Marl Lake Management Plan

The Marl Lake Protection and Rehabilitation District adopted the lake management plan on ______________ after obtaining input from residents and lake users at a series of four public planning sessions held at _____ in ______, Wisconsin in <list months> 2014. 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 Town of Deerfield on: _________________________________________

The plan was adopted by Waushara County on _____________________________________________.

The plan was approved by the Wisconsin Department of Natural Resources on ____________________.
A special thanks to all who helped to create the Marl Lake Management Plan and provided guidance during the plan’s development.

Marl Lake Management Planning Committee Members and Resources

Planning Committee

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

- Waushara County Watershed Lakes Council
- Waushara County Staff and Citizens
- Wisconsin Department of Natural Resources Professionals, Mark Sessing and Ted Johnson
- Wisconsin Department of Natural Resources Lake Protection Grant Program
- UW-Extension
- Dr. Samantha Kaplan and Dr. Paul McGinley, UW-Stevens Point

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

University of Wisconsin – Stevens Point
Water Resource Specialists – Ryan Haney and Danielle Rupp
Water Resource Scientist – Nancy Turyk
Center for Watershed Science and Education

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

Regional Aquatic Invasive Species Education Specialist – Paul Skawinski
Regional Aquatic Invasive Species Specialist – Kaycie Stushek

- Does anyone else belong in this list for the specific lake?
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Introduction

Marl Lake is located in the Township of Deerfield, northwest of Wautoma, in Waushara County. Land in the towns of Deerfield and Wautoma are located in the Marl Lake watershed. The muck bottomed lake is a 28-acre seepage lake with a maximum depth of 34 feet and a residence time of 5 months. Many of its residents have a long history with this quiet lake.

The purpose of this plan is to learn about Marl Lake and identify features important to the Marl Lake community in order to provide a framework for the protection and improvement of the lake. This framework, or lake management plan, will enable citizens and other supporters to achieve the vision for Marl Lake now and in the years to come. The planning process included a series of four public planning sessions which were held at the Deerfield Town Hall to assist area residents, members of the Marl Lake Protection and Rehabilitation District, lake users, and representatives of local municipalities with the development of the lake management plan. These meetings took place between October 2014 and January 2015.

Participation in the planning process was open to everyone and was encouraged by letters sent directly to Marl 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, topic-specific surveys related to the subject of each upcoming planning session were made available prior to each planning session. 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 were filled out anonymously online or on paper upon request. Survey questions and responses were shared at the planning sessions and can be found in the Appendix.

Guest experts and professionals were invited to attend 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. Information provided by the professionals was organized with the survey results into discussion topics, which included: the fishery and recreation; the aquatic plant community; water quality and land use; shoreland health; and communication. After learning about the current conditions of each topic, participants

Overarching Vision for Marl Lake

Marl Lake will maintain its tradition of clean water, abundant wildlife and quiet, No Wake setting; a serene refuge for family gatherings, superb fishing, and enjoyment of nature.
The purpose of this plan is to learn about Marl Lake, identify factors important to lake residents and users, and develop goals to protect and improve Marl Lake for future generations.

identified goals, objectives, and actions for the lake management plan that were recorded by professionals from UW-Stevens Point. Planning session notes and presentations were posted to the Waushara County website.

The Marl Lake Planning Committee consisted of property owners and Town board members. 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, Inc. (RC&D), University of Wisconsin-Extension (UWEX), and the University of Wisconsin-Stevens Point Center for Watershed Science and Education (CWSE).

This lake management plan (LMP) and its planning process allow the community to guide the fate of its lake. The LMP is a dynamic document that identifies goals and action items for the purpose of maintaining, protecting and/or creating desired conditions in a lake for within given period of time. It can correct past problems, improve on current conditions, and provide guidance for future boards, lake users, and technical experts by identifying which issues have been addressed and how successful previous efforts were. Each plan is unique, dependent upon the conditions of the lake, its watershed, and the interests of the stakeholders involved. The actions identified in this LMP serve as a gateway for obtaining grant funding and other resources to help implement activities outlined in the plan. Because many entities are involved in lake and land management, it can be challenging to navigate the roles, partnerships, and resources that are available. The planning process and content of this plan have been designed to identify where some of the key assistance exists.

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

- **Marl Lake Protection and Rehabilitation 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 lake 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 Marl 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 Towns of Deerfield and Wautoma**: 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 to identify and prioritize needs within Wisconsin’s lake community, and decide where to apply resources and funding. A well thought out lake management plan increases an application’s competitiveness for funding from the State – if multiple Waushara County lakes have similar goals in their lake management plans, they can join together when seeking grant support to increase competitiveness for statewide resources.

### Background

One of the first steps in creating this plan was to gather and compile data about the lake and its ecosystem to understand past and current lake conditions. This was done alongside 32 other lakes as part of the Waushara County Lakes Project. The Waushara County Lakes Project was initiated by citizens in the Waushara County Watershed Lakes Council who encouraged the 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. Many of the lakes had insufficient data available to help evaluate current water quality, aquatic plant communities, invasive species, and shorelands, or had data obtained 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 for future reference. The results of this project, including this plan, will assist citizens, municipalities, Waushara County, and State staff to efficiently manage water resources and help make informed decisions and policies that will affect their lakes now and for future generations.

Several reports from the Marl Lake Study and the materials associated with the planning process and reports can be found on the Waushara County website: [http://www.co.waushara.wi.us/](http://www.co.waushara.wi.us/). Hover over the Departments tab, then Zoning and Land Conservation, Land Conservation, and finally click on Lake Management Planning.
Goals, Objectives and Actions

The following goals, objectives, and associated actions were derived from the values and concerns of citizens and members of the Marl Lake Management Planning Committee, and the known science about Marl Lake, its ecosystem and the landscape within its watershed. Implementing and regularly updating the goals and actions in the Marl Lake Management Plan will ensure that the vision is supported and that changes or new challenges are incorporated into the plan. A management plan is a living document that changes over time to meet the current needs, challenges and desires of the lake and its community. The goals, objectives and actions listed in this plan should be reviewed annually and updated with any necessary changes.

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

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

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

People and the Lake
- Recreation—access, sharing the lake, informing lake users, rules
- Communication and Organization—maintaining connections for partnerships, implementation, community involvement
- Updates and Revisions—continuing the process
- Governance—protection of the lake, constitution, state, county, local municipalities, Marl Lake Protection and Rehabilitation District
The following goals have been identified as ‘high priority’:
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.

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<thead>
<tr>
<th>Resource</th>
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<td>Center for Watershed Science and Education</td>
<td>CWSE</td>
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<td>Golden Sands Resource Conservation and Development</td>
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<td>Marl Lake Protection &amp; Rehabilitation District</td>
<td>MLPRD</td>
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<td>Wisconsin Department of Natural Resources</td>
<td>WDNR</td>
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Contact information for organizations and individuals who support lake management in Waushara County can be found in Appendix A.

<Look through the goals and objectives. What other acronyms show up in this particular plan? Add to table. Should any be deleted from the table?>
In-Lake Habitat and a Healthy Lake

Many lake users value Marl 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 Marl Lake includes the aquatic 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 in order to flourish. Activities in and around a lake that can affect a fishery may involve disturbances to the native aquatic plant community or substrate, excessive additions of nutrients or harmful chemicals, removal of woody habitat, shoreline alterations, and/or an imbalance in the fishery. Shoreland erosion can cause sediment to settle onto the substrate, causing the deterioration of spawning habitat. Habitat can be improved by allowing shoreland vegetation to grow, minimizing the removal of aquatic plants, providing fallen trees or limbs in suitable areas, and protecting wetlands and other areas of critical habitat.

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

Managing a lake for a balanced fishery can result in fewer expenses to lake stewards and the public. While some efforts may be needed to provide a more suitable environment to meet the needs of the fish, they usually do not have to be repeated on a frequently reoccurring basis. Protecting existing habitat such as emergent, aquatic, and shoreland vegetation, and allowing trees that naturally fall into the lake to remain in the lake are free of cost. Alternatively, restoring habitat in and around a lake can have an up-front cost, but the effects will often continue for decades. Costs in time, travel, and other expenses are associated with routine efforts such as fish stocking and aeration. Ideally, a lake contains the habitat, water quality, and food necessary to support the fish communities that are present within the lake and provide fishing opportunities for people without a lot of supplemental effort and associated expenses to maintain these conditions.
- WDNR survey results (seining? Electroshocking?).
- Recommendations given by Fisheries Biologist?
- Do they have winter fish kills? Do they experience problems with low D.O.? Does the group have an aerator (if yes, need operating instructions)?
- Any special structures already in place for fish (weirs, cribs, previous tree drops, etc.)?
- Lake user survey results: anything interesting to say about fish/the fishery? Values? What do respondents normally catch?
- Other discussion topics or concerns about fish, habitat, etc. that came up during the fish meeting?
- Any local fishing clubs?

**Guiding Vision for the Fish Community**

*[Lake Specific]*

**Goal 1. [Lake Specific]**

**Objective 1.1. [Lake Specific]**

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Aquatic Plants
Aquatic plants provide the forested landscape within Marl Lake. They provide food and habitat for spawning, breeding, and survival for a wide range of inhabitants and lake visitors including fish, waterfowl, turtles, amphibians, as well as invertebrates and other animals. They improve water quality by releasing oxygen into the water and utilizing nutrients that would otherwise be used by algae. A healthy lake typically has a variety of aquatic plant species which creates diversity that makes the aquatic plant community more resilient and can help to prevent the establishment of non-native aquatic species.

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

During the 2011 aquatic plant survey of Marl Lake, ninety-four percent (89 of 95) of sites sampled had vegetative growth. Of the sampled sites within Marl Lake, the average depth was 11 feet and the maximum depth was 24 feet.

The dominant plant species in the survey was muskgrass (Chara spp.), followed by Fries’ pondweed (Potamogeton friesii) and sago pondweed (Stuckenia pectinata). Muskgrass is a favorite food source for a wide variety of waterfowl, and muskgrass beds offer cover and food to fish, especially young trout, largemouth bass, and smallmouth bass. Fries’ pondweed is also an important food source for a variety of waterfowl, and this submersed plant species offers shade and cover for fish, and habitat for invertebrates. Sago pondweed provides food to waterfowl and is used as cover and habitat by invertebrates and fish (Borman et al, 2001).

- Are there any species of special concern?
- Are there any aquatic invasive plants?

Does anything about the AP community warrant management?

More detailed information can be found in the Marl Lake Aquatic Plant Report or the Marl Lake 2010-2012 Lake Study Report.

- Do they have a separate APM?
Guiding Vision for Aquatic Plants in Marl Lake

[Lake specific]

Goal 2. [Lake specific]

Objective 2.1. [Lake Specific]

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Aquatic Invasive Species (AIS)

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

- Do they have AIS? If not, delete the sections and pictures that don’t apply:
  - Curly-leaf pondweed (CLP)
    - When was it identified originally (year?)
    - When and where was it most recently found in our study? Was it found in our study?
    - Append maps and reference them here.
  - Eurasian water-milfoil (EWM)

This plant can live in harmony with the rest of the aquatic plant community but may become invasive. The die-off of large beds of CLP in June can contribute to nuisance algae blooms throughout the summer. In Marl Lake CLP should be monitored annually in early June, and if the beds expand, management should be considered <or other recommendations??>
- When was it identified originally (year?)
- When and where was it most recently found in our study? Was it found in our study?
- Append maps and reference them here.

EWM can exist as part of the plant community or it can create dense beds that can damage boat motors, make areas non-navigable, and inhibit activities like swimming and fishing. 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.

- If they have a separate Aquatic Plant Management Plan (APM), reference it here and include description of highlights and summary of AIS/AP management discussion (below).
- If they have invasives but no separate APM, summary of AIS/AP management discussion should go here:

Summary of Aquatic Plant Management Planning Session Discussion - <Date>  
[Lake specific discussion information] The following management strategies were determined to be the most practical and effective options that would minimize impacts to the lake as a whole:

[Lake specific option #1]

[Lake specific option #2]

**Guiding Vision for Aquatic Invasive Species**

[Lake specific]

**Goal 3. [Lake specific]**

**Objective 3.1. [Lake specific]**

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Objective 3.2. [Lake specific]

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**Critical Habitat**

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

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

**Guiding Vision Marl Lake’s Critical Habitat**

*Marl Lake’s sensitive areas will be enhanced and protected from degradation.*

**Goal 4. Identify and inform others of quality habitat in and near Marl Lake.**

**Objective 4.1. Explore options for official identification of important habitat areas to inform others and to better protect habitat in the lake.**

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<td>Request critical habitat designations from WDNR.</td>
<td>WDNR Lake Specialists</td>
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<tr>
<td>If critical habitat is designated on Marl Lake,</td>
<td>WDNR Critical Habitat Report</td>
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communicate to property owners, visitors, and Town Board as to why these areas are important.

**Landscapes and the Lake**

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

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

The water quality in Marl 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 Marl Lake was assessed by measuring different characteristics including temperature, dissolved oxygen, water clarity, water chemistry, and algae. All of these factors were taken into consideration when management planning decisions were made.

**Water Quality**

100% of survey respondents indicated that lake water quality has a major impact on both their personal enjoyment value and the economic value of the lake. Half of the survey respondents believed that water quality had declined in the time they have visited the lake with water level changes as the primary culprit.
A variety of water chemistry measurements were used to characterize the water quality in Marl Lake. Water quality was assessed during the 2010-2012 lake study and involved a number of measures including temperature, dissolved oxygen, water chemistry, and nutrients (phosphorus and nitrogen). Nutrients are important measures of water quality in lakes because they are used for growth by algae and aquatic plants. Each of these interrelated measures plays a part in the lake’s overall water quality. In addition, water quality data collected in past years was also reviewed to determine trends in Marl Lake’s water quality.

Dissolved oxygen is an important measure in Marl Lake because a majority of organisms in the water depend on oxygen to survive. Oxygen is dissolved into the water from contact with air, which is increased by wind and wave action. Algae and aquatic plants also produce oxygen when sunlight enters the water, but the decomposition of dead plants and algae reduces oxygen in the lake. Dissolved oxygen concentrations during the 2010-2012 study period remained sufficient to support fish and other organisms throughout the year.

The water clarity measured in Marl Lake is considered good. For Marl Lake, water clarity ranged from 6 feet to 26 feet with an average of 14.9 feet over the two-year monitoring period. When compared with historic data, the average water clarity measured during the study was slightly better in April, about the same in August and October, and slightly worse in May, June, July, September, and November.

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

Phosphorus is an element that is essential in trace amounts to most living organisms, including aquatic plants and algae. Sources of phosphorus can include naturally-occurring phosphorus in soils and wetlands, and groundwater. Common sources from human activities include soil erosion, animal waste, fertilizers, and septic systems. Although a variety of compounds are important to biological growth, phosphorus receives 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.

Total Phosphorus concentrations for Marl Lake ranged from a high of 19 ug/l in August 2011 to a low of 3 ug/l in August 2012 with an average concentration of 14.6 ug/l over the monitoring period. This is down from an average of 21.8 ug/l from historical data dating back to 1981 indicating an improvement in water quality. The summer median total phosphorus was 16 ug/L and 15 ug/L in 2011 and 2012, respectively, which is below Wisconsin’s phosphorus standard of 40 ug/L for shallow seepage lakes. During the study, inorganic nitrogen concentrations were high enough in the spring and winter to enhance algal blooms throughout the summer (Shaw, et al. 2000).
Managing nitrogen, phosphorus and soil erosion throughout the Marl 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 Marl 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.

**Guiding Vision for Water Quality in Marl Lake**

*Marl Lake will have clear, clean water that supports a healthy lake ecosystem and great recreational opportunities.*

**Goal 5. Minimize nutrient and sediment loading to the lake by improving land management practices near the lake.**

**Objective 5.1.** The water quality in Marl Lake will be maintained the same or better than the average measurements observed during the 2010-2012 study. Spring nitrogen concentrations will show a decreasing trend over the next 5 years (*Median summer concentrations of total phosphorus less than 16 ug/L, average water clarity greater than 15 feet*)

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<tr>
<td>Refrain from the use of fertilizers on shoreland properties (see Shorelands section). Consider distributing educational materials around the lake.</td>
<td>MLPRD Board</td>
<td>UWEX Lakes (educational materials)</td>
<td>2016, Ongoing</td>
</tr>
<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 and neighborly discussions. Consider including information on a lake sign.</td>
<td>MLPRD Board</td>
<td>UWEX Lakes (educational materials)</td>
<td>2016, Ongoing</td>
</tr>
<tr>
<td>Encourage the restoration of unmowed vegetation between the road and the lake to slow and absorb runoff and pollutants from the road (see Shorelands section).</td>
<td>MLPRD Board</td>
<td>UWEX Lakes (educational materials)</td>
<td>2016, Ongoing</td>
</tr>
<tr>
<td>Improve shoreland vegetation to reduce phosphorus and sediment loading to the lake (see Shorelands section).</td>
<td></td>
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</table>
Encourage private well owners around Marl Lake to test their water for nitrates.

Establish a groundwater monitoring program in accordance with WisCALM guidance for water clarity and nutrients.

Monitor dates of ice on/ice off and submit the information to the state database.

**Objective 5.2.** Develop strategies to ensure healthy shorelands remain intact and improvements are made to those that have disturbance.

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<td>See Shorelands section.</td>
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**Shorelands**

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

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

The summary of scores for shorelands around Marl Lake is displayed on the map in the Appendix. Many stretches of Marl Lake’s shorelands are in good to moderately-good shape, but some portions have challenges that should be addressed. Only one segment of Marl Lake shoreland ranked as poor. For a more complete understanding of the ranking, an interactive map showing results of the shoreland surveys can be found on the County’s webpage.

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 viewing
corridor for each shoreland lot. 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.

Guiding Vision for Marl Lake’s Shorelands

[Lake specific]

Goal 6. [Lake specific]

Objective 6.1. [Lake specific]

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Watershed Land Use

It is important to understand where Marl 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. Groundwater also feeds Marl Lake; its land area may be slightly different than the surface watershed.

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

The surface watershed for Marl Lake is 4,378 acres. Primary land use is forest (45%) followed by agriculture (28%) and developed land (19%) (Figure 1). The lake’s shoreland is surrounded primarily by

Figure 1. Surface watershed of Marl Lake.
developed land. In general, the land closest to the lake has the greatest immediate impact on water quality. Modeling results indicate agricultural land is the greatest contributor (69%) of phosphorus to the lake.

Estimates of phosphorus from the landscape can help to understand the phosphorus sources to Bughs 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 Marl Lake. The phosphorus contributions by land use category, called phosphorus export coefficients, are shown in Appendix E. The phosphorus export coefficients have been obtained from studies throughout Wisconsin (Panuska and Lillie, 1995).

Guiding Vision for Marl Lake’s Watershed

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

**Goal 7.** Explore and utilize resources for healthy lake management.

**Objective 7.1.** Support healthy land management activities around Marl lake.

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<td>Encourage the County to support and follow-up with water quality based Best Management Practices (BMPs) within the watershed.</td>
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<td>WLCD, NRCS</td>
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<tr>
<td>Continue to use WLCD as a resource for land management activities.</td>
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<td>WLCD</td>
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Support any landowners interested in the protection of their land via a conservation program (i.e. Conservation Easement or Purchase of Development Rights) by referring them to WLCD.

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<tr>
<th>Support any landowners interested in the protection of their land via a conservation program (i.e. Conservation Easement or Purchase of Development Rights) by referring them to WLCD.</th>
<th>NCCT NRCS WDNR Lake Protection Grants</th>
<th>Wisconsin Stewardship Fund, Knowles-Nelson Stewardship Fund, WDNR Lake Protection Grant Program, Waushara County</th>
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<tr>
<td>Explore funding options for land purchase within the watershed for conservation, preservation, or restoration purposes.</td>
<td>Wisconsin Stewardship Fund, Knowles-Nelson Stewardship Fund, WDNR Lake Protection Grant Program, Waushara County</td>
<td>Ongoing</td>
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### People and the Lake

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

[Lake specific information on boat landings, etc.] The lake is enjoyed by people who swim, boat, fish, and appreciate its beauty.

- Is it a no-wake lake?
- What are the no-wake hours?
- How does everyone like the boating hours? Other regulations?
- What do survey respondents/meeting attendees enjoy doing on the lake?
- What concerns were voiced in surveys?
What concerns were voiced in meetings?

Guiding Vision for Recreation

Goal 8. [Lake specific]

Objective 8.1. [Lake specific]

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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 Marl 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

Goal 9. [Lake specific]

Objective 9.1. [Lake specific]

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Lake Management Plan – Marl Lake, Waushara County, Spring 2015
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

[Lake specific]

Goal 10. [Lake specific]

Objective 10.1. [Lake specific]

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Governance
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 (DNR) to have met the lake management plan requirements and grant requirements. If the DNR requires modifications or additional information before approving the plan, the plan will be changed to meet DNR requirements that are acceptable to the 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/. Waushara County offers technical and financial assistance through the Land Conservation and Zoning Department and University of Wisconsin-Extension Department. Additional assistance may be available from other agencies and organizations, including DNR, UW-Extension Lakes Program, Golden Sands RC&D, Wisconsin Wetlands Association, and Wisconsin Trout Unlimited.

**Lake Regulations**

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

**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


UW-Stevens Point Center for Watershed Science and Education, 2014. Waushara County Lake Study - Marl Lake 2010-2012. Final Report to Waushara County and Wisconsin Department of Natural Resources.

UW-Stevens Point Center for Watershed Science and Education, 2013. Waushara County Lake Study - Marl Lake 2010-2012 Mini-Report. Report to Waushara County and Wisconsin Department of Natural Resources. Planning Meeting Presentations


Appendices
Appendix A: Waushara County Lake 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 RC&D  
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 RC&D  
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.

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

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

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

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

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

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

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

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

Fertilizers/Soil Testing
Contact: Ken Williams
Waushara County UW-Extension
209 S St. Marie 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
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

Groundwater Levels/Quantity (Cont’d)
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/

Contact: Eric Olson

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

Land Use Plans and Zoning Ordinances (cont’d)
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

Websites:
- 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

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

Septic Systems/Onsite Waste
Contact: Terri Dopp-Paukstat
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 or Danielle Rupp (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: Aquatic Plant Management Strategies

- What options were discussed and chosen as preferred options? List these first with an intro paragraph.
- What options were discussed and not selected? List these in a separate section with an intro paragraph.

**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.

**LIMITATIONS**
* Removes near-shore wildlife and fish habitat.
* Opens up areas where invasives to become established.
* If aquatic invasive species are not pulled properly, could worsen the problem.

**Hand Pulling Using Suction**

**ADVANTAGES**
* Can be used for thinning plants around docks.
* Can be used in deeper areas (with divers).
* Can target specific plants with proper training.
* Can be effective in controlling small infestations of aquatic invasive species.
* May be useful in helping to remove upper root mass of aquatic invasive species.
LIMITATIONS
* Costs associated with hiring a diver may be comparable to chemical treatment expenses.
* Currently an experimental treatment – not readily available.
* If aquatic invasive species are not pulled properly, could worsen the problem.

**Mechanical Harvesting**

**ADVANTAGES**
* Removes plant material and nutrients.
* Can target specific locations.
* Used to manage larger areas for recreational access or fishery management.

**LIMITATIONS**
* Not used in water depths less than 3 feet.
* Some harm to aquatic organisms.
* Is a temporary control.
* Risk of introduction of new aquatic invasive species (on a hired harvester) or spread of some existing invasive species.
* Hired cost at least $150/hr.

**Water Level Manipulation**

**ADVANTAGES**
* Controls aquatic plants in shallower, near-shore areas.
* Can be low cost.

**LIMITATIONS**
* Requires a controlling structure on the lake.
* May cause undesired stress on ecosystem.
* Cannot be used frequently.

**Milfoil Weevils**

**ADVANTAGES**
* Natural, native maintenance of native and exotic milfoils.
* Prefers the aquatic invasive Eurasian Watermilfoil.
* Some lakes may already have a native populations; need a professional stem count and assessment of shoreland health, structure of fishery, etc.
* Doesn’t harm lake ecosystem.

**LIMITATIONS**
* Require healthy shoreline habitat for overwintering.
* Cannot survive in areas of mechanical harvesting or herbicide application.
* Effectiveness highly variable between lakes (only works well for some lakes).
* Limited access to weevils for purchase in WI.
* Still considered experimental.
Chemical Treatment: Spot

ADVANTAGES
* May be less destructive to lake ecosystem than lake-wide treatment.

LIMITATIONS
* Only considered in lakes with aquatic invasive plants.
* Usually not fully effective in eradicating target species.
* Contaminants may remain in sediment.
* Effects on lake ecosystem not fully understood.
* Does not remove dead vegetation, which depletes oxygen and releases nutrients, adds to build-up of muck.
* Extra nutrients may spur additional aquatic plant and algae growth.

Chemical Treatment: Lake-wide

ADVANTAGES
* May reduce aquatic invasives for a time.
* Treatment not needed as frequently.

LIMITATIONS
* Only considered in lakes with aquatic invasive plants.
* Usually not fully effective in eradicating target species.
* Contaminants may remain in sediment.
* Does not remove dead vegetation, which depletes oxygen and releases nutrients, adds to build-up of muck.
* Extra nutrients may spur additional aquatic plant and algae growth.
* Negatively affects native vegetation.
* Effects on lake ecosystem not fully understood.
* Opens up space once taken up by natives for invasive species to colonize once again.
* ~$4000 per 5 acres.
Appendix C: Shoreland Survey – <Year>

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

The summary of scores for shorelands around Marl Lake are displayed below. The shorelands were color-coded to show their overall health based on natural and physical characteristics. Blue shorelands identify healthy shorelines with sufficient vegetation and few disturbances. Red shorelands indicate locations where changes in management or mitigation may be warranted. Many stretches of Marl Lake’s shorelines are in good to moderately-good shape, but some portions have challenges that should be addressed. Only one segment of Marl Lake shoreland ranked as poor. For a more complete understanding of the ranking, an interactive map showing results of the shoreland surveys can be found on the County’s webpage at http://gis.co.waushara.wi.us/ShorelineViewer/.

Waushara County Shoreline Assessment

Map Date – July, 2011
Aerial Date – April, 2010

Map created by Dave McFarlane
Center for Land Use Education
Appendix D: Lake User Survey Results