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 Helen Management Plan
Portage County, Wisconsin

Plan prepared by UW-Stevens Point, Center for Watershed Science and Education

Plan approved by Lake Helen Protection and Rehabilitation District Planning Committee:	May 23, 2009
Updated by Lake Helen Protection and Rehabilitation District:	July 20, 2011
Reviewed and Updated by Lake Helen Protection and Rehabilitation District:	May 13, 2017
Reviewed and Updated with “Proposed Obvious Updates”:	March 24, 2022
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 approved by Wisconsin Department of Natural Resources:	Submitted to WI DNR August 10, 2023 Approved by WI DNR August 1, 2024

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

Lake Helen Lake Management Planning Committee Members and Resources

Lake Helen Protection and Rehabilitation District Representatives

Don Becker
Lee Moyer
James & Judy Ehlenbeck
Mark, Kyle & Vicki Brandenburg
Rick Meyers
Pat Boedecker
Del & Micki Anderson
Bill Pingel
Joe Weisbrod
Rob & Anne Hvizdak

Hunt 'em and Hook 'em Sportsmans Club

Steve Grill

University of Wisconsin – Stevens Point

Nancy Turyk - Center for Watershed Science and Education
Jen McNelly - Center for Watershed Science and Education

Wisconsin Department of Natural Resources

Patrick "Buzz" Sorge – Lake Management Specialist
Scott Provost – Water Resources Management Specialist
Tom Meronek – Fisheries Biologist

Portage County

Randy Slagg – Portage County Land Conservation Department

Portage County Lake Study Researchers/Authors

Dr. Bob Bell – Algae
Dr. Robert Freckman – 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
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

Lake Helen Lake Management Planning 2023 Update Committee Members and Resources

Lake Helen Protection and Rehabilitation District Representatives

Kara Boghossian
Glen Bersie
Bill Pingel
Justin Ehlenbeck
Jeff Rasmussen

Lake Helen Fish Committee

Fred Stoeger
Mark Lynaugh
Dylan Abler
Adam Forstner
Justin Ehlenbeck
Bill Pingel
Glen Bersie

Golden Sands RC&D

Kendra Kundinger, Executive Director
Chris Hamerla, Regional AIS Coordinator

Portage County

Tracy Arnold-Land and Water Conservation-Conservation Technician
Jen McNelly-Planning and Zoning- Water Resource Specialist
Ryan Rose-Parks Director
David Peterson-District 25 Portage County Supervisor

Wisconsin Department of Natural Resources

Scott Provost-Water Resources Mgmt
Colton Hutchinson-Water Resources Mgmt
Lucas Koenig-Fisheries Biologist

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

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

List of Goals

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.

Goal 2 - Manage aquatic invasive species (AIS) through sustainable management to minimize spread, ensure a healthy aquatic ecosystem, and provide recreational opportunities. Since EWM has been found, this will be an on-going effort.

Goal 3 - Maintain the diversity and quality of native aquatic plants through the sustainable management of aquatic plants for fish and wildlife habitat and to protect water quality. This goal will be achieved when aquatic plant surveys indicate that the 2-5 foot zone of the lake is at least 80% vegetated for two consecutive surveys.

Goal 4 - Reduce phosphorus loading from residential areas and the watershed to reduce the frequency of algae blooms (to fewer than 25% of growing season days with chlorophyll a concentrations greater than 10 ug/L). This goal will be achieved when monitoring indicates that median summer (5 samples/summer) total phosphorus levels are 17 ug/L for 3 consecutive years.

Goal 5 - Create, restore and protect healthy, stable shoreland habitats near and around Lake Helen. This goal will be achieved when 75% of the shoreline is vegetated.

Goal 6 - Improve water quality and water clarity. This goal will be achieved when landowners have installed runoff control practices and the shoreland goals are achieved.

Goal 7 - Manage terrestrial invasive species (TIS) through sustainable management to minimize spread, ensure a healthy shoreland ecosystem, and provide recreational opportunities. Since Japanese Knotweed and Wild Parsnip have been found, this will be an on-going effort.

Goal 8 - Maintain and enhance activities on Lake Helen that promote a sense of community and allow all users to enjoy the lake.

Goal 9 - Create informational and communication opportunities for Lake Helen landowners and users to develop interactions with others that are involved in decisions that affect Lake Helen.

Goal 10 - Keep the information and resources within the Lake Helen Lake Management Plan current and up to date.

Introduction

Lake Helen is situated in the northeast corner of Portage County, Wisconsin. Lake Helen is valued by those who use and enjoy the lake for its good water quality, natural beauty, peace and tranquility, quality fishing, and recreational opportunities.

In 2008, the Lake Helen Protection and Rehabilitation District (LHPRD) partnered with UW-Stevens Point to develop and lake management plan. The purpose of this plan was to learn about Lake Helen, identify factors important to Lake Helen Protection and Rehabilitation District residents, and develop goals, objectives, and associated actions to protect and improve Lake Helen. THe Lake Helen Management Planning Team consisted of Lake Helen Lake DIstrict members that were assisted by Portage County staff including the County Conservationist, Zoning Specialist, and Groundwater SPecialist; the Wisconsin Department of Natural Resources Lake Management and Fisheries staff; and the staff from the University of WIsconsin-Stevens Point Center for Watershed Science and Education and the Center for Land Use Education. A survey was sent to District members to obtain their opinions about Lake Helen. Survey results were used throughout the planning process.

The purpose of lake management plans is to provide guidance to prevent or solve problems that may harm lake ecosystems. The development of lake management plans for Lake Helen Protection and Rehabilitation District (LHPRD) and 28 other Portage County lakes is the second phase of the Portage County Lakes Study. During the first phase, data collection was completed for the 29 lakes. Researchers focused on data related to topics affecting lake health, including water quality, shoreline development, amphibian habitat, fisheries, and aquatic plants. A summary of the study result can be found in the Background Information (from 2002-2003 study) section of this document.

As important as data collection is to any management plan, the success of the plan depends upon citizen involvement. The Lake Helen Protection and Rehabilitation District (LHPRD) management plan was developed by interested citizens, local organizations, and professionals who applied the data while actively gathering additional citizen input. A citizen survey was conducted to learn about values, opinions, and any perceived issues with the lake. The members of the Lake Helen Protection and Rehabilitation District (LHPRD) management planning committee met monthly for four months, learning about topics related to the pond and developing 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 Helen can have the greatest influence on the lake by understanding and choosing lake-friendly options to manage their land and the lake.

- **Lake Helen Protection and Rehabilitation District (LHPRD):** This plan provides the District 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 realize accomplishments related to the lake. Resources and funding opportunities for lake management activities are made more available by placement of goals into the lake management plan, and the local organizations can identify partners to help achieve their goals for Lake Helen.

- **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.

- **The Town of Alban:** The Town 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 Lake Helen.

- **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 (WI DNR)**: 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 WI DNR 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 Helen Protection and Rehabilitation District (LHPRD) 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 Helen Protection and Rehabilitation District (LHPRD). The results will also be shared throughout this lake management plan update. For a full copy please visit: https://www.lakehelendistrict.com/lake-management.html.

Goals, Objectives and Actions

The following goals and objectives are derived from the values and concerns of the members of the Lake Helen Protection and Rehabilitation District (LHPRD) based on the science used to assess Lake Helen and its ecosystem. Implementing the goals and actions in the Lake Helen Management Plan will protect what resident's value most for current and future generations. These goals are intended to be met through implementation, education, encouragement, and incentives. Resources that are listed within the plan include primary organizations or individuals that would be able to provide information, suggestions, or services to accomplish the goals and objectives. 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 annually in the fall and updated with any necessary changes.

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

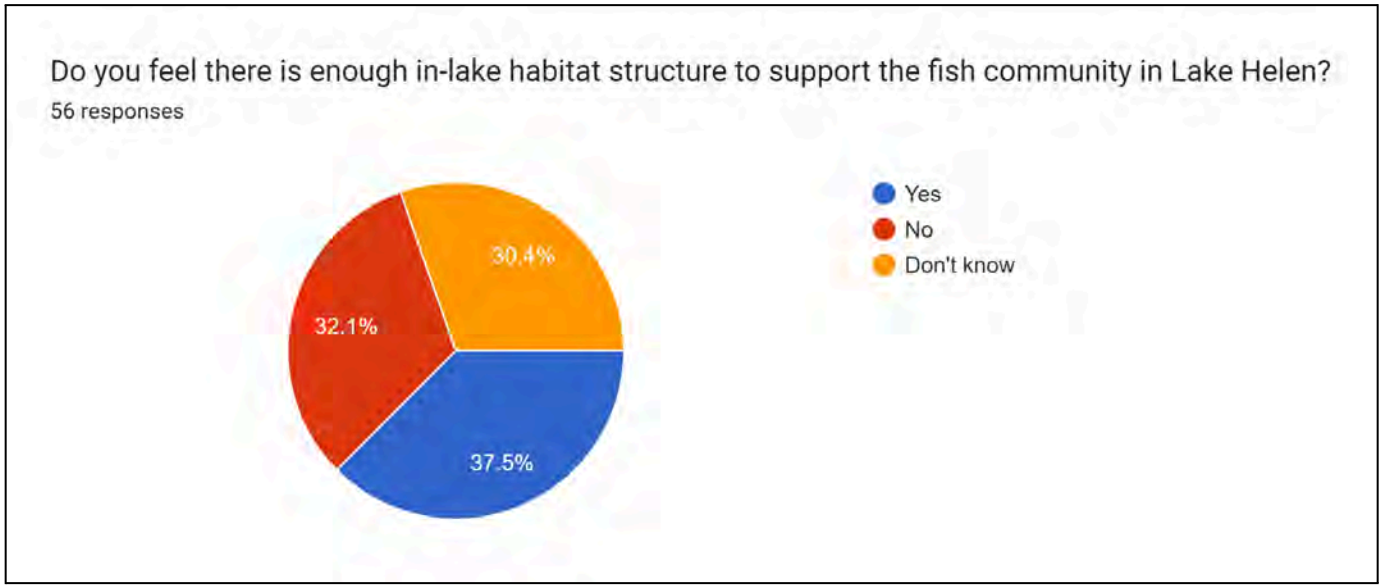
Recreation—access, sharing the lake, informing lake users, rules
Communication and Organization—maintaining connections for partnerships, implementation, community involvement
Updates and Revisions—continuing the process
Governance—protection of the lake, constitution, state, county, local municipalities, Lake Helen Protection and Rehabilitation District (LHPRD)

In-Lake Habitat and a Healthy Lake

Many lake users value Lake Helen 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 Helen includes the aquatic plants, branches, and tree limbs above and below the water.

Results from the 2023 Lake Helen 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. The fishing regulations for Lake Helen can be found on the WDNR website:
https://apps.dnr.wi.gov/fisheriesmanagement/Public/LakeRegulation/Details?WBIC=287200&WBIC_NAME=Lake%20Helen

WI DNR Lake Helen 2021 Fish Survey Results

(Electrofishing entire shoreline)

Common Name of Fish	Number	Percent	Average Length	Length Range
Walleye	3	2.8	18.0	16.8 - 19.2
Largemouth Bass	40	37.7	11.3	8.8 - 16.4
Bluegill	40	37.7	6.4	3.6 - 9.2
Yellow Perch	1	0.9	6.8	6.8 - 6.8
Yellow Bullhead	22	20.8	-	-
Total	**106**	**100.0**	-	-

WALLEYE STATUS

- Abundance: Low
  - 2021 Electrofishing CPE = 2.3/mile
  - None captured in previous surveys
- Size Structure: Unknown
  - Not enough fish captured to determine size structure
- Growth: Unknown
  - Not enough fish captured to determine size structure

NORTHERN PIKE STATUS

- Abundance: Unknown
  - 2021 none were captured
  - 2010 fyke net CPE = 1.8/net night
    - Above 50th percentile compared to lake classification
- Size Structure: Unknown
  - 2021 none were captured
  - 2010 PSD21" = 7%
    - Poor size structure
- Growth: 2010 was below average growth

LARGEMOUTH BASS STATUS

- Abundance: Below average
  - 2021 electrofishing CPE = 31/mile
    - Below 50th percentile compared to lake classification
  - 2010 electrofishing CPE = 42/mile
    - Above 50th percentile compared to lake classification
- Size Structure: Poor

	2021	2010
– PSD12" =	33%	57%
– PSD15" =	3%	0%
– PSD20" =	0%	0%

- Growth: Above average
  - 2010 near 75th percentile compared to lake classification

BLACK CRAPPIE STATUS

- Abundance: Unknown
  - 2021 none were captured
  - 2010 fyke net CPE = 1.1/net night
    - Above 50th percentile compared to lake classification
- Size Structure: Unknown
  - 2021 non were captured
  - 2010:
    - PSD8" = 67%
    - PSD10" = 11%
    - PSD12" = 0%

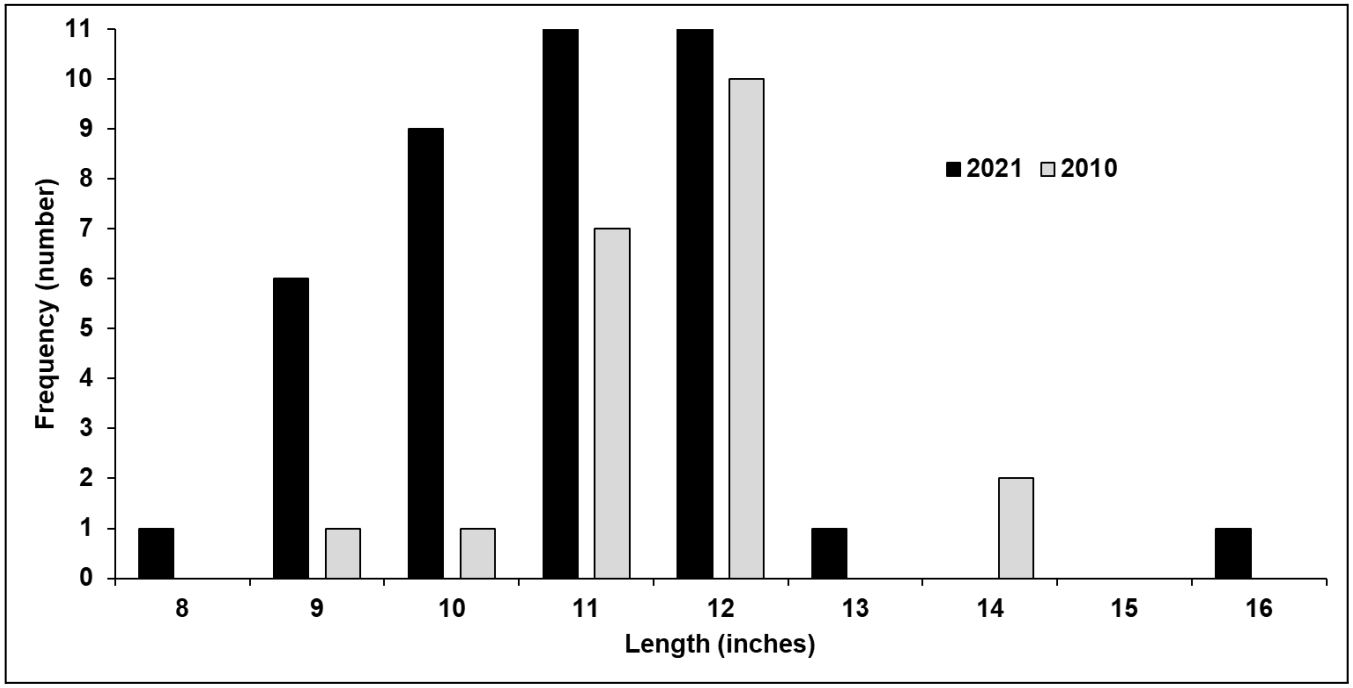
BLUEGILL STATUS

- Abundance: Low
  - 2021 Electrofishing CPE = 31/mile
    - Below the 10th percentile compared to lake classification
- Size Structure: Good
  - PSD6" = 55%
  - PSD8" = 30%
  - PSD10" = 0%
- Growth: Excellent/Fast
  - 2021 growth is near 75th percentile compared to lake classification

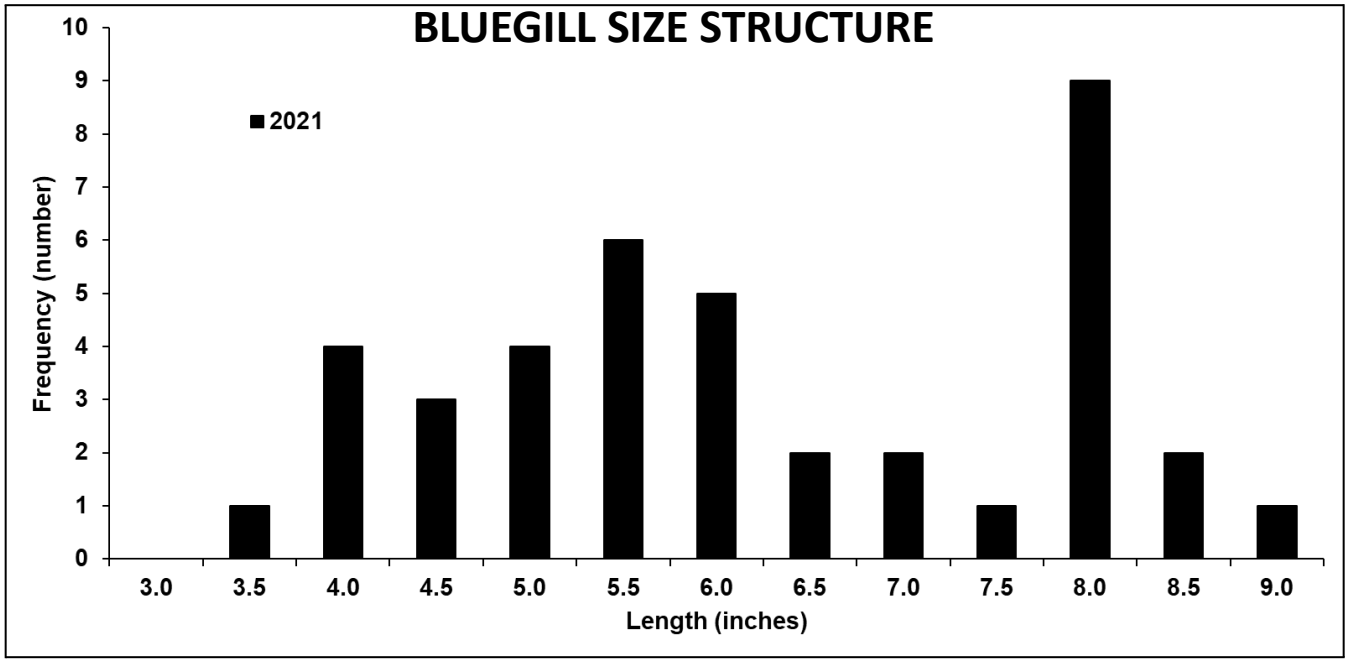
YELLOW PERCH STATUS

- Abundance: Above average
  - 2021 electrofishing CPE = 0.8/mile
    - Above the 50th percentile compared to lake classification
- Size Structure: Unknown
  - Did not capture enough fish to determine size structure
- Not much for perch in our data

LARGEMOUTH BASS SIZE STRUCTURE



BLUEGILL SIZE STRUCTURE



LAKE HELEN STOCKING HISTORY

Year	Species	Age Class	Number Stocked	Avg Length
2016	Fathead Minnow	Adult	400	3
2016	Fathead Minnow	Yearling	400	3
2016	Yellow Perch	Yearling	1000	7
2016	Walleye	Large Fingerling	1200	8
2012	Black Crappie	Large Fingerling	1538	6
2012	Yellow Perch	Large Fingerling	1176	6
2010	Yellow Perch	Yearling	100	6
2010	Walleye	Large Fingerling	500	7
2010	Yellow Perch	Large Fingerling	100	6
1996	Largemouth Bass	Fingerling	6000	2.3
1995	Largemouth Bass	Fingerling	1950	2.8
1995	Northern Pike	Fingerling	345	8.2
1994	Northern Pike	Fingerling	390	5
1994	Largemouth Bass	Fingerling	1950	3
1993	Northern Pike	Fingerling	400	8
1993	Largemouth Bass	Fingerling	4000	2
1977	Northern Pike	Adult	267	
1975	Northern Pike	Adult	100	
1973	Northern Pike	Adult	105	15
1972	Bluegill	Adult	1000	5

Lake Helen Fisheries Committee Efforts 2022-2023

Committee held meetings with DNR Fish Biologist, Golden Sands, and Portage County initially focused on stocking. WI DNR Biologists Tim Parks and Lucas Koenig changed our focus to a holistic approach to fish management to ensure any investment is money well spent. Committee focused on habitat improvements to support natural reproduction and protection for young fish and regulation changes to support population levels and increase size structure. WI DNR agreed to pursue restocking efforts after the necessary changes have been implemented.

Through Committee efforts, in 2022 Northern Pike Size Limit Changes include: No minimum length limit, Daily bag limit of 5 and we encourage keeping the smaller Northern to allow for size structure growth. In 2026 Panfish Daily Bag Limit Change include: Daily bag limit of 10 in total, Lower limit will provide population improvement and size structure growth.

The Committee facilitated fish habitat improvement projects in 2022. On March 4th 2022 Volunteers Installed 6 Fish Stick Complexes on Lake Helen. Fish Sticks are intended to restore woody habitat in lakes by adding trees to the near-shore area. Natural woody habitat is a necessary part of improving fish population and size structure. 18 total trees were used to construct the complexes. "Fish Sticks are feeding, breeding, and nesting areas for all sorts of critters – from fish to songbirds. They can also prevent bank erosion – protecting lakeshore properties and your lake.“

Initial Fish Stick Installation in March 2022

Goal 1

To have balanced healthy fish communities maintained through sustainable management practices.

Objective 1.1: Improve shallow water fish habitat through tree falls/fish sticks and near shore habitat in 25-35% of Lake Helen. A total of 18 Fish Sticks would need to be installed for 34%.

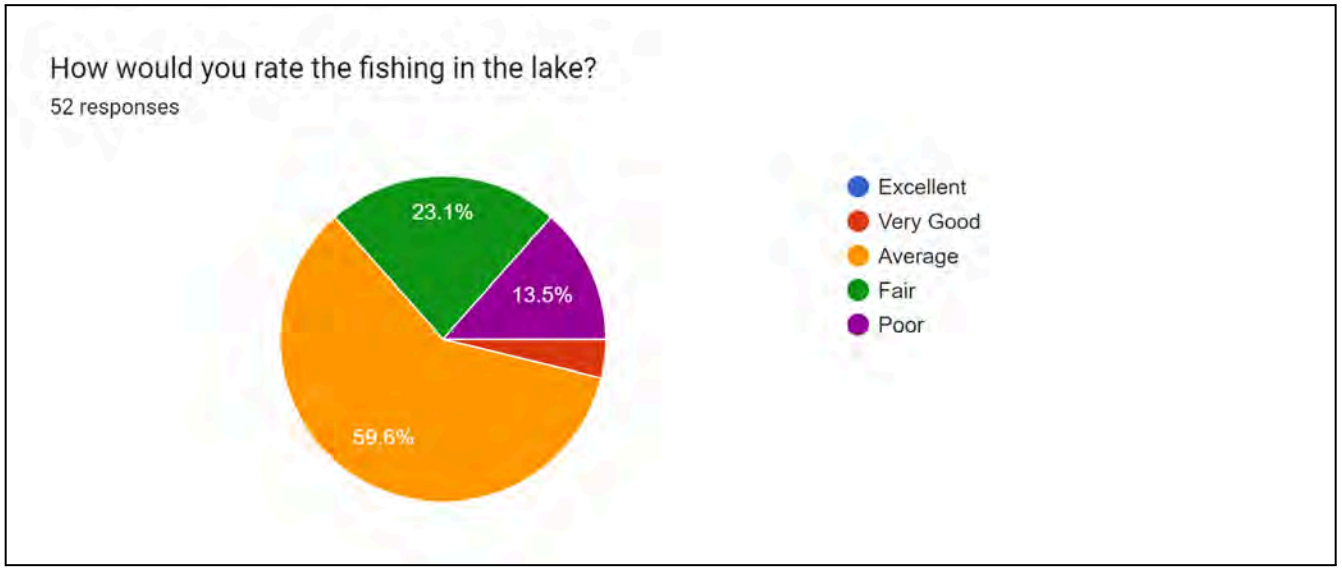
Actions	Lead person/group	Start Date	End Date	Resources
Establish an initial Fisheries Committee to work with the DNR and residents to maintain a healthy fish community.	Lake District Commission	2009	2016	WI DNR
Establish on-going Fisheries Committee to provide continued review of the fish community and to continue to pursue the goals.	Lake District Commission	6/1/2019	Ongoing	WI DNR
Add/restore fish habitat including fish sticks on residential properties and County access points.	Fisheries Committee	3/2022	Ongoing	WI DNR Portage County Land Water Conservation Department

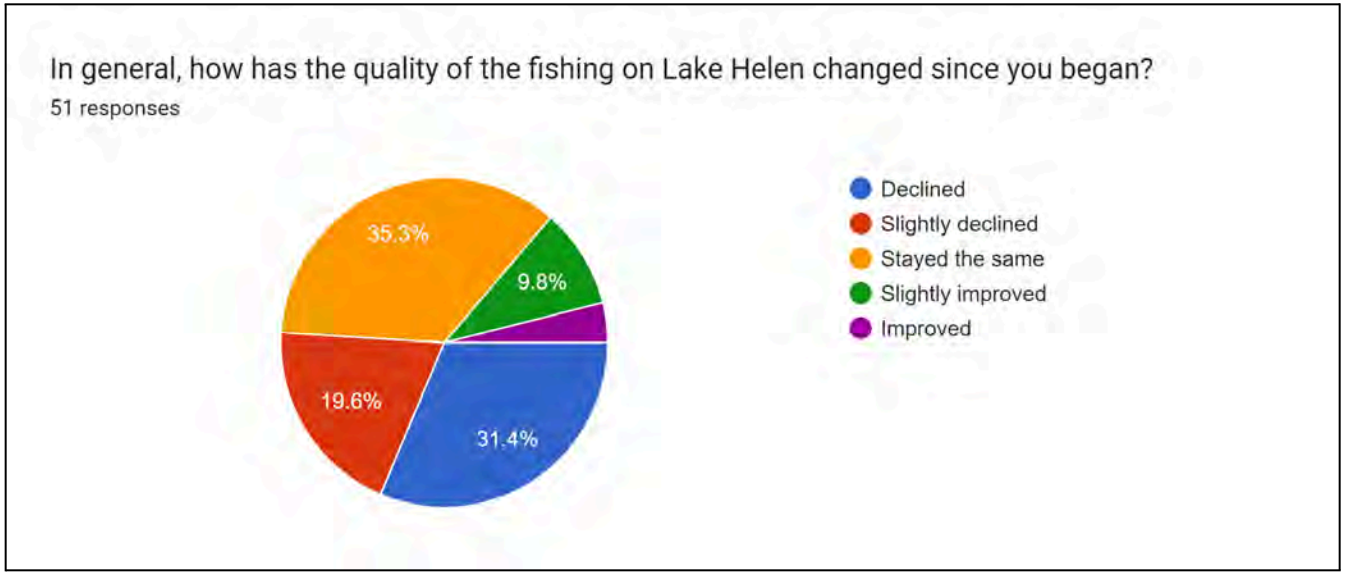
Objective 1.2: Work with DNR to determine lake specific fisheries goals.

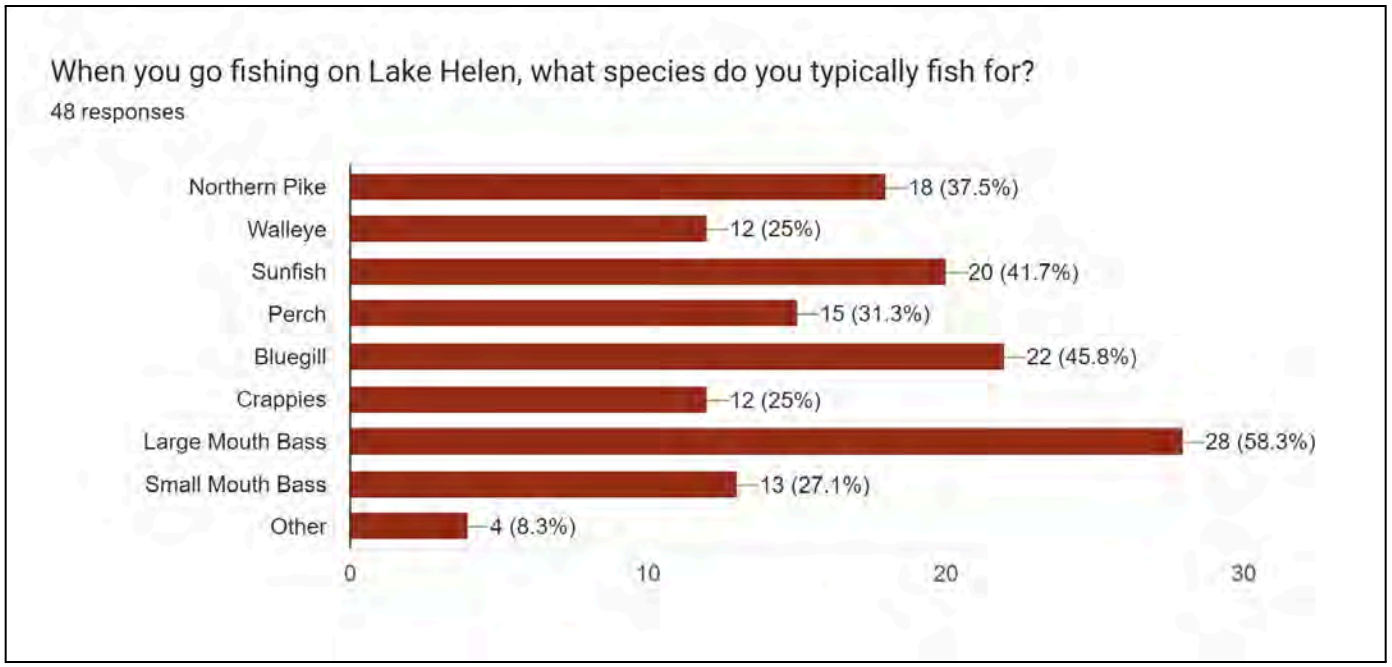
Actions	Lead person/group	Start Date	End Date	Resources
Work with DNR using local lake data to develop lake-specific fishery recommendations.	Fisheries Committee	August 6, 2020	Ongoing	WI DNR
Work with DNR to get recommendations about fish-stocking and if it makes sense for Lake Helen.	Fisheries Committee	May 2021	Ongoing	WI DNR

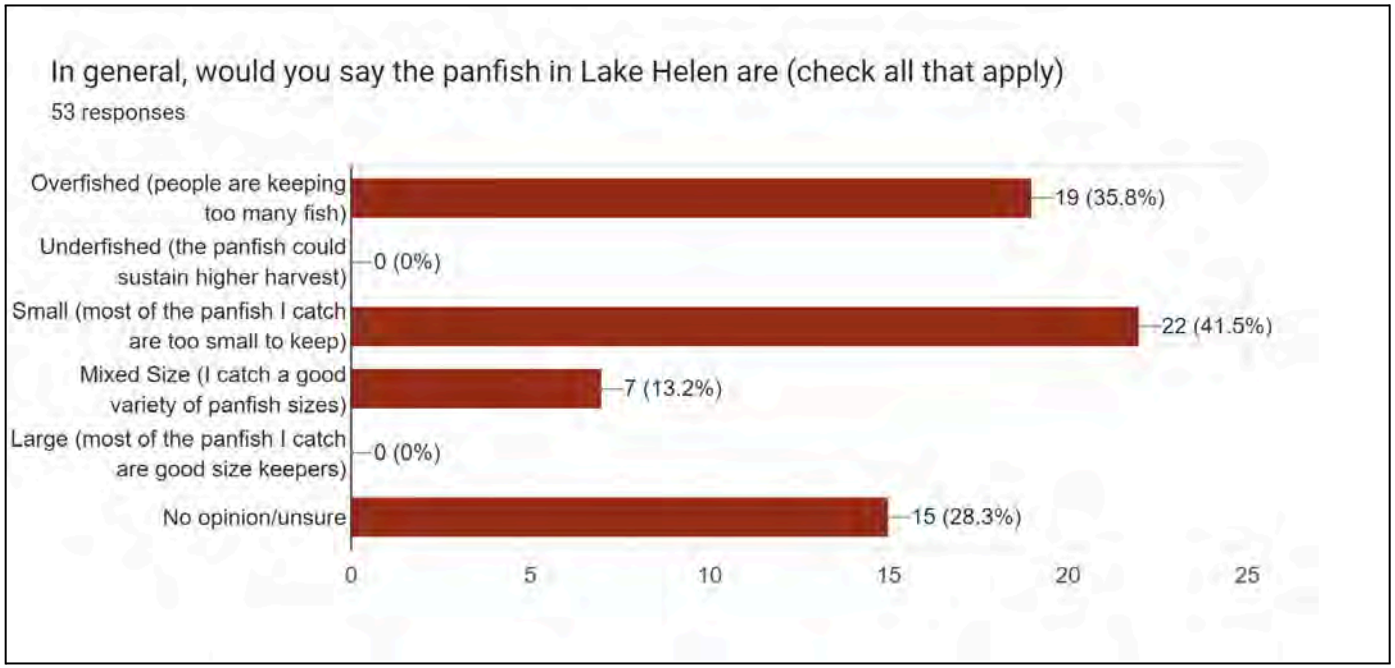
Goal 1 Notes/History:

- Fish stocking completed to date: 1972-Bluegill, 1973-Northern Pike, 1975-Northern Pike, 1977-Northern Pike, 1993-Largemouth Bass, Northern Pike, 1994-Largemouth Bass, Northern Pike, 1995- Largemouth Bass, Northern Pike, 1996-Largemouth Bass, 1996-Largemouth Bass, 2010-Yellow Perch (Large Fingering), Walleye, Yellow Perch (Yearling), 2012-Yellow Perch, Black Crappie, 2016-Walleye, Yellow Perch, Fathead Minnow (Yearling). Fathead Minnow (Adult)
- Past fish surveys: 2001-Electrofishing & Mini Fyke Net, 2010-Electrofishing & Fyke Net, 2021-Electrofishing
- Initial Fish Committee established in 2009. Led by Mark Brandenburg. Focused on fish stocking.
- At the May 2017 meeting, residents stated that we need to find ways to create spawning areas that encourage the fish that were stocked to grow. In addition, it was suggested that we shouldn't stock more fish until we see that the population is growing.
- At the May 2017 meeting, residents said we should determine what can be done to encourage catch and release, especially until the fish population that has been stocked is spawning and growing.
- At the May 2017 meeting, residents said we should contact the DNR to determine if anything can be done to control the number of fish taken out of the lake during the winter fisheree.
- Fisheries Committee re-established in 2019 with broad healthy fisheries focus. Led by Fred Stoeger.
- Working with DNR to change fishing regulations for Northern and Panfish. Keith Hoffman completed this in 2021, changes take place 2022 and 2024
- Six fish stick complexes were set up in March 2022, led by Keith Hoffman in conjunction with WI DNR, Portage County Land Water Conservation Dept through the Healthy Lakes and Rivers grant.
- Summary and recommendation from DNR in 2022,
    - Based on the survey, the greatest potential for a productive fishery is with largemouth and panfish.
    - Management should probably be focused on habitat and harvest regulations that may protect panfish species from potential overharvest.
    - Stocking walleye will add a predatory component that should be considered when looking at the big picture for panfish.

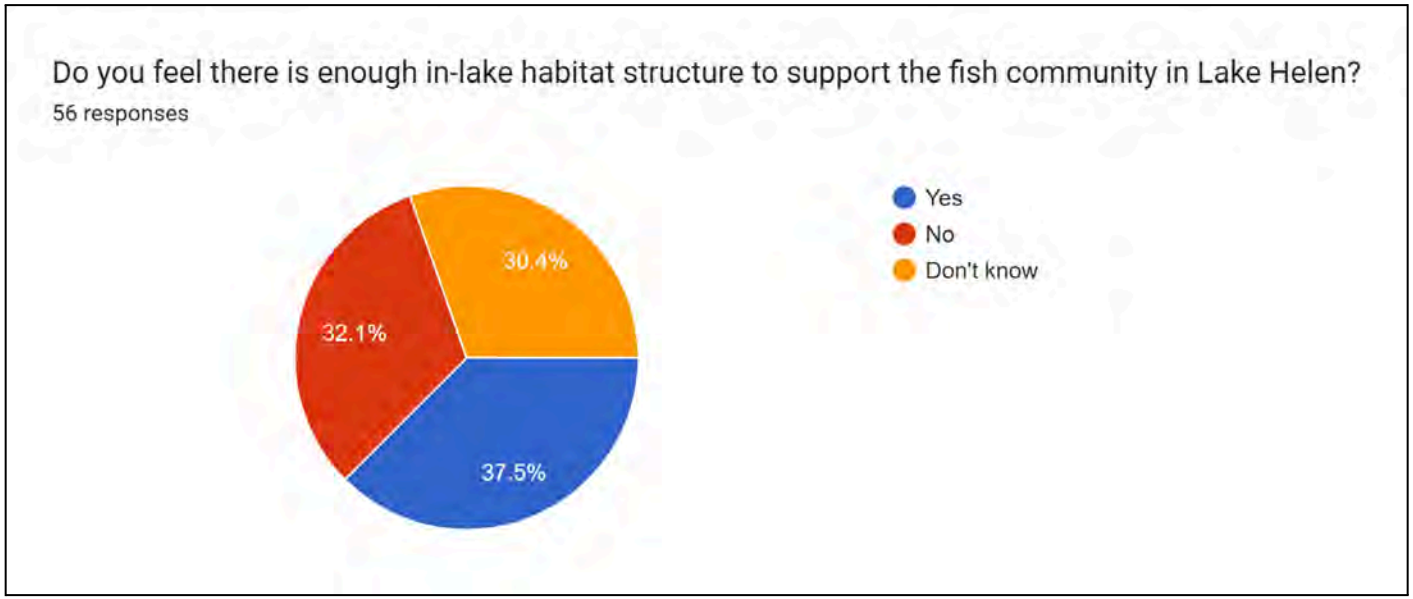

How would you rate the fishing in the lake?
52 responses
23.1%
13.5%
59.6%
Excellent
Very Good
Average
Fair
Poor


In general, how has the quality of the fishing on Lake Helen changed since you began?
51 responses
35.3%
9.8%
19.6%
31.4%
Declined
Slightly declined
Stayed the same
Slightly improved
Improved


When you go fishing on Lake Helen, what species do you typically fish for?
48 responses
Northern Pike
18 (37.5%)
Walleye
12 (25%)
Sunfish
20 (41.7%)
Perch
15 (31.3%)
Bluegill
22 (45.8%)
Crappies
12 (25%)
Large Mouth Bass
28 (58.3%)
Small Mouth Bass
13 (27.1%)
Other
4 (8.3%)
0
10
20
30


In general, would you say the panfish in Lake Helen are (check all that apply)
53 responses
Overfished (people are keeping too many fish)
19 (35.8%)
Underfished (the panfish could sustain higher harvest)
0 (0%)
Small (most of the panfish I catch are too small to keep)
22 (41.5%)
Mixed Size (I catch a good variety of panfish sizes)
7 (13.2%)
Large (most of the panfish I catch are good size keepers)
0 (0%)
No opinion/unsure
15 (28.3%)
0
5
10
15
20
25

Results from the 2023 Lake Helen Resident Survey



Aquatic plants

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 Helen. The families of lake residents and users enjoy Lake Helen's fishery and wildlife viewing. Healthy, native communities of aquatic plants are important to provide these opportunities. The residents of Lake Helen 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 Helen.

Goal 2

Manage aquatic invasive species (AIS) through sustainable management to minimize spread, ensure a healthy aquatic ecosystem, and provide recreational opportunities. Since EWM has been found, this will be an on-going effort.

Objective 2.1: Control the Eurasian watermilfoil in Lake Helen to a management population and try to prevent the spread throughout the lake.

Actions	Lead person/group	Start Date	End Date	Resources
Apply for a rapid response grant to help with the costs of EWM management on Lake Helen	Lake District Commission	2008-2009	2014	UWSP Center for Watershed Science and Education (CWSE) Golden Sands RC&D
Eradicate initial EWM problem areas in Lake Helen through a variety of means.	Lake District Commission/Residents Golden Sands RC&D	2009	2014	Golden Sands RC&D
Establish an Aquatic Invasive Species Committee to deal with the management, control, and prevention of aquatic invasive species in Lake Helen.	Lake District President	2011	Ongoing	Extension Lakes Golden Sands RC&D WI DNR
Continue to monitor & control EWM in Lake Helen through a variety of means, such as manual pulling and/or chemical.	Lake District Commission/Residents Golden Sands RC&D	2015	Ongoing	Golden Sands RC&D

At each Annual meeting a report should be given that outlines the status of EWM, progress made in controlling it, and for the new year.	Lake District Commission Golden Sands RC&D	2017	Ongoing	WI DNR Golden Sands RC&D
Create an aquatic plant management plan to outline methods of managing the EWM in Lake Helen. Keep this plan updated	Lake District Commission Golden Sands RC&D	2019	Ongoing	UWSP Center for Watershed Science and Education (CWSE) Golden Sands RC&D
Continue to monitor EWM in Lake Helen and map the populations.	Lake District Commission/Residents Golden Sands RC&D	Ongoing	Ongoing	Golden Sands RC&D Portage County Land Water Conservation Department
Establish on-going plan to provide continued EWM invasive species monitoring and removal.	Lake District Commission Golden Sands RC&D	Ongoing	Ongoing	Golden Sands RC&D Portage County Land Water Conservation Department

Objective 2.1 Notes/History:

- Initial Invasive Species Committee established in 2011 lead by Rob H
- Rapid Response Grant applied for, monies received, and monies applied to initial EWM treatment costs in 2014
- Pulling EWM used initially and ultimately EWM was chemically treated on May 27, 2014.
- EWM was chemically treated in 2014 and May 2020
- More EWM was discovered by the WI DNR in 2016 via lake survey. May 13, 2017, Golden Sands conducted a training session and worked with local residents to dive and carefully remove the plot of EWM plants.
- In 2017, changed to responsibility of Board of Commissioners, with one Commissioner designated as the Invasive Species Coordinator
- May 13, 2017 Golden Sands conducted a training session and worked with local residents to manually remove the plants, Follow-up to be done in August 2017.
- May 13 & Aug 19, 2017- Two manual removal sessions took place
- June 22, 2018 - two scuba divers, a snorkeler, and a support team removed a tremendous amount of EWM.
- Due to the lack of aggressive manual pulling, by the fall of 2018 the EWM population had noticeably increased and by 2019 had grown to a mapped area of approximately 40 acres. We partnered with Golden Sands to hire divers to manually pull EWM. However, heavy concentration in the deep areas made manual removal futile. In spite of that it was determined that the best course of action was another full lake chemical treatment, which was done in May 2020. A three-year grant was received in 2021 to reinvigorate monitoring and manual pulling efforts.

- 2019 - Manual pulling efforts continued using divers. However, we've noticed that the amount of EWM is out of control and another chemical treatment may be needed next year
- Aquatic plant management plan created in October 2019 with help from Golden Sands.
- May 2020 - The second chemical treatment took place. No EWM was seen during the summer
- 2021 - A group regularly checking for EWM plants throughout the summer. We were able to manually remove plants in the shallow areas. A diver team pulled plants from deeper parts of the northwest part of the lake in June. However, due to water clarity issues, we were unable to use divers as much as we had hoped. We received a three-year grant to help us control EWM without chemicals.
- DASH removal events took place in June and October of 2022.
- June of 2023 completed two days of DASH with Aquatic Plant Management. The total removed via DASH for the two days was 200.5 cubic feet.
- On 7/15/23 a group removed about 30 - 5 gallon pails by hand-pulling EWM and skimming fragments from the surface of the water.
- On 7/22/23 a group removed about 20 - 5 gallon pails by hand-pulling EWM and skimming fragments from the surface of the water.

Objective 2.2: Prevent the introduction of any new aquatic invasive species into Lake Helen and/or prevent the distribution of EWM to other waterbodies.

Actions	Lead person/group	Start Date	End Date	Resources
Monitor for new invasive aquatic species and eradicate as needed.	Lake District Commission/Residents Golden Sands RC&D	2011	Ongoing	Golden Sands RC&D WI DNR Rapid Response Plan
Establishing a Clean Boat-Clean Waters (CBCW) program.	Lake District Commission Golden Sands RC&D	2018	Ongoing	Extension Lakes Golden Sands RC&D

Objective 2.2 Notes/History:

- At the May 2017 meeting, it was noted that no other invasive species had been found in Lake Helen. Goldens Sands warned residents to be on the lookout for Zebra mussels, since they had been found in other County Lakes. In 2019-2020 Zebra mussels were found in small quantities attached to docks. The following year they were found in greater quantities on boats and docks. We consulted with Golden Sands and the DNR. It seems that there is nothing we can do to eliminate them. Property owners have been encouraged to remove any they find from their boats and docks and to keep their boat motors lifted out of the water to prevent damage.

- At the May 2017 meeting we discussed the fact that we are having trouble finding volunteers and the few who were doing with advised looking at hiring college kids to monitor the boat landing. In summer of 2018, we changed the approach from using volunteers to hiring a boat landing monitor through a partnership with Golden Sands RC&D. 75% of the wage for this position is paid through a grant from the DNR that needs to be applied for each year. The grant was received and the position hired in 2019, 2020, 2021, 2022.

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 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.

See the Aquatic Plant Management Plan section for more information on Eurasian WaterMilfoil/Hybrid Watermilfoil (EWM/HWM) management options as well as related goals and objectives.

General recommendations for managing and reducing the spread of AIS:

AIS are being brought into Lake Helen on boats/trailers and on fishing equipment used directly in the lake. To prevent the further spread and/or establishment of new AIS in Lake Helen, shoreland property owners and users should be informed of proper cleaning techniques for boating and fishing equipment.

Reducing nutrients that travel across the landscape and into the lake can help lessen excessive plant growth. Maintaining a healthy amount of native aquatic plants can help to reduce the frequency and intensity of algal blooms. Denuded lakebeds can increase the potential for AIS establishment, and sediment stirred up by wind or boats can mix phosphorus into the water where algae can use it for 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 local lake citizens, Golden Sands Resource Conservation & Development Council, Inc. (Golden Sands RC&D), and WDNR aquatic plant biologists.

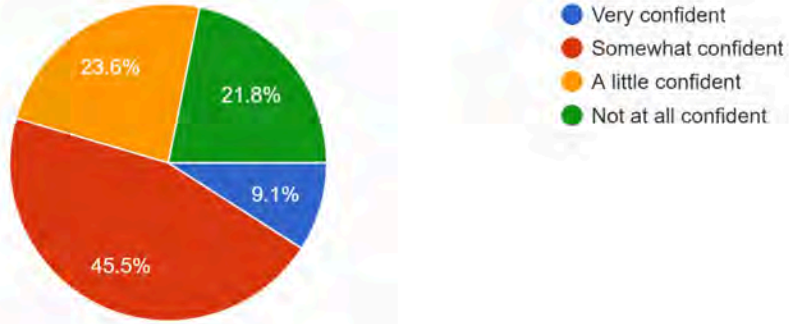
AIS can be removed from the pond by non-mechanical means without a permit. The plant material should be discarded on land away from the pond or channels. Since EWM/HWM can spread from fragments, proper techniques should be followed to avoid spread and to ensure the plant and its deep roots are completely removed.

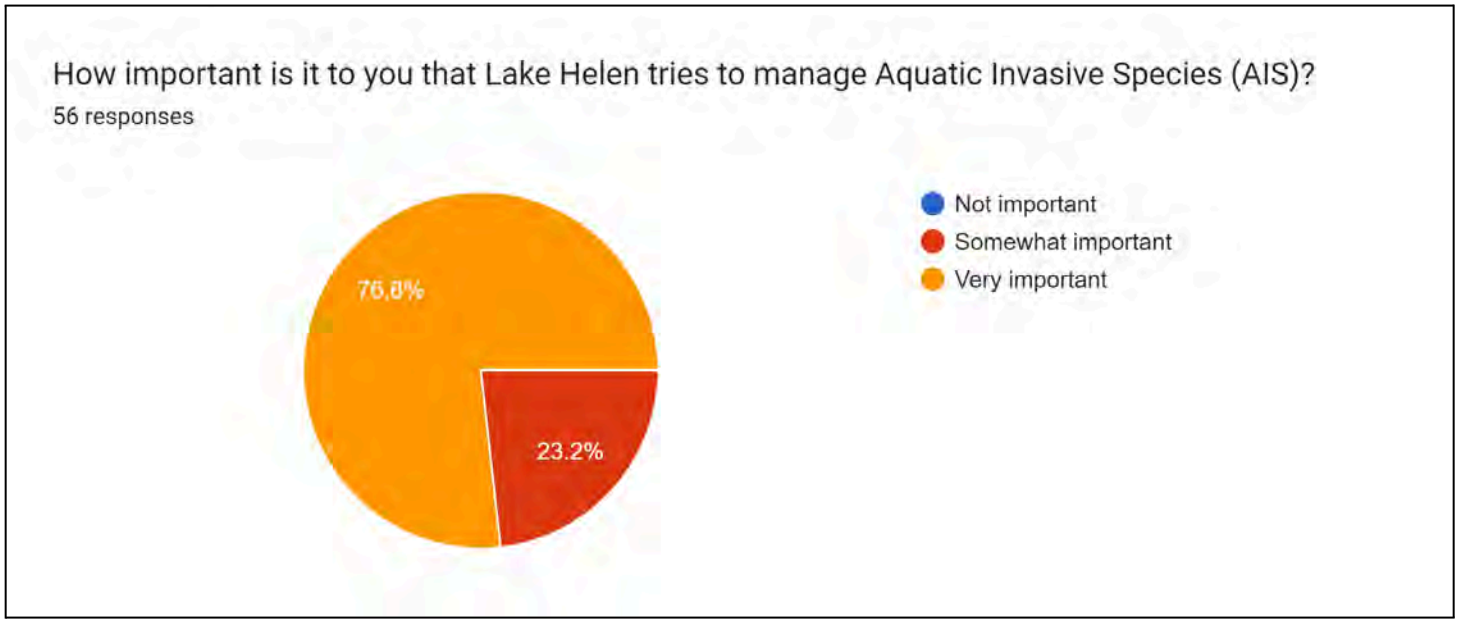
To help prevent the spread of aquatic invasive species into Lake Helen, do you clean your boat, trailer, and fishing equipment before using it in Lake Helen after it has been used in another lake?

55 responses

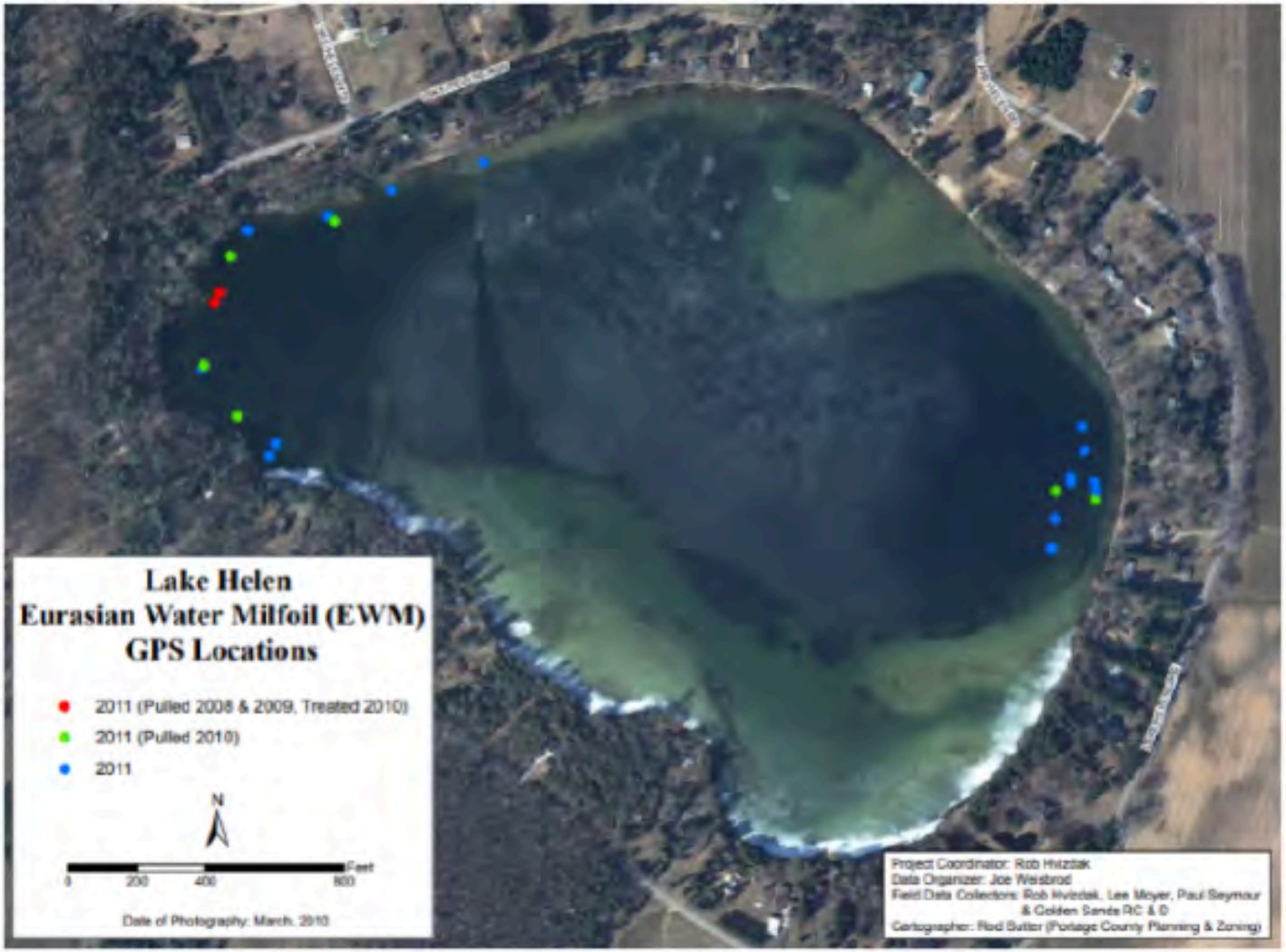
How confident are you in your ability to identify invasive aquatic plants apart from native aquatic plants?

55 responses



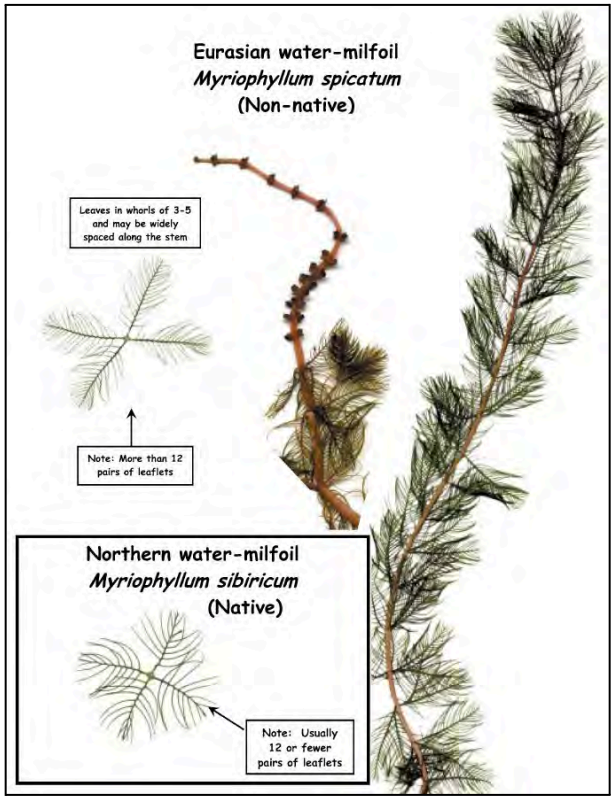

How important is it to you that Lake Helen tries to manage Aquatic Invasive Species (AIS)?
56 responses
76.8%
23.2%
Not important
Somewhat important
Very important

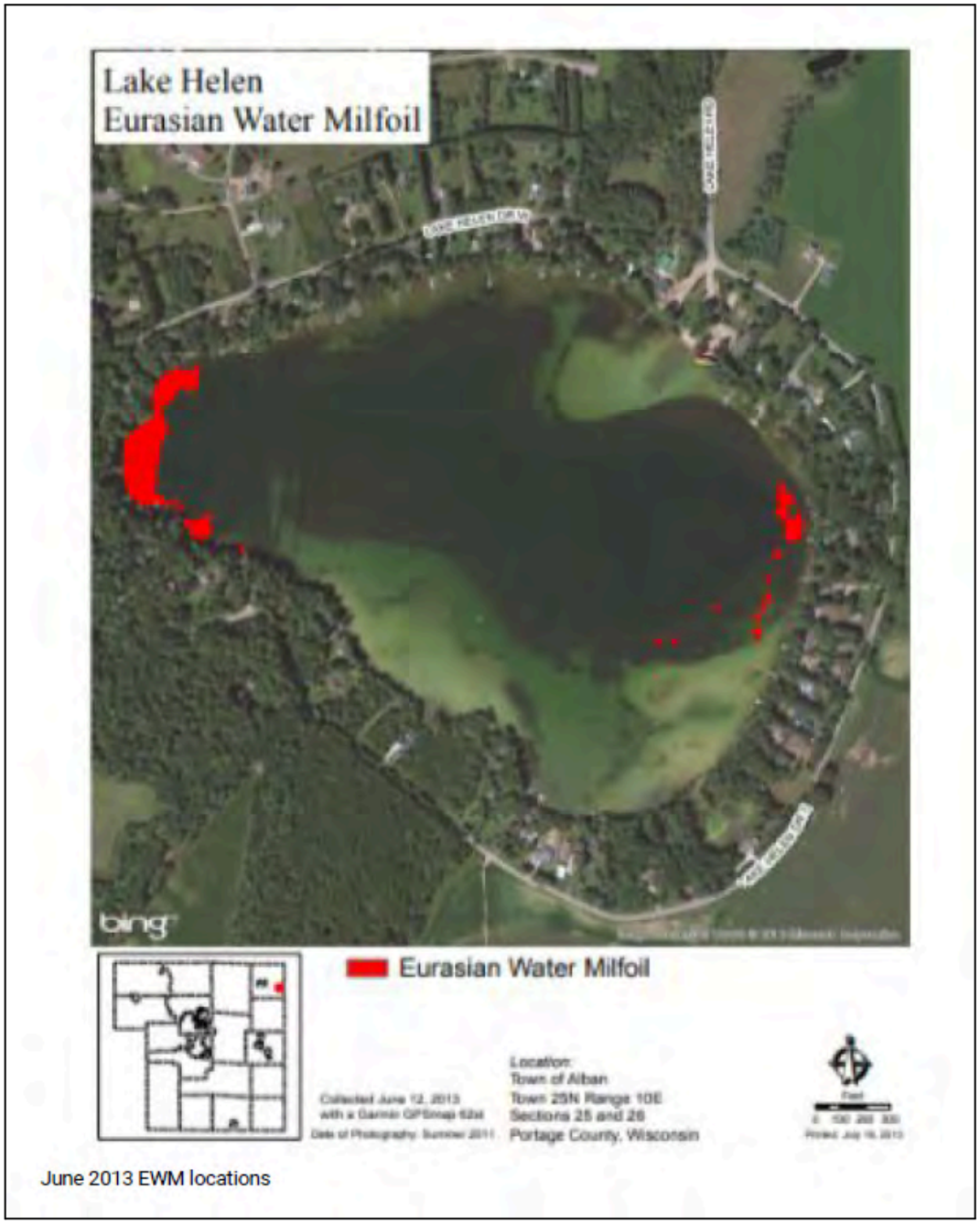
Map of Eurasian watermilfoil in Lake Helen 2011
Golden Sands RC&D



EWM Locations noting hand pulling efforts and treatments from 2008 - 2011.

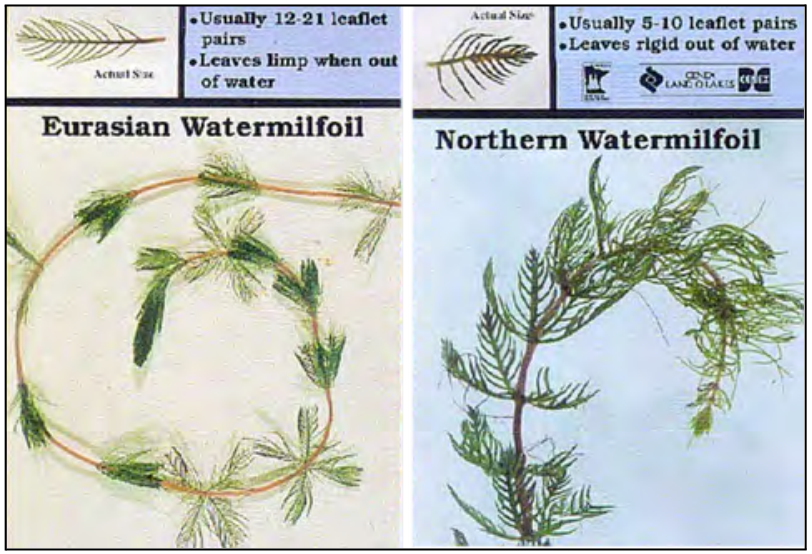
Map of Eurasian watermilfoil in Lake Helen 2013 Golden Sands RC&D



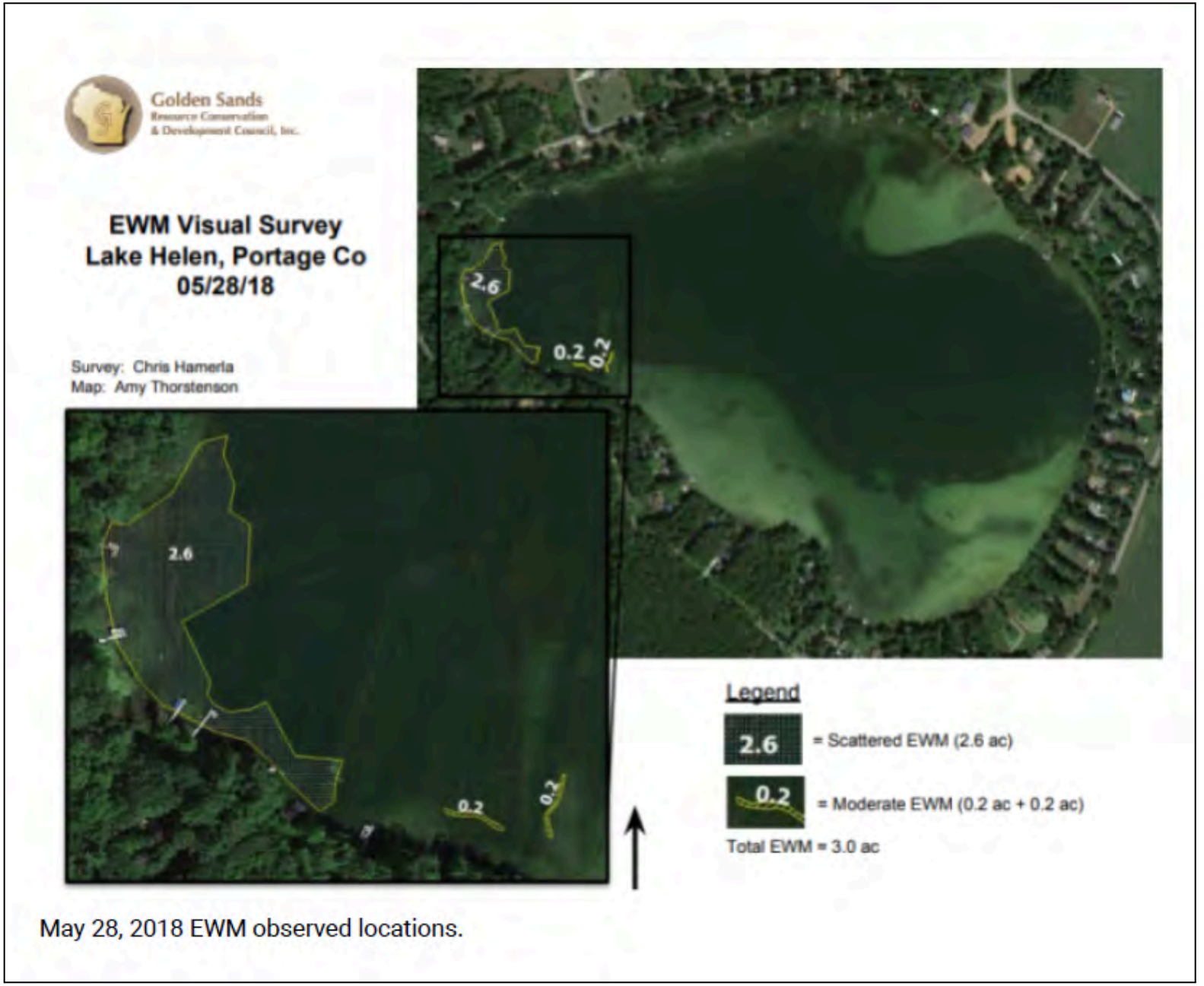


June 2013 EWM locations

Map of Eurasian watermilfoil in Lake Helen 2017 Golden Sands RC&D

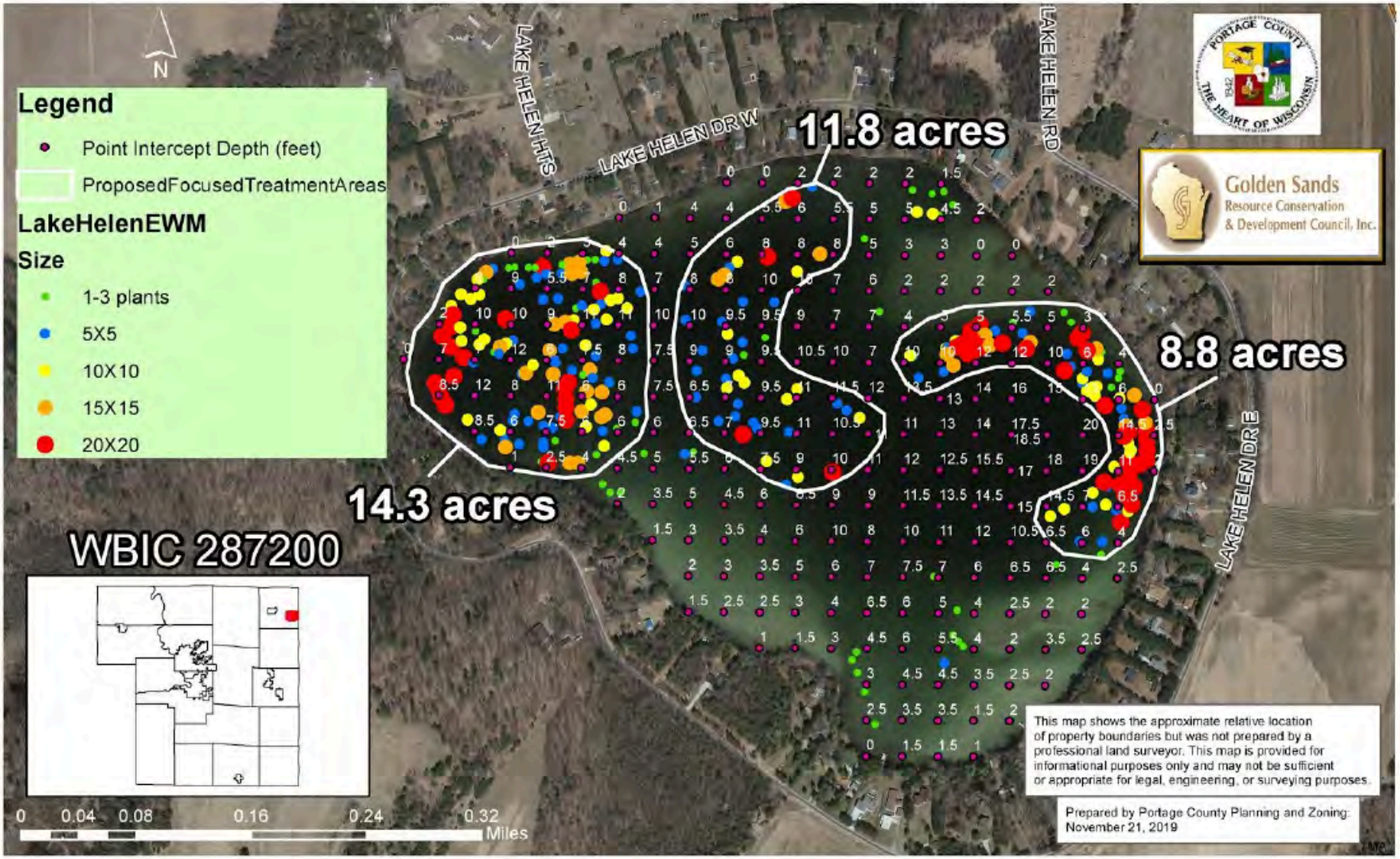


July 10, 2017 observed EWM locations.



May 28, 2018 EWM observed locations.

Lake Helen Proposed Focus Treatment Areas
Point Intercept Points/EWM Points
(Depth in feet, 40m between PI points)
2019



Golden Sands RC&D comparison of EWM from 2013 and 2019

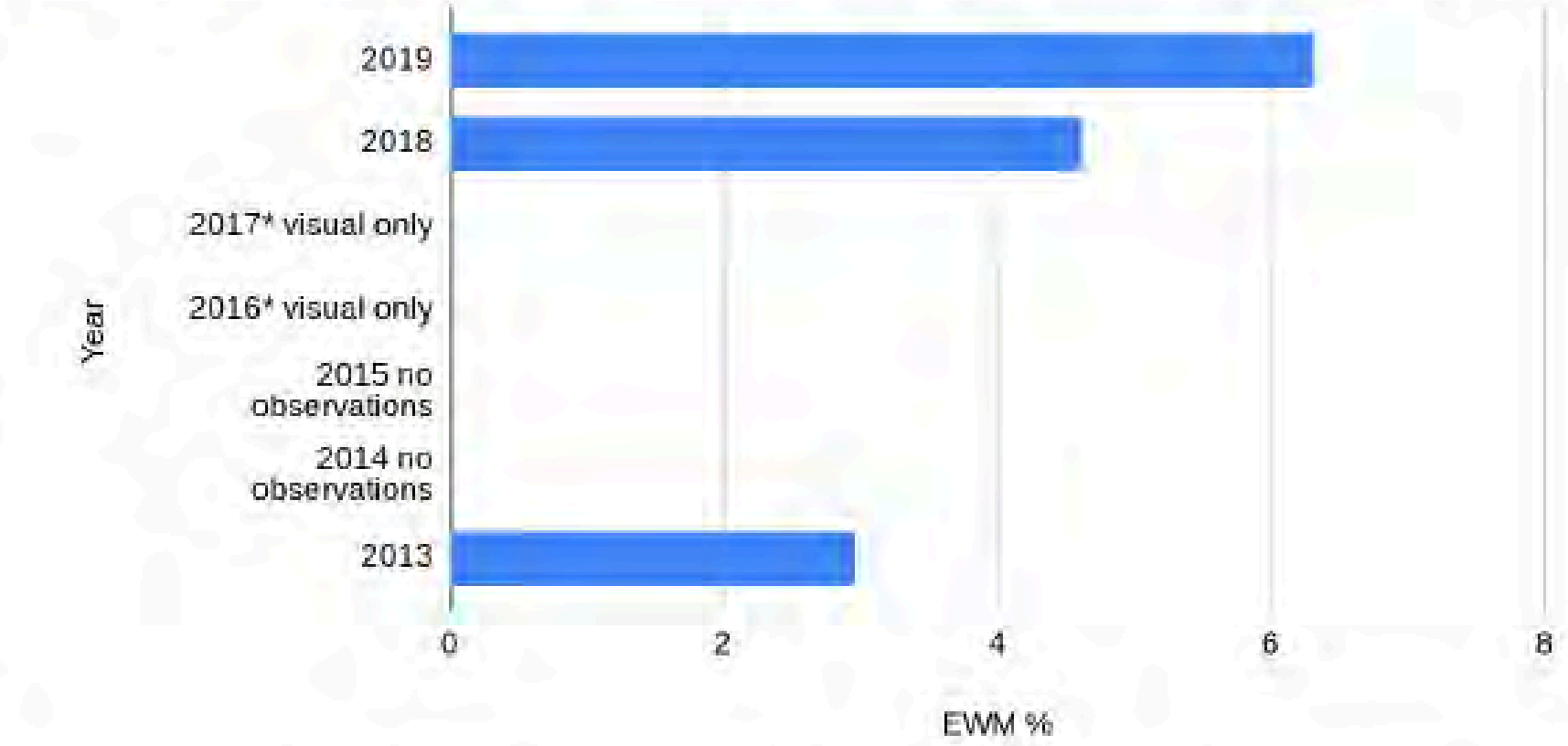
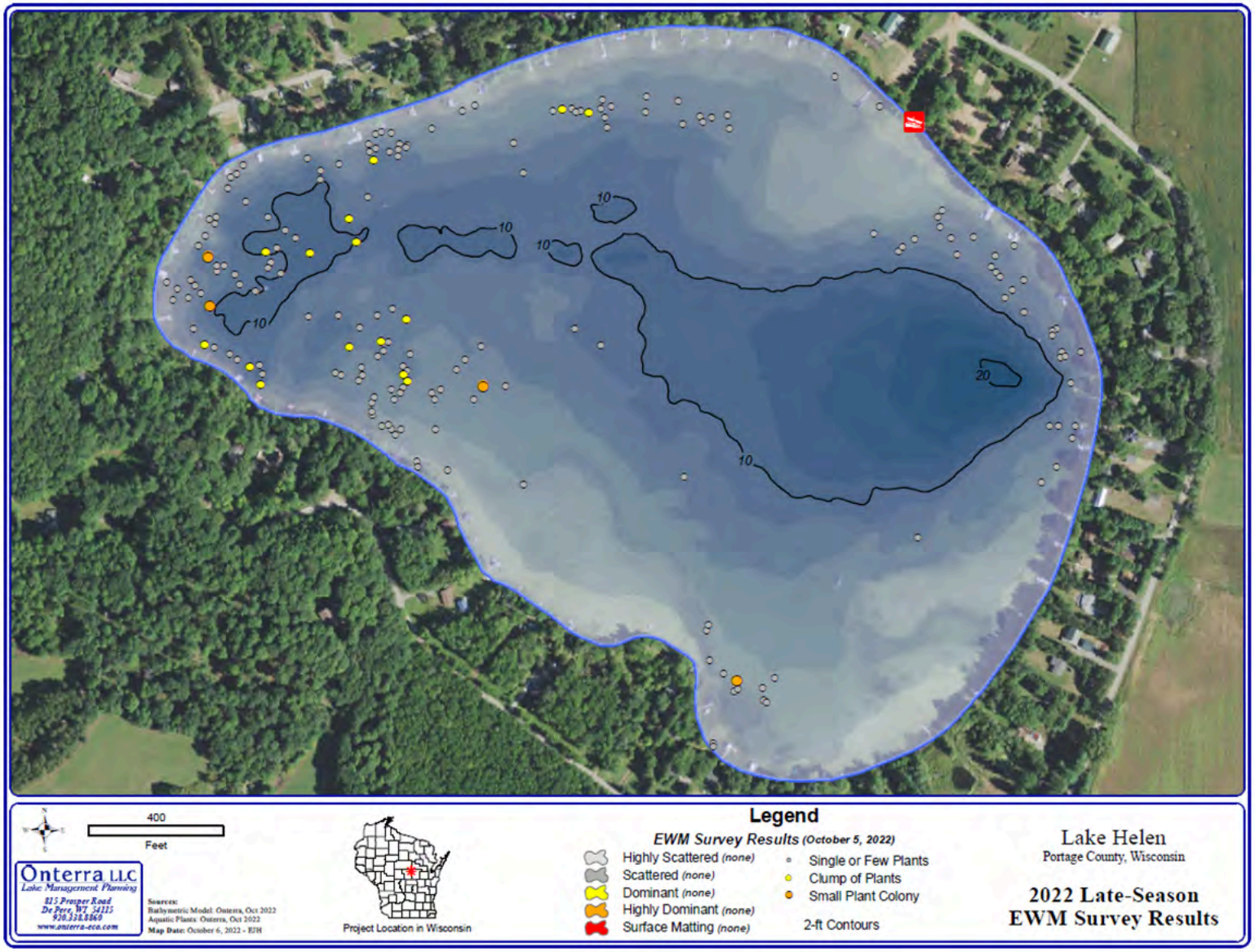


Figure 6. Comparison of EWM occurrence from 2013 - 2019. (Note: A whole lake chemical treatment for EWM was completed in May 2014.)

2022 EWM Late-Season Survey Results by Onterra, LLC

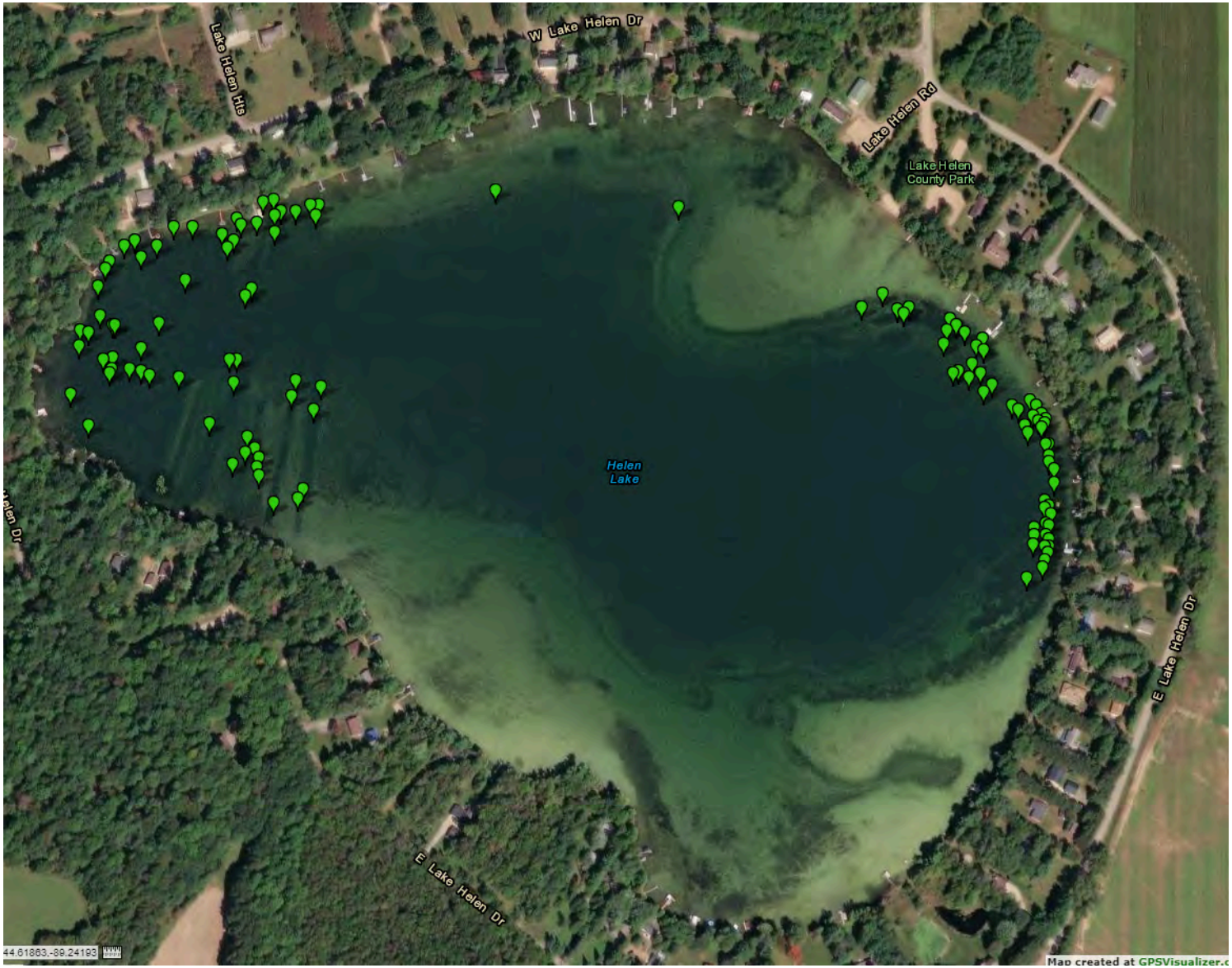


2022 & 2023 EWM Monitoring and Control Actions

Aquatic Plant Management from Minocqua was contracted to conduct two diver assisted suction harvesting (DASH) services. DASH removal events took place in June and October of 2022. WI DNR Surface Water- EWM Grant covered all costs. Volunteer labor and equipment donations are critical, $2,841 labor and $790 equipment in 2022. June of 2023 completed two days of DASH with Aquatic Plant Management. The total removed via DASH for the two days was 200.5 cubic feet. July 2023 completed four days of EWM Hand pulling and fragment pickup with local volunteers. On 7/15/23 & 7/16/23 the group removed about 30 - 5 gallon pails. On 7/22/23 & 7/23/23 the group removed about 20 - 5 gallon pails. On 8/23/23 Jim and Judy Ehlenbeck along with Glen Bersie did GPS lake mapping of weeds, they came up with 120 points based on what they could see due to water quality. Justin Ehlenbeck took the GPS points and created a map as shown below. On 8/13/23 the group removed about 14 - 5 gallon pails. On 8/30/23 Aquatic Plant Management LLC removed 93 cubic feet of EWM by dive pulling.

EWM Mapping from 8/23/23 (120 GPS Points)

Courtesy of: https://www.gpsvisualizer.com/



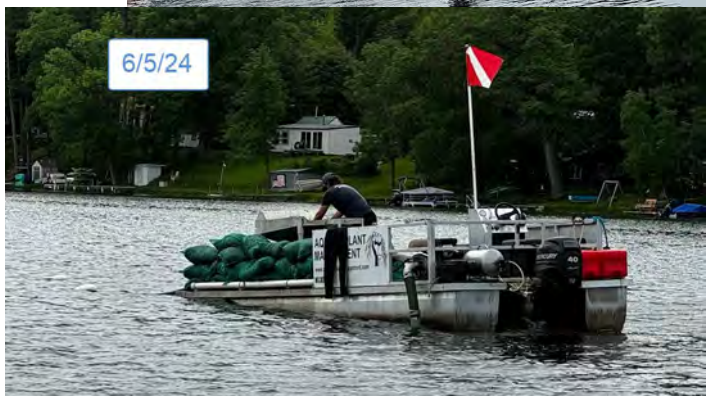
2024 EWM Monitoring and Control Actions

GPS Mapping: On 5/14/24 Jim and Judy Ehlenbeck along with Jeff Rasmussen and Justin Ehlenbeck did GPS lake mapping of weeds, they came up with 301 points based on what they could see due to water quality/wind. See next pages for these results.

Aquatic Plant Management from Minocqua: was contracted to conduct one day of diver assisted suction harvesting (DASH) services on Thursday, 5/30 with removing 36 bags. They also completed two days of DASH on Tuesday, 6/4 with removing 33 bags and Wednesday, 6/5 with removing 45 bags. The combined three days removed __ cubic feet of EWM.

APM Focus Areas: referencing the image on the following pages under the heading of **EWM Mapping from 5/14/24 (301 GPS Points)** the APM team helped target the following locations:

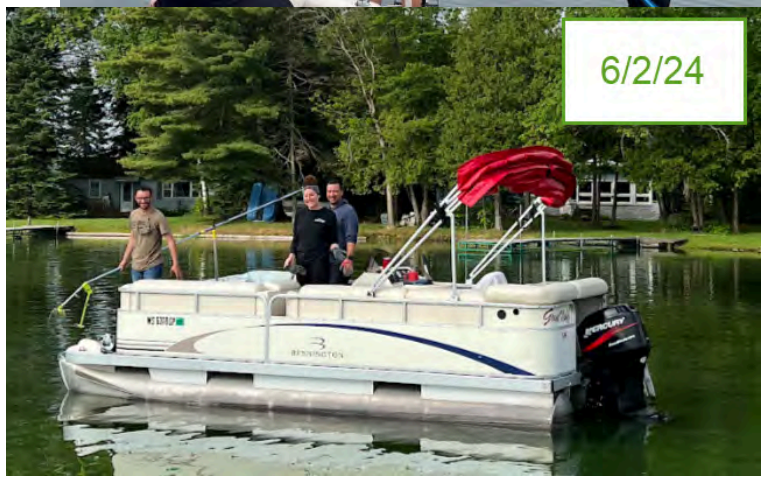
- On Thursday, 5/30 the APM team targeted the area in the red box
- On Tuesday, 6/4 the APM team targeted the area in the orange box
- On Wednesday, 6/5 the APM team targeted the area in the grey and purple boxes



2024 EWM Monitoring and Control Actions Continued…

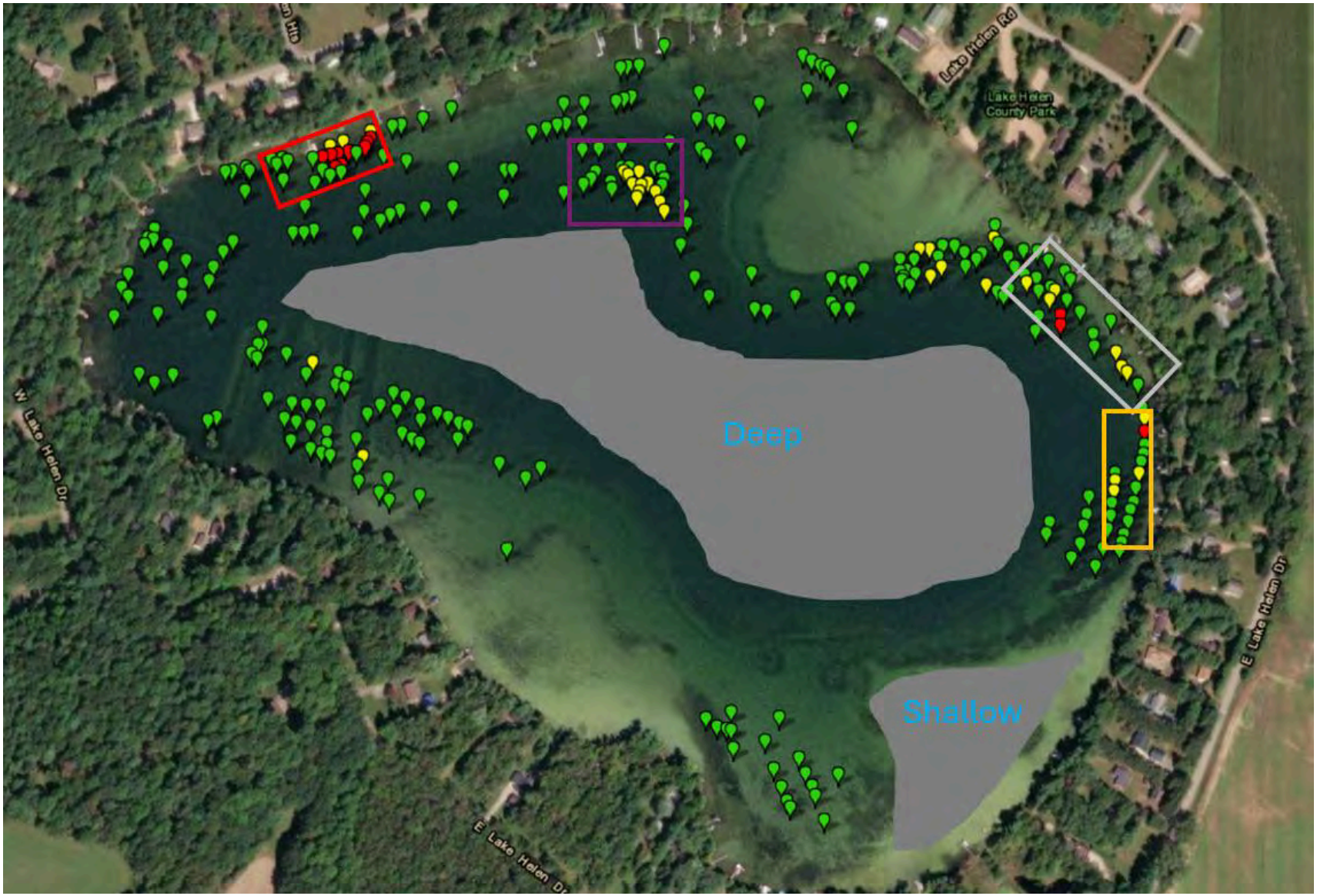
Volunteer labor and equipment donations: are critical to support removing EWM.

- On Sunday, 5/26 the group removed about 175 gallons of EWM, (filling all 7 - 20 gallon tubs and 7 - 5 gallon pails that were available).
- On Thursday, 5/30 the group removed 2 - 20 gallon tubs and 5 - 5 gallon pails from scooping fragments from APM.
- On Sunday, 6/2 the group removed 15 - 20 gallon tubs and 6 - 5 gallon pails
- On Tuesday, 6/4 the group removed 4 - 20 gallon tubs and 1 - 5 gallon pails from scooping fragments from APM.
- On Wednesday, 6/5 the group removed 2 - 20 gallon tubs from scooping fragments from APM.
- On Sunday, 6/9 the group removed 6 - 20 gallon tubs and 4 - 5 gallon pails



EWM Mapping from 5/14/24 (301 GPS Points)

Courtesy of: https://www.gpsvisualizer.com/



EWM Map Legend:

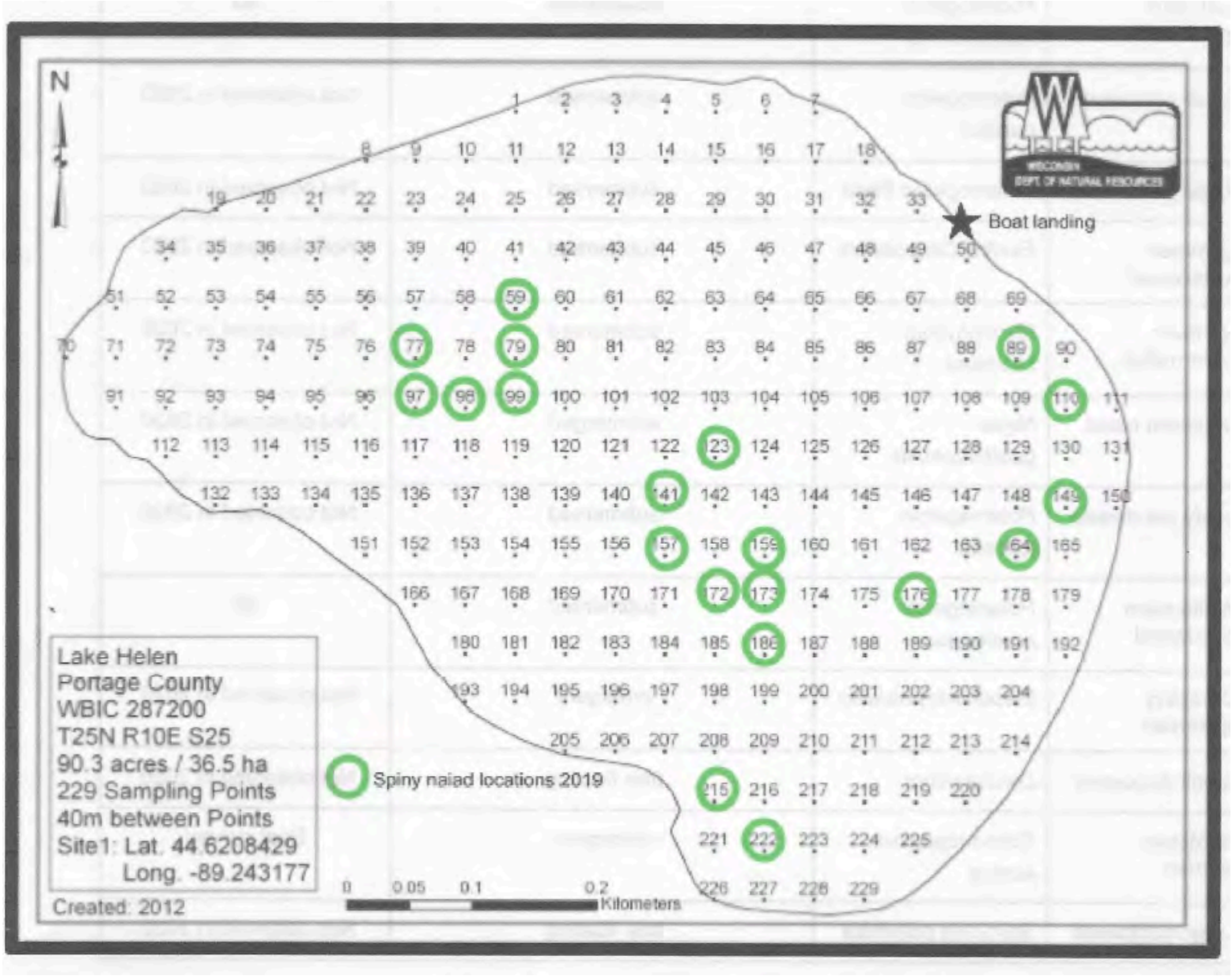
***Singles:** Independent or only a handful of plants (**green** points)

***Scattered:** Highly scattered plants in the colony (**yellow** points)

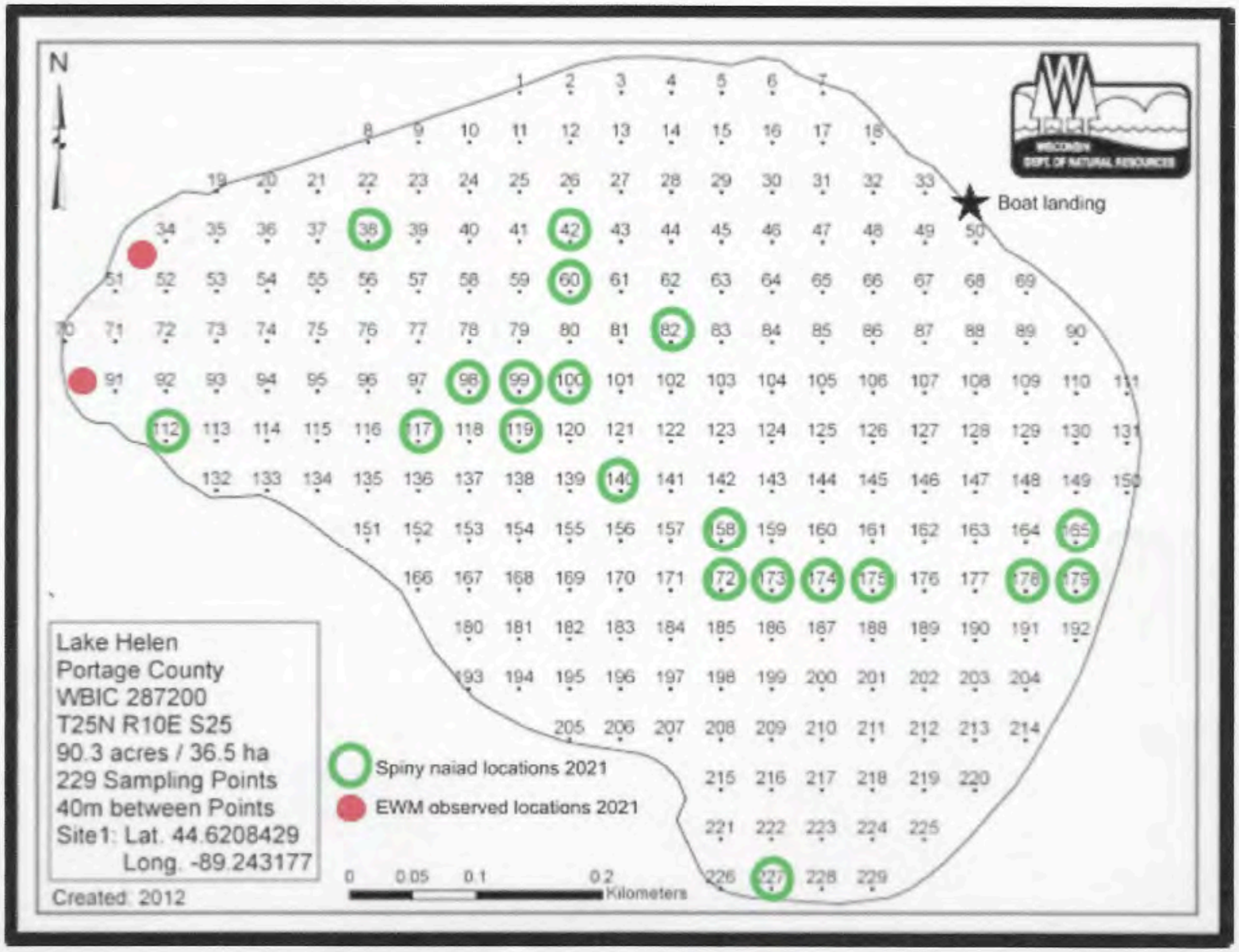
***Dense:** A dense colony of plants. More EWM than other native plants. (**red** points)

***Grey Areas:** not surveyed during the event

2019 Spiny Naiad sites. None observed in 2020.



2021 EWM observations and Spiny naiad sites.



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 Helen Protection and Rehabilitation District
Contact: Bill Pingel (or current President)
Address: 3137 W Lake Helen Dr
Email: bcpingel@gmail.com

Town of Alban
Contact: Ray Oksuita (or current Town Chair)
Phone: 715-581-7208

EWM/HWM Management Options for Lake Helen

Changes may occur within the pond that change how the pond responds to control attempts for EWM/HWM. It is essential that management methods be carefully evaluated on an annual basis before implementation. Since multiple approaches and adaptive year-to-year changes in approach/strategy are most successful, the population of EWM/HWM should be evaluated using a 'point-intercept' method, which includes a visual survey of the littoral zone before and after treatment to determine the effectiveness of a strategy in a given year. Strategies for the subsequent year should be adjusted accordingly. EWM/HWM management involves evolving scientific knowledge; therefore, the management strategies for the management of EWM/HWM in Lake Helen should be adapted as EWM/HWM populations in the lake change and as new information becomes available.

Management options will change depending upon the amount and location of EWM/HWM in Lake Helen; therefore, annual monitoring of these species is essential. The presence of EWM/HWM and other AIS will also define the type of aquatic plant management that can be conducted to address recreational impediments. The following EWM/HWM management strategies have been determined to be the most practical and effective options that would minimize impacts to Lake Helen as a whole:

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 can be done by individual waterfront property owners who have been trained in removal techniques intended to be successful in removal while minimizing fragmentation of the plant. Volunteers who have learned proper techniques in identifying and removing EWM/HWM and other AIS can remove plants by hand-pulling at any time, without a permit. This technique can be employed following a chemical treatment to remove individual plants.

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	

Divers trained in proper EWM removal techniques can be hired to manually remove AIS in deeper parts of the pond. If populations are low enough, this is the recommended option for controlling EWM/HWM at depths too great for hand-removal without additional gear**.** Hand removal of EWM/HWM may stir up bottom sediments, which can greatly reduce visibility. In this case, divers should use suction techniques to minimize sediment disturbance. Grants may be available to support manual-removal efforts. This technique can be employed following a chemical treatment to remove individual plants. To improve grant competition, LHPRD members could work with other area lake groups to jointly apply for a grant.

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

All chemical treatments in Lake Helen will require a permit from the WNDR. See the Portage County Lake Information Directory (appendices) for contact information. Visit the WDNR website for permit requirements and guidance: http://dnr.wi.gov/topic/wastewater/aquaticpesticides.html. Follow WDNR guidelines for informing lake users of the use of chemicals in the lake, which includes providing documentation about the chemical to all shoreland property owners.

Often multiple approaches and adaptive year-to-year changes in approach are most successful. Strategies for the subsequent year should be adjusted accordingly. EWM/HWM management involves evolving scientific knowledge; therefore, management strategies for EWM in Lake Helen should be adapted as EWM populations in the lake change and as new information becomes available.

Hybrid watermilfoil (HWM) results from a hybridization of native watermilfoil with EWM. HWM is present in Lake Helen. There is evidence suggesting HWM can be more tolerant of certain herbicides such as 2,4-D products. If the plants are not responsive to chemical treatments, a *challenge test* should be conducted to Lake Helen. A lab will then grow them in a controlled setting where different combinations of herbicides are applied at differing rates to evaluate their effectiveness. There are many combinations of herbicides and concentrations that can potentially be used to treat HWM. The only way to know the appropriate combination is by sending samples to be challenge tested. Treating HWM without knowing the appropriate combination of

chemicals can create an even more resilient strain in the lake, damage the native aquatic plant population, and waste money.

Although the chemicals used are approved for use in aquatic environments by the US Environmental Protection Agency (EPA) and WDNR, the full impacts to the aquatic ecosystem are still unknown (WDNR, 2012). For more information, see the "Aquatic Plant Management Strategies'' section and Large-Scale Treatment Research in Wisconsin (appendices). The appropriate herbicide, concentration, and contact time should be determined using the most up-to-date determinations.

Chemical Spot Treatment with Contact Herbicide (Early Season) – Permit required

Action: A *point-intercept* (P.I.) survey is required before and after large scale (greater than 10 acres) chemical treatments. The decision-making group should review the results in fall/winter to determine if chemical treatment is warranted in the upcoming year.

Treatment should occur early in the season, prior to emergence of native plants. In Lake Helen, a chemical spot treatment should be conducted using Reward (diquat bromide) or ProcellaCOR applied at rates to achieve concentrations of 0.37 ppm**.** If the *challenge test* for the HWM in Lake Helen suggests that a different suite of chemicals would be more effective to treat the HWM, adjustments should be made to this plan.

Following a chemical treatment, monitoring for the target species must be conducted during that summer at least 30 days after the treatment, and the results of its effectiveness on the target and non-target species should be documented and provided to the WDNR.

Mechanical Harvesting-Permit required	
ADVANTAGES	LIMITATIONS
Removes plant material and nutrients	Will spread EWM/HWM
Can target specific locations	Not used in water depths less than 3 feet
	Some harm to aquatic organisms

EWM/HWM beds should be avoided by the harvester. Harvesting beds of EWM/HWM can only be conducted if the following circumstances exist and the WDNR Water Quality Specialist signs off: 1) if the EWM/HWM has become the dominant species and biodiversity is diminished. See the harvesting maps and the Harvesting in Lake Helen section earlier in this plan for additional details.

Milfoil Weevils - EWM - *(Note: Not viable if chemical treatment options are being pursued.)*	
ADVANTAGES	LIMITATIONS
Natural, native maintenance of native and exotic milfoils	Require healthy shoreline habitat for overwintering
Prefers the aquatic invasive Eurasian Watermilfoil	Cannot survive in areas of mechanical harvesting or herbicide application
Some lakes may already have a native populations.	Effectiveness highly variable between lakes (works well for some lakes)
Doesn't harm lake ecosystem	Limited access to weevils for purchase in WI
	Still considered experimental
	Requires unmowed/natural shorelines for weevil habitat
	Too many panfish may prevent weevil population growth

This option can be considered in areas of the lake with native or restored shorelines. Potential effectiveness in the desired areas of Lake Helen should be determined with a professional population estimate and assessment of shoreland health, abundance of predatory fish, etc. Milfoil weevils are expensive; therefore, obtaining a starter population and rearing them in predator-free conditions may be desirable from a financial standpoint. Professional assistance from consultants or Golden Sands RC&D staff should be sought if stocking or rearing is pursued. It is unknown if native milfoil weevil populations are present in Lake Helen.

No Action (Note: This option is not recommended in Lake Helen at this time.)	
ADVANTAGES	LIMITATIONS
No associated cost	May not be effective in obtaining aquatic plant management objectives
Least disruptive to lake ecosystem	

No action over time can be an option in Lake Helen, particularly to evaluate how the EWM/HWM in Lake Helen responds without management. In some cases, EWM has been observed to establish itself as a population that remains small and becomes a component of the ecosystem. If this option is chosen, routine monitoring should take place to ensure that EWM does not reach nuisance levels.

Goal 3

Maintain the diversity and quality of native aquatic plants through the sustainable management of aquatic plants for fish and wildlife habitat and to protect water quality. This goal will be achieved when aquatic plant surveys indicate that the 2-5 foot zone of the lake is at least 80% vegetated for two consecutive surveys.

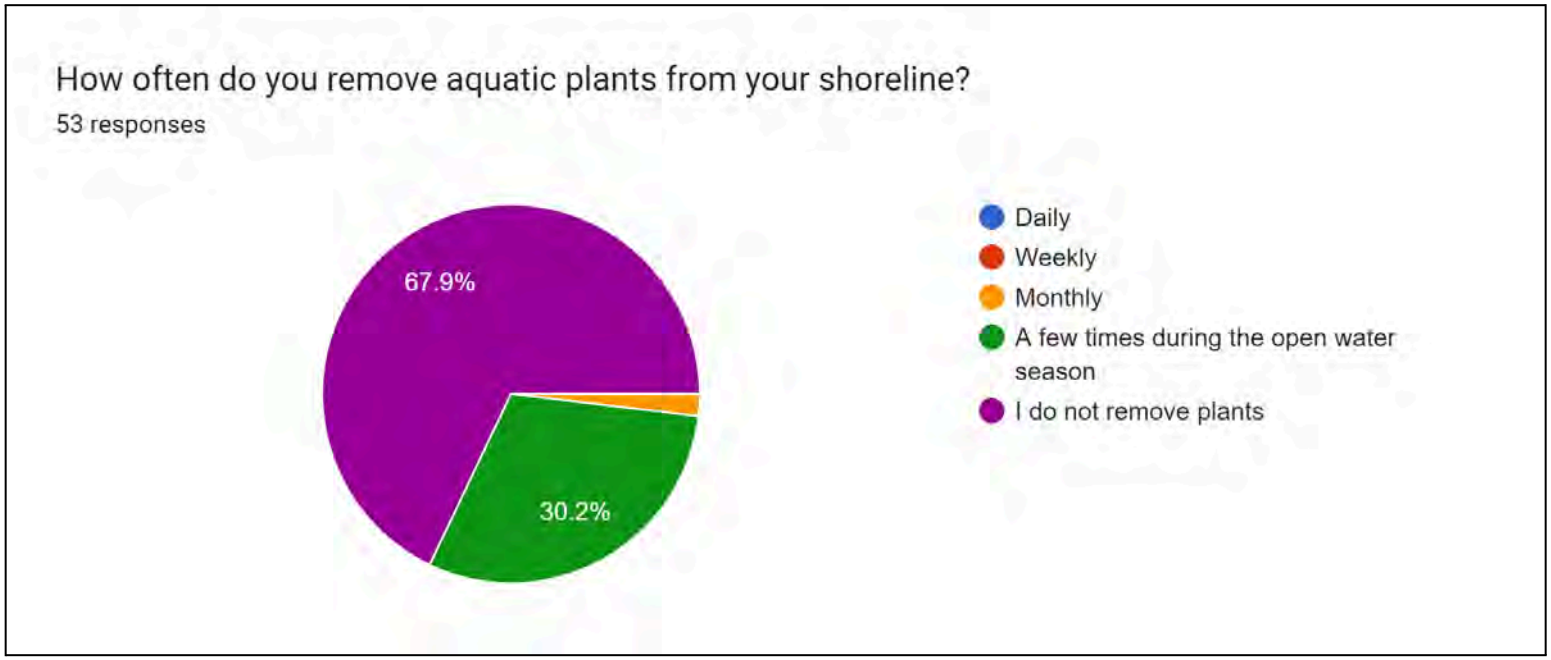
Objective 3.1: Minimize disturbed areas of native aquatic vegetation.

Actions	Lead person/group	Start Date	End Date	Resources
Conduct a plant survey of Lake Helen a minimum of every five years per WI DNR recommendation.	Lake District Commission Golden Sands RC&D	2013	Next survey due 2027	WI DNR UWSP Center for Watershed Science and Education (CWSE) Portage County Land Water Conservation Department Golden Sands RC&D
Continue to provide information about the value of native aquatic plants and the consequences of removing native plant communities.	Lake District Commission	2017	Ongoing	Extension Lakes Portage County Land Water Conservation Department
Host speakers on aquatic plants	Lake District Commission Golden Sands RC&D	2017	Ongoing	WI DNR Portage County Land Water Conservation Department Golden Sands RC&D
Learn to distinguish between native and invasive aquatic plant species	Lake District Commission/Residents	2019	Ongoing	Portage County Land Water Conservation Department Golden Sands RC&D Extension Lakes

Objective 3.1 Notes/History:

- See the APM plan page 13 and pages 26-32 for PI survey maps and dates
- PI survey conducted by Golden Sands 2019, 2020, 2021
- Training conducted in June 2021 by Golden Sands.
- Training conducted in June 2022 by Portage County Land and Water Conservation Dept.

Results from the 2023 Lake Helen Resident Survey

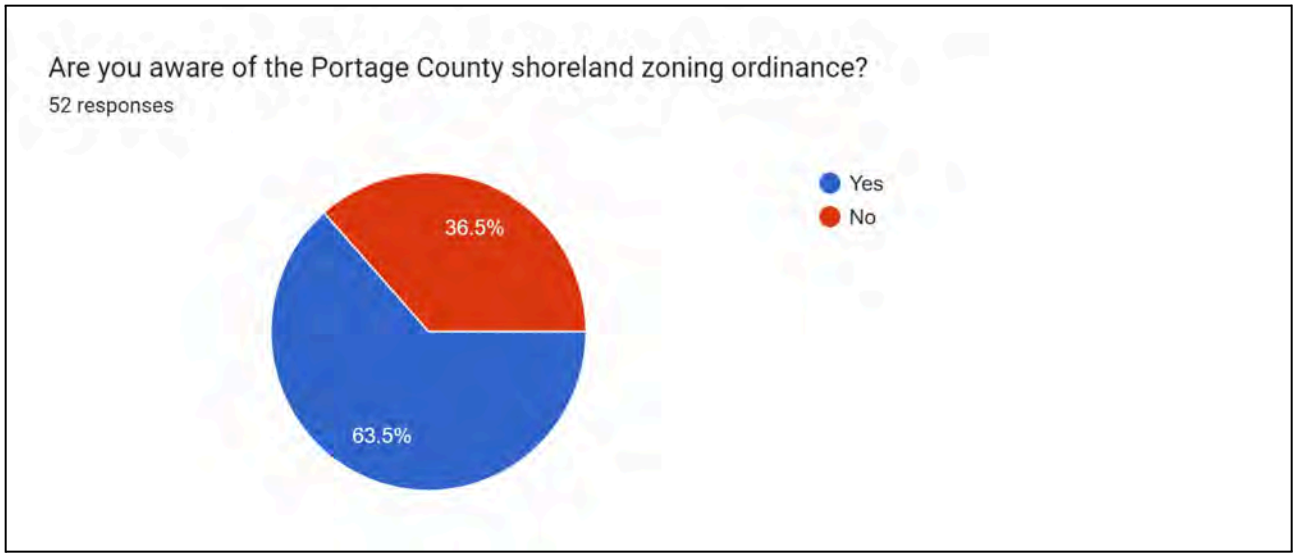


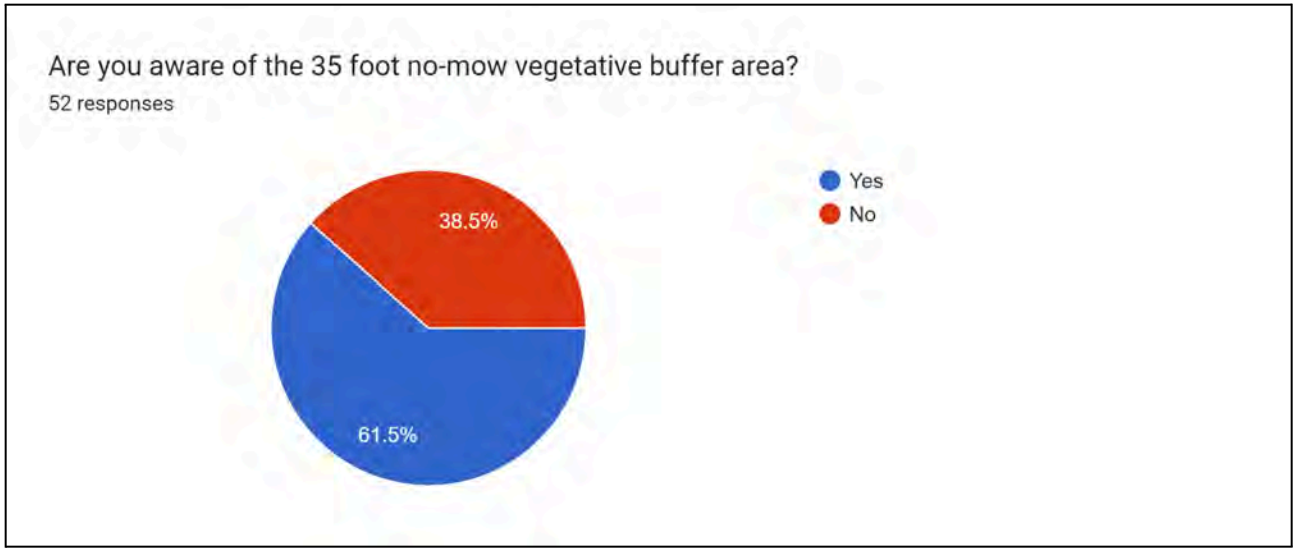
Landscapes and the Lake

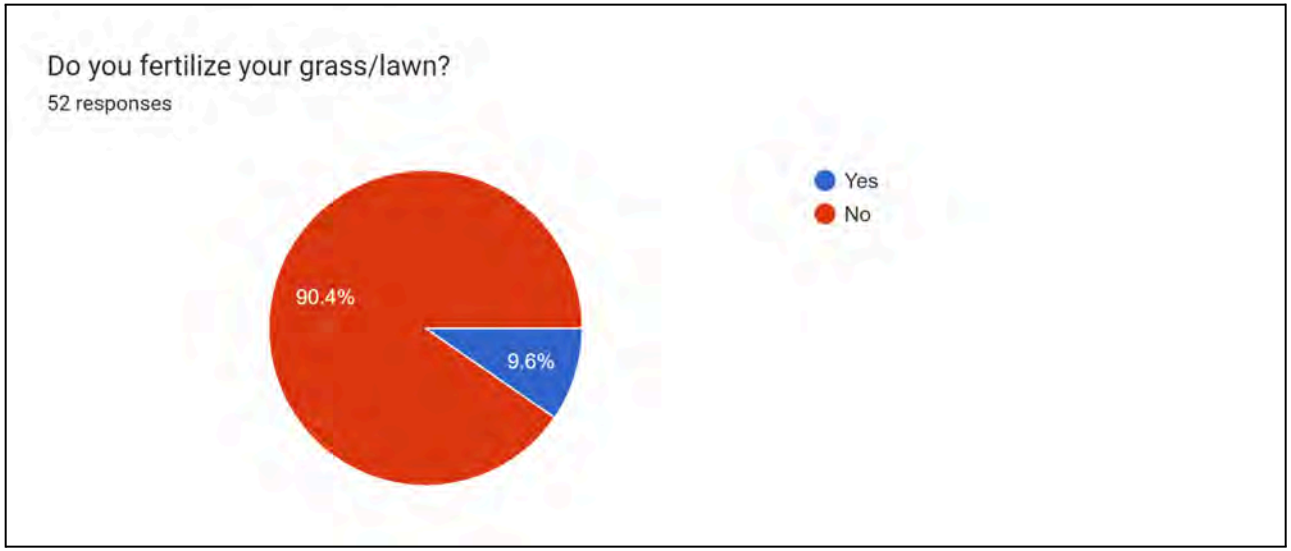
Land use and land management practices within a lake's watershed can affect both its water quantity and quality. While forests, grasslands, and wetlands allow a fair amount of precipitation to soak into the ground, resulting in more groundwater and good water quality, other types of land uses may result 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.

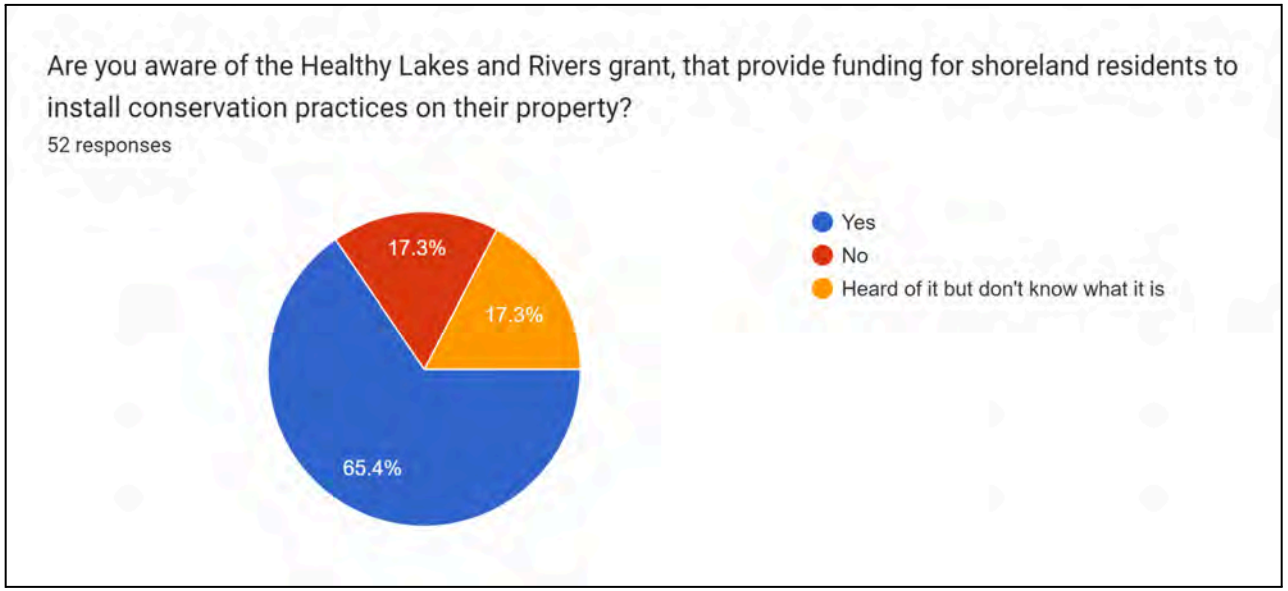
Shoreland vegetation is critical to a healthy lake's ecosystem. It helps improve the quality of the runoff that is flowing across the landscape towards Lake Helen. It also provides habitat for many aquatic and terrestrial animals including birds, frogs, turtles, and many small and large mammals. Healthy 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 Helen 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 Helen 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. A summary of these results can be found in the Background Information (from 2002-2003 study) section.


Are you aware of the Portage County shoreland zoning ordinance?
52 responses
Yes
No
36.5%
63.5%


Are you aware of the 35 foot no-mow vegetative buffer area?
52 responses
Yes
No
38.5%
61.5%


Do you fertilize your grass/lawn?
52 responses
Yes
No
90.4%
9.6%


Are you aware of the Healthy Lakes and Rivers grant, that provide funding for shoreland residents to install conservation practices on their property?
52 responses
Yes
No
Heard of it but don't know what it is
17.3%
17.3%
65.4%

Water Quality and Land Use

A variety of water chemistry measurements were used to characterize the water quality in Lake Helen. 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 Helen's water quality.

Lake Helen is host to a variety of plants, insects, fish, amphibians, and a variety of other animals that all depend on good water quality in the lake. Planning participants and survey respondents indicated water quality influenced their enjoyment of the pond and impacted their perceived aesthetic value. The results from the Portage County Lakes Study indicated Lake Helen has fair water quality that could use some improvement. At that time, the lake had periodically high concentrations of phosphorus during parts of the year, and nitrogen at concentrations that could fuel excessive plant and algae growth. Nutrients (phosphorus and nitrogen) are used by algae and aquatic plants for growth, much like houseplants and 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.

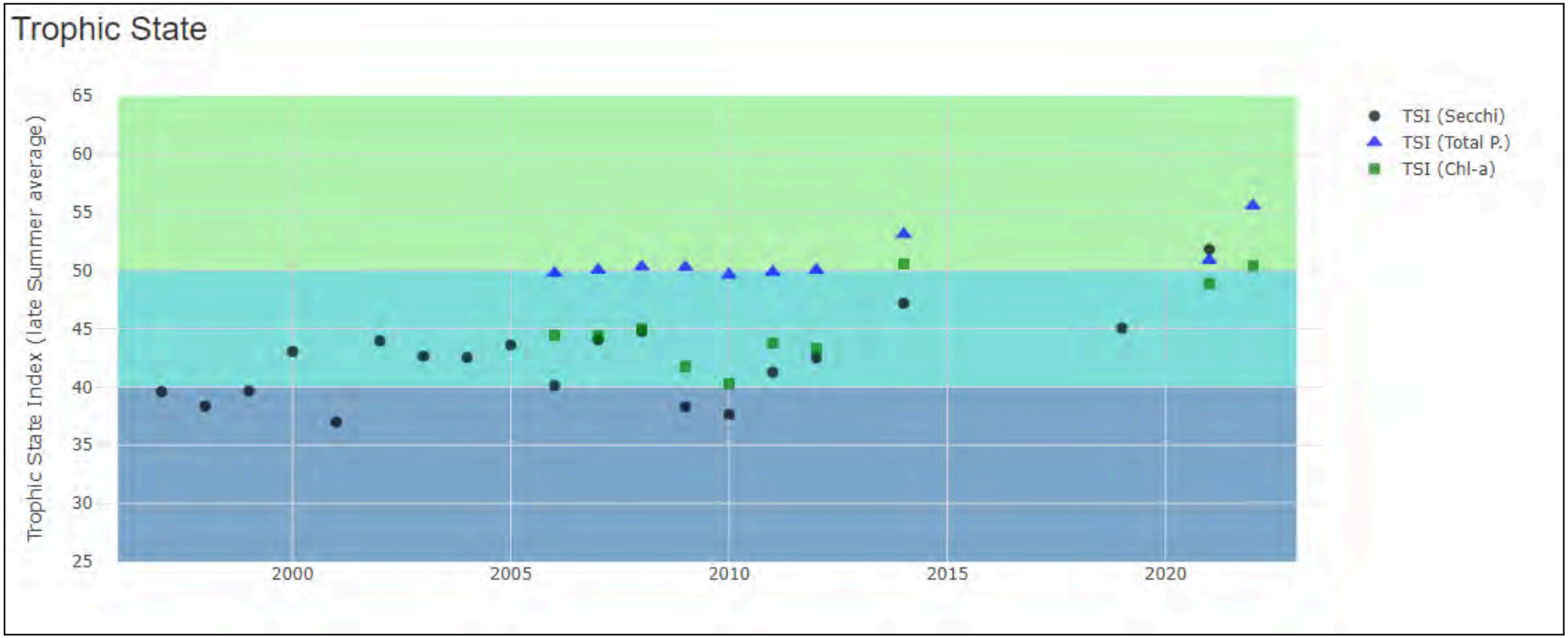
The most common mechanism for the transport of phosphorus from the land to the water is through surface runoff, but it can also travel to the lake in groundwater. Once in a lake, a portion of the phosphorus becomes part of the aquatic system in the forms of plant tissue, animal tissue and sediment. The phosphorus continues to cycle within the lake for many years.

Phosphorus standards in Wisconsin vary by lake type. For shallow impoundments like Lake Helen, median total phosphorus concentrations during the summer should be less than 40 ug/L. Above this concentration, changes to the aquatic ecosystem, including an increase in plant and algal growth and changes to the fish community, are likely to occur.

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, chlorophyll-*a* concentrations greater than 10 µg/L result in a moderate increase in risk to health due to the increased growth of blue-green algae. Concentrations of chlorophyll-*a* measured in samples collected from Lake Helen showed little year-to-year variability in recent years. This algal growth is fueled by the phosphorus and nitrogen in the lake water.

The residents and users of Lake Helen desire to have clean water to use and enjoy for generations to come. Survey respondents felt that the overall water quality in Lake Helen was good. Data shows that water quality has improved since the 1970's but additional improvement would make conditions in the lake more resilient. Protecting and improving water quality will be done through reducing stormwater runoff which in turn reduces sediment and phosphorus inputs to and in the lake. Reducing phosphorus will reduce the frequency of algae blooms and improve water clarity.

2023 Updates: Lake Helen 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)

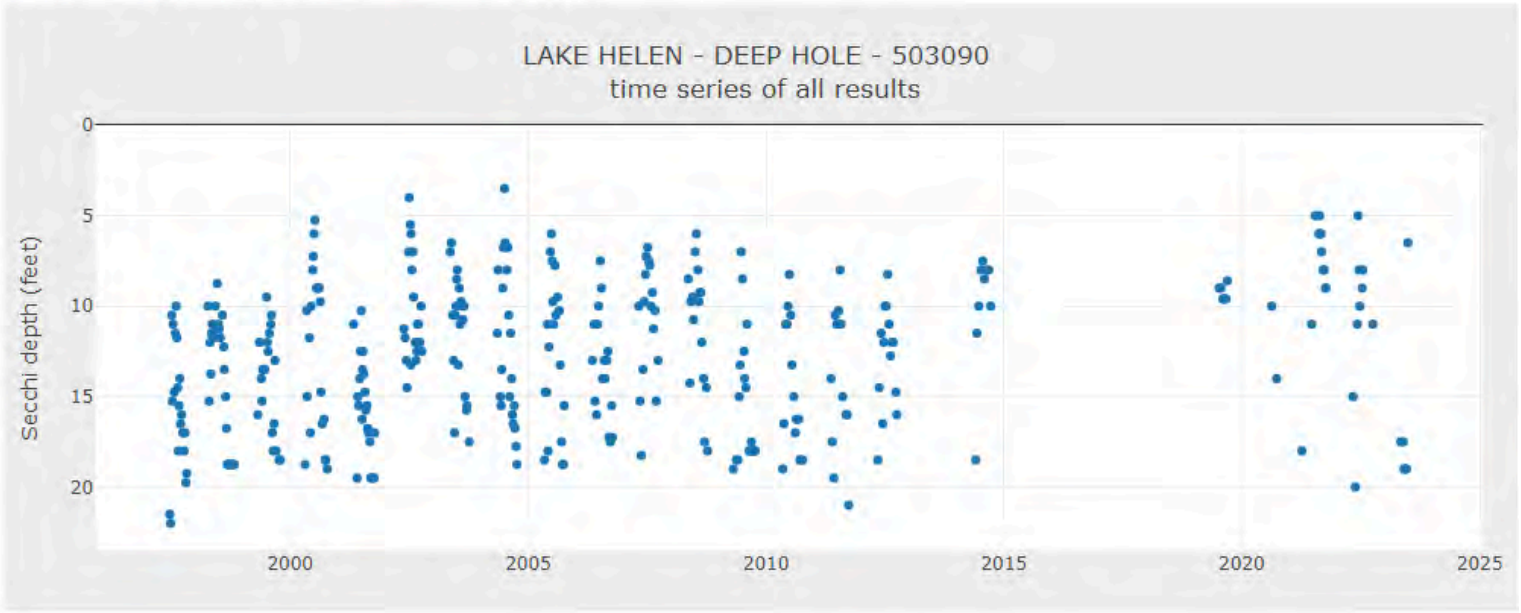
Secchi depth, total phosphorus (TP) and chlorophyll-α (chl-a) are all measures of a lake's trophic state, or the amount of nutrients available. We can convert results from each of these parameters into a trophic state index value, similar to how we might convert measures of temperature to Celsius or 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.

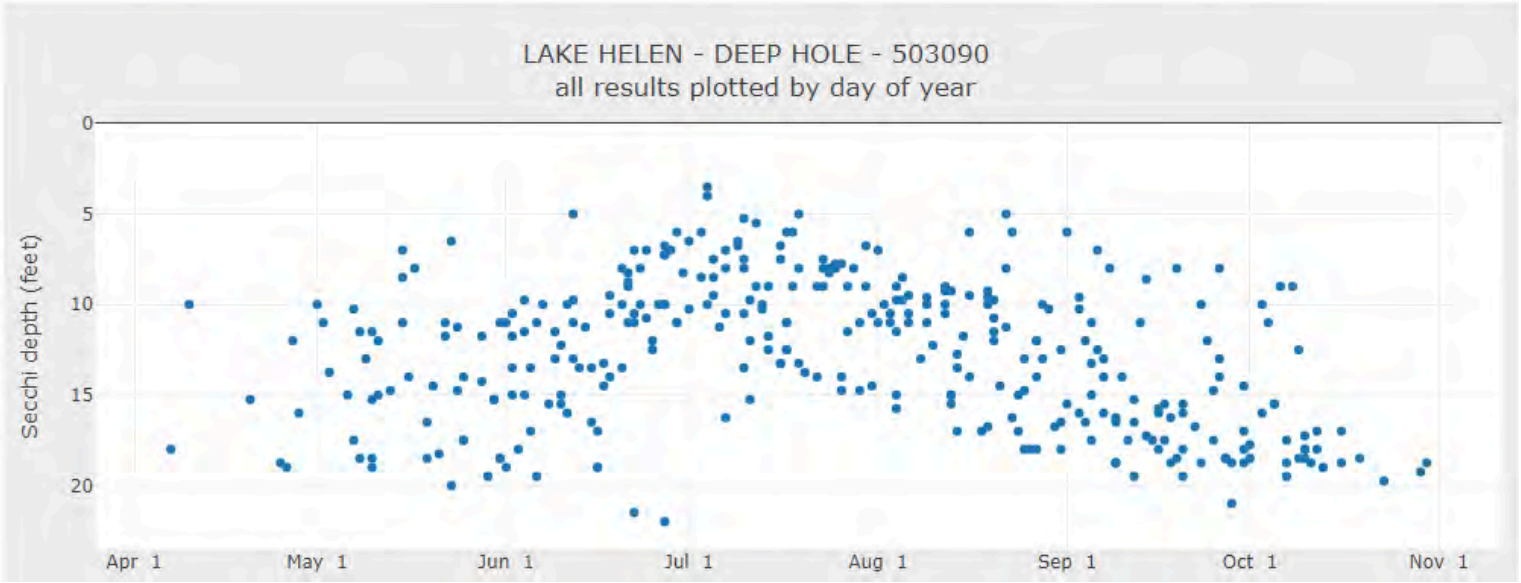
TSI	TSI Description
TSI < 30	Classical oligotrophy: clear water, many algal species, oxygen throughout the year in bottom water, cold water, oxygen-sensitive fish species in deep lakes. Excellent water quality.
TSI 30-40	Deeper lakes still oligotrophic, but bottom water of some shallower lakes will become 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

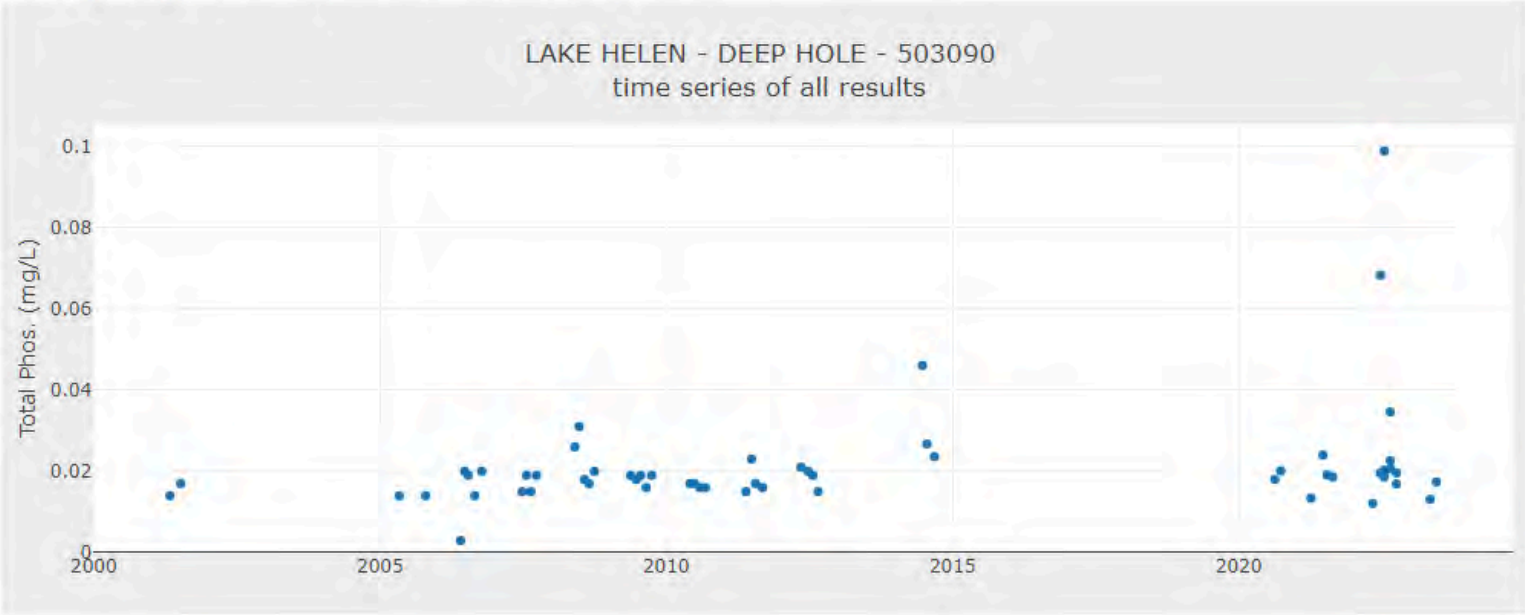
A Secchi disk is an 8-inch (20 cm) disk with alternating black and white quadrants. It is lowered into the water of a lake until it can no longer be seen by the observer. This depth of disappearance, called the Secchi depth, is a measure of the transparency of the water.

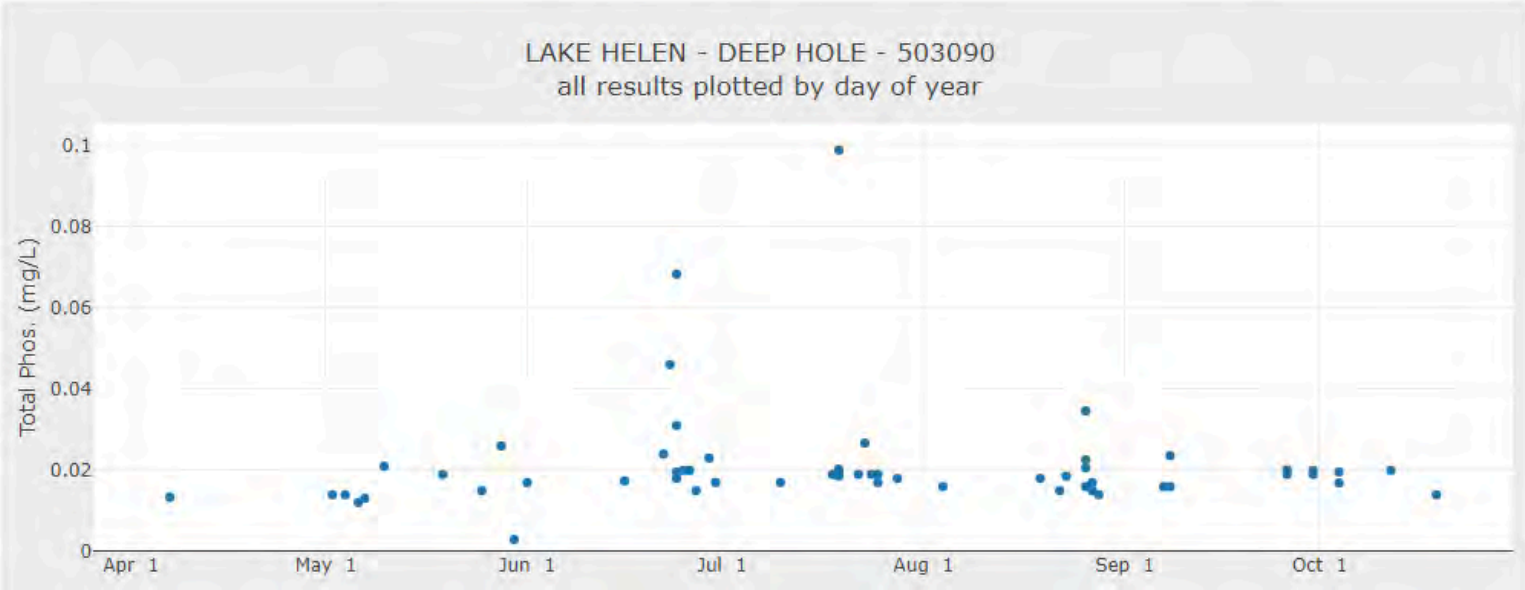
Secchi depth by date and time of year



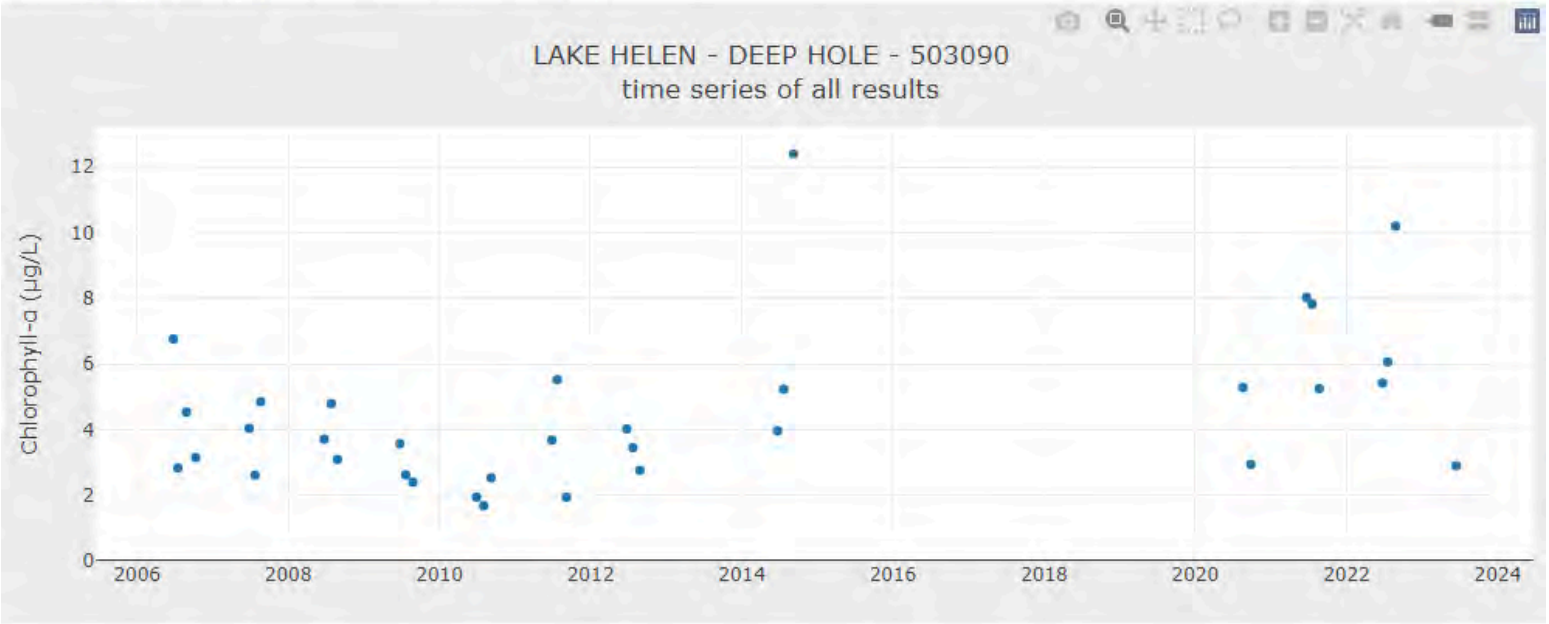


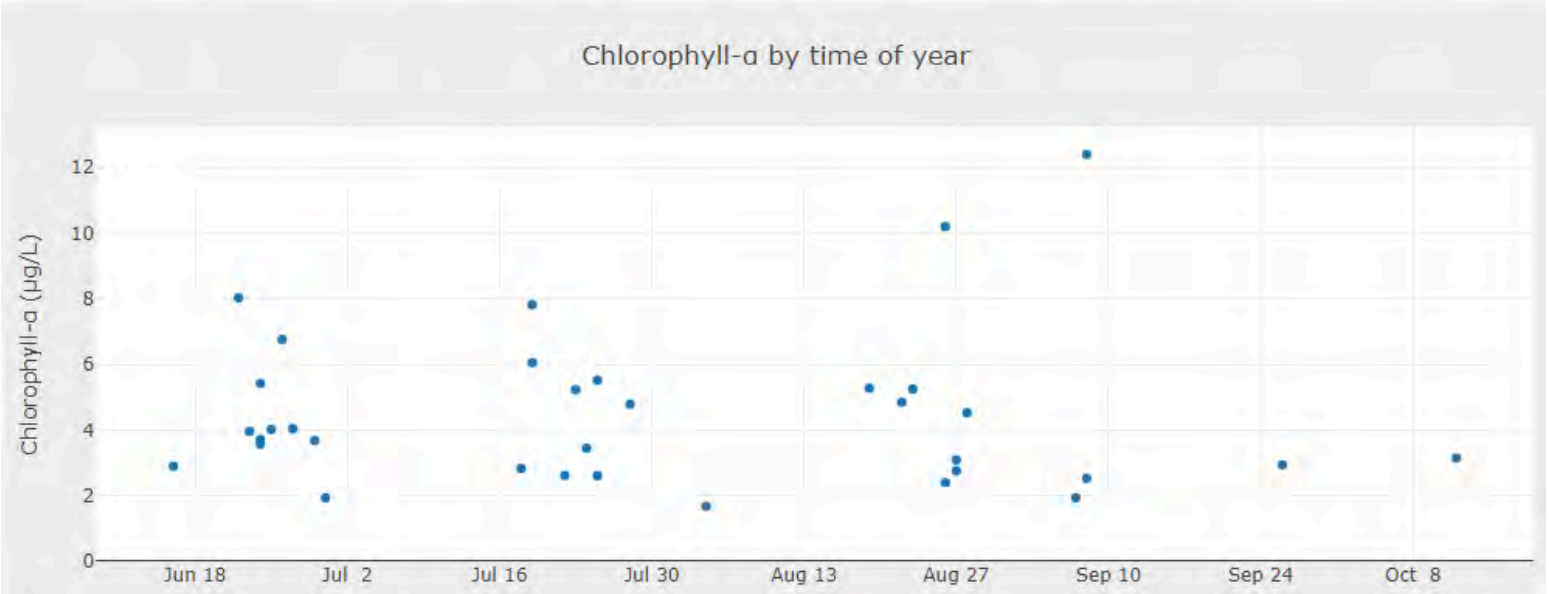
Total phosphorus by date and time of year





Chlorophyll-α by date and time of year





Blue Green Algae Blooms

When Blue Green Algae (BGA) bloomed in 2021 we began water quality testing to determine nutrient levels feeding the algae. We took a sample out of the standing water in the wetland complex to the north, which had never been tested previously. This wetland complex is connected to lake Helen from a non-natural ditch and culvert. The results indicated extremely high levels of P and N from this area. Scott Provost went back to the earlies lake survey, circa 1890's which indicated that there was no natural connection between the lake and the wetlands which means that at some point in time, someone dug their own ditch connecting the wetlands to the lake which has allowed the nutrient rich water to bleed into the lake for many years. It was suggested that we meet with the town of Alban to discuss a plan to stop this connection. February 2022 members of the Lake Helen Protection and Rehabilitation District met with members of the Town of Alban board to discuss. The decision was made and agreed upon by all parties to temporarily plug the culvert and work toward a permanent solution. The temporary plugs were put in place shortly after the spring thaw and continuously monitored throughout the year. A flowgate was ordered from WI Flowgate & Drainage to be the permanent solution. This would allow the lake district and town of Alban to determine the max allowable water level on the wetland side and set up the gate accordingly. If the water level rises above the setpoint, where it could potentially damage the roadway, it would flow over the gate to alleviate the concern. The flowgate was installed in September of 2022. To date the flowgate has been successfully holding back the flow of all water from the wetland complex and the water never reached the spillover point. The continuing DNR water quality monitoring has shown a consistent reduction in N and P in Lake Helen.

Contributing factors of blooms include nutrient introduction (phosphorus and nitrogen), polymictic nature of Lake Helen, and zebra mussel colonized lakes have up to 3 times more Blue Green Algae blooms. Lake Helen's Blue Green Algae blooms started in June 2021, returned in May 2022 and June of 2023.

Goal 4

Reduce phosphorus loading from residential areas and the watershed to reduce the frequency of algae blooms (to fewer than 25% of growing season days with chlorophyll a concentrations greater than 10 ug/L). This goal will be achieved when monitoring indicates that median summer (5 samples/summer) total phosphorus levels are 17 ug/L for 3 consecutive years.

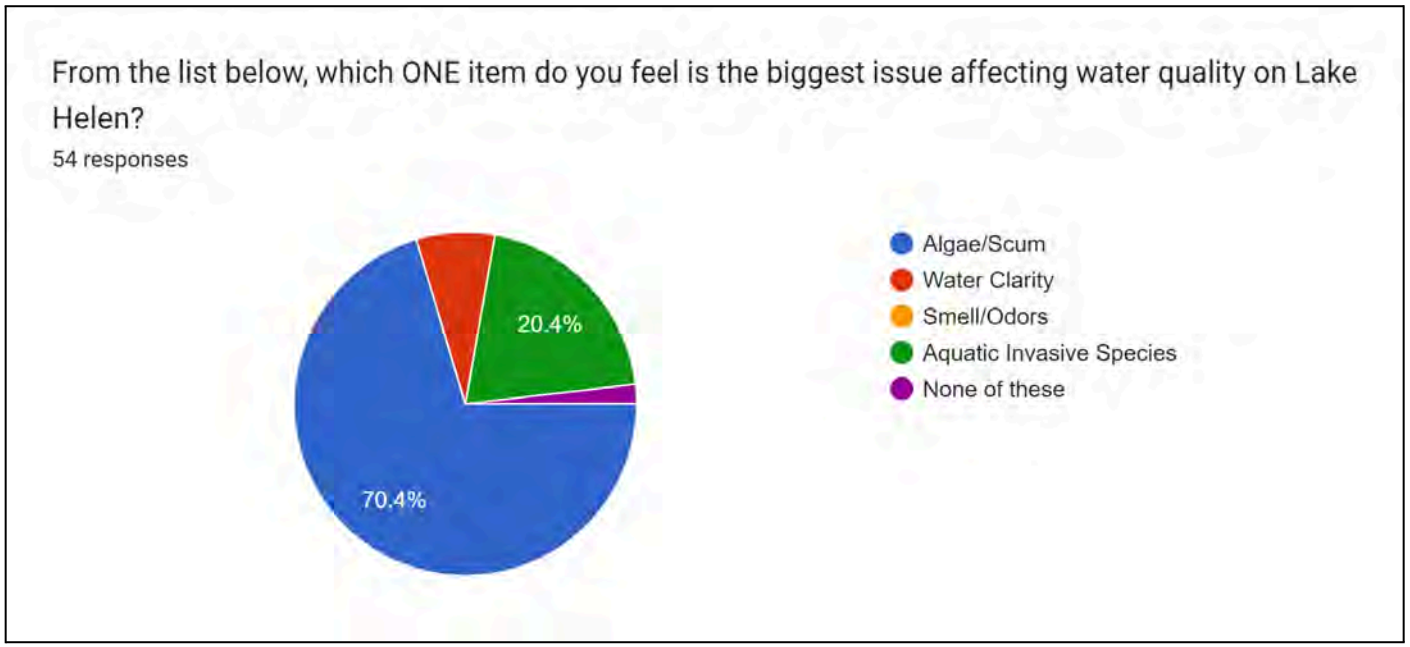
Objective 4.1: Reduce average summer total phosphorus to 17 ug/L. This will be accomplished by reducing annual phosphorus loading to Lake Helen by 24 lbs; from an annual total of 121 lbs to 97 lbs.

Actions	Lead person/group	Start dates	End Date	Resources
Citizens Lake Monitoring Network, test, and monitor water quality in Lake Helen deep hole as a part of this WI DNR statewide network. Test and monitor water quality in Lake Helen 4 times per year.	Lake District Commission/Residents	1995	Ongoing	DNR CLMN Coordinator Extension Lakes Portage County Land Water Conservation Department
Test and monitor water in culverts and ditches that enter the lake during spring runoff. If results are high, then consider treatment options.	Lake District Commission/Residents	2021	Culvert plugged in 2022	UWSP Center for Watershed Science and Education (CWSE) WI DNR
Review the results of water quality data and the informational brochure “Understanding Lake Data” with citizens through the use of the website.	Lake District Commission	2023	Ongoing	Extension Lakes UWSP Center for Watershed Science and Education
Per WI DNR recommendation, run 2 aerators from April through September, in order to keep the lake profile mixed to reduce cyanobacteria blooms. 1 aerator in the deep hole and one in the northwest bay.	Lake District Commission	2021	Ongoing	WI DNR

Goal 4 Notes/History:

- Added Understanding Lake Data brochure and water quality data to the website in 2011
- Started monitoring culverts in 2021, per the Lake Helen Protection Rehabilitation District December 6, 2021 minutes, “The North side culvert sample was shown to have very high nitrogen & phosphorus levels”. Temporary plugged both culverts in 2021, in 2022 blocked main culvert and blocked all inflow into the Lake.
- Sept 2022 - a letter was sent to all property owners concerning the BGA issue. The letter included information about what the property owners could do to reduce the problem including shoreline requirements and information about the Healthy Lakes program.

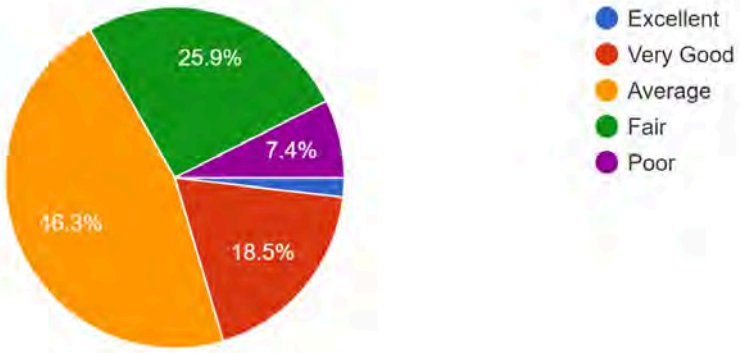
Results from the 2023 Lake Helen Resident Survey



Results from the 2023 Lake Helen Resident Survey

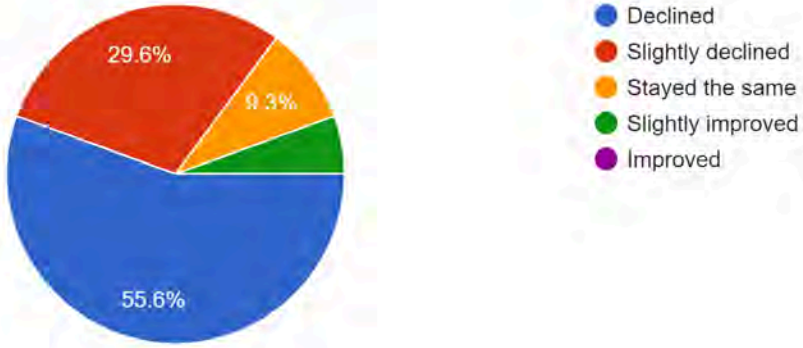
How would you rate the water quality in Lake Helen currently?

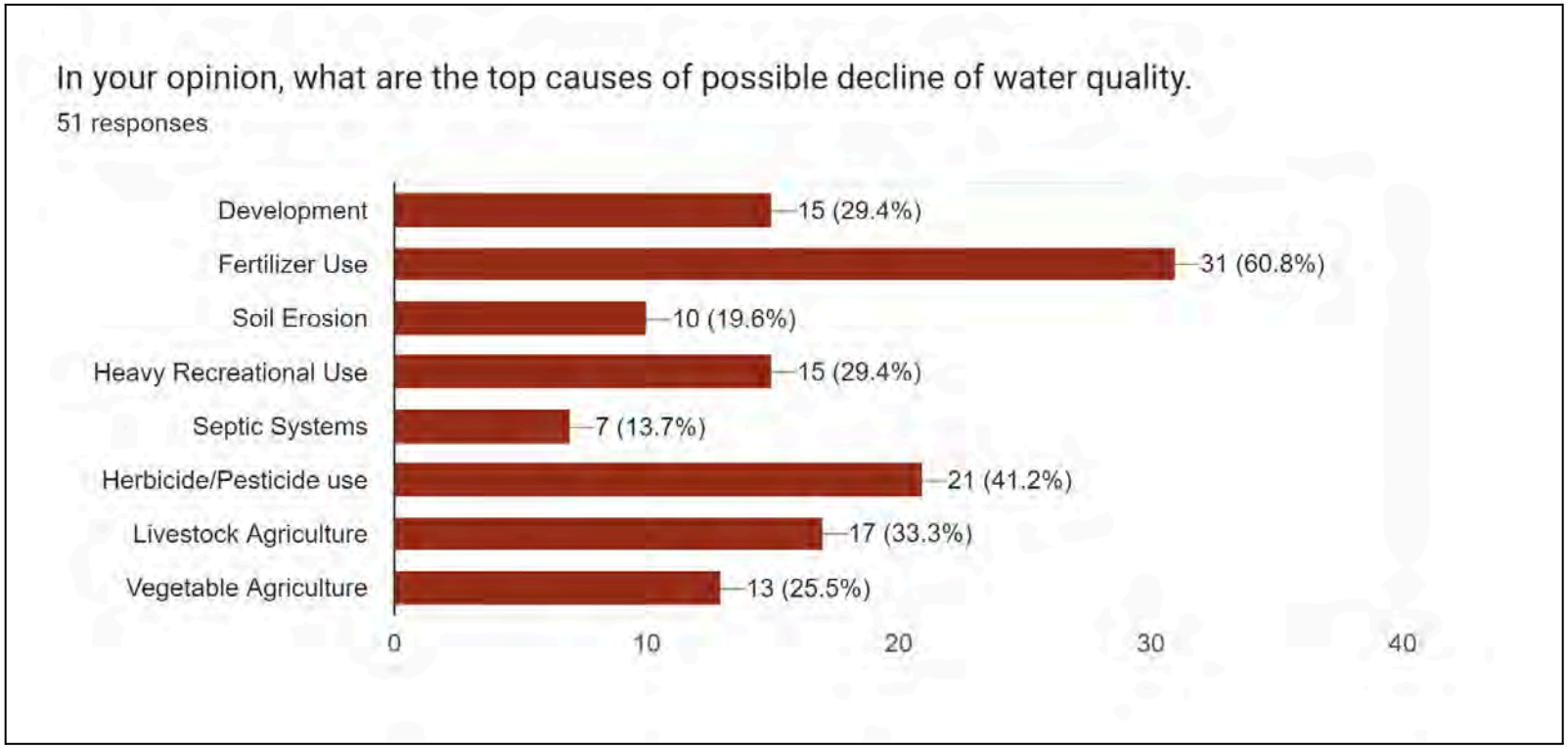
54 responses



In general, since you have lived/recreated on or near Lake Helen, do you feel that the lake water quality has...?

54 responses




In your opinion, what are the top causes of possible decline of water quality.
51 responses
Development
15 (29.4%)
Fertilizer Use
31 (60.8%)
Soil Erosion
10 (19.6%)
Heavy Recreational Use
15 (29.4%)
Septic Systems
7 (13.7%)
Herbicide/Pesticide use
21 (41.2%)
Livestock Agriculture
17 (33.3%)
Vegetable Agriculture
13 (25.5%)
0
10
20
30
40

Shorelands

Shorelands are some of the most important habitats for terrestrial and aquatic wildlife, including birds, near lakes. They also help to slow runoff moving to the lake and filter runoff before it enters the lake. Restoring and protecting shorelands help to provide scenery and solitude, as well as natural space for lake residents to enjoy nature. Most of the shoreland around Lake Helen is highly developed and lacks natural buffers. The majority of survey respondents realize that the removal of native shoreland plants increased erosion and the presence of vegetative buffers reduced runoff and removed sediments. Therefore, residents may be willing to restore buffers and protect shoreland plants.

Goal 5

Create, restore and protect healthy, stable shoreland habitats near and around Lake Helen. This goal will be achieved when 75% of the shoreline is vegetated.

Objective 5.1: All landowners are knowledgeable about the importance of shoreland habitat to Lake Helen's ecosystem.

Action	Lead person/group	Start Date	End Date	Resources
Conduct a shoreland vegetation survey and repeat every 10 years.	Portage County Land and Water Conservation Department	2002-2003	Next due in 2024	WI DNR Extension Lakes
Participate in the Portage County shoreland zoning revisions	Lake District Commission	2011	Ongoing	Portage County Planning and Zoning
Provide lake residents with information about the values of native vegetation near the lake.	Lake District Commission Portage County Planning Zoning/Land Water Conservation Departments	2014	Ongoing	Portage County* Identify demonstration Sites
Continue to provide information about the current rules for shoreland zoning.	Portage County Planning and Zoning Lake District Commission	2014	Ongoing	Portage County Planning and Zoning*

Encourage residents to participate in the Healthy Lakes and Rivers Grant Program	Portage County Land and Water Conservation Department	2019	Ongoing	WI DNR Healthy Lakes and Rivers Grant

*Portage County has shoreland zoning ordinances in place that cover development near shorelines, vegetation removal, excavation and filling, wetland districts and non-compliant properties. To view the ordinances in full visit: http://www.co.portage.wi.us/Ordinances/Chapter%207.pdf

For more information regarding shoreland zoning in Portage County or to receive information about shoreland programs and projects you can contact: Portage County Planning and Zoning 1462 Strongs Avenue Stevens Point, WI 54481 or 715-346-1334.

Objective 5.2: Protect existing primary amphibian areas identified in Portage County Lake Study (http://www.co.portage.wi.us/plzo/lakes.html) and identify other important habitats.

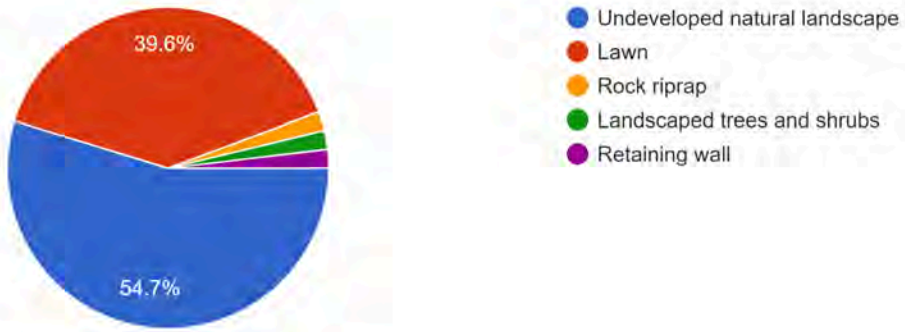
Action	Lead person/group	Start Date	End Date	Resources
Work with the County to protect habitat at public boat landing. Consider healthy shoreland practices to provide habitat, such as native plantings and fish sticks.	Lake District Commission	2020	Ongoing	Portage County Parks Portage County Land Water Conservation Department
Continue to provide information on why identified sensitive areas are important. Keep the identified habitat areas and describe their value as part of lake walk.	Lake District Commission	Ongoing	Ongoing	Portage County Parks Department Portage County Land Water Conservation Department

Goal 5 Notes/History:

*Letter to owners in 2021 due to the Blue Green Algae issue included information on the values of native vegetation.

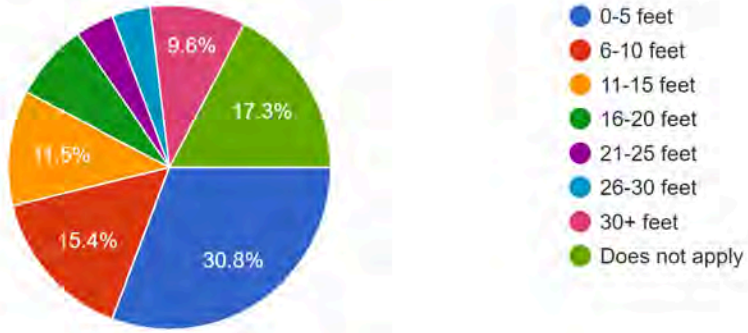
What best describes the location where the majority of your property meets the lake?

53 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?

52 responses



Lake Helen Shoreland Inventory

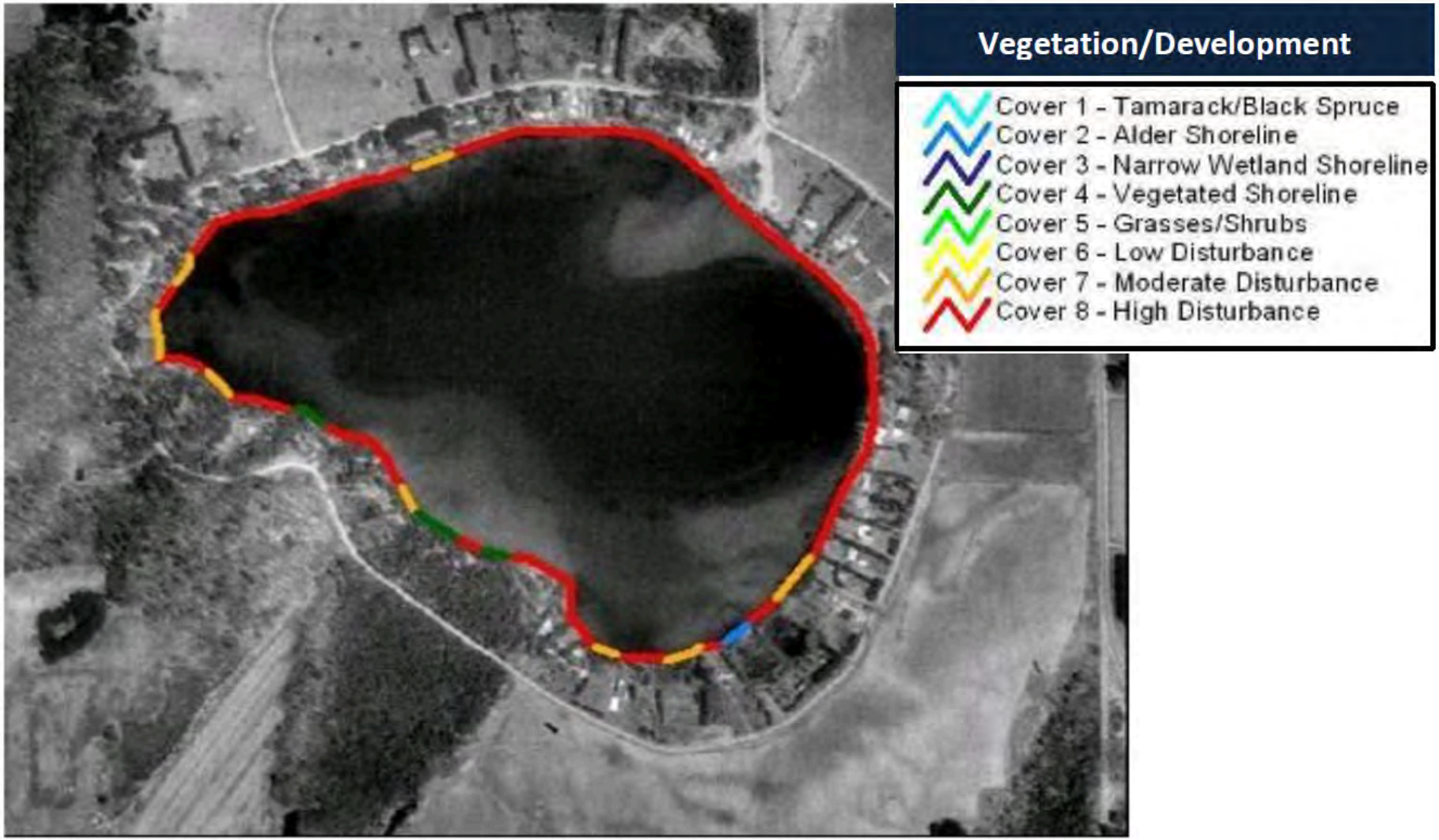
Shoreland vegetation is critical to a healthy ecosystem in and around Lake Helen. It provides habitat for many aquatic and terrestrial animals including birds, frogs, turtles, and many small and large mammals. It also helps to improve the quality of the runoff that is flowing across the landscape towards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

The results of the 2002-2003 and 2012 survey of Lake Helen's shoreland are shown below. The 2002-2003 shoreland survey was conducted during the Portage County Lakes Study. The survey categories differed from those in the 2012 survey, but some comparisons can be made. The 2002-2003 categories include: Tamarack/Black Spruce, Alder Shoreline, Narrow Wetland Shoreline, Vegetated Shoreline, Grasses/Shrubs, Low Disturbance, Moderate Disturbance and High Disturbance.

2002-2003 Shoreland Survey Categories

Category Code and Cover-type Description	
Wetlands	
Cover 1	All wetland shore zone with a weet gale or leather leaf shrub layer associated with tamarack or black spruce.
Cover 2	All wetland shore zone with an alder shrub layer.
Cover 3	Narrow wetland shore zone (< 5 m) with an adjacent upland component that was not developed.
Upland with No Development	
Cover 4	Upland shore zone with a densely vegetated shoreline component (i.e., tall grasses or dense shrub component adjacent to the water). Also has a non-rocky substrate within the water zone area.
Cover 5	Upland shore zone that lacked dense shoreline grasses or shrubs, or a water zone area with a rocky substrate.
Development Categories	
Cover 6	Low level of vegetation disturbance: Unaltered shore zone except for pier access.
Cover 7	Moderate level of vegetation disturbance: Shore zone area containing mowed lawn but having intact overstory.
Cover 8	High level of vegetation disturbance: Highly disturbed cover including shorelands that were mowed to the water line (e.g., beach, rip-rap, or seawall).

Lake Helen Shoreland 2002-2003



2012 Shoreland Survey Categories

The 2012 survey categories are as follows: the ring nearest the lake depicts the shoreland vegetation depth inland from the water's edge for the 0.5 to 3 foot tall vegetation (forbs and grasses), the middle ring depicts the depth of the vegetation that is 3 to 5 feet tall (shrubs), and the outer ring depicts the depth of the vegetation that is greater than 15 feet in height (trees). Approximately 300 feet of shoreland have improved around Lake Helen since the 2002-2003 survey; however, an estimated 98% of the shoreline needs restoration to improve water quality, provide habitat, and meet county and state shoreland standards.

During the 2012 survey, an assessment of human influence features was also conducted around Lake Helen. These inventoried features included artificial beaches, docks, rip-rap, seawalls, erosion, and structures built near the water's edge. Structures such as seawalls, rip-rap (rocked shoreline), and artificial beach result in reduction of habitat which directly impacts the fishery and wildlife. Docks and artificial beaches can result in altered in-lake habitat, and denuded lake beds provide opportunities for invasive species to become established and reduce habitat that is important to fish and other lake inhabitants. Erosion can contribute sediment to the lake, which can alter spawning habitat and carry nutrients into the lake. Unmanaged runoff from the rooftops of structures located near shore can also contribute more sediment to the lake. Each human-made feature by itself may not result in a large impact to the lake, but when these features occur more frequently around the lake, the cumulative impact can be a problem for habitat and
water quality.

In 2012, Lake Helen had a combination of docks/piers, structures near the lake, and rip-rap at 70 locations. Wherever possible, runoff from the near shore structures should be mitigated through the installation of rain gardens, swales and rain barrels to reduce impacts to water quality. Rip-rap is a problem because it lacks habitat. It can be replaced with bio-logs and natural shoreland vegetation. If erosion from the lake is a concern at these sites, the disturbance of near shore aquatic plants should be minimized. The presence of aquatic plants helps to break waves. For example, water lilies make good wave "baffles".

Lake Helen Shoreland Vegetation

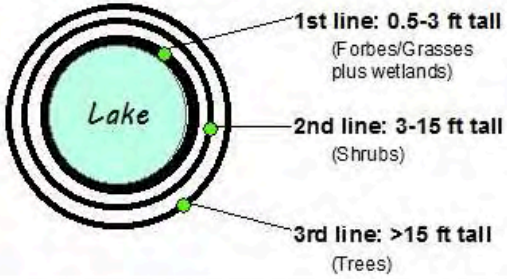
Portage Co. Wisconsin

Map Key

Vegetation Distance Inland from Shore

- Not Present
- <1'
- 1-5'
- >5-15'
- >15-35'
- >35'
- Wetland
- Development

Vegetation Layers



Development Category	Number of Points
Artificial Beaches	1
Seawalls	0
Rip-Rap	2
Docks	65
Boat Landings	1
Erosion	0
Structures within 75 ft of water	3
Residential Land	0
Cropland	0

Center for Watershed Science and Education
College of Natural Resources
University of Wisconsin-Stevens Point

Surveyed Summer 2012

Goal 6

Improve water quality and water clarity. This goal will be achieved when landowners have installed runoff control practices and the shoreland goals are achieved.

Objective 6.1: Waterfront property owners install stormwater management practices, to reduce runoff to the lake.

Actions	Lead person/group	Start Date	End Date	Resources
Work to reduce stormwater runoff from impervious surfaces on each property around the lake.	Lake District Commission/Residents	2009	Ongoing	Portage County Planning and Zoning Portage County Land Water Conservation Department
Continue to provide information about healthy shoreland practices through Newsletters, Facebook, website, annual meetings and picnics.	Lake District Commission	2009	Ongoing	Portage County Land Water Conservation Department
Participate in the Healthy Lakes and Rivers grant program by working with Portage County Land and Water Conservation Department	Lake District Commission/Residents Portage County Land Water Conservation Department	2009	Ongoing	Portage County Land Water Conservation Department WI DNR Healthy Lakes and Rivers Program
Support the Portage County Land and Water Conservation Department in their efforts to reduce runoff to the lake by supporting water quality-based nutrient management plans and best management	Lake District Commission/Residents Portage County Land Conservation Department	2021	Ongoing	Portage County Land Water Conservation Department

Objective 6.2: Develop ownership/responsibility for management of runoff and the quality of Lake Helen for every landowner in the surface watershed and groundwater watershed.

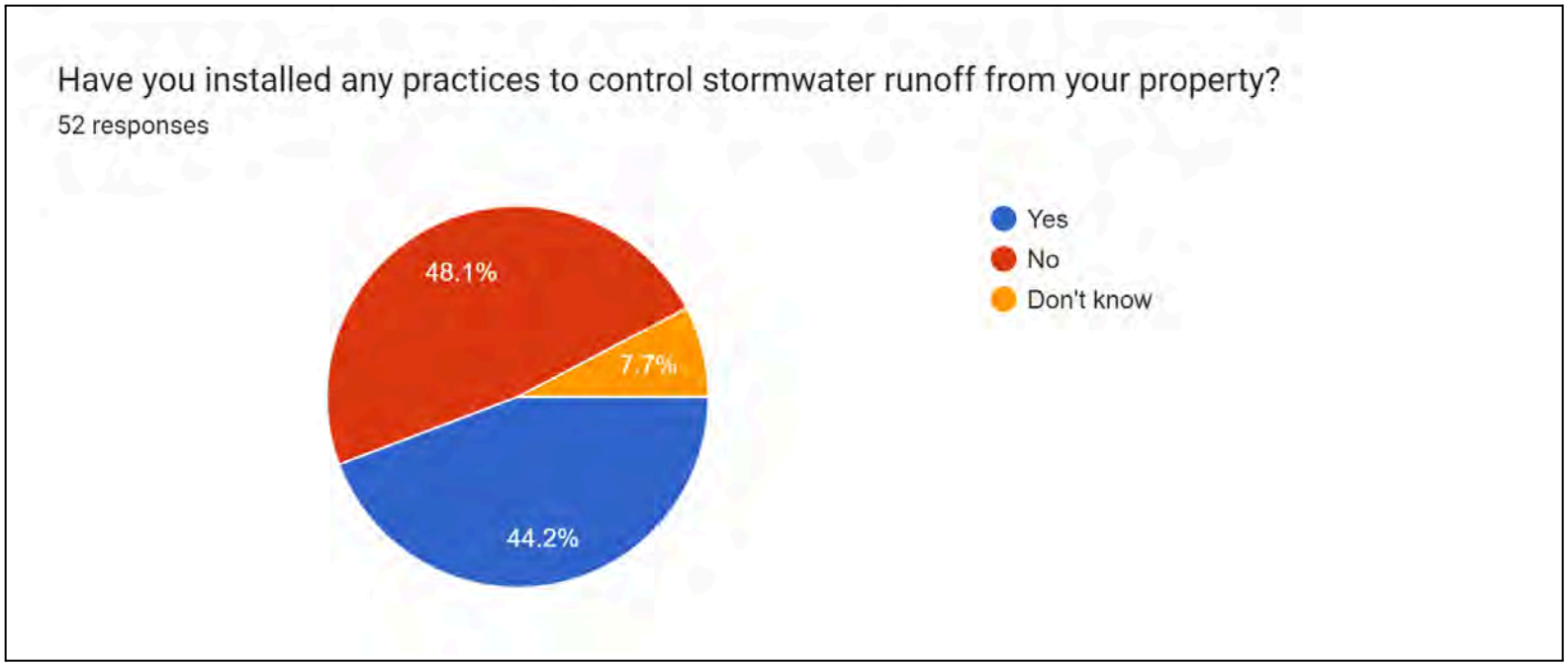
Action	Lead person/group	Start Date	End Date	Resources
Educate residents about "green" (phosphorus-free, biodegradable) cleaning products.	Lake District Commission	2023	Ongoing	UWSP Center for Watershed Science and Education (CWSE)

Objective 6.3: Stay informed of other potential sources of water pollution and monitor Lake Helen if necessary.

Action	Lead person/group	Start Date	End Date	Resources
Stay informed regarding other sources of possible contamination to Lake Helen by communicating with WI DNR, Portage County and Golden Sands RC&D.	Lake District Commission/Residents	2023	Ongoing	UWSP Center for Watershed Science and Education (CWSE) WI DNR Portage County Land and Water Conservation Department Portage County Groundwater Specialist

Goal 6 Notes/History:

- Information about the value of native vegetation near the lake and rain gardens was added to the website in 2011.
- Updated to include shoreland zoning and native buffers in 2021.
- Sep 2021 a letter was sent to all property owners emphasizing Healthy Lakes programs and Shoreline Zoning requirements.
- Healthy Lakes and Rivers 2021 included two 350 sq ft native plantings and six fish stick practices.
- Healthy Lakes and Rivers 2022 included ten 350 sq ft native plantings
- Healthy Lakes and Rivers 2023 included one 350 sq ft native plantings


Have you installed any practices to control stormwater runoff from your property?
52 responses
48.1%
7.7%
44.2%
Yes
No
Don't know

Goal 7

Manage terrestrial invasive species (TIS) through sustainable management to minimize spread, ensure a healthy shoreland ecosystem, and provide recreational opportunities. Since Japanese Knotweed and Wild Parsnip have been found, this will be an on-going effort.

Actions	Lead person/group	Start Date	End Date	Resources
Eradicate Japanese Knotweed that has been found in the Lake Helen wetlands. Then monitor to ensure it has been removed & does not spread.	Lake District Commission/Residents	2017	Ongoing	Golden Sands RC& D Portage County Land Water Conservation Department
Eradicate Wild Parsnip that has been found on Lake Helen Drive. Then monitor to ensure it has been removed & does not spread.	Lake District Commission & Invasive Species Committee	2022	Ongoing	Golden Sands RC& D Portage County Land Water Conservation Department

Goal 7 Notes/History:

- Japanese Knotweed was found on two properties, one near the wetlands, the other near a pond. On May 13, 2017 Golden Sands conducted a training session and worked with local residents to manually remove the plants. Follow-up was done later in 2017 through 2021 with good success as to the number of Japanese Knotweed plants. Plans are to continue the eradication until all plants are gone.
- Wild Parsnip was discovered in two locations, one on East Lake Helen DR near the park and also on the corner of Lake Helen Road and Hwy 49 in 2022. They were treated with chemicals and hand digging to eradicate the Wild Parsnips. Which looked to be successful but in 2023 the Corner of Lake Helen Road and Hwy 49 had more plants than before this area was previously hand dug. We treated it with a chemical which was successful with removal on East Lake Dr in 2022.

Japanese Knotweed

Wild Parsnip

People and the Lake

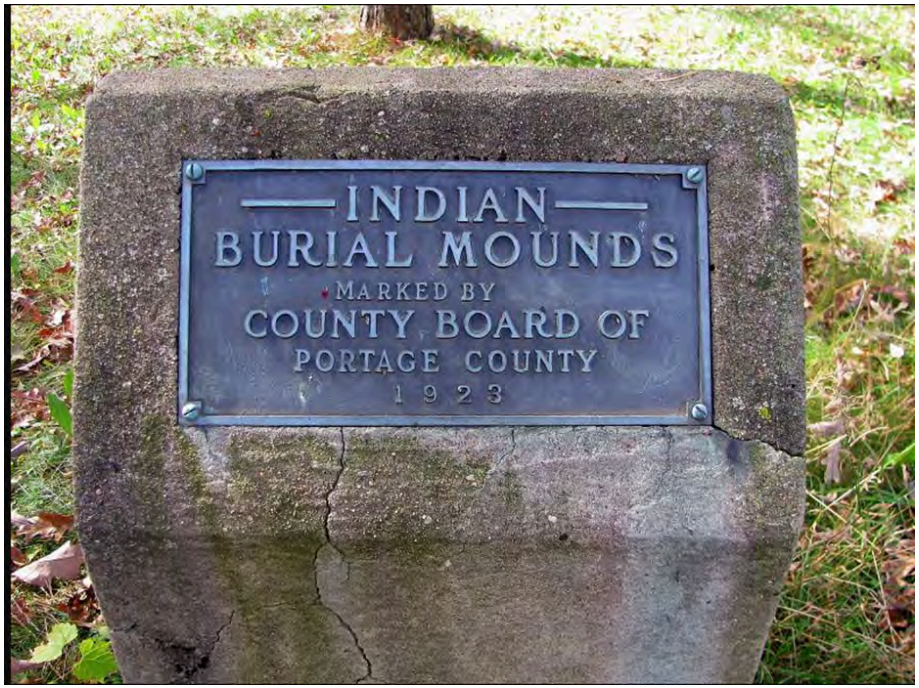
The people that interact with the lake are a key component of the lake and its management. In essence, a lake management plan is a venue by which people decide how they would like people to positively impact the lake. The plan summarizes the decisions of the people to take proactive steps to improve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

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**

Recreation

Lake Helen residents enjoy many different recreational opportunities on Lake Helen. Based on survey results, the most popular recreational activities on Lake Helen included enjoying scenery, walking, swimming, solitude, fishing, wildlife, and boating. Recreational needs and uses on the lake will likely continue to increase as populations and development in the area increases. It is important to provide safe recreational opportunities while still protecting water quality and lake habitats and minimizing conflicts between uses.

Goal 8

Maintain and enhance activities on Lake Helen that promote a sense of community and allow all users to enjoy the lake.

Objective 8.1: Maintain and develop new activities on Lake Helen that promote a sense of community.

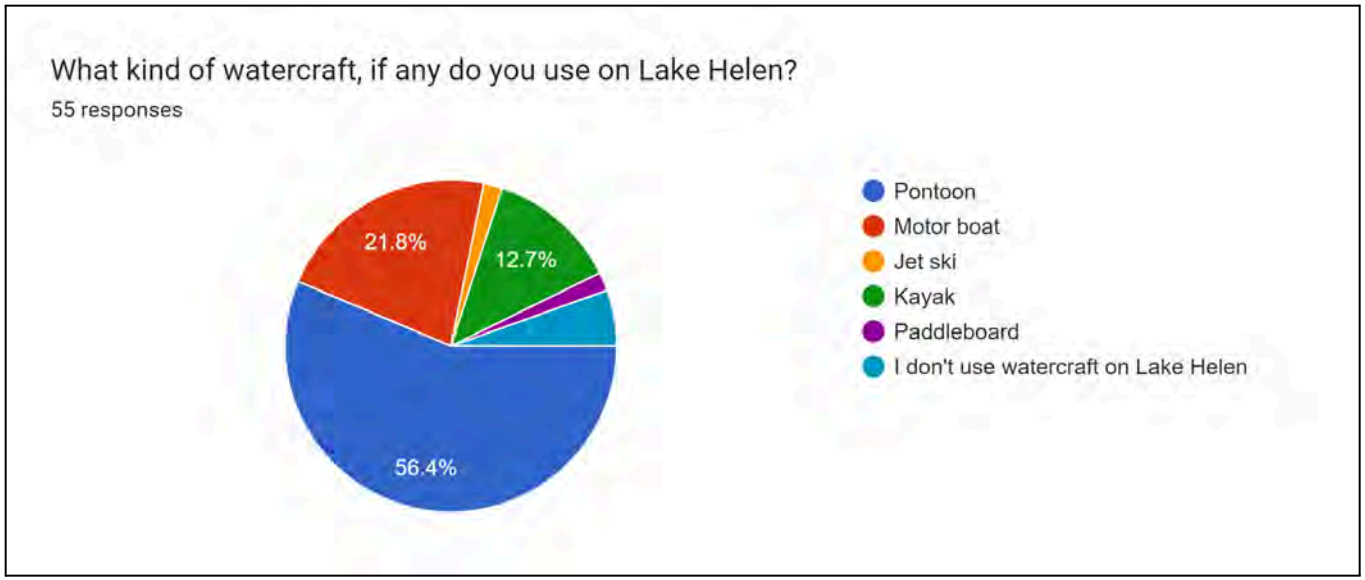
Action	Lead person/group	Start Date	End Date	Resources
Continue to organize lake picnics, Boat Parade, 4th of July Family walk/run and other annual social events to re-establish community.	Lake District Commission/Residents	2009	Ongoing	Residents
Maintain the lake walk around Lake Helen and explore ways to make the lake walk safer.	Lake District Commission/Residents	2009	Ongoing	Town of Alban
Maintain and promote the use of the Lake Helen Frog walk.	Lake District Commission/Residents	Ongoing	Ongoing	

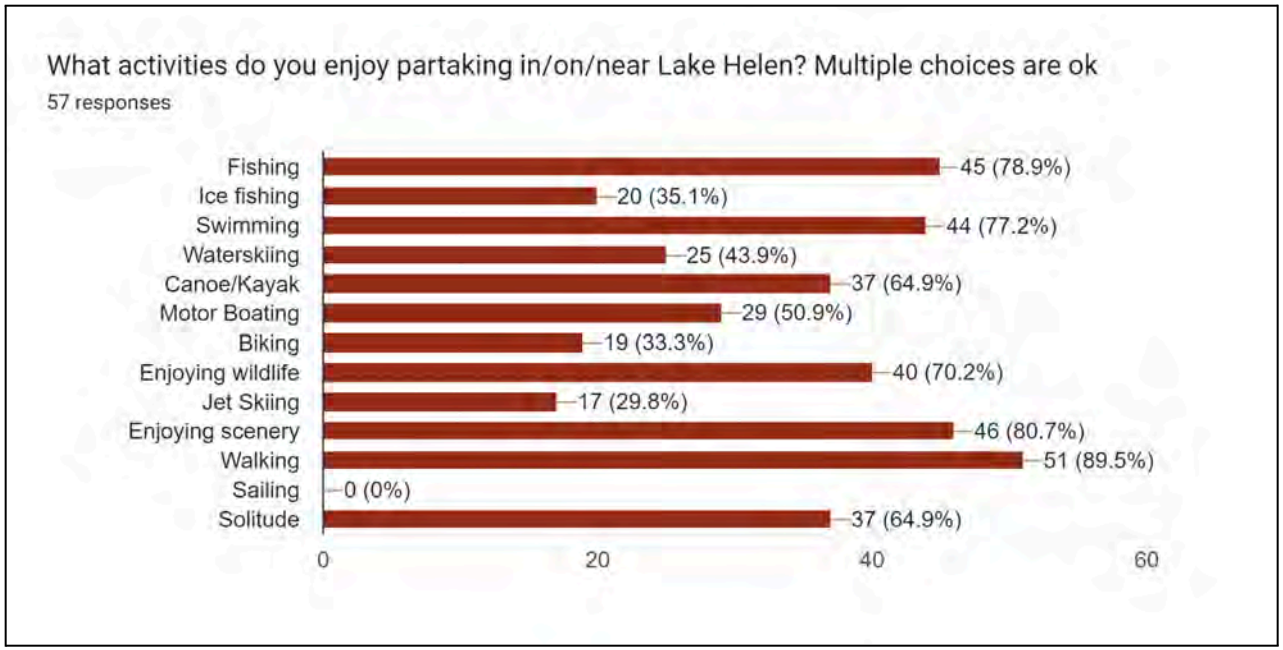
Objective 8.2: Reduce conflict by accommodating different types of recreational use on Lake Helen.

Action	Lead person/group	Start Date	End Date	Resources
Maintain slow no-wake from 4pm-10am. Working smoothly and is supported by residents and landowners.	Lake District Commission/Residents	No date found	Ongoing	

Goal 8 Notes/History:

- Annual picnics are organized and held first Sat in August
- "Helena's Frog Walk" Developed in 2009. Initially included with the first welcome packet. Can also be downloaded from the website.
- In 2019, Maya Desai started a walk/run on the 4th of July in order to build a community around the lake, along with raising funds for fish stocking. It has been a successful event and continues to grow every year.


What kind of watercraft, if any do you use on Lake Helen?
55 responses
21.8%
12.7%
56.4%
Pontoon
Motor boat
Jet ski
Kayak
Paddleboard
I don't use watercraft on Lake Helen


What activities do you enjoy partaking in/on/near Lake Helen? Multiple choices are ok
57 responses
Fishing
Ice fishing
Swimming
Waterskiing
Canoe/Kayak
Motor Boating
Biking
Enjoying wildlife
Jet Skiing
Enjoying scenery
Walking
Sailing
Solitude
45 (78.9%)
20 (35.1%)
44 (77.2%)
25 (43.9%)
37 (64.9%)
29 (50.9%)
19 (33.3%)
40 (70.2%)
17 (29.8%)
46 (80.7%)
51 (89.5%)
0 (0%)
37 (64.9%)
0
20
40
60


PAPA
GAP
JUST HOOK IT.
USA
Mike
lake helen
alban, WI

Communication and Organization

Working together on common values will help to achieve the goals that have been outlined in this plan. Many of the goals outlined in this plan are focused on disseminating information to pond and watershed residents and pond users, ultimately to help them make informed decisions that will result in a healthy ecosystem in Lake Helen that is enjoyed by many people. There is no single best way to distribute information to those that enjoy and/or affect Lake Helen, so the planning committee has identified a variety of options to communicate with one another and in the community.

Informational Opportunities

Many of the goals in this plan involve the distribution and dissemination of information to residents to help them make informed land management decisions, and request assistance from local municipalities and other stakeholders. A large percentage of the Lake District residents are part time users which creates some challenges and requires creativity. Increased information and communication will help achieve the goals and objectives listed throughout this document.

Goal 9

Create informational and communication opportunities for Lake Helen landowners and users to develop interactions with others that are involved in decisions that affect Lake Helen.

Objective 9.1: Provide information about lake stewardship to new and existing landowners and residents on Lake Helen.

Action	Lead person/group	Start Date	End Date	Resources
Distribute welcome packets to new landowners. Include no wake times, no wake speed within 100 feet of shoreline, pier planner, shoreland zoning rules and rationale for regulations. Explore the electronic version of a welcome packet.	Lake District Commission	2013	Ongoing	Extension Lakes Program Portage County Planning and Zoning Portage County Land Water Conservation Department

Revise Welcome Packet & make available to new property owners each year.	Lake District Commission	2017	Ongoing, updated in 2017 and 2023	Extension Lakes Program Portage County Planning and Zoning Portage County Land Water Conservation Department
Coordinate with the County Register of Deeds to learn about and contact new property owners on Lake Helen.	Lake District Commission	No date found	Ongoing	Town of Alban Portage County Register of Deeds Portage County GIS

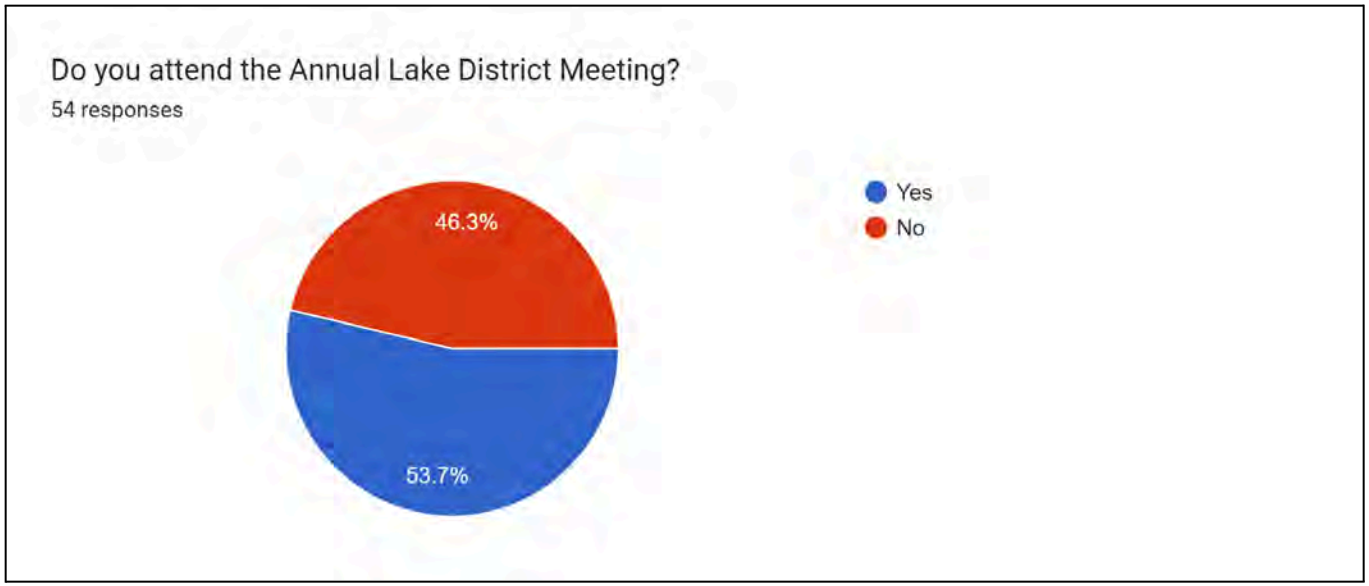
Objective 9.2: Increase communications between all Lake Helen Residents, Town, County, and professionals.

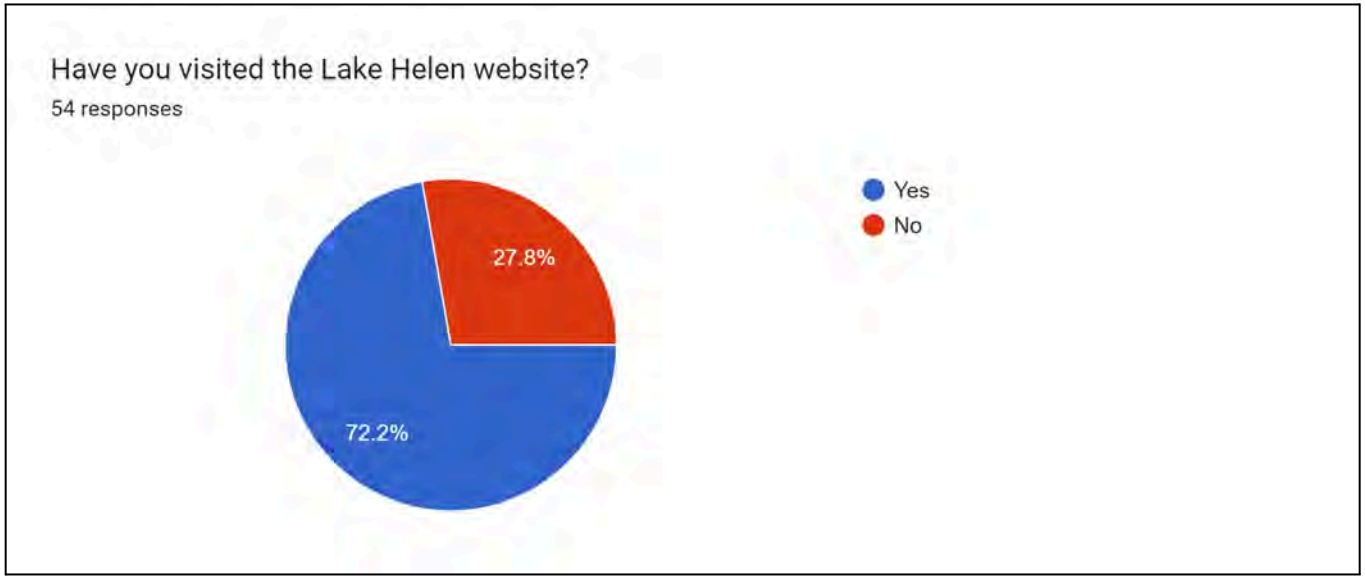
Action	Lead person/group	Start Date	End Date	Resources
Maintain the lake district website at www.lakehelendistrict.com. Add pertinent links to the Portage County Lakes, Extension Lakes, and informational websites.	Lake District Commission	2009	Ongoing	Portage County Land Water Conservation Department Extension Lakes WI DNR
Create and maintain a central email address for all Lake Helen Lake District information that all district commissioners have access to so that information can be seen and shared.	Lake District Commission	2023	Ongoing	Lake District Commission Residents
Support the formation of a Portage County Lakes group for lakes to come together and collaborate on issues.	Lake District Commission	2020	Ongoing	Portage County Land Water Conservation Department Extension Lakes
Encourage lake property owners to join the “Lake Helen Our Happy Place” Facebook page.	Lake District Residents	June 2019 it was a Public page	January 2020 it turned into a group page	Residents

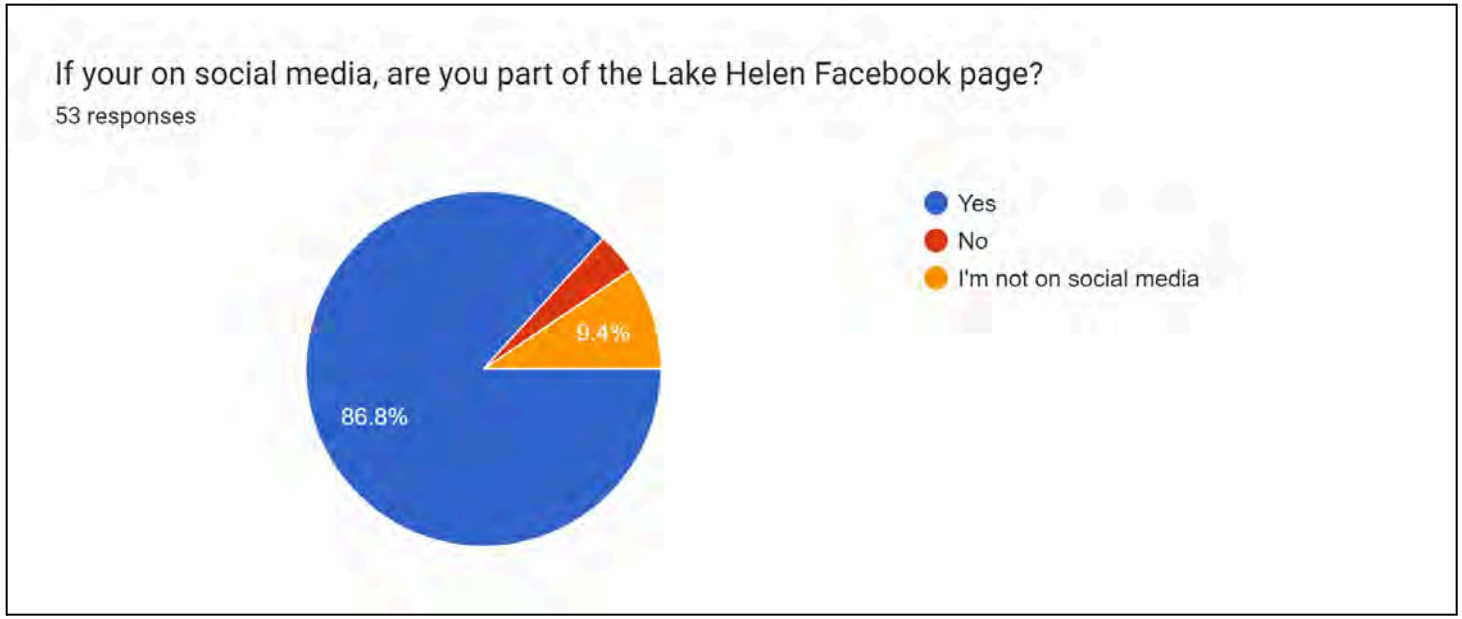
Convert newsletter to an electronic newsletter with paper copies still sent to those without a computer. Create at least two newsletters annually.	Lake District Commission	2023	Ongoing	WI DNR Golden Sands RC&D Portage County Planning and Zoning Department Portage County Land Water Conservation Department
Work to improve communication among the town, county, WDNR, RC&D, and Lake District.	Lake District Commission	Ongoing	Ongoing	Town of Alban Portage County Land Water Conservation Department WI DNR Golden Sands RC&D
Encourage Lake District Commissioners, landowners, and new people to attend annual Wisconsin Lake Conference; Provide financial incentives from the District.	Lake District Commission	Ongoing	Ongoing	Extension Lakes Portage County Land Water Conservation Department

Goal 9 Notes/History:

- Mail.lakehelen@gmail.com was set up to send and receive messages in 2009.
- Initial welcome packet developed and distributed in 2011.
- Website completely rebuilt in 2011, adding links noted Home & Commissioners pages are updated multiple times each year.
- Welcome packet redeveloped by Robin Novak-Nelson in 2017. To be distributed to each new property owner at least one per year.
- Commissioners started attending in 2018. Presented in 2022.
- Lake Helen Chairman participated in the initial meeting with UW Extension setup via zoom in 2020 and in 2021 to increase capacity.
- The Portage County Lakes and Rivers group was formed in 2020 by Tracy Arnold of Portage County Land and Water Conservation Dept, Jen McNelly of Portage County Planning and Zoning and Chris Hamerla of Golden Sands RC&D.
- Email addresses are requested at annual meetings when residents sign-in.


Do you attend the Annual Lake District Meeting?
54 responses
46.3%
53.7%
Yes
No


Have you visited the Lake Helen website?
54 responses
27.8%
72.2%
Yes
No


If your on social media, are you part of the Lake Helen Facebook page?
53 responses
Yes
No
I'm not on social media
9.4%
86.8%

Boat landing sign 2022

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. It is important to communicate with partners listed in this plan to understand what they have accomplished, if impediments to success exist, or conditions have changed.

Goal 10

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

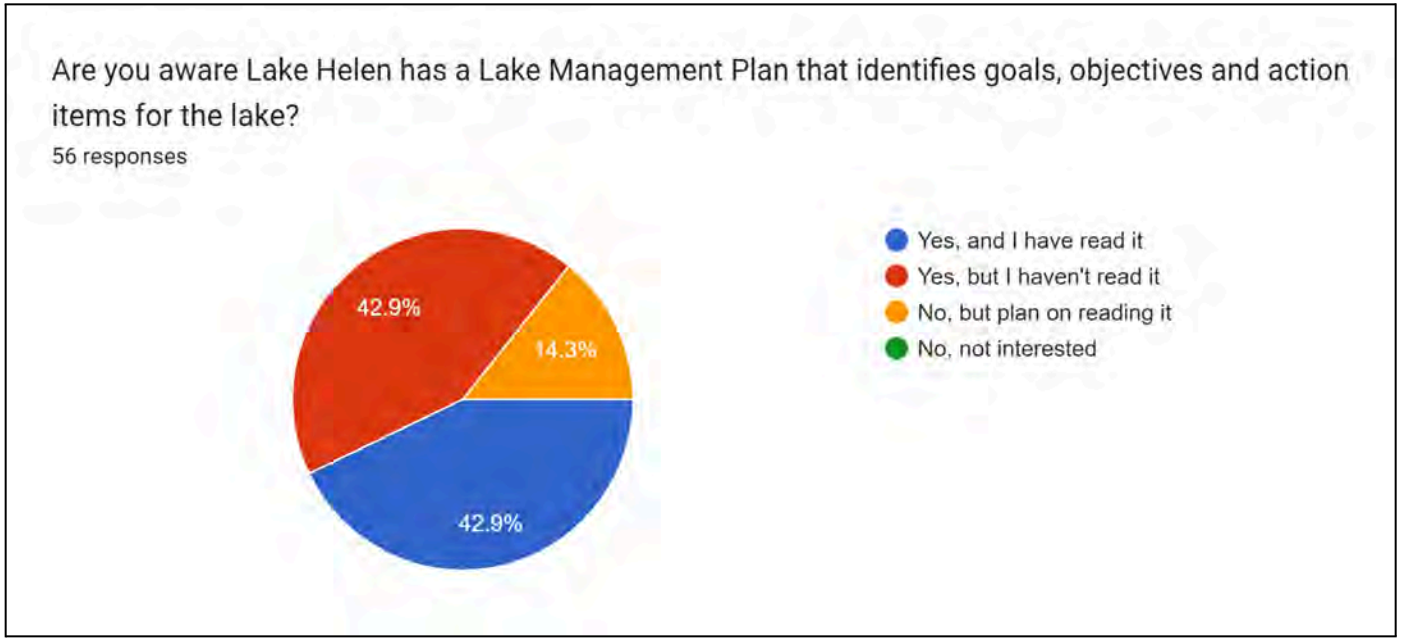
Action	Lead person/group	Start Date	End Date	Resources
Annually review the Lake Helen Lake Management Plan and update the plan with new or revised areas of concern, action items, dates, lead person/group, and resources.	Lake District Commission	Ongoing	Last completed in 2023	Portage County Land Water Conservation Department Golden Sands RC&D WI DNR
Annually review the Lake Helen Aquatic Plant Management Plan and update the plan with new or revised areas of concern, action items, dates, lead person/group, and resources.	Lake District Commission	Ongoing	Annually	Portage County Land Water Conservation Dept Golden Sands RC&D WI DNR

Goal 10 Notes/History:

- On May 13, 2017 a meeting was held with interested Lake Helen property owners to review some of the goals and actions. In March 2022, the Chairman reviewed the plan and updated it with the obvious changes, noting comments on the completed actions, those that have had progress, as well as suggestions for a few changes, additions, and deletions. These notes will be reviewed by the full Board of Commissioners, updated further, then approved.
- The changes are to be approved by the LH P&R District Commissioners and posted online. They are then to be reviewed with interested property owners, with comments and suggestions accepted and considered for the next review.

- August 2022-July 2023, Kara Boghossian-Lake Helen District Board representative and Tracy Arnold-Portage County Land and Water Conservation Dept worked though the entire plan to make suggested updates to be presented to the full board for review. Resident survey was also sent out April 14, 2023-May 21, 2023 to collect data to guide the Lake Management Plan update.

Results from the 2023 Lake Helen Resident Survey



Understanding and planning for how our actions affect others is a key step in battling to protect and conserve Lake Helen as a valuable natural resource. We would like to thank you for taking the time to read through this plan, which is a sign of your dedication to these efforts. We would also like to thank all those that participated in the planning process and gave freely of their time and expertise in order to create this plan.

If you wish to find additional or updated information about Lake Helen, an electronic version of this document, or information on the Lake Helen Lake Protection and Rehabilitation District please visit: www.lakehelendistrict.com and http://www.co.portage.wi.us/Planning&Zoning/PCL/Main%20Page/Main%20Page.shtm

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 Helen. They can serve as tools to help achieve the goals, objectives and actions outlined in the Lake Helen Management Plans.

Land management plans that influence the land uses around Lake Helen 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 Alban Comprehensive Plan: http://www.co.portage.wi.us/Comprehensive%20Plan/Planning%20Program/Alban/Alban.html

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.

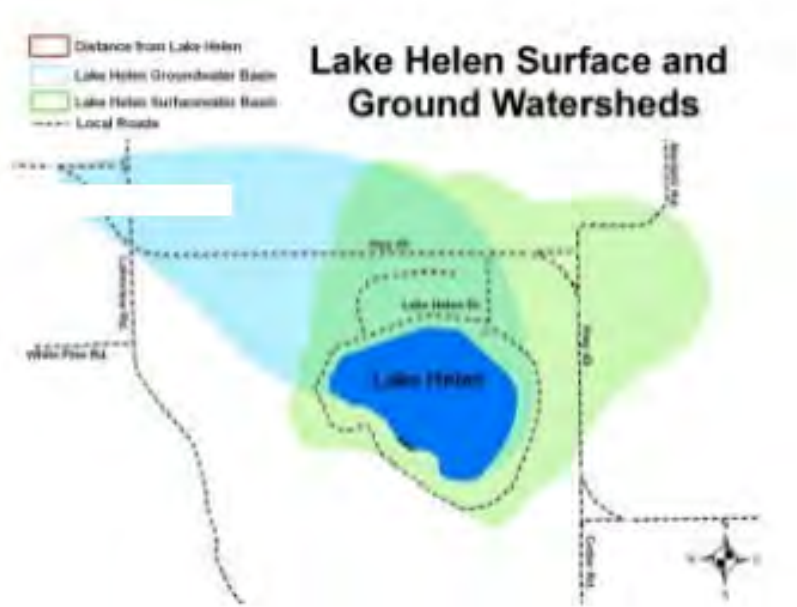
Turyk, N; R. Bell; R. Cook; T. Ginnett; R. Crunkilton; L. Markham; P. McGinle; B. Shaw; and E. Wild; 2006. Final report to Portage County and Wisconsin DNR. http://www.co.portage.wi.us/plzo/lakes.html

Background Information (from 2002-2003 study)

Much of the background information on Lake Helen was taken from the Lake Helen section of the Portage County Lake Study (2005). The complete document can be found at: http://www.co.portage.wi.us/Planning&Zoning/lakes.html Lake Helen is a groundwater drainage lake with moderately hard water, located two miles east of Rosholt in the town of Alban, Wisconsin. Lake Helen covers 87.4 acres, has an estimated volume of 599 acre-feet, and a maximum depth of 18 feet (WDNR 1972). One small tavern on the northeast side of the lake comprises the commercial development on the shoreline. A County Park with public access and picnic area are present on the northeast shore, with a boat-launch and a small swimming beach. The remaining shoreline primarily consists of residential development.

Watershed

Lake Helen's surface watershed, an area of land where water from precipitation drains from higher elevations towards Lake Helen, is approximately 500 acres. A large portion of the watershed is in non-irrigated agriculture (159 acres) or forest (89.6 acres) and 79 acres (16%), of the watershed is residential. Residential development along the lakeshore boomed in the 1950's and 1960's increasing from nine acres in 1948, to 70 acres in 1968. Forest and wetland acreage has remained fairly constant since 1948.



A groundwater watershed is similar to a surface watershed, except that it is an area of land where the groundwater, instead of surface water, drains to Lake Helen. Often surface water watersheds and groundwater watersheds do not match each other, which is the case inLkae Helen. Lake Helen's groundwater watershed encompasses 443 acres of land to the north west and the lake. According to 2002 data, land use within the groundwater watershed included 98 acres (22%) of non-irrigated cropland, 92 acres (21%) of forested areas and 57 acres (12%) of residential land use. Land use within the groundwater watershed increased in residential development sometime between 1948-1969. Other land uses have remained fairly constant.

Sensitive Areas

The sensitive areas associated with Lake Helen are defined by lands immediately around the lakeshore that would be significantly impacted by most disturbances or development. Near Lake Helen these areas include two wetlands adjacent to the banks of Lake Helen; one extending from the northeast side and the other from the southwest side at the point of the intermittent outflow; a steeply sloped area along the western lakeshore that would be prone to erosion, and a small County park that is located on the northeast shore.

Critical Habitat Areas

Critical habitat areas or sensitive areas are important places in and near the pond that are essential to maintaining a healthy, sustainable ecosystem. The sensitive areas within Lake Helen may offer critical or unique fish and wildlife habitat, or water quality or erosion control benefits to the pond. More details about critical habitat areas are available online: http://dnr.wi.gov/lakes/criticalhabitat/.

The critical habitat areas identified for Lake Helen through the Lake Study were based on amphibian habitat; however, these same areas are also important to other aquatic and terrestrial species. The primary amphibian habitat is located in small sections on the south side of the lake and in the wetlands to the north of the lake. Key features of these habitat areas include protected wetlands with submergent and emergent vegetation. The HLPRD will work with the DNR to designate additional critical habitat around Lake Helen.

Lake Helen Critical Habitat Areas (UWSP)

Birds

Lakeshore development can negatively or positively affect habitat quality for birds depending on the ecological requirements of each species. Development can play an important role in providing resources unavailable to certain species in a more natural environment, yet eliminate other species' needs altogether, especially at the most extreme levels of environmental disturbance. The 28 bird species found around Lake Helen can be divided into 2 general groups based on the type of habitat and resources they need or utilize. The first group of birds has a tendency to be found in developed areas. These species may take advantage of resources that are unique to urban environments such as birdfeeders. The second group prefers more undeveloped sites. The majority of these bird species eat only insects (insectivores) and thus are likely to feed in more forested environments.

Shoreline

Only 5.5% of the shoreline around Lake Helen was considered vegetated shoreline. Vegetated shoreline was characterized as being upland areas with dense vegetation comprised of tall grasses or shrubs that lacks a rocky component. Alder shoreline was characterized as areas where alder dominates the shore zone; 1.6% of Lake Helen shoreline was classified as alder shoreline.

Around Lake Helen, 93% of the shoreline vegetation was considered to be disturbed. Of that, 15.8% of the lake's shoreline vegetation was considered moderately disturbed, these areas may contain a mowed lawn but have an intact overstory, and 77.1% was considered to be highly disturbed, these areas were defined as a beach, rip rap, seawall, or where the shore is mowed to the water line (See Appendix C).

Draft Lake Management Plan – Lake Helen 10/1/2008 3 The lack of vegetated shoreline surrounding Lake Helen is cause for concern due to the lack of habitat and the lack of runoff control. Runoff or excess water coming off hard surfaces such as roofs, driveways/roads, patios, and compacted soils that enter Lake Helen can carry a variety of pollutants with the water. Negative impacts on a lake due to runoff include: excess nutrients (such as phosphorus) in the lake, which can cause algae blooms and excessive plant growth and an increased amount of sediment in the lake, which 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.

Survey respondents recognized the necessity of shoreline cover surrounding the lake. Fifty-four percent of survey respondents strongly agreed that removal of native shoreline and near shore aquatic plants increased shoreline erosion and 55% agreed that vegetative buffers reduced and removed sediments. However, the vast majority of respondents did not have stormwater and runoff management techniques in place but were interested in learning more about them.

Aquatic Plants

According to R. Freckmann, (UWSP) there were 23 species of aquatic macrophytes, or aquatic plants that have been identified in Lake Helen or wet areas of the adjacent shore. This is below average compared to the other Portage County lakes.

Lake Helen is surrounded by homes and cottages, leaving very little wet shore and little native vegetation. Eurasian water milfoil was identified in Lake Helen in the summer of 2008 but was hand pulled at that time. If not watched closely, this and other invasive aquatic species could quickly become established in the lake due to the lack of native plant cover.

Seventy-two percent of survey respondents agreed that the presence of native aquatic plants were essential to maintaining water quality and clarity in Lake Helen. When asked about of aquatic plants in Lake Helen, 38% felt that the amount of growth was excessive, 25% felt it was dense, 23% felt it was just right, and the remaining 13% were split between very little plant growth in the lake and the lake was choked with plants.

Water Quality

Water quality assessment of 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.

The temperature in Lake Helen was generally mixed from top to bottom, although it weakly stratified in July and August. Despite the lack of temperature stratification, dissolved oxygen concentrations fell below 5 mg/L (needed to support many aquatic species) at depths below 10 feet during the summer and late winter.

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. Overall, water clarity in Lake Helen is considered fair, with periods of poorer water quality in the summer months. These fluctuations throughout the summer are normal as algae and aquatic plant populations and sedimentation increase and decrease. Disturbance of sediment by wind or boating activity also influence the water clarity in shallow lakes.

A variety of water chemistry measurements were used to characterize the water quality in Lake Helen. Lake Helen is considered a hard water lake due to inputs of calcium from groundwater. Nutrients (phosphorus and nitrogen) are important measures of water quality in lakes because they are used for growth by algae and aquatic plants.

Draft Lake Management Plan – Lake Helen 10/1/2008 4 For the most part total phosphorus was below problem levels of 30 ug/L; however, some concentrations were as high as 97 ug/L. This resulted in an algae bloom that negatively affected water clarity (See Phosphorus section). Inorganic nitrogen (NO2+NO3-N and NH4) was above the 0.3 mg/L needed to fuel algae blooms throughout the summer.

The algal community when considered relative to the chlorophyll a, phosphorus, and nitrogen values for Lake Helen presents a picture of a barely oligotrophic or more likely mildly mesotrophic lake. The 30 genera identified during the sample periods were relatively common and with the exception of the cyanobacterium Microcystis. None of those that reached numerical dominance in the sample counts were associated with toxins or health issues. The water clarity was only fair and the large fraction of blue-green algae in the community should be seen as indicative of a lake that might be accelerating towards mesotrophic status (B. Bell).

Chloride levels, and to a lesser degree sodium and potassium levels, are commonly used as an indicator of how strongly a lake is being impacted by human activity. Both chloride and sodium levels are elevated in Lake Helen. Although these constituents are not detrimental to the aquatic ecosystem, they indicate that sources of contaminants (road salt, fertilizer, animal waste and/or septic system effluent) are entering the lake from

either surface runoff or via groundwater.

Atrazine was found in low concentrations in the lake water (0.13 and 0.06 ppb). Some toxicity studies have indicated that even at these low levels reproductive system abnormalities can occur in frogs. The presence of Atrazine indicates that other agri-chemicals may also be entering Lake Helen.

When asked about changes in Lake Helen's water quality, survey respondents were split between a perceived decline and no change. Algae, aquatic plants, and litter were identified as the top three water quality problems and the use of fertilizer and heavy recreational use were identify by 44% of respondents as the top causes of water quality problems. Development, herbicides, erosion, vegetable and livestock agriculture were each perceived as causes for water quality problems by 24% of respondents.

Phosphorus

Phosphorus is an element that is essential to most living organisms in trace amounts, including plants. Sources of phosphorus can include naturally occurring phosphorus in soils, wetlands, small amounts in groundwater, agricultural runoff, urban runoff, domestic and industrial sewage, septic systems, and animal waste.

Phosphorus is the "limiting nutrient" in Lake Helen. Biological growth is most respondent to phosphorus due to its relative short supply with respect to other substances necessary for growth. However, increases of just a small amount of phosphorus results in increases in growth rates and abundance, especially in aquatic plants and algae.

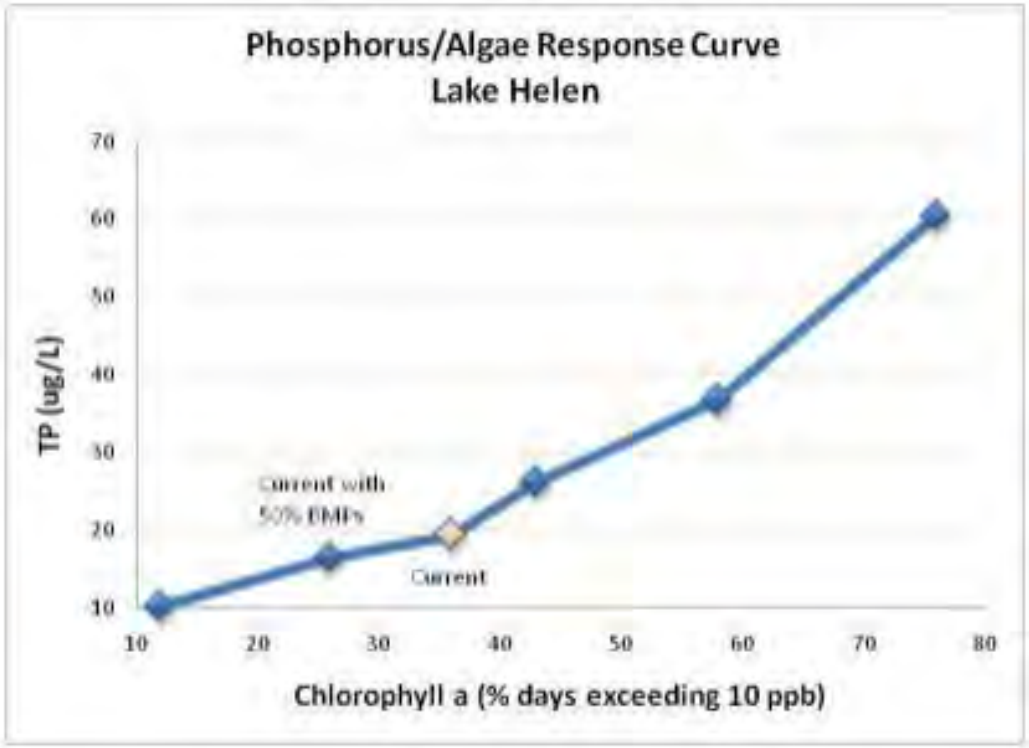
Phosphorus concentrations in Lake Helen are variable throughout the year. Average total phosphorus (TP) for 2002-2004 was 18.9 ug/L, which falls below the problem level of 30 ug/L. Spring averages for total phosphorus (TP) were 24.7 ug/L, summer averages for TP were 20.8 ug/L, fall averages for TP were 17.5 ug/L, and winter averages for TP were 2.0 ug/L. However, readings as high as 97 ug/L were taken during July. Concentrations this high can contribute to or cause algae blooms in the lake. Although the average concentrations are below problem thresholds, they are slowly increasing over time. It is important to reduce phosphorus before it reaches problem levels.

The importance of managing phosphorus in the Lake Helen watershed is key to protecting the lake itself. Watershed activities that increase the Draft Lake Management Plan – Lake Helen 10/1/2008 5 input of phosphorus to the lake include removing native vegetation (trees, bushes, and grasses), mowing grass and planting crops up to the water's edge, and increasing the amount of impervious surfaces. Phosphorus inputs to Lake

Helen can be controlled through the use of Best Management Practices (BMP's) that minimize the movement of phosphorus to the lake.

The phosphorus response graph below shows how different land management strategies and hence phosphorus concentrations may affect the frequency of algae blooms (chlorophyll a) in Lake Helen. The current conditions in Lake Helen are highlighted. The frequency of blooms can be decreased by the implementation of best management practices on the current landscape. Conversely, changes in land uses and/or land use practices may readily increase the frequency of algae blooms that occur between May and September.

The category of "current with 50% BMPs" was the goal identified for Lake Helen. This category means that with the current level of development 50% of the developed land (residential, agricultural, infrastructure) in the watershed implement some form of best management practice to reduce runoff and connectedness. This should result in a decrease of phosphorus to 17 ug/L and most importantly, a decrease in algae blooms to fewer than 25% of growing season days (measured by chlorophyll a concentrations greater than 10 ug/L). Naturally, it is desirable for new development within the watershed to employ similar practices.



Recreation

Lake Helen is used for many different types of recreation. According to respondents of the citizen survey, the most popular activities at Lake Helen include enjoying the scenery, walking, swimming, fishing, using Lake Helen as a place of solitude, and enjoying wildlife. Recreational boating on Lake Helen included motor boating (60%), canoeing/kayaking (42%), water skiing (29%), sailing (5%), and jet skiing (5%).

The majority of respondents (62%) described their recreational/boating experience on the lake as having a moderate amount of disturbance. Eighty-two percent of survey respondents also indicated that they were satisfied with the current slow no-wake period on Lake Helen which runs from 4 pm to 10 am.

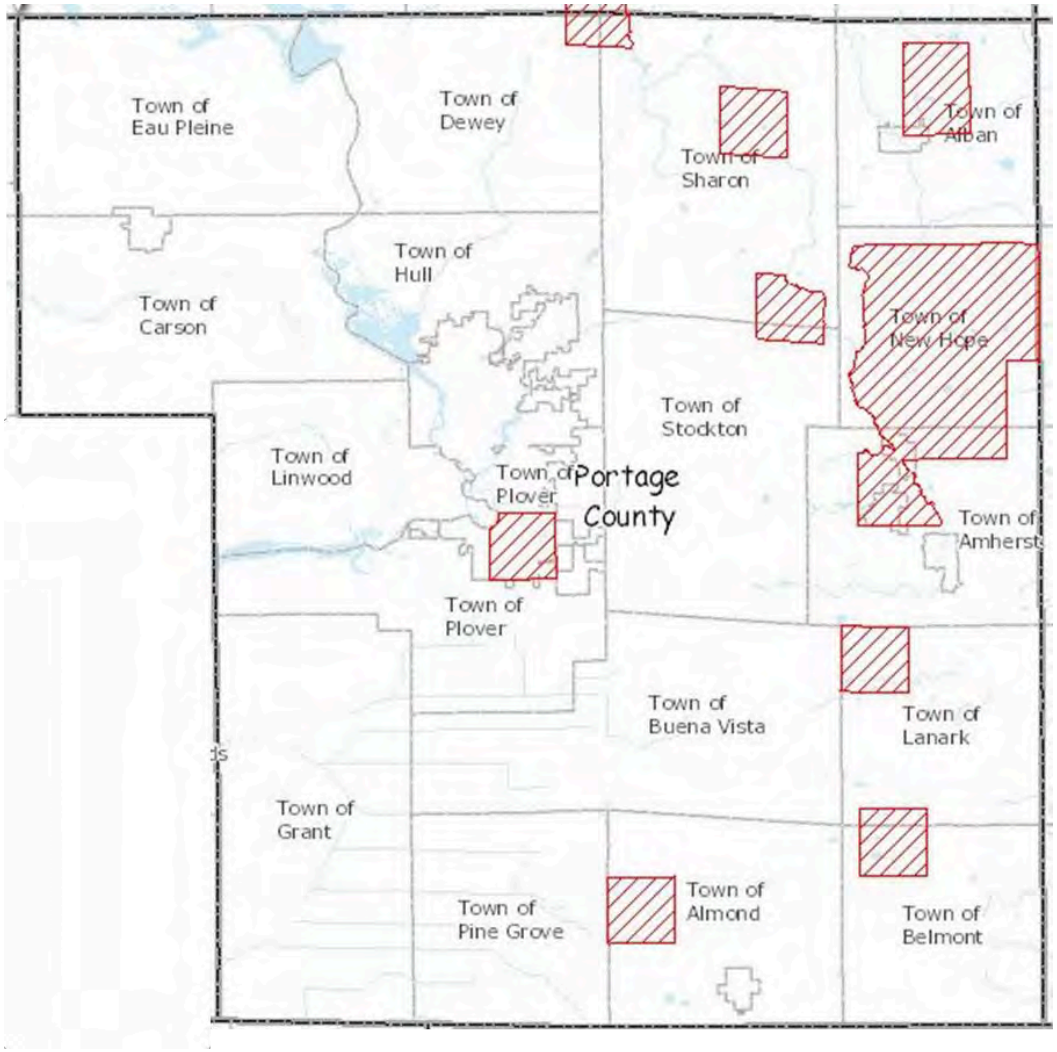
Atrazine Prohibition Areas for Portage County

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

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

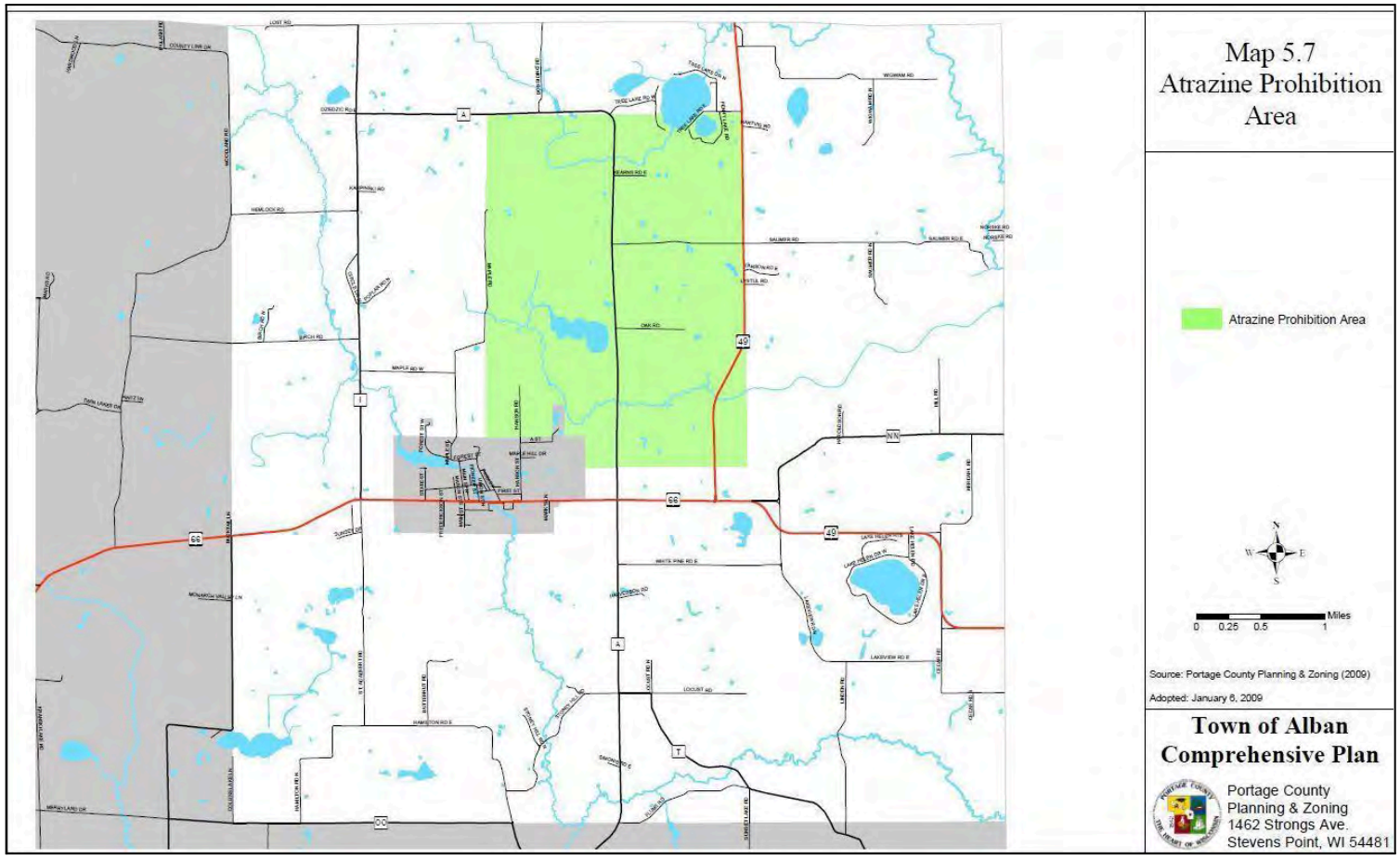
Atrazine is a popular corn herbicide that is used to control weeds in corn fields and has been used in Wisconsin for over 25 years. Atrazine may have entered Wisconsin's groundwater as a result of its use on farm fields. In some cases it may be the result of a spill or improper disposal of unwanted or 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 Alban

https://www.co.portage.wi.us/home/showpublisheddocument/1518/636077360008600000



United States Geological Survey:

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