State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
1300 W. Clairemont Ave.
Eau Claire WI 54701

Tony Evers, Governor

Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

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

Sunset Lake Management Plan
Portage County, Wisconsin

Plan Created by UW-Stevens Point, Center for Watershed Science and Education:	March 4, 2010
Plan approved by Sunset Lake Management Planning Committee:	September 15, 2010
Plan approved by Town of New Hope:	September 15, 2010
Plan approved by Wisconsin Department of Natural Resources:	_____
Plan approved by Portage County:	_____
Plan updated by Sunset Lake management plan update participants:	October 25, 2014
Plan update approved by Sunset Lake Association:	April 12, 2023
Plan update approved by Town of New Hope:	April 19, 2023
Plan update approved by Portage County Land Conservation:	May 30, 2023
Plan update approved by Wisconsin Department of Natural Resources:	submitted to WI DNR May 30, 2023 Approved by WI DNR August 10, 2024

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

Sunset Lake Management Planning Committee Members and Resources

Wisconsin Department of Natural Resources

Tom Meronek-Fisheries Biologist
Scott Provost-Water Resources Management Specialist

Portage County

Randy Slagg-Conservation Technician

Golden Sands RC&D

Paul Skawinski-Regional Aquatic Invasive Species Coordinator

University of Wisconsin-Stevens Point

Dr. Robert Freckmann-Professor Emeritus of Botany
Dr. Ron Crunkilton-Professor Water Resources
Nancy Turyk-Center for Watershed Science and Education
Jen McNelly-Center for Watershed Science and Education
George Kraft-Center for Watershed Science and Education
Linda Stoll-Center for Land Use Education
Dan McFarlane-Center for Land Use Education
Bob Korth-UWEX Lakes
Meagan Leatherbury-Graduate Student, Central Wisconsin Environmental Stations

Portage County Lake Study Researchers/Authors

Becky Cook Water Quality/Watersheds
Dr. Paul McGinley – Water Quality/Watersheds
Dr. Byron Shaw – Water Quality/Watersheds and Upland Sensitive Areas
Dick Stephens – Water Quality/Watersheds and Upland Sensitive Areas
Nancy Turyk – Water Quality/Watersheds/Final Report
Dr. Glenn Bowles – Near Shore Summary
Dr. Alan Haney – Upland Sensitive Areas
Dr. Vince Heig – Upland Sensitive Areas
Dr. Bob Bell - Algae
Dr. Robert Freckmann – Aquatic Plants and Upland Sensitive Areas
Dr. Tim Ginnett – Birds
Brad Bulin (Graduate Student) – Birds
Dr. Ron Crunkilton – Fish
Steve Bradley (Portage County Conservationist) – Land Use Coverages/Watersheds
Lynn Markham – Planning Assistance
Mike Hansen – Portage County Planning Assistance
Dr. Erik Wild – Reptiles and Amphibians/Near Shore Habitat
Roni Pelaski (Graduate Student) – Reptiles and Amphibians/Near Shore Habitat

Sunset Study. Lake Management Plan Update Participants
Lettie W. Jensen Community Center, October 25, 2014

Sunset Lake Plan Update Participants

Phillip Hacker
Helen Klimowicz
Jenny Larsen
Pat Quigley

University of Wisconsin Stevens Point

Nancy Turyk – Center for Watershed Science and Education
Sarah Hull Center for Watershed Science and Education

Portage County

Randy Slagg-Conservation Technician

Sunset Lake Management Plan 2023 Update Participants

Sunset Lake Residents

Pat Quigley
Jenny Larson
Mary Dahlen
Gerry O'Brien
Mary O'Brien

Portage County

Tracy Arnold-Conservation Technician
Jen McNelly-Water Resource Specialist

Wisconsin Department of Natural Resources

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

University of WI Stevens Point

Sam DeRoche-Program Manager, Central WI Environmental Station
Paul List-Graduate Assistant, Central WI Environmental Station
Paul Skawinski, Citizen Lake Monitoring Network Educator, Extension Lakes
Dr. Ray P Reser PhD. RPA, Emeritus Professor of Archaeology

Table of Contents

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

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

Mission Statement (created 2022)

Sunset Lake will maintain a healthy and sustainable fishery and will support a healthy, balanced, and diverse native aquatic plant community. Existing habitat that is critical to a healthy ecosystem in Sunset Lake will be protected while preserving the quiet setting of Sunset Lake and allowing for recreational opportunities.

Mission Statement Objectives (created 2022)

Mission Statement Objective 1 – Fisheries
Mission Statement Objective 2 – Aquatic Plants
Mission Statement Objective 3 – Critical Habitat
Mission Statement Objective 4 – Community

List of Goals (reorganized 2022)

GOAL 1-Eurasian Water Milfoil (EWM) will be managed, and new aquatic invasive species (AIS) will be prevented from becoming established in Sunset Lake. We will know we have achieved this goal when no new AIS are identified in the lake through our monitoring efforts and EWM is limited or non-existent.

GOAL 2-Maintain the water quality in Sunset Lake at 2002/2003 concentrations [average summer TP (total phosphorus) concentration of 12/UG/L with algae blooms (10 UG/L) occurring 11% of the days]. We will know that we are achieving this when monitoring indicates that median summer (5 samples/summer) total phosphorus remains 12 UG/L. Funding streams will be identified and sought to facilitate this maintenance.

GOAL 3-The shoreland vegetation around Sunset Lake will provide habitat, protect water quality, and provide a sense of privacy for shoreland residents and lake users. Shorelands will be maintained or improved to accomplish the goal. We will know we have accomplished the goal when 75% shoreland buffers around Sunset Lake are consistent or better than the requirements in the state shoreland zoning ordinance.

GOAL 4-Town of New Hope can utilize the visions, wishes, and goals documented in this lake management plan when considering town-level management planning or decisions within the watershed that may affect the lake.

GOAL 5-To foster communication and education with the community and users of Sunset Lake.

GOAL 6-Annually review and update the Sunset Lake Management Plan and AIS rapid response plan.

Introduction

Sunset Lake is located in the Town of New Hope in Portage County, Wisconsin. Those who use and enjoy the lake value it for its natural beauty, peace and tranquility, wildlife viewing, fishing, and recreational opportunities.

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 Sunset Lake and 28 other Portage County lakes was 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.

The purpose of this lake management plan is to provide guidance to prevent or solve problems that may harm Sunset Lake and its watershed.

As important as data collection is to any management plan, the success of the plan depends upon citizen involvement. The Sunset Lake management plan was developed by a committee of 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 survey was sent to 41 residences within the Sunset Lake watershed. The survey was also available online for any members of the public interested in participating. Seventeen citizen surveys were returned, for a response rate of 41%.

The Sunset Lake management planning committee met over the course of five months, learning about the lake and developing the original lake management plan. The overall goal for the Sunset Lake Management Plan includes incorporating the qualities and values identified in the citizen survey, utilizing the history of the lake and family heritage/genealogy of those who live on the lake, and working to achieve a balanced lake by reducing conflict, increasing educational opportunities, and protecting natural shorelines.

The discovery of and continuing efforts to eliminate invasive aquatic species has renewed interest in the Sunset Lake Management Plan and has been the impetus for this updated version. It is intended to retain the original plan where still relevant, new data has not been found or is not available.

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 Sunset Lake can have the greatest influence on the lake by understanding and choosing lake-friendly options to manage their land and the lake.

- **Citizens:** This plan provides citizens with a well-thought-out plan for the lake and lists options that can easily be prioritized. Annual review of the plan will also help citizens to realize their accomplishments. Resources and funding opportunities for lake management activities are made more available by placement of goals into the lake management plan, and citizens can identify partners to help achieve their goals for Sunset Lake.
- **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 New Hope**: 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 the lake.
- **Portage County:** County professionals will better know how to identify needs, provide support, base decisions, and allocate resources to assist in lake-related efforts documented in this plan. This plan can also inform county board supervisors in decisions related to Portage County lakes, streams, wetlands, and groundwater.
- **Wisconsin Department of Natural Resources**: Professionals working with lakes in Portage County can use this plan as guidance for management activities and decisions related to the management of the resource, including the fishery, and invasive species. Lake management plans help the Wisconsin Department of Natural Resources to identify and prioritize needs within Wisconsin's lake community and decide where to apply resources and funding. A well-thought-out lake management plan increases an application's competitiveness for state funding– if multiple Portage County lakes have similar goals in their lake management plans, they can join together when seeking grant support to increase competitiveness for statewide resources.

2023 UPDATE

A resident survey was conducted in 2023. This survey was approved by the WI DNR prior to sending it out. Sunset Lake Association took the lead on sending the resident survey. The resident survey was hybrid, being available both electronically and hardcopy if requested. We did receive one request for a hard copy. That was sent out and results were added to the submitted data. All results from the resident survey were put into a document and shared with the Sunset Lake Association. The results will also be shared throughout this lake management plan update. For a full copy please visit: www.sunsetlakeportageco.com or email sunsetlakepoco@gmail.com

Sunset Lake Association

The Sunset Lake Association currently has 25 members who have signed up and paid dues for 2023. The Incorporation paperwork was filed with the State of Wisconsin and accepted in December 2022. Top priorities for 2023 include developing an Association website, continuing the Milfoil control efforts during the summer months, and reviewing the Lake Management plan.

Actions	Lead person/group	Start/end dates	Resources
Elect a Board of Directors	Sunset Lake Association	Complete 01/2023	Extension Lakes
Create and adopt bylaws	Sunset Lake Association	Complete 01/2023	Extension Lakes
Develop a Sunset Lake Association website	Sunset Lake Association	2023	
Review Lake Management Plan	Sunset Lake Association/ Portage County Land and Water Conservation Dept	2022/2023	Portage County Land and Water Conservation Dept WI DNR UWSP Extension Lakes

Contact information for Sunset Lake Association:

Email: sunsetlakepoco@gmail.com
Website: www.sunsetlakeportageco.com

Mission, Goals, Objectives, and Actions

The overall goal for the Sunset Lake management plan is to identify actions that can be accomplished to ensure Sunset Lake can be enjoyed by current and future generations.

The following goals, objectives, and actions were derived from the values and concerns of citizens and members of the Sunset Lake Association, and the known science about Sunset Lake, its ecosystem, and the landscape within its watershed. Implementing and regularly updating the goals and actions in the Sunset Lake Management Plan will ensure that the vision is supported, and that changes or new challenges are incorporated into the plan. 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.**

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

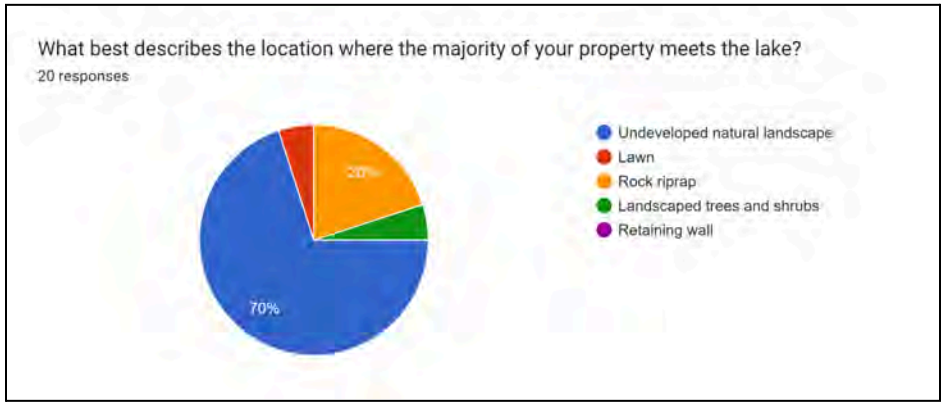
Recreation—access, sharing the lake, informing lake users, rules
Communication and Organization—maintaining connections for partnerships, implementation, community involvement Updates and Revisions—continuing the process
Governance—protection of the lake, constitution, state, county, local municipalities, Friends of Sunset Lake

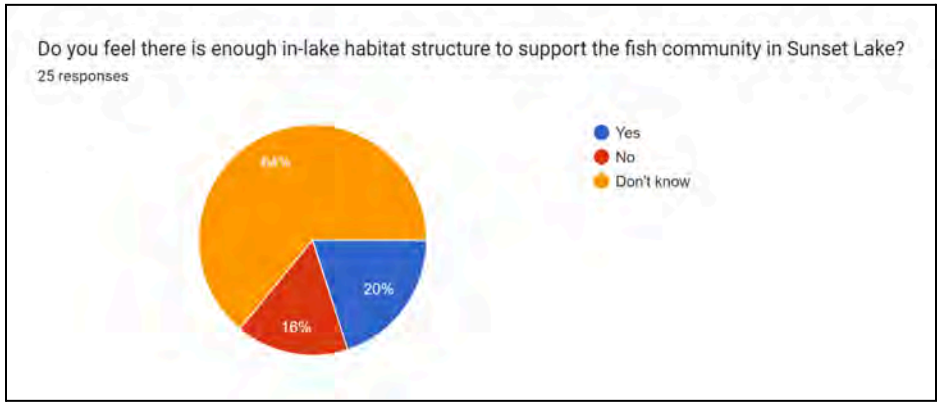
In-Lake Habitat and a Healthy Lake

Many lake-users value Sunset Lake 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.

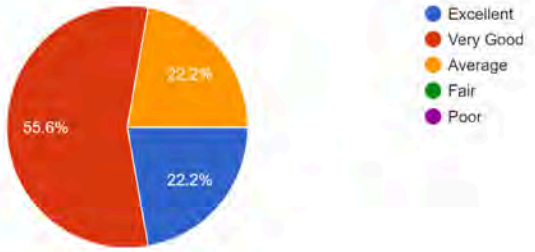
Lake habitat occurs within the lake, along all its shorelands, and even extends into its watershed for some species. Many animals that live in and near the lake are only successful if their needs – food, a healthy environment, and shelter – are met. Native vegetation including wetlands along the shoreline 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 Sunset Lake includes the aquatic plants, branches, and tree limbs above and below the water.

2023 RESIDENT SURVEY RESULTS

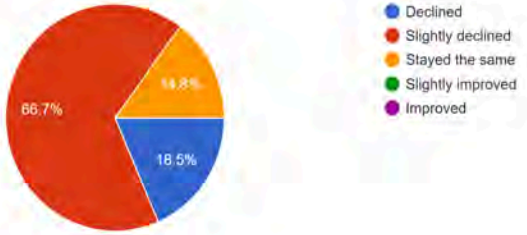




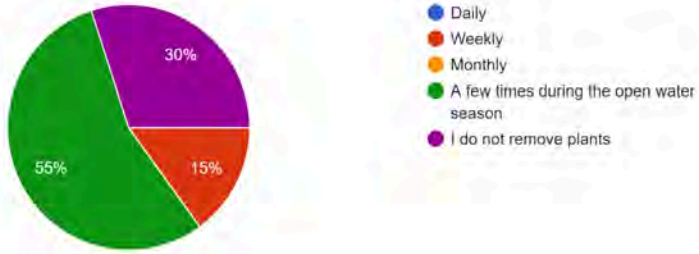
How would you rate the water quality in Sunset Lake currently?
27 responses



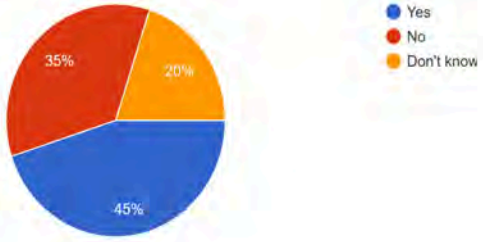
In general, since you have lived/recreated on or near Sunset Lake, do you feel that the lake water quality has...?
27 responses



How often do you remove aquatic plants from your shoreline?
20 responses



Have you installed any practices to control stormwater runoff from your property?
20 responses



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 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, by placing tree bundles ("fish sticks") in suitable shoreland areas, and protecting wetlands and other areas of critical habitat.

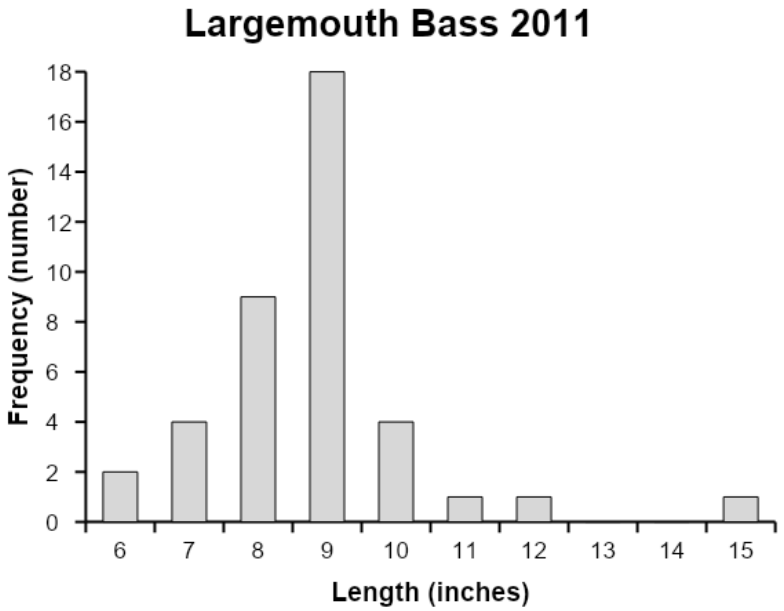
Photo courtesy of Limnology Center, UW Madison

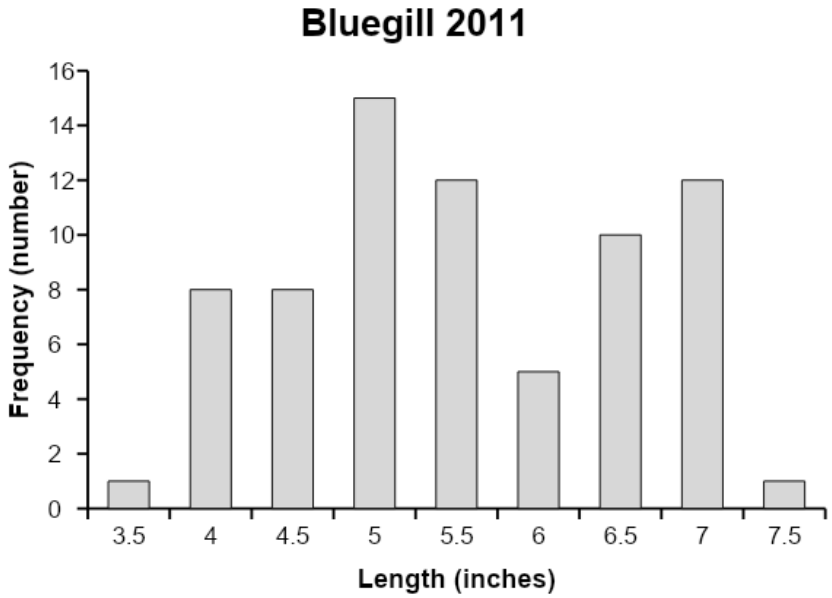
People are an important part of a sustainable fish community; their actions on the landscape and the numbers and sizes of fish taken out of the lake can influence the entire lake ecosystem. Adhering to the current or future appropriate fishing regulations can help to balance healthy populations of predator and prey fish species. Fishing regulations may be adjusted as the fish community changes, with the goal of maintaining a healthy fishery that 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 naturally present within the lake. In turn these fish communities provide fishing opportunities for people without the need for supplemental effort and expenses to maintain these ideal conditions. Healthy lake ecosystems are valuable natural resources for all lake users. It is important to maintain a good fishery so that wildlife, anglers, and families are able to enjoy the fishery on Sunset Lake. Survey respondents felt that the quality of fishing in Sunset Lake was fair, but that fishing had declined in recent years. A healthy fishery consists of healthy habitat, adequate forage, healthy spawning areas, and dynamic naturally-reproducing fish populations.

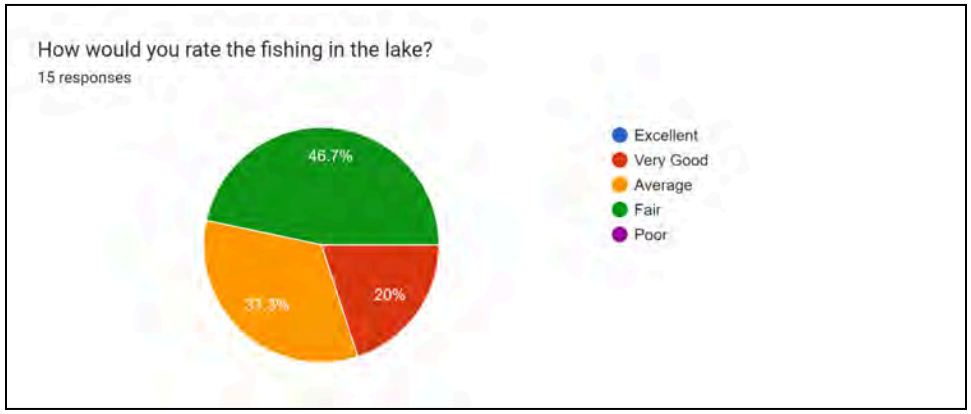
2014 Updates: Sunset Lake's fish community was surveyed through electrofishing by the Wisconsin Department of Natural Resources (WDNR) in 2010. More recent data has not been found.

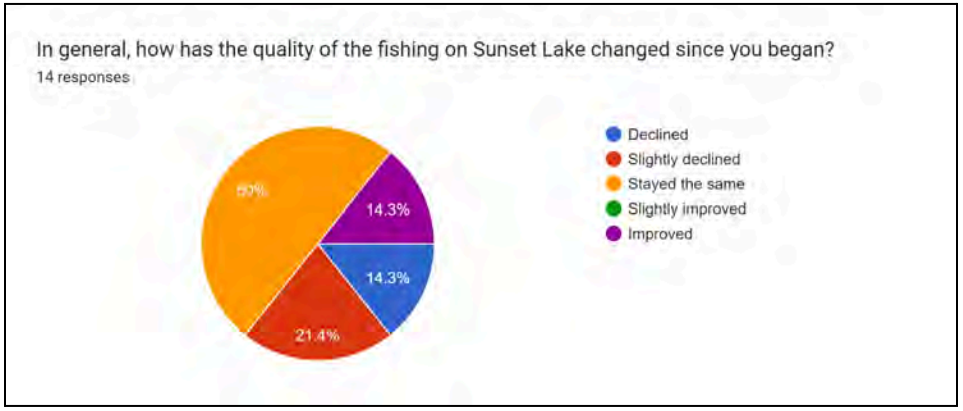
2022 Updates:

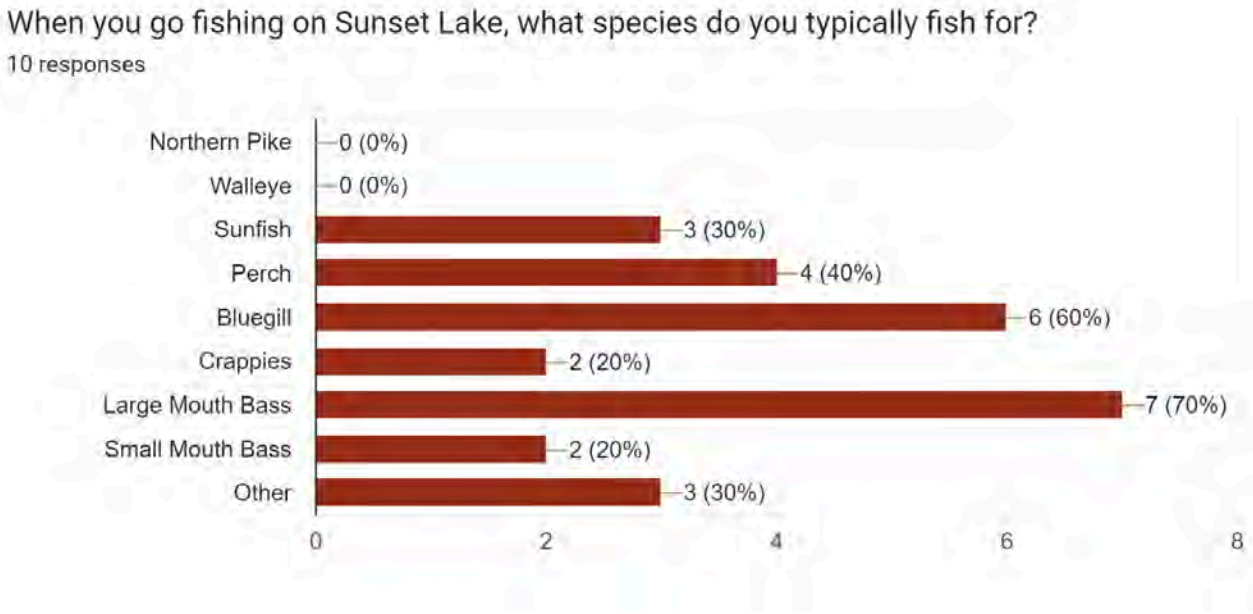
Sunset Lake's fish community was surveyed through summer fyke netting and fall electrofishing by the Wisconsin Department of Natural Resources (WDNR) in 2011. The next fisheries survey on Sunset Lake is planned to be conducted by the WDNR in 2023. For a fisheries lake class, Sunset Lake is considered a two-story lake with a simple sportfish assemblage. Lake class is helpful for comparing fish populations with other lakes that have similar productivity characteristics and fish communities. During the 2011 surveys, a total of 40 largemouth bass, 72 bluegill, and 7 yellow bullhead were captured. The average size captured was 9.2 inches for largemouth bass and 5.7 inches for bluegill. The average size largemouth bass and bluegill captured during the 2011 surveys were above the 75th percentile compared to the lake class standard for similar lakes. Largemouth bass ranged in length from 6.8-15.8 inches and bluegill ranged from 3.9-7.5 inches. The upcoming survey in 2023 will help identify any changes in the fishery since the 2011 survey and will shed light on future management for Sunset Lakes fishery.






How would you rate the fishing in the lake?
15 responses
46.7%
33.3%
20%
Excellent
Very Good
Average
Fair
Poor


In general, how has the quality of the fishing on Sunset Lake changed since you began?
14 responses
50%
14.3%
14.3%
21.4%
Declined
Slightly declined
Stayed the same
Slightly improved
Improved


When you go fishing on Sunset Lake, what species do you typically fish for?
10 responses
Northern Pike
Walleye
Sunfish
Perch
Bluegill
Crappies
Large Mouth Bass
Small Mouth Bass
Other
0 (0%)
0 (0%)
3 (30%)
4 (40%)
6 (60%)
2 (20%)
7 (70%)
2 (20%)
3 (30%)
0
2
4
6
8

Guiding Vision for the Fish Community

The planning committee for Sunset Lake envisions a lake with a healthy balanced fishery that has adequate habitat.

Mission Statement (MS) Objective 1.0 - Fisheries

MS Objective 1.1. Learn about the fishery in Sunset Lake and how it can be managed in a sustainable manner.

Actions	Lead person/group	Start/end dates	Resources
Work with UWSP and WDNR to conduct a survey of the fish community to learn if the fishery is balanced and what might be adjusted to improve the balance.	Sunset Lake Association	2023	WDNR Fisheries Biologist UWSP Fisheries Society
Encourage allowing woody habitat to remain in Sunset Lake if it falls in to provide habitat for numerous species. Disseminate information regarding these benefits.	Sunset Lake Association	Ongoing	WDNR Fisheries Biologist WDNR Healthy Lakes grants Portage County Land/Water Conservation
Encourage Portage County Parks to identify areas where woody habitat could be placed.	Sunset Lake Association/ Portage Co. Parks Dept.	2023	WDNR Fisheries Biologist Portage Co. Land and Water Conservation Dept WDNR Healthy Lakes grants

MS Objective 1.2. Ensure that fishing regulations will be followed by all who fish on Sunset Lake.

Actions	Lead person/group	Start/end dates	Resources
Enforce fishing regulations.	WI DNR wardens	Ongoing	WI DNR

The Aquatic Plant Community

Aquatic plants provide the forested landscape within Sunset Lake. They provide food and habitat for spawning, breeding, and survival for a wide range of inhabitants and lake visitors including fish, waterfowl, turtles, amphibians, as well as invertebrates and other animals. They improve water quality by releasing oxygen into the water and utilizing nutrients that would otherwise be used by algae. A healthy lake typically has a variety of aquatic plant species which creates diversity that makes the aquatic plant community more resilient and can help to prevent the establishment of non-native aquatic species. 65% of the survey respondents felt the amount of aquatic plant growth in Sunset Lake was just right to support healthy fish and wildlife populations and did not inhibit use of Sunset Lake. Aquatic plant growth occurs in areas of the lake where sunlight can reach the lakebed, which is a limiting factor in Sunset Lake. This increases the importance of avoiding disturbance of native aquatic plants.

In July of 2016, a Point Intercept (PI) survey was conducted on Sunset Lake. The plant coverage on Sunset Lake is not overly extensive due to the quick drop off in depth of the water. Of the 296 sampling sites, 102 of them had vegetation (34.50% of the whole lake, or 88.70% of the littoral zone). Plants were found throughout the lake in less than 30 feet of water. The littoral zone of Sunset Lake is near shore and is where plants can grow with abundant enough sunlight to penetrate to the lakebed. Relative Frequency is a measure of the percentage of each plant species sampled in the entire lake. In Sunset Lake, Chara sp., Potamogeton gramineus, and Najas flexillis were among the most common species sampled in the 2016 survey, all of which are native species.

In July of 2022, the Wisconsin Department of Natural Resources along with staff from UW Extension Lakes conducted a PI survey for Sunset Lake. The results from the 2022 PI survey can be found below to help visualize the findings. Of the 297 sites sampled, 56 of them had vegetation (18.86% of the whole lake, or 71.80% of the littoral zone). The littoral zone for Sunset Lake was within water less than 25 feet. This is shallower than back in 2016 and the increased water levels may have been due to this change in the littoral zone limiting the area of plant growth and lowering the vegetation throughout the lake. Based on the 2022 PI Survey, Chara contraria, Potamogeton gramineus, and Myriophyllum spicatum were the most common species sampled, respectively. Myriophyllum spicatum also known as Eurasian Watermilfoil is a nonnative, invasive species that can be controlled through management practices (talked about more in the Aquatic Invasive Species section). Species richness changed from nine in 2016 to eleven in 2022, which is the number of different plant species within the lake. With the inclusion of visuals (seen but not sampled), richness is thirteen for 2016 and fourteen for 2022. The Floristic Quality Index value also slightly increased from 15.87 in 2016 to 17.39 in 2022. The FQI value helps to represent the quality of the native plant community within the lake. Sunset lakes FQI falls within the margins of good overall quality based on the FQI.

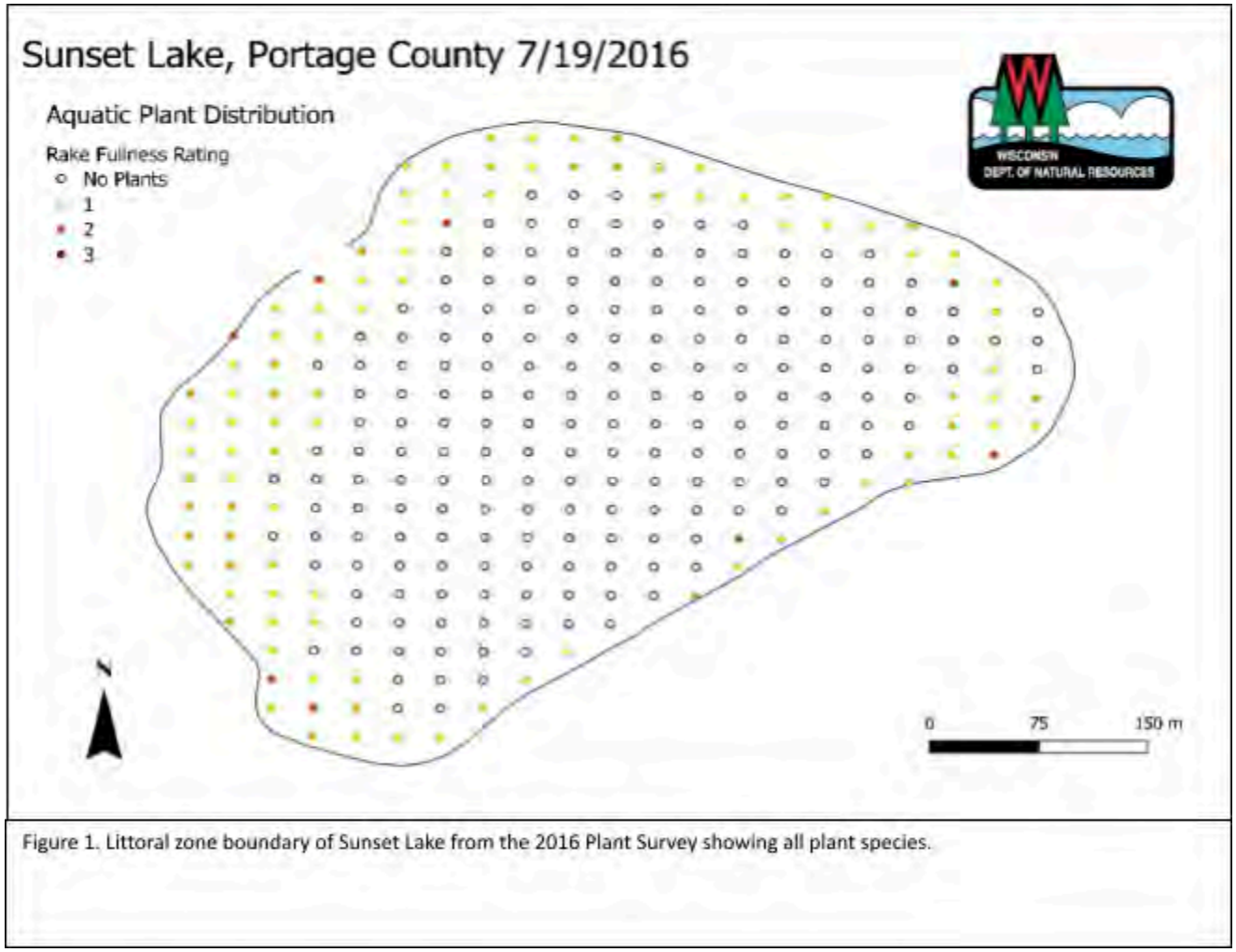
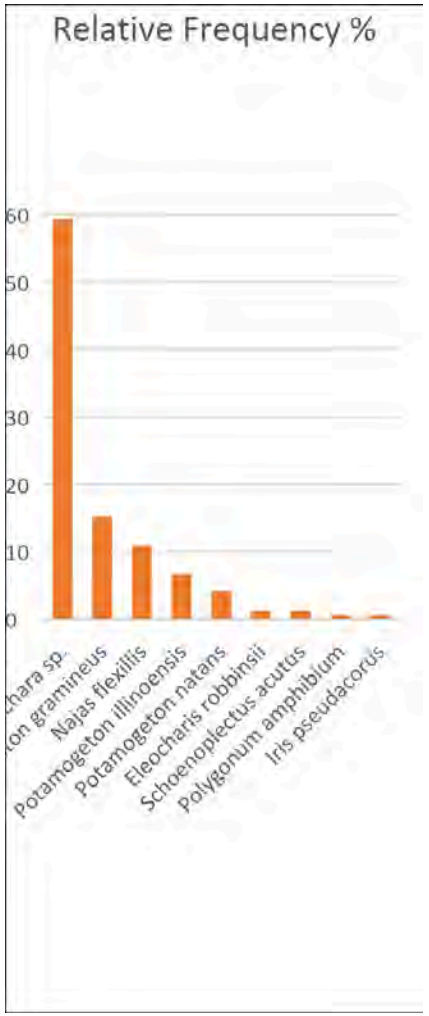
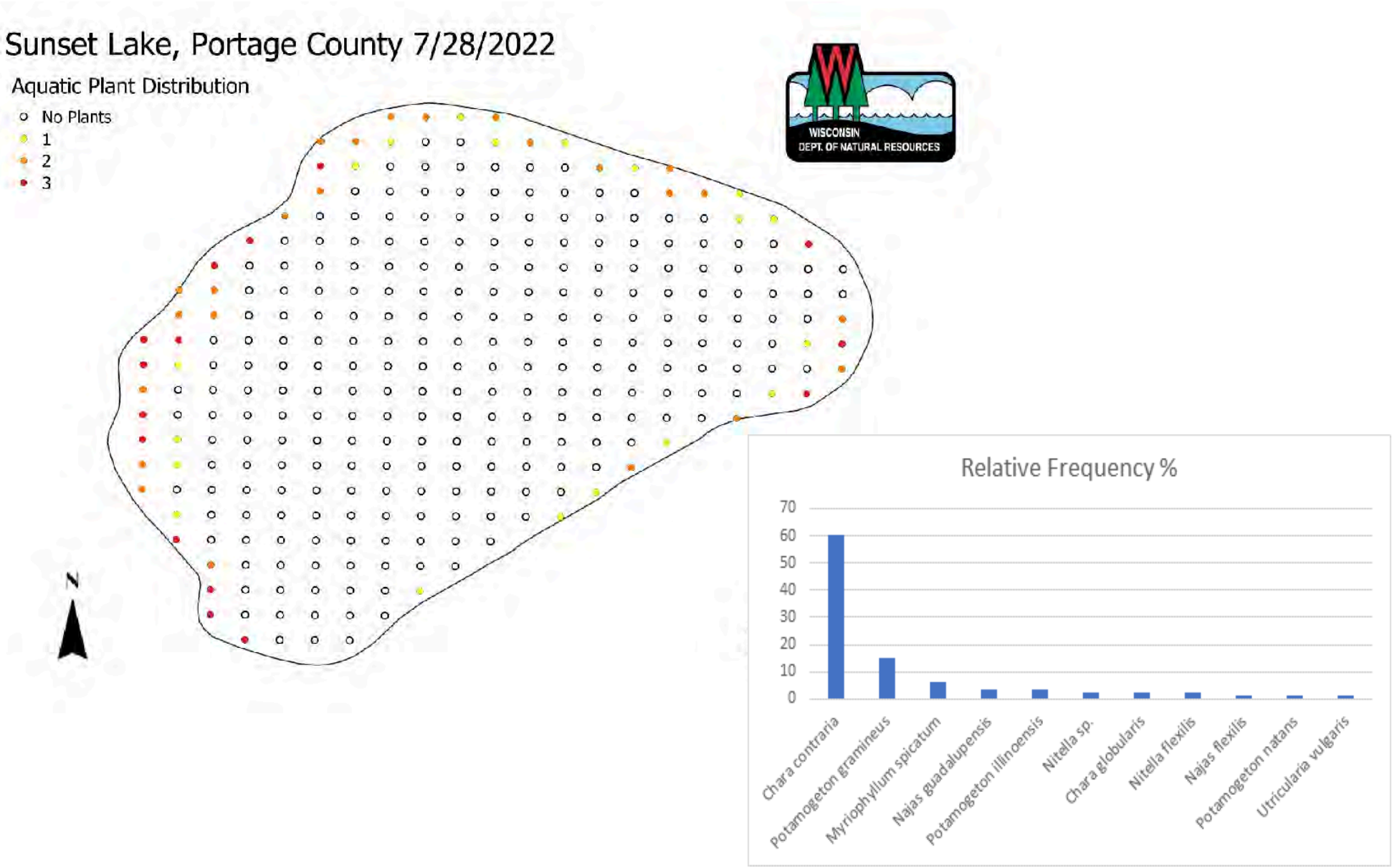


Figure 1. Littoral zone boundary of Sunset Lake from the 2016 Plant Survey showing all plant species.




Sunset Lake, Portage County 7/28/2022
Aquatic Plant Distribution
No Plants
1
2
3
N
WISCONSIN
DEPT. OF NATURAL RESOURCES
Relative Frequency %
70
60
50
40
30
20
10
0
Chara contraria
Potamogeton gramineus
Myriophyllum spicatum
Najas guadalupensis
Potamogeton illinoensis
Nitella sp.
Chara globularis
Nitella flexilis
Najas flexilis
Potamogeton natans
Utricularia vulgaris

Guiding Vision for the Aquatic Plant Community

The planning committee for Sunset Lake envisions a lake with healthy native aquatic plant communities that provide habitat, food, and spawning areas, and also help to maintain the water quality in Sunset Lake.

Mission Statement (MS) Objective 2.0 – Aquatic Plants

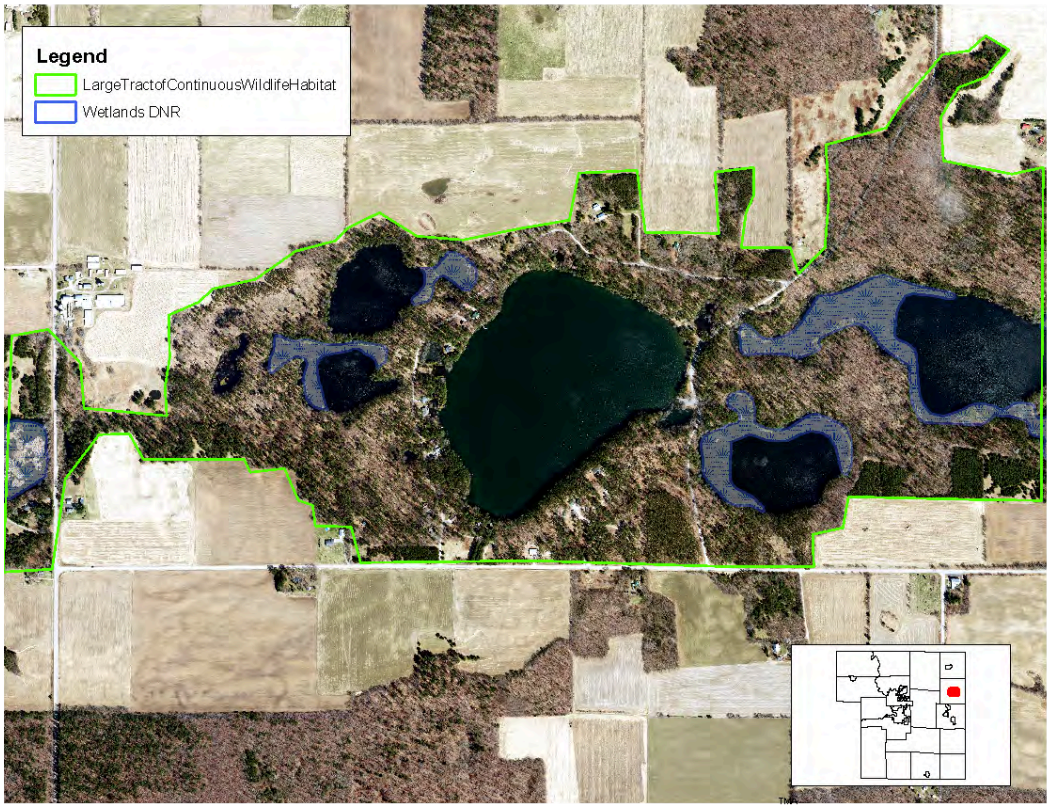
(MS) Objective 2.1. Learn about the native aquatic plant communities in Sunset Lake to understand what is present and if any additional protections are warranted.

Actions	Lead person/group	Start/end dates	Resources
A point-intercept (P.I.) survey of the aquatic plant community should be conducted every 5 years to obtain data for treatment and/or management of EWM.	WDNR	Completed in 2022, Next in 2027	WDNR Water Resource Mgmt Specialist Golden Sands RC&D UWSP Consultant
Invite WDNR aquatic plant specialists to share information about recent aquatic plant surveys in Sunset Lake. This data should also be provided to the Central Wisconsin Environmental Station (CWES).	Sunset Lake Association	2022 and As needed	WDNR Water Resource Mgmt Specialist CWES
Request that Golden Sands RC&D hold a native aquatic plant identification workshop.	Sunset Lake Association	As needed	Golden Sands RC&D CWES
Distribute information about the benefits of leaving healthy native aquatic plant communities intact, and how they can help reduce potential establishment of aquatic invasive species.	Sunset Lake Association	Ongoing	Extension Lakes Golden Sands RC&D

Critical Habitat

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

Protection of these areas near Sunset Lake is important because they exemplify the character and qualities of the lake in addition to ensuring the long-term health of the lake. The sensitive areas that were identified by researchers in the lake study can be found in the Sensitive Areas appendix. More details about critical habitat areas are available online at: http://dnr.wi.gov/lakes/criticalhabitat/ .



Reptile and Amphibian Habitat

From: Paloski and Wild, UWSP Portage County Lake Study, 2003.

Reptile and Amphibian Habitat are highlighted in red. Salamander Habitat is highlighted in yellow.

Guiding Vision for the Critical Habitat

The planning committee for Sunset Lake envisions measures taken to protect habitat that is critical to a healthy ecosystem in Sunset Lake.

Mission Statement (MS) Objective 3.0 – Critical Habitat

MS Objective 3.1. Protect the critical habitat areas near Sunset Lake that were identified in the Portage County Lakes Study.

Actions	Lead person/group	Start/end dates	Resources
Protect the small wetland near the boat landing that provides excellent frog habitat.	Sunset Lake Association	Ongoing	Portage Co. Parks Portage Co. Land and Water Conservation Dept
Protect the large, wooded area at CWES that provides excellent salamander habitat.	CWES	Ongoing	Conservancy easements
Control road runoff from entering the wetland near the park.	Portage Co. Parks	Completed in 2014	Portage Co. Land and Water Conservation Dept
Discuss potential critical habitat management strategies to be included in property plans for CWES and County Parks plans.	Sunset Lake Association		CWES Portage Co. Parks
Encourage CWES to use the critical habitat information for Sunset Lake as part of their teaching mission.	CWES, Sunset Lake Association	Ongoing	

Communication and Organization

Working together on common values will help to achieve the goals that are outlined in this plan. This will involve communication between individuals, the Town of New Hope, Portage County, resource managers, and elected officials. In addition, staying informed about lake and groundwater-related topics will be essential to achieving the goals laid out in this plan.

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

2014 Updates: The citizens around Sunset Lake formed a private group on Facebook called the "Sunset Lake Community".

2022 Updates: CWES noted the need for a body to spearhead the management of Sunset Lake and the removal of EVM which has resulted in the development of the Sunset Lake Conservation Program (SLCP). SLCP consists of and is open to all interested citizens, residents on Sunset Lake, Water Quality Specialists, the 6th grade class from Tomorrow River Community Charter School, and UWSP student-led organizations. Sunset Lake Association replaced the Sunset Lake Conservation Program title. Same mission to protect and enhance Sunset Lake by working together.

Photo credit: Central Wisconsin Environmental Station

Guiding Vision for the Community

The planning committee for Sunset Lake envisions measures taken to preserve the quiet setting of Sunset Lake while allowing for recreational opportunities.

Mission Statement (MS) Objective 4.0 - Community

MS Objective 4.1. Provide recreational opportunities to enjoy Sunset Lake while minimizing conflicts between users and protecting lake water quality and habitat.

Action	Lead person/group	Start/end dates	Resources
Utilize law enforcement officers to ensure beach rules are followed (alcohol, dogs, closure at 11 PM).	Portage County Sheriff Dept/ Portage County Parks Dept.	Ongoing	Portage County Sheriff Dept Portage County Parks Dept.
Maintain the no wake status on Sunset Lake and place a sign at the boat landing to inform boaters of this status.	Sunset Lake Association Town of New Hope	2023	Portage County Parks Dept.
No unleashed dogs on the beach at the County Park	Lake visitors	Ongoing	Portage County Parks Dept.
Per Portage County Shoreland Ordinance, maintain/enhance the native shoreland 35 foot buffer area to protect the water quality of Sunset Lake and reduce goose poop on shoreland.	Sunset Lake Association	Ongoing	WDNR Healthy Lakes/River Grant Portage County Land & Water Conservation Dept

List of Goals: (updated 2022)

Goal 1 - EWM will be controlled, or eradicated, and new aquatic invasive species (AIS) will be prevented from becoming established in Sunset Lake. We will know we have achieved this goal when no new AIS are identified in the lake through our monitoring efforts and EWM is limited or non-existent.

Goal 2 - Maintain the water quality in Sunset Lake at 2002/2003 concentrations (average summer TP concentrations of 12 ug/L with algae blooms (10 ug/L) occurring 11% of the days). We will know that we are achieving this when monitoring indicates that median summer (5 samples/summer) total phosphorus remain 12 ug/L.

Goal 3 - The shoreland vegetation around Sunset Lake will provide habitat, protect water quality, and provide a sense of privacy for shoreland residents and lake users. Shorelands will be maintained or improved to accomplish this goal.
We will know we have accomplished this goal when shoreland buffers around Sunset Lake are consistent or better than the requirements in the state shoreland zoning ordinance.

Goal 4 - Town of New Hope can utilize the visions, wishes, and goals documented in this lake management plan when considering town-level management planning or decisions within the watershed that may affect the lake.

Goal 5 - To foster communication and education with the community and users of Sunset Lake.

Goal 6 - Annually review and update the Sunset Lake Management Plan and AIS rapid response plan.

Aquatic Invasive Species (AIS)

Aquatic invasive species (AIS) are non-native aquatic plants and animals that are most often unintentionally introduced into lakes by lake users. This most commonly occurs via trailers, boats, equipment, and from the release of bait. In some lakes, aquatic invasive plant species can exist as a part of the plant community, while in other lakes populations explode and create dense beds that can damage boat motors, make areas non-navigable, inhibit swimming and fishing, and disrupt the lakes' ecosystems.

Routine monitoring should be done frequently by volunteers trained in AIS identification and proper removal methods. If other AIS are found, refer to the AIS Rapid Response Plan (appendices). Coordinate monitoring efforts with the Central Wisconsin Environmental Station (CWES), Sunset Lake residents, the Sunset Lake Conservation Program, Golden Sands Resource Conservation & Development Council, Inc. (Golden Sands RC&D), and the Aquatic Plant Biologist with the WDNR.

Curly-leaf pondweed (CLP)

Curly-leaf pondweed (CLP) can live in harmony with the aquatic plant community but may become invasive. The die-off of large beds of CLP in June can contribute to nuisance algae blooms throughout the summer. CLP has been known to be present in Sunset Lake since 2009 but has not been abundant enough to cause concern.

Eurasian watermilfoil (EWM)

In some lakes, Eurasian watermilfoil (EWM) can exist as part of the plant community, while in others EWM can create dense beds that can damage boat motors, make areas non-navigable, and inhibit recreational activities. This plant can produce viable seed; however, it often spreads by fragmentation. Just a small fragment of the stem is enough to start a new plant, so spread can occur quickly if plants are located near areas of activity such as beaches and boat launches. According to the WDNR website, EWM can potentially hybridize with northern milfoil. Hybrid forms (HWM) tend to be more resistant to chemical treatment.

EWM has been known to be present in Sunset Lake since 2009. According to Golden Sands RC&D, the two primary locations to watch for EWM are on the southern end of the lake, near the wetland clearing and near the pier; however, EWM has been found around the entire shore. Since 2009, hand-pulling has been conducted by trained volunteers and divers, in addition to chemical treatments. Table 1 on the next two pages summarizes these management efforts.

Curly-leaf pondweed (CLP).

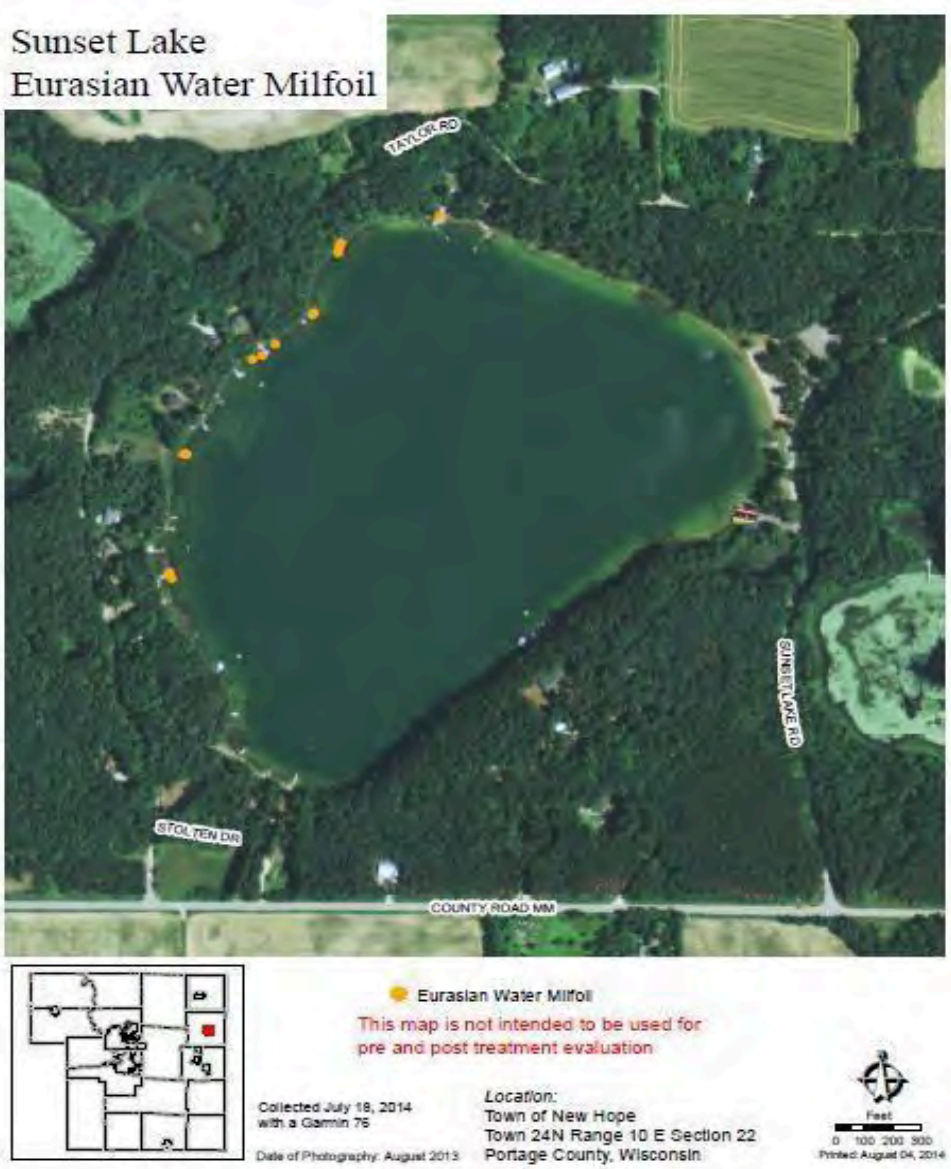
Eurasian watermilfoil (EWM).

Golden Sands Resource Conservation and Development (RC&D) Work on Sunset Lake

Paul Skawinski conducted an aquatic invasive species volunteer training workshop at Sally Clanton's house in June 2009. Helen Klimowicz was in attendance there. Worked with Helen that year after she discovered EWM in the lake. Found some EWM near the boat landing in Fall 2009. Over the winter of 2009-10, Paul Skawinski wrote a grant proposal to WDNR for an Early Detection / Rapid Response grant for Sunset, Lime, and Pickerel Lakes (all had small populations of EWM discovered in 2009 and no established lake association/district). The County served as the sponsor for the grant. This grant was received, and small-scale herbicide treatments were done in spring 2010 on each of those lakes.

From 2010 - 2014, Skawinski assisted Helen Klimowicz as needed with monitoring and removal of EWM in Sunset Lake.

After 2014, when Paul Skawinski transitioned out, Chris Hamerla started working with Sunset Lake. Chris Hamerla worked with Helen Klimowicz numerous times to train volunteers around the lake on how to ID EWM in the hopes they would pull plants as they found them. Helen and perhaps a few volunteers did continue to do EWM removal around the lake. No work during 2015 and 2016 but Helen Klimowicz was actively collecting fragments and doing EWM removal. In August of 2017 Chris Hamerla surveyed and mapped EWM. In June of 2018 the EWM was mapped with Helen's help. In July 2018 an EWM ID and removal training was held at CWES and an EWM removal took place after the training. Following the CWES event, Sunset Lake paid for another removal date using SCUBA. See attached picture. August of 2019 a lake resident did some diving and found deeper plants. Volunteers were trained to ID and remove EWM. June of 2020 Golden Sands monitored for EWM and gave info to Helen Klimowicz for volunteers to plan EWM removals. EWM removal using 2 snorkelers paid for by Sunset Lake. July of 2021 meeting with CWES personnel to discuss EWM removal graduate program. April 2022 Chris Hamerla, participated in a Sunset Lake management planning discussion meeting.



Eurasian watermilfoil around Sunset Lake, conducted in 2014 by Paul Skawinski/Kayce Stushek of Golden Sands RC&D partnering with Portage Co.

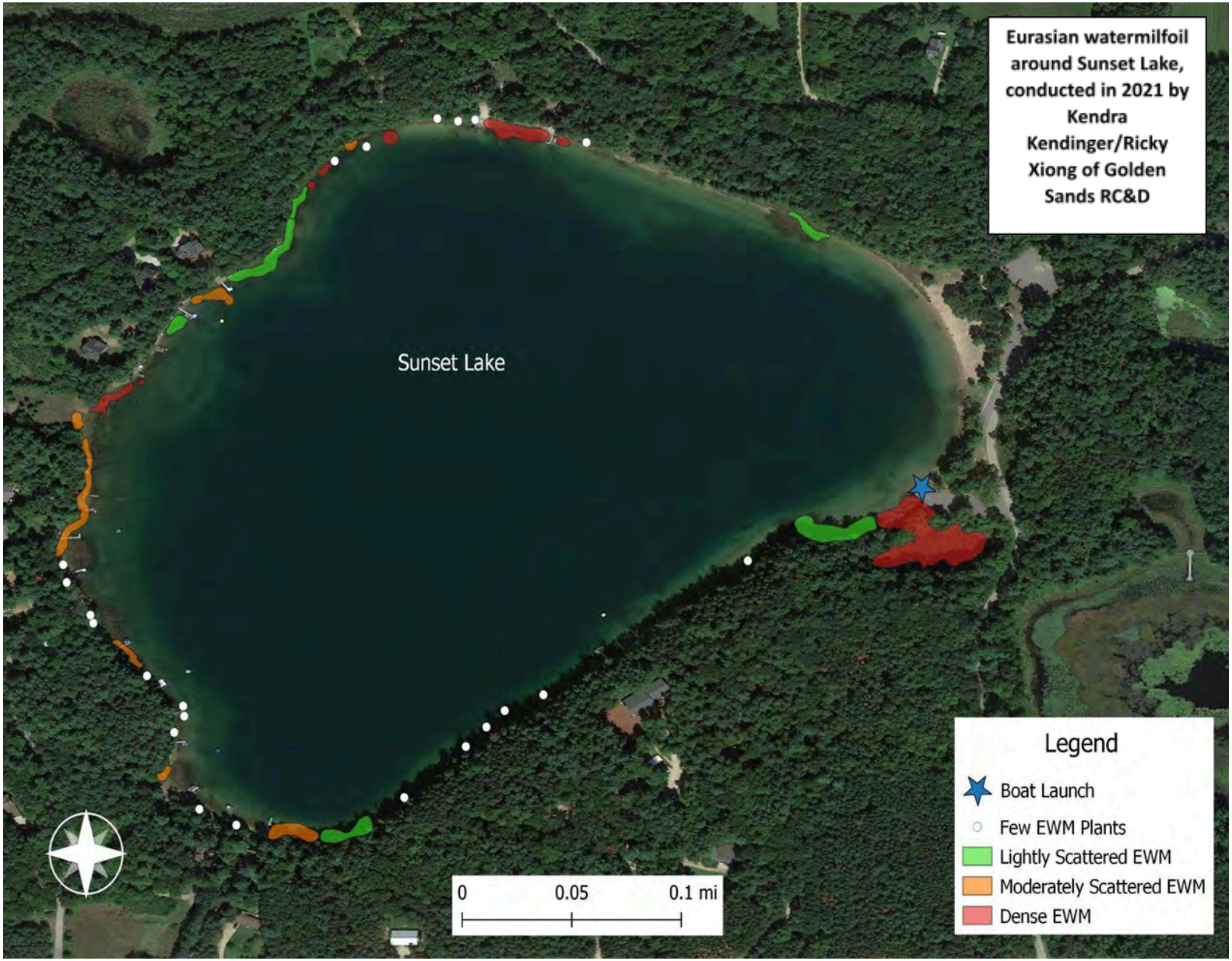
July 2021 EWM survey conducted by Golden Sands.

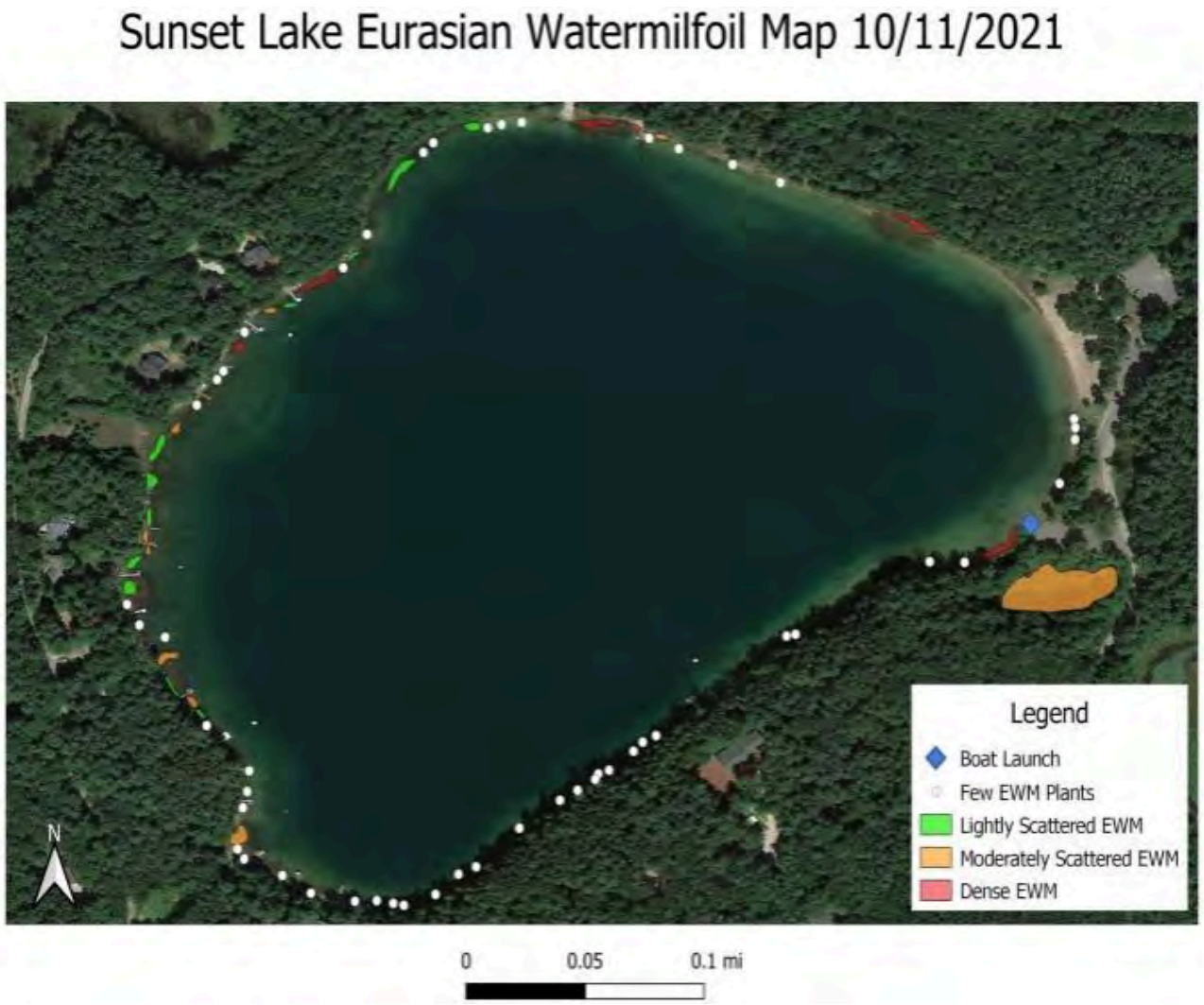
GOLDEN SANDS
RESOURCE CONSERVATION & DEVELOPMENT COUNCIL, INC.
1100 Main Street, Suite #150
Stevens Point, WI 54481
Phone (715) 343-6215
https://www.goldensandsrcd.org/
a 501(c)3 non-profit conservation organization
Conservation That Works!

Sunset Lake, Portage Co, 2021 EWM Map

Survey: A visual survey was conducted on Sunset Lake in Portage County, Wisconsin on July 15th, 2021 by Golden Sands RC&D. The survey was completed by AIS Technicians Kendra Kundinger and Ricky C. Xiong. The survey was completed around the entire shoreline of Sunset Lake. The survey was done on kayak and observed the plants range from shoreline to observable depth.

Results: Eurasian watermilfoil (EWM) was found along most of the shoreline in Sunset Lake. There were very dense populations of EWM in Frog Pond (South-East side of Sunset Lake) which is now connected to the lake due to high water levels in recent years. Other than Frog Pond, the eastern side of the lake had only one small patch of EWM. Dense Patches of EWM were also observed in the north part of the lake. The southern section of the lake had spread out patches of EWM. A large percentage of the western shoreline was covered in spread out patches of EWM that vary in density. Small one to two plants (white dots) were also noted throughout the lake. We suggest starting with these smaller locations to build confidence and see results. Some curly-leaf pondweed was also observed in certain areas. A map of the survey is located on the next page.


Eurasian watermilfoil around Sunset Lake, conducted in 2021 by Kendra Kendinger/Ricky Xiong of Golden Sands RC&D
Sunset Lake
Legend
Boat Launch
Few EWM Plants
Lightly Scattered EWM
Moderately Scattered EWM
Dense EWM
0
0.05
0.1 mi



10/11/2021 Survey:

A visual survey was conducted on Sunset Lake in Portage County, Wisconsin on October 11th, 2021 by Golden Sands RC&D. The survey was completed by AIS Technician Kendra Kundinger. The survey was completed around the entire shoreline of Sunset Lake by kayak and observed the plants' range from shoreline to observable depth. This was a follow-up survey to the previous survey conducted on July 15th, 2021 and after Milfoil Mondays have been conducted throughout the summer.

10/11/2021 Results: Eurasian watermilfoil (EWM) was found along a majority of the shoreline in Sunset Lake. There were more individual/a few plants in locations than mapped in our July survey. This could have been from different visibility conditions, new plant growth since mid-July, or plant deterioration due to late-season. The trees lining Frog Pond (Southeast side of Sunset Lake) had densely populated areas of EWM with Frog Pond being moderately populated. The Southern portion of the lake had scattered plants (no observed patches), which are denoted by the white dots on the map. A large portion of the Western side of the lake had varying scattered EWM. The Northern portion of the lake had a few densely populated areas with a few scattered plants. The Eastern side of the lake had very few, scattered plants mixed in with Sago pondweed (*Stuckenia pectinata*). A continued removal effort on Sunset Lake would be beneficial to help prevent any further spread of EWM.

Central Wisconsin Environmental Station Work on Sunset Lake

Paul List created a data collection tracking project for Eurasian Watermilfoil using anecdata. The project in its entirety can be viewed at: https://www.anecdata.org/projects/view/981. The project goal states, “Through this project, we hope to collaboratively preserve and restore Sunset Lake by removing the aquatic invasive species, Eurasian Watermilfoil.” Also stated, “This project is a partnership with the Central Wisconsin Environmental Station, Tomorrow River Community Charter School, Golden Sands Resource Conservation and Development, and the residents of Sunset Lake to track and remove Eurasian Watermilfoil, allowing Sunset Lake to continue to be a good home for plants, animals, and humans alike.” Removal efforts at CWES include, “continue to organize and host regular efforts to remove milfoil, with the assistance of community residents and students from TRCCS.” One program included Milfoil Monday’s where residents would meet and pull Eurasian Watermilfoil weekly. End of field season 2022, Central Wisconsin Environmental Station reported 2 tons/4,000 pounds of Eurasian Watermilfoil removed.

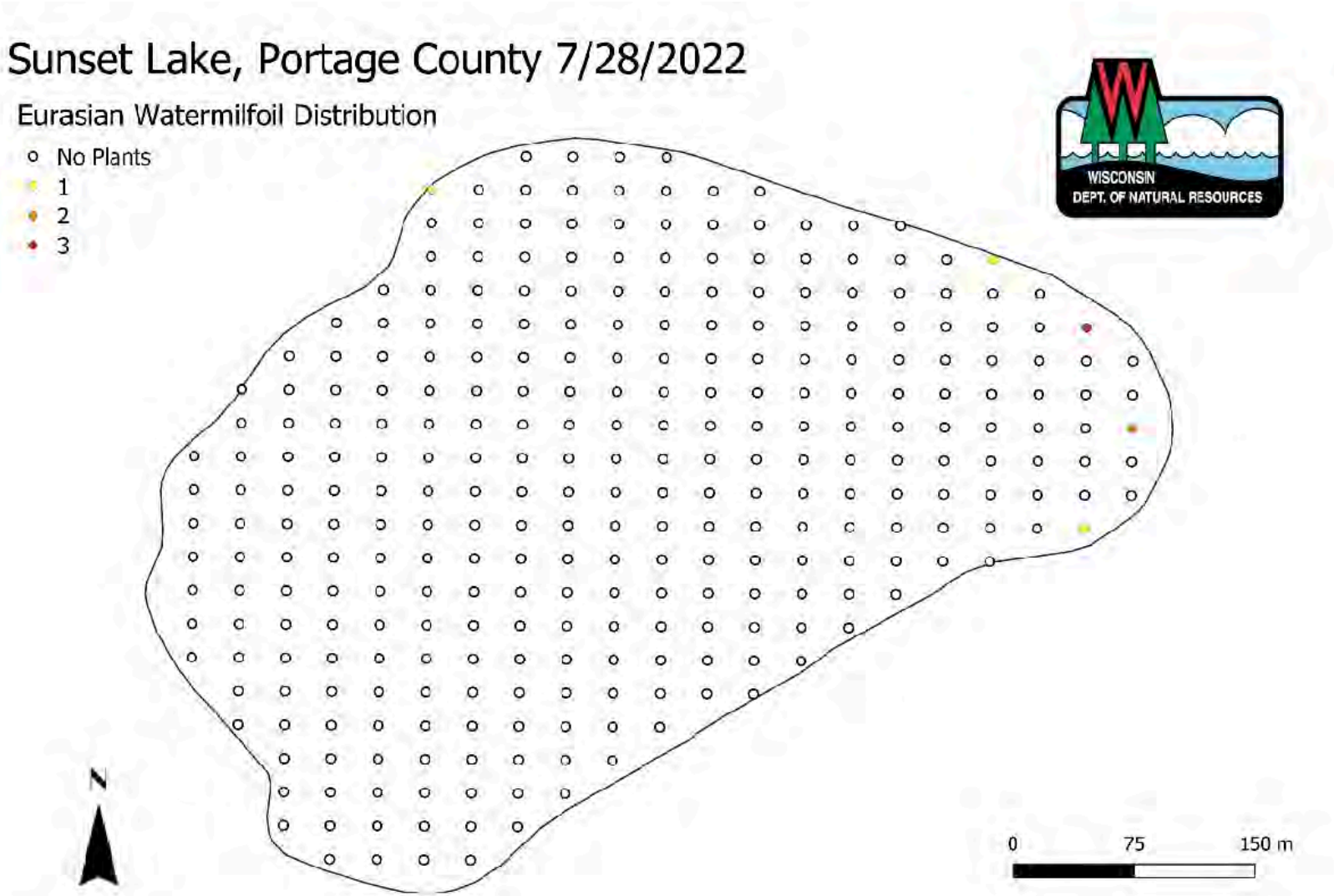

Sunset Lake, Portage County 7/28/2022
Eurasian Watermilfoil Distribution
No Plants
1
2
3
WISCONSIN
DEPT. OF NATURAL RESOURCES
N
0
75
150 m

Table 1. History of Eurasian watermilfoil (EWM) management in Sunset Lake.

Year	Notes	Point-Intercept (P.I.) Survey	Other Surveys	Hand-pulling	Hand-pulling (Divers)	Chemical Treatment	Plant ID Workshop
2009	EWM was first identified near boat landing and swimming beach.			X	X		
2010	Small-scale chemical treatment for EWM bed near boat landing (pre/post monitoring done).					X	
2011	No EWM was found near boat landing in 2011.		Visual Survey				
2012			Visual Survey	X			
2013				X			
2014	Visual survey of EWM conducted and mapped by Golden Sands RC&D (see appendices). Highest density location: southernmost location off pier on western side. Small plants in shallows on the northern side of wetland marsh.		Visual Survey	X			
2015	A P.I. survey was conducted by WDNR Water Resources Management Specialists. Visual survey of EWM conducted and mapped by Golden Sands RC&D (see appendices). EWM workshop hosted by Golden Sands RC&D. Volunteer Helen Klimowicz reported most of the EWM had been pulled except for an area off the pier on the southeastern side.	WDNR	Visual Survey	X			X
2016	Volunteer Helen Klimowicz reported most of the EWM had been pulled and continued to remove EWM by hand.			X			

Year	Notes	Point-Intercept (P.I.) Survey	Other Surveys	Hand-pulling	Hand-pulling (Divers)	Chemical Treatment	Plant ID Workshop
2017	RC&D conducted a survey and mapped EWM. Volunteer continued hand-pulling,		Visual Survey	X			
2018	RC&D conducted another survey and held EWM identification and removal training at CWES. SCUBA divers were hired to assist in removal of EWM.			X	X		X
2019	RC&D assisted with EWM identification and removal training.			X	X		X
2020	Volunteer Helen Klimowicz continued to recruit volunteers for hand-pulling efforts. Some volunteers used snorkels.			X			
2021	CWES partnered with volunteer Helen Klimowicz to begin the development of the Sunset Lake Conservation Program to consolidate and organize EWM removal. CWES sponsored and coordinated Milfoil Mondays for weekly hand-pulling by volunteers. CWES established the Green Team with the 6th grade class of the Tomorrow River Community Charter School to hand-pull and collect data on Fridays for a citizen science project.			X			
2022	Paul List has continued the Milfoil Monday project with residents, CWES staff and campers, and Tomorrow River Community Charter School 6th graders volunteering to hand pull EWM. Paul has also trained residents to record the results of their efforts in the ANECDATA app. The project name is **Sunset Lake Conservation Program: Eurasian Watermilfoil** https://www.anecdata.org/projects/view/981	X	X	X			

EWM Management Options for Sunset Lake:

Each lake is different and the response to control of EWM may differ from lake to lake. No single approach will be appropriate for all lakes. Often multiple approaches and adaptive year-to-year changes in approach are most successful. The population of EWM should be evaluated using a 'point intercept' method, accompanied by more thorough observations, before and after treatments to determine the effectiveness of an approach in a given year. Consultation with an aquatic plant biologist is recommended when selecting a strategy. Strategies for the subsequent year should be adjusted accordingly. EWM management involves evolving scientific knowledge; therefore, the management strategies for the management of EWM in Sunset Lake should be adapted as EWM populations in the lake change and as new information becomes available. Grants through the WDNR's AIS program may be available to cover the costs of some management options and PI surveys.

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

- **Hand-Pulling by Trained Volunteers -** ***This is a recommended option for Sunset Lake while EWM populations remain low.*** This can be done by individual lakefront property owners who have been trained in removal techniques that are intended to both be successful in removal and minimize fragmentation of the plant. Volunteers that have learned proper techniques in identifying and removing EWM and other AIS can remove plants by hand-pulling at any time and without a permit. While it is not advised, property owners are allowed to clear an area up to 30 feet around their dock for boating and swimming access to open water by hand harvesting without a permit.

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

- **Hand-Pulling (Diver-Assisted, with or without suction) -** ***This is a recommended option for Sunset Lake, at depths that require scuba gear*****.** Trained divers can be hired to manually remove AIS in deeper parts of the lake and in the "Frog Pond" next to the boat launch. Grants through the WDNR may be available to support hand-pulling efforts, and it was recommended that Sunset Lake volunteers work with other area lake groups to jointly apply for a grant. Assistance with this effort can be provided by Golden Sands RC&D, WDNR, or private consultants. Pulling EWM can also stir up bottom sediment, which can greatly reduce visibility. In this case, divers can use suction techniques which would reduce the disturbance of sediment.

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

- **Chemical Spot Treatment with Contact Herbicide (Early Season) -** Chemically treating aquatic invasive plants kills, but does not remove, the plants from the water. Decaying plants can sometimes cause conditions ideal for algae blooms and other water quality problems. All chemical treatments in the lake require a permit from the WNDR. Although the chemicals used are approved for use in aquatic environments by the US Environmental Protection Agency and WDNR, the full impacts to the aquatic ecosystem are still unknown (WDNR, 2012). For more information, see "Aquatic Plant Management Strategies" and "Large Scale Chemical Treatment Research in Wisconsin" (appendices).

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

The most recent information about chemical spot treatments suggests that they are effectively low-dose whole-lake treatments without the necessary contact time and concentrations. Studies of the effectiveness of chemical spot treatment for EWM control have been conducted in recent years. Results of these studies suggest that the treatment may be less effective than previously thought and may promote chemically resistant forms of EWM; however, chemical spot treatments may still be appropriate in certain conditions to control EWM in the future.

Hybrid watermilfoil (HWM) results from a hybridization of native watermilfoil with EWM. HWM tends to be more resilient and less affected by chemical treatment. HWM may be suspected in a lake if 1) the plants' appearance is different than EWM; 2) management with chemicals becomes difficult or ineffective; or, 3) the lake is near other lakes with HWM. If some of these criteria are met, plant samples should be submitted to a lab for confirmation. If HWM is confirmed, a *challenge test* should be conducted to determine which combination of chemicals will be effective in controlling that particular strain of HWM. More than 13 combinations of chemicals can potentially be used to treat HWM – the only way to know the appropriate combination is by sending plant samples to be challenge tested. Treating HWM without knowing the appropriate combination of chemicals can result in an even more resilient strain, damaging the native aquatic plant population and wasting money. **(*Note:* Prior to chemical treatment, the northernmost EWM bed on Sunset Lake should undergo testing for HWM.)**

Action: Monitor results of various manual removal techniques each year in fall/winter using point-intercept survey methods. As part of the permit application process for chemical application, the appropriate herbicide, concentration, and contact time should be determined using the most up-to-date determinations. Work with the Water Resource Specialist with the WDNR for specifics. Test for HWM and conduct a *challenge test* to determine the appropriate chemical combination. If EWM is found to not be a hybrid, and the area is less than 5 acres in size, a contact herbicide such as endothall or diquat should be used instead of systemic herbicides. Treatment should occur early in the season, prior to emergence of native plants. When possible, use additional caution when applying chemicals to high quality aquatic plant species and species of special concern. Follow guidelines to inform lake users of the use of chemicals in the lake and provide documentation about the chemical to all property owners around the lake. Monitoring for the target species should be conducted 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. To reduce the chance of developing resilient strains of EWM, it is recommended that different treatments be used in consecutive treatment years.

- **Milfoil Weevils - EWM/HWM** - This option is not viable if chemical treatment options are being pursued in the same region of the lake. This option could be considered in areas of the lake with native or restored shorelines. Milfoil weevils are expensive to purchase, so obtaining a starter population and rearing them in predator-free conditions may be desirable from a financial standpoint. Professional assistance from staff at Golden Sands RC&D should be sought if stocking or rearing is pursued. It is unknown if native milfoil weevil populations are present in Sunset Lake.

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

- **No Action -** *Because EWM can be controlled or eliminated from Sunset Lake, this option is not recommended at this time.* Waiting and seeing how EWM populations respond to no action over time could be an option. If this option is chosen, routine monitoring should take place to ensure that EWM does not reach nuisance levels. As of 2021, mapping and visual surveys have noted EWM spread in areas where there have been no efforts for management or removal.

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

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

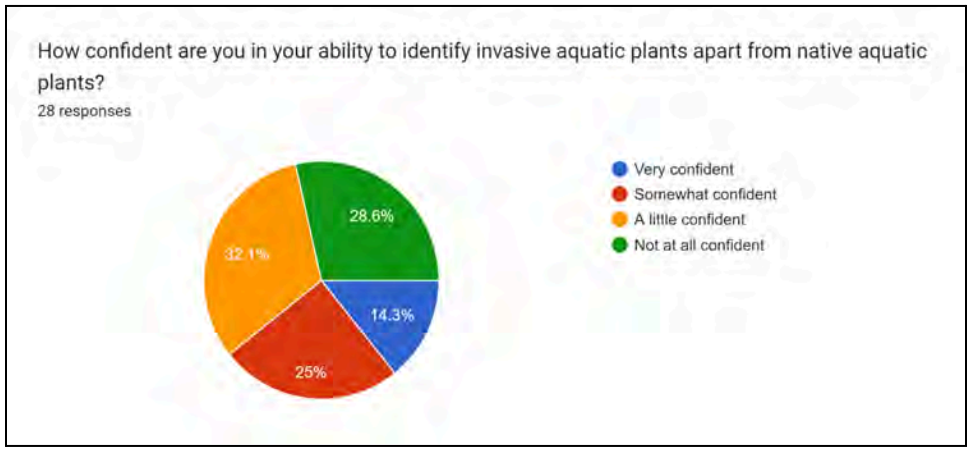
Town of New Hope
Contact: Town Chairperson
Phone: 715-677-4684

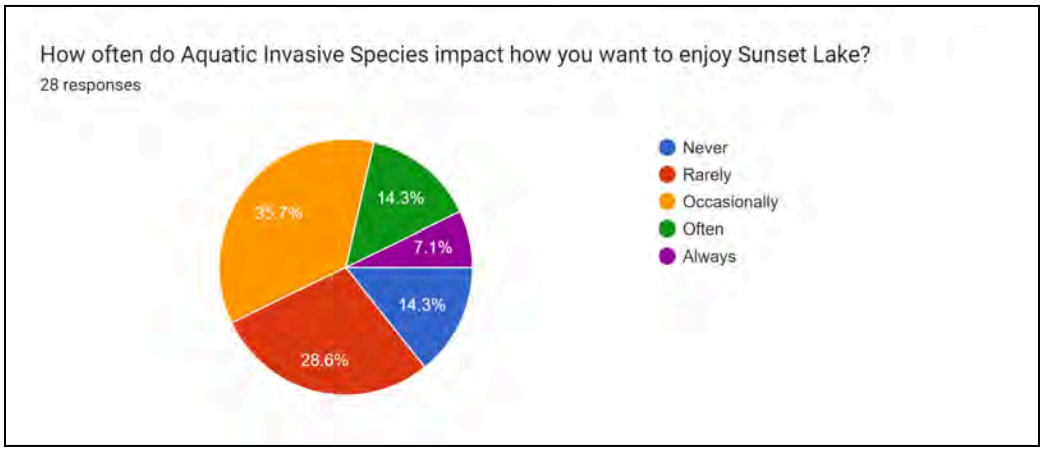
Sunset Lake Association Contact
Contact: Pat Quigley
Address: 935 Taylor Rd.
Amherst Junction, WI 54407
Telephone: 715-937-1334
E-mail: sunsetlakepoco@gmail.com

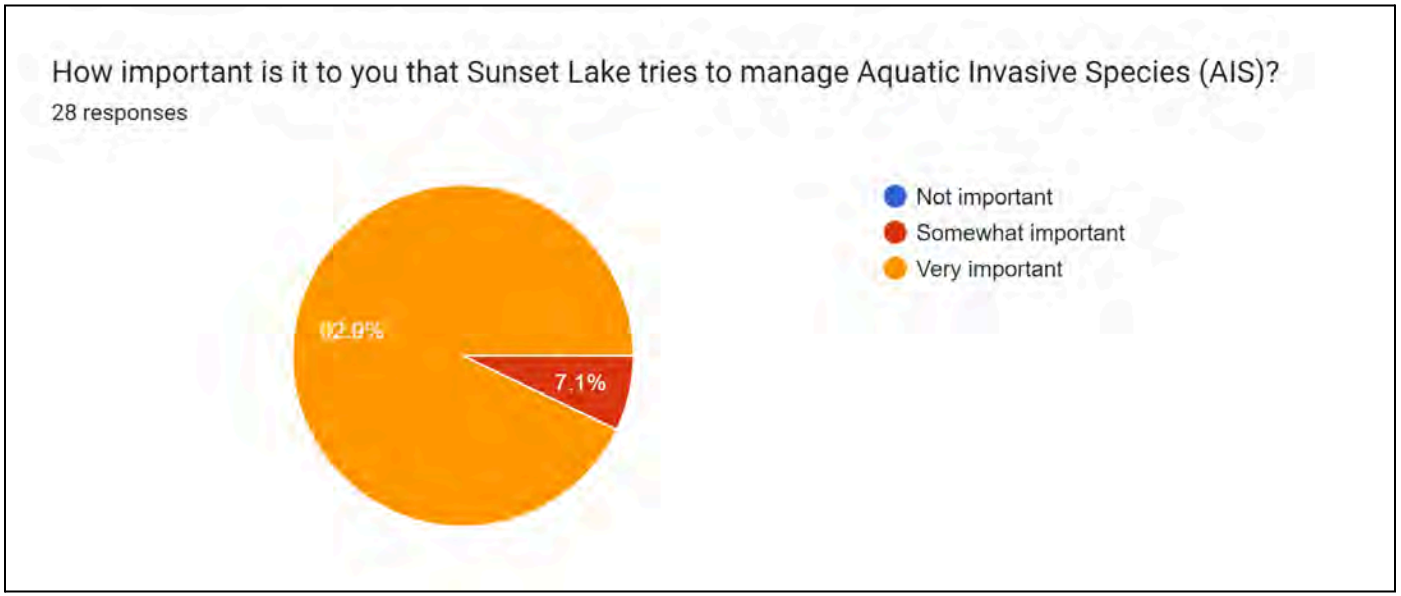
Central Wisconsin Environmental Station
Contact: Tom Quinn
Address: 10186 County Rd. MM,
Amherst Junction, WI 54407
Telephone: 715-346-2705
E-mail: tquinn@uwsp.edu

Newspapers: Amherst Community Spirit, Portage County Gazette, Stevens Point Journal

Post notice at the access points to the waterbody.


How confident are you in your ability to identify invasive aquatic plants apart from native aquatic plants?
28 responses
28.6%
32.1%
14.3%
25%
Very confident
Somewhat confident
A little confident
Not at all confident


How often do Aquatic Invasive Species impact how you want to enjoy Sunset Lake?
28 responses
14.3%
35.7%
7.1%
14.3%
28.6%
Never
Rarely
Occasionally
Often
Always


How important is it to you that Sunset Lake tries to manage Aquatic Invasive Species (AIS)?
28 responses
92.9%
7.1%
Not important
Somewhat important
Very important

Goal 1. EWM will be controlled, or eradicated, and new aquatic invasive species (AIS) will be prevented from becoming established in Sunset Lake. We will know we have achieved this goal when no new AIS are identified in the lake through our monitoring efforts and EWM is limited or non-existent.

Objective 1.1. Manage Eurasian watermilfoil (EWM) in Sunset Lake.

Action	Lead person/group	Start/end dates	Resources
Conduct a point-intercept (P.I.) survey of the aquatic plant community. A P.I. survey is required to obtain a permit for chemical treatment of EWM and helps to quantify changes over time.	Sunset Lake Association WDNR	Completed in 2022. Establish a schedule 2023	WI DNR Water Resource Mgmt Specialist Golden Sands RC&D Consultant
Using survey information, adjust strategies as needed. Review P.I. survey results and choose the appropriate management options for the upcoming year.	Sunset Lake Association	Annually in fall	WI DNR Water Resource Mgmt Specialist CWES
If hiring divers is appropriate, work to submit a WI DNR AIS grant to help cover costs.	Sunset Lake Association	As needed	WI DNR AIS Grant WI DNR Water Resource Mgmt Specialist Golden Sands RC&D
Monitor EWM in Sunset Lake. Those trained in identification and proper removal techniques should participate in manual removal efforts.	Sunset Lake Association	Ongoing	Golden Sands RC&D WI DNR Water Resource Mgmt Specialist CWES
Test for HWM prior to chemical treatment. Submit samples to a lab for WDNR analysis.	Sunset Lake Association	Prior to chemical treatment	WI DNR Water Resource Mgmt Specialist
Explore instituting a boat landing fee to help pay for AIS control in Sunset Lake.	Sunset Lake Association		Extension Lakes Portage County Parks
For chemical permits, conduct P.I. surveys and updates to this plan every 5 years.	Sunset Lake Association	Completed in 2023, needed again in 2028	WI DNR Water Resource Mgmt Specialist Consultant

Objective 1.2. Prevent any new AIS from becoming established in Sunset Lake through monitoring and dissemination of AIS-related information.

Action	Lead person/group	Start/end dates	Resources
Provide information and education on AIS to lake residents and users through website, Facebook, e-mails, newspaper articles, etc.	Sunset Lake Association	Ongoing	Extension Lakes Golden Sands RC&D, CWES
Investigate ways to distribute AIS information with local fishing license purchases.	Sunset Lake Association		Golden Sands RC&D WI DNR
Learn to identify aquatic native plants and AIS through workshops.	Sunset Lake Association	Annually - Summer	Golden Sands RC&D, CWES
Develop an AIS monitoring schedule.	Sunset Lake Association	2023	Golden Sands RC&D CWES
If any new AIS are found, use the AIS Rapid Response Plan. Update AIS Rapid Response Plan as needed.	Sunset Lake Association	Annually Ongoing	UWSP (See AIS Rapid Response Plan)
Work with Golden Sands and CWES on AIS issues in Sunset Lake and Portage County.	Sunset Lake Association	Ongoing	Golden Sands RC&D CWES UWSP Center for Watershed Science & Education Portage County Parks Extension Lakes Portage County Lakes and Rivers Group

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

Shoreland vegetation is critical to a healthy lake's ecosystem. It helps improve the quality of the runoff that is flowing across the landscape towards the lake. It also provides habitat for many aquatic and terrestrial animals including birds, frogs, turtles, and many small and large mammals. Healthy shoreland vegetation includes a mix of tall grasses/flowers, shrubs, and trees which extend at least 35 feet landward from the water's edge. Shorelands include adjacent wetlands, which 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 Sunset Lake 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 Sunset Lake was assessed by measuring different characteristics including temperature, dissolved oxygen, water clarity, water chemistry, and algae. All these factors were taken into consideration when management planning decisions were made.

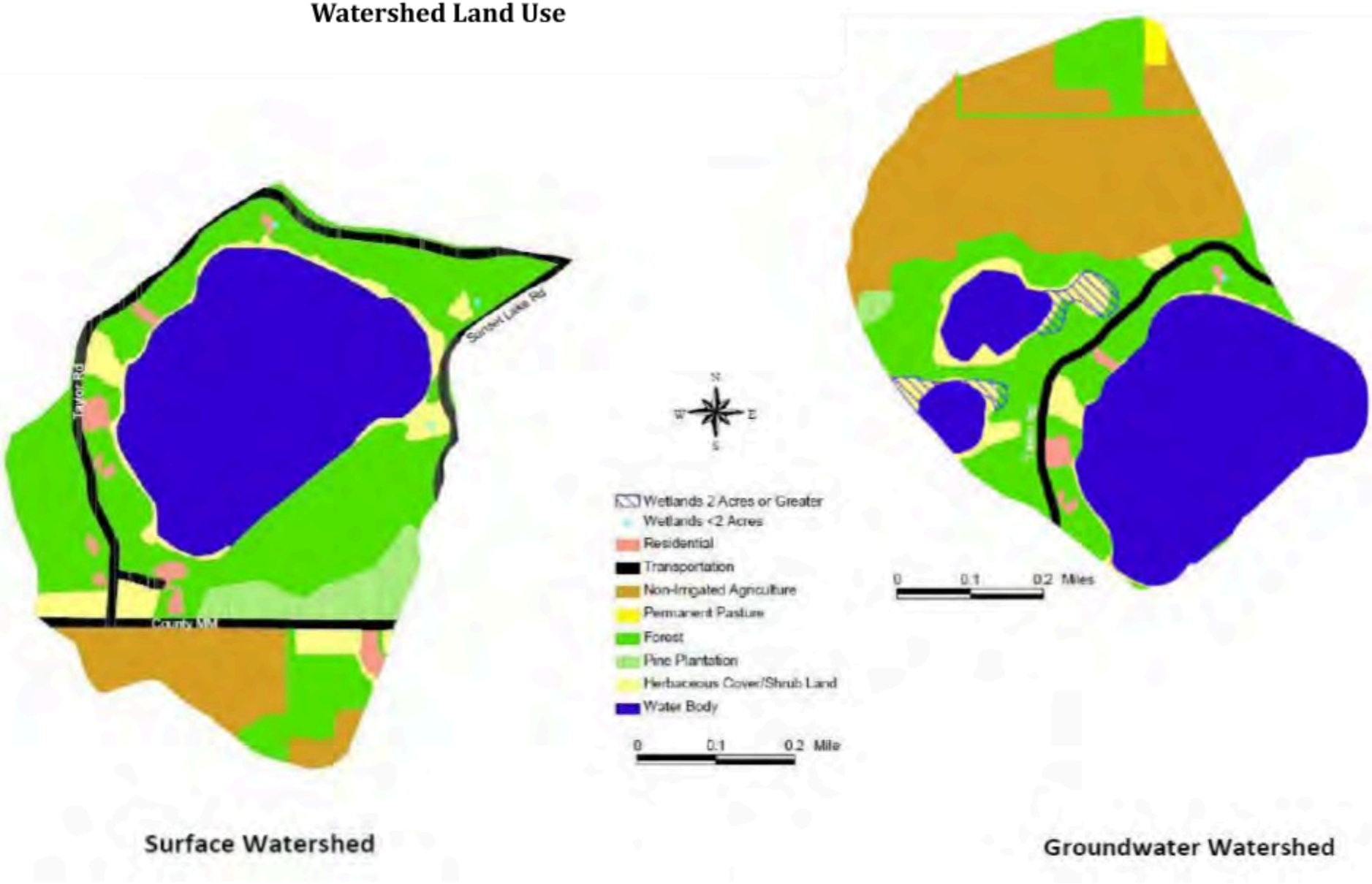
Water Quality, Land Use, and Water Levels

A variety of water chemistry measurements were used to characterize the water quality in Sunset Lake. 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 Sunset Lakes water quality. Past studies on Sunset Lake can be found on the Portage County website at; https://www.co.portage.wi.us/department/planning-zoning/land-and-water-conservation/lakes-study/Sunset-Lake

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. A map of the area prohibited around Sunset Lake can be found in the Town of New Hope Comprehensive Plan. Link: https://www.co.portage.wi.us/department/planning-zoning/planning-section/comprehensive-planning/town-of-new-hope

Sunset Lake is host to a wide variety of plants, insects, fish, amphibians, and a variety of other animals that all depend on good water quality in the lake. Survey respondents indicated water quality influenced their enjoyment of the lake and impacted their perceived value of Sunset Lake. The majority of survey respondents felt the water quality in Sunset Lake was excellent or good. Citizens who were familiar with the lake felt the overall water quality in Sunset Lake had remained the same over time. Data shows water quality in Sunset Lake is good, although there is an indication of human influence. The Sunset Lake planning committee envisions maintaining or improving water quality in Sunset Lake.

Watershed Land Use



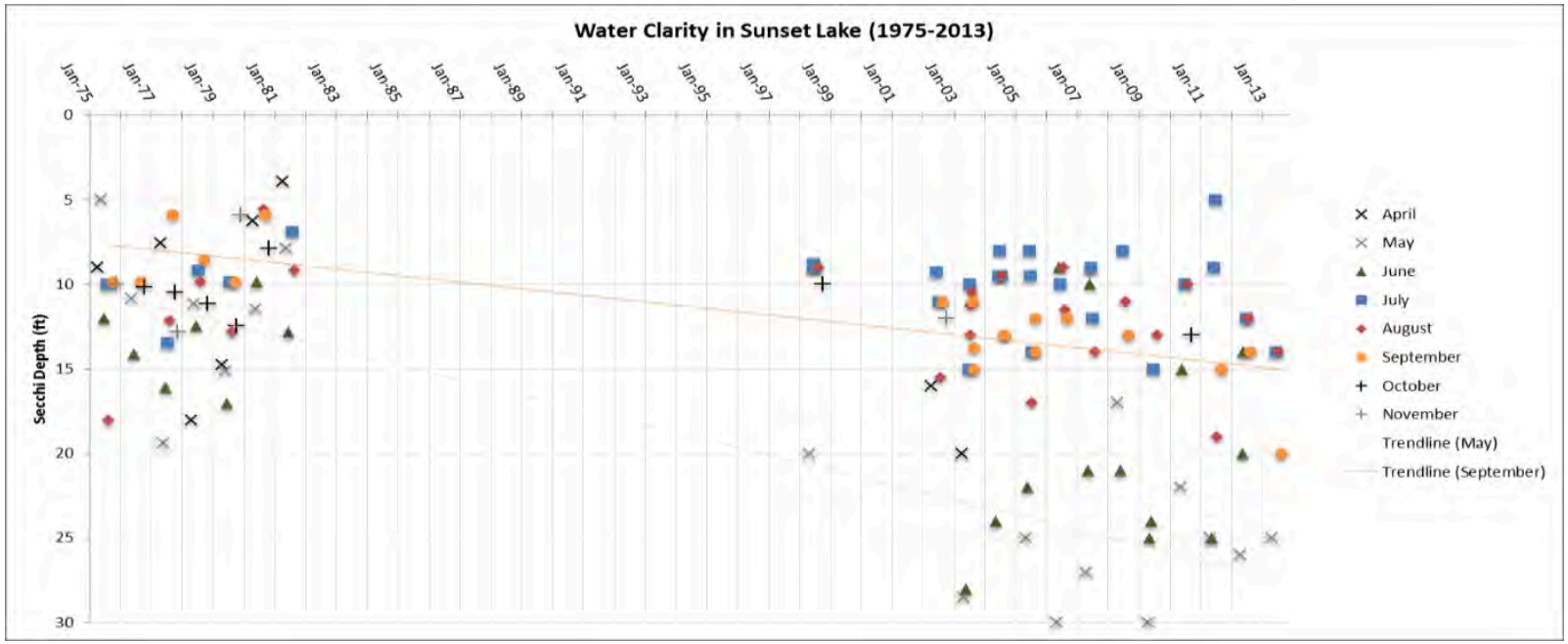
Water Quality in Sunset Lake-2013

Lake water quality is a result of many factors including the underlying geology, the climate, and land management practices. Assessing lake water quality allows us to evaluate current lake health and changes over time. This information can be used to identify what is needed to achieve a more desirable state or preserve an existing state for aesthetics, recreation, wildlife and the fishery.

Water Clarity (1975-2013)

Water clarity is a measure of the depth that light can penetrate into the water. It is an aesthetic measure and is also related to the depth that rooted aquatic plants can grow. Water clarity is affected by water color, turbidity (marl or sediment), and algae, so it is normal for water clarity to change throughout the year and from year to year. Most of the water clarity data collected after 2003 was done by local citizen monitors participating in the Citizen Lake Monitoring Network (CLMN) sponsored by the Wisconsin Department of Natural Resources (http://dnr.wi.gov/lakes/clmn/).

Water clarity measurements were made sporadically between 1975 and 2013. In recent years, samples have been collected by Sarah Clanton. Water clarity in Sunset Lake is considered good when compared to other seepage lakes in Portage County. Since 2002, water clarity has shown consistency in the measurements taken during July, August, and October. In general, during the months of April, May, June and September the water clarity has improved. Continued monitoring of water clarity by volunteers will help alter lake stewards of changes that may be occurring in the lake over time.



Fluctuating water levels in lakes are natural responses to changes in climate and weather patterns. Some of the lakes in Portage County, including Sunset, have historically experienced fluctuations in water levels. The plant and animal life in these lakes have adapted to and sometimes depend on these fluctuations for survival; however, since 2006, the annual precipitation has been average and, in some years, above average (Kraft et al., 2014). Excess withdrawal of groundwater can add to the natural fluctuations, affecting the extent and duration of low water levels (Kraft, 2014).

In 2014, Citizens who attended the Sunset Lake plan update session reported an observed reduction in water quality and clarity and indicated the need for continued monitoring to determine if the changes they have observed represent a long-term trend. Water clarity measurements have been made sporadically between 1975 and 2013. Overall, water clarity in Sunset Lake is considered good when compared with other seepage lakes in Portage County. Since 2002, water clarity has shown consistency in the measurements taken during July, August, and October. In general, during the months of April, May, June and September, the water clarity has improved.

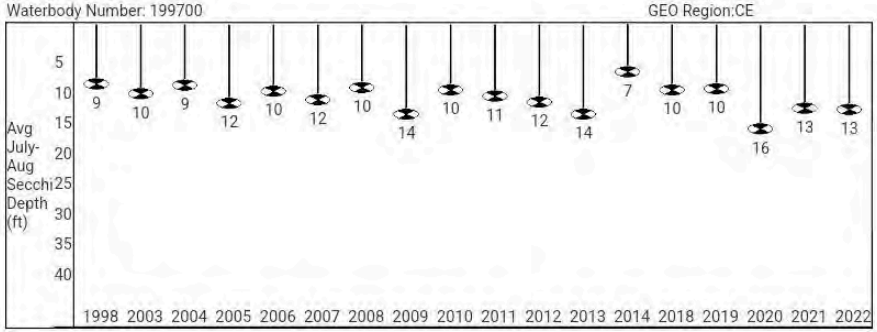
Since 2014, water levels have increased within Sunset Lake and citizens have volunteered to use Secchi disk measurements for water clarity through the Citizen Lake Monitoring Network (CLMN) Program. As of 2022, water chemistry monitoring through CLMN is also being conducted for Chlorophyll a, Total Phosphorus and Total Nitrogen to obtain more current water quality indicators of the lake's status.

2022 Updates: Sunset Lake 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 Viewer https://dnr.wisconsin.gov/topic/SurfaceWater/swdv

One aspect of CLMN that is monitored on Sunset Lake is water clarity. Water clarity monitoring is a process in which the volunteer lowers an 8" diameter, black & white disc ("Secchi disc") into the deepest part of the lake to determine how far down they can see the disc as it is lowered. Water clarity monitoring is done every 10-14 days throughout the open-water season. Water clarity is a quick way to estimate lake health, and it plays an important role in determining the types of plants and animals that a water body can support. This graph shows average summer (July-August) Secchi readings by year for Sunset Lake.

Sunset Lake
Portage County
Waterbody Number: 199700

Lake Type: SEEPAGE
DNR Region: WC
GEO Region:CE

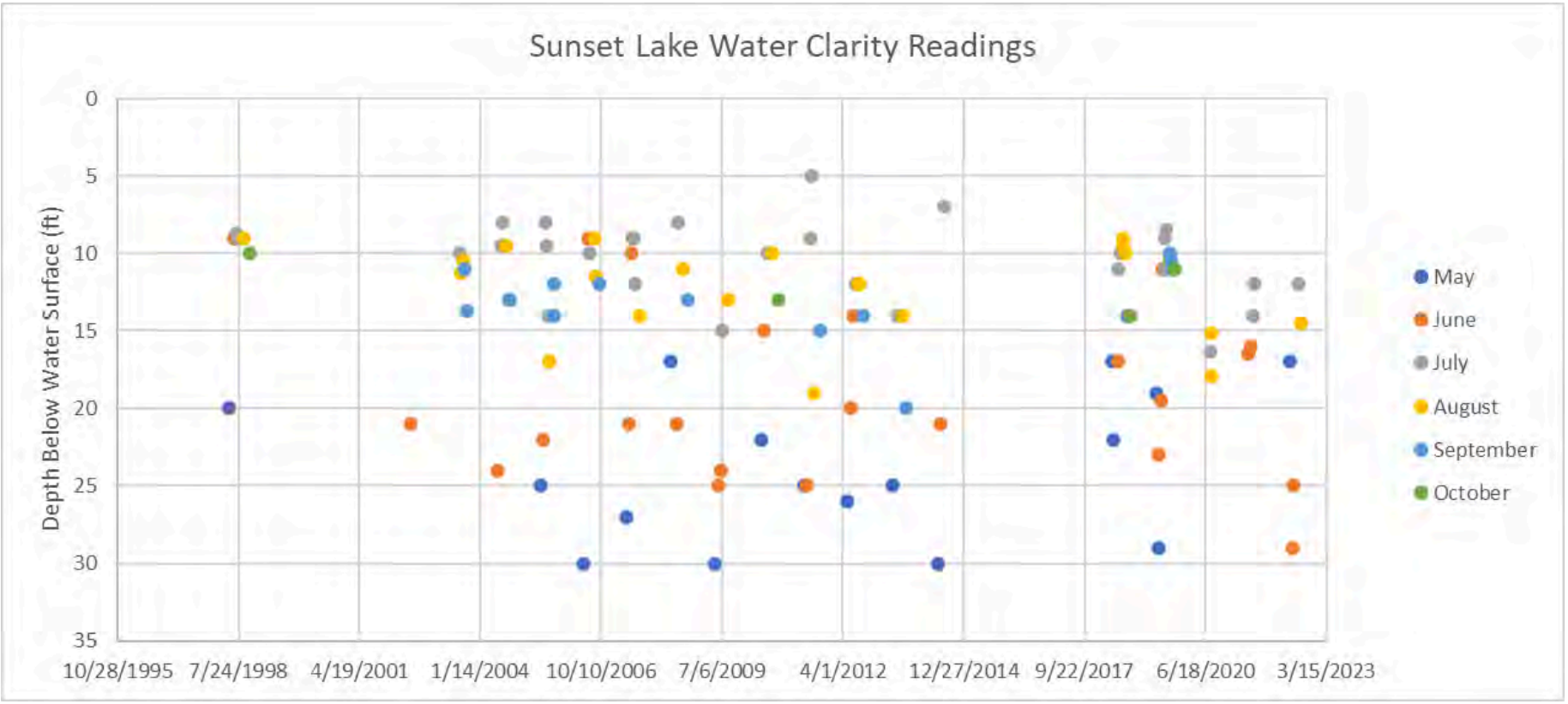


Past secchi averages in feet (July and August only).

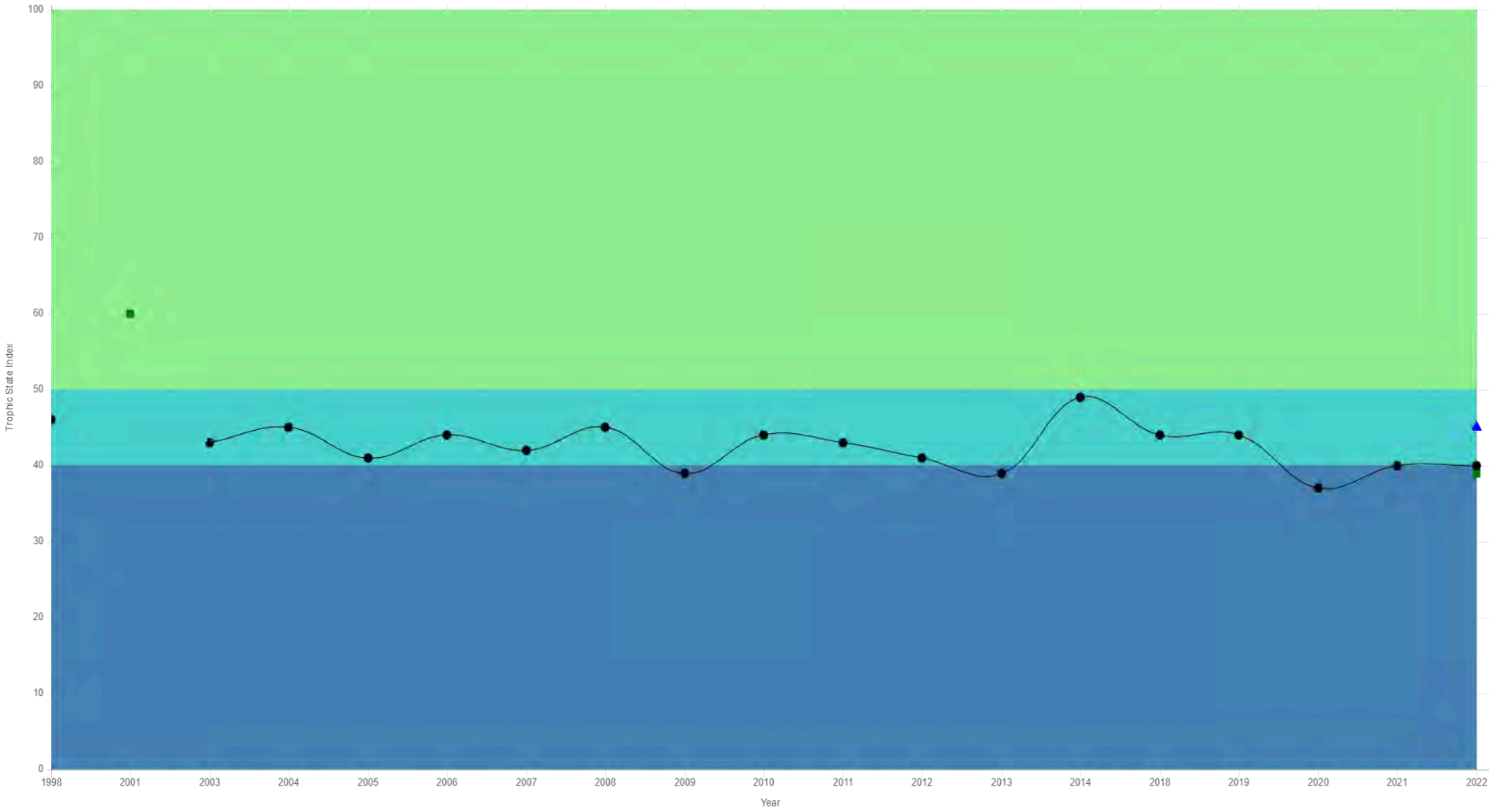
Year	Secchi Mean	Secchi Min	Secchi Max	Secchi Count
1998	8.92	8.75	9	3
2003	10.58	10	11.25	3
2004	9.13	8	9.5	4
2005	12.13	8	17	4
2006	10.17	9	11.5	3
2007	11.67	9	14	3
2008	9.5	8	11	2
2009	14	13	15	2
2010	10	10	10	2
2011	11	5	19	3
2012	12	12	12	3
2013	14	14	14	2
2014	7	7	7	1
2018	9.92	9	11	6
2019	9.75	8.5	11	4
2020	16.43	15.1	17.9	3
2021	13	12	14	2
2022	13.25	12	14.5	2

Report Generated: 11/22/2022

The chart below shows the Water Clarity Readings per Month from May-October for the years data was available.



One measure of a lake's health is the trophic state, which relates to the amount of algae in the water. The average summer trophic state for the last 5 years was 41 (Mesotrophic) and was determined using Secchi data. For a two-story lake, this is considered excellent.



Guiding Vision for Water Quality

Sunset Lake will have clear blue water that is good for swimming, fishing, frogs, eagles, and other animals. The lost habitat from the wetland that was filled on the northeastern side of the lake will be reestablished. Lake levels will have natural fluctuations and will not be adversely affected by land use practices.

Goal 2. Maintain the water quality in Sunset Lake at 2002/2003 concentrations (average summer TP concentrations of 12 ug/L with algae blooms (10 ug/L) occurring 11% of the days). We will know that we are achieving this when monitoring indicates that median summer (5 samples/summer) total phosphorus remains 12 ug/L.

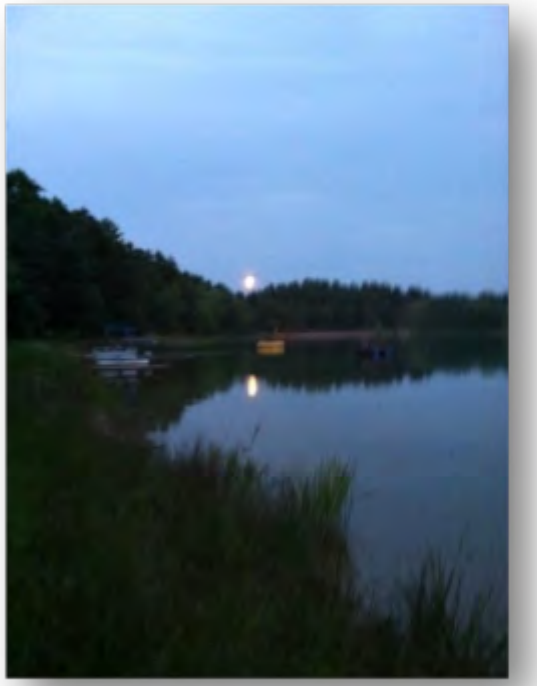
Objective 2.1. Monitor the water quality in Sunset Lake to evaluate if goals are being met.

Action	Lead person/group	Start/end dates	Resources
Monitor nitrates and phosphorus during spring and fall overturn.	Sunset Lake Association	Spring/Fall Annually	Citizen Lake Monitoring Network (CLMN) Need funding source for analyses UWSP Water & Environmental Analysis Lab
Continue citizen monitoring of water clarity a minimum of five times each summer.	Sunset Lake Association	Annually June – Sept.	Citizen Lake Monitoring Network (CLMN)
Identify interested volunteers to monitor water quality.	Sunset Lake Association	As needed	Citizen Lake Monitoring Network (CLMN)
Provide informational emails to local citizens about how contaminants enter the lake and the importance of testing their drinking water wells annually.	Sunset Lake Association	Annually	Extension Lakes

Since 2014, water levels have increased within Sunset Lake and citizens have volunteered to use Secchi disk measurements for water clarity through the Citizen Lake Monitoring Network (CLMN) Program. As of 2022, water chemistry monitoring through CLMN is also being conducted for Chlorophyll a, Total Phosphorus and Total Nitrogen to obtain more current water quality indicators of the lake's status.

Shorelands

Shorelines 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 shorelines help to provide scenery and solitude, as well as natural space for lake residents to enjoy nature. The majority of survey respondents who owned shoreline property indicated they currently have an undeveloped natural shoreline; however, the majority of shoreline property owners also indicated the length of their buffers was in the 10–25-foot range – less than the 35 feet required by the state and county shoreland zoning ordinances. The majority of survey respondents also felt shoreline damage was one of the primary causes leading to the decline of water quality.



Sunset Lake is highly developed, and documented disturbances include numerous docks, artificial beaches, sites with erosion, rip-rap, and one boat landing. Structures such as seawalls, rip-rap (rocked shoreline), and artificial beaches result in habitat loss. Erosion contributes sediment to the lake, which can alter spawning habitat and carry nutrients into the lake. Unmanaged runoff from rooftops of structures contributes more runoff to the lake, often resulting in the delivery of more sediment to the lake. Especially on the steep sides, attention should be paid to minimizing runoff and erosion from access paths and stairs. At the top of the hill where structures exist, rain gardens and rain barrels can help reduce the extra flow of water to the lake. Meandering stairways can reduce erosion if natural vegetation is present on the sides and minimizing mowed lawns will also reduce erosion. Docks result in altered in-lake habitat. Denuded lake beds adjacent to docks provide opportunities for invasive species to become established and reduce habitat that is important to fish and other lake inhabitants.

2014 Updates: The County Park has installed several practices to reduce runoff to the lake. Shoreland surveys were conducted in 2002 and 2012. Maps with survey results from both years can be found in the Shoreland Inventory appendix. While approximately 900 feet of shore on the eastern side of Sunset Lake have improved since 2002, significant degradation has occurred on the western side. Efforts should be made to restore the shoreline where problems exist. Except for a 30-foot-wide viewing corridor, the shorter (0.5 -3 ft high) vegetation should extend from the water's edge to at least 35 feet inland. This helps water quality, habitat, and the fishery and is consistent with the state shoreland ordinance (NR115).

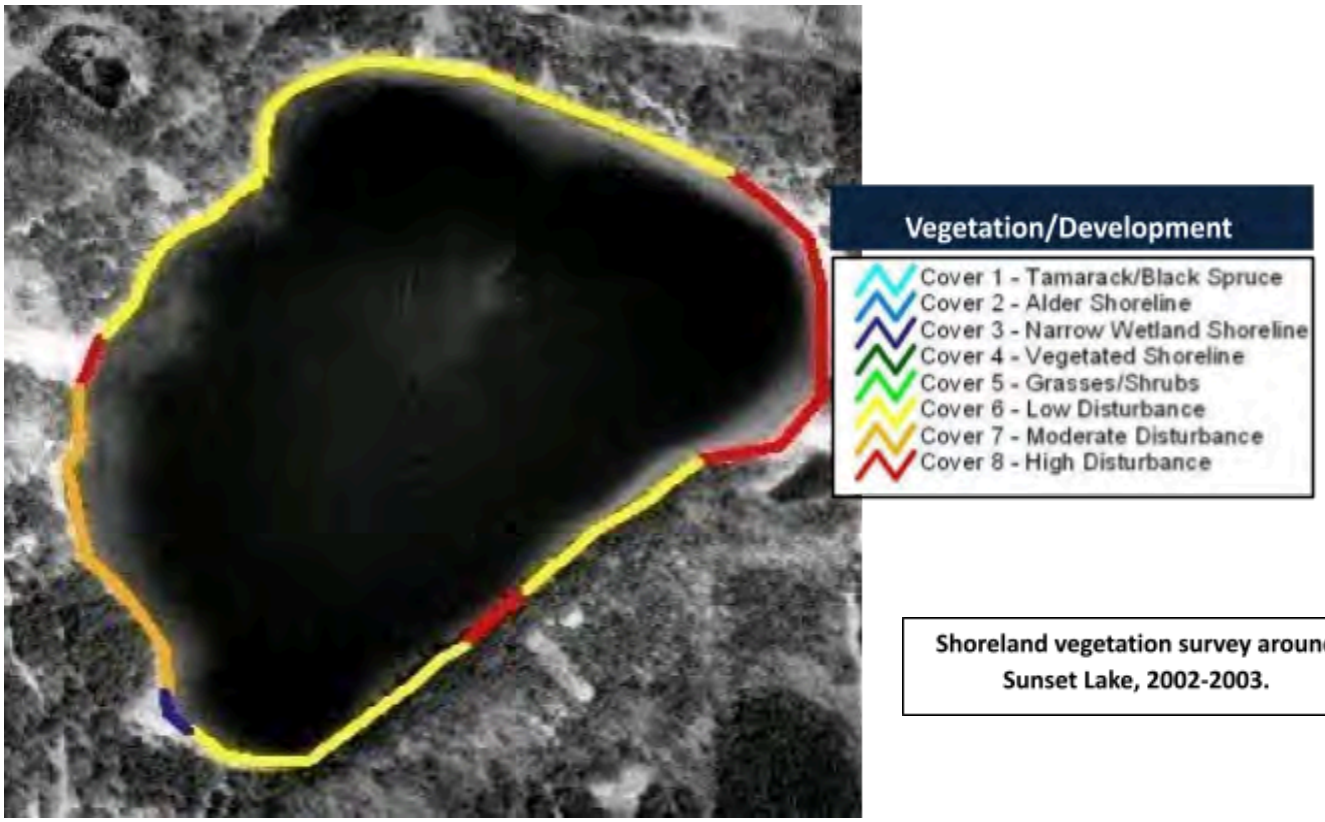
<u>2022 Updates</u>: Water levels remaining high over the last couple of years has resulted in some residents dramatically altering their shoreline. Wetlands have been filled and there is an area of significant erosion along the north side of the lake. Many trees that lined the lake have died and fallen into the lake. In some areas, the trees have remained in the water and in others the trees have been removed. Areas in the County Park have remained under water, including a paved parking lot.

Photo credit: Tracy Arnold, Portage County Land and Water Conservation Dept.

Shoreland Inventory

Shoreland vegetation is critical to a healthy ecosystem in and around Sunset Lake. 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.

2002-2003 Portage County Shoreland Inventory



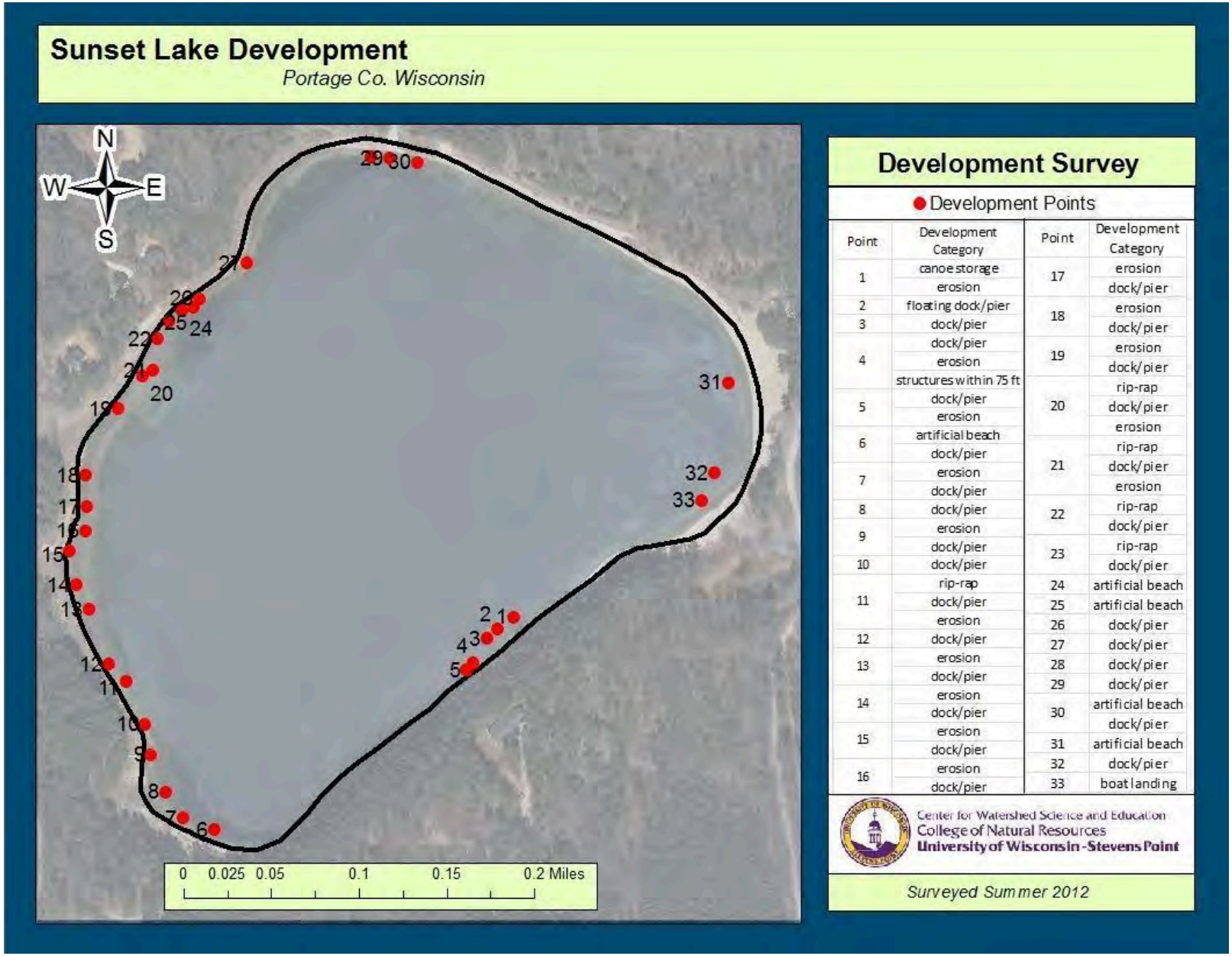
Shoreland vegetation survey around Sunset Lake, 2002-2003.

A shoreland survey was conducted in 2002-2003 during the Portage County Lakes Study. The survey categories differed from those in the 2012 survey, but some comparisons can be made. Survey classifications for the 2002-2003 survey are described in the table below.

Categories applied during the 2002-2003 shoreland survey of Portage County lakes. Observations were predominant 15 feet inland from the water's edge.

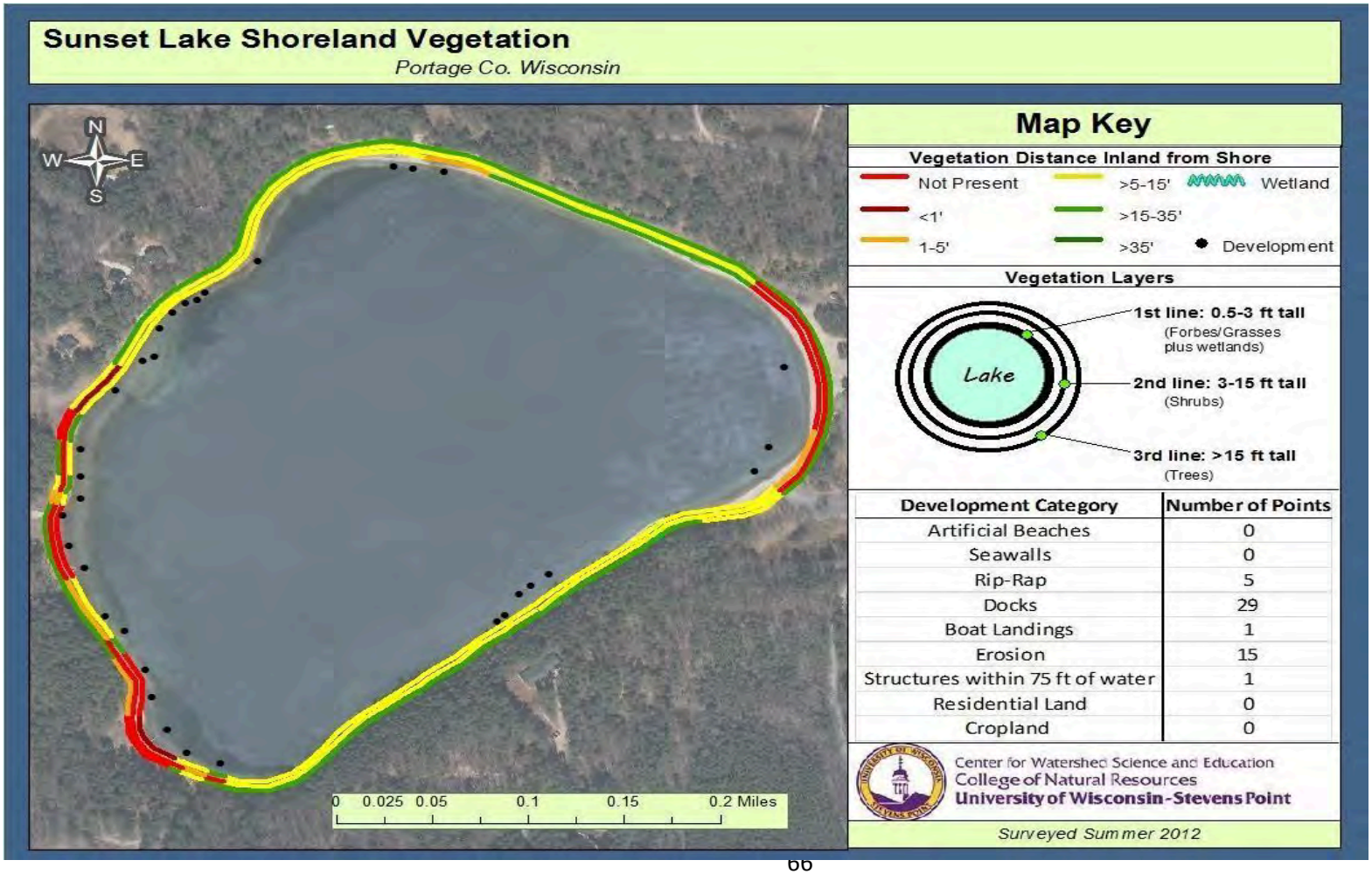
Category Code and Cover-type Description	
Wetlands	
Cover 1	All wetland shore zone with a sweet gale or leather leaf shrub layer associated with tamarack or black spruce.
Cover 2	All wetland shore zone with an alder shrub layer.
Cover 3	Narrow wetland shore zone (< 5 m) with an adjacent upland component 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).

During the 2012 survey, an assessment of human influence features was also conducted around Sunset Lake (see below). 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, 33 sites were identified around Sunset Lake. Most of the sites were docks/piers/boat launches. Some rip-rap exists which should be replaced with bio-logs and native vegetation. If erosion is a concern, undisturbed aquatic vegetation helps to buffer wave action. To improve shoreland habitat and remain consistent with county and state shoreland standards, artificial beaches should be limited to 30 feet wide, the maximum allowed for access corridors. Fifteen sites with erosion existed and should be addressed.



Features of human influence around Sunset Lake, conducted in Summer 2012 by UWSP Center for Watershed Science and Education.

The results of the 2012 survey of Sunset Lake's shoreland are shown in the figure below. 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). While approximately 900 feet of the shore on the eastern end of the lake have improved since 2002, significant degradation has occurred on the western end of the lake. Efforts should be made to restore the shoreline where problems exist. Except for a 30-foot-wide viewing corridor, the shorter (0.5-3 ft high) vegetation should extend from the water's edge to at least 35 feet inland. This helps water quality, habitat, and the fishery and is consistent with county and state shoreland standards.



Development Category	Number of Points
Artificial Beaches	0
Seawalls	0
Rip-Rap	5
Docks	29
Boat Landings	1
Erosion	15
Structures within 75 ft of water	1
Residential Land	0
Cropland	0

Shoreland vegetation survey around Sunset Lake, conducted in Summer 2012 by UWSP Center for Watershed Science and Education

Guiding Vision for Shorelands

Sunset Lake will have natural shorelines that maintain the health of the lake and provide habitat for wildlife.

Goal 3. The shoreland vegetation around Sunset Lake will provide habitat, protect water quality, and provide a sense of privacy for shoreland residents and lake users. Shorelands will be maintained or improved to accomplish this goal. We will know we have accomplished this goal when 75% of the shoreland buffers around Sunset Lake are consistent or better than the requirements in the state shoreland zoning ordinance.

Objective 3.1. Shoreland owners around Sunset Lake will understand their roles in protecting this important land and will make informed land management decisions.

Action	Lead person/group	Start/end dates	Resources
Encourage natural shorelines around Sunset Lake by distributing educational materials and hosting a speaker or demonstration.	Sunset Lake Association	Ongoing	UWSP Portage County Land & Water Conservation Dept
Provide information about native plants and landscaping to lake residents by disseminating information through emails, newspapers, Facebook pages, website, etc.	Sunset Lake Association	Ongoing	Portage County Land & Water Conservation Dept Extension Lakes
Protect steep slopes around the lake from erosion by working with the County to develop educational materials for property owners.	Sunset Lake Association	Ongoing	Portage County Land & Water Conservation Dept Consultants Extension Lakes
Protect undeveloped shorelines to protect habitat and water quality by disseminating informational materials about healthy shoreland practices and the use of conservation easements, stewardship funds, etc. by willing landowners.	Sunset Lake Association	Ongoing	Portage County Land & Water Conservation Dept North Central Conservancy Trust Knowles-Nelson Stewardship funds WDNR Lake Protection grants

To ensure Sunset Lake shorelands are healthy, all shoreland property owners will learn about and implement the Portage County Shoreland Ordinance (at a minimum).	Sunset Lake Association	Ongoing	Portage County Planning and Zoning Portage County Land & Water Conservation Dept WDNR Healthy Shoreland grants
CWES will use best practices to maintain runoff from their structures and lake access points. Rain gardens and other practices will serve as educational sites for residents and visitors.	CWES	Ongoing	UWSP Sustainability Fund Portage County Land & Water Conservation Dept Consultants Extension Lakes WDNR Healthy Shoreland grants
Explore/consider rules that better protect the shoreland area, such as buffers greater than 35 feet.	Sunset Lake Association	Ongoing	Portage County Planning & Zoning Extension Lakes

Objective 3.2. Reduce nutrient inputs from shoreline properties around Sunset Lake.

Action	Lead person/group	Start/end dates	Resources
Install runoff controls and vegetative buffers at Sunset Lake County Park to reduce runoff from the road and beach and serve as a demonstration site. Maintain practices that have been installed.	Portage County Land & Water Conservation Dept	Projects completed in 2014 Ongoing	Portage County Parks Portage County Land & Water Conservation Dept WDNR Healthy Shoreland grants
Provide information via e-mail and mail to shoreland residents about the benefits of reducing runoff and erosion by installing rain gardens, filter strips, and other healthy shoreland practices.	Sunset Lake Association	Ongoing	Extension Lakes
Provide information via e-mail and mail about the importance of not using fertilizer on their landscape.	Sunset Lake Association	Ongoing	Extension Lakes
Provide information on maintenance of their septic system and encourage homeowners to site septic systems as far away from the lake as possible.	Sunset Lake Association	Ongoing	Portage County On-Site Waste Specialist Extension Lakes

Goal 4. Town of New Hope can utilize the objectives and goals in the lake management plan when considering town-level management planning or decisions within the watershed that may affect the lake.

Objective 4.1. Maintain awareness of land management rules and decisions that affect groundwater quality and quantity in Sunset Lake.

Action	Lead person/group	Start/end dates	Resources
Monitor zoning regulations to ensure that they stay at 10-acre minimums within the Town of New Hope. If changes are proposed, alert lake residents via email.	Town of New Hope		Town of New Hope Portage County Planning & Zoning
Pay attention to the atrazine concentrations in the prohibition area. If they change, alert the lake residents via email.	Town of New Hope	Ongoing	Town of New Hope Portage County Groundwater Citizen Advisory Committee – New Hope rep. Portage County Groundwater Specialist Portage County Land & Water Conservation Dept
Monitor proposed groundwater legislation as it relates to high-capacity wells. Keep lake residents informed of developments via email.	Sunset Lake Association	Ongoing	CWES UWSP Groundwater Center Portage County Groundwater Specialist

Objective 4.2. Work with the County and landowners to protect important lands near Sunset Lake and improve land management practices within the watershed.

Action	Lead person/group	Start/end dates	Resources
Monitor the contract CWES/UWSP has with the Boy Scouts. Work to keep that land protected by encouraging use of deed restrictions.	CWES Director	Ongoing	CWES UWSP Center for Land Use Education Boy Scouts of America
Support conservation easements on the vacant lot on the western side of Sunset Lake, other near-shore properties, and throughout the Sunset Lake watershed.	WI DNR		North Central Conservancy Trust Knowles-Nelson Stewardship funds WI DNR Lake Protection grant

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 Sunset Lake residents, UWSP Central Wisconsin Environmental Station, the Portage County Parks Department, the community, and a suite of lake users are essential to maximize the effects of plan implementation.

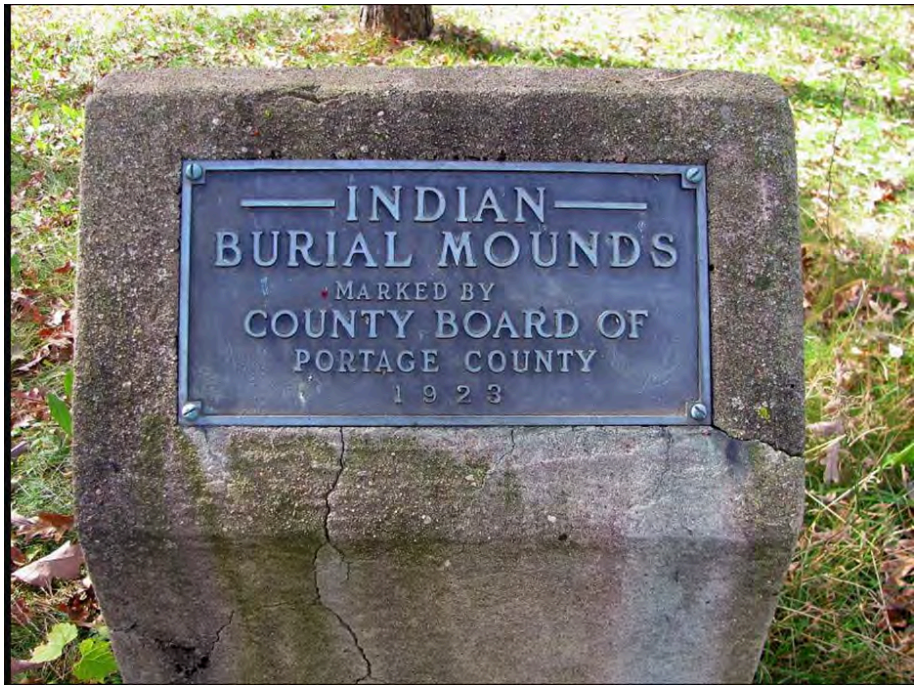
Recreation

Residents and lake users enjoy many different recreational opportunities on Sunset Lake. Based on survey results, the most popular recreational activities on Sunset Lake included swimming/snorkeling, walking, enjoying scenery, solitude, and enjoying wildlife. The County Park is enjoyed by many visitors and some conflicts exist with park users in the small space provided by the park. CWES provides recreational opportunities for its campers and others participating in programs at the camp. Recreational needs and uses on the lake will likely continue to increase as populations in the area increase so it is essential to plan for recreational opportunities on the lake that do not increase e conflict among users.

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**

Communication and Organization

Working together on common values will help to achieve the goals that are outlined in this plan. This will involve communication between individuals, the Town of New Hope, Portage County, resource managers, and elected officials. In addition, staying informed about lake- and groundwater-related topics will be essential to achieving the goals laid out in this plan.

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

2014 Updates: The citizens around Sunset Lake formed a private group on Facebook called the "Sunset Lake Community".

2022 Updates: CWES noted the need for a body to spearhead the management of Sunset Lake and the removal of EVM which has resulted in the development of the Sunset Lake Conservation Program (SLCP). SLCP consists of and is open to all interested citizens, residents on Sunset Lake, Water Quality Specialists, the 6th grade class from Tomorrow River Community Charter School, and UWSP student-led organizations.

Guiding Vision for Communication and Organization

Improve communication to keep a sense of strong community around the lake.

Goal 5. To foster communication and education with the community and users of Sunset Lake.

Objective 5.1. Provide information to landowners and lake users that will allow them to make informed decisions.

Action	Lead person/group	Start/end dates	Resources
Explore the formation of a lake group to enhance communication, provide a voice for Sunset Lake, funding for management efforts, and enable the group to apply for grants.	Sunset Lake Association	Completed in 2022	CWES Portage County Parks UWSP-Extension Lakes
Provide information to lake residents on topics concerning the lake through a monthly informational website, email, Facebook, stuff mailboxes, and/or send hard copies.	Sunset Lake Association	Ongoing	
Host quarterly educational meetings	Sunset Lake Association	Quarterly	CWES (Biannually) Portage County Land & Water Conservation Dept Extension Lakes Golden Sands RC&D WI DNR

Objective 5.2. Stay informed about lake stewardship and network/learn from others.

Action	Lead person/group	Start/end dates	Resources
Encourage Sunset Lake property owners and stewards to obtain "Lake Tides", a quarterly newsletter about Wisconsin lakes.	Sunset Lake Association	Ongoing	Extension Lakes
"Like" the Sunset Lake and Portage Co. Lakes and Rivers Facebook pages. Request adding names to the Portage Co. Lakes and Rivers listserv by sending to arnoldt@co.portage.wi.gov.	Sunset Lake Association	Ongoing	Portage County Land and Water Conservation Dept UWSP Center for Watershed Science and Education
Encourage Sunset Lake property owners and stewards to attend the Wisconsin Lakes Convention in Stevens Point.	Sunset Lake Association	Annually in spring	Extension Lakes
Encourage Sunset Lake property owners to participate in Lake Leaders Institute.	Sunset Lake Association	Even calendar years - fall	Extension Lakes
Support the formation of the Portage County Lakes and Rivers Association. If formed, send a representation from Sunset Lake.	Portage County Land and Water Conservation Dept	Formed in 2021	Portage County Land & Water Conservation Dept
Monitor the Town of New Hope website to receive town board and plan commission agendas and minutes.	Sunset Lake Association	Ongoing	Town of New Hope
Obtain a list of watershed residents and addresses.	Sunset Lake Association	Ongoing	Portage County Planning and Zoning
Reach out to residents in the watershed to share information concerning Sunset by sending emails and mailings.	Sunset Lake Association	Ongoing	Extension Lakes
Submit articles to the Community Spirit.	Sunset Lake Association	Ongoing	The Community Spirit

Goal 6. Annually review and update the Sunset Lake Management Plan and AIS rapid response plan.

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.

Action	Lead person/group	Start/end dates	Resources
Annually review and update the Sunset Lake Management Plan and AIS Rapid Response Plan.	Sunset Lake Association	Annually	Portage County Land & Water Conservation Dept Golden Sands Extension Lakes CWES
Connect with partners listed in the plan for updates to their efforts. Share everyone's updates with all partners.	Sunset Lake Association	Annually	Partners listed in the plan
If situations warrant, revisions to this plan may be made at any time. Barring this need, this plan should be updated every 5 years.	Sunset Lake Association	Next update 2028	Partners listed in the plan WI DNR Planning Grant

Background Information (from 2002-2003 study)

A lake is the reflection of the health and activities that occur in the lake, near its shore, and in the surrounding watershed. A healthy lake ecosystem consists of components that support aquatic plants, fish, wildlife and more – not only in the lake, but also in the surrounding landscape.

Data collected during the first phase of the Portage County Lakes Study are summarized in this section. For more detail, see the complete study reports. These reports, as well as citizen survey results collected during plan development, can be found at:
https://www.co.portage.wi.us/department/planning-zoning/land-and-water-conservation/lakes-study

Updated information is located in each section of this plan and when available, is appended to this plan. More information about Sunset Lake can be found at :

https://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=199700

Update 2022: Efforts should be made by the Sunset Lake Association to find the funding to replicate the study to compare concerns and highlights of Sunset Lake overtime.

Description

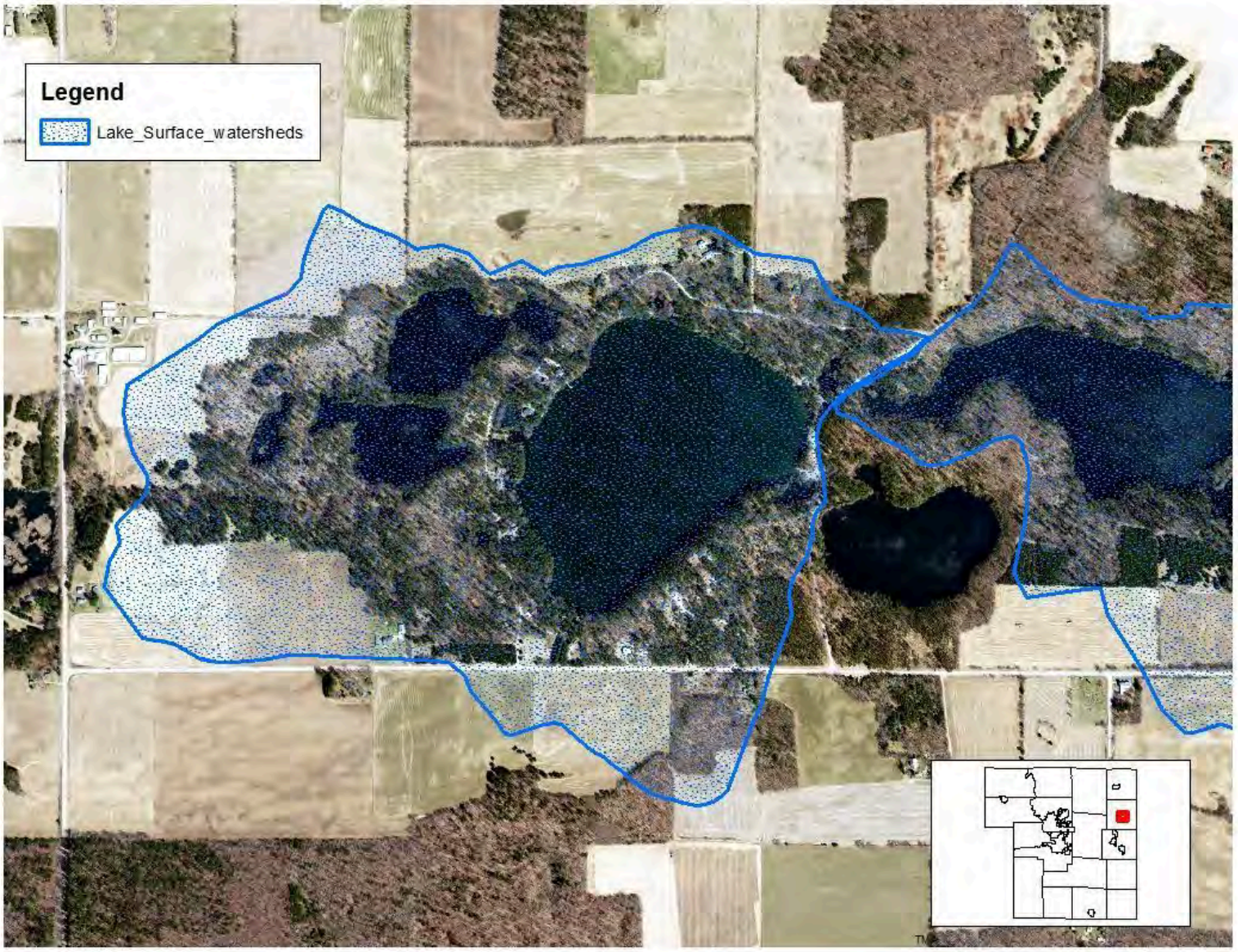
Sunset Lake is a 61-acre groundwater seepage lake located northeast of Nelsonville, in the Town of New Hope, Portage County, Wisconsin. The lake is one of the deepest in the county, with a maximum depth of 55 feet (Wisconsin Department of Natural Resources, 2005). The lake bottom consists of sand and gravel, although small stretches of rubble and silt are also present. A popular county park on the eastern side of the lake has a boat landing, swimming beach, and picnic area.

Watersheds

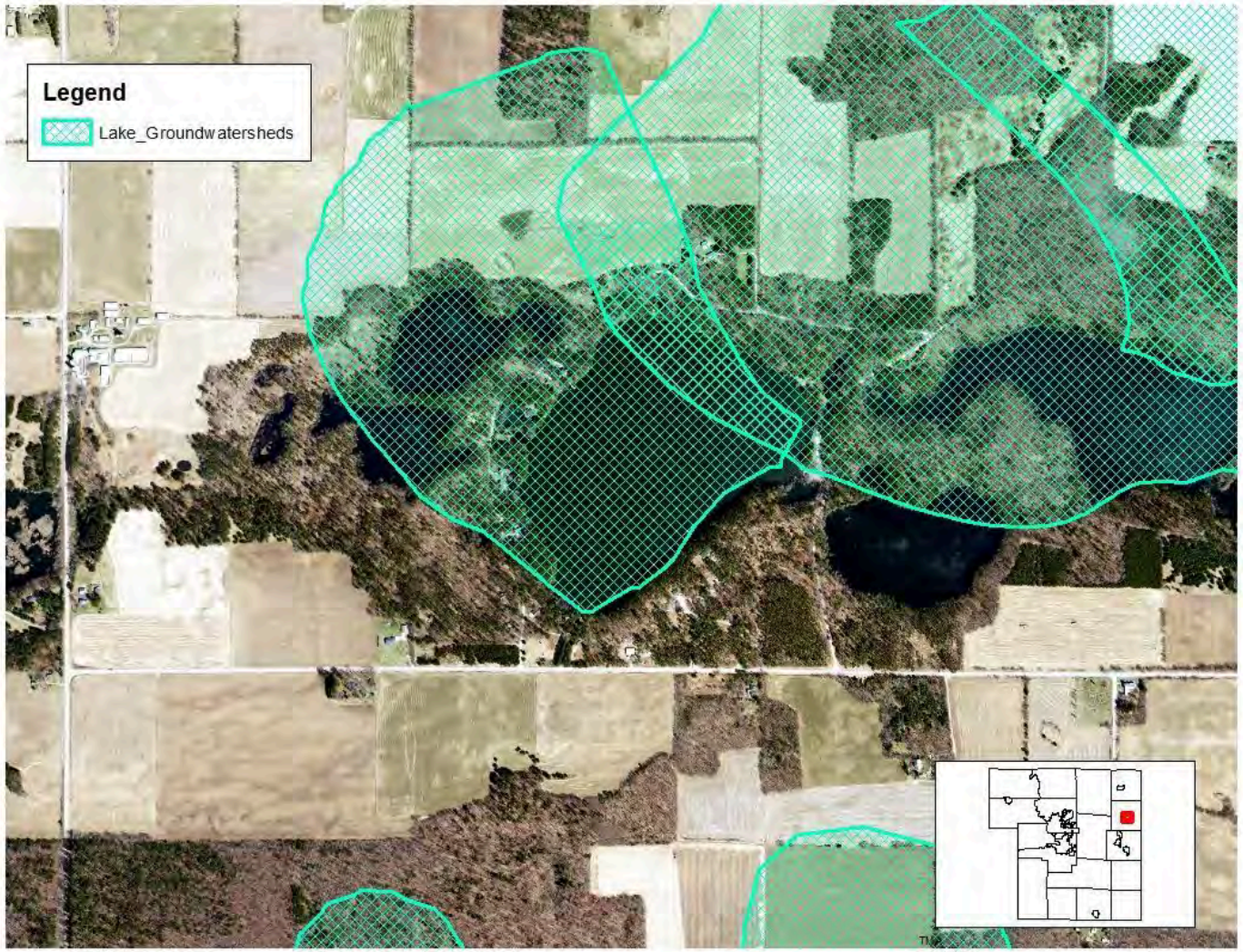
Sunset Lake's surface watershed, the land area where surface water from higher elevations drains towards the lake, is approximately 318 acres (Figure 1).

The groundwater watershed is similar to the surface watershed, except it is the land area where groundwater, instead of surface water, drains towards the lake. Surface watersheds and groundwater watersheds often do not match each other, which is the case for Sunset Lake. Sunset Lake's groundwater watershed is approximately 222 acres and stretches to the northwest of the lake.

Sunset Lake Surface water Watershed



Sunset Lake Groundwater Watershed



Sensitive Areas

Sensitive areas associated with Sunset Lake are defined by lands adjacent to the water that are particularly valuable to the lake's ecosystem or would be significantly impacted by disturbances or development. These areas include steep shorelines surrounding almost the entire lake, which are prone to erosion and could contribute to sedimentation and associated water quality problems. The sensitive areas also include large tracts of wetlands stretching to Skunk Lake that provide uninterrupted wildlife habitat (Appendix). **These areas are not only important to reptiles and amphibians, but also to other aquatic and terrestrial species.**

The primary amphibian habitat is found in several locations around Sunset Lake, but the most sensitive areas are found on the eastern and southeastern sides of the lake. Key features of this habitat are undisturbed natural shorelines and large amounts of submergent, emergent, and floating leaf vegetation. There is also a small wetland near the boat landing that provides excellent frog habitat, and a large, wooded area at the Central Wisconsin Environmental Station that provides ideal habitat for salamanders (Appendix).

Shoreline

Approximately 98% of Sunset Lake's shoreline is considered disturbed. Of that, 58% exhibit low level vegetation disturbance, 15.7% is moderately disturbed, and 24.1% is highly disturbed. Areas of low-level vegetation disturbance are areas that have unaltered shore except for pier access. Areas of moderate disturbance may contain mowed lawns but have intact overstory vegetation. Areas of high disturbance include beaches, rip-rap, lawns mowed to the water line, and boat accesses. The remaining 2% of Sunset Lake's shoreline is characterized as narrow wetland.

While only some of Sunset Lake's shoreline is vegetated, any changes would likely impact the lake's water quality, algae and aquatic plant growth, and the fishery and other inhabitants. Vegetated shorelines act as buffers for runoff from surfaces such as roofs, driveways, roads, patios and compacted soils. Runoff that enters the lake can carry a variety of pollutants. Negative impacts to lakes due to increased runoff include the introduction of more nutrients (such as phosphorus), which can cause algae blooms and excessive plant growth, and an increased amount of sediment, which can create cloudy or turbid water and bury fish spawning areas and other critical habitat. Sediment can also transport additional contaminants to the lake, such as bacteria, debris, metals and pesticides.

Twelve of the seventeen survey respondents owned shoreline property. All twelve indicated their shorelines were undeveloped or natural.

County and state shoreland zoning rules were developed to help protect lake water and habitat by regulating vegetation buffer areas along lake shorelines. Current zoning requires a buffer depth of 35 feet from the water's edge.

Shoreline buffer depths around Sunset Lake varied greatly. Two respondents indicated they had shoreline buffers greater than 50 feet deep, while nine respondents indicated their buffers were less than the required 35 feet.

Aquatic Plants

Aquatic plants play many important roles in aquatic ecosystems. They provide habitat for aquatic and semi-aquatic organisms, and food for fish, waterfowl, and other animals. Aquatic plants take up nutrients that would otherwise be used by algae and moderate water temperatures on hot days.

Sixty-nine species of aquatic macrophytes, or aquatic plants, have been identified in Sunset Lake or on the wet areas of shore. This is above average when compared to other Portage County lakes.

In the summer of 2009, Eurasian watermilfoil (EWM) was discovered in Sunset Lake between the swimming area and the boat landing. Efforts were made to hand-pull the EWM; however, it was difficult to remove due to the rooting depth of the plants and the soft lake bottom. Plans were made to chemically treat the area to eradicate the EWM. It is important that regular monitoring be done to determine how EWM has spread or if any new invasive species are introduced to Sunset Lake.

When asked about the abundance of aquatic plants in Sunset Lake, 65% of the survey respondents felt plant growth was just right. Respondents indicated July and August were the months with the densest plant growth, which is typical for most Wisconsin lakes.

Water Quality and Land Use

Land uses and their associated management practices can have significant impacts on water quality. Land use within Sunset Lake's surface watershed is predominantly forest land (50%) and non-irrigated agriculture (28%) (Appendix). Since 1948, forest land has increased, while herbaceous vegetation has significantly decreased.

The groundwater watershed consists primarily of non-irrigated agriculture (33%) and forest land (24%) (Appendix). The land uses have not changed significantly since 1948.

Although land uses may not easily be changed, land management practices can be modified to improve water quality. Survey respondents indicated a willingness to change how they manage their land around Sunset Lake. The top motivators included providing better fish and wildlife habitat, increasing the natural beauty of their property, improving water quality, increasing their property values, and displaying a commitment to the environment.

When asked about Sunset Lake's water quality, a majority of survey respondents indicated they felt the water quality was good or excellent and had not changed since their first encounters with the lake. They also indicated the lake's water quality had major economic impacts and major impacts on their personal enjoyment of the lake.

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

Chloride concentrations, and to lesser degrees sodium and potassium concentrations, are commonly used as indicators of how strongly a lake is being impacted by human activity. In Sunset Lake, chloride, sodium and potassium concentrations measured in 2002-2003 were low.

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

The temperature in Sunset Lake was generally well-mixed from top to bottom in the spring and fall. Lake temperatures indicated strong stratification in the winter and summer. Dissolved oxygen was always plentiful in the upper 25 feet of the lake. During much of the year, water in the bottom 20 feet lacked enough oxygen to support many biota; however, this is considered normal and is due to the decomposition of organic materials.

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. Clarity measurements in Sunset Lake ranged from 12 feet to 28 feet. May had the best water clarity and July had the poorest. Fluctuations in water clarity throughout the summer are normal, as algae populations, aquatic plant populations, and sedimentation rise and fall.

Chlorophyll *a* is a measure of algae. Chlorophyll *a* concentrations in Sunset Lake ranged from 2.35 mg/L to 5.69 mg/L. The readings were all considered to be relatively low.

The 31 algal genera identified during the sample periods were relatively common and none of those that reached numerical dominance in the sample counts were associated with toxins or health issues. The algal community relative to the chlorophyll *a*, phosphorus, and nitrogen values for Sunset Lake presented a picture of an oligotrophic lake.

Nutrients

Nutrients (nitrogen and phosphorus) are important measures of water quality in lakes because they are used for growth by algae and aquatic plants.

In Sunset Lake, both the phosphorus and nitrogen concentrations fluctuate throughout the year, but they are generally not high enough to fuel algae blooms in the summer.

Nitrogen concentrations in Sunset Lake were low, including nitrate, which is easily used for growth by aquatic plants and algae (Figure 2). Levels were well below the 0.3 mg/L needed to fuel algae growth.

Phosphorus is an element that is essential to most living organisms, including plants. Sources of phosphorus can include naturally occurring phosphorus in soils, wetlands, and groundwater. Sources from human influence include soil erosion, agricultural and urban runoff, septic systems, and animal waste.

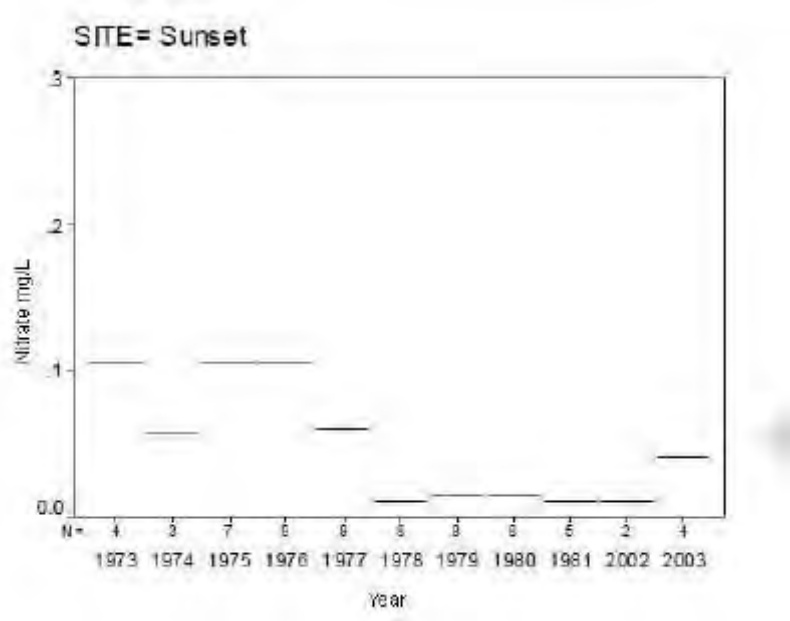


Figure 2. Median Nitrate-N concentrations in Sunset Lake, 1973-2003.

In Sunset Lake, the aquatic plant growth is highly responsive to phosphorus due to its limited supply relative to other substances necessary for growth. Small increases in phosphorus result in increased growth rates and abundance of aquatic plants and algae.

Phosphorus concentrations in Sunset Lake were variable throughout the year. Median total phosphorus (TP) concentrations in spring/fall in 2002-2003 were 15.4 ug/L (Figure 3).

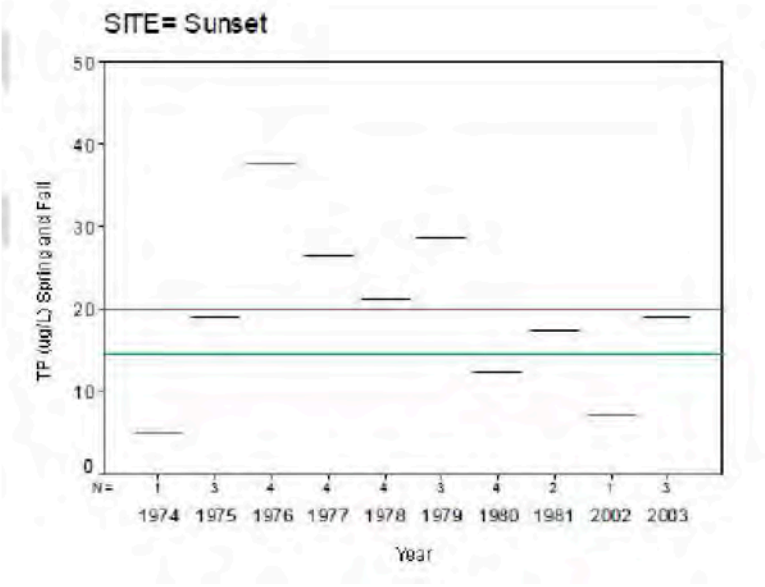


Figure 3. Median total phosphorus concentrations in Sunset Lake in samples collected in spring and fall, 1973-2003

The Wisconsin Department of Natural Resources has determined phosphorus criteria values for lakes in Wisconsin. The proposed phosphorus criteria value for deep seepage lakes like Sunset Lake is 20 ug/L. Sunset Lake had average summer TP concentrations of 17 ug/L in 2002-2003. These concentrations fall below the proposed criteria value. Total phosphorus should be monitored in Sunset Lake to identify any increases.

Managing phosphorus in the Sunset Lake watershed is key to protecting the lake itself. Positive changes in land use and management practices can result in improved water quality. Phosphorus inputs can be controlled through the use of best management practices (BMPs) that minimize the movement of runoff to the lake. Best management practices that should be used near shore and throughout the watershed

include developing water quality-based nutrient management plans, only applying fertilizer or manure based on soil tests for specific crops or turf, providing cover and/or appropriate mitigation when open soils are necessary during construction or cropping, using cover crops, properly storing manure, and spreading manure only when the ground is not frozen. Some of the near shore land use practices that can decrease phosphorus loading to Sunset Lake include native vegetation buffers (trees, bushes, and grasses), eliminating the use of fertilizers, minimizing runoff, protecting exposed soil, and increasing setbacks for septic drain fields. The Portage County Land Conservation Department is one of many organizations that can provide assistance to landowners who want to reduce impacts to Sunset Lake from their lands.

Estimates of phosphorus from the landscape can help to understand the phosphorus sources to Sunset Lake. Land use in the surface watershed was evaluated and used to populate the Wisconsin Lakes Modeling Suite (WILMS) model. In general, each type of land use contributes different amounts of phosphorus in runoff and through groundwater. The types of land management practices that are used and their distances from the lake also affect the contributions to the lake from a parcel of land. Based on modeling results, non-irrigated agriculture and water had the greatest percentages of phosphorus contributions from the watershed to Sunset Lake (Figure 4).

Future degradation of water quality in Sunset Lake can be minimized with thoughtful land use planning throughout the watershed. This includes locating roads away from the lake, diverting runoff from infrastructure so it can infiltrate the soil rather than run towards the lake, and controlling runoff and nutrient inputs from new and existing developments.

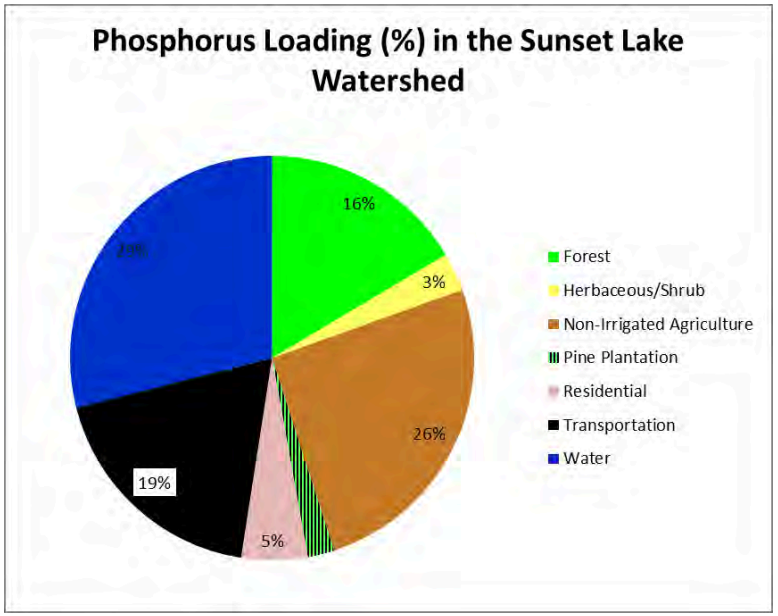


Figure 4. WILMS modeling results for Sunset Lake (McGinley, 2008).

A “build-out” of the current zoning in the watershed (Town of New Hope) was conducted to estimate nutrient delivery to Sunset Lake if the allowable development occurs. Additional build out scenarios included connecting more of the landscape to the lake through water diversion (such as culverts and roads). The development of a lake model allows us to estimate phosphorus and algal changes within the lake based on various land use scenarios.

In Figure 5, points displayed include (from left to right) undeveloped, current land use with 25% of the landscape using BMPs, current land use, built out watershed, and built out with two additional levels of connectedness. The yellow line on the graph represents the proposed Wisconsin Department of Natural Resources flag (warning) value for phosphorus in a seepage lake (15ug/L) and the pink line shows the proposed Wisconsin Department of Natural Resources criteria value for phosphorus (20 ug/L). The goal for this plan is to maintain the 2002-2003 water quality in Sunset Lake.

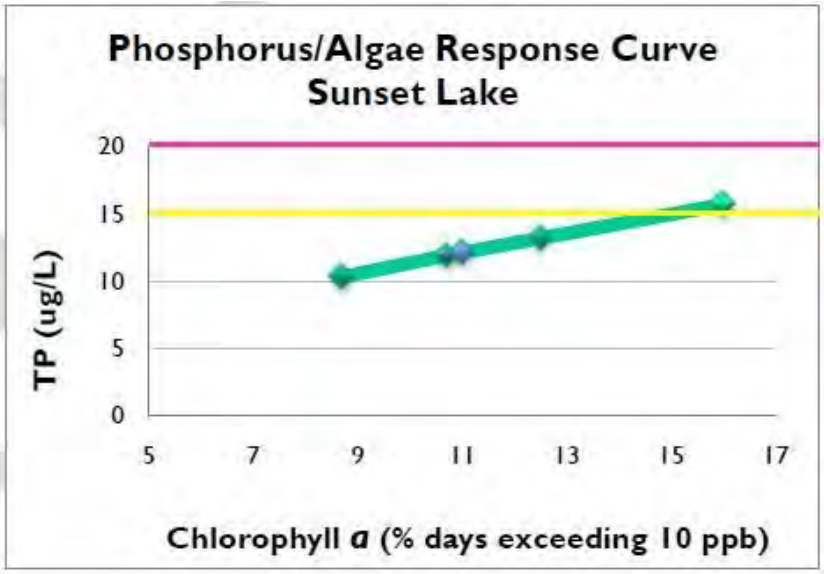


Figure 5. Phosphorus and related algae response to land use scenarios in the watershed.

Recreation

According to respondents of the citizen survey, the most popular activities at Sunset Lake included swimming/snorkeling, walking, enjoying scenery, solitude, and enjoying wildlife.

Conflicts between users were few on Sunset Lake. Only a few survey respondents indicated they were sometimes bothered by other lake users. A majority indicated they saw others but were not bothered by them.

When survey respondents were asked to rate their fishing experiences, 29% indicated fishing was fair and 24% indicated fishing was average. The majority of survey respondents felt the quality of fishing had declined over time, and the decline was attributed to aquatic plants and algae.

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 Sunset Lake. They serve as tools to help achieve the goals, objectives and actions outlined in the Sunset Lake Management Plan.

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

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

Portage County has eight ordinances that may impact the water quality of Sunset Lake: 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 Springville Pond. 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.

References

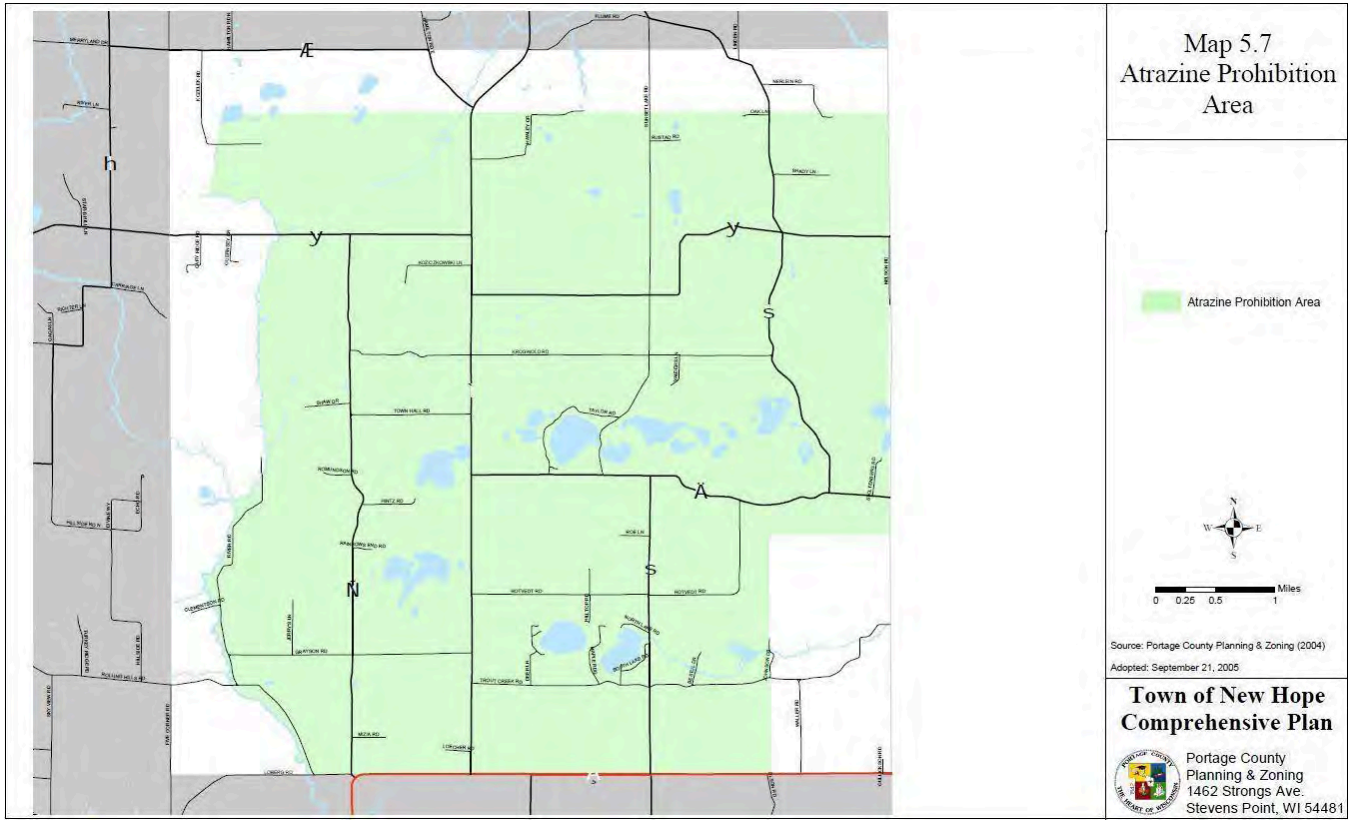
Fassbender, R.L., and L.M. Nelson. 1971. Surface Water Resources of Portage County. Wisconsin Department of Natural Resources, Madison, Wisconsin.

Turyk, N; R. Bell; R. Cook; T. Ginnett; R. Crunkilton; L. Markham; P. McGinley; B. Shaw; and E. Wild; 2006.

Final report to Portage County and Wisconsin DNR. https://www.co.portage.wi.us/home/showpublisheddocument/15841/636495502961970000

Atrazine Prohibition Areas

https://www.co.portage.wi.us/home/showpublisheddocument/16169/636518839085670000



Atrazine Prohibition Areas for Portage County

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

United States Geological Survey:
45,527 acres of land within Portage County are in atrazine prohibition areas.

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

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