AIS) Coordinator
WDNR-Scott Provost or Colton Hutchinson	Golden Sands RC & D- Chris Hamerla
473 Griffith Ave, Wisconsin Rapids, WI 54494	1100 Main St, Suite #150, Stevens Point, WI 54481
715-421-7881	715-343-6215
Scott.Provost@wisconsin.gov or colton.hutchinson@wisconsin.gov	info@goldensandrcd.org or Chris.Hamerla@goldensandsrcd.org

1. Collect Specimens or Take Pictures

- Collect, press, and dry a complete sample. This method is best because a plant expert can then examine the specimen

Or –

- Collect a fresh sample. Enclose in a plastic bag with a moist paper towel and refrigerate.

Or –

- Take detailed photos (digital or film) and send them by mail or email.

Regardless of method used, provide as much information as possible. Try to include flowers, seeds or fruit, buds, full leaves, stems, roots and other distinctive features. In photos, place a coin, pencil, or ruler for scale. Deliver or send specimens ASAP.

Note Location (Provide one or more of the following)

- Latitude & Longitude
- UTM (Universal Transverse Mercator) coordinates
- County, Township, Range, Section, Part-section
- Precise written site description, noting nearest city & road names, landmarks, local topography

If possible, give the exact geographic location using a GPS (global positioning system) unit, topographic map, or the Wisconsin Gazetteer map book. If using a map, include a photocopy with a dot showing the plant's location. You can use TopoZone.com to find the precise location on a digital topographic map. Click the cursor on the exact collection site and note the coordinates (choose UTM or Latitude/Longitude).
and note the coordinates (choose UTM or Latitude/Longitude).

2. To positively I.D. the species, send or bring specimen and additional information:

- Collection date & county
- Your name, address, phone, email
- Exact location (Latitude/Longitude or UTM preferred, or Township/Range/Section)
- Plant name (common or scientific)
- Land ownership (if known)
- Population description (estimate number of plants, area covered)
- Habitat type(s) where found (forest, field, prairie, wetland, open water)

Send or bring specimen to:

Portage County AIS Coordinator
Golden Sands RC&D
Address: 1100 Main St, Suite #150
Stevens Point, WI 54481
Phone: 715-343-6215
E-Mail : info@goldensandsrcd.org

UW-Stevens Point Herbarium
Stephanie Lyon, Curator
301 Daniel O. Trainer Natural Resources Building
Stevens Point, WI 54481
Phone: 715-346-4248
E-Mail: slyon@uwsp.edu

Wisconsin Dept. Natural Resources
AIS Program Coordinator
WI Dept. of Natural Resources, P.O. Box 7921, Madison, WI 53707-7921
Phone: 920-838-2597, E-Mail: amy.kretlow@wisconsin.gov

Once the specimen is dropped off or sent for confirmation, make sure to contact:

Portage County AIS Coordinator
Golden Sands RC&D
Address: 1100 Main St, Suite #150
Stevens Point, WI 54481
Phone: 715-343-6215
E-Mail : info@goldensandsrcd.org

3. If an invasive species is confirmed, the Portage County AIS Coordinator will post notice at the access points to the waterbody and contact the following:

Wisconsin Department of Natural Resources
Water Resources Management Specialist
Contact: Scott Provost and/or Colton Hutchinson
473 Griffith Ave., Wisconsin Rapids, WI 54494
Phone: 715-421-7881
E-Mail: Scott.Provost@wisconsin.gov and/or colton.hutchinson@wisconsin.gov

Lake Jacqueline Protection & Rehabilitation District President
Contact: Pam Riggs
Address: 7135 Jacqueline Lake Lane
Phone: 906-869-3969
E-mail: fmlyimru@gmail.com
District E-mail: lakejacquelinedistrict@gmail.com

Town of Sharon
Contact: Jeff Check-Chair
Address: 7565 Twin Lakes Dr, Custer, WI 54423
Phone: 715-570-4261

Critical Habitat

Special areas harbor habitat that is essential to the health of a lake and its inhabitants. In Wisconsin, critical habitat areas are identified by biologists and other lake professionals from the Wisconsin Department of Natural Resources in order to protect features that are important to the overall health and integrity of the lake, including aquatic plants and animals. While every lake contains important natural features, not all lakes have official critical habitat designations. Designating areas of the lake as critical habitat enables these areas to be located on maps and information about their importance to be shared. Having a critical habitat designation on a lake can help lake groups and landowners plan waterfront projects that will minimize impact to important habitat, ultimately helping to ensure the long-term health of the lake.

Critical habitat sites are sensitive and fragile areas that support fish and wildlife habitat, provide mechanisms that protect water quality, and harbor quality plant communities. Protection of these areas within Lake Jacqueline is important because they exemplify the character and qualities of the lake and ensure the long-term health of Lake Jacqueline. The sensitive areas that were identified by researchers in the lake study can be found in the Sensitive Areas. Critical habitat areas around Lake Jacqueline have been identified by biologists with the WDNR but no formal designation has occurred. A map of the areas that were identified can be found in the appendix. More details about critical habitat areas are available online at: http://dnr.wi.gov/lakes/criticalhabitat/ .

Attributes Common to All the Critical Habitat Areas on Lake Jacqueline

Water Quality

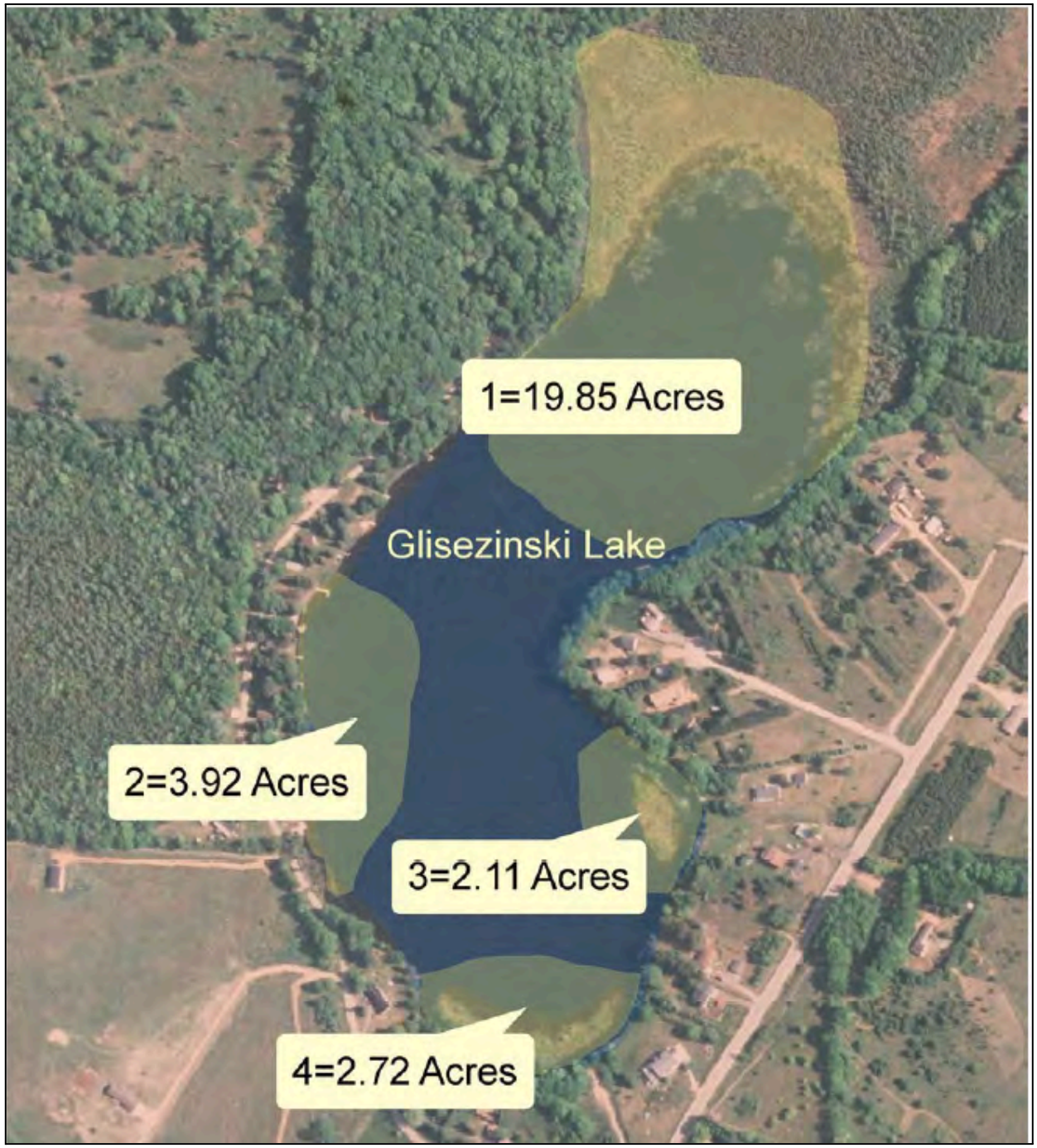
The aquatic and shoreline vegetation at all of the sites provides important water quality protections. The plants at all four sites provide a nutrient buffer by absorbing nutrients thus reducing algae growth. The plants at all sites provide a biological buffer, reducing the possibility that introduced exotic plant species could become established. The plants at all sites provide a physical buffer that protects the shoreline against wave erosion. Aquatic plants at all sites provide sediment stabilization, their roots anchoring the sediments and preventing resuspension by boat motors and waves and the resulting turbidity.

Wildlife Habitat

All of the Critical Habitat Areas provide very important wildlife habitat. Some values are unique to a Critical Habitat Area and some habitat values are shared by all the Critical Habitat Areas. All of the sites provide: 1. feeding areas for mink, loons, 2. shelter and cover for amphibians and 3. shelter, cover and feeding areas for turtles.

Fish Habitat

The designation of Critical Habitat Areas helps to preserve important fish habitat in a lake. The Critical Habitat Areas possess various attributes (submergent, floating-leaf, emergent and overhanging vegetation, and large woody cover) that have the potential to provide spawning areas, feeding areas, cover and nursery areas throughout the season. Some values are unique to a Critical Habitat Area and some habitat values are shared by all the Critical Habitat Areas in a lake.


1=19.85 Acres
Glisezinski Lake
2=3.92 Acres
3=2.11 Acres
4=2.72 Acres

Landscapes and the Lake

Land use and land management practices within a lake's watershed can affect both its water quantity and quality. While forests, grasslands, and wetlands allow a fair amount of precipitation to soak into the ground, resulting in more groundwater and good water quality, other types of land uses may result in increased runoff and less groundwater recharge, and may also be sources of pollutants that can impact the lake and its inhabitants. Areas of land with exposed soil can produce soil erosion. Soil entering the lake can make the water cloudy and cover fish spawning beds. Soil also contains nutrients that increase the growth of algae and aquatic plants.

Development on the land may result in changes to natural drainage patterns and alterations to vegetation on the landscape, and may be a source of pollutants. Impervious (hard) surfaces such as roads, rooftops, and compacted soil prevent rainfall from soaking into the ground, which may result in more runoff that carries pollutants to the lake. Wastewater, animal waste, and fertilizers used on lawns, gardens and crops can contribute nutrients that enhance the growth of algae and aquatic plants in our lakes. Land management practices can be put into place that better mimic some of the natural processes, and reduction or elimination of nutrients added to the landscape will help prevent the nutrients from reaching the water. In general, the land nearest the lake has the greatest impact on the lake water quality and habitat.

Shoreland vegetation is critical to a healthy lake's ecosystem. It helps improve the quality of the runoff that is flowing across the landscape towards the lake. It also provides habitat for many aquatic and terrestrial animals including birds, frogs, turtles, and many small and large mammals. Healthy shoreland vegetation includes a mix of tall grasses/flowers, shrubs, and trees which extend at least 35 feet landward from the water's edge. Shorelands include adjacent wetlands, which also serve the lake by allowing contaminants to settle out, providing shelter for fish and wildlife, and decreasing the hazard of shoreline erosion by providing a shoreland barrier from waves and wind.

The water quality in Lake Jacqueline is the result of many factors, including the underlying geology, the climate, and land management practices. Since we have little control over the climate and cannot change the geology, changes to land management practices are the primary actions that can have positive impacts on the lake's water quality. The water quality in Lake Jacqueline was assessed by measuring different characteristics including temperature, dissolved oxygen, water clarity, water chemistry, and algae. All of these factors were taken into consideration when management planning decisions were made.

Water Quality and Watershed Land Use

A variety of water chemistry measurements were used to characterize the water quality in Lake Jacqueline. Water quality was assessed during the 2002-2003 lake study and involved a number of measures including temperature, dissolved oxygen, water chemistry, and nutrients (phosphorus and nitrogen). Nutrients are important measures of water quality in lakes because they are used for growth by algae and aquatic plants. Each of these interrelated measures plays a part in the lake's overall water quality. In addition, water quality data collected in past years was also reviewed to determine trends in Lake Jacqueline's water quality.

Lake Jacqueline is host to a wide variety of plants, insects, fish, amphibians, and a variety of other animals that all depend on good water quality in the Lake. The majority of residents on Lake Jacqueline felt that the water quality in Lake Jacqueline was good or fair, but that it declined over the years. Data shows that while water quality has improved slightly from historic levels, there are still concerns over high phosphorus and nitrogen levels in the lake. Although the average concentrations (presented earlier in the plan) are less than the proposed DNR phosphorus standards, individual sampling concentrations in Lake Jacqueline are often well above this level and therefore; reduction is recommended. Protecting and improving water quality goals will be met through increasing infiltration and reducing runoff to the lake, which will help to reduce phosphorus and nitrogen inputs and concentrations in the lake. Reducing phosphorus and nitrogen in the lake will limit algae blooms and improve water clarity.

It is important to understand where Lake Jacqueline's water originates in order to understand the lake's health. During snowmelt or rainstorms, water moves across the surface of the landscape (runoff) towards lower elevations such as lakes, streams, and wetlands. The land area that contributes runoff to a lake is called the surface watershed. Groundwater also feeds Lake Jacqueline; its land area may be slightly different than the surface watershed.

The capacity of the landscape to shed or hold water and contribute or filter particles determines the amount of erosion that may occur, the amount of groundwater feeding a lake, and ultimately, the lake's water quality and quantity. Essentially, landscapes with greater capacities to hold water during rain events and snowmelt slow the delivery of the water to the lake. Less runoff is desirable because it allows more water to recharge the groundwater, which feeds the lake year-round - even during dry periods or when the lake is covered with ice. A variety of land management practices can be put in place to help reduce impacts to our lakes. Some practices are designed to reduce runoff. These include protecting/restoring wetlands, installing rain gardens, swales, rain barrels, and routing drainage from pavement and roofs away from the lake. Some practices are used to help reduce nutrients from moving across the landscape towards the lake. Examples include manure management practices, eliminating/reducing the use of fertilizers, increasing the distance between the lake and a septic drainfield, protecting/restoring wetlands and native vegetation in the shoreland, and using erosion control practices. Land use and land management practices within the Lake Jacqueline watershed play a large role in the amount of sediment, nutrients, and other pollutants entering the lake. Although it may not be reasonable to change land uses, management practices on the landscape can result in water quality improvements. Thoughtful decisions that are made when land is developed may actually improve water quality or at least minimize disturbances.

Total and calcium hardness

Total and calcium hardness concentrations indicate that Jacqueline Lake is a soft-water lake. Alkalinity was also low, making the lake naturally less productive and more susceptible to the effects of acid rain.

Nitrogen and Phosphorus

Nutrients (phosphorus and nitrogen) are used by algae and aquatic plants for growth much like house plants or crops. Phosphorus is present naturally throughout the watershed in soil, plants, animals and wetlands. Common sources from human activities include soil erosion, animal waste, fertilizers and septic systems. The most common mechanism for the transport of phosphorus from the land to the water is through surface runoff, but it can also travel to the lake in groundwater. Once in a lake, a portion of the phosphorus becomes part of the aquatic system in the form of plant tissue, animal tissue and sediment. The phosphorus can continue to cycle within the lake for many years.Phosphorus levels in Jacqueline Lake have been quite variable over time. Concentrations in 2002-03 were higher than the average historic levels, and higher than the 25.5 ppb average concentration for similar lakes in Portage County. However, sampling in 2021-2023 indicates that these levels may be decreasing with most samples having concentrations between 15 and 20 ppb. Levels of phosphorus above 30 ppb are high enough to categorize a lake as eutrophic, making it subject to aquatic plant growth that results in better fishing and wildlife viewing than swimming. The lake sediment is comprised of decaying vegetation which is rich in nutrients. The soft mucky sediment in this shallow lake can be disturbed during heavy storms with strong winds or by boats that are creating wakes or have large engines. When the sediment mixes into the oxygen rich upper waters, phosphorus is released and becomes available for use by algae and aquatic plants.

In Jacqueline Lake nitrogen concentrations were low, indicating it is likely not contributing to excessive algal or plant growth.

Lake Jacqueline should continue to be consistently monitored for nitrogen and phosphorus to see if these concentrations are stable or changing over time and to try and identify any trends in water quality over time.

Water clarity

The water clarity in Jacqueline Lake is considered fair. The average Secchi depth reading for similar lakes in the region is 10 feet; Jacqueline Lake has poorer clarity than this. The water clarity of Jacqueline Lake during the 2002-03 growing seasons was better than the historic growing season average, although historically clarity has varied widely. The months of June and September shows the best water clarity and the month of July the poorest. These fluctuations throughout the summer are normal as algae populations and sedimentation increase and decrease. The high amount of natural color decreases the Secchi disk reading for this lake.

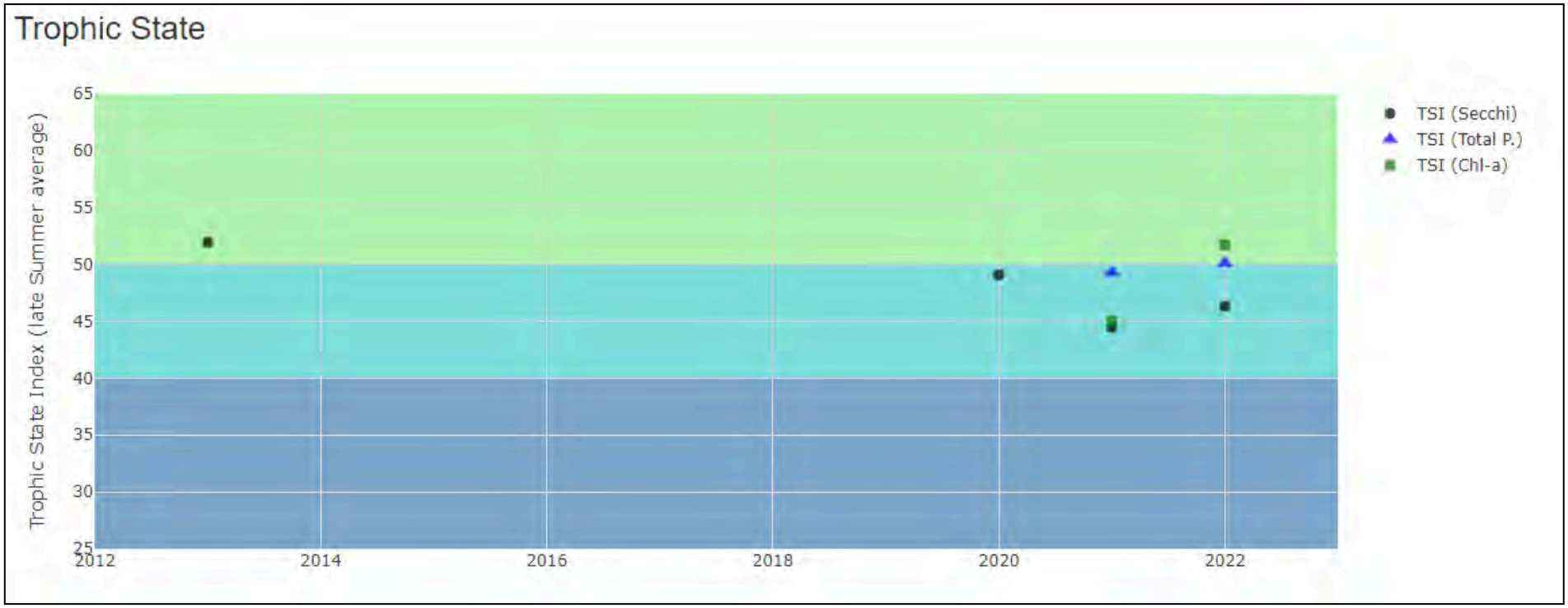
Temperature and dissolved oxygen

Temperature and dissolved oxygen were measured top to bottom each time a sample was collected. Due to Jacqueline Lake's shallow depth it does not stratify, but tends to reach a maximum temperature throughout the water column in late July or early August and oxygen levels below about 8 feet in depth drop significantly. Survival of most aquatic biota is difficult when oxygen levels fall below 5 mg/L.

Chlorophyll-*a*

Chlorophyll-*a* is a measurement of algae in the water. Concentrations greater than 20 µg/L are perceived by many as problem blooms. According to the World Health Organization, concentrations greater than 10 µg/L of chlorophyll-*a* result in a moderate increase in risk to health due to the increased growth of blue-green algae. Monitoring results in recent years indicate that chlorophyll-*a* concentrations in Lake Jacqueline have been below 10 ug/L.

2023 Updates: Jacqueline actively participates in the Citizen Lake Monitoring Network. Water quality data collected include: Chlorophyll A, Fluorescence, Phosphorus Total, Temperature profiles, Water levels, Nitrogen Total, Carbon Diss Organic, Dissolved Oxygen and Secchi Disk. All data is entered in the Surface Water integrated Monitoring System (SWIMS) database and can be viewed on the Surface Water Data Explorer - SWDE WDNR (shinyapps.io)



About Trophic State Index (TSI)

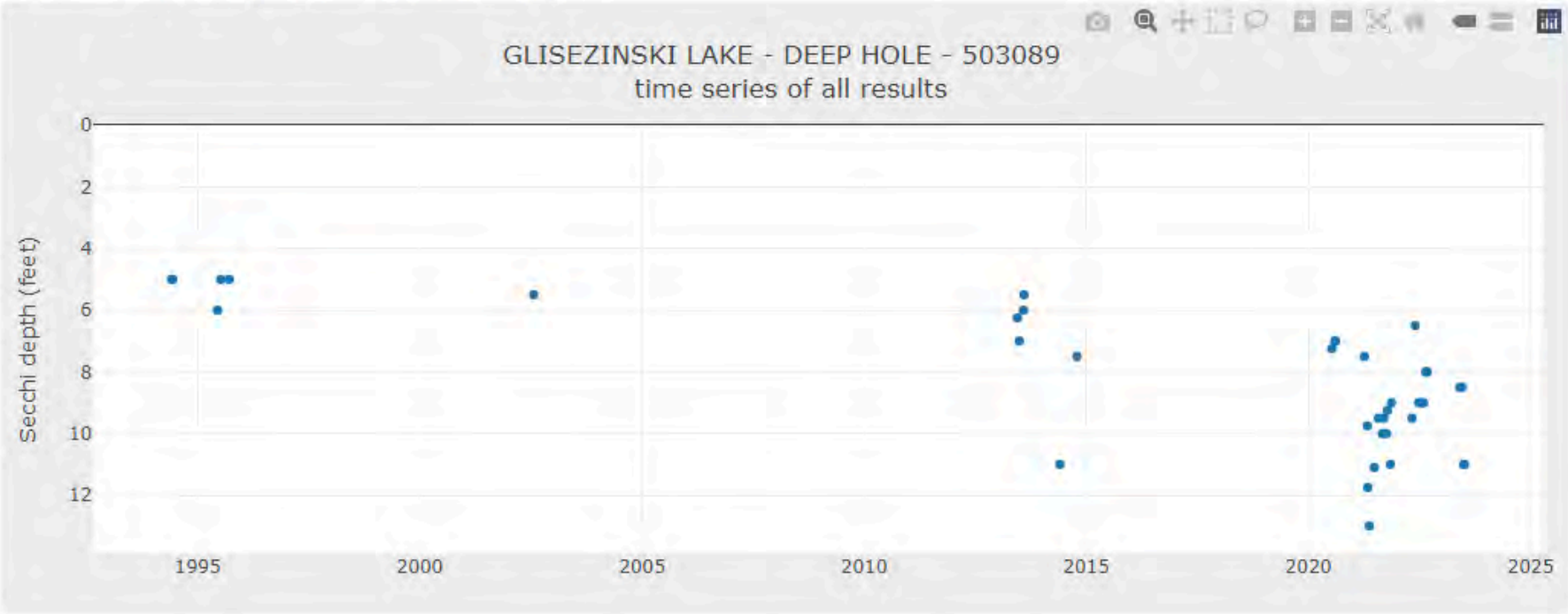
Secchi depth, total phosphorus (TP) and chlorophyll-α (chl-a) are all measures of a lake's trophic state, or the amount of nutrients available. We can convert results from each of these parameters into a trophic state index value, similar to how we might convert measures of temperature to Celsius or Fahrenheit so that we can compare them. We don't expect TSI values from Secchi depth, TP and chl-a to be exactly the same, and sometimes the differences can give us hints about what is going on in the lake.

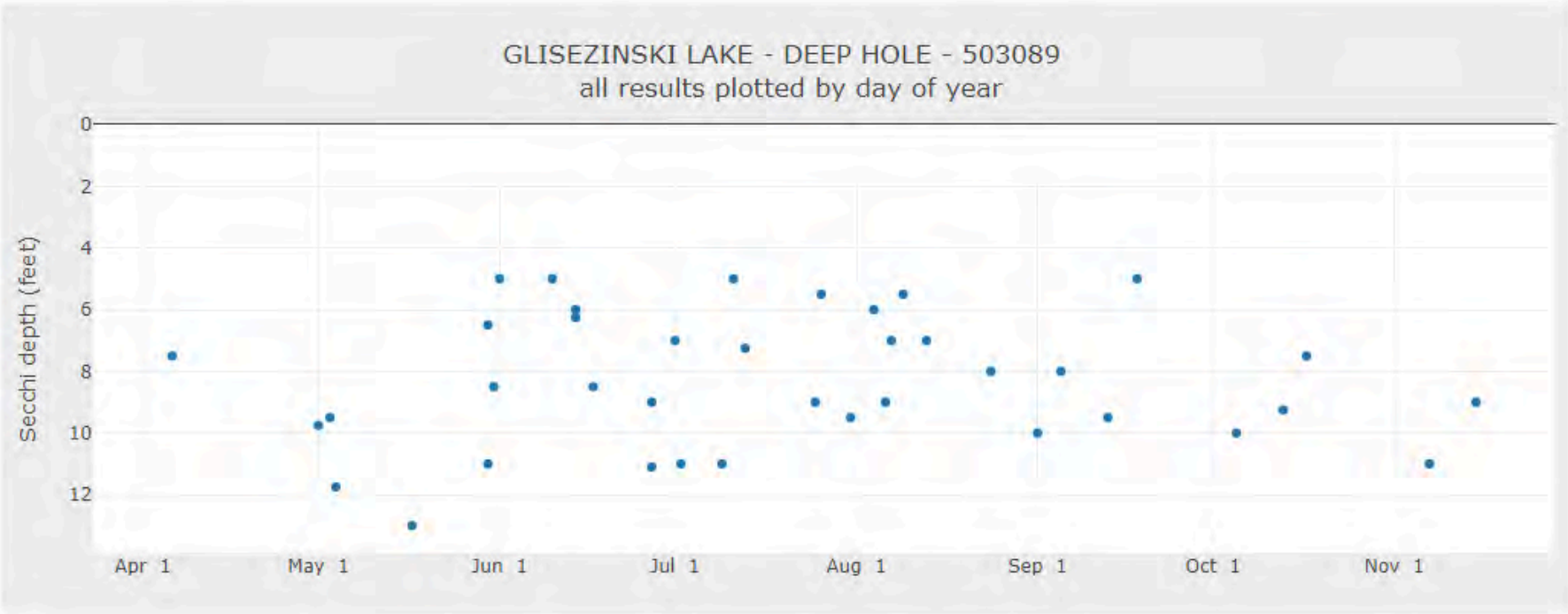
TSI	TSI Description
TSI < 30	Classical oligotrophy: clear water, many algal species, oxygen throughout the year in bottom water, cold water, oxygen-sensitive fish species in deep lakes. Excellent water quality.
TSI 30-40	Deeper lakes still oligotrophic, but bottom water of some shallower lakes will become oxygen-depleted during the summer.
TSI 40-50	Water moderately clear, but increasing chance of low dissolved oxygen in deep water during the summer.
TSI 50-60	Lakes becoming eutrophic: decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.
TSI 60-70	Blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible.
TSI 70-80	Becoming very eutrophic. Heavy algal blooms possible throughout summer, dense plant beds, but extent limited by light penetration (blue-green algae block sunlight).
TSI > 80	Algal scums, summer fishkills, few plants, rough fish dominant. Very poor water quality.

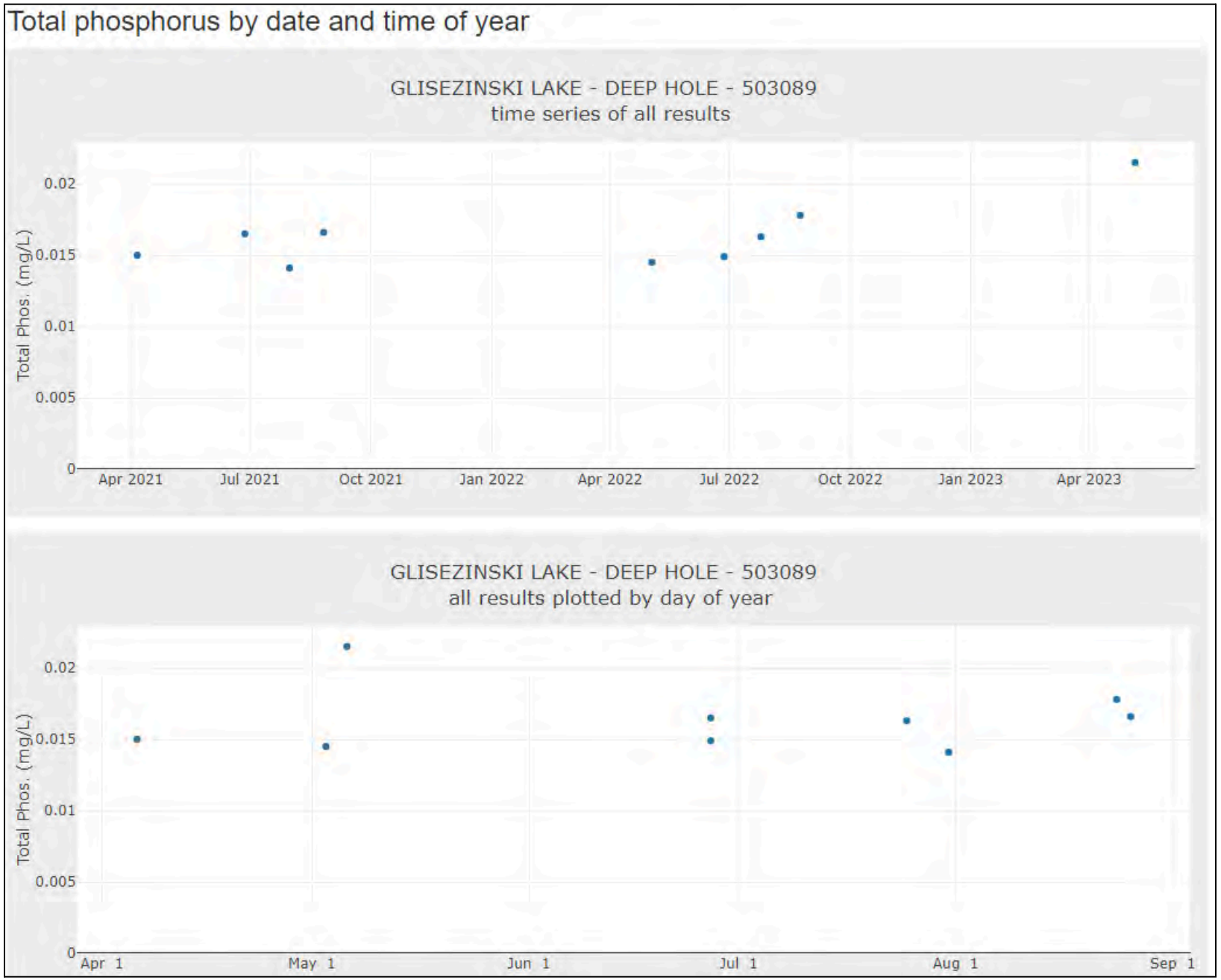
Secchi Disk

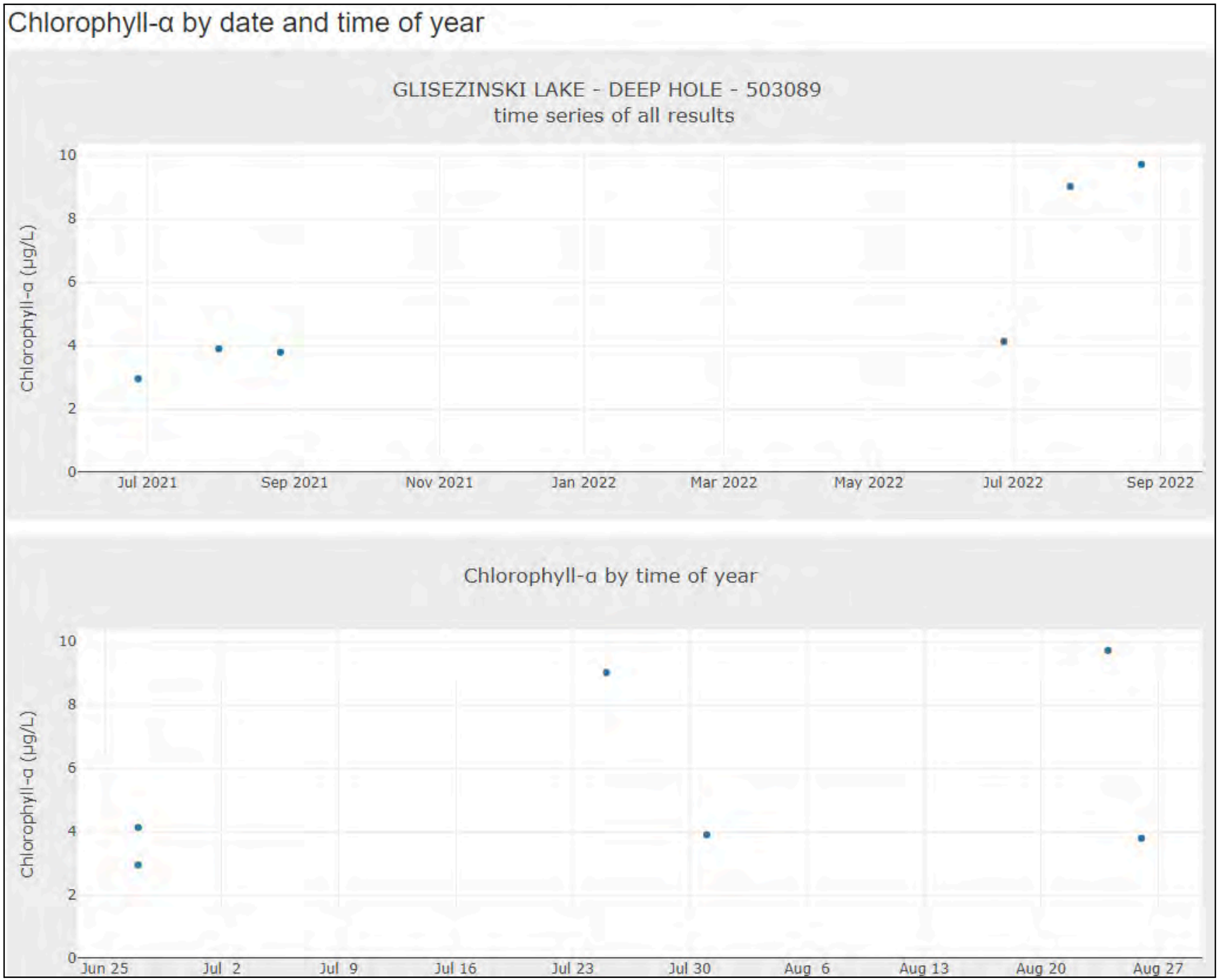
A Secchi disk is an 8-inch (20 cm) disk with alternating black and white quadrants. It is lowered into the water of a lake until it can no longer be seen by the observer. This depth of disappearance, called the Secchi depth, is a measure of the transparency of the water.

Secchi depth by date and time of year

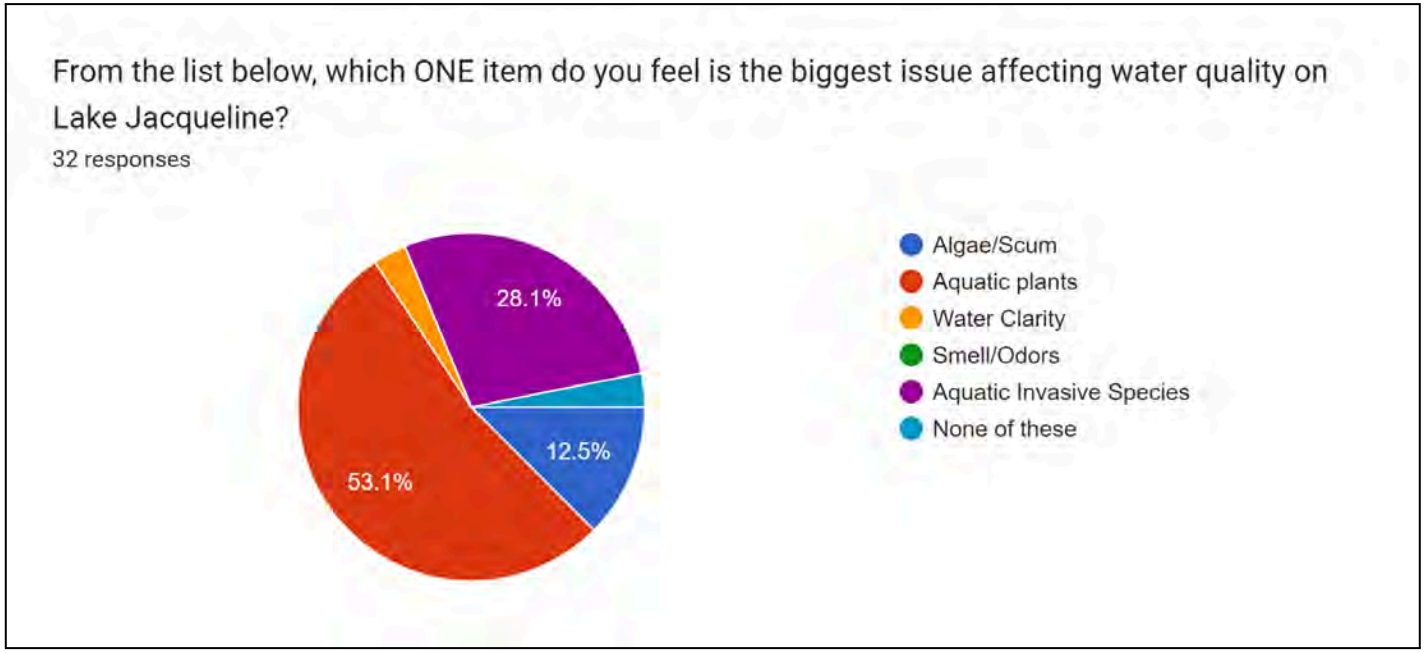




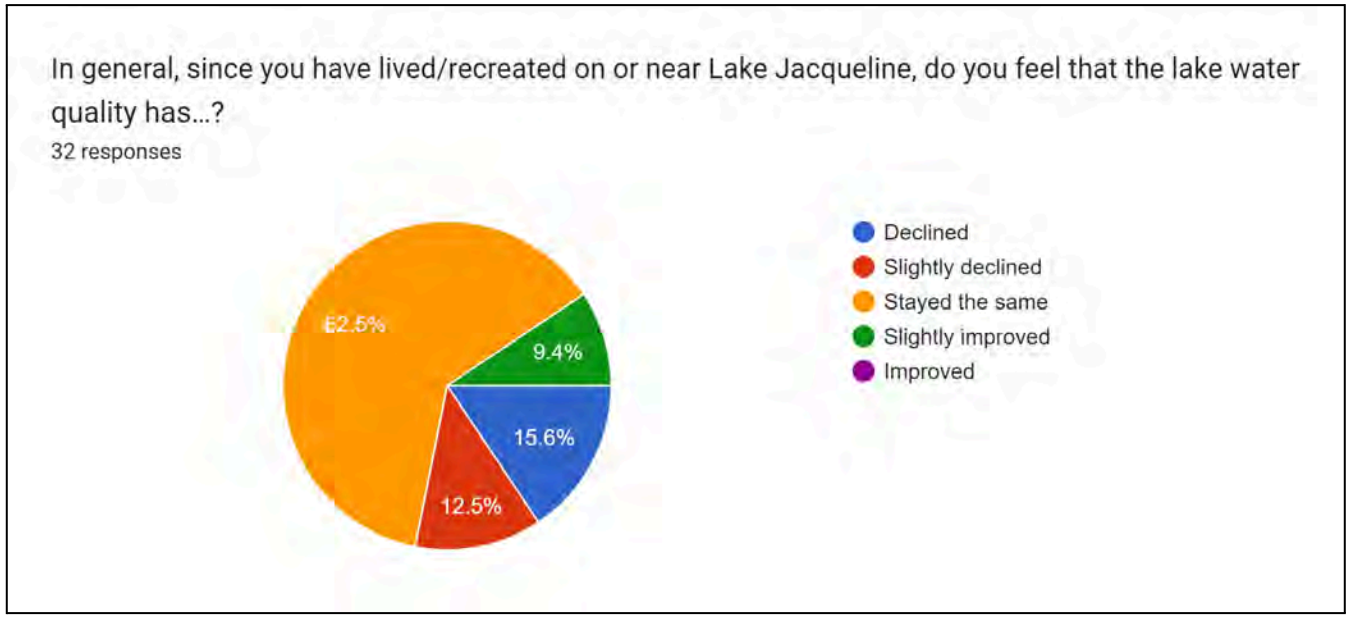

Total phosphorus by date and time of year
GLISEZINSKI LAKE - DEEP HOLE - 503089
time series of all results
Total Phos. (mg/L)
0.02
0.015
0.01
0.005
0
Apr 2021
Jul 2021
Oct 2021
Jan 2022
Apr 2022
Jul 2022
Oct 2022
Jan 2023
Apr 2023
GLISEZINSKI LAKE - DEEP HOLE - 503089
all results plotted by day of year
Total Phos. (mg/L)
0.02
0.015
0.01
0.005
0
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1

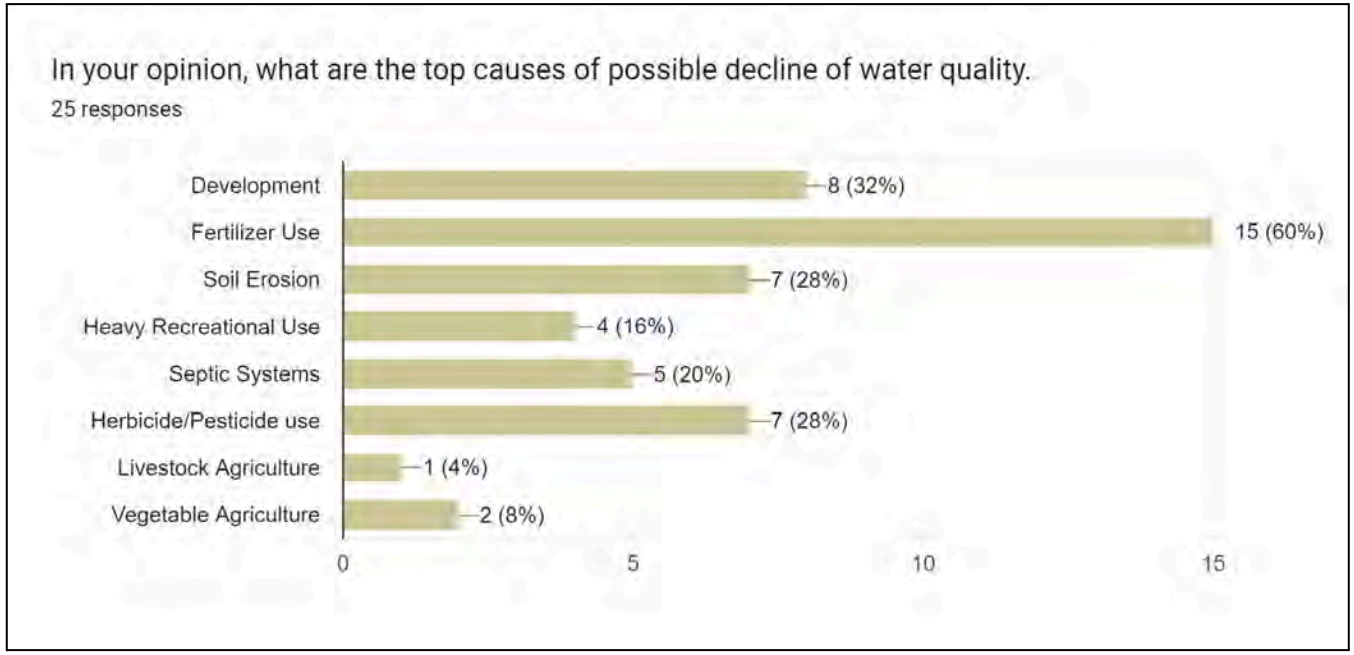

Chlorophyll-α by date and time of year
GLISEZINSKI LAKE - DEEP HOLE - 503089
time series of all results
Chlorophyll-α (µg/L)
0
2
4
6
8
10
Jul 2021
Sep 2021
Nov 2021
Jan 2022
Mar 2022
May 2022
Jul 2022
Sep 2022
Chlorophyll-α by time of year
Chlorophyll-α (µg/L)
0
2
4
6
8
10
Jun 25
Jul 2
Jul 9
Jul 16
Jul 23
Jul 30
Aug 6
Aug 13
Aug 20
Aug 27

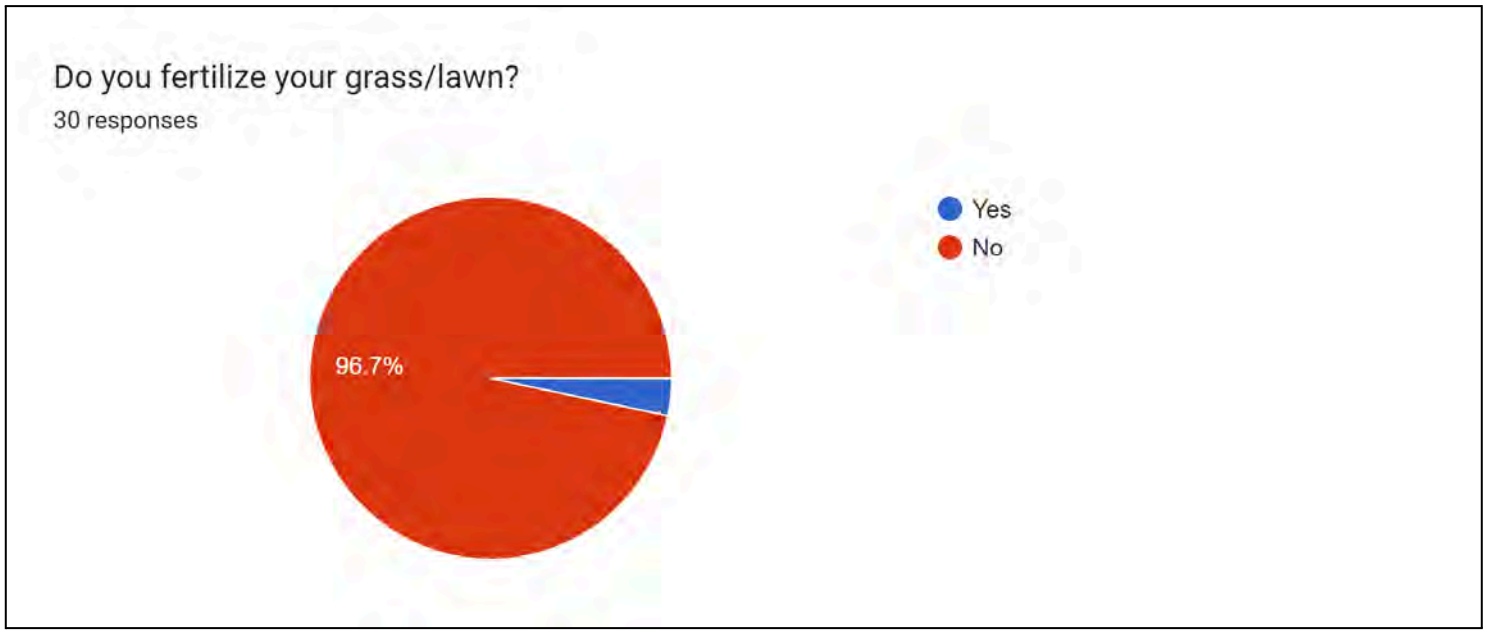
Results from the 2023 Resident Survey

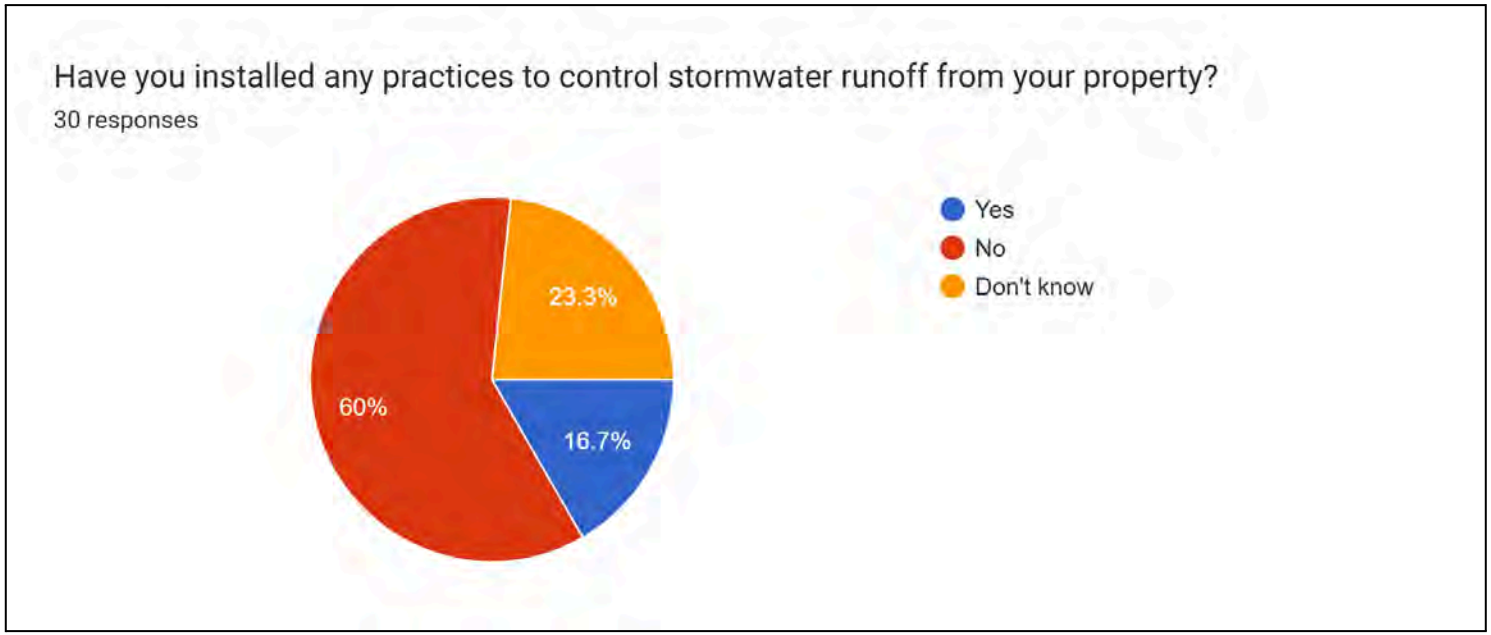


Results from the 2023 Resident Survey






Do you fertilize your grass/lawn?
30 responses
96.7%
Yes
No


Have you installed any practices to control stormwater runoff from your property?
30 responses
23.3%
60%
16.7%
Yes
No
Don't know

Goal 3

Maintain and improve water quality.

Objective 3.1: Maintain phosphorus concentrations at or below 25.5 ppb (2002-03 median summer concentration was 21.5 ppb). We will know that we are achieving our goal when our measured median summer concentrations remain at or below this level for three years.

Action	Lead person/group	Start/end dates	Resources
Test water annually, at a minimum in the spring and fall. Encourage participation in the WI DNR Citizen Water Quality testing program.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Citizen Lake Monitoring Network Extension Lakes
Continued electric motor only use on the lake to reduce sediment resuspension.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Town of Sharon Lake Jacqueline Lake District

Objective 3.2: Reduce runoff from residential properties through informational opportunities.

Actions	Lead person/group	Start/end dates	Resources
Provide educational materials on buffer zones along the shoreline including best management practices to reduce stormwater runoff.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Extension Lakes WI DNR Portage County Land Water Conservation Department
Encourage landowners to work with the Portage County Land Conservation Department on Shoreland Restoration, through the Healthy Lakes and Rivers Grant where needed.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Portage County Land Water Conservation Department
Work with the Town of Sharon to reduce/eliminate road runoff from any roads to the lake.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Town of Sharon

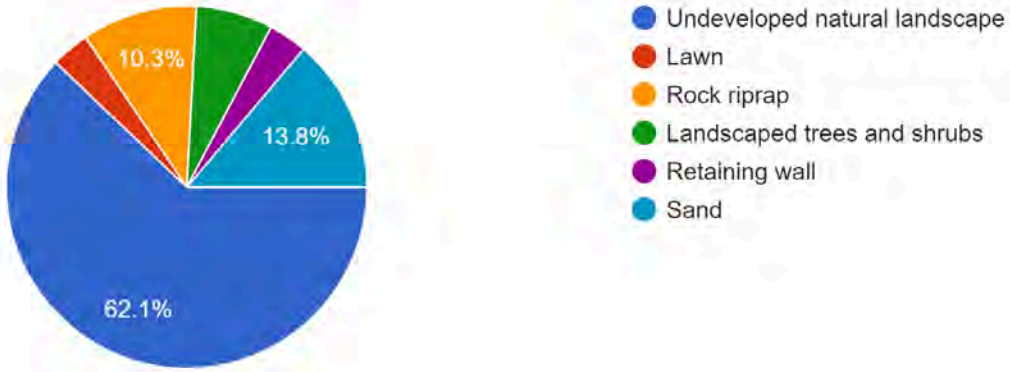
Shorelands

Shoreland vegetation is critical to a healthy lake ecosystem. It provides habitat for many aquatic and terrestrial animals including birds, frogs, turtles, and small and large mammals. It also helps to improve the quality of the runoff that is flowing across the landscape towards the lake. Healthy shoreland vegetation includes a mix of unmowed grasses/flowers, shrubs, trees, and wetlands which extends at least 35 feet landward from the water's edge. In 2003, 65% percent of the shoreline has various levels of disturbance including a public boat landing. Overdeveloped shorelands can't support the fish, wildlife, and clean water that are important to the users and residents of Lake Jacqueline.

Structures such as artificial beaches result in habitat loss. Erosion contributes sediment to the lake, which can alter spawning habitat and carry nutrients into the lake. Unmanaged runoff from rooftops of structures also contributes runoff to the lake, often delivering more sediment to the lake. Docks result in altered in-lake habitat. Denuded lake beds adjacent to docks provide opportunities for invasive species to become established and reduce habitat that is important to fish and other lake inhabitants.

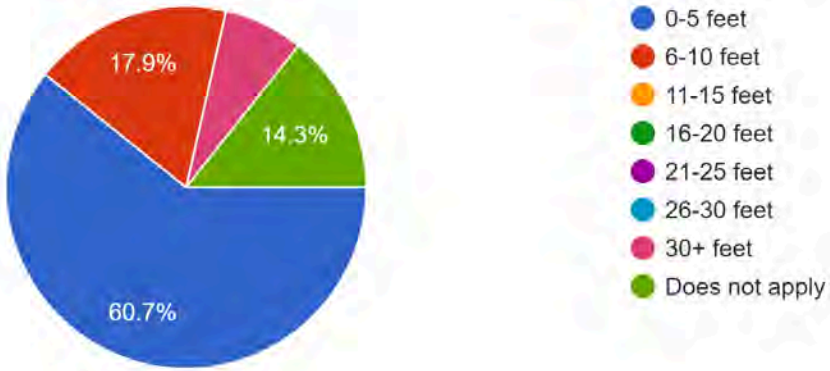
What best describes the location where the majority of your property meets the lake?

29 responses



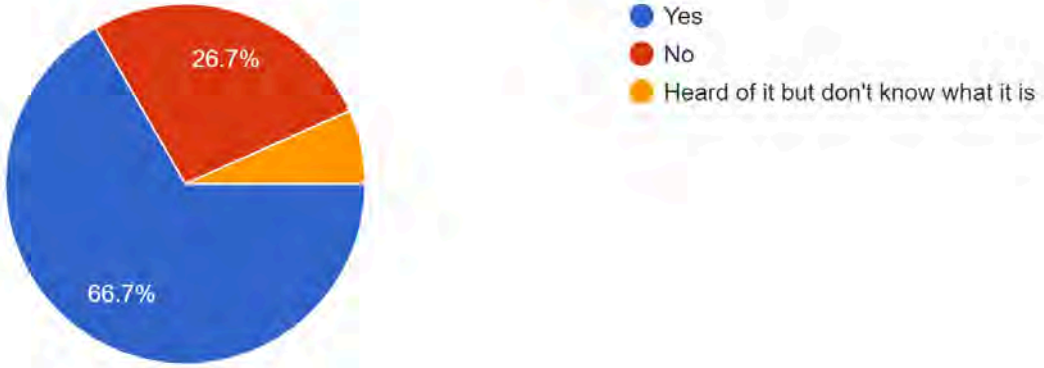
If you have undeveloped natural landscape or a combination of un-mowed vegetation with trees and shrubs, how far from the lakeshore on to the property does it extend?

28 responses



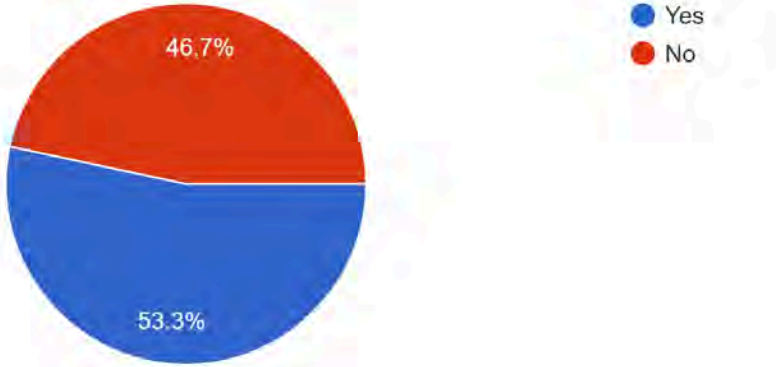
Are you aware of the Healthy Lakes and Rivers grant, that provide funding for shoreland residents to install conservation practices on their property?

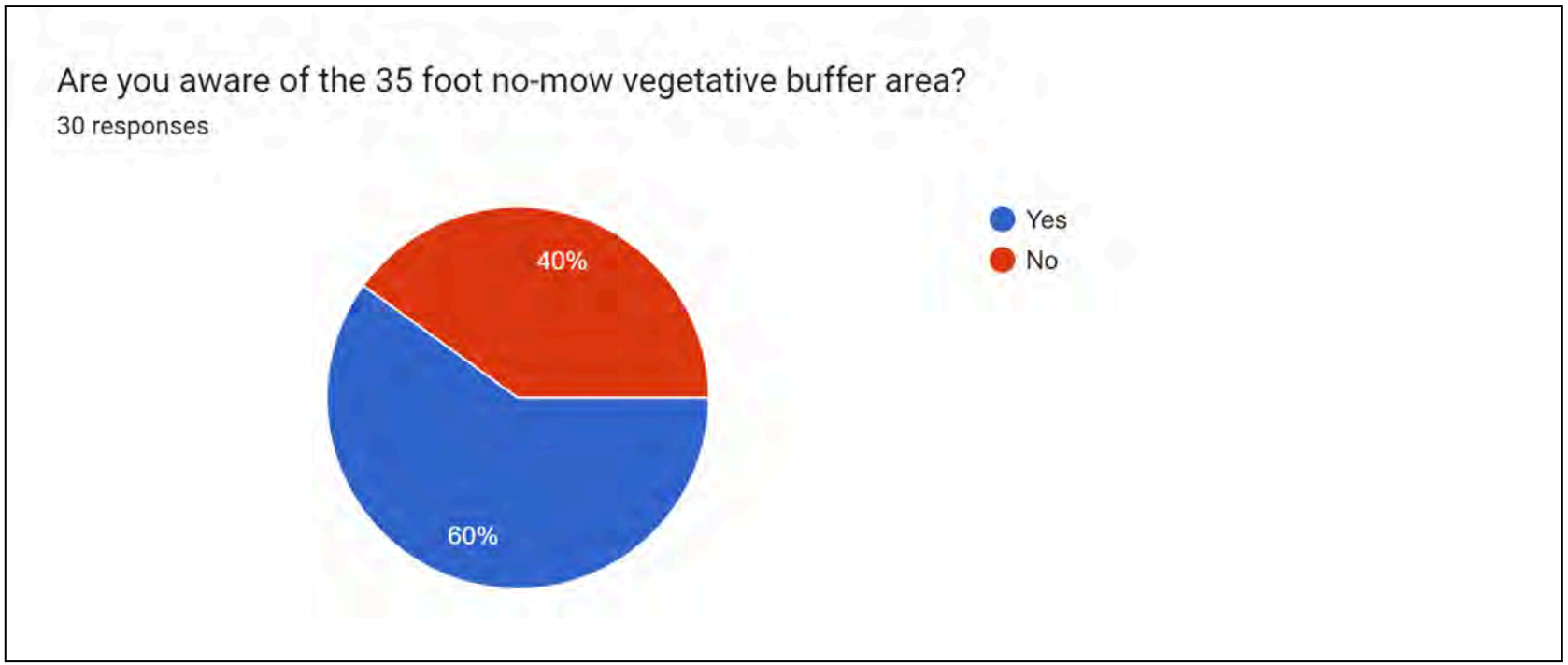
30 responses



Are you aware of the Portage County shoreland zoning ordinance?

30 responses




Are you aware of the 35 foot no-mow vegetative buffer area?
30 responses
40%
60%
Yes
No

Lake Jacqueline Shoreland Inventory

Shoreland vegetation is critical to a healthy ecosystem in and around Lake Jacqueline. It provides habitat for many aquatic and terrestrial animals including birds, frogs, turtles, and many small and large mammals. It also helps to improve the quality of the runoff that is flowing across the landscape towards the lake. Healthy shoreland vegetation includes a mix of tall grasses/flowers, shrubs and trees.

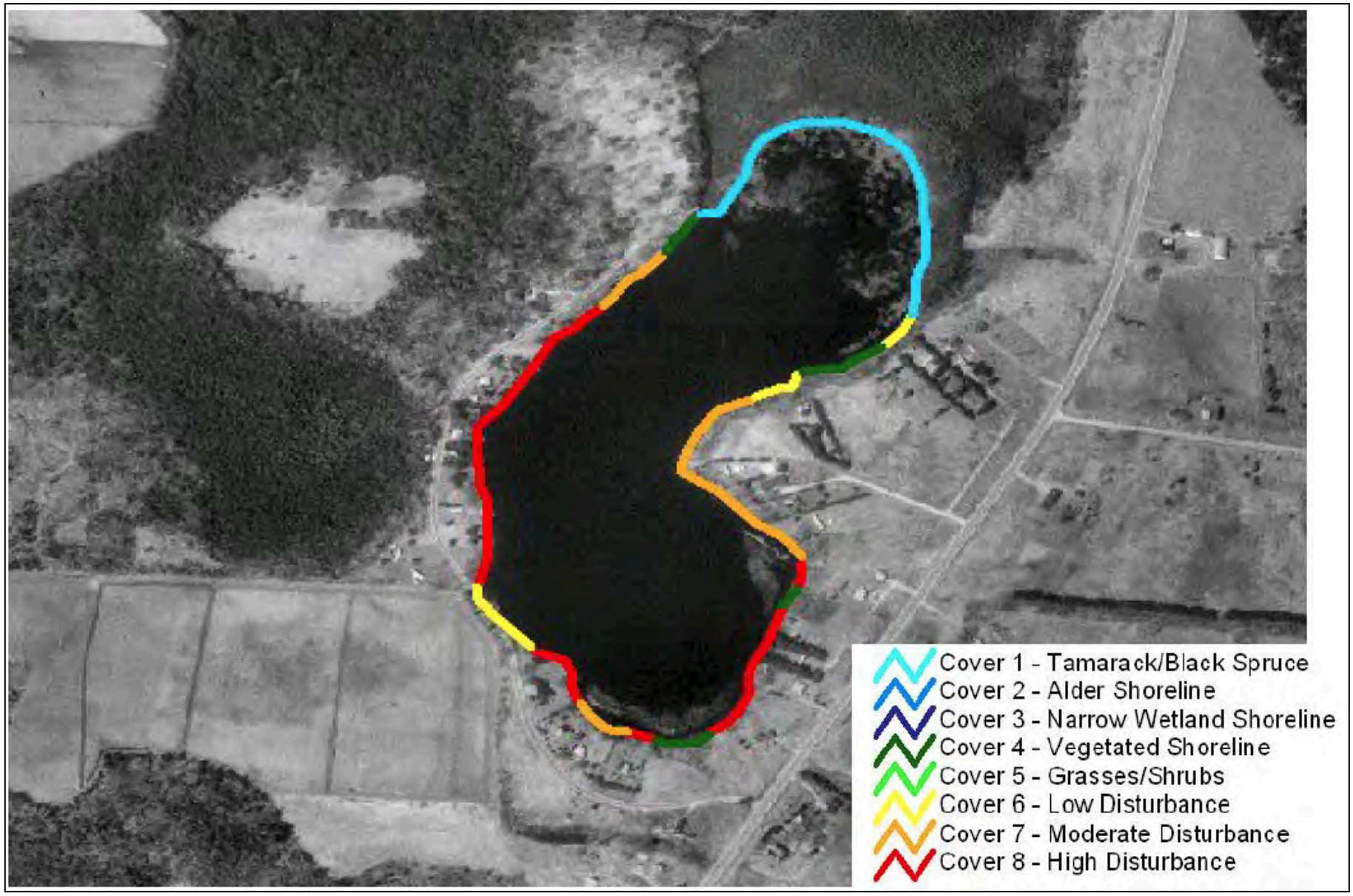
In June 2002-2003, Twenty-four percent of the shoreline of Jacqueline Lake was comprised of black spruce (Picea mariana) and tamarack (Larix laricina) wetland. Tamarack/black spruce wetlands are characterized as wetland shore zone with a sweet gale or leatherleaf understory and a black spruce or tamarack canopy. Vegetated shoreline comprised 11.3% of the shoreline. Vegetated shoreline is characterized as being an upland shore zone that is densely vegetated by tall grasses or shrubs and does not have a rocky component.

In 2002-2003, around Jacqueline Lake, 65% of the shoreline is considered to be disturbed. Of that, 9.8% of the lake's shoreline vegetation is considered to be in a low disturbance developed area, 21.3% is moderately disturbed, and 4.1% is highly disturbed development. An area that exhibits low vegetation disturbance is defined as a location where there is an unaltered shore zone except for pier access. An area that has moderate vegetation disturbance is an area of shore that may contain a mowed lawn but has an intact overstory. An area that exhibits high vegetation disturbance is defined as a beach, rip rap, sea wall or where the shore is mowed to the water line.

2002-2003 Portage County Shoreland Inventory

A shoreland survey was conducted in 2002-2003 during the Portage County Lakes Study. The survey categories differed from those in the 2012 survey, but some comparisons can be made. Survey classifications for the 2002- 2003 survey are described in the table below. There has been significant improvement in the length of undisturbed shoreline for Lake Jacqueline from 2002 to 2012.

Categories of shoreline vegetation around Jacqueline Lake, 2002-2003



Goal 4

Create, restore and protect healthy, stable shoreland habitats near and around Lake Jacqueline. This goal will be achieved when 60% of the shoreline is vegetated.

Objective 4.1: Prevent further disturbance and development of shoreline.

Actions	Lead person/group	Start/end dates	Resources
Provide information on importance of shoreland vegetation to Lake District members through the annual meeting and e-mail correspondence.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Extension Lakes Portage County Land Water Conservation Department
Protect loon nesting area on Lake Jacqueline. May need signage to protect this area.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Extension Lakes Portage County Land Water Conservation Department
Waterfront property owners will be familiar with the County/state shoreland zoning ordinance and what it means to them. Create information that contains photos of good examples of shoreline management and restoration.	Lake Jacqueline Protection and Rehabilitation District		Portage County Planning and Zoning Department UWSP Center for Land Use Education
Conduct a shoreline plant/habitat survey as a follow up to the Portage County Lakes Study and every five years.	Lake Jacqueline Protection and Rehabilitation District	Next survey 2024	UWSP Center for Watershed Science & Education Portage County Land and Water Conservation Department WI DNR Lake Planning grants

Objective 4.2: Protect wildlife and amphibian habitat at the North end of Lake.

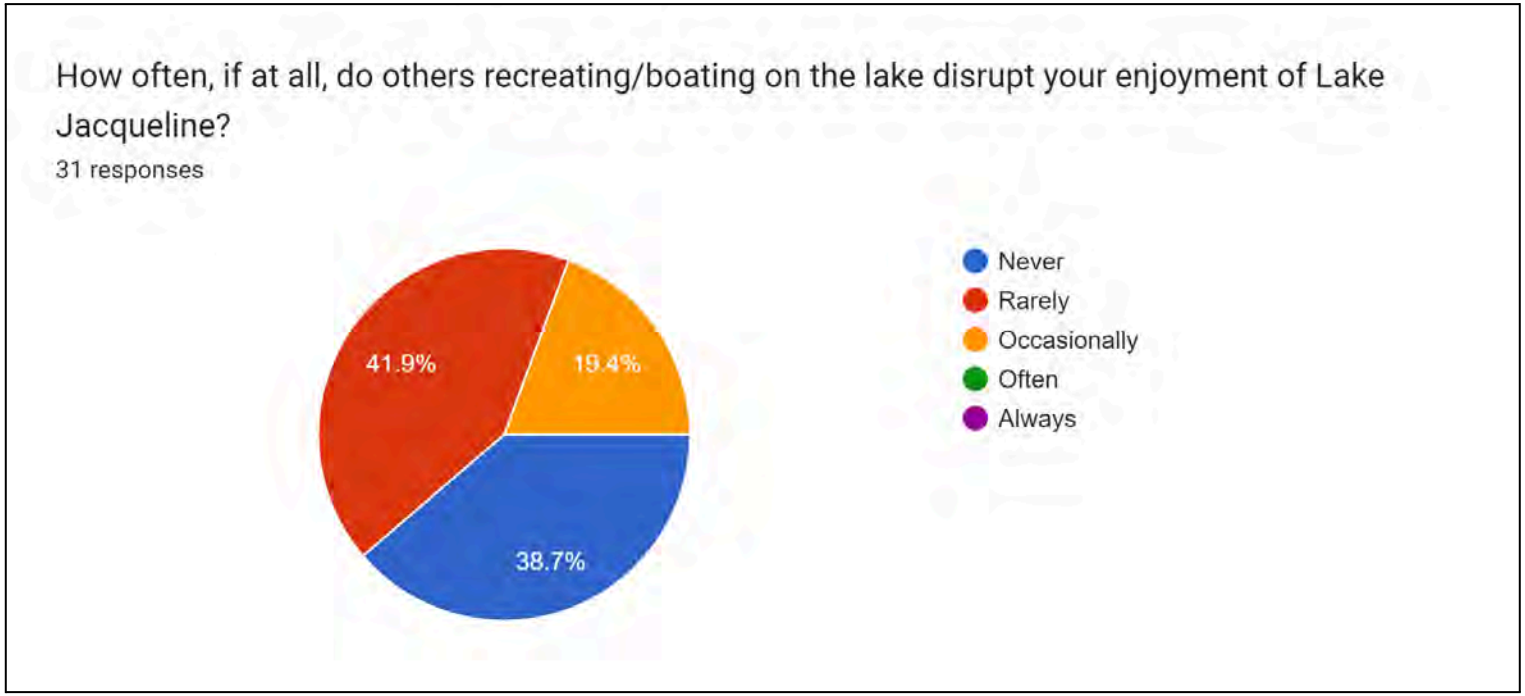
Actions	Lead person/group	Start/end dates	Resources
Maintain signage and buoy markers at loon nesting area.	Lake Jacqueline Protection and Rehabilitation District	On-going	Extension Lakes WI DNR

People and the Lake

The people that interact with the lake are a key component of the lake and its management. In essence, a lake management plan is a venue by which people decide how they would like people to positively impact the lake. The plan summarizes the decisions of the people to take proactive steps to improve their lake and their community. Individual decisions by lake residents and visitors can have a positive impact on the lake and on those who enjoy this common resource. Collaborative efforts may have a bigger positive impact; therefore, communication and cooperation between a lake association, community, and suite of lake users are essential to maximize the effects of plan implementation.

Boating hours, regulations, and fishing limits are examples of principles that are put into place to minimize conflicts between lake users and balance human activities with environmental considerations for the lake.

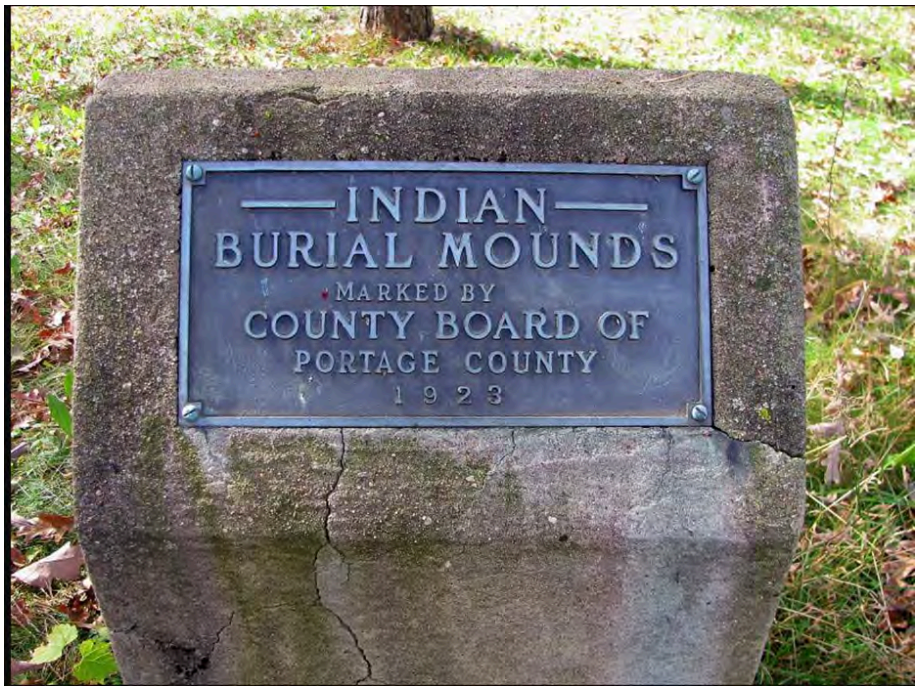
Results from the 2023 Resident Survey



Cultural Resource Management

Native peoples have lived in Portage County and Central Wisconsin for thousands of years. They fished in post-glacial lakes and rivers, hunted mammoth, mastodon and other megafauna along the edges of continental glaciers. They burned and cleared areas of the land and they raised crops. They built camps and villages. And they buried their dead, typically on ridges above lakes, streams and rivers … Today we are stewards of those lakes and resources, along with those sites of previous occupation and burial. Lands still held sacred by Wisconsin Tribes. Such properties should be appropriately cared for, and merit respect and recognition.

Native burial mounds are by far the most obvious and numerous burial features occurring adjacent to surface waters in Portage County. More mounds were built by ancestral Native American communities in Wisconsin than in any other region of North America. Prior to Euromerican settlement, there may have been 20,000-25,000 mounds across the state. Estimates are that perhaps 4,000 of these remain today.
The earliest mounds, dating as far back as 500 BC were round or "conical" in shape. By about AD 800, communities began to build mounds in other forms, including linear-shaped, and "effigy" mounds made in the shape of birds, turtles, bears, panthers and other animals (more effigy mounds occur in Wisconsin than anywhere else in the world). Mounds may exist singly, or as "mound groups" of several to over 100 individual mounds, sometimes clustered as "sub-groups" within a larger group.

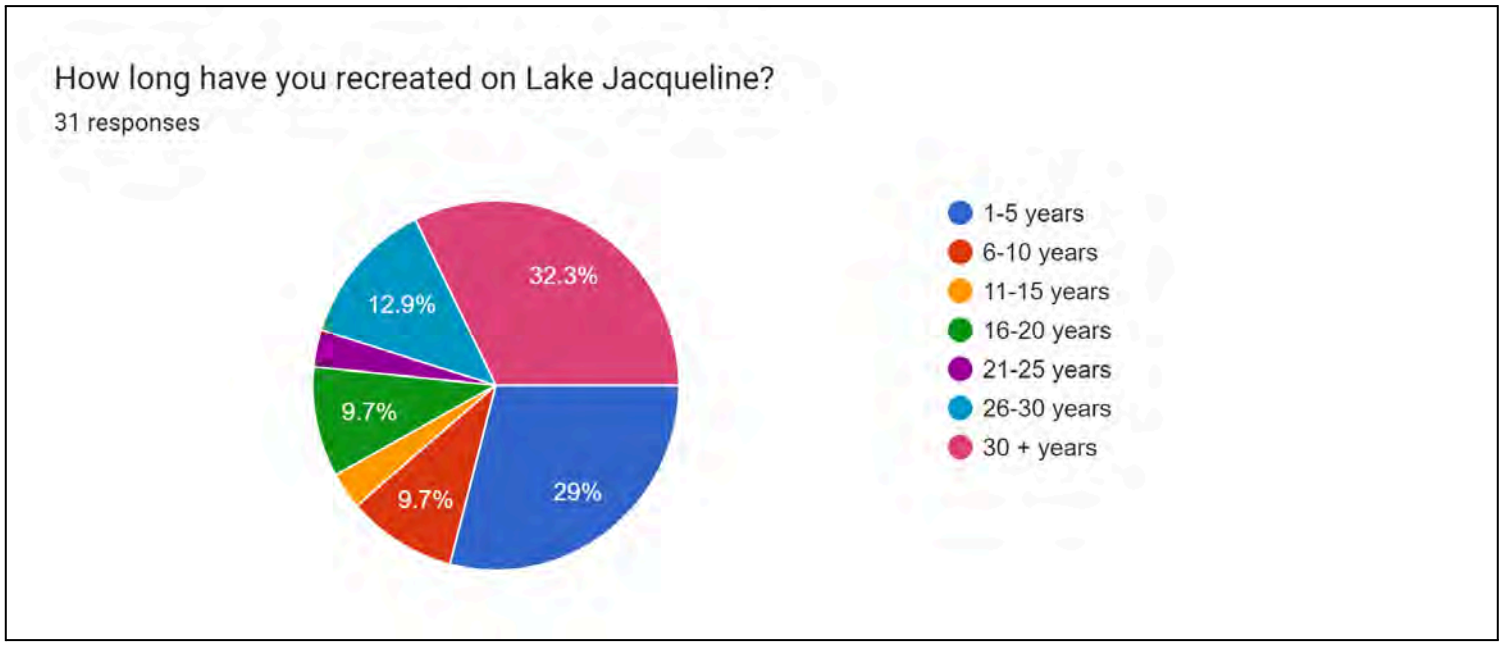


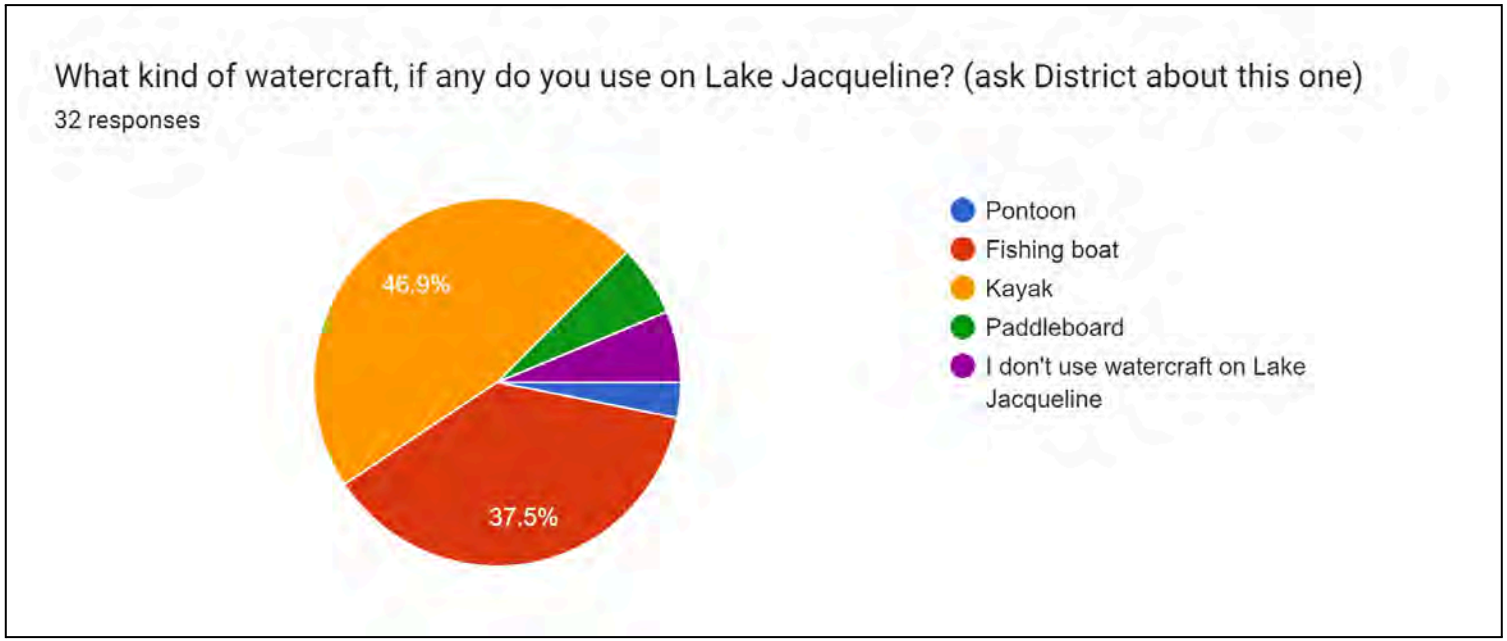
All of these sites are protected from disturbance under the State's burial sites law (Wisconsin Statutes s.157.70). An important feature of WS 157.70 stipulates that there may be no disturbance of the burial or within (a minimum of) five feet from the perimeter or base of a mound or other defined burial area. A buffer greater than 15 feet or greater is preferred, and is the DNR standard (exceptions considered in consultation with the Wisconsin Historical Society).

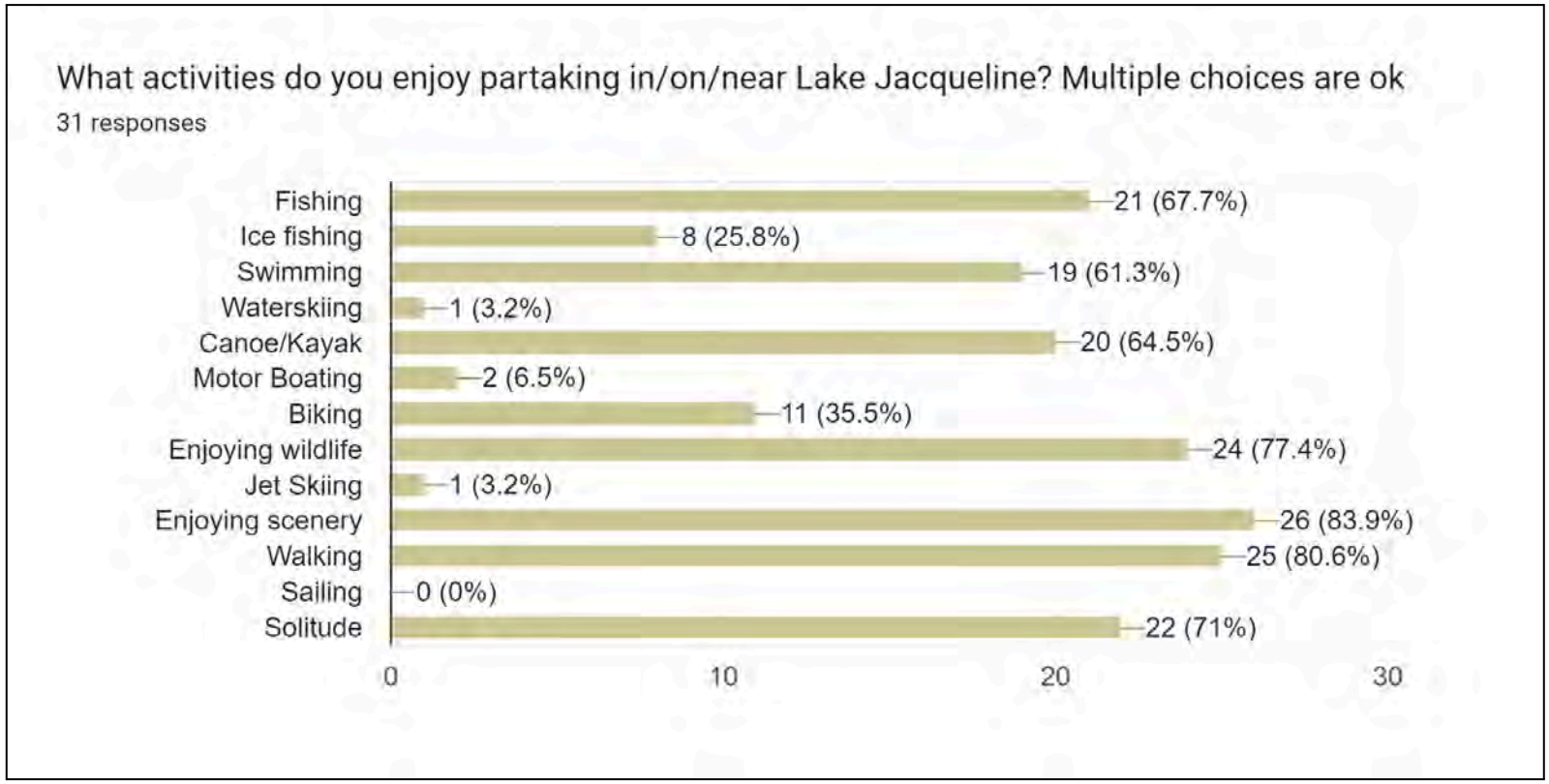
The link below provides standards that should apply to human burial sites of all forms – including non-mound burials; conical, linear, effigy and platform mounds; and other types of burial sites. This policy and standards do not apply to areas where cremated human remains have been recently deposited or dispersed. The following policies and plan components apply to all DNR properties, but are consistent and applicable to private, county, town, and village properties. Note: Submerged burials require additional considerations; please consult with the Departmental Archaeologist for further guidance.

For management purposes, it may be useful to think of burial areas as "preserves" which occur within a larger setting, and which have different management needs than other areas within a lake management plan area.

Cultural Resources Best Management Practices: **https://www.co.portage.wi.us/home/showpublisheddocument/38943**


How long have you recreated on Lake Jacqueline?
31 responses
32.3%
12.9%
9.7%
9.7%
29%
1-5 years
6-10 years
11-15 years
16-20 years
21-25 years
26-30 years
30 + years


What kind of watercraft, if any do you use on Lake Jacqueline? (ask District about this one)
32 responses
46.9%
37.5%
Pontoon
Fishing boat
Kayak
Paddleboard
I don't use watercraft on Lake Jacqueline


What activities do you enjoy partaking in/on/near Lake Jacqueline? Multiple choices are ok
31 responses
Fishing
21 (67.7%)
Ice fishing
8 (25.8%)
Swimming
19 (61.3%)
Waterskiing
1 (3.2%)
Canoe/Kayak
20 (64.5%)
Motor Boating
2 (6.5%)
Biking
11 (35.5%)
Enjoying wildlife
24 (77.4%)
Jet Skiing
1 (3.2%)
Enjoying scenery
26 (83.9%)
Walking
25 (80.6%)
Sailing
0 (0%)
Solitude
22 (71%)
0
10
20
30

Recreation

Lake Jacqueline residents and lake users enjoy many different recreational opportunities. Based on survey results, the most popular recreational activities on Lake Jacqueline included enjoying wildlife, enjoying scenery, fishing, solitude, and walking. Lake Jacqueline is a no-wake lake with a recent electric motor only ordinance. These conditions provide a quiet, safe environment for fishing, boating, swimming, and wildlife viewing, and minimize water quality impairments due to agitation of sediments.

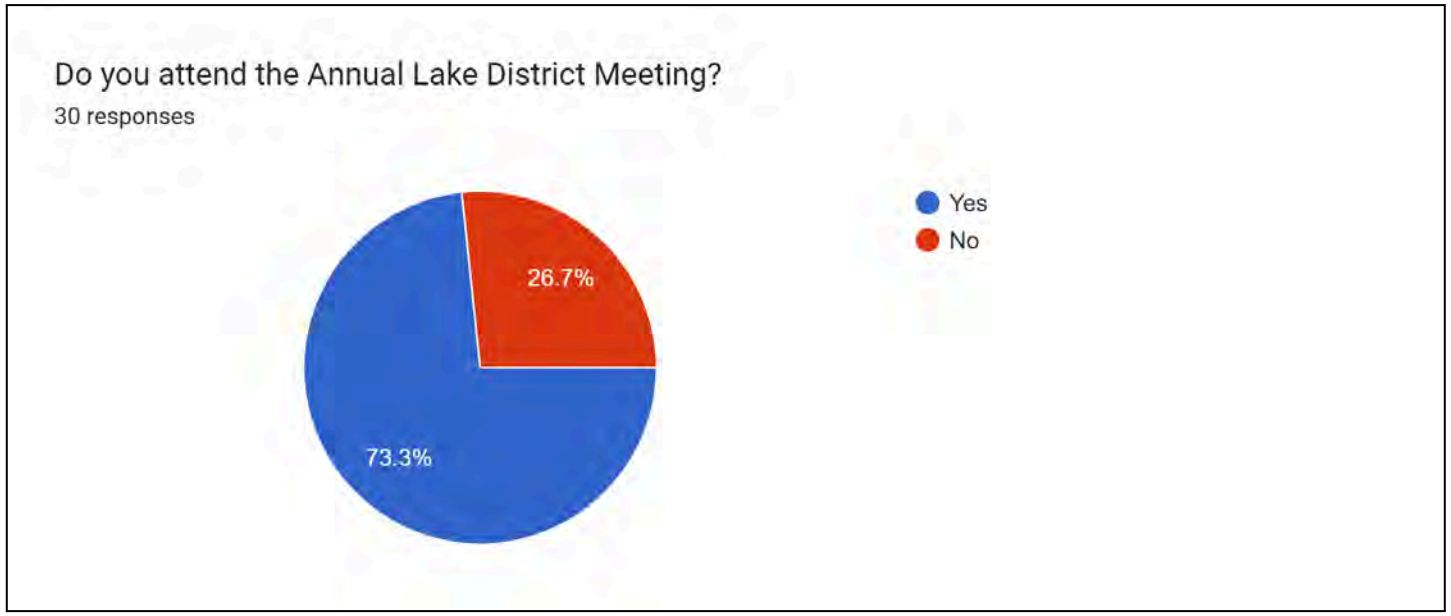
Conflicts between users do not appear to be of concern on Lake Jacqueline as per the 2023 resident survey:38.7% Never, 41.9% Rarely, and 19.4% Occasionally were the results when asked “How often, if all all, do others recreating/boating on the lake disrupt your enjoyment of Lake Jacqueline?”

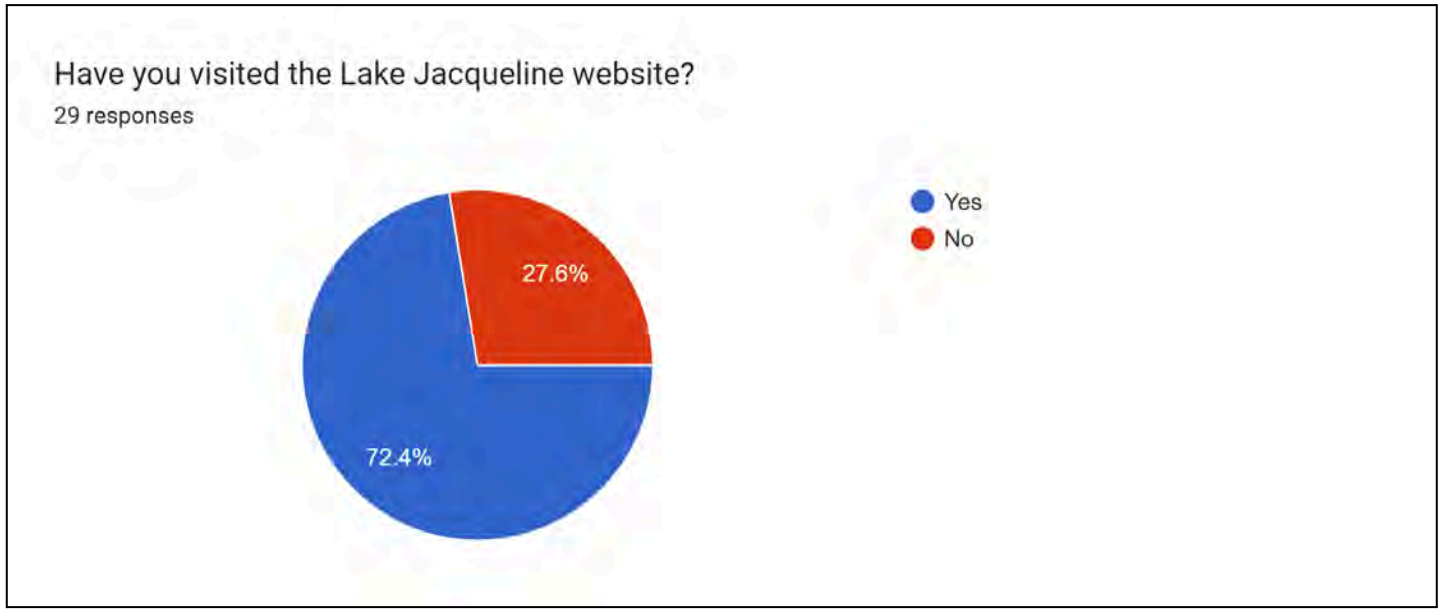
Goal 5

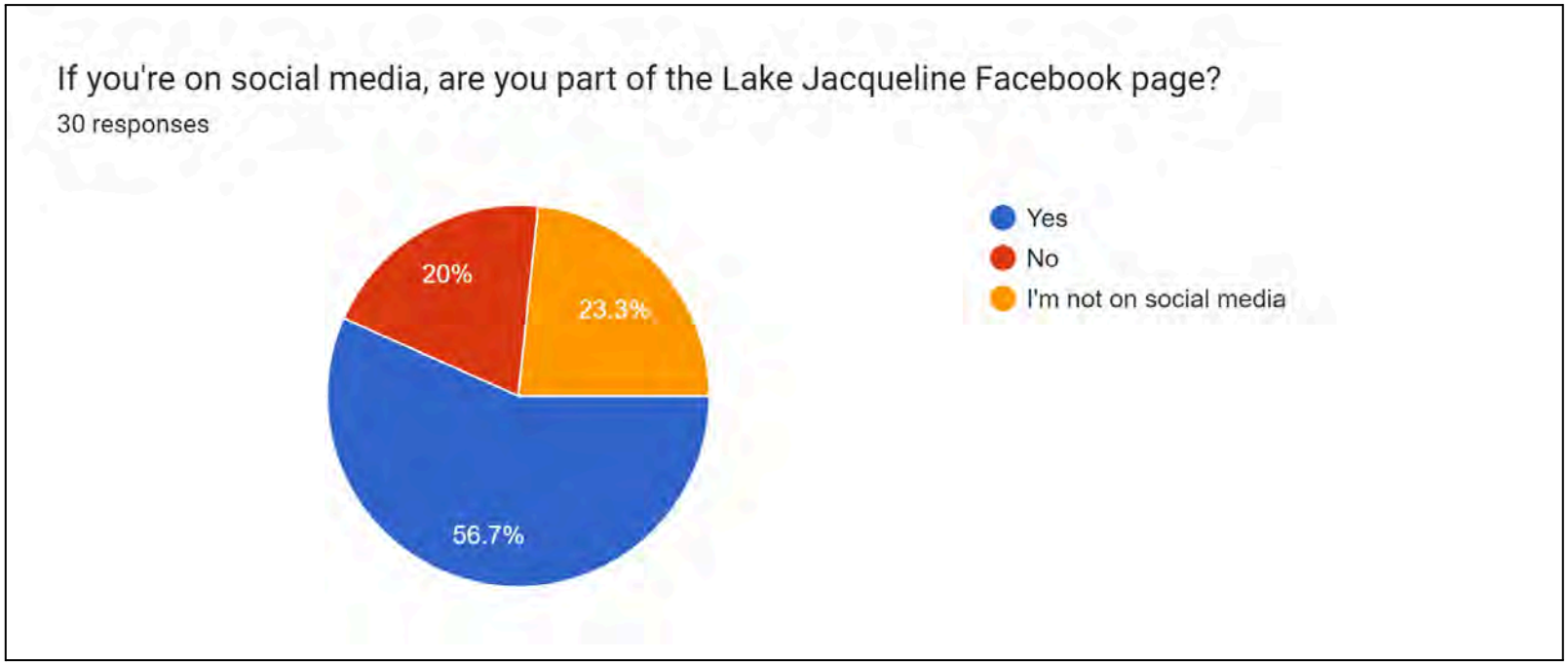
Continue electric motor only rules for boating on Lake Jacqueline.

Objective 1: Enforce no wake and electric motor only rules.

Action	Lead person/group	Start/end dates	Resources
Maintain signs at the boat landing.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Town of Sharon


Do you attend the Annual Lake District Meeting?
30 responses
Yes
No
26.7%
73.3%


Have you visited the Lake Jacqueline website?
29 responses
Yes
No
27.6%
72.4%


If you're on social media, are you part of the Lake Jacqueline Facebook page?
30 responses
20%
23.3%
56.7%
Yes
No
I'm not on social media

Communication and Organization

Many of the goals outlined in this plan are focused on disseminating information to lake and watershed residents and lake users, ultimately to help them make informed decisions that will result in a healthy ecosystem in Lake Jacqueline that is enjoyed by many people. There is no single best way to distribute information to those that enjoy and/or affect Lake Jacqueline so the planning committee has identified a variety of options to communicate with one another and in the community. Working together on common values will help to achieve the goals that have been outlined in this plan. The Lake Jacqueline Lake Protection District conducts two general meetings per year for residents and interested parties. All have an opportunity to participate in planning and authorize funds for management activities.

Updates and Revisions

A management plan is a living document that changes over time to meet the current needs, challenges and desires of the lake and its community. The goals, objectives and actions listed in this plan should be reviewed annually and updated with any necessary changes.

Goal 6

Keep the information and resources within the Lake Jacqueline Lake Management Plan current and up to date.

Actions	Lead person/group	Start/end dates	Resources
Continue use of annual meetings, e-mail list, Lake Jacqueline Facebook group to communicate with lake district members.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	
Annually review the Lake Jacqueline's Management Plan with new or revised areas of concern, action items, dates, lead person/group, and resources.	Lake Jacqueline Protection and Rehabilitation District	Annually review	Portage County Land Water Conservation Department Golden Sands RC&D Extension Lakes

Support the creation of a county-wide Lake Association.	Lake Jacqueline Protection and Rehabilitation District	Completed in 2020	Portage County Land Water Conservation Department
If situations warrant, revisions to this plan may be made at any time. Barring this need, this plan should be updated every 5 years.	Lake Jacqueline Protection and Rehabilitation District	Next update 2028	Portage County Land Water Conservation Department Golden Sands RC&D Extension Lakes
Encourage Lake District members to attend the annual lake convention. Send notices to members of the event.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Extension Lakes
Encourage Lake District members to attend Lake Leaders training. Send notices to members of the event.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Extension Lakes
Update contact information with Extension Lakes.	Lake Jacqueline Protection and Rehabilitation District	Ongoing	Extension Lakes

Background Information (from 2002-2003 study)

Information in this section was taken from the Portage County Lakes Study and the citizen surveys. The complete lake study document and summarized survey results can be found at: https://www.co.portage.wi.us/department/planning-zoning/land-and-water-conservation/lakes-study.

The background information provided from the Portage County Lakes Study helps to give us a good understanding of Lake Jacqueline and its ecosystem. A healthy lake ecosystem are comprised of many components that include in-lake habitat and vegetated shorelands that support aquatic plants, fish, wildlife, good water quality and quantity, absence of aquatic invasive species and more. These components are not only found in Lake Jacqueline but also extend to where the water meets the land and beyond into the watershed. Lake Jacqueline is a reflection of the health and activities that occur in the lake, near the shore, and in the watershed.

Lake Jacqueline is a 40 acre soft-water bog lake located seven miles north of Polonia in the Town of Sharon. The lake has a maximum depth of 17 feet (WDNR 2005). The lake bottom materials contain sand and muck. It is a unique seepage lake with floating bogs and tamarak-black spruce swamp present on the north shore. There are no inlets or outlets.

Description

Updated information is located in each section of this plan and when available, is appended to this plan. More information about Lake Jacqueline can be found at https://apps.dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=987100.

Jacqueline Lake is a very soft water bog lake located seven miles north of Polonia in the Town of Sharon. This 40 acre lake has a volume of 175 acre-feet, a maximum depth of 17 feet, and an estimated retention time of 3.4 years. The bottom consists of sand and muck. It is a unique seepage lake with floating bogs and a tamarack-black spruce swamp on the north shore. There are no inlets or outlets. Without aeration, frequent winterkills limit the fishery; however, northern pike, largemouth bass, and panfish are present. Attempts have been made to control dense aquatic vegetation with only partial success. The lake was rapidly developed in the 1960s and early 1970s. As a result much of the wildlife use of the lake is gone; however, this lake is rich in rare plant species and the north end provides excellent wetland habitat.

Watersheds

A surface watershed is an area of land where water from precipitation drains from higher elevations towards the lake. Lake Jacqueline's surface watershed is approximately 342 acres (Figure 1).

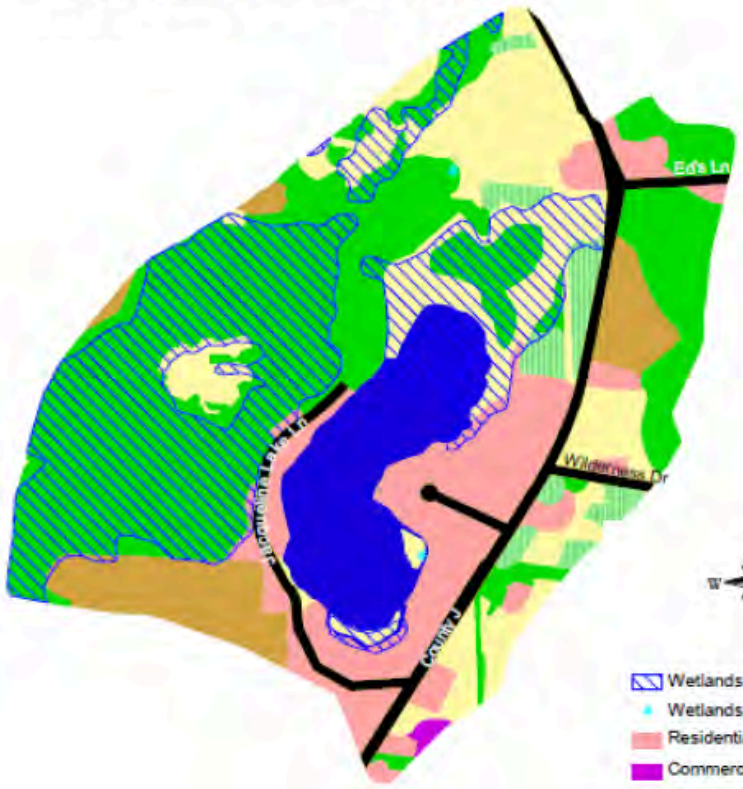
As water moves across the landscape, the quality can either improve or degrade depending upon what it comes in contact with en route to the lake. Land use types and associated management practices can have a significant impact on water quality. Though land uses may not easily be changed, land management practices can be modified to improve water quality.

Land uses within the surface watershed are predominantly forested and residential development. The areas near shore have the most direct impact on habitat and water quality in a lake. On Lake Jacqueline this area is currently comprised of residential land uses.

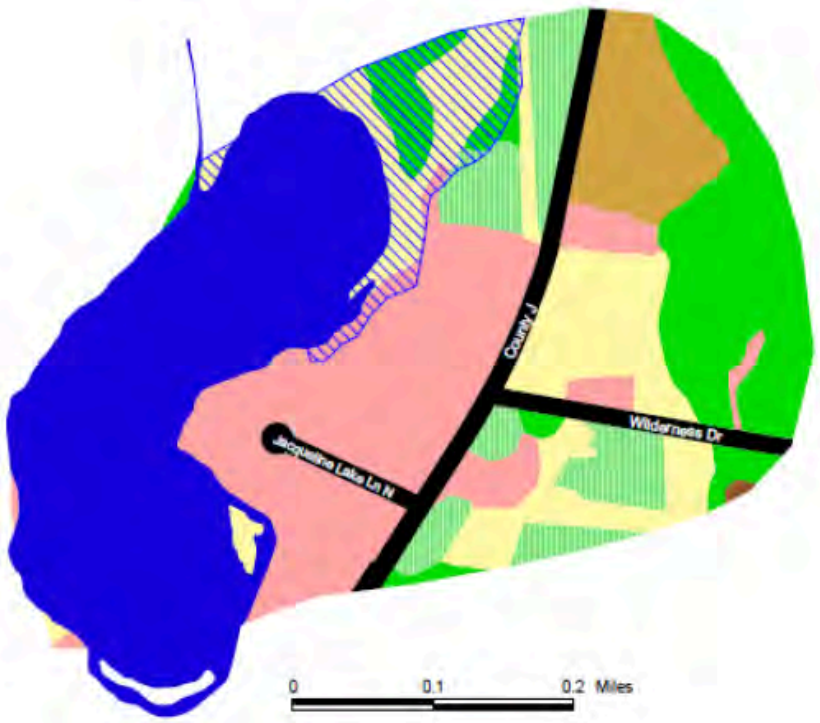
A groundwater watershed is similar to a surface watershed, except that it is an area of land where the groundwater drains to Lake Jacqueline. Within the groundwater watershed, precipitation soaks into the ground and recharges the groundwater. The groundwater slowly moves towards the lake, and enters it via springs and seeps. During dry periods, this provides the majority of water in Lake Jacqueline. Often surface watersheds and groundwater watersheds do not match each other, which is the case with Lake Jacqueline. Lake Jacqueline's groundwater watershed is approximately 117 acres (Figure 1). The land cover within the groundwater watershed is also primarily comprised of residential and forested areas.

Survey respondents indicated a willingness to change how they manage their land to protect/improve the Lake Jacqueline ecosystem. The top motivators included increasing property values, improving water quantity/saving water, better habitat for fish/wildlife, increasing natural beauty of property, and improving water quality.

Lake Jacqueline Watershed Land Uses



Surface Water Watershed



Groundwater Watershed

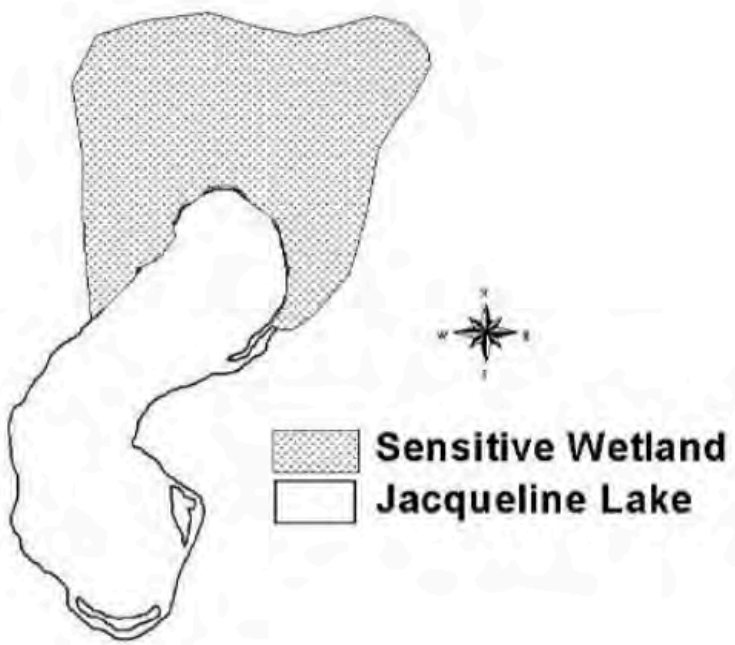
Sensitive Areas

The sensitive areas associated with Lake Jacqueline are defined by lands adjacent to the lake that are particularly valuable to the lake's ecosystem or that would be significantly impacted by most disturbances or development. The primary area associated with Jacqueline Lake is focused in the tamarack and black spruce bog at the north end of the lake. This is a unique wetland habitat that is home to a variety of amphibian species and unique/rare plants for this region of the state.

The habitats of amphibians and reptiles are of importance because they utilize both aquatic and terrestrial habitats and the shoreline interface between the two. These areas of habitat are not only important for reptiles and amphibians but also other aquatic and terrestrial species.

The primary amphibian habitat on Lake Jacqueline is located on the north side of the lake. Key features of this habitat include protected wetland areas with large amounts of submergent, emergent, and floating-leaf vegetation as well as downed trees. The good news is that a number of frog species are represented and stretches of undeveloped shoreline still exist. However, there are also high levels of shoreline development on portions of the lake.

Jacqueline Sensitive Areas.



Shoreline

Approximately 65% of the shoreline around Lake Jacqueline was considered disturbed; 9.8% is considered to be low disturbance, 21.3% was considered moderately disturbed and 4.1% was highly disturbed. Areas of low disturbance are completely vegetated except for a path to access the water. Areas of moderate disturbance may contain a mowed lawn with intact overstory vegetation. Areas of high disturbance of vegetation are defined as a beach, rip rap, lawn mowed to the water line, or a boat access. The Lake Jacqueline shoreline is comprised of 24% black spruce/tamarack wetlands and 11.3% dense vegetation such as tall grasses and shrubs.

Protecting the existing shoreland and restoring the disturbed shoreland would improve near shore habitat along with the water quality in the lake, growth of algae and aquatic plants, and the fish and other species that currently comprise the lake's ecosystem. Surfaces such as roofs, driveways, roads, patios, compacted soils increase the amount of runoff moving across the landscape towards Lake Jacqueline. Runoff that enters the lake can carry a variety of pollutants into the water. Some of the negative impacts in the lake due to additional runoff may include: increased nutrients (such as phosphorus), which can cause algae blooms and excessive plant growth, and increased amounts or changes in the type of sediment. This in turn can lead to cloudy or turbid water, sediment burying fish spawning areas and other critical habitat, and sediment transporting additional contaminants such as bacteria, debris, metals, and pesticides.

According to the citizen survey, 17 of the 22 respondents owned shoreline property. Twelve of those respondents who owned shoreline property indicated their shorelines were undeveloped or natural. Respondents indicated the depth of their shoreline buffers around Lake Jacqueline varied greatly. However, 13 respondents indicated their buffers were less than 35 feet, which is required by the county/state shoreline zoning ordinances. These special rules, the shoreland zoning ordinances, apply to the near shore area of the lake. These rules were developed to help protect water quality and habitat of lakes while allowing for access to a lake.

Aquatic Plants

Aquatic plants play many important roles in aquatic ecosystems including providing habitat for aquatic and semi-aquatic organisms; food for fish, waterfowl, and other animals; use of nutrients that would otherwise be used by algae; and modifying/cooling water temperatures on hot days.

According to R. Freckmann (UWSP), there are **44** species of aquatic macrophytes or plants that have been identified in Lake Jacqueline or on the wet areas of shore. Lake Jacqueline has several relatively rare species, especially unusual in the southern two-thirds of Wisconsin, including three species of special concern: the water-thread pondweed, whorled-leaf bladderwort, and violet bladderwort.

When asked about the abundance of aquatic plants in Lake Jacqueline, the majority of respondents indicated that the growth was dense. Respondents also indicated July and August were the months with the densest plant growth, which is typical for most Wisconsin lakes.

Water Quality and Land Use

When asked about Lake Jacqueline's water quality, the majority of survey respondents felt the water quality was good or excellent and felt that the water quality had stayed the same during the period that they were familiar with it. Survey respondents also indicated the quality of lake water had an impact both economically and on their personal enjoyment of the lake.

The assessment of water quality in a lake involves a number of measures including temperature, dissolved oxygen, water chemistry, chlorophyll *a*, and algae. Each of these measures plays a part in the lakes overall water quality.

Chloride concentrations, and to a lesser degree sodium and potassium concentrations, are commonly used as indicators of how strongly a lake is being impacted by human activity. In Lake Jacqueline potassium, chloride, and sodium levels measured in 2002/03 were all low.

Atrazine, an agricultural herbicide, was detected in Lake Jacqueline. Some toxicity studies have indicated that even at low levels reproductive system abnormalities can occur in frogs. The presence of atrazine indicates that other agri-chemicals may also be entering and present in Lake Jacqueline.

The temperature in Lake Jacqueline was generally mixed during the entire year, which is typical for shallow lakes. Profiles of dissolved oxygen show that during much of the summer in water deeper than 8 feet the dissolved oxygen is below the 5 mg/L needed to support most aquatic biota. This is of significant concern because much of the cool deeper water in the lake is not available for use during the warm summer months.

Water clarity is a measure of how deep light can penetrate the water. It is an aesthetic measure and is related to the depth that rooted aquatic plants can grow. Water clarity can be affected by sediment, algae, and color in water. Clarity measurements in Lake Jacqueline ranged from six to ten feet. June had the best water clarity and July had the poorest. The natural brown stained water, due to organic acids associated with adjacent wetlands, was responsible for a relatively high measure of color in the water which reduces light penetration. Fluctuations in water clarity throughout the summer are normal as algae and aquatic plant populations and sedimentation increase and decrease however, changes in water quality are best determined with long-term records. These measurements could be made by trained citizens.

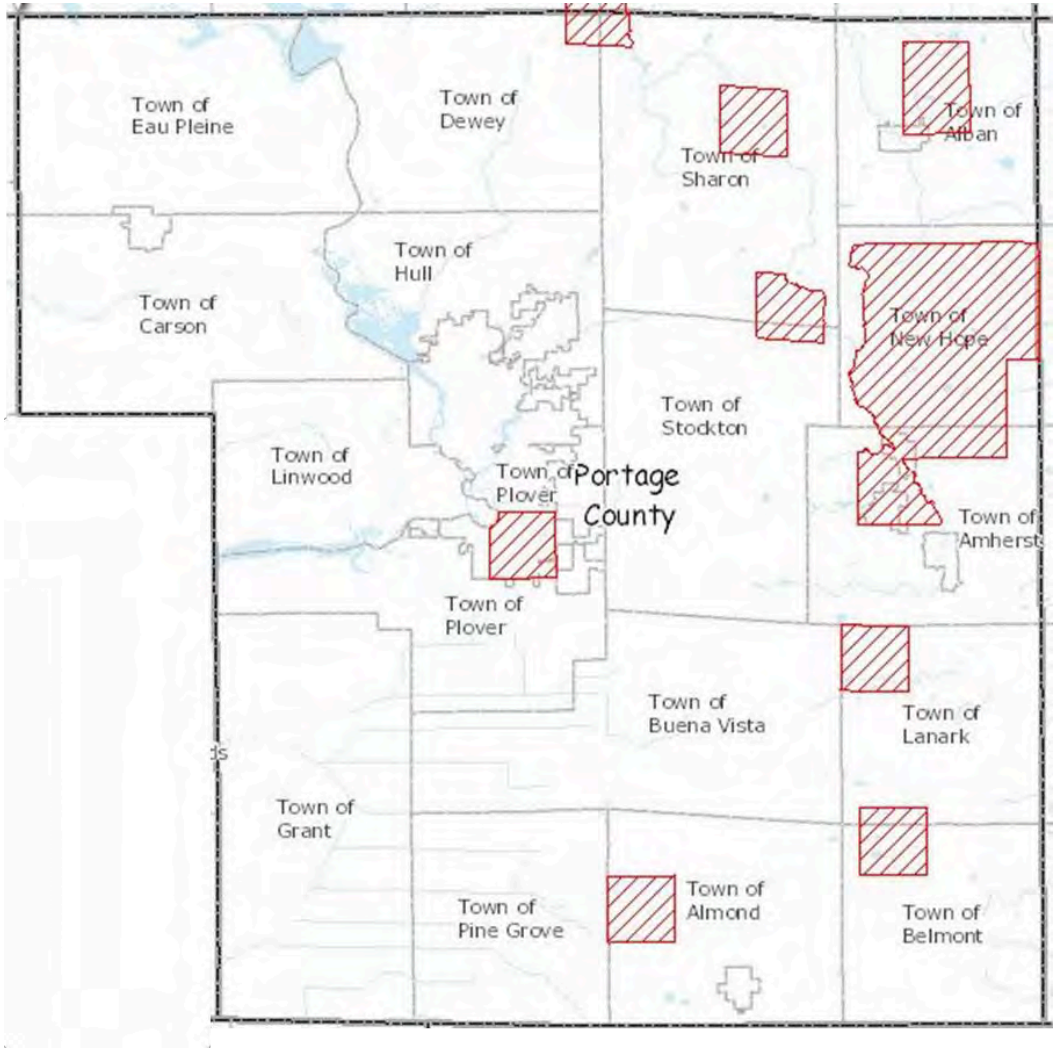
Atrazine Prohibition Areas for Portage County

https://datcpgis.wi.gov/maps/?viewer=pa

45,527 acres of land within Portage County are in atrazine prohibition areas.

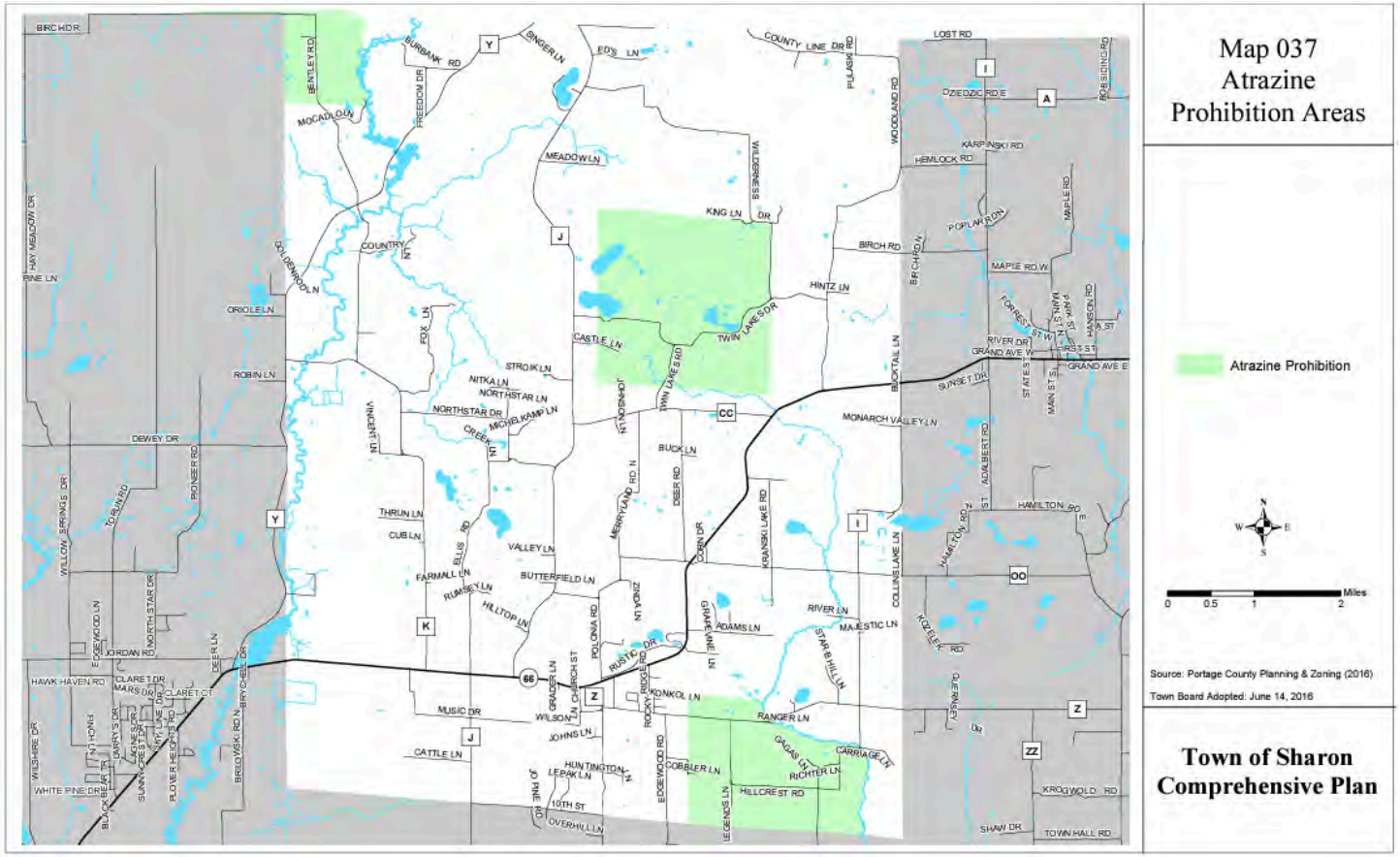
Atrazine is a popular corn herbicide that is used to control weeds in corn fields and has been used in Wisconsin for over 25 years. Atrazine may have entered Wisconsin's groundwater as a result of its use on farm fields. In some cases it may be the result of a spill or improper disposal of unwanted or unused product. As of 2006, there are 102 atrazine prohibition areas in Wisconsin, covering about 1.2 million acres. An atrazine prohibition area is an area of land where all uses of atrazine are prohibited.

http://wi.water.usgs.gov/gwcomp/find/portage/atrazine.html



Atrazine Prohibition Areas for Town of Sharon

https://www.co.portage.wi.us/home/showpublisheddocument/3663/636093746224100000



United States Geological Survey:

45,527 acres of land within Portage County are in atrazine prohibition areas. Atrazine is a popular corn herbicide that is used to control weeds in corn fields and has been used in Wisconsin for over 25 years. Atrazine may have entered Wisconsin's groundwater as a result of its use on farm fields. In some cases it may be the result of a spill or improper disposal of unwanted or unused product. As of 2006, there are 102 atrazine prohibition areas in Wisconsin, covering about 1.2 million acres. An atrazine prohibition area is an area of land where all uses of atrazine are prohibited. http://wi.water.usgs.gov/gwcomp/find/portage/atrazine.html

Nutrients

Chlorophyll *a* is a measure of algae in Lake Jacqueline. Chlorophyll *a* concentrations in Lake Jacqueline were relatively high and ranged from 0.05 to 45.89 mg/L, with an average of 9.7 mg/L. Any chlorophyll *a* measure over 5 mg/L is considered to be high.

The 44 algal genera identified during the sample periods were relatively common. The algal community relative to the chlorophyll *a*, phosphorus, and nitrogen values for Lake Jacqueline presents a picture of a mesotrophic lake. Lakes with algal communities similar to those seen in Lake Jacqueline can often be attributed to some source of organic enrichment such a heavy agricultural runoff or failing septic systems (B. Bell).

Nutrients (nitrogen and phosphorus) are important measures of water quality in lakes because they are used for growth by algae and aquatic plants. In Lake Jacqueline both the phosphorus and nitrogen concentrations fluctuated throughout the year, but were generally low.

Nitrogen concentrations in Lake Jacqueline were slightly elevated in 2002 from historic levels, including nitrate, which is easily used for growth by aquatic plants and algae (Figure 2). However, concentrations still remained below the the 0.3 mg/L needed to fuel algae growth in spring and winter (Figure 2). The nitrate levels in Lake Jacqueline should be monitored to ensure that they are not increasing.

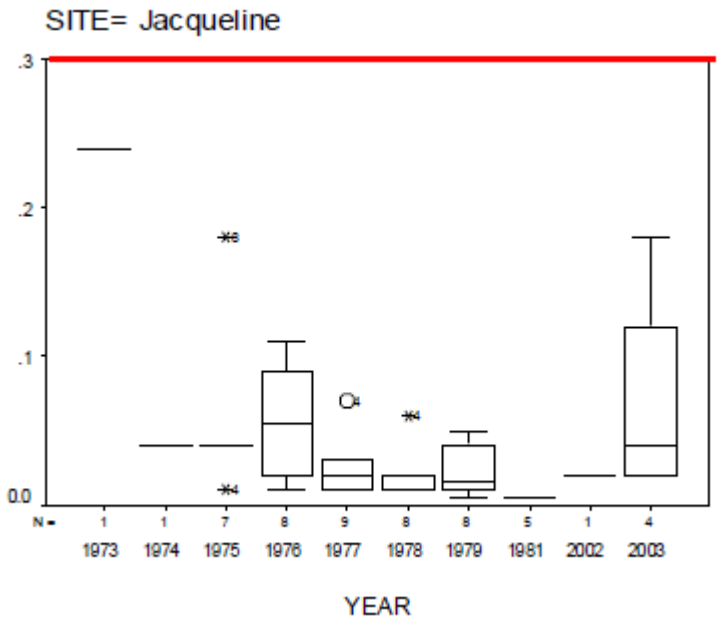


Figure 2. Median Nitrate-N concentrations (mg/L) in Lake Jacqueline, 1973-2003. Red line indicates the nitrate level needed to fuel algae growth.

Phosphorus is an element that is essential to most living organisms including plants. Sources of phosphorus can include naturally occurring phosphorus in soils, wetlands, and small amounts in groundwater. Sources from human influence include soil erosion, agricultural and residential runoff, septic systems, and animal waste In Lake Jacqueline the aquatic plant and algae growth is most responsive to phosphorus due to its relative limited supply with respect to other elements necessary for growth. Increases of small amounts of phosphorus can result in increased abundance of aquatic plants and algae. Phosphorus concentrations in lake Jacqueline are variable throughout the year. Median total phosphorus (TP) concentrations in spring/fall for 2002/2003 were 30 ug/L (Figure 3).

The Wisconsin DNR's phosphorus criteria value for Shallow groundwater seepage lakes is 40 ug/L. Average summer concentrations at or above this value would result in noticeably degraded water quality. The average summer total phosphorus concentrations in Collins Lake was 21.8 ug/L in 2002/03. Total phosphorus should be monitored in Lake Jacqueline to be sure that any changes are observed and addressed prior to noticeable changes in algal and aquatic plant communities.

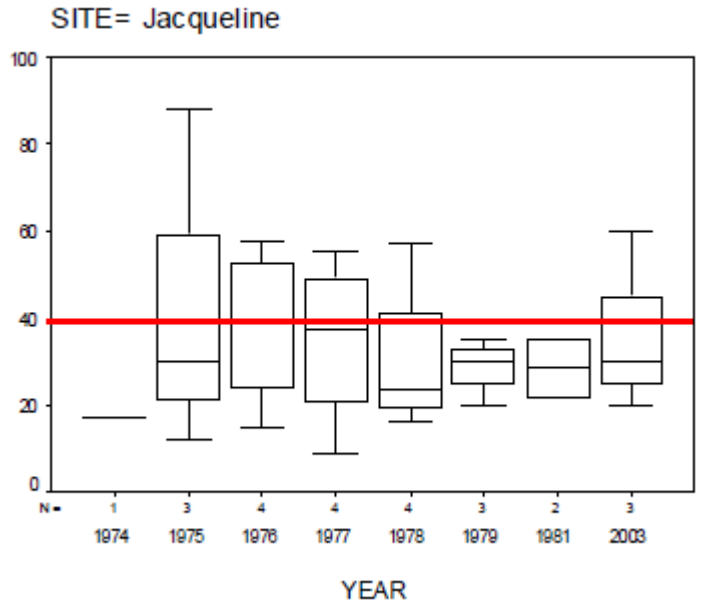


Figure 3. Median total phosphorus concentrations (ug/L) in Lake Jacqueline in samples collected in summer, 1974-2003. Red line is WDNR criteria value for phosphorus for shallow groundwater seepage lakes.

Managing phosphorus in the Lake Jacqueline watershed is key to protecting the lake itself. Positive land management practices and land uses can result in good water quality in Lake Jacqueline. Phosphorus inputs to the lake can be controlled through the use of many different Best Management Practices (BMP's) that minimize the movement of runoff, nutrients, and pesticides to the lake. BMPs that should be used near shore and throughout the watershed include the development of water quality-based nutrient management plans for agricultural land, only applying phosphorus and nitrogen from fertilizer or manure based on soil tests for turf or specific crops, providing cover on the landscape and/or appropriate mitigation when open soils are necessary during construction or cropping, use of cover crops, properly storing manure, and manure application only when the ground is not frozen. Some of the near shore land use practices that can decrease the inputs of phosphorus to Lake Jacqueline include leaving native vegetation (trees, bushes, and grasses), eliminating the use of fertilizer, minimizing runoff/increasing infiltration, minimizing and securing exposed soil, and increasing the setback of septic drain fields. The Portage County Land Conservation Department is a local organization that can provide assistance to landowners that want to reduce impacts to Lake Jacqueline from their property.

Future degradation of water quality in Lake Jacqueline can be minimized with thoughtful land use planning throughout the watershed. This includes locating roads away from the lake, diverting runoff to areas where it can infiltrate rather than runoff to the lake, limiting withdrawal of groundwater, and controlling runoff, nutrient, and chemical inputs from new and existing developments and agriculture.

Governance

There are a variety of management plans, regulations and ordinances that provide guidance for the development, use and protection of natural resources in and around Lake Jacqueline. They can serve as tools to help achieve the goals, objectives and actions outlined in the Lake Jacqueline Management Plans.

Land management plans that influence the land uses around Tree Lake and in its watersheds include:

- Wolf River DNR Basin Plan that covers a regional area: http://dnr.wi.gov/water/basin/wolf/wolf_final_801.pdf
- Portage County Comprehensive Plan: https://www.co.portage.wi.us/department/planning-zoning/planning-section/comprehensive-planning/portage-county
- Portage County Land and Water Conservation Plan: https://www.co.portage.wi.us/home/showpublisheddocument/27502/637164123499230000
- Town of Sharon Comprehensive Plan: https://www.co.portage.wi.us/department/planning-zoning/planning-section/comprehensive-planning/town-of-sharon

Portage County has eight ordinances that may impact the water quality of Lake Helen: the Zoning Ordinance, Shoreland Zoning Ordinance, Wellhead Protection Zone Ordinance, Subdivision Ordinance, Open Space Design Ordinance, Floodplain Zoning Ordinance, Private Sewage Septic System Ordinance, and Animal Manure Storage and Nutrient Management Plan Ordinance. These ordinances can be found at: https://www.co.portage.wi.us/government/code-of-ordinances

In addition to these county ordinances, there are several state regulations that have a direct impact on water quality in Lake Helen. These regulations include:

- Agricultural Runoff Regulation: http://dnr.wi.gov/topic/nonpoint/AgPerformanceStandards. html
- Storm Water Runoff Regulation – including NR 151, 152, 153, 155, 216, 243, and ATCP 50: http://dnr.wi.gov/topic/stormwater/learn_more/regulations. html
- Shoreland-Wetland Zoning Regulations: https://dnr.wisconsin.gov/topic/ShorelandZoning
- Critical Habitat Areas Regulations: http://dnr.wi.gov/lakes/criticalhabitat/
- Pesticide prohibitions and use restrictions including ATCP 30 which regulates atrazine applications: https://docs.legis.wisconsin.gov/code/admin_code/atcp/020/30.pdf

In addition to pieces of governance that will assist with the goals, objectives and actions outlined in this plan, there are a number of community groups and organizations that can provide support and assistance. These include citizen and professional organizations, UW- Extension, and others. Please see the appendices for a list of resources and contact information.

Literature Cited

Fassbender, R.L., and L.M. Nelson. 1971. Surface Water Resources of Portage County.
Wisconsin Department of Natural Resources, Madison, Wisconsin.

Freihoefer, A., N. Turyk, B. Shaw. 2001. Water Quality Assessment of the Plover River Watershed – Langlade, Marathon, and Portage Counties, Wisconsin.
Final report to the Wisconsin Dept. of Natural Resources. https://www.uwsp.edu/cnr-ap/watershed/Documents/ploverriver_final.pdf

Turyk, N; R. Bell; R. Cook; T. Ginnett; R. Crunkilton; L. Markham; P. McGinley; B. Shaw; and E. Wild. 2006.
Final report to Portage County and Wisconsin Dept. of Natural Resources.
https://www.co.portage.wi.us/department/planning-zoning/land-and-water-conservation/lakes-study