2016

Long Lake – Saxeville/Springwater
Waushara County, Wisconsin
Lake Management Plan

Prepared by staff from the Center for Watershed Science and Education
University of Wisconsin-Stevens Point

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

Lake Management Plan for Long Lake – Saxeville/Springwater, Waushara County, Wisconsin

The Long Lake Management Plan (LLMP) was developed with input from residents and lake users at a series of four public planning sessions held at the Waushara County Courthouse in Wautoma, Wisconsin in January, February, March and April 2016. The inclusive community sessions were designed to learn about and identify key community opportunities, assets, concerns, and priorities. Representatives of state and local agencies also attended the planning sessions to offer their assistance to the group in developing a strategic lake management plan (LMP).

The plan was adopted by the Long Lake Association on: _____.
Date

The plan was approved by the Wisconsin Department of Natural Resources on: _____.
Date

The plan was accepted by the Town of Saxeville on: _____.
Date

The plan was accepted by the Town of Springwater on: _____.
Date

The plan was accepted by Waushara County on: _____.
Date

A special thanks to all who helped to create the Long Lake Management Plan and provided guidance during the plan's development.

Long Lake Management Planning Committee Members and Resources

Planning Committee

Representatives of Long Lake Association

Representatives of Friends of Long Lake

Waushara County
County Conservationist – Ed Hernandez
Land Conservation Department
Community, Natural Resources and Economic Development Agent—
Patrick Nehring, University of Wisconsin-Extension

University of Wisconsin – Stevens Point
Center for Watershed Science and Education
Water Resources Specialist – Ryan Haney
Water Resources Scientist – Nancy Turyk

Wisconsin Department of Natural Resources
Water Resources Management Specialist – Ted Johnson
Fisheries Biologists – Dave Bartz and Scott Bunde

We are grateful to many for providing funding, support and insight to this planning process:

Waushara County Watershed Lakes Council

Waushara County Staff and Citizens

Wisconsin Department of Natural Resources Lake Manager, Ted Johnson

Wisconsin Department of Natural Resources Lake Protection Grant Program

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Overarching Vision for Long Lake

Long Lake will continue its tradition of clear, clean water, family friendly recreation and no invasive species.

Introduction

Long Lake is located in the townships of Springwater and Saxeville, northeast of Wild Rose. There is public access to the lake at the public boat launch located near the narrows on its southern side. Long Lake is a 254-acre (WDNR) seepage lake with groundwater and surface runoff contributing the majority of its water. The maximum official depth in Long Lake is 71 feet (WDNR); however, some lake users have indicated they have measured greater depths. The lakebed has a moderate to steep slope and its bottom sediments are mostly sand, marl, with some gravel (Figure 1).

The residents of Long Lake have a history of lake stewardship and active lake monitoring program. Water quality data has been routinely collected since the 1970s and various studies and plans have been commissioned by the Long Lake Association over the years including:

- *Long Lake Protection Plan*, July 1996, R.A. Smith & Associates, Inc.
- *Survey of Aquatic Plants in Long Lake*, January 2005, Aquatic Biologists, Inc.
- *Water Quality Assessment of Long Lake*, June 2006, UW-Stevens Point Water and Environmental Analysis Laboratory
- *Comprehensive Survey of Long Lake*, March 2009, Cason & Associates, LLC

The following mission statement was written by the Long Lake Association in 1994 and was officially adopted in 1996:

"Long Lake Association functions and focuses on the commitment to preserve and protect the natural resources of Long Lake, to prevent and combat pollution of the lake and shore land, to maintain the scenic beauty of the Long Lake area, to maintain accessibility for recreational and leisure activities and to develop and institute lake policies and practices in conjunction with lake studies and lake planning programs."

In 2016, Long Lake Association and Friends of Long Lake members around Long Lake came together once again, to learn and discuss the latest about Long Lake, accomplishments to date, and its future, the result of which is described in this Long Lake Management Plan. This document provides information about Long Lake while laying out a framework for the protection and improvement of lake features which were identified as important to

the Long Lake Association. This framework, or lake management plan, provides the guidance needed for citizens and others involved in lake or land management to achieve the vision of the Long Lake Association.

The planning process included a series of four public planning sessions held between January and April 2016 at the Waushara County Courthouse in Wautoma, Wisconsin. Participation in these sessions was encouraged through letters about the process which were mailed to Long Lake waterfront property owners and press releases in the Argus, a local newspaper. In addition, when emails were provided, participants were sent emails about upcoming meetings which could be forwarded to others. To involve and collect input from as many people as possible, a survey was conducted prior to each planning session which sought feedback on the upcoming planning sessions' topic(s). The public was informed about the surveys via postcards mailed to waterfront property owners and by press releases. The surveys could be completed anonymously online or on paper upon request. Survey questions and responses were shared at the planning sessions and can be found at http://www.co.waushara.wi.us/pView.aspx?id=30231&catid=636.

Guest experts and professionals also attended the planning sessions. They presented information and participated in discussions with participants to provide context, insight and recommendations for the Long Lake Management Plan, which included the science as well as any environmental and regulatory considerations. This information was organized with the survey results into discussion topics, which included: the fishery, recreation, and lake levels; the aquatic plant community; water quality and land use; shoreland health; and communication. After learning about the current conditions of each topic, planning committee members identified goals, objectives, and actions for the lake management plan that were recorded by professionals from UW-Stevens Point. Planning session notes and presentations are available on the Waushara County website.

Implementing the content of this Long Lake Management Plan will enable Long Lake residents and other supporters to achieve the vision for Long Lake now and in the years to come.

The Long Lake Planning Committee consisted of shoreland property owners. During the planning process, technical assistance was provided by the Waushara County Conservationist, the Waushara County Community, Natural Resources and Economic Development Extension Agent, and professionals from the Wisconsin Department of Natural Resources (WDNR), University of Wisconsin-Extension (UWEX), and the University of Wisconsin-Stevens Point Center for Watershed Science and Education (CWSE).

This Long Lake Management Plan and the process used to create and update it, allows the Long Lake Association to guide the health of its lake. It is a dynamic document that identifies goals and action items for the purpose of maintaining, protecting and/or creating desired conditions in a lake over the next 20 years. It will provide the guidance for future association board members, lake users, and technical experts by identifying which issues have been addressed and how successful previous efforts have been. The actions identified in a Lake Management Plan (LMP) can serve as a gateway for obtaining resources, including grant funding, to help implement activities outlined in the plan. Because many entities are involved in lake and land management, it can be challenging to navigate the roles, partnerships and resources that are available.

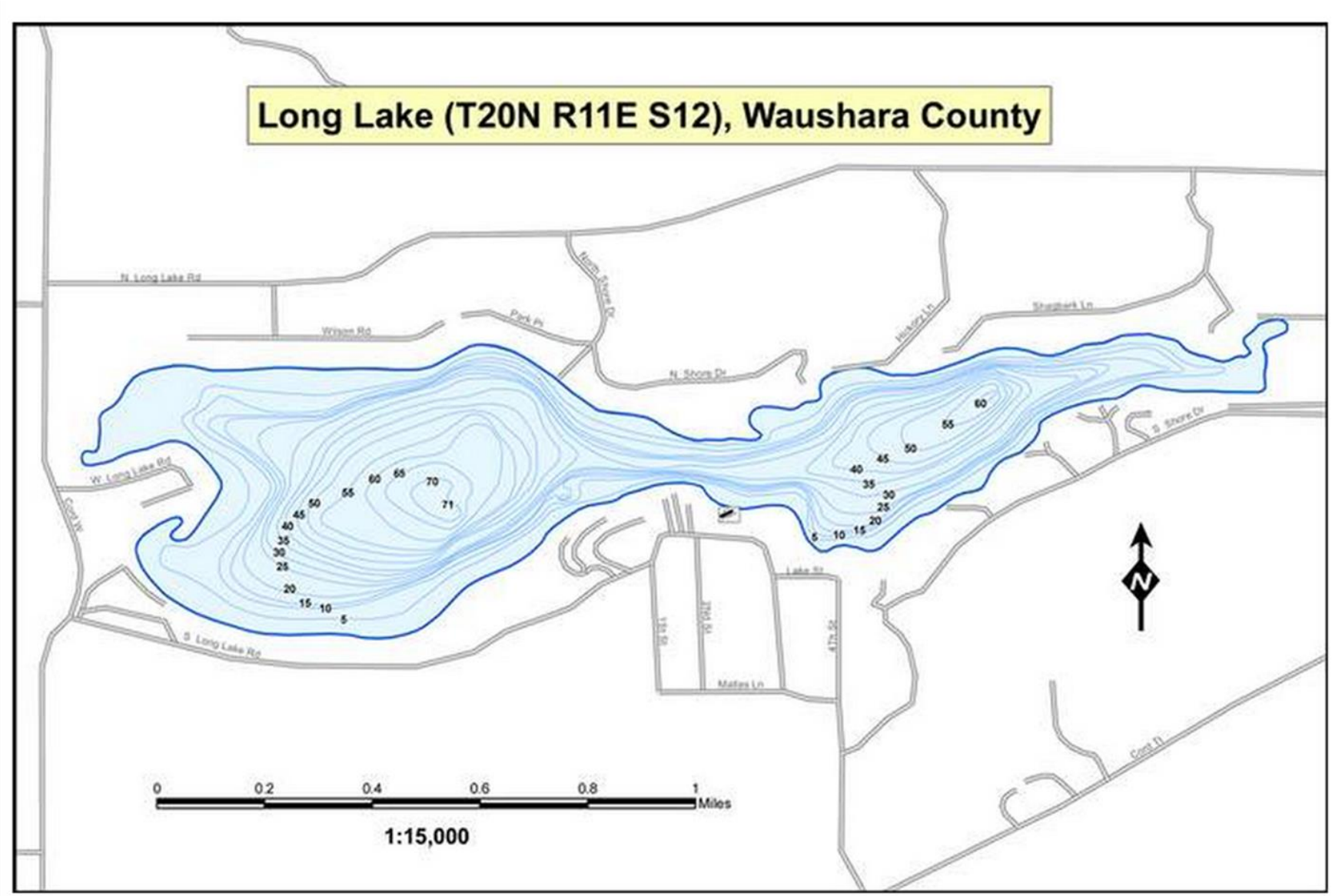


Figure 1. Contour map of the Long Lake lakebed (Source: Lake Link).

From the beginning of this plan's development, efforts have been made to identify where key assistance exists and identify opportunities for ensuring that the lake's ecological, aesthetic, and recreational opportunities are plentiful into the future. This plan was developed to incorporate a comprehensive analysis of the lake and its watershed following guidance adapted from Chapter NR 109 Wisconsin Administrative Code which includes:

1. An assessment of the lake's historical water quality, including at least one year of current baseline limnological data. **[Water Quality]**
2. An identification of the water quality problems or threats to lake water quality including degradation of fish habitat and wetlands caused by nonpoint sources of pollution in the watershed. [**Landscapes and the Lake**] **[In-Lake Habitat and a Healthy Lake**].
3. An assessment of the lake's fishery (provided by the WDNR) and aquatic habitat including the extent of the lake area covered by aquatic plants and a characterization of the shoreline habitat and any known ecological relationships. **[In-Lake Habitat and a Healthy Lake]**
4. An identification of the need for the protection and enhancement of fish and wildlife habitat, endangered resources, aesthetics or other natural resources. **[Fish Community] [Critical Habitat] [Shorelands]**
5. An assessment of the lake's watershed including:**[Landscapes and the Lake]**
    a. A description of land uses listing each land use classification as a percentage of the whole and an estimate of the amount of nonpoint pollution loading produced by each category.
    b. A listing of known point sources of pollution affecting the lake or that have affected the lake.
    c. A characterization of the habitat conditions and any known ecological relationships.
6. A description of the institutional framework affecting management of the lake including, local government jurisdictional boundaries, plans, ordinances including an analysis of the need for adoption of local ordinances for lake protection. **[Governance]**
7. A summary of the historical uses of the lake, including recreational uses up to the time of application, and how these uses may have changed because of water quality or habitat degradation.
8. A description of any other problems or issues perceived to need management actions. [Water Levels]
9. A description of any management actions taken or are in progress. [Throughout plan]
10. Identification of objectives to maintain or improve the lake's water quality, fisheries, aquatic habitat and recreational and other uses. [Throughout plan]
11. Identification of target levels of control and resource protection needed to meet the objectives. [Throughout plan]
12. Identification and discussion of the alternative management actions considered for pollution control, lake restoration or other management including expected results.
13. An analysis of the need for and a list of the proposed management actions that will be implemented to achieve the target level of pollution abatement or resource protection. [Throughout plan]
14. A strategy for tracking, evaluating and revising the plan including water quality monitoring. **[Updates & Revisions] [Water Quality]**

15. A plan for operation and maintenance of any structural management practice. The operation and maintenance period shall be for a minimum of 25 years. **[Not Applicable]**

Who can use the Long Lake Management 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 on or near Long Lake can have the greatest influence on the lake by understanding and choosing lake-friendly options to manage their land and the lake.
- **Long Lake Association:** This plan provides the Long Lake Association with a well thought out plan for the whole lake and lists options that can easily be prioritized. Annual review of the plan will also help the Long Lake Association to realize its accomplishments. Resources and funding opportunities for Long Lake Association management activities are made more available by placement of goals into this Long Lake Management Plan, and the Long Lake Association can identify partners to help achieve their goals for Long 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 Towns of Saxeville and Springwater**: The towns 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.
- **Waushara County:** County professionals will better know how to identify needs, provide support, base decisions, and allocate resources to assist the Long Lake Association in lake-related efforts documented in this plan. This plan can also inform county board supervisors in decisions related to Waushara County lakes, streams, wetlands, and groundwater.
- **Wisconsin Department of Natural Resources**: Professionals working with lakes in Waushara County can use this plan as guidance for working with the Long Lake Association relating to 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 funding from the State – if multiple Waushara County lakes have similar goals in their lake management plans, they can join together when seeking grant support to increase competitiveness for statewide resources.

Background

One of the first steps in creating this plan was to gather and compile data about the lake and its ecosystem to understand past and current lake conditions. This was done alongside 32 other lakes as part of the Waushara County Lakes Project. The Waushara County Lakes Project was initiated by citizens in the Waushara County Watershed Lakes Council who encouraged Waushara County to work in partnership with personnel from UW-Stevens Point to assess 33 lakes in the county. This effort received funding from the Wisconsin Department of Natural Resources Lake Protection Grant Program. There was insufficient data available for many of the lakes to evaluate current water quality, aquatic plant communities, invasive species, and shorelands. The data that was available had been collected at differing frequencies or periods of time, making it difficult to compare lake conditions. Professionals and students from UW-Stevens Point and the Waushara County Land Conservation Department conducted the Waushara County Lakes Study and interpreted data for use in the development of lake management plans. Data collected by citizens, consultants, and professionals at the Wisconsin Department of Natural Resources were also incorporated into the planning process to provide a robust set of information from which informed decisions could be made. Sources of information used in the planning process are listed at the end of this document.

Several reports from the Long Lake Study and the materials associated with the planning process and reports can be found on the Waushara County website: http://www.co.waushara.wi.us/ (select “Departments”, “Zoning and Land Conservation”, “Land Conservation”, and “Lake Management Planning”). Unless otherwise noted, the data used in the development of this plan was detailed in the report *Waushara County Lakes Study – Long Lake 2010-2012*, University of Wisconsin-Stevens Point.

Goals, Objectives and Actions

The following goals, objectives and associated actions were derived from the values and concerns of citizens interested in Long Lake and members of the Long Lake Planning Committee, as well as the known science about Long Lake, its ecosystem and the landscape within its watershed. Implementing and regularly updating the goals and actions in the Long 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. **The goals, objectives and actions listed in this plan should be reviewed annually and updated with any necessary changes.**

Although each lake is different, the Wisconsin Department of Natural Resources requires that each comprehensive lake management plan address a specific list of topics affecting the character of a lake, whether each topic has been identified as a priority or as simply something to preserve. In this way, every lake management plan considers the many aspects associated with lakes. These topics comprise the chapters in this plan and 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, Long Lake Association

List of Goals

The following are high priority goals/objectives identified by the Long Lake Association:

Goal 1. Long Lake will have a sustainable family friendly fishery.

Goal 2. Protect native plants in and around Long Lake.

Goal 3. Prevent the establishment of any aquatic invasive species in Long Lake.

Goal 4. Prevent the degradation of critical habitat areas in Long Lake.

Goal 5. Maintain or improve the water quality in Long Lake.

Goal 6. Protect and restore healthy, stable shoreland habitats near and around Long Lake.

Goal 7. Watershed property owners and elected governmental officials will know about and utilize resources for healthy land management practices.

Goal 8. Maintain open communications with lake users, keep visitors and residents informed about responsible lake stewardship, and encourage involvement in the Long Lake Association and Friends of Long Lake.

The following goals were identified as the three highest ranking priority goals. Details involving these goals can be found in the body of this plan.

1. Goal 5 – Maintain or improve the water quality in Long Lake.
2. Goal 3 – Prevent the establishment of any aquatic invasive species in Long Lake.
3. Goal 1 – Long Lake will have a sustainable family friendly fishery.

Lead persons and resources are identified under each objective of this plan. These individuals and organizations are able to provide information, suggestions, or services to accomplish objectives and achieve goals. The following table lists organization names and their common acronyms used in this plan. This list should not be considered all-inclusive – assistance may also be provided by other entities, consultants, and organizations.

Resource	Acronym
Clean Boats, Clean Waters	CBCW
WDNR Citizen Lake Monitoring Network	CLMN
UWSP Center for Watershed Science and Education	CWSE
Wisconsin Department of Agriculture, Trade and Consumer Protection	DATCP
Long Lake Association	LLA
Friends of Long Lake	FLL
We Really Kare Fishing Club	WRKFC
United States Geological Society	USGS
North Central Conservancy Trust	NCCT
USDA Natural Resources Conservation Service	NRCS
Golden Sands Resource Conservation & Development Council, Inc.	RC&D
University of Wisconsin Extension	UWEX
University of Wisconsin-Stevens Point	UWSP
Waushara County Land Conservation Department	WCLCD
Waushara County Watershed Lakes Council	WCWLC
Wisconsin Department of Natural Resources	WDNR
Wisconsin Department of Transportation	WDOT
UWSP Water and Environmental Analysis Lab	WEAL

Contact information for organizations and individuals who support lake management in Waushara County can be found in Appendix A. Waushara County Lakes Information Directory.

In-Lake Habitat and a Healthy Lake

Many lake users value Long Lake for its clean, clear water. They also enjoy fishing for catch and release or for food, and watching the fish and wildlife and sharing the experience with children. These attributes are all interrelated; the health of one part of the lake system affects the health of the rest of the plant and animal community, the experiences of the people seeking pleasure at the lake, and the quality and quantity of water in the lake. Habitat is the structure for a healthy fishery and wildlife community. It can provide shelter for some animals and food for others.

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

Fish Community

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

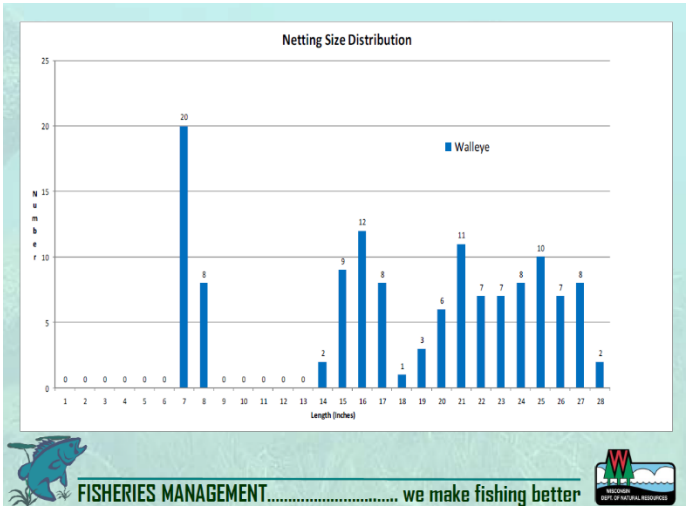
Photo courtesy of Limnology Center, UW Madison.

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. Putting appropriate fishing regulations in place and adhering to them can help to balance the fishery with healthy prey and predatory species, can be adjusted as the fish community changes, and can provide for excellent fishing.

Managing a lake for a balanced fishery can result in fewer expenses to lake stewards and the public. While some efforts may be needed to provide a more suitable environment to meet the needs of the fish, they usually do not have to be repeated on a frequently reoccurring 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. Ideally, a lake contains the habitat, water quality, and food necessary to support the fish communities that are present within the lake and provide fishing opportunities for people without a lot of supplemental effort and associated expenses to maintain these conditions.

Dave Bartz, Fisheries Biologist with the WDNR, presented the following information about Long Lake at the March 16, 2016 planning session. The most recent fishery surveys were conducted in Long Lake in 2014 with spring fyke netting for northern pike and walleye and spring electrofishing for largemouth bass and panfish. In addition, Long Lake was included in a study about cisco beginning in 2011. The study was designed to gain a better understanding of the environmental factors associated cisco populations and the evaluation of the cisco populations and distribution. Cisco were surveyed in Long Lake on August 6, 2013.



- Northern pike had poor size structure. The survey did not capture many, but due to weather conditions, they had likely completed spawning at the time that sampling was conducted.
- Walleye were in low abundance with above average growth with 28% greater than 15 inches. They are solely a stocked fishery, there is no evidence that they are reproducing in Long Lake. Stocking has been conducted by We Really Kare Fish Club, the Long Lake Association and WDNR.
- Largemouth bass were in low abundance. A catch rate of 41/hr. was observed but the preferred catch rate would be 100-150/hr. The community had a fair size structure. The PSD12 inches was 12% but 40-60% would be preferred. The density of larger fish has declined in this lake.
- Bluegill were observed in low abundance with a catch rate of 219/hr.; 300/hr. would be preferred. This community had below average growth.
- Black crappies were observed in fair abundance. Additional coarse woody habitat and aquatic plants would provide habitat/structure near shore which is particularly necessary for them to thrive and reproduce.
- Cisco were in relatively high abundance during the 2013 survey, with a maximum size of 15 inches. A winter kill has not been observed in quite some time.
- Previously a musky program existed; however, stocking was discontinued in 2004. Some large musky are still present in the lake; a 48” fish was reported to be caught by an angler during winter 2016.
- The low abundance of fish in Long Lake is not due to predation, but a lack of habitat. The primary recommendations to improve the fishery are to improve habitat which includes the addition of coarse woody structure and shoreland and aquatic plants in the near shore area.

Guiding Vision for the Fish Community

Long Lake will have a sustainable, family-friendly fishery.

Goal 1. Improve the quality of the fishery in Long Lake through improved habitat and regulations. (Priority Ranking of 3)

Objective 1.1. Improve the fishery by improving habitat for fish along the shoreland and near-shore areas and informing lake residents and users about fishery-related information and issues.

Actions	Lead person/group	Resources	Timeline
Provide opportunities for shoreland property owners to learn about the fishery in Long Lake and how they can improve it.	LLA	WDNR Fisheries Biologist UWEX Lakes (info materials) WRKFC	Ongoing
Identify lake property owners who are willing to create fish habitat on their property (e.g. tree drops, fish sticks, brush under pier, etc.). Encourage owners to leave fallen wood in the lake.	LLA	WDNR Fisheries Biologist WDNR Healthy Lakes grants (Feb 1) WCLCD WRKFC	Ongoing
Explore obtaining a lake-wide permit for tree drops, tree clusters and/or fish sticks.	LLA	WDNR Healthy Lakes grants (Feb 1) WDNR Fisheries Biologist WRKFC	Ongoing
Continue to inform shoreland property owners about creating structure by placing brush or Christmas trees under their piers.	LLA	WDNR Fisheries Biologist UWEX Lakes	Ongoing
Discourage additional fish cribs.	LLA	WDNR Fisheries Biologist	Ongoing

Objective 1.2. Optimize the fishery with adjustments in fishing regulations, as necessary.

Actions	Lead person/group	Resources	Timeline
Encourage a reduction in the bag limit for panfish.	LLA	WDNR Fisheries Biologist	2017
Work with the WDNR Fisheries Biologist to obtain the most up to date information and recommendations on improvements to the fishery overall.	LLA	WDNR Fisheries Biologist WRKFC	Ongoing
Continue to work with WDNR to control musky population	LLA	WDNR Fisheries Biologist	Ongoing
Continue to work with WDNR to provide forage fish for muskies.	LLA	WDNR Fisheries Biologist	Ongoing

Aquatic Plant Community

Aquatic plants provide the forested landscape within Long 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. Aquatic plants near shore and in shallows provide food, shelter and nesting material for shoreland mammals, shorebirds and waterfowl. It is not unusual for otters, beavers, muskrats, weasels, and deer to be seen along a shoreline in their search for food, water, or nesting material. The aquatic plants that attract the animals to these areas contribute to the beauty of the shoreland and lake.

An aquatic plant survey was conducted in Long Lake by Cason and Associates in August 2008. Forty percent (300 of 753) of the samples sites had vegetated growth and a total of 19 species of aquatic plants were observed. The most abundant species was muskgrass, which was observed at 94% of the vegetated sites, followed by variable pondweed (25% of vegetated sites) and bushy pondweed (25% of vegetated sites).

During a July 2014 aquatic plant survey of Long Lake conducted by staff from RC&D, 45% (339 of 753) of the sampled sites had vegetative growth. Thirty species of aquatic plants were observed, with the greatest diversity occurring in the shallows of the east and west bays and in the area between the two lobes. Similar to the 2008 survey, the most common species (94% of sites) was muskgrass (*Chara* sp.) followed by variable pondweed (13%). Additionally, small bladderwort, a highly sensitive and uncommon plant with a coefficient of conservatism of 10, was observed in one location in the far west bay. No aquatic invasive plant species were observed.

The similarities between the 2004, 2008, and 2014 aquatic plant surveys indicate a healthy, stable environment. A list of the aquatic plants that were observed during these surveys can be found in Appendix E. Aquatic PlantsMore detailed information can be found in the *2014 Long Lake Aquatic Plant Report* or the *Long Lake 2010-2012 Lake Study Report*.

Bladderworts are carnivorous plants. They use special trigger hairs to sense an insect—which then is sucked into digestive "bladders" in the plant. Like other bladderworts, **small bladderwort** blooms above the water surface.

In recent years, residents have observed a bloom of algae in an area on the northeast side of the lake. It has been identified as filamentous algae by the WDNR and is likely the result of nutrients related to land use, such as a combination of phosphorus runoff from lakeshore properties, failing septic systems, and groundwater contamination. It is also possible that the decrease in water quality is a function of weather patterns / climate and that the situation could improve over time.

Guiding Vision for Aquatic Plants in Long Lake

Long Lake will have a healthy and diverse native plant community that supports a balanced fishery and promotes good water quality while maintaining good swimming and recreational access.

Goal 2. Protect the diverse and high quality of native aquatic plants in and around Long Lake.

Objective 2.1. Shoreland property owners will be knowledgeable about the importance of native aquatic plants and will act accordingly.

Actions	Lead person/group	Resources	Timeline
Inform property owners of the importance of native aquatic vegetation to impede the establishment of AIS and the role of native plants in providing food and habitat for fish and wildlife. Provide educational materials provided at the annual meeting and in the spring newsletter.	LLA	UWEX Lakes WCLWC	Ongoing
If plants significantly impede recreation, consider hand-pulling small areas around private docks (within WDNR guidelines). Be vigilant about watching for AIS which may become established in the areas these areas which lack native aquatic vegetation.	Shoreland property owners		Ongoing
Remind shoreland property owners about refraining from the application of herbicides/pesticides on/near shorelands. Provide reminders at the annual meeting and in a newsletter.	LLA	UWEX Lakes	Ongoing

Aquatic Invasive Plant and Animal Species (AIS)

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

Purple loosestrife

A wetland perennial growing 3-7 feet tall, purple loosestrife prefers moist soil and shallow water where it competes with native wetland plants. Flowers consist of 5-6 pink-rose colored petals that bloom from the bottom of the flower spike to the top from early July to September. Plants can be most effectively controlled using beetles that only feed on this plant (Galerucella beetles) or by removing seed heads to reduce their spread. Purple loosestrife was observed at Long Lake in 2013 and efforts have been made to eliminate this population. Watch for new plants and take action to remove them immediately.

Zebra mussels

The zebra mussel (*Dreissena polymorpha*) is a tiny (1/8-inch to 2-inch) bottom-dwelling clam native to Europe and Asia. Zebra mussels were introduced into the Great Lakes in 1985 or 1986, and have been spreading throughout them since that time. They were most likely brought to North America as larvae in ballast water of ships that traveled from fresh-water Eurasian ports to the Great Lakes. Zebra mussels look like small clams with a yellowish or brownish D-shaped shell, usually with alternating dark- and light-colored stripes. They can be up to two inches long, but most are under an inch. Zebra mussels usually grow in clusters containing numerous individuals.

Zebra mussels were found on the north shore of Long Lake in August 2002 in about 4-5 feet of water. Subsequent water samples collected by the WDNR have confirmed the existence of free swimming zebra mussel larvae. After three years of intensive monitoring, however; in 2006, Long Lake was **delisted for zebra mussels by the WDNR**. A copy of the letter from the WDNR that indicates Long Lake is delisted for zebra mussels can be found in Appendix D. Notification of Zebra Mussel De-Listing.

Phragmites and Japanese Knotweed

See Appendix F for additional information.

Long Lake has had a very active Clean Boats, Clean Waters program since 2005, which has no doubt aided the lake's defense against infestation of AIS. Because aquatic invasives have not become established in Long Lake, residents and lake users need to remain all the vigilant to keep it that way. Survey results indicated that most, but not all shoreland property owners are cleaning their boating equipment after visiting other lakes, so efforts to keep the shoreland residents as well as lake users informed is essential. If an invasive plant species are suspected in Long Lake by any lake user, the lake user is encouraged to refer to Appendix C. Rapid Response Plan for more information on how to report it.

Guiding Vision for Aquatic Invasive Species

Long Lake will be free from aquatic invasive species.

Goal 3. Prevent AIS from becoming established in Long Lake. (Priority Ranking of 2)

Objective 3.1. Continue Clean Boats Clean Waters efforts at the Long Lake boat landing.

Actions	Lead person/group	Resources	Timeline
Encourage additional volunteer participation in CBCW.	LLA	CBCW RC&D	As needed
Work with RC&D to strengthen the power of volunteers at the boat launch.	LLA	RC&D	Ongoing
Work with WDNR to strengthen/improve current laws and enforcement.	LLA	WDNR	Ongoing

Objective 3.2. Strengthen community and shoreland property owner knowledge and actions to prevent AIS.

Actions	Lead person/group	Resources	Timeline
Shoreland property owners will understand the importance of preventing AIS from becoming establish and will take steps to prevent introduction.	LLA Shoreland property owners	UWEX Lakes – info materials	
Provide opportunities for shoreland property owners to become trained in the identification of AIS. Encourage them to monitor when they are out on the lake.	LLA	RC&D	Ongoing
Encourage participation of shoreland property owners in CBCW. Consider providing incentives for doing so.	LLA	CBCW RC&D	As needed
Invite a speaker from a local lake group that has AIS to talk about the amount of time and effort associated with control and the	LLA		As needed

importance of prevention.			
Provide information to shoreland property owners about the effects on property values from AIS infestations.	LLA	UWEX Lakes – Info materials	As needed

Critical Habitat

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

Although Long Lake does not have an official critical habitat area designation, there are areas within Long Lake that are important for fish and wildlife. Natural, minimally-impacted areas with woody habitat such as logs, branches, and stumps; areas with emergent and other forms of aquatic vegetation; areas with overhanging vegetation; and wetlands are all elements of good quality habitat. Identifying other important areas around the lake that are important habitat and informing lake users of their value can help raise awareness for the protection of these areas.

Three sensitive areas, with particular significance to the fishery, were identified in the 1996 Long Lake Protection Plan prepared by R.A. Smith & Associates and are shown in the map below. These are some of the limited areas of the lake with quality rooted aquatic plants that, among other things, provide the structure essential to fish spawning and nursery habitat. Disturbance of aquatic plants in these areas should be minimized to sustain the lake's fishery.

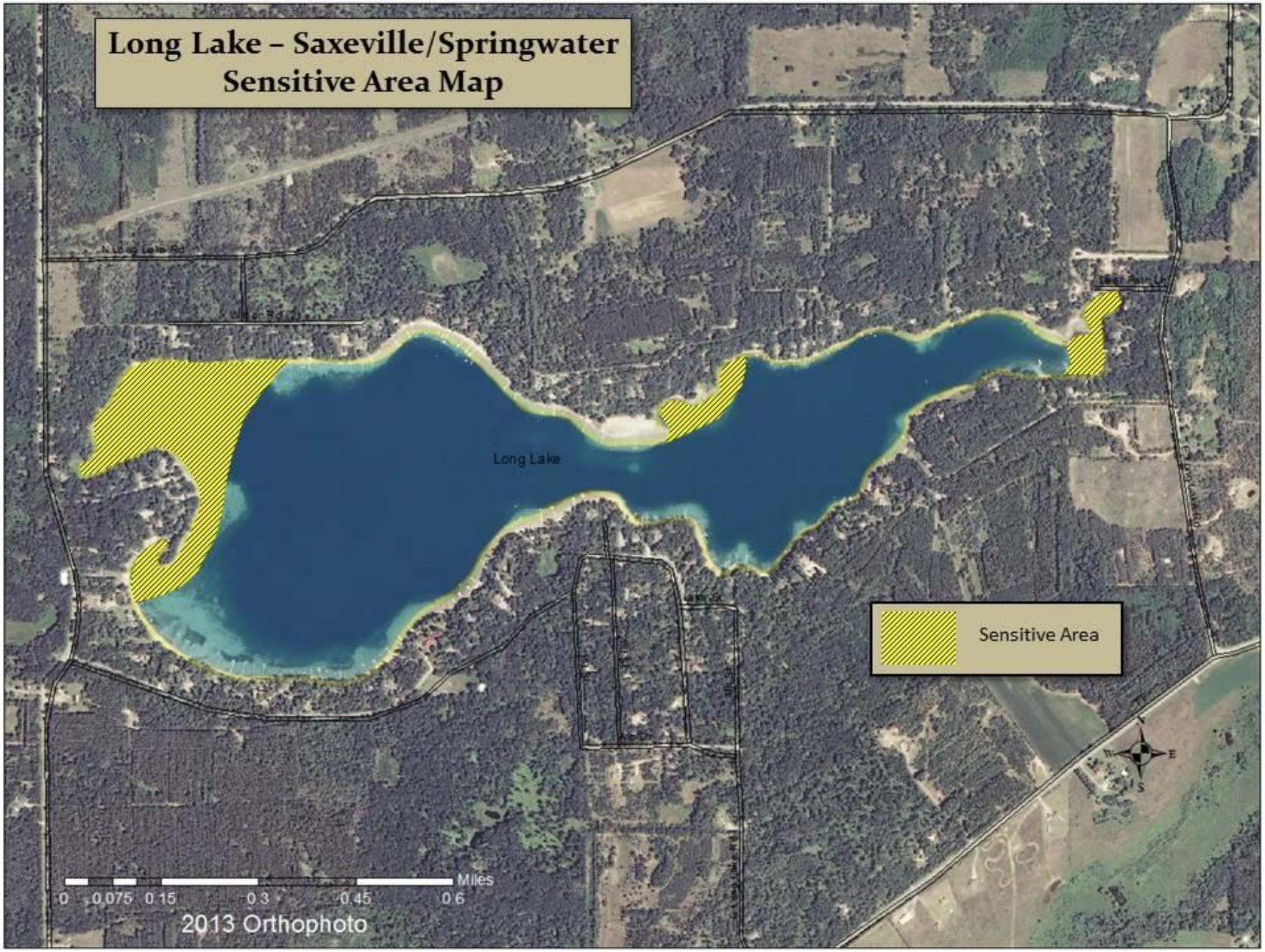
Guiding Vision Long Lake's Critical Habitat

Unique and sensitive areas in and around Long Lake will be enhanced and protected.

Goal 4. Protect unique areas that are valuable to the water quality and habitat of Long Lake.

Objective 4.1. Identify and inform others of sensitive habitat in and near Long Lake.

Actions	Lead person/group	Resources	Timeline
Request critical habitat designations from WDNR.	LLA	WDNR Lake Specialists	2017


Long Lake – Saxeville/Springwater
Sensitive Area Map
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Landscapes and the Lake

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

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

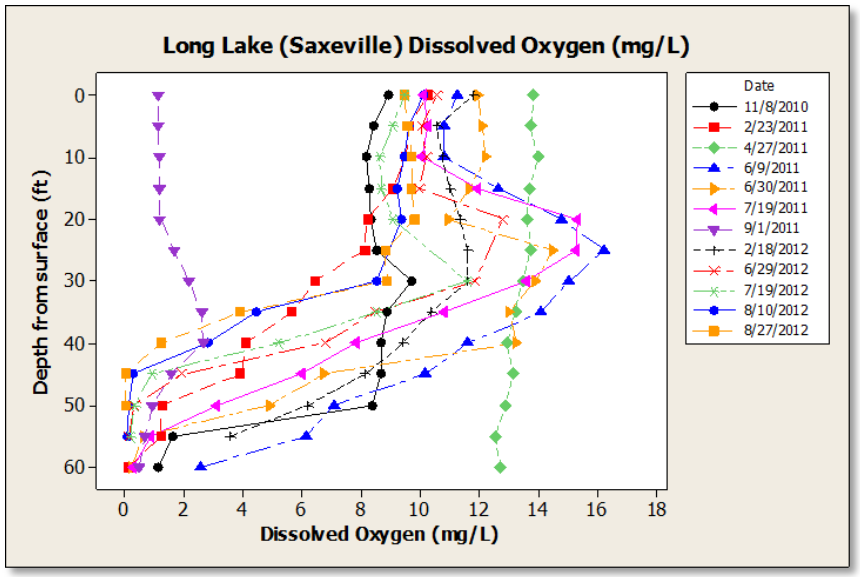
The water quality in Long Lake is the result of many factors, including the underlying geology, the climate, and land management practices. Since we have little control over the climate and cannot change the geology, changes to land management practices are the primary actions that can have positive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

Water Quality

Almost all survey respondents felt that water quality had a major impact on the personal and economic value of their lake property and more than 66% felt that the water quality had remained unchanged during their time at the lake. Of the 23% that felt water quality had declined, water level changes and fertilizers were the two most suspected culprits.

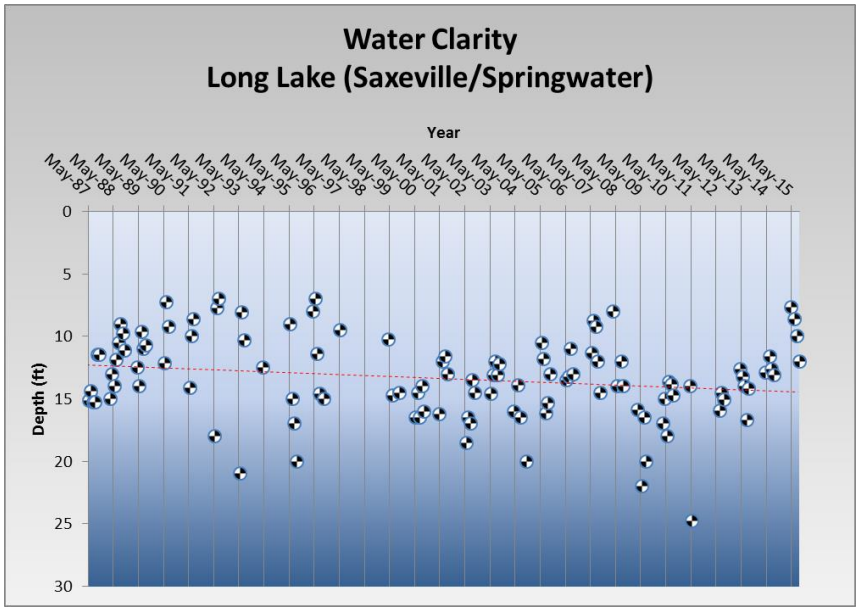
A variety of water chemistry measurements were used to characterize the water quality in Long Lake. Water quality was assessed during the 2010-2012 lake study and involved a number of measures including temperature, dissolved oxygen, water chemistry, and nutrients (phosphorus and nitrogen). Nutrients 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 were also reviewed to determine trends in Long Lake's water quality.

Dissolved oxygen is an important measure in Long Lake because a majority of organisms in the water depend on oxygen to survive. Oxygen is dissolved into the water from contact with air, which is increased by wind and wave action. Algae and aquatic plants also produce oxygen when sunlight enters the water, but the decomposition of dead plants and algae reduces oxygen in the lake. During winter and summer when lakes stratify (layer), the amount of dissolved oxygen is often lower towards the bottom of the lake. Dissolved oxygen concentrations below 5 mg/L can stress some species of cold water fish and over time can reduce the amount of available habitat for sensitive cold water species of fish and other aquatic organisms. In fall and spring, concentrations of dissolved oxygen were uniform throughout the water column in Long Lake, indicative of lake overturn. In summer, dissolved oxygen was stratified, with the upper 35 feet always having sufficient concentrations for the fishery. During the summer, increases in dissolved oxygen were observed at depths near 25 feet; these increases at depth are typically due to the production of oxygen by algae.

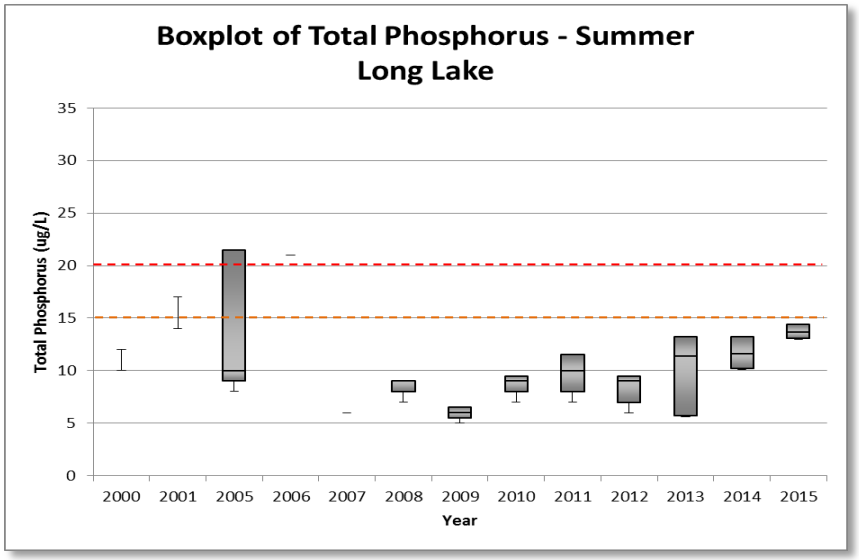


In Long Lake, color was low, so the variability in transparency throughout the year is primarily due to fluctuating algae concentrations, marl formation, and/or resuspended sediment following storms and/or heavy boating activity. The water clarity measured in Long Lake's west basin was considered good. Over the 2010-2012 monitoring period, water clarity ranged from 11 feet to 28 feet. When compared with previous data, average clarity measured in all months during the study was better than historic averages. The long-term trend, including data back to 1987, suggests that water clarity has changed little in Long Lake.

Chloride, sodium and potassium concentrations are commonly used as indicators of how a lake is being impacted by human activity. The presence of these compounds where they do not naturally occur indicates sources of water contaminants. Long Lake had moderate average chloride and potassium concentrations and elevated average sodium concentrations over the monitoring period. Although these elements are not detrimental to the aquatic ecosystem, their presence indicates sources of contaminants such as road salt, fertilizer, animal waste and/or septic system effluent may be entering the lake from either surface runoff or via groundwater.

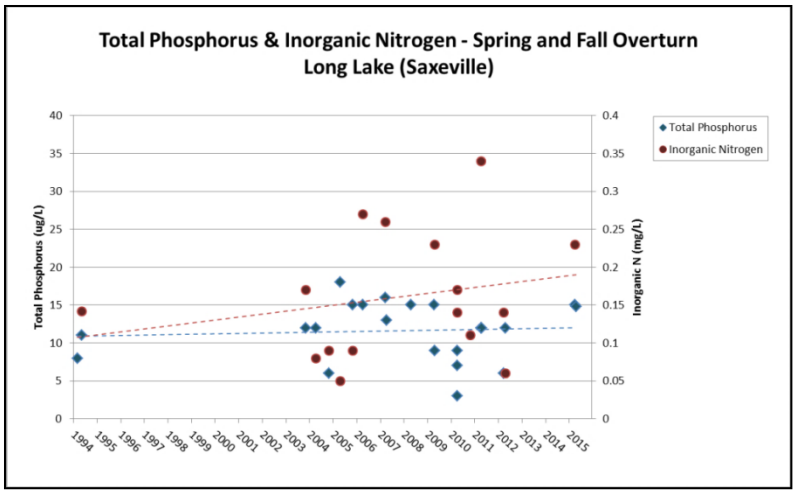


Phosphorus is an element that is essential in trace amounts to most living organisms, including aquatic plants and algae. Sources of phosphorus can include naturally-occurring phosphorus in soils and wetlands, and groundwater. Common sources from human activities include soil erosion, animal waste, fertilizers, and septic systems. Although a variety of compounds are important to biological growth, phosphorus receives attention because it is commonly the "limiting nutrient" in many Wisconsin lakes. Due to its relatively short supply compared to other substances necessary for growth, relatively small increases in phosphorus result in significant increases in aquatic plants and algae.



During the study, total phosphorus concentrations in Long Lake ranged from a high of 29 ug/L in early August 2011 to a low of 10 ug/L in late August 2011. The summer median total phosphorus concentrations were 18 and 17 ug/L in 2011 and 2012, respectively. This is just below Wisconsin's phosphorus standard of 20 ug/L for deep seepage lakes. Data collected since 2012 by volunteers on Long Lake remains consistent. Inorganic nitrogen concentrations in Long Lake were within the natural background range for lakes in Waushara County. Although the summer concentrations are below the summer phosphorus standard, monitoring of phosphorus and inorganic nitrogen revealed an increase in both nutrients. Private well data also suggests elevated nitrate concentrations in well water to the west of Long Lake. These data are available at http://www.uwsp.edu/cnr-ap/watershed/Pages/WellWaterViewer.aspx.

Managing nitrogen, phosphorus and soil erosion near shore and throughout the Long Lake watershed is one of the keys to protecting the lake itself. Near shore activities that may increase the input of phosphorus to the lake include applying fertilizer, removing native vegetation (trees, bushes and grasses), mowing vegetation, and increasing the amount of exposed soil. Nitrogen inputs to Long Lake can be controlled by using lake-friendly land management decisions, such as the restoration of shoreland vegetation, elimination/reduction of fertilizers, ground water contaminates, proper management of animal waste and septic systems, and the use of water quality-based management practices.



Guiding Vision for Water Quality in Long Lake

Long Lake will have good water quality that supports a healthy lake and recreation.

Goal 5. Long Lake will have good water quality. (Priority Ranking of 1)

Maintain median summer phosphorus concentrations below the flag value of 15 ug/L and spring inorganic nitrogen concentrations below 0.3 mg/L.

Objective 5.1. Shoreland and watershed property owners will be knowledgeable about the relationship between water quality and their land management practices.

Actions	Lead person/group	Resources	Timeline
Inform others around the lake about the impacts of nutrients and land management on water quality in the Association newsletter.	LLA	WCWLC	Ongoing
Refrain from the use of fertilizers on shoreland properties (see Shorelands section). Encourage soil testing to determine if fertilizer is necessary.	Shoreland property owners	WC UWEX WCLCD	Ongoing
Inform shoreland property owners about options to control and absorb runoff and pollutants before they enter Long Lake (see Shorelands section).	LLA	WCWLC UWEX Lakes (info materials) Consultants	Ongoing

Objective 5.2. Monitor lake water to evaluate if goals are being met and private well water to ensure drinking water is healthy.

Actions	Lead person/group	Resources	Timeline
Regularly monitor water clarity (minimum 5 times/summer).	Trained volunteer	LLA, CLMN Coordinator	Ongoing-June-Sept
Continue monitoring water chemistry (total phosphorus and chlorophyll during the summer).	Trained volunteer	LLA, CLMN Coordinator	Ongoing-summer
Test for phosphorus and nitrogen in lake water during spring overturn.	Trained volunteer	WEAL or other state certified water testing lab	Ongoing-spring
Submit all collected data to LLA and WDNR SWIMS* for long term storage, interpretation, and use.	Trained volunteer	CLMN** Coordinator	As needed – at least annually
Encourage residents to test their drinking water for nitrates. Private well testing for bacteria, atrazine and nitrate should be done annually.	LLA	WEAL or other state certified water testing lab	Ongoing-annually

*WDNR SWIMS (Surface Water Integrated Monitoring System) **WDNR CLMN (Citizens Lake Monitoring System)

Water Levels

Fluctuating water levels in lakes are natural responses to changes in climate, and weather patterns, and manmade pumping. Some seepage lakes in Waushara County have historically experienced fluctuations in water levels and some plants have adapted to these fluctuations for survival. Since 2006, annual precipitation for Wautoma has been average and in some years above average so low water levels are not a result of lack of precipitation (Kraft et. al., 2014). Excess withdrawal of groundwater can add to natural fluctuations, affecting the extent and duration of low water levels (Kraft, 2014). Though some residents at Long Lake feel that they have been impacted by large withdrawals at this time, the Long Lake Planning Committee envisions lake water levels that will remain within natural fluctuations and may not experience adverse impacts from groundwater pumping through the maintenance of infiltration and limitations on large withdrawals in the surrounding area.

When water levels in the lake drop, the lakebed is exposed. Regardless of water levels, lakebeds remain public property; however, during low periods, shoreland property owners can access this area. These are fragile areas, which provide habitat for lake inhabitants when the water levels rebound. Therefore, care should be taken to avoid “cleaning up” the exposed lakebed, especially woody structure. Activities such as cutting an area larger than 35 feet wide, driving a motor vehicle on the lakebed, tilling, and chemically treating vegetation if the area is wet should be avoided, if possible. If there is reason for one of these activities, a permit from the WDNR is required. In addition to water quality and habitat benefits, maintaining healthy shoreland vegetation will help to keep the shoreline from eroding during periods of low water. Although it has not been documented around Long Lake, in Waushara County, the endangered species, Facette’s Locoweed grows on some of the lakes’ exposed shorelines. Care should be taken to protect these unique species.

Guiding Vision for Long Lake's Water Levels

Long Lake will maintain typical historical water levels.

Long Lake will experience fluctuations in water levels.

Objective 1: Understand water fluctuations (natural vs. manmade) in and near Long Lake.

Actions	Lead person/group	Resources	Timeline
Continue the lake level monitoring program. Work with WCLCD to verify current monitoring methods and inquire about the installation of a monitoring well. Collect measurements at least monthly.	LLA	WCLCD WDNR Water Quality Specialist	Ongoing
Continue to monitor manmade usage (pumping) of lake water by outside sources	LLA		Ongoing
Continue the lake level monitoring program.	LLA	USGS	Ongoing

Objective 2: Work with citizens and elected officials to ensure that Long Lake maintains natural lake levels.

Actions	Lead person/group	Resources	Timeline
Provide information to Association members via website and/or email on what is currently happening with water withdrawals and impacts on lake levels.	LLA	Wisconsin Lakes	Ongoing
Connect with other lake groups and organizations in the area focused on water level/groundwater issues in Central Wisconsin.	LLA	WCWLC Friend of Central Sands Wisconsin Lakes	Ongoing – as needed
Support local legislators working on groundwater legislation; give legislators more support and representation at discussions on groundwater issues related to water withdrawal.	LLA	Town, Village, County elected officials State and Federal legislators	Ongoing – as needed

Shorelands

Shoreland vegetation is critical to a healthy lake ecosystem. It provides habitat for many aquatic and terrestrial animals including birds, frogs, turtles, and small and large mammals. It also helps to improve the quality of the runoff that is flowing across the landscape towards the lake. Healthy shoreland vegetation includes a mix of unmowed grasses/flowers, shrubs, trees, and wetlands which extend at least 35 feet landward from the water's edge.

To better understand the health of the Waushara County lakes, shorelands were evaluated. The survey inventoried the type and extent of shoreland vegetation. Areas with erosion, rip-rap, barren ground, sea walls, structures and docks were also inventoried. A scoring system was developed for the collected data to provide a more holistic assessment. Areas that are healthy will need strategies to keep them healthy, and areas with potential problem areas and where management and conservation may be warranted may need strategies for improvement. The scoring system is based on the presence/absence and abundance of shoreline features, as well as their proximity to the water's edge. Values were tallied for each shoreline category and then summed to produce an overall score. Higher scores denote a healthier shoreline with good land management practices. These are areas where protection and/or conservation should be targeted. On the other hand, lower scores signify an ecologically unhealthy shoreline. These are areas where management and/or mitigation practices may be desirable for improving water quality and habitat.

The summary of scores for shorelands around Long Lake is displayed on the map in Appendix B. Shoreland Survey – 2011. Overall, much of Long Lake's shorelands are disturbed and many segments have challenges that should be addressed. The conditions of some of the stretches of shoreland ranked as poor.

Shoreland ordinances were enacted to improve water quality and habitat, and to protect our lakes. To protect our lakes, county and state (NR 115) shoreland ordinances state that vegetation should extend at least 35 feet inland from the water's edge, with the exception of an optional 35 foot viewing corridor for each shoreland lot. Based on the 2011 shoreland inventory, 41% (9,840 feet) of Long's shoreland was mowed lawn, which is nearly double the 5,670-foot length of shoreline that would be allowed as access corridors. Although some properties were grandfathered in when the ordinance was initiated in 1966, the lake's health and its inhabitants would benefit from all properties following this guidance. Half of survey respondents indicated that the majority of their property within 35 feet of the lake was mowed or weed-whacked.

Guiding Vision for Long Lake's Shorelands

Long Lake will have a shoreland that provides aesthetic beauty and benefits water quality and habitat for wildlife that use or live near shore.

Goal 6. Long Lake shorelands will become increasingly healthy over time.

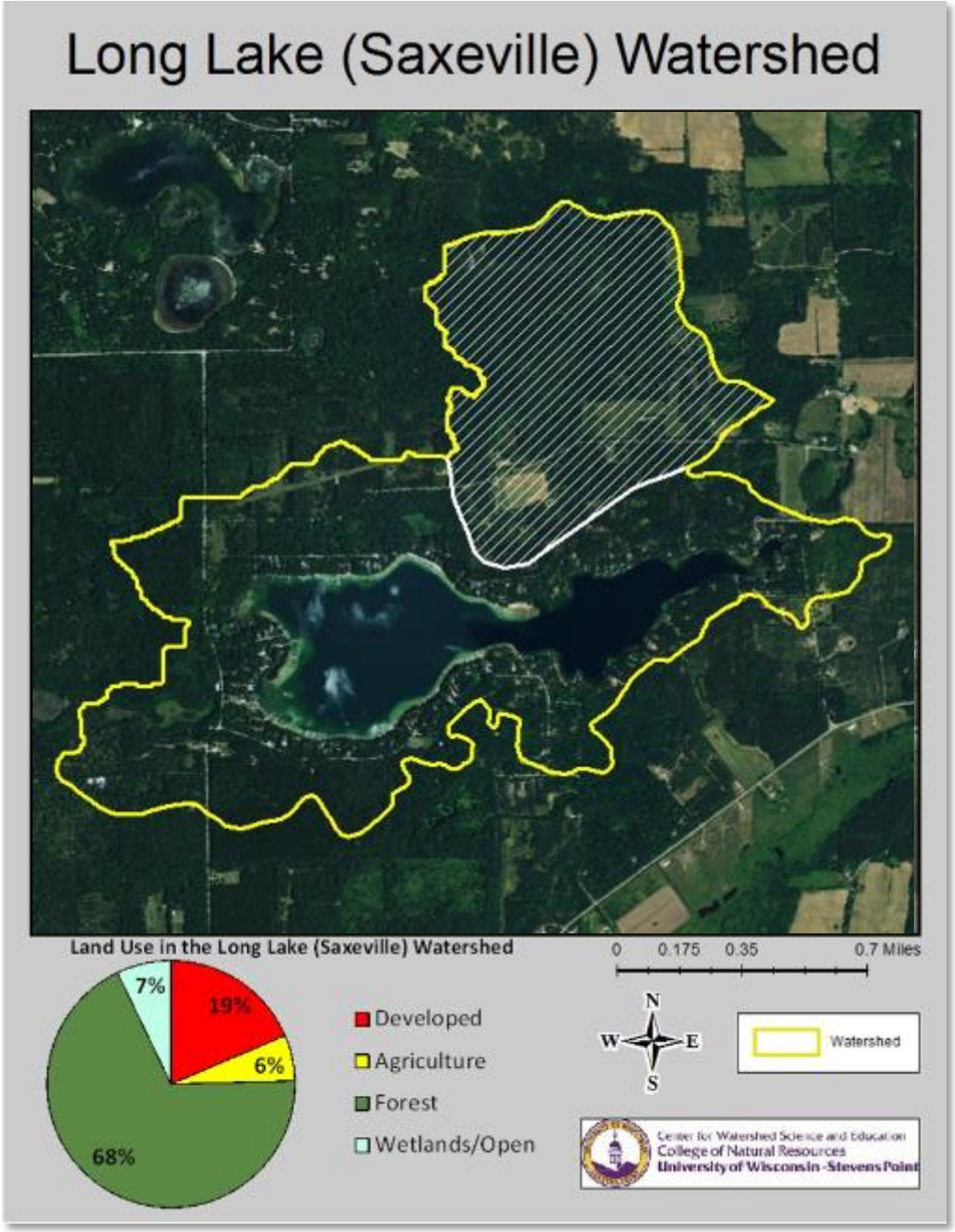
Objective 6.1. Long Lake shoreland property owners will be knowledgeable about and make good decisions about shoreland practices that result in good water quality and habitat.

Actions	Lead person/group	Resources	Timeline
WCLCD will provide support to shoreland property owners to implement healthy shoreland practices.	WCLCD	WC Board Supervisors WDNR Healthy Lakes Grants	
Make informational materials available to all shoreland property owners about basic lake stewardship including healthy shorelands and their composition (wildflowers, shrubs, trees, etc.).	LLA	WCWLC UWEX Lakes – info materials	Ongoing
Encourage and support shoreland owners interested in shoreland restoration and inform them to contact the WCLCD for available resources.	LLA Shoreland property owners	UWEX Lakes – info materials WCLCD Consultants WDNR Healthy Lakes grants	Ongoing
Explore a demonstration site in the county that residents can be directed to see.	LLA Towns of Saxeville and Springwater Shoreland property owners	WCLCD UWEX Lakes Consultants	2016-2017
Discourage lake property owners from using fertilizer on their lawns as they are a source of nitrogen seepage into the lake; those concerned about appearance of lawn should have their soil tested to determine if any amendments are warranted.	LLA	WCLCD UWEX	Ongoing
Inform lake property owners that burning along the shoreline is a source of nutrients (phosphorous) entering the lake water. When burning near the water, ash debris should be removed and deposed of.	LLA		Ongoing
Host a speaker/demonstration on how to restore shorelands.	LLA	WCLCD UWEX Lakes-Patrick Goggin Consultants	2017

Watershed Land Use

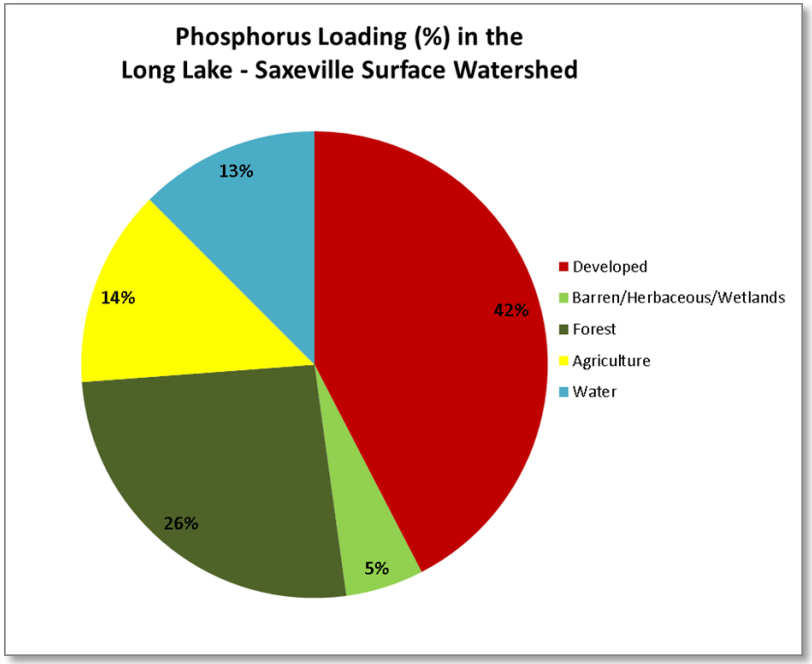
It is important to understand where the water in Long Lake originates in order to understand the lake's health. During snowmelt or rainstorms, water moves across the surface of the landscape (runoff) towards lower elevations such as lakes, streams, and wetlands. The land area that contributes runoff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

The capacity of the landscape to shed or hold water and contribute or filter particles determines the amount of erosion that may occur, the amount of groundwater feeding a lake, and ultimately, the lake's water quality and quantity. Essentially, landscapes with greater capacities to hold water during rain events and snowmelt slow the delivery of the water to the lake. Less runoff is desirable because it allows more water to recharge the groundwater, which feeds the lake year-round - even during dry periods or when the lake is covered with ice. A variety of land management practices can be put in place to help reduce impacts to our lakes. Some practices are designed to reduce runoff. These include protecting/restoring wetlands, installing rain gardens, swales, rain barrels, and routing drainage from pavement and roofs away from the lake. Some practices are used to help reduce nutrients from moving across the landscape towards the lake. Examples include manure management practices, eliminating/reducing the use of fertilizers, increasing the distance between the lake and a septic drainfield, protecting/restoring wetlands and native vegetation in the shoreland, and using erosion control practices.



The surface watershed for Long Lake is 1,802 acres (WDNR HUC16). The northern part of the watershed, identified with white crosshatching on the map, is approximately 418-acres. This area is internally drained, meaning there is no direct outflow for surface runoff to the lake from the landscape. Instead, the water that falls in this part of the watershed is connected to the lake via groundwater flow. Primary land uses within the watershed are forest and developed land. The lake's shoreland is surrounded primarily by developed land, wetlands and forests. In general, the land closest to the lake has the greatest immediate impact on water quality.

Estimates of phosphorus from the landscape can help to understand the phosphorus sources to Long 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 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, developed land had the greatest percentages of phosphorus contributions from the watershed to Long Lake.



Guiding Vision for Long Lake's Watershed

Land within the Long Lake watershed will contribute good water quality to the lake.

Goal 7. Watershed, shoreland property owners, and elected government officials will be informed about and make healthy land management decisions.

Objective 7.1. Support healthy land management techniques in the Long Lake watershed.

Actions	Lead person/group	Resources	Timeline
The County will provide information and support to property owners in the watershed related to water quality-based best management practices (BMPs) including those that reduce the application of excess nitrogen and pesticides that leach to groundwater.	WCLCD LLA	NRCS DATCP County Board Supervisors	Ongoing
Support property owners interested in the protection of their land via a land conservation program (i.e. Conservation Easement, Purchase of Development Rights, or sale of land for protection).	Watershed property owners	NCCT WDNR Lake Protection grants Knowles-Nelson Stewardship funds	As needed
Encourage subdivisions and other new developments to manage storm water on site and consider ways to minimize impacts from septic systems on Long Lake.	WC	Town of Saxeville Town of Springwater Developers	As needed
Encourage design of road and construction projects that minimize impacts to Long Lake.	LLA	WCLCD Town of Saxeville Town of Springwater WC Highway Department WI DOT	As needed

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 Long Lake Association to take proactive steps to improve their lake and their community. Individual input by lake residents and visitors can have a positive impact on the lake and on those who enjoy this common resource. Collaborative efforts may have a bigger positive impact; therefore, communication and cooperation between the Long Lake Association and lake users are essential to maximize the effects of plan implementation.

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

Recreation

The primary recreational activities identified by over 75% of the Long Lake survey respondents included enjoying the scenery, walking, swimming/snorkeling, canoeing/kayaking, motor boating, and tubing/water skiing. A boat ramp on the south side of the lake near the narrows provides public access to Long Lake. The launch does not provide ADA handicapped access. There are no boating hours on Long Lake, which was supported by 95% of survey respondents.

Guiding Vision for Recreation

Lake users will enjoy Long Lake with minimal recreational conflicts.

Avoid user conflicts by creating an environment of civility and compliance.

Objective: Provide lake users with the information they need to make good decisions.

Actions	Lead person/group	Resources	Timeline
Continue to communicate with lake users by providing information for lake residents, their guests, and renters. Information should include: not operating any boat or PWC faster than slow no wake speed within 100 feet of any dock, pier, raft, etc., and any PWC faster than slow no wake within 200 feet of shore.	LLA	UWEX Lakes	Ongoing
Maintain public landing/boat launch signs.	Town of Saxeville LLA	Town of Saxeville	Ongoing
Explore implementation of a trailer parking fee for maintenance of landings.	LLA	Town of Saxeville	2016

Communication and Organization

Developing a sense of community and a base of local knowledge, respect, and trust are primary components necessary for in the enjoyment, protection, and improvement of Long Lake. Working together to achieve the goals that are outlined in this plan will ensure the desires expressed for current residents and future generations are realized.

Guiding Vision for Communication

The Long Lake community will be connected and informed on lake issues.

Goal 8. Increase participation in lake stewardship.

Objective 8.1. Develop opportunities for education and outreach among full and part-time residents.

Actions	Lead person/group	Resources	Timeline
Maintain the LLA website to provide a common source of communication. http://www.llasaxeville.org/	LLA	WC UWEX	Ongoing
Maintain an email and mailing list of shoreland property owners and others interested in Long Lake.	LLA	WC UWEX	Ongoing
Share minutes (or meeting notes) from annual meeting on website and/or fall newsletter.	LLA		As needed
Continue to distribute a welcome packet/mailing to all new shoreland property owners with basic lake stewardship information/brochures.	LLA	UWEX Lakes	Ongoing
Communicate updates to lake management plan and management activities to residents and users of the lake via email list and/or newsletter.	LLA	WC UWEX	Ongoing
Host an annual meeting to discuss lake management and opportunities for shoreland property owners.	LLA		Annually
Host gatherings to learn about topics identified in this LMP. Invite speakers or conduct demonstrations.	LLA		As needed

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.

Guiding Vision for Updates and Revisions

Long Lake will continue to work to have an up-to-date and relevant lake management plan that is reviewed annually and documents all management activities and results.

This lake management plan will contain relevant information.

Objective: Review the plan and update as needed.

Actions	Lead person/group	Resources	Timeline
Review the plan at the annual meeting and discuss accomplishments and identify goals/objectives/actions for upcoming year. Obtain status updates from partners.	LLA	UWEX Lakes	Annually
Work with partners listed in this plan if updates are needed or desired.	LLA	Partners in this plan	As needed

Governance

Lake Management Plan Approval

The draft lake management plan has been completed by the Long Lake Association or its committee. The final draft of the lake management plan will be approved through a vote of the Long Lake Association membership or board. The final draft will be approved by the Wisconsin Department of Natural Resources (DNR) to have met the lake management plan requirements and grant requirements. If the DNR requires modifications or additional information before approving the plan, the plan will be changed to meet DNR requirements that are acceptable to the Long Lake Association but only with the Long Lake Association's approval. The completed plan that has been approved by the Long Lake Association and the DNR will be presented to the municipalities containing the lake and Waushara County. The municipality may reference the lake management plan or parts of the plan in their comprehensive plan to guide municipal or county decisions.

Lake Assistance

The lake management plan will enhance the ability of the lake to apply for financial assistance. The lake management plan will be considered as part of the application for grants through the Wisconsin Department of Natural Resources. Current listings of grants available from the DNR can be found at http://dnr.wi.gov/aid/. Waushara County offers technical and financial assistance through the Land Conservation and Zoning Department and University of Wisconsin-Extension Department. Additional assistance may be available from other agencies and organizations, including DNR, UW-Extension Lakes Program, Golden Sands RC&D, Wisconsin Wetlands Association, and Wisconsin Trout Unlimited.

Lake Regulations

The lake management plan is superseded by federal, state, county, and municipal laws and court rulings. However, the lake management plan may influence county and municipal ordinances and enforcement, which is why the lake management plan will be reviewed and included or referenced in the county and related municipal comprehensive plans. Federal laws contain regulations related to water quality, wetlands, dredging, and filling. State laws contain regulations related to water quality, water and lake use, aquatic plants and animals, shoreline vegetation, safety, and development. County laws contain regulations related to development, safety, use, and aquatic plants and animals. Municipal laws contain regulation of use and safety. The court system interprets these rules and regulations. The rules and regulations are primarily enforced by the US Army Corps of Engineers, the Wisconsin Department of Natural Resources, the Waushara County Sheriff Department, and the Waushara County Land Conservation and Zoning Office. If considering development near or on a lake, addressing problem plants or animals, or changing the lake bottom contact the Waushara County Land Conservation & Zoning Department at the Waushara County Courthouse (920) 787-0443 and/or the Wisconsin Department of Natural Resources (888) 936-7463.

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Appendices

Appendix A. Waushara County Lakes Information Directory

Algae - Blue-Green

Contact: Ted Johnson
Wisconsin Department of Natural Resources
Phone: 920-424-2104
E-mail: TedM.Johnson@wisconsin.gov
Website: http://dnr.wi.gov/lakes/bluegreenalgae/

Contact: Wisconsin Department of Health Services
1 West Wilson Street, Madison, WI 53703
Phone: 608-267-3242
Website:
http://www.dhs.wisconsin.gov/eh/bluegreenalgae/contactus.htm

Aquatic Invasive Species/Clean Boats Clean Water

Contact: Golden Sands RC&D
1100 Main St., Suite 150, Stevens Point, WI 54481
Phone: 715-343-6215
Websites: www.goldensandsrcd.org
http://dnr.wi.gov/invasives/

Aquatic Plant Management (Native and Invasive)

Contact: Ted Johnson
Wisconsin Department of Natural Resources
Phone: 920-424-2104
E-mail: TedM.Johnson@wisconsin.gov
Website: http://dnr.wi.gov/lakes/plants/

Aquatic Plant Identification

Contact: Golden Sands RC&D
1100 Main St., Suite 150, Stevens Point, WI 54481
Phone: 715-343-6215
Website: www.goldensandsrcd.org

Contact: Dr. Emmet Judziewicz
UWSP Freckmann Herbarium
TNR 301, 800 Reserve St., Stevens Point, WI 54481
Phone: 715-346-4248
E-mail: ejudziew@uwsp.edu

Contact: Ted Johnson
Wisconsin Department of Natural Resources
Phone: 920-424-2104
E-mail: TedM.Johnson@wisconsin.gov

Aquatic Plant Surveys/Management

Contact: Ted Johnson
Wisconsin Department of Natural Resources
Phone: 920-424-2104
E-mail: TedM.Johnson@wisconsin.gov
Website: http://dnr.wi.gov/lakes/plants/

Best Management Practices (rain gardens, shoreland buffers, agricultural practices, runoff controls)

Contact: Ed Hernandez
Waushara County Land Conservation Department
PO Box 1109, Wautoma, WI 54982
Phone: 920-787-0453
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Boat Landings, Signage, Permissions (County)

Contact: Scott Schuman
Waushara County Parks
PO Box 300, Wautoma, WI 54982
Phone: 920-787-7037
E-mail: wcparks.parks@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/parks.htm

Boat Landings (State)

Contact: Dave Bartz
Wisconsin Department of Natural Resources
Hwy 22N, Box 430, Montello, WI 53949
Phone: 608-635-4989
E-mail: David.Bartz@wisconsin.gov
Website:
http://dnr.wi.gov/org/land/facilities/boataccess/

Boat Landings (Town)

Contact the clerk for the specific town/village in which the boat landing is located.

Citizen Lake Monitoring Network
Contact: Brenda Nordin
Wisconsin Department of Natural Resources
Phone: 920-662-5141
E-mail: brenda.nordin@wisconsin.gov

Conservation Easements

Contact: Gathering Waters Conservancy
211 S. Paterson St., Suite 270, Madison, WI 53703
Phone: 608-251-9131
E-mail: info@gatheringwaters.org
Website: http://gatheringwaters.org/

Contact: Ted Johnson
Wisconsin Department of Natural Resources
Phone: 920-424-2104
E-mail: TedM.Johnson@wisconsin.gov

Contact: Patrick Sorge
Wisconsin Department of Natural Resources
PO Box 4001, Eau Claire, WI 54702
Phone: 715-839-3794
E-mail: Patrick.Sorge@wisconsin.gov

Contact: North Central Conservancy Trust
PO Box 124, Stevens Point, WI 54481
Phone: 715-344-1910
E-mail: info@ncctwi.org
Website: http://www.ncctwi.org/

Contact: NRCS Stevens Point Service Center
1462 Strongs Ave., Stevens Point, WI 54481
Phone: 715-346-1325

Critical Habitat and Sensitive Areas

Contact: Ted Johnson
Wisconsin Department of Natural Resources
Phone: 920-424-2104
E-mail: TedM.Johnson@wisconsin.gov
Website: http://dnr.wi.gov/lakes/criticalhabitat/

Dams

Contact: Joe Behlen
Wisconsin Department of Natural Resources
473 Griffith Ave., Wisconsin Rapids, WI 54494
Phone: 715-421-9940
E-mail: joseph.behlen@wisconsin.gov
Website: http://dnr.wi.gov/org/water/wm/dsfm/dams/

Fertilizers/Soil Testing

Contact: Ken Williams
Waushara County UW- Extension
209 S St. Marie St, PO Box 487, Wautoma, WI 54982
Phone: 920-787-0416
E-mail: ken.williams@ces.uwex.edu
http://waushara.uwex.edu/agriculture/services

Fisheries Biologist (management, habitat)

Contact: Dave Bartz
Wisconsin Department of Natural Resources
Hwy 22N, Box 430, Montello, WI 53949
Phone: 608-635-4989
E-mail: David.Bartz@wisconsin.gov
Website: http://dnr.wi.gov/fish/

Frog Monitoring—Citizen Based
Contact: Andrew Badje
Wisconsin Department of Natural Resources
Phone: 608-266-3336
E-mail: Andrew.badje@wisconsin.gov
E-mail: WFTS@wisconsin.gov

Grants

Contact: Ted Johnson
Wisconsin Department of Natural Resources
Phone: 920-424-2104
E-mail: TedM.Johnson@wisconsin.gov
Website: http://dnr.wi.gov/Aid/Grants.html#tabx8

Contact: Ed Hernandez
Waushara County Land Conservation Department
PO Box 1109, Wautoma, WI 54982
Phone: 920-787-0453
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Groundwater Quality

Contact: Kevin Masarik
UWSP Center for Watershed Science & Education
TNR 224, 800 Reserve St., Stevens Point, WI 54481
Phone: 715-346-4276
E-mail: kmasarik@uwsp.edu
Website: http://www.uwsp.edu/cnr/watersheds/

Groundwater Levels/Quantity

Contact: Ed Hernandez
Waushara County Land Conservation Department
Address: PO Box 1109 Wautoma, WI 54982
Phone: 920-787-0453
E-mail: lcdzoning.courthouse@co.waushara.wi.us

Contact: George Kraft
UWSP Center for Watershed Science & Education
TNR 224, 800 Reserve St., Stevens Point, WI 54481
Phone: 715-346-2984
E-mail: george.kraft@uwsp.edu

Groundwater Levels/Quantity (cont'd)

Contact: Scott Provost
Wisconsin Department of Natural Resources
473 Griffith Ave., Wisconsin Rapids, WI 54494
Phone: 715-421-7881
E-mail: scott.provost@wisconsin.gov
http://prodoasext.dnr.wi.gov/inter1/hicap$.startup

Informational Packets

Contact: UWSP Center for Watershed Science & Education
TNR 224, 800 Reserve St. Stevens Point, WI 54481
Phone: 715-346-2497
E-mail: pclakes@uwsp.edu

Lake Groups – Friends, Associations, Districts

Contact: Patrick Nehring
UWEX Economic Resource Development Agent
PO Box 487, Wautoma, WI 54982
Phone: 920-787-0416
E-mail: Patrick.nehring@ces.uwex.edu

Contact: Patrick Goggin
UWEX Lakes
TNR 203, 800 Reserve St., Stevens Point, WI 54481
Phone: 715-365-8943
E-mail: pgoggin@uwsp.edu
Website:
http://www.uwsp.edu/cnr/uwexlakes/organizations/

Contact: Eric Olson
UWEX Lakes
TNR 206, 800 Reserve St., Stevens Point, WI 54481
Phone: 715-346-2192
E-mail: eolson@uwsp.edu
Website:
http://www.uwsp.edu/cnr/uwexlakes/organizations/

Contact: Susan Tesarik
Wisconsin Lakes
4513 Vernon Blvd., Suite 101, Madison, WI 53705
Phone: 1-800-542-5253
E-mail: lakeinfo@wisconsinlakes.org
Website: http://wisconsinlakes.org/

Lake Levels

See: Groundwater

Lake-Related Law Enforcement (no-wake, transporting invasives, etc.)

Contact: Ben Mott
State Conservation Warden
Wisconsin Department of Natural Resources
427 E. Tower Drive, Suite 100, Wautoma, WI 54982
Phone: 920-896-3383
Website: http://www.wigamewarden.com/

Land Use Plans and Zoning Ordinances

Contact: Terri Dopp-Paukstat
Waushara County Planning and Zoning
PO Box 1109, Wautoma, WI 54982
Phone: 920-787-0453
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Contact: UWSP Center for Land Use Education
TNR 208, 800 Reserve St., Stevens Point, WI 54481
Phone: 715-346-3783
E-mail: Center.for.Land.Use.Education@uwsp.edu
Website: http://www.uwsp.edu/cnr/landcenter/

Nutrient Management Plans

Contact: Ed Hernandez
Waushara County Land Conservation Department
PO Box 1109, Wautoma, WI 54982
Phone: 920-787-0453
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Contact: NRCS Stevens Point Service Center
1462 Strongs Ave., Stevens Point, WI 54481
Phone: 715-346-1325

Parks (County)

Contact: Scott Schuman
Waushara County Parks
PO Box 300, Wautoma, WI 54982
Phone: 920-787-7037
E-mail: wcparks.parks@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/parks.htm

Purchase of Development Rights

Contact: North Central Conservancy Trust
PO Box 124, Stevens Point, WI 54481
Phone: 715-341-7741
E-mail: info@ncctwi.org
Website: http://www.ncctwi.org/

Purchase of Land

Contact: Ted Johnson
Wisconsin Department of Natural Resources
Phone: 920-424-2104
E-mail: TedM.Johnson@wisconsin.gov
Website: http://dnr.wi.gov/topic/stewardship/

Rain Barrels – Order

Contact: Golden Sands RC&D
1100 Main St., Suite 150, Stevens Point, WI 54481
Phone: 715-343-6215
Website: http://www.goldensandsrcd.org/store

Rain Gardens and Stormwater Runoff

Contact: Ed Hernandez
Waushara County Land Conservation Department
PO Box 1109, Wautoma, WI 54982
Phone: 920-787-0453
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Septic Systems/Onsite Waste

Contact: Terri Dopp-Paukstat
Waushara County Planning and Zoning
PO Box 1109, Wautoma, WI 54982
Phone: 920-787-0453
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Shoreland Management

Contact: Ed Hernandez
Waushara County Land Conservation Department
PO Box 1109, Wautoma, WI 54982
Phone: 920-787-0453
E-mail: lcdzoning.courthouse@co.waushara.wi.us
Website: http://www.co.waushara.wi.us/zoning.htm

Shoreland Vegetation

http://dnr.wi.gov/topic/ShorelandZoning/

Shoreland Zoning Ordinances

See: Land Use Plans and Zoning Ordinances

Soil Fertility Testing

Contact: Ken Williams
Waushara County UW- Extension
209 S St. Marie St., Wautoma, WI 54982
Phone: 920-787-0416
E-mail: Ken.williams@ces.uwex.edu
Website: http://waushara.uwex.edu/index.html

Water Quality Monitoring

Contact: Ted Johnson
Wisconsin Department of Natural Resources
Phone: 920-424-2104
E-mail: TedM.Johnson@wisconsin.gov

Water Quality Problems

Contact: Ted Johnson
Wisconsin Department of Natural Resources
Phone: 920-424-2104
E-mail: TedM.Johnson@wisconsin.gov

Contact: Nancy Turyk
UWSP Center for Watershed Science and Education
TNR 216, 800 Reserve St., Stevens Point, WI 54481
Phone: 715-346-4155
E-mail: nturyk@uwsp.edu

Wetlands

Contact: Keith Patrick
Wisconsin Department of Natural Resources
5301 Rib Mountain Drive, Wausau, WI 54401
Phone: 715-241-7502
E-mail: keith.patrick@wisconsin.gov
Website: http://dnr.wi.gov/wetlands/

Contact: Wisconsin Wetlands Association
214 N. Hamilton Street, #201, Madison, WI 53703
Phone: 608-250-9971
Email: info@wisconsinwetlands.org

Wetland Inventory

Contact: Dr. Emmet Judziewicz
UWSP Freckmann Herbarium
TNR 301, 800 Reserve St., Stevens Point, WI 54481
Phone: 715-346-4248
E-mail: ejudziew@uwsp.edu

Woody Habitat

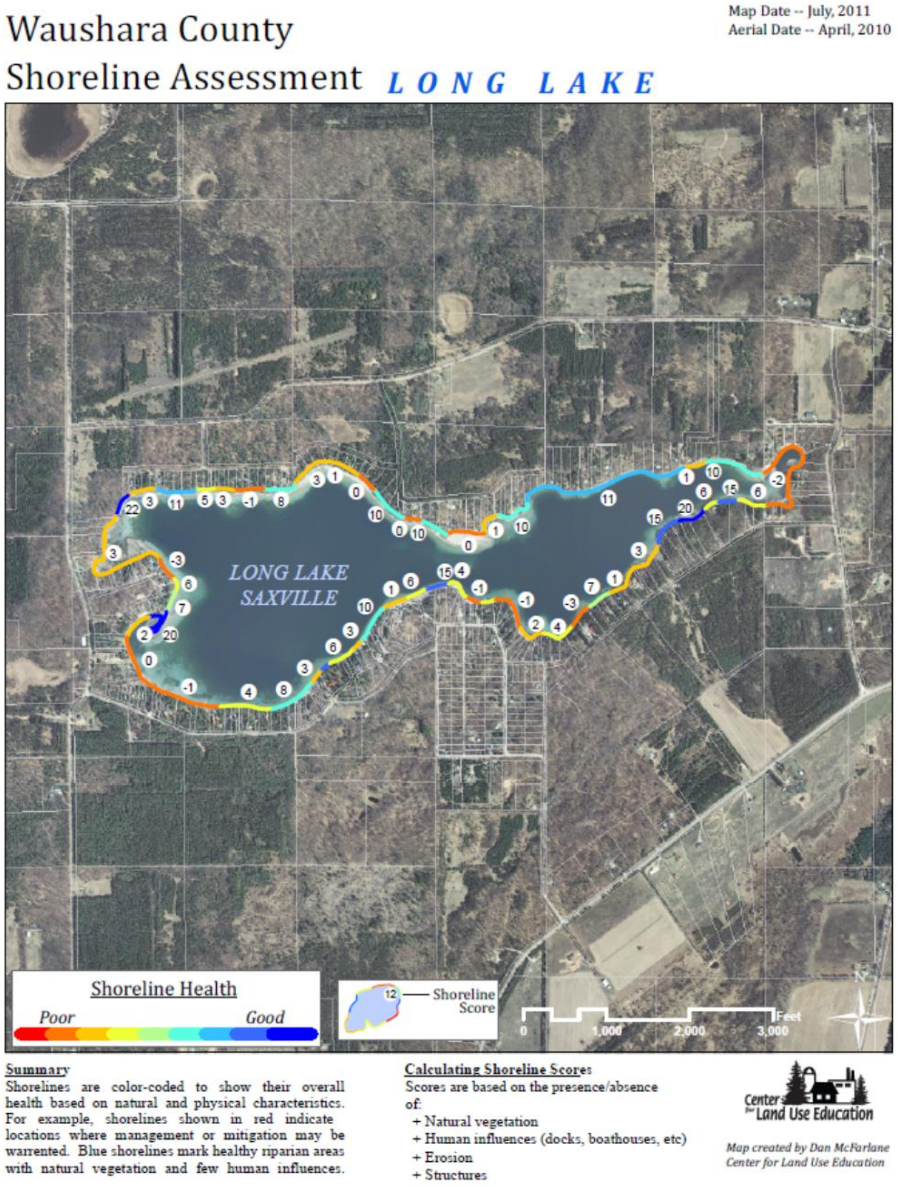
Contact: Dave Bartz
Wisconsin Department of Natural Resources
Phone: 608-635-4989
Address: Hwy 22N Box 430, Montello, WI 53949
E-mail: David.Bartz@wisconsin.gov

If you are looking for any information that is not listed in this directory, please contact:
Ryan Haney (wclakes@uwsp.edu)
UWSP Center for Watershed Science and Education
TNR 224, 800 Reserve St., Stevens Point, WI 54481
Phone: 715-346-2497

Appendix B. Shoreland Survey – 2011

A scoring system was developed for the collected data to provide a more holistic assessment. Areas that are healthy will need strategies to keep them healthy, and areas with potential problem areas and where management and conservation may be warranted may need a different set of strategies for improvement. The scoring system is based on the presence/absence and abundance of shoreline features, as well as their proximity to the water's edge. Values were tallied for each shoreline category and then summed to produce an overall score. Higher scores denote a healthier shoreline with good land management practices. These are areas where protection and/or conservation should be targeted. On the other hand, lower scores signify an ecologically unhealthy shoreline. These are areas where management and/or mitigation practices may be desirable for improving water quality.

The summary of scores for shorelands around Long Lake are displayed to the right. The shorelands were color-coded to show their overall health based on natural and physical characteristics. Blue shorelands identify healthy shorelands with sufficient vegetation and few disturbances. Red shorelands indicate locations where changes in management or mitigation may be warranted. Overall, much of Long Lake's shorelands are disturbed and many segments have challenges that should be addressed. The conditions of some of the stretches of shoreland ranked as poor. For a more complete understanding of the ranking, an interactive map showing results of the shoreland surveys can be found on the Waushara County's website [http://gis.co.waushara.wi.us/ShorelineViewer/.](http://gis.co.waushara.wi.us/ShorelineViewer/)



Appendix C. Rapid Response Plan

SURVEY/MONITOR

1. Learn how to survey/monitor the lake.	**Contacts:** **Water Resource Management Specialist** Wisconsin Department of Natural Resources Phone: 920-424-2104 E-Mail: TedM.Johnson@wisconsin.gov **Regional Aquatic Invasive Species (AIS) Coordinator** Golden Sands RC&D 1100 Main St., Suite #150 Stevens Point, WI 54481 Phone: 715-343-6278 E-Mail: info@goldensandsrcd.org
2. Survey/monitor the lake monthly/seasonally/annually.	If you find a suspected invasive species, report it as soon as possible using the procedure below.

REPORTING A SUSPECTED INVASIVE SPECIES

1. Collect specimens or take photos. Regardless of the 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 specimen ASAP.	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).
2. Note the location where the specimen was found. 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).	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

3. Gather information to aid in positive species identification.	• Collection date and 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 (estimated number of plants and area covered) • Habitat type(s) where found (forest, field, prairie, wetland, open water)
4. Mail or bring specimens and information to any of the following locations: Digital photos may be emailed.	**Wisconsin Dept. Natural Resources** 427 E. Tower Drive, Suite 100 Wautoma, WI 54982 Phone: (920) 787-4686 **Regional AIS Coordinator** Golden Sands RC&D 1100 Main St., Suite #150 Stevens Point, WI 54481 Phone: 715-343-6214 E-Mail : info@goldensandsrcd.org **UW-Stevens Point Herbarium** 301 Trainer Natural Resources Building 800 Reserve Street Stevens Point, WI 54481 Phone: 715-346-4248 E-Mail: ejudziew@uwsp.edu **Wisconsin Invasive Plants Reporting & Prevention Project** Herbarium-UW-Madison 430 Lincoln Drive Madison, WI 53706 Phone: (608) 267-7612 E-Mail: invasiveplants@mailplus.wisc.edu
5. Once the specimen is dropped off or sent for positive identification, be sure to contact:	**Regional AIS Coordinator** Golden Sands RC&D 1100 Main St., Suite #150 Stevens Point, WI 54481 Phone: 715-343-6214 E-Mail : info@goldensandsrcd.org

If an invasive species is confirmed, the Regional AIS Coordinator will make the following public information contacts:

- **Wisconsin Department of Natural Resources**
  427 E. Tower Drive, Suite 100
  Wautoma, WI 54982
  Phone: (920) 787-4686

  The town board(s) in which the water body is located

  Towns of: Saxeville and Springwater

- **The Lake Association/District** in which the waterbody is located.
  Long Lake Association
  Contact: Gary Wisbrocker, President
  Phone: (715) 258-0790

- **University of Wisconsin-Stevens Point**
  Water Resource Scientist
  Nancy Turyk
  Trainer Natural Resources Building
  800 Reserve Street
  Stevens Point, WI 54481Telephone: 715-346-4155
  E-mail: nturyk@uwsp.edu

- **Local Residents**

If an invasive species is confirmed the secretary of the Long Lake Association will make the following public information contacts:

- **Newspapers**: The Argus, The Resorter

Contact the WDNR to post notice(s) at the access point(s) to the water body.

Appendix D. Notification of Zebra Mussel De-Listing

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor
Scott Hassett, Secretary
Ronald W. Kazmierczak, Regional Director

Northeast Region Headquarters
2984 Shawano Ave., P.O. Box 10448
Green Bay, Wisconsin 54307-0448
Telephone 920-662-5100
FAX 920-662-5413
TTY Access via relay - 711

February 2, 2006

James Schiek
Long Lake Association
PO Box 9
Saxeville, WI 54976

Subject: Zebra Mussel De-Listing

Dear Mr. Schiek:

The department has received and reviewed the zebra mussel monitoring information recently submitted by the Long Lake Association, for the purpose of addressing the lake association's request to consider the removal of Long Lake from the List of Zebra Mussel Infested Water Bodies. Along with the information provided by the lake association, data collected through the department's zebra mussel monitoring activities were also reviewed. Together, these data sets exhibit:

- Two consecutive years of veliger (larval zebra mussel) monitoring without a positive result.
- Three consecutive years of sampler deployment in the lake without finding any zebra mussels.
- Three consecutive years of monitoring in-lake substrates (piers, boats, etc.) without finding any zebra mussels.

These findings meet the department's criteria for de-listing, and therefore it is our decision to remove Long Lake from the List of Zebra Mussel Infested Water Bodies.

Long Lake will be put on the Zebra Mussel Watch List with other water bodies where zebra mussels have been detected, but have not established sustaining populations. The department considers the water bodies on this list as priorities for zebra mussel monitoring, thus the department will continue to monitor Long Lake for veligers. Accordingly, the lake association should also continue its zebra mussel monitoring efforts, specifically the deployment of the substrate samplers (half-pipe and plate samplers) and the inspection of docks, boats, etc. by residents.

In conjunction with this decision to de-list Long Lake, we will be replacing the yellow *Aquatic Invasive Species Advisory* sign at the Long Lake boat landing with a *Help Prevent the Spread* sign. It's our understanding that the lake association feels that such action will enhance its efforts to prevent the introduction of aquatic invasive species (AIS) to Long Lake. In that spirit of prevention, we encourage the lake association's ongoing efforts and pledge our support and willingness to work in partnership with you to keep Long Lake AIS-free!

Sincerely,

Richard Sachs
Aquatic Invasive Species Coordinator, Northeast Region

Cc: Ron Martin, Scott Provost, Steve Galarneau

dnr.wi.gov
wisconsin.gov

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Appendix E. Aquatic Plants

List of aquatic plants observed in Long Lake during point-intercept surveys conducted in 2004, 2008, and 2014.

Common name	Scientific name	C-value	2004	2008	2014
EMERGENT					
Amphibious smartweed	*Persicaria amphibia*	6			X
Broad-leaf cattail	*Typha latifolia*	1			X
Hard-stem bulrush	*Schoenoplectus acutus*	6			X
Narrow-leaf cattail	*Typha angustifolia*	0			X
Porcupine sedge	*Carex hystericina*	6			X
Three-square bulrush	*Schoenoplectus pungens*	5			X
FLOATING LEAF					
Bullhead pond lily	*Nuphar variegata*	6			X
White water lily	*Nymphaea odorata*	6	X	X	X
SUBMERGENT					
Aquatic moss	*Drepanocladus* spp.	-			X
Clasping leaf pondweed	*Potamogeton richardsonii*	5	X	X	
Common bladderwort	*Utricularia macrorhiza*	7	X	X	X
Common waterweed	*Elodea canadensis*	3	X	X	X
Coontail	*Ceratophyllum demersum*	3	X	X	X
Flat-stem pondweed	*Potamogeton zosteriformis*	6	X	X	X
Floating-leaf pondweed	*Potamogeton natans*	5	X	X	X
Fries' pondweed	*Potamogeton friesii*	8	X	X	X
Illinois pondweed	*Potamogeton illinoensis*	6	X	X	X
Large-leaf pondweed	*Potamogeton amplifolius*	7	X	X	X
Muskgrasses	*Chara* spp.	-	X	X	X
Northern water milfoil	*Myriophyllum sibericum*	6	X	X	
Fern pondweed	*Potamogeton robbinsii*	8	X	X	
Sago pondweed	*Stuckenia pectinata*	3	X	X	X
Slender naiad	*Najas flexilis*	6	X	X	X
Slender stonewort	*Nitella flexilis*	-			X
Small bladderwort	*Utricularia minor*	10			X
Small pondweed	*Potamogeton pusillus*	7	X	X	X
Southern naiad	*Najas guadalupensis*	8			X
Stiff pondweed	*Potamogeton strictifolius*	8			X
Stonewort sp.	*Nitella sp.*	-	X	X	
Variable pondweed	*Potamogeton gramineus*	7	X	X	X
Water celery	*Vallisneria americana*	6	X	X	X
White water crowfoot	*Ranunculus aquatilis*	8			X
White-stem pondweed	*Potamogeton praelongus*	8	X	X	X

Long Lake aquatic plant survey summary, 2014.

	Lake Average	Statewide Average	North Central Hardwood Forests Ecoregion Average
Littoral Frequency of Occurrence (%)	78.47	74.3	76
Maximum Depth of Plant Growth (ft)	33.5	15.3	15.9
Species Richness (Including visuals)	30	16.8	16.2
Floristic Quality Index (FQI)	31.37	24.1	23.3

Frequency of occurrence of aquatic plant species observed in Long Lake, 2014.

Scientific Name	Common Name	Coefficient of Conservatism Value (C Value)	2014 % Frequency of Occurrence
Floating-leaf Species			
Polygonum amphibium	Water smartweed	5	0.59
Nymphaea odorata	White water lily	6	3.83
Emergent Species			
Typha angustifolium	Narrow-leaved cattail	1	0.29
Typha latifolia	Broad-leaved cattail	1	0.88
Submergent Species			
Chara	Muskgrasses	7	94.4
Potamogeton gramineus	Variable pondweed	7	12.98
Myriophyllum sibiricum	Northern water-milfoil	6	5.9
Najas flexilis	Slender naiad	6	4.13
Potamogeton friesii	Fries' pondweed	8	4.13
Potamogeton illinoensis	Illinois pondweed	6	3.54
Najas guadalupensis	Southern naiad	8	3.24
Stuckenia pectinata	Sago pondweed	3	3.24
Potamogeton amplifolius	Large-leaf pondweed	7	2.95
Vallisneria americana	Wild celery	6	2.06
Potamogeton praelongus	White-stem pondweed	8	1.47
Utricularia vulgaris	Common bladderwort	7	1.18
Ceratophyllum demersum	Coontail	3	0.88
Nitella	Nitella	7	0.88
Schoenoplectus pungens	Three-square bulrush	5	0.88
Potamogeton pusillus	Small pondweed	7	0.59
Potamogeton strictifolius	Stiff pondweed	8	0.59
Potamogeton zosteriformis	Flat-stem pondweed	6	0.59
Nuphar variegata	Spatterdock	6	0.29
Potamogeton natans	Floating-leaf pondweed	5	0.29
Ranunculus aquatilis	White water crowfoot	8	0.29
Schoenoplectus acutus	Hardstem bulrush	6	0.29
Utricularia minor	Small bladderwort	10	0.29

Appendix F. AIS Survey Results

Long Lake, Waushara County AIS survey results

July 17th, 2014

Conducted by Paul Skawinski and Krista Kamke, Golden Sands RC&D

During the course of the survey, observed native aquatic plants were also recorded.

AIS & Aquatic Plant List (AIS highlighted in bold red and marked with an asterisk*)

***Banded mystery snail**

***Narrow leaf cattail**

***Japanese knotweed**

***Phragmites**

Three-square bulrush

White water lily

Illinois pondweed

Large-leaf pondweed

Water celery

Northern water milfoil

Flat-stem pondweed

White-stem pondweed

Common waterweed

Sago pondweed

Variable pondweed

Muskgrasses (4 species found: Chara aspera, C. contraria, C. globularis, C. braunii)

Slender naiad

Floating-leaf pondweed

Hardstem bulrush

Blue flag iris

Fries' pondweed

Southern naiad

Bald spikerush

Stiff pondweed

Small duckweed (Lemna minor)

Soft rush

Water smartweed

Slender nitella (Nitella flexilis)

Canada rush

Broad-leaf cattail

Common bladderwort

Torrey's bulrush

Bullhead pondlily

Soft-stem bulrush

Small bladderwort

Leafy pondweed

Broad-leaf arrowhead

Aquatic moss (Drepanocladus sp.)

Coontail

Notes: Weather calm in morning, partly cloudy. The majority of plant diversity is in the northwest bay. The Japanese knotweed is in the northwest bay, in the southwest end along the shoreline. The non-native Phragmites is at the west end of the lake, at the entrance to the northwest bay.

Japanese knotweed Long Lake 071714

Phragmites Long Lake 071714