Lake Management Plan for Porters Lake, Waushara County, Wisconsin

The Porters Lake Management Plan was developed with input from residents and lake users at a series of four public planning sessions held at the Mountain View Community Center in Wautoma, Wisconsin in June, July, August and September 2015. The inclusive community sessions were designed to learn about and identify key community opportunities, assets, concerns and priorities. Representatives of state and local agencies, as well as nonprofit organizations, 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 Porters Lake Management District on: January 23, 2016 .

The plan was accepted by the Town of Mt. Morris on: March 14, 2017 .

The plan was accepted by Waushara County on: March 2, 2016 .

The plan was approved by the Wisconsin Department of Natural Resources on: May 9, 2016 .
A special thanks to all who helped to create the 2016 Porters Lake Management Plan and provided guidance during the plan’s development.

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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 Porters Lake

Porters Lake will remain a quiet, high quality lake with rich diversity in plants, wildlife and recreational opportunities. Future generations will be able to capture the same “summer cottage” feel while experiencing nature at its best.

Introduction

Porters Lake is located in the township of Mt. Morris, northeast of the city of Wautoma and north of Highway 152. It has a public boat launch located on its southern side. Porters Lake is a 76-acre groundwater drainage lake with surface runoff and groundwater contributing most of its water. Its maximum depth is 18 feet. The lakebed has a gradual slope with bottom sediments comprised mostly of muck and/or soft marl, with some sand in its northeastern bay. In 2015, community members around Porters Lake came together in partnership with local professionals to learn about Porters Lake and develop this lake management plan.

The purpose of this plan is to provide a framework for the protection and improvement of Porters Lake. Implementing the content of this lake management plan (LMP) will enable citizens and other supporters to achieve the vision for Porters Lake now and in the years to come. The plan was developed by community members who learned about the lake and identified features important to the Porters Lake community to help guide the fate of the 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 and identifies steps to correct past problems, improve on current conditions, and provide guidance for future boards, lake users, and technical experts. Because many entities are involved in lake and land management, it can be challenging to navigate the roles, partnerships and resources that are available; the planning process and content of this plan have been designed to identify where some key assistance exists. The actions identified in this LMP can serve as a gateway for obtaining grant funding and other resources to help implement activities outlined in the plan.
Who can use the Porters 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 near Porters Lake can have the greatest influence on the lake by understanding and choosing lake-friendly options to manage their land and the lake.

- **Porters Lake Management District**: This plan provides the District 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 District to realize its accomplishments. Resources and funding opportunities for District management activities are made more available by placement of goals into the lake management plan, and the District can identify partners to help achieve their goals for Porters 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 fun.

- **The Town of Mt. Morris**: The Town 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 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 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 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. Prior to this project, there were insufficient data available for many of the lakes to evaluate current water quality, aquatic plant communities, invasive species, and shorelands. The data that were 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 Porters Lake Study and the materials associated with the planning process and reports can be found on Waushara County’s website: [http://www.co.waushara.wi.us/](http://www.co.waushara.wi.us/) (select “Departments”, “Zoning and Land Conservation”, “Land Conservation”, and “Lake Management Planning”). Unless otherwise noted, data used in the development of this plan were detailed in the 2014 report *Waushara County Lakes Study – Porters Lake*, University of Wisconsin-Stevens Point.

The Planning Process

The planning process included a series of four public planning sessions held between June and September 2015 at the Mountain View Community Center. The Porters Lake Management Planning Committee consisted primarily of shoreland property owners. Technical assistance during the planning process 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), Golden Sands Resource Conservation & Development Council, Inc. (RC&D), University of Wisconsin-Extension (UWEX), and the University of Wisconsin-Stevens Point Center for Watershed Science and Education (CWSE).

Participation in the planning process was open to everyone and was encouraged by letters sent directly to Porters Lake waterfront property owners and by press releases in local newspapers. In addition, members of the planning committee were provided with emails about upcoming meetings which could be forwarded to others. To involve and collect input from as many people as possible, a survey related to the topic(s) of each upcoming planning session was made available beforehand. Property owners and interested lake users were notified about the surveys and how to access them (via postcards mailed to waterfront property owners and press releases in local newspapers). The surveys could be filled out anonymously online and paper copies were available upon request. Survey questions and responses were shared at the planning sessions and can be found in Appendix F. Lake User Survey Results.
Guest experts and professionals attended the planning sessions. They presented information and participated in discussions with participants to provide context, insight and recommendations for the lake management plan, including environmental and regulatory considerations. This information was organized with the survey results into discussion topics, which included: the fishery and recreation; the aquatic plant community; water quality, water quantity, 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.
Goals, Objectives and Actions

The following goals, objectives and associated actions were derived from the values and concerns of citizens interested in Porters Lake and members of the Porters Lake Management Planning Committee, as well as the known science about Porters Lake, its ecosystem and the landscape within its watershed. A lake management plan is a living document that changes over time to meet the current needs, challenges and desires of the lake and its community. Implementing and regularly updating the goals and actions in the Porters Lake Management Plan will ensure that the vision is supported and that changes or new challenges are incorporated into the plan. 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. For the purposes of this plan, the chapters have been grouped as follows:

In-Lake Habitat and a Healthy Lake

Fish Community—fish species, abundance, size, important habitat and other needs
Aquatic Plant Community—habitat, food, health, native species, and invasive species
Critical Habitat—areas of special importance to the wildlife, fish, water quality, and aesthetics of the lake

Landscapes and the Lake

Water Quality and Quantity—water chemistry, clarity, contaminants, lake levels
Shorelands—habitat, erosion, contaminant filtering, water quality, vegetation, access
Watershed Land Use—land use, management practices, conservation programs

People and the Lake

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

Goal 1. Improve the quality of the fishery in Porters Lake through sustainable management practices.
Goal 2. Protect the exceptional diversity of native plants in and around Porters Lake.
Goal 3. Eliminate aquatic invasive species from Porters Lake and prevent new species from becoming established.
Goal 4. Preserve existing high quality habitat in and near Porters Lake for abundant fish and wildlife.
Goal 5. Maintain or improve water quality in Porters Lake.
Goal 6. Create a robust dataset for Porters Lake to monitor trends, declines and improvements over time.
Goal 7. Porters Lake will endeavor not to be adversely impacted by large groundwater withdrawals from high capacity wells.
Goal 8. Porters Lake shorelands will become increasingly healthy over time. Over the next five years, 1,000 feet of mowed shoreland will be restored.
Goal 9. Watershed and shoreland property owners will know about and utilize resources for healthy land management practices.
Goal 10. Lake users will be informed and respectful of Porters Lake.
Goal 11. Increase participation in lake stewardship.
Goal 12. Review plan annually and update as needed.

The following short-term goals were identified as priorities by the planning committee:

**Goal 3. Eliminate aquatic invasive species from Porters Lake and prevent new species from becoming established.**

**Objective 3.1.** Monitor, identify and eliminate aquatic invasive species on or around Porters Lake.

**Goal 4. Preserve existing high quality habitat in and near Porters Lake for abundant fish and wildlife.**

**Objective 4.1.** Critical habitat in and near Porters Lake will be identified and protected.
Goal 7. Porters Lake will endeavor not to be adversely impacted by large groundwater withdrawals from high capacity wells.

**Objective 7.1.** Understand water fluctuations (natural vs. manmade) in and near Porters Lake.

**Objective 7.2.** Work with citizens and elected officials to ensure that Porters Lake has “normal” lake levels.

Goal 9. Watershed and shoreland property owners will know about and utilize resources for healthy land management practices.

**Objective 9.1.** Support healthy land management activities in the Porters Lake watershed to reduce sediment/phosphorus loading.
Lead persons and resources are given 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.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Acronym</th>
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<tbody>
<tr>
<td>Clean Boats, Clean Waters</td>
<td>CBCW</td>
</tr>
<tr>
<td>WDNR Citizen Lake Monitoring Network</td>
<td>CLMN</td>
</tr>
<tr>
<td>UWSP Center for Watershed Science and Education</td>
<td>CWSE</td>
</tr>
<tr>
<td>Wisconsin Department of Agriculture, Trade and Consumer Protection</td>
<td>DATCP</td>
</tr>
<tr>
<td>North Central Conservancy Trust</td>
<td>NCCT</td>
</tr>
<tr>
<td>USDA Natural Resources Conservation Service</td>
<td>NRCS</td>
</tr>
<tr>
<td>Porters Lake Management District</td>
<td>PLMD</td>
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<tr>
<td>Golden Sands Resource Conservation &amp; Development Council, Inc.</td>
<td>RC&amp;D</td>
</tr>
<tr>
<td>University of Wisconsin Extension</td>
<td>UWEX</td>
</tr>
<tr>
<td>University of Wisconsin-Stevens Point</td>
<td>UWSP</td>
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<tr>
<td>Waushara County</td>
<td>WC</td>
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<tr>
<td>Waushara County Land Conservation Department</td>
<td>WCLCD</td>
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<tr>
<td>Waushara County Watershed Lakes Council</td>
<td>WCWLC</td>
</tr>
<tr>
<td>Wisconsin Department of Natural Resources</td>
<td>WDNR</td>
</tr>
<tr>
<td>Wisconsin Department of Transportation</td>
<td>WDOT</td>
</tr>
<tr>
<td>UWSP Wisconsin Environmental Analysis Laboratory</td>
<td>WEAL</td>
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</tbody>
</table>

Contact information for organizations and individuals who support lake management in Waushara County can be found in Appendix A. 2016 Waushara County Lakes Information Directory.
In-Lake Habitat and a Healthy Lake

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

Lake habitat occurs within the lake, along all 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 Porters Lake includes the plants, branches and tree limbs above and below the water.

The Fish Community

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

People are an important part of a sustainable fish community; their actions on the landscape and the numbers and sizes of fish taken out of the lake can influence the entire lake ecosystem. Putting appropriate fishing regulations in place and adhering to them can help 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 required to provide a more suitable environment to meet the needs of the fish, they usually do not have to be repeated frequently. 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 up-front costs, but the effects will often continue for decades. Costs in time, travel, and other expenses are associated with routine efforts such as fish stocking and aeration. Ideally, a lake contains the habitat, water quality, and food necessary to support the fish communities 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, met with the planning committee on September 18, 2015. Bartz provided the following information:

The most recent fish survey was conducted on Porters Lake in spring 2009 using electrofishing; the next survey is scheduled for 2017. The results of the 2009 survey indicated there was good abundance of largemouth bass, with a capture rate of 116/hour for fish longer than 8 inches. Their abundance had improved from 1994, when a survey that year recorded a capture rate of 50/hour for largemouth bass longer than 8 inches. The mean length of the largemouth bass surveyed in 2009 was 11.7 inches. Their growth rate is considered below average, taking 7 years to reach 14 inches. Bluegill remained in low abundance in 2009 with a capture rate of 159/hour for fish longer than 3 inches; the 1994 rate was also low, averaging 86/hour. The bluegill population in 2009 had a fair size structure, with a mean length of 5.2 inches and an average growth rate.

Panfish rule proposal

According to the WDNR website, “starting in 2016 one of three regulations will be placed on 94 lakes across Wisconsin in an effort to identify the most socially acceptable regulation to improve underperforming panfish populations. These regulations are intended to increase panfish average size on lakes that are currently not meeting management objectives but have the growth potential to improve. The lakes will be evaluated by biologists and anglers by 2021 and the results discussed with the public. Ultimately, the best regulation will be selected as the standard regulation option for addressing similar issues.” According to Bartz, Porters Lake has been selected as one of these study lakes. Additional WDNR monitoring will occur following the rule change and no additional fish stocking permits will be issued until the study is complete, which may be as long as ten years. The new rule for Porters Lake, which will take effect April 1, 2016, will be a total of 15 panfish, with not more than 5 of any species (perch, crappie, bluegill/sunfish).

Most respondents to the lake user survey indicated they value the fishery for seeing or watching fish. One-half of the respondents valued the fish as a food source for wildlife and for catch-and-release fishing. Surprisingly, only one-quarter of the respondents use the fishery in Porters Lake for food. Of those who fish in Porter’s Lake, 73% felt fishing had declined over the years. Overfishing, especially in winter, was the most common reason given for the perceived decline, followed by loss of habitat from motors disturbing the lakebed in shallow water, heavy recreational use, and declining water levels.
Guiding Vision for the Fish Community
*Porters Lake will have a healthy, well-balanced and sustainable fishery.*

**Goal 1. Improve the quality of the fishery in Porters Lake through sustainable management practices.**

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

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<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inform individuals about the importance of woody habitat in shallow water in near-shore areas of Porters Lake and encourage placement in appropriate areas.</td>
<td>PLMD</td>
<td>WDNR, UWSP, WCLCD, WDNR Healthy Lakes Grants</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Continue efforts to protect and restore shoreland areas and avoid shoreland alterations by providing educational materials to homeowners.</td>
<td>PLMD Shoreland property owners</td>
<td>WDNR Healthy Lakes Grants</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Lakeshore property owners will avoid removing aquatic plants from the lake other than what is needed to access docks or swimming.</td>
<td>Shoreland property owners</td>
<td>UWEX Lakes (informational material) PLMD</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Encourage property owners with docks to safely place bundled woody habitat beneath docks to create additional habitat.</td>
<td>PLMD</td>
<td>WDNR Fisheries Biologist, UWEX Lakes (informational material)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Encourage shoreland property owners to leave any fallen woody habitat in the lake.</td>
<td>PLMD</td>
<td>UWEX Lakes (informational material), WDNR Fisheries Biologist</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
Aquatic Plants

Aquatic plants provide the forested landscape within Porters 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, 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.

Two formal aquatic plant surveys were conducted on Porters Lake in 2012. The first, contracted by the Porters Lake Management District (PLMD), was conducted by Onterra, LLC on June 26, 2012. Results are summarized in its December 2014 Aquatic Plant Community Assessment Report. A later aquatic plant survey was conducted in July 2012 by UWSP as part of the Waushara County Lakes Project.

During the 2012 UWSP aquatic plant survey, twenty-four species of aquatic plants were found. This was above average for lakes in the Waushara County Lakes Study. The greatest plant diversity was found in the southwestern shallows of the lake (Figure 1). Ninety-eight percent (178 of 181) of the sampled sites had vegetative growth. Of the sampled sites within Porters Lake, the average depth was 6 feet and the maximum depth was 18 feet. The dominant plant species was muskgrass, followed by slender naiad and variable pondweed. Four of

![Figure 1. Species richness in Porters Lake, 2012 survey.](image-url)
the surveyed plants in Porters Lake are considered high quality plants (C-value greater than 8): floating-leaf bur-reed, southern naiad, white-stem pondweed, and small purple bladderwort. **Small purple bladderwort** (*Utricularia resupinata*), a carnivorous plant, is designated as a species of special concern in Wisconsin. Additionally, Onterra, LLC observed **Robbins’ spikerush** (*Eleocharis robbinsii*), which is also a species of special concern and is more frequently found in northern Wisconsin. The invasive species European watermilfoil (Myriophyllum spicatum, EWM) was identified in Porters Lake for the first time during the UWSP survey. More detailed information can be found in the Aquatic Plant Survey of Porters Lake, Waushara County; Waushara County Lakes Study – Porters Lake; and, Appendix D. Aquatic Plants.

On September 2, 2013, a “meander survey” conducted by Golden Sands Resource Conservation & Development Council, Inc. (RC&D) in Porters Lake observed 56 native aquatic species, as well as Eurasian watermilfoil. Subsequent RC&D surveys conducted in late summer 2015 identified 55 native aquatic plant species, as well as freshwater sponges, an animal species. The number of native aquatic plant species found in Porters Lake is three times higher than the average for lakes in the Waushara County Lakes Study.

A shoreline plant Inventory was conducted by Paul Skawinski on September 2 and September 16, 2014. Skawinski observed a total of 115 species of plants (aquatic & terrestrial) including three native orchids: pink lady slipper (*Cypripedium acaule*), hooded ladies’ tresses (*Spiranthes romanzoffiana*), and nodding ladies’ tresses (*Spiranthes cernua*) (Skawinski, 2014). No threatened or endangered species were found. Non-native narrow-leaf cattail, purple loosestrife, and glossy buckthorn were observed. These are known to be highly invasive and should be monitored.

**Guiding Vision for Aquatic Plants in Porters Lake**

*Porters Lake will have a healthy and diverse native aquatic plant community that supports a balanced fishery and promotes good water quality while still having great swimming and sufficient access for recreation.*
Goal 2. Protect the exceptional diversity of native plants in and around Porters Lake.

Objective 2.1. Reduce disturbance to native aquatic plants and wetlands. Minimize the disturbance of the lakebed in Porters Lake.

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<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoreland property owners will realize the importance of aquatic plants in Porters Lake and will be provided educational materials provided in annual mailing, website, welcome packet, on lake boat tours or shoreland walks.</td>
<td>PLMD</td>
<td>UWEX Lakes, WCLWC</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Develop a water trail that highlights important natural and historic areas around the lake.</td>
<td>PLMD</td>
<td>Interested citizen</td>
<td>2016</td>
</tr>
<tr>
<td>Minimize removal and disturbance of native aquatic vegetation (to impede establishment of additional aquatic invasive species).</td>
<td>Shoreland property owners</td>
<td></td>
<td>Ongoing</td>
</tr>
<tr>
<td>Obtain the appropriate permit for hand harvesting of any native plants beyond 30 feet from docks.</td>
<td>Shoreland property owners</td>
<td>WDNR Lake Biologist</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

Aquatic Invasive Species (AIS)

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

Eurasian watermilfoil (EWM) is an aquatic invasive species that can co-exist as part of the aquatic plant community or it can create dense beds. This plant produces viable seeds; however, it often spreads by fragmentation. Just a small fragment of the stem is enough to start a new plant, so spread can occur quickly if plants are located near points of activity such as beaches and boat launches.

During the 2012 aquatic plant survey, EWM was identified in Porters Lake for the first time: a 1.4-acre colony was observed near-shore in the southwestern portion of the lake and a few scattered plants were observed in the far northeastern portion of the lake. This non-native species was found in shallow water intermixed with northern watermilfoil.
In late summer and early fall 2012, crews conducted numerous hand-removal efforts with assistance from SCUBA divers to reduce the EWM population. In February 2013, PLMD received a WDNR Early Detection and Response Grant to help offset costs of a 3-year EWM control project. In May 2013, granular 2,4-D was applied to a 2.3-acre area at a rate of 4 ppm by Stantec, Inc. Two subsequent aquatic plant surveys conducted by Onterra, LLC revealed no EWM in the lake and minimal collateral damage to native aquatic plants. Surveys conducted by Onterra, LLC in early and late summer 2014 did not identify EWM anywhere in the lake. On June 1, 2015, an early-season AIS survey conducted by Onterra, LLC also failed to identify any EWM, as did a July 21, 2015 AIS survey (including a diver-assisted meander and point-intercept survey), making 2015 the third consecutive year no EWM was observed in Porters Lake. In fall 2015, scattered EWM plants were identified along portions of the southeastern shoreline in water up to 18” deep. All of the plants were hand-pulled by volunteers and disposed of on dry land. Unused funds from the WDNR Early Detection and Response Grant will continue to fund early- and late-season surveys, possibly through 2017. It is hoped that continuing an aggressive approach to EWM surveillance and removal in Porters Lake will eliminate it from the lake.

The response to EWM control efforts may differ from lake to lake. No single approach will be appropriate for all lakes. Often multiple approaches and adaptive year-to-year changes in approach are most successful. EWM populations should be evaluated using a ‘point-intercept’ method, accompanied by more thorough observations pre- and post-treatment to determine the effectiveness of an approach in any given year. Strategies for the subsequent year should be adjusted accordingly. EWM management involves evolving scientific knowledge; therefore, EWM management strategies in Porters Lake should be adapted as EWM populations in the lake change and as new information becomes available.

Hybrid watermilfoil (HWM) is a hybridization of native watermilfoil with EWM. HWM tends to be more resilient and less affected by chemical treatment. HWM may be suspected in a lake if 1) the plant’s appearance is different from EWM; 2) management with chemicals becomes difficult or ineffective; and, 3) the lake is near other lakes with HWM. If these criteria are met, plant samples should be submitted to a lab for confirmation. Once HWM is confirmed, a challenge test should be conducted to determine which combination of chemicals will be most effective in controlling that particular strain of HWM. Over 13 combinations of chemicals can potentially be used to treat HWM. The only way to know the appropriate combination is by sending samples to be challenge tested. Treating HWM without knowing the appropriate combination of chemicals can result in an even more resilient strain in the lake, damage to native aquatic plant populations, and the waste of resources.

Figure 2. Locations of wetland invasive species observed during a shoreland survey conducted by RC&D, September 2014. (Map courtesy of Golden Sands Resource Conservation & Development Council, Inc.)
Additional invasive species were identified during a shoreline survey conducted in September 2014 by RC&D. These species were non-native narrow-leaf cattail, glossy buckthorn, and purple loosestrife (Figure 2). PLMD used beetles for more than 15 years as a natural method to manage purple loosestrife found in scattered places along the lakeshore. Volunteers continue to hand-pull scattered plants wherever possible. PLMD members have been notified of the presence of buckthorn and narrow-leaf cattail, as well as the best methods to remove these invasives. If an invasive plant species not previously documented in Porters Lake is observed, guidance on how to report it can be found in Appendix C. Rapid Response Plan.

Summary of Aquatic Plant Management Planning Session Discussion – August 14, 2015

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

- **Manual removal. (Native plants, EWM)** This is being done by individual lakefront property owners now. Property owners are permitted to clear areas up to 30’ around their docks for boat and swimming access to open water. Additionally, those trained to properly identify and remove EWM and other AIS can remove those plants manually any time of year without a permit. Trained divers can be hired to manually remove AIS in deeper parts of the lake. This option was supported by a majority of survey respondents.

- **Chemical spot treatment. (EWM)** Results of recent studies of the effectiveness of chemical spot treatment suggest treatment is less effective than previously thought and may actually promote chemically-resistant forms of EWM; however, chemical spot treatments may still be appropriate in certain conditions to control EWM. If hybrid watermilfoil (HWM) is determined to be present, the type of chemical should be based on the specific type of hybrid. This can be determined through DNA testing. If the EWM is not a hybrid, and the plant bed is less than 5 acres, a contact herbicide such as endothall or diquat should typically be used. Systemic herbicides should not be used. Treatment should occur early in the season prior to emergence of native plants. To reduce the chance of developing resilient strains of EWM, different treatments should be used each year. This option was supported by just under one-half of the survey respondents.

- **Milfoil weevils. (EWM)** THIS OPTION IS NOT RECOMMENDED FOR THE CURRENT EWM POPULATIONS IN PORTERS LAKE This option could be considered in areas of the lake with native or restored shorelines. Milfoil weevils are commercially available, but are expensive. Obtaining a starter population and rearing them in predator-free conditions can be desirable from a financial standpoint. Professional assistance should be sought if stocking or rearing is pursued. This option was supported by a majority of survey respondents.

- **Do nothing.** THIS OPTION IS NOT RECOMMENDED FOR THE CURRENT EWM POPULATIONS IN PORTERS LAKE. Pursuing no active management options and observing how EWM responds may be an option. Although EWM is present in a lake and typically behaves very aggressively, there have been reported cases where EWM populations have stabilized and not presented a significant issue to lake users. Only 26% of the survey respondents supported this option.
Guiding Vision for Aquatic Invasive Species

*Porters Lake and its wetlands will be free of aquatic invasive species.*

**Goal 3.** Eliminate aquatic invasive species from Porters Lake and prevent new species from becoming established.

**Objective 3.1.** Monitor, identify and eliminate aquatic invasive species on or around Porters Lake.

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<th>Lead person/group</th>
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<tbody>
<tr>
<td>Continue to thoroughly monitor for EWM, including volunteer monitoring, contracted point-intercept surveys, and routine meander surveys.</td>
<td>PLMD</td>
<td>Interested citizens, RC&amp;D</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Monitor, identify and properly remove purple loosestrife on shorelands. In addition to hand pulling and use of herbicides, consider using biological control methods.</td>
<td>PLMD</td>
<td>RC&amp;D WDNR Aquatic Plant Biologist</td>
<td>Following RC&amp;D workshop (see below)</td>
</tr>
<tr>
<td>Protect native plant species so as not to create open niches for terrestrial invasive species.</td>
<td>Shoreland property owners</td>
<td>PLMD WDNR Lake Manager</td>
<td>Ongoing</td>
</tr>
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**Objective 3.2.** Prevent AIS from becoming established in Porters Lake.

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<th>Actions</th>
<th>Lead person/group</th>
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<tbody>
<tr>
<td>Provide opportunities for individuals to learn to identify monitor and properly remove phragmites, purple loosestrife, Japanese knotweed, reed canary grass and other terrestrial invasive species on their properties. Continue to thoroughly monitor for EWM including Clean Boats Clean Waters (CBCW), identification workshops and regular meander surveys.</td>
<td>PLMD Volunteers</td>
<td>RC&amp;D WDNR Aquatic Plant Biologist Consultants</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Individuals that know how to identify AIS will routinely monitor Porters Lake and its wetlands and report any suspicious plants in accordance with the Rapid Response Plan.</td>
<td>PLMD Volunteers</td>
<td>RC&amp;D WDNR Aquatic Plant Specialist Consultants</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Prevent introduction of AIS though boat launch information (CBCW).</td>
<td>PLMD Volunteers</td>
<td>CBCW</td>
<td>Focus on summer</td>
</tr>
</tbody>
</table>
Critical Habitat

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

Although Porters Lake does not have an official critical habitat area designation, there are areas within Porters 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. Identifying areas around the lake that are important habitat and then informing lake users of their value can help raise awareness for the protection of these areas.

The Hansen family owns a large amount of undeveloped land on the eastern/northeastern side of Porters Lake, including over 50 acres of quality wetland. A 2013 report details four distinct wetland habitat types (Figure 3) with a total of 138 plant species (Skawinski, 2013). Additionally, much of this land is part of a formal forest and prairie restoration effort.

The northeastern bay of Porters Lake is shallow and segues into a quality wetland complex to the east of the lake. Porters Lake residents have expressed concern about the impact of motorized boat traffic on the shallow bay. The planning committee would like to explore options to prevent motorized boats from entering this area, and would also like to request a formal sensitive habitat designation for the bay from the WDNR.

Figure 3. Wetland habitat types: 1) Porters Lake; 2) Shoreline; 3) Sedge meadow; 4) Acidic sphagnum bog (Skawinski, 2013).
Guiding Vision Porters Lake’s Critical Habitat

The unique and special sensitive areas in and near Porters Lake will be enhanced and protected from degradation.

Goal 4. Preserve existing high quality habitat in and near Porters Lake for abundant fish and wildlife.

Objective 4.1. Critical habitat in and near Porters Lake will be identified and protected.

| Actions                                                                  | Lead person/group | Resources                           | Start/end dates                        |
|                                                                         |                   |                                    |                                      |
| Request critical habitat area designations from WDNR.                   | PLMD              | WDNR Lake Specialists               | 2016                                  |
| If critical habitat is designated on Porters Lake, communicate to visitors why these areas are important. | PLMD              | WDNR Critical Habitat Report        | Following critical habitat area designation |
| Inform property owners about the benefits of No Wake and refraining from the disturbance and removal of aquatic plants. | PLMD              | UWEX Lakes (educational materials)  | Ongoing                               |
| Explore a “No Motor” restriction for the shallow northeast bay of Porters Lake. | PLMD              | Town of Mt. Morris                  | 2016                                  |
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 extending 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 Porters 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 Porters Lake was assessed by measuring different characteristics including temperature, dissolved oxygen, water clarity, and water chemistry. All of these factors were taken into consideration when management planning decisions were made.

Water Quality

All respondents to the public survey indicated water quality has an impact on both their personal enjoyment value and the economic value of their lake property. Sixty-three percent of respondents indicated the water in Porters Lake has only minor aesthetic problems periodically and is excellent for swimming and boating. One-half of the survey respondents felt the water quality had not changed during their time at the lake, but nearly one-half also indicated they felt conditions had declined, primarily due to falling water levels, agriculture and shoreline damage.

A variety of water chemistry measurements were used to characterize water quality in Porters Lake. Water quality was assessed during the 2010-2012 Waushara County Lakes Study and involved a number of measures including temperature, dissolved oxygen, water chemistry, and nutrients (phosphorus...
and nitrogen). Nutrients are important measures of water quality in lakes because they are used for growth by algae and aquatic plants. Each of these interrelated measures plays a part in the lake’s overall water quality. In addition, water quality data collected in past years was also reviewed to determine trends in Porters Lake’s water quality.

Dissolved oxygen is an important measure 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. The late winter data showed relatively constant concentrations throughout the water column; however, in February 2011 and February 2012, concentrations below five feet were less than 5 mg/L. This is of particular concern during years with longer ice and snow cover. During the summer, dissolved oxygen was stratified (layered) and occasional increases were evident at about eight feet. These increases in dissolved oxygen in deeper water typically occur as a result of oxygen production by algae.

The water clarity measured in Porters Lake was considered good. Water clarity ranged from 6.5 feet to 14 feet, with averages shown in Figure 4. A robust water clarity dataset has been compiled since 1986 by citizen monitors. When compared with the earlier data, the average water clarity measured during the study was better in April, June and September; similar in July, August and October; and poorer in May and November. Water clarity in Porters Lake is typically poorer during the summer months, with the shallowest water clarity depths recorded in late summer.

Chloride, sodium and potassium 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. Porters Lake had low average chloride, potassium and sodium concentrations during the study.

Atrazine, an herbicide commonly used on corn, was detected in Porters Lake (0.10 µg/L and 0.11 µg/L DACT). The presence of this chemical suggested agricultural activities in the surrounding area are impacting water quality. Some toxicity studies have indicated reproductive system abnormalities can occur in frogs at these levels (Hayes, 2001; Hayes, 2003).

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 so much 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.

The summer median total phosphorus concentrations were 14.5 ug/L and 17 ug/L in 2011 and 2012, respectively. This is below Wisconsin’s phosphorus standard of 40 ug/L for shallow seepage lakes, but above the proposed flag value of 15 ug/L (Figure 5). In spring, the average concentration of inorganic nitrogen was 0.12 mg/L. Inorganic nitrogen concentrations above 0.3 mg/L are sufficient to produce algal blooms throughout the summer.

Managing nitrogen, phosphorus and soil erosion throughout the Porters 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 Porters Lake can be controlled by using lake-friendly land management decisions, such as the restoration of shoreland vegetation, elimination/reduction of fertilizers, proper management of animal waste and septic systems, and the use of water quality-based management practices.

One pound of phosphorus entering a lake can result in up to 500 pounds of algal growth! (Vallentyne, 1974)
Guiding Vision for Water Quality in Porters Lake

Porters Lake will have excellent water quality that supports a healthy lake ecosystem and quality recreation.

Goal 5. Maintain or improve water quality in Porters Lake.

Objective 5.1. Maintain median summer phosphorus concentrations below the flag value of 15 mg/L and spring inorganic nitrogen concentrations below 0.3 mg/L.

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<tbody>
<tr>
<td>Inform others around the lake about the impacts of nutrients and land management on water quality through the distribution of a District newsletter.</td>
<td>PLMD</td>
<td>WCWLC</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Refrain from the use of fertilizers on shoreland properties (see Shorelands section). Encourage soil testing to determine if fertilizer is necessary.</td>
<td>PLMD</td>
<td>WC UWEX</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Encourage the restoration of unmowed vegetation to slow and absorb runoff and pollutants from the road (see Shorelands section).</td>
<td>PLMD</td>
<td>WCWLC UWEX Lakes (educational materials)</td>
<td>Ongoing</td>
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Goal 6. Create a robust dataset for Porters Lake to monitor trends, declines and improvements over time.

Objective 6.1. Continue current monitoring initiatives and begin collecting data that are not routinely recorded.

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<tbody>
<tr>
<td>Regularly monitor water clarity (minimum 5 times/summer).</td>
<td>Trained volunteer</td>
<td>CLMN Coordinator</td>
<td>Ongoing – summer</td>
</tr>
<tr>
<td>Continue monitoring water chemistry (total phosphorus and chlorophyll-a).</td>
<td>Trained volunteer</td>
<td>CLMN Coordinator</td>
<td>Ongoing – summer</td>
</tr>
<tr>
<td>Test for inorganic nitrogen in lake water during spring overturn.</td>
<td>Interested volunteer</td>
<td>State certified water testing labs WEAL</td>
<td>Ongoing – spring</td>
</tr>
<tr>
<td>Submit all collected data to WDNR for long term storage, interpretation, and use.</td>
<td>Interested volunteer</td>
<td>CLMN Coordinator</td>
<td>As needed</td>
</tr>
<tr>
<td>Encourage homeowners to test their drinking water for nitrates and atrazine. Private well testing for bacteria and nitrate should be done annually.</td>
<td>PLMD</td>
<td>State certified water testing labs WEAL</td>
<td>Ongoing – annually</td>
</tr>
</tbody>
</table>
Lake Levels
In Waushara County, some seepage lakes have historically experienced fluctuations in water levels and some of their plants have adapted to these fluctuations. Since 2006, annual precipitation for Wautoma has been average and in some years above average (Kraft et al., 2014). Groundwater level declines have dewatered the sensitive wetlands northeast of the lake, threatening this high quality habitat. Excess withdrawal of groundwater can add to natural fluctuations, affecting the extent and duration of low water levels (Kraft, 2014). The planning committee envisions improved water levels in Porters Lake through limitations on groundwater withdrawals in the surrounding area.

Guiding Vision for Water Quantity

*Porters Lake will have typical historic water levels at or near the ordinary high water mark.*

Goal 7. Porters Lake will endeavor not to be adversely impacted by large groundwater withdrawals from high capacity wells.

Objective 7.1. Understand water fluctuations (natural vs. manmade) in and near Porters Lake.

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<tbody>
<tr>
<td>Provide information to PLMD members via website and/or email on what is currently happening with water withdrawals and impacts on lake levels.</td>
<td>PLMD</td>
<td>UWEX – informational materials</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Continue lake level monitoring program via monitoring well located on south shore. Record depth to water regularly (weekly or more during the growing season). Submit data to Waushara County.</td>
<td>PLMD</td>
<td>WCLCD UWSP</td>
<td>2016</td>
</tr>
<tr>
<td>Install a monitoring well with a recording device in the nearby wetland.</td>
<td>PLMD</td>
<td>WCLCD WDNR lake grants</td>
<td>2016</td>
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Objective 7.2. Work with citizens and elected officials to ensure that Porters Lake has “an average lake level of 876.49 MSL”. *(Not an officially designated OHWM)*

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<tr>
<td>Connect with other lake groups and organizations in the area focused on water level/groundwater issues in Central Wisconsin.</td>
<td>PLMD</td>
<td>WCWLC Friends of Central Sands Wisconsin Lakes</td>
<td>Ongoing – as needed</td>
</tr>
</tbody>
</table>
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 extending at least 35 feet landward from the water’s edge. To better understand the health of Waushara County lakes, shorelands were evaluated. The survey inventoried the types and extents of shoreland vegetation (Figure 6). 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 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.

Figure 6. Shoreline survey of disturbances around Porters Lake, 2011.
Higher scores denote a healthier shoreline with good land management practices. These are areas where protection and/or conservation should be targeted. 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 Porters Lake is displayed on the map in Appendix B. Shoreland Survey – 2011. Large portions of Porters Lake’s shorelands are in good shape, but some segments have challenges that should be addressed.

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 30 foot wide access corridor for each shoreland lot. According to the 2011 shoreland survey conducted by Waushara County, approximately 2,316 feet of shoreline are currently mowed. Based on the number of parcels and the optional access corridor, the total disturbed shoreline should be reduced to no more than 1,320 feet. Although some properties were grandfathered in when the ordinance was initiated in 1966, following this guidance will benefit the health of the lake and its inhabitants.

Porters Lake has a small watershed draining to it, meaning the most controllable impacts originate along the lake’s immediate shoreline. To reduce these impacts, property owners should be aware of their connection to lake water quality, best management practices, and appropriate resources to help them implement the best management practices.

**Guiding Vision for Porters Lake’s Shorelands**

*Porters Lake will have a shoreland that provides aesthetic beauty and benefits water quality and habitat for birds, frogs, and other animals that use or live near shore.*
Goal 8. Porters Lake shorelands will become increasingly healthy over time. Over the next five years, 1,000 feet of mowed shoreland will be restored.

Objective 8.1. Porters Lake shoreland property owners will be knowledgeable about and make good decisions about shoreland practices that result in good water quality and habitat.

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<tbody>
<tr>
<td>Provide informational materials to all shoreland property owners about basic lake stewardship including healthy shorelands and their composition (wildflowers, shrubs, trees, etc.).</td>
<td>PLMD</td>
<td>WCWLC UWEX Lakes – informational materials</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Encourage and support shoreland owners interested in shoreland restoration.</td>
<td>PLMD Shoreland property owners</td>
<td>UWEX Lakes – informational materials WCLCD Consultants WDNR Healthy Lakes grants</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Encourage those interested in shoreland restorations to contact the WCLCD for available resources.</td>
<td>PLMD</td>
<td>WCLCD WDNR Healthy Lakes grants</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Host a speaker/demonstration: “How to restore your shoreline.”</td>
<td>PLMD</td>
<td>WCLCD UWEX Lakes (Patrick Goggin) Consultants</td>
<td>2016</td>
</tr>
<tr>
<td>Consider restoring and showcasing a “demonstration site” with a sign at the water’s edge about shoreland restoration and/or hosting a “shoreland tour”.</td>
<td>PLMD Town of Wautoma Shoreland property owners</td>
<td>WCLCD UWEX Lakes Consultants WDNR Healthy Lakes grants</td>
<td>2016</td>
</tr>
<tr>
<td>Implement a soil testing initiative to have property owner soil samples tested for phosphorus and any recommended amendments.</td>
<td>PLMD</td>
<td>WC UWEX</td>
<td>Fall 2016</td>
</tr>
<tr>
<td>Explore purchase of large blocks of undeveloped shoreland property for protection.</td>
<td>PLMD</td>
<td>UWEX Lakes WDNR Lake Protection grants Knowles-Nelson Stewardship funds</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Recruit/maintain facilitator to gather and distribute appropriate information from WDNR, UWEX, WCLCD, and other sources regarding best management practices to protect/improve water quality and the resources available.</td>
<td>PLMD</td>
<td>WDNR UWEX Lakes WCLCD</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Pursue removal of red mat on lake bed in the near-shore area on northern side of lake.</td>
<td>PLMD</td>
<td>WDNR</td>
<td>2016</td>
</tr>
</tbody>
</table>
Watershed Land Use

It is important to understand where Porters Lake’s water originates in order to understand the lake’s health. During snowmelt or rainstorms, water moves across the surface of the landscape (runoff) towards lower elevations such as lakes, streams, and wetlands. The land area that contributes runoff to a lake is called the surface watershed (Figure 7). Groundwater also feeds Porters 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 following analysis is based on the 16-digit hydrologic unit code provided by the U.S. Geological Survey. Onterra, LLC delineated a slightly smaller watershed, 162 acres, in their 2007 Comprehensive Management Plan, shown in red on Figure 7.)

Figure 7. Surface watershed outline of Porters Lake.
The surface watershed for Porters Lake is 235 acres. Primary land use is forest. In general, the land closest to the lake has the greatest immediate impact on water quality. The lake’s shoreland is surrounded primarily by forested residences and wetlands.

Estimates of phosphorus from the landscape can help to understand the phosphorus sources to Porters 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, agriculture had the greatest percentage of phosphorus contributions from the watershed to Porters Lake (Figure 8). The phosphorus contributions by land use category, called phosphorus export coefficients, are shown in the table below. The phosphorus export coefficients have been obtained from studies throughout Wisconsin (Panuska and Lillie, 1995).

Table 1. Modeling data used to estimate phosphorus inputs from land uses in the Porters Lake watershed. Low and most likely coefficients were used to calculate the range, in pounds.

<table>
<thead>
<tr>
<th>Porters Lake Land Use</th>
<th>Phosphorus Export Coefficient (lbs/acre-yr)</th>
<th>Land Use Area Within the Watershed</th>
<th>Phosphorus Load</th>
<th>Pounds</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Acres</td>
<td>Percent</td>
<td></td>
<td>Acres</td>
</tr>
<tr>
<td>Water</td>
<td>0.1</td>
<td>76</td>
<td>32</td>
<td>0-15</td>
<td>31%</td>
</tr>
<tr>
<td>Developed</td>
<td>0.04</td>
<td>15</td>
<td>6</td>
<td>0.3-1</td>
<td>2%</td>
</tr>
<tr>
<td>Barren/Herbaceous/Wetland</td>
<td>0.09</td>
<td>90</td>
<td>38</td>
<td>3-14</td>
<td>33%</td>
</tr>
<tr>
<td>Forest</td>
<td>0.04</td>
<td>37</td>
<td>16</td>
<td>1-2</td>
<td>3%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0.45</td>
<td>17</td>
<td>7</td>
<td>2-13</td>
<td>31%</td>
</tr>
</tbody>
</table>

*Values are not exact due to rounding and conversion

Figure 8. Phosphorus loading in the Porters Lake surface watershed.
Guiding Vision for Porters Lake’s Watershed

*Land within the Porters Lake watershed will be managed in a way that supports clean water and a healthy lake.*

**Goal 9.** Watershed and shoreland property owners will know about and utilize resources for healthy land management practices.

**Objective 9.1.** Support healthy land management activities in the Porters Lake watershed to reduce sediment/phosphorus loading.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encourage the County to support and follow-up with water quality-based best management practices (BMPs) within the watershed. Include BMPs that reduce application of excess nitrogen and pesticides that leach to groundwater.</td>
<td>WCLCD</td>
<td>NRCS DATCP County Board Supervisors</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Support landowners 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).</td>
<td>Watershed property owners</td>
<td>NCCT WDNR Lake Protection grants Knowles-Nelson Stewardship funds</td>
<td>As needed</td>
</tr>
<tr>
<td>Encourage subdivisions and other new developments to manage stormwater on site and consider ways to minimize impacts from septic systems on Porters Lake.</td>
<td>WC</td>
<td>Town of Mt. Morris Developers</td>
<td>As needed</td>
</tr>
<tr>
<td>Protect wetlands to maintain the water budget of Porters Lake. Any altered wetlands should be mitigated within the lake’s watershed.</td>
<td></td>
<td>WDNR</td>
<td>As needed</td>
</tr>
<tr>
<td>Encourage design of road and construction projects that will minimize impacts to Porters Lake.</td>
<td>PLMD</td>
<td>Town of Mt. Morris WC Highway Department WDOT</td>
<td>As needed</td>
</tr>
<tr>
<td>Explore implementation of deed restrictions (regarding limits on hi-cap wells and groundwater recharge areas) on large blocks of property within the lake’s watershed. Consider purchase then resell with conservation easement.</td>
<td>PLMD</td>
<td>NCCT UWEX Lakes</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Recruit/maintain facilitator to gather and distribute appropriate information from WDNR, UWEX, WCLCD, and other sources regarding best management practices to protect/improve water quality.</td>
<td>PLMD</td>
<td>WDNR UWEX Lakes WCLCD</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
People and the Lake

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

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

Recreation

A boat launch on the southern side of Porters Lake provides public access to the lake. The launch is managed by the Town of Mt. Morris. Although motors are allowed, Porters Lake is a “No Wake” lake. The lake is enjoyed by people who swim and snorkel, canoe and kayak, watch wildlife, fish, and appreciate its beauty (Figure 9). Motors operated in shallow water are disturbing the lake sediment, aquatic plants, fish nests, and habitat. Many would like to see motors banned from the northeastern bay due to its shallow bottom and rich biodiversity.

The northeastern bay of Porters Lake is of particular value to the lake’s habitat and quality (see Critical Habitat section). As it is quite shallow (1.5 feet – 3 feet), boat traffic has long been a concern to the residents, as motorized traffic inevitably disturbs bottom sediments and native plants. The following email was sent to the WDNR on August 3, 2015 on behalf of the Porters Lake Management District:

“Ted,

I hope you are having a good summer.

I want to begin a discussion with you regarding a situation at Porters Lake that a number of concerned property owners feel is damaging native aquatic and shore line plants on the lake. The problem is occurring in the bay on the northeast part of the lake. From the time you lived in the area you may recall this area is totally natural with no homes, piers or any other manmade structures anywhere around the bay. This bay is very shallow.

The problem we are experiencing has to do with motorized boats entering this shallow bay. These motorized boats often fail to trim their props when they enter. Even if motors are trimmed invariably they get stuck and the only way to get out is to rev up the engine which rips up the bottom, tears and fragments plants and creates a wake which damages the shoreline. We have seen small fishing boats with motors as well as larger motored pontoon boats enter this bay and create havoc doing so.

This bay is unique in many ways. There is a large wild rice bed in this bay. Along the shore line Paul Skawinski found a native orchid called nodding ladies tress (Spiranthes cernua). In addition, a native aquatic plant species that is currently listed as special concern on the DNR’s endangered and threatened species list is found in this bay. Robbins spikerush (Eleocharis robbinsii) is found near the far end
of the bay where water leaves the lake via Porters Creek. There are many native mussels and freshwater sponges in the bay which get covered up by sediments kicked up as motors churn up the soft sediments on the bottom.

What we seek is the DNR’s help to get this area designated off limits to any motorized boat traffic. We would like to have signs posted on both sides of the bay that prominently indicate boats with motors are not allowed in this section of the lake. In addition to signage hopefully this bay could be buoyed off in such a way that allows small non-motorized watercraft to pass through the buoys. Once this is done any violators should be subject to fines for violations. We understand the enforcement of any off limits violations is likely to come from citizen action.

Earlier this summer Paul Skawinski from UW Extension along with Amy Thorstenson and Dillon Epping from Golden Sands RC & D completed point intercept work on the lake to determine plant species and density at over 200 points throughout the lake. Paul found two more native aquatic plant species not previously noted. As a result the latest count of native aquatic plant species in Porters Lake now stands at 52. Two years ago Paul Skawinski performed a shore line plant inventory and identified 115 native shore line plants. My fear is the lake risks losing some native and rare aquatic and shoreline plant species in the bay unless motorized boat traffic is prohibited.

Ted, the issue of motorized boats entering the bay and causing damage is a topic the Porters Lake Management District has discussed many times. At our annual meetings and in newsletters we have repeatedly asked boaters to avoid taking their motorized watercraft into this part of the lake. Despite our education effort as well as speaking to offending motorized boat owners we still have some who feel they have an absolute right to go anywhere on the lake regardless of the damage they may cause.

Ted, if this issue does not fall within your area of responsibility perhaps you can refer me to an associate within the DNR that deals with this issue.

Ted, I currently serve as the treasurer of the Porters Lake Management District. I have included Don Dalton, PLMD president, Kris Helms-Doyle, PLMD secretary and Greg Foster, Mt. Morris town supervisor and PLMD board member on this email. Bernadette Krentz, Waushara County board supervisor is also a PLMD board member. I do not have her email address so I will mail a copy of this email to her.”
What recreational activities do you partake in on Porters Lake (check all that apply)?

(20 Responses)

Figure 9. Recreational activities identified by survey respondents.
Guiding Vision for Recreation

Porters Lake will be valued for its great swimming, paddling and relaxation. Recreation on the Porters Lake will be harmonious with the lake and its ecosystem.

Goal 10. Lake users will be informed and respectful of Porters Lake.

Objective 10.1. Foster an environment of compliance amongst lake users.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop a water trail that highlights important natural and historic</td>
<td>PLMD</td>
<td>UWEX Lakes</td>
<td>2016</td>
</tr>
<tr>
<td>areas around the lake.</td>
<td>Interested citizen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continue to work with the Town of Mt. Morris to maintain the boat</td>
<td>PLMD</td>
<td>UWEX Lakes</td>
<td>Ongoing</td>
</tr>
<tr>
<td>landing and signage.</td>
<td></td>
<td>Town of Mt. Morris</td>
<td></td>
</tr>
<tr>
<td>Consider developing a walking trail around the lake to add to the</td>
<td>Interested citizen</td>
<td>UWEX Lakes</td>
<td>Ongoing</td>
</tr>
<tr>
<td>enjoyment of the lake and its surrounding land.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Objective 10.2. Foster an environment of compliance amongst lake users.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explore a No Motor restriction for the north bay of Porters Lake.</td>
<td>PLMD</td>
<td>Town of Mt. Morris</td>
<td>2016</td>
</tr>
<tr>
<td>Work with the Towns to ensure the continuation of boat patrol on the</td>
<td>PLMD</td>
<td>WC Sheriff</td>
<td>Ongoing</td>
</tr>
<tr>
<td>lake, especially during busy times.</td>
<td></td>
<td>WDNR Warden</td>
<td></td>
</tr>
<tr>
<td>Record No Wake or other violations on camera and submit to lake</td>
<td>PLMD</td>
<td>WDNR Conservation</td>
<td>Ongoing</td>
</tr>
<tr>
<td>district for follow up.</td>
<td></td>
<td>Warden</td>
<td></td>
</tr>
</tbody>
</table>

Communication and Organization

Many of the goals outlined in this plan focus on distributing information to lake and watershed residents and lake users in order to help them make informed decisions that will result in a healthy ecosystem in Porters Lake enjoyed by many people. Working together on common values will help to achieve the goals that are outlined in this plan.
Guiding Vision for Communication

The Porters Lake community will be connected and informed in lake stewardship.

Goal 11. Increase participation in lake stewardship.

Objective 11.1. Develop opportunities for education and outreach among full and part-time residents.

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

Objective 11.2. Achieve good communication with clubs, municipalities, agency staff, elected officials, and organizations interested in Porters Lake or lake health.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network with other lake groups in Waushara County by having Porters Lake should be represented on the WCWLC.</td>
<td>PLMD</td>
<td>WC UWEX</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Network with other lakes in the state to learn lake management strategies, etc. by having a representative attend the Wisconsin Lake Convention.</td>
<td>PLMD</td>
<td>UWEX Lakes</td>
<td>Annually</td>
</tr>
<tr>
<td>Consider nominating an individual interested in Porters Lake for the Lake Leaders Institute.</td>
<td>PLMD</td>
<td>UWEX Lakes</td>
<td></td>
</tr>
</tbody>
</table>
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

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

Goal 12. Review plan annually and update as needed.

Objective 12.1. Communicate updates with community members and members of the District.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Lead person/group</th>
<th>Resources</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review plan at annual meeting and discuss accomplishments and identification of goals/objectives/actions for upcoming year.</td>
<td>PLMD</td>
<td></td>
<td>Annually</td>
</tr>
<tr>
<td>Formally update this LMP every 5 years.</td>
<td>PLMD</td>
<td>WCWLC WC UWEX</td>
<td>2019</td>
</tr>
</tbody>
</table>
Governance
Written by Patrick Nehring, Community Agent, UW-Extension Waushara County.

Lake Management Plan Approval
The draft lake management plan will be completed by the lake association/district board, a committee, or a committee of the whole. The final draft of the lake management plan will be approved through a vote of the lake association/district membership or board. The final draft will be approved by the Wisconsin Department of Natural Resources (WDNR) 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 lake association/district. The completed plan that has been approved by the lake association/district 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/](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 Resource Conservation & Development Council, Inc., 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.
Comprehensive Plans
The lake management plan and changes to the plan will be presented to the County and the Municipality for review and possible incorporation into their comprehensive plans. The comprehensive plan is intended to be used to guide future decision. Zoning, subdivision, and official mapping decisions must be consistent with the comprehensive plan.

Process for Inclusion in the Municipal Comprehensive Plan
The Municipal Plan Commission will review the lake management plan to determine if it is consistent with the municipality’s comprehensive plan. If the lake management plan is found by the Municipal Plan Commission to not be consistent with the municipality’s comprehensive plan, the plan commission may (a) recommend changes to the comprehensive plan or (b) ask that an aspect of the lake management plan be revisited. When the Municipal Plan Commission has reached a consensus that the lake management plan aligns with the municipality’s vision, the Municipal Plan Commission will develop an amendment to the comprehensive plan referencing the lake management plan. This could include a reference to the lake management plan under local policies in the agricultural, natural and cultural resources background information and the addition of a recommendation to support the lake management plan and to implement the applicable recommendations contained in the lake management. The Municipal Plan Commission will recommend by resolution that the amendment to the comprehensive plan be adopted by the Municipal Board. A public hearing on the changes to the comprehensive plan will be held with a thirty-day class one notice. The Municipal Board will consider the recommendations from the Municipal Plan Commission. The Municipal Board may (a) adopt the recommendations to the comprehensive plan by ordinance, (b) adopt by ordinance the recommendations with changes, or (c) request the plan commission revisit the changes to the comprehensive plan.

Process for Inclusion in the County Comprehensive Plan
Waushara County Land Use Committee will review the updates to the municipality’s comprehensive plan and the lake management plan as referenced by the municipality’s comprehensive plan to determine if they are consistent with the County’s comprehensive plan. If they are found by the land use committee to not be consistent with the municipality’s comprehensive plan, the land use committee may (a) recommend changes to the County’s comprehensive plan or (b) ask that an aspect of the lake management plan or municipality’s comprehensive plan be revisited. When the Land Use Committee has reached a consensus that the updates to the municipality’s comprehensive plan and the lake management plan aligns with the county’s vision, and if it is not already consistent, it will develop an amendment to the County’s comprehensive plan. The amendment may be include a reference to the lake management plan under local policies in the agricultural, natural and cultural resources background information and the addition of a recommendation to support the lake management plan and to implement the applicable recommendations contained in the lake management. The Land Use Committee will recommend the amendment to the comprehensive plan to the Land, Water, and Education Committee.

The Land, Water, and Education Committee will review the amendment and if it concurs with the recommendation from the Land Use Committee, it will make a recommendation to the Planning & Zoning Committee. The Planning & Zoning Committee will hold a public hearing with a thirty-day class one notice. The Planning & Zoning Committee will recommend by resolution the amendment to the comprehensive plan or the amendment with changes be adopted by the County Board.
The County Board will consider the recommendations from the Planning & Zoning Committee. The County Board may (a) adopt the amendment to the comprehensive plan by ordinance, (b) adopt the amendment with changes, or (c) request the Land Use Committee or Planning & Zoning Committee revisit the changes to the comprehensive plan.

Use of the Comprehensive Plan
The lake management plans as referenced in the comprehensive plans will be used by the County and the Municipality to consider certain actions or in the implementation of zoning and other applicable regulations. The County Board of Adjustments and the County Planning and Zoning Committee may reference the lake management plans as referenced in the comprehensive plan when considering zone changes, variances, conditional uses, and suitable mitigation measures. The Municipality and County may take action as called for in the lake management plan as referenced in the comprehensive plan, including changes to zoning and other applicable regulations, shortly after the County’s comprehensive plan has been updated or may take action as needed.

The lake organization, lake residents, riparian property owners, or other citizens may request that the Municipality or County take a specific action to implement aspects of the lake management plan as referenced in the comprehensive plan. The lake organization lake residents, riparian property owners, or other citizens may provide written or oral support to encourage the Municipality and County to reference the lake management plan when considering regulation or action that may impact the lake. The lake organization will inform the Municipality and the County when the lake management plan is updated and allow the Municipality and County an opportunity to participate in the update process.
References

Bartz, David, 2015. Fish community and habitat in Porters and Johns Lakes. Presentation given at the Mountain View Community Center on September 18, 2015.


McNelly, Jen, 2012. Aquatic Plant Survey of Porters Lake, Waushara County. UW-Stevens Point Center for Watershed Science and Education.

Onterra, LLC. December 2014. Porters Lake Aquatic Plan Community Assessment.


UW-Stevens Point Center for Watershed Science and Education, 2014. Waushara County Lakes Study - Porters Lake. Final Report to Waushara County and Wisconsin Department of Natural Resources.

UW-Stevens Point Center for Watershed Science and Education, 2013. Waushara County Lakes Study - Porters Lake Summary. Report to Waushara County and Wisconsin Department of Natural Resources. Planning Meeting Presentations


Appendices
## Appendix A. 2016 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/](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](http://www.dhs.wisconsin.gov/eh/bluegreenalgae/contactus.htm)

### Aquatic Invasive Species/Clean Boats Clean Water
Contact: Golden Sands Resource Conservation & Development Council, Inc.  
1100 Main St., Suite 150, Stevens Point, WI 54481  
Phone: 715-343-6215  
Websites: [www.goldensandsrcd.org](http://www.goldensandsrcd.org)  

### 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/](http://dnr.wi.gov/lakes/plants/)

### Aquatic Plant Identification
Contact: Golden Sands Resource Conservation & Development Council, Inc.  
1100 Main St., Suite 150, Stevens Point, WI 54481  
Phone: 715-343-6215  
Website: [www.goldensandsrcd.org](http://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

### Aquatic Plant Identification (cont’d)
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/](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](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](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  

### Boat Landings (Town)
Contact the clerk for the specific town/village in which the boat landing is located.
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/

Conservation Easements (cont’d)
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 Street, PO Box 487, Wautoma, WI 54982
Phone: 920-787-0416
E-mail: ken.williams@ces.uwex.edu
Website: 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

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
Website: 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/

Lake Groups (cont’d)
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: lcdnzoning.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 Resource Conservation & Development Council, Inc.
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: lcdnzoning.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: lcdnzoning.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: lcdnzoning.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 Street, PO Box 487, 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
Contact: UWSP Wisconsin Environmental Analysis Laboratory
TNR 200, 800 Reserve St., Stevens Point, WI 54481
Stevens Point, WI 54481
Phone: 715-346-3209
E-mail: weal@uwsp.edu
Website: http://www.uwsp.edu/cnr-ap/weal/Pages/default.aspx
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

The summary of scores for shorelands around Porters Lake is displayed in the figure 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. Large portions of Porters Lake’s shorelands are in good shape, but some segments have challenges that should be addressed. 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.

A scoring system was developed for the collected data to provide a more holistic assessment. 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.
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 Resource Conservation & Development Council, Inc.
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:**

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

  **Regional AIS Coordinator**
  Golden Sands Resource Conservation & Development Council, Inc.
  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

Digital photos may be emailed.

5. **Once the specimen is dropped off or sent for positive identification, be sure to contact:**

  **Regional AIS Coordinator**
  Golden Sands Resource Conservation & Development Council, Inc.
  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
  Town of: Mt. Morris

- **The Lake District** in which the waterbody is located.
  Contact: Raymond ‘Skip’ Hansen
  Email: shansen@div-ins.com

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

- **Local Residents**
- **Porters Lake District**

If an invasive species is confirmed the secretary of the Porters Lake District 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. Aquatic Plants

Porters Lake aquatic plant survey summary, 2012.

<table>
<thead>
<tr>
<th></th>
<th>Lake Average</th>
<th>Statewide Average</th>
<th>North Central Hardwood Forests Ecoregion Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Littoral Frequency of Occurrence (%)</td>
<td>98.34</td>
<td>74.3</td>
<td>76</td>
</tr>
<tr>
<td>Maximum Depth of Plant Growth (ft)</td>
<td>18</td>
<td>15.3</td>
<td>15.9</td>
</tr>
<tr>
<td>Species Richness (Including visuals)</td>
<td>24</td>
<td>16.8</td>
<td>16.2</td>
</tr>
<tr>
<td>Floristic Quality Index (FQI)</td>
<td>26.61</td>
<td>24.1</td>
<td>23.3</td>
</tr>
</tbody>
</table>

Frequency of occurrence of aquatic plant species observed in Porters Lake, 2012.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Coefficient of Conservatism Value (C Value)</th>
<th>2012 % Frequency of Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emergent Species</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eleocharis palustris</td>
<td>Creeping spikerush</td>
<td>6</td>
<td>0.56</td>
</tr>
<tr>
<td>Sparganium fluctuans</td>
<td>Floating-leaf bur-reed</td>
<td>10</td>
<td>0.56</td>
</tr>
<tr>
<td>Typha sp.</td>
<td>Cattail</td>
<td>1</td>
<td>1.12</td>
</tr>
<tr>
<td><strong>Submergent Species</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chara</td>
<td>Muskgrasses</td>
<td>7</td>
<td>72.47</td>
</tr>
<tr>
<td>Najas flexilis</td>
<td>Slender naiad</td>
<td>6</td>
<td>46.07</td>
</tr>
<tr>
<td>Potamogeton gramineus</td>
<td>Variable pondweed</td>
<td>7</td>
<td>29.78</td>
</tr>
<tr>
<td>Najas guadalupensis</td>
<td>Southern naiad</td>
<td>8</td>
<td>24.16</td>
</tr>
<tr>
<td>Potamogeton zosteriformis</td>
<td>Flat-stem pondweed</td>
<td>6</td>
<td>21.91</td>
</tr>
<tr>
<td>Vallisneria americana</td>
<td>Wild celery</td>
<td>6</td>
<td>19.1</td>
</tr>
<tr>
<td>Potamogeton natans</td>
<td>Floating-leaf pondweed</td>
<td>5</td>
<td>15.73</td>
</tr>
<tr>
<td>Utricularia resupinata</td>
<td>Small purple bladderwort</td>
<td>9</td>
<td>15.17</td>
</tr>
<tr>
<td>Stuckenia pectinata</td>
<td>Sago pondweed</td>
<td>3</td>
<td>14.04</td>
</tr>
<tr>
<td>Elodea canadensis</td>
<td>Common waterweed</td>
<td>3</td>
<td>9.55</td>
</tr>
<tr>
<td>Myriophyllum sibiricum</td>
<td>Northern water-milfoil</td>
<td>6</td>
<td>8.99</td>
</tr>
<tr>
<td>Potamogeton illinoensis</td>
<td>Illinois pondweed</td>
<td>6</td>
<td>8.99</td>
</tr>
<tr>
<td>Potamogeton amplifolius</td>
<td>Large-leaf pondweed</td>
<td>7</td>
<td>7.87</td>
</tr>
<tr>
<td>Ceratophyllum demersum</td>
<td>Coontail</td>
<td>3</td>
<td>3.37</td>
</tr>
<tr>
<td>Schoenoplectus acutus</td>
<td>Hardstem bulrush</td>
<td>6</td>
<td>3.37</td>
</tr>
<tr>
<td>Potamogeton praelongus</td>
<td>White-stem pondweed</td>
<td>8</td>
<td>2.81</td>
</tr>
<tr>
<td>Nuphar variegata</td>
<td>Spatterdock</td>
<td>6</td>
<td>1.69</td>
</tr>
<tr>
<td>Myriophyllum spicatum</td>
<td>Eurasian water-milfoil</td>
<td>0</td>
<td>0.56</td>
</tr>
</tbody>
</table>
Appendix E. Aquatic Plant Management Strategies

General recommendations:

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

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

No Action

ADVANTAGES
* No associated cost.
* Least disruptive to lake ecosystem.

LIMITATIONS
* May not be effective in achieving aquatic plant management objectives.

Hand Pulling

ADVANTAGES
* Can be used for thinning aquatic plants around docks.
* Can target specific plants - with proper training.
* Can be effective in controlling small infestations of aquatic invasive species.
* No associated cost.
* If aquatic invasive species are not pulled properly, could worsen the problem.

LIMITATIONS
* Removes near-shore wildlife and fish habitat.
* Opens up areas where invasives to become established.
<table>
<thead>
<tr>
<th><strong>Hand Pulling Using Suction</strong></th>
<th><strong>ADVANTAGES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>* Can be used for thinning plants around docks.</td>
<td></td>
</tr>
<tr>
<td>* Can be used in deeper areas (with divers).</td>
<td></td>
</tr>
<tr>
<td>* Can target specific plants with proper training.</td>
<td></td>
</tr>
<tr>
<td>* Can be effective in controlling small infestations of aquatic invasive species.</td>
<td></td>
</tr>
<tr>
<td>* May be useful in helping to remove upper root mass of aquatic invasive species.</td>
<td></td>
</tr>
<tr>
<td><strong>LIMITATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>* Costs associated with hiring a diver may be comparable to chemical treatment expenses.</td>
<td></td>
</tr>
<tr>
<td>* Currently an experimental treatment – not readily available.</td>
<td></td>
</tr>
<tr>
<td>* If aquatic invasive species are not pulled properly, could worsen the problem.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Mechanical Harvesting</strong></th>
<th><strong>ADVANTAGES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>* Removes plant material and nutrients.</td>
<td></td>
</tr>
<tr>
<td>* Can target specific locations.</td>
<td></td>
</tr>
<tr>
<td>* Used to manage larger areas for recreational access or fishery management.</td>
<td></td>
</tr>
<tr>
<td><strong>LIMITATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>* Not used in water depths less than 3 feet.</td>
<td></td>
</tr>
<tr>
<td>* Some harm to aquatic organisms.</td>
<td></td>
</tr>
<tr>
<td>* Is a temporary control.</td>
<td></td>
</tr>
<tr>
<td>* Risk of introduction of new aquatic invasive species (on a hired harvester) or spread of some existing invasive species.</td>
<td></td>
</tr>
<tr>
<td>* Hired cost at least $150/hr.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Water Level Manipulation</strong></th>
<th><strong>ADVANTAGES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>* Controls aquatic plants in shallower, near-shore areas.</td>
<td></td>
</tr>
<tr>
<td>* Can be low cost.</td>
<td></td>
</tr>
<tr>
<td><strong>LIMITATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>* Requires a controlling structure on the lake.</td>
<td></td>
</tr>
<tr>
<td>* May cause undesired stress on ecosystem.</td>
<td></td>
</tr>
<tr>
<td>* Cannot be used frequently.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Milfoil Weevils</strong></th>
<th><strong>ADVANTAGES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>* Natural, native maintenance of native and exotic milfoils.</td>
<td></td>
</tr>
<tr>
<td>* Prefers the aquatic invasive Eurasian Watermilfoil.</td>
<td></td>
</tr>
<tr>
<td>* Some lakes may already have a native population; need a professional stem count and assessment of shoreland health, structure of fishery, etc.</td>
<td></td>
</tr>
<tr>
<td>* Doesn’t harm lake ecosystem.</td>
<td></td>
</tr>
<tr>
<td><strong>LIMITATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>* Require healthy shoreline habitat for overwintering.</td>
<td></td>
</tr>
<tr>
<td>* Cannot survive in areas of mechanical harvesting or herbicide application.</td>
<td></td>
</tr>
<tr>
<td>* Effectiveness highly variable between lakes (only works well for some lakes).</td>
<td></td>
</tr>
<tr>
<td>* Limited access to weevils for purchase in WI.</td>
<td></td>
</tr>
<tr>
<td>* Still considered experimental.</td>
<td></td>
</tr>
</tbody>
</table>
### Chemical Treatment: Spot

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>LIMITATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>* May be less destructive to lake ecosystem than lake-wide treatment.</td>
<td>* Only considered in lakes with aquatic invasive plants.</td>
</tr>
<tr>
<td></td>
<td>* Usually not fully effective in eradicating target species.</td>
</tr>
<tr>
<td></td>
<td>* Contaminants may remain in sediment.</td>
</tr>
<tr>
<td></td>
<td>* Effects on lake ecosystem not fully understood.</td>
</tr>
<tr>
<td></td>
<td>* Does not remove dead vegetation, which depletes oxygen and releases nutrients, adds to build-up of muck.</td>
</tr>
<tr>
<td></td>
<td>* Extra nutrients may spur additional aquatic plant and algae growth.</td>
</tr>
</tbody>
</table>

### Chemical Treatment: Lake-wide

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>LIMITATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>* May reduce aquatic invasives for a time.</td>
<td>* Only considered in lakes with aquatic invasive plants.</td>
</tr>
<tr>
<td>* Treatment not needed as frequently.</td>
<td>* Usually not fully effective in eradicating target species.</td>
</tr>
<tr>
<td></td>
<td>* Contaminants may remain in sediment.</td>
</tr>
<tr>
<td></td>
<td>* Does not remove dead vegetation, which depletes oxygen and releases nutrients, adds to build-up of muck.</td>
</tr>
<tr>
<td></td>
<td>* Extra nutrients may spur additional aquatic plant and algae growth.</td>
</tr>
<tr>
<td></td>
<td>* Negatively affects native vegetation.</td>
</tr>
<tr>
<td></td>
<td>* Effects on lake ecosystem not fully understood.</td>
</tr>
<tr>
<td></td>
<td>* Opens up space once taken up by natives for invasive species to colonize once again.</td>
</tr>
<tr>
<td></td>
<td>* ~$4000 per 5 acres.</td>
</tr>
</tbody>
</table>
Appendix F. Lake User Survey Results
Appendix F. Lake User Survey Results

**Porter's Lake**
**MSL Elevations**

<table>
<thead>
<tr>
<th>Date</th>
<th>MSL Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/26/02</td>
<td>876.58</td>
</tr>
<tr>
<td>10/2/03</td>
<td>876.23</td>
</tr>
<tr>
<td>8/18/04</td>
<td>876.61</td>
</tr>
<tr>
<td>8/23/05</td>
<td>876.45</td>
</tr>
<tr>
<td>8/28/06</td>
<td>876.13</td>
</tr>
<tr>
<td>8/3/07</td>
<td>876.16</td>
</tr>
<tr>
<td>8/20/08</td>
<td>876.44</td>
</tr>
<tr>
<td>8/4/09</td>
<td>875.59</td>
</tr>
<tr>
<td>7/21/10</td>
<td>876.75</td>
</tr>
<tr>
<td>8/11/11</td>
<td>876.62</td>
</tr>
<tr>
<td>8/30/12</td>
<td>876.33</td>
</tr>
<tr>
<td>7/25/13</td>
<td>876.52</td>
</tr>
<tr>
<td>7/31/14</td>
<td>876.60</td>
</tr>
<tr>
<td>8/28/15</td>
<td>876.52</td>
</tr>
</tbody>
</table>

Benchmark Elevation: 892.78 MSL