

2015

Marl Lake, Waushara County Lake Management Plan



Prepared in 2015 by staff from the Center for Watershed Science and
Education

University of Wisconsin-Stevens Point



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

2015 Marl Lake Management Plan

The Marl Lake Protection and Rehabilitation District adopted the lake management plan on September 18, 2015 after obtaining input from residents and lake users at a series of four public planning sessions held at the Deerfield Town Hall near Hancock, Wisconsin in October, November, December 2014 and January 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 Town of Deerfield on January 10, 2017.
Date

The plan was adopted by Waushara County on January 6, 2016.
Date

The plan was approved by the Wisconsin Department of Natural Resources on April 19, 2016.
Date

Any changes, updates or revisions to this document after the last date on this page do not reflect contributions made or approved by University of Wisconsin-Stevens Point.

A special thanks to all who helped to create the 2015 Marl 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:

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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.

Introduction

Marl Lake is a 28-acre seepage lake 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 has a maximum depth of 34 feet and a residence time of 5 months. Many residents have a long history with this quiet lake. The Marl Lake Protection and Rehabilitation District was formed in 1988, originally to address concerns about animal waste pollution entering the lake from a nearby dairy. Previous plans prepared for Marl Lake include a 1996 aquatic plant management plan, a 2003 comprehensive lake management plan prepared by NES Ecological Services, and a 2013 comprehensive lake management plan prepared by Onterra, LLC. Ongoing concerns inspired community members to come together in partnership with local professionals and experts to develop this lake management plan.

The purpose of this plan is to provide a framework for the protection and improvement of Marl Lake. Implementing the content of this lake management plan (LMP) will enable citizens and other supporters to achieve the vision for Marl 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 Marl 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 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 enjoyable.
- **The Towns of Deerfield and Wautoma:** The Town can consider 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 state funding— if multiple Waushara County lakes have similar goals in their lake management plans, they can join together when seeking grant support to increase competitiveness for statewide resources.

Background

One of the first steps in creating this plan was to gather and compile data about the lake and its ecosystem to understand past and current lake conditions. This was done alongside 32 other lakes as part of the Waushara County Lakes Project. The Waushara County Lakes Project was initiated by citizens in the Waushara County Watershed Lakes Council who encouraged Waushara County to work in partnership with personnel from UW-Stevens Point to assess 33 lakes in the county. This effort received funding from the Wisconsin Department of Natural Resources Lake Protection Grant Program. There was insufficient data available for many of the lakes to evaluate current water quality, aquatic plant communities, invasive species, and shorelands. The data that 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 Wisconsin Department of Natural Resources professionals were also incorporated into the planning process, helping to create 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 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/>. (select "Departments", "Zoning and Land Conservation", "Land Conservation", and "Lake Management

Planning”). Unless otherwise noted, the data used in the development of this plan were detailed in the report *Waushara County Lake Study – Marl Lake 2010-2012*, University of Wisconsin-Stevens Point.

The Planning Process

The planning process included a series of four public planning sessions held between October 2014 and January 2015 at the Deerfield Town Hall. 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).

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, a topic-specific survey related to the subject of each upcoming planning session was 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 could be filled out anonymously online, or 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 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 then recorded by professionals from UW-Stevens Point. Planning session notes and presentations are available on the Waushara County website.

Implementing the content of this lake management plan will enable citizens and other supporters to achieve the vision for Marl Lake now and in the years to come.

Goals, Objectives and Actions

The following goals, objectives and associated actions were derived from the values and concerns of citizens interested in Marl Lake and members of the Marl Lake Management Planning Committee, as well as the known science about Marl 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 Marl Lake Management Plan will ensure 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 and have been grouped as follows:

In-Lake Habitat and a Healthy Lake

Fish Community—fish species, abundance, size, important habitat and other needs

Aquatic Plant Community—habitat, food, health, native species, and invasive species

Critical Habitat—areas of special importance to the wildlife, fish, water quality, and aesthetics of the lake

Landscapes and the Lake

Water Quality and Quantity—water chemistry, clarity, contaminants, lake levels

Shorelands—habitat, erosion, contaminant filtering, water quality, vegetation, access

Watershed Land Use—land use, management practices, conservation programs

People and the Lake

Recreation—access, sharing the lake, informing lake users, rules

Communication and Organization—maintaining connections for partnerships, implementation, community involvement

Updates and Revisions—continuing the process

Governance—protection of the lake, constitution, state, county, local municipalities, Marl Lake Protection and Rehabilitation District

The following goals were identified as 'high priority':

Goal 3. Invasive species will be controlled or eliminated from Marl Lake. (Aquatic Plant)

Objective 3.2. Reduce or eliminate populations of EWM/HWM and CLP in Marl Lake.

Inform property owners about refraining from removing native aquatic vegetation, annually reevaluate the plant community to determine next steps, consider no action, consider herbicides if populations expand beyond what is manageable by hand, work with area lakes to apply for grant to hire divers for hand pulling.

Goal 5. Minimize nutrient and sediment loading to the lake by improving land management practices near the lake. (Water Quality)

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).*

Refrain from the use of fertilizers on shoreland properties, inform others about the impact of nutrients on the lake, encourage restoration of unmowed vegetation on shoreland areas, encourage private well owners to test their water for nitrates, establish monitoring program in accordance with WisCALM guidance, monitor ice-on/ice-off dates.

Goal 6. Understand water fluctuations (natural vs. manmade) in and near Marl Lake. (Water Quantity)

Objective 6.1. Evaluate water quantity related to natural and human induced reductions in and near Marl Lake.

Begin monitoring lake levels in Marl Lake; work with County to install a lake level monitoring well, work with other organizations to reduce groundwater withdrawals, work with and support legislators on groundwater legislation.

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.

Resource	Acronym
Citizen Lake Monitoring Network	CLMN
Clean Boats Clean Waters	CBCW
UWSP Center for Watershed Science and Education	CWSE
Marl Lake Protection & Rehabilitation District	MLPRD
North Central Conservancy Trust	NCCT
USDA Natural Resources Conservation Service	NRCS
Golden Sands Resource Conservation and Development Council, Inc.	RC&D
University of Wisconsin Extension	UWEX
University of Wisconsin-Stevens Point	UWSP
Waushara County Land Conservation Department	WCLCD
Waushara County Parks Department	WCPD
Waushara County Watershed Lakes Council	WCWLC
Wisconsin Environmental Analysis Laboratory	WEAL
Wisconsin Department of Natural Resources	WDNR

Contact information for organizations and individuals who support lake management in Waushara County can be found in Appendix A: 2015 Waushara County Lake Information Directory.

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.

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.

A majority of survey respondents felt the quality of fishing had not changed significantly in their time at the lake and that the greatest threat to the fishery in the future was loss of habitat primarily due to water level decline.

The most recent fish survey was conducted by the WDNR in spring 2006 using electrofishing. Marl Lake is scheduled to be surveyed again in 2015. Results of the 2006 survey indicated that largemouth bass abundance was high at 473/hr > 8", compared to 126/hr in 1998. The size structure was fair (PSD12=53%, RSD14+11%) and overall growth was slightly below average. Bluegill abundance was low at 175/hr > 3" with a fair size structure (PSD6=34%, RSD7+15% compared to PSD6=18%, RSD7=3% in 1998) and slow growth (below statewide average). At the December 17, 2014 planning session, WDNR fisheries biologist David Bartz concluded that fisheries management at Marl Lake should include improvement or restoration of shoreland habitat (2011 shoreland inventory ranked Marl Lake's shorelands as "medium"), installation of large woody debris such as tree drops and fish sticks in the littoral area, and continued monitoring for invasive species. He also mentioned that Marl Lake may be a good candidate for removal of the size limit on largemouth bass to help balance the two species, but would like to see the results of the 2015 fish survey first.



Guiding Vision for the Fish Community

Marl Lake will host a healthy, sustainable fishery.

Goal 1. Support the enhancement of the existing fish community in Marl Lake.

Objective 1.1. Near shore fish habitat in Marl Lake will be improved.

Actions	Lead person/group	Resources	Timeline
Protect existing natural habitat including downed trees and woody features throughout the lake by informing landowners about their importance, depth of woody features placement to ensure boating safety, and by providing educational materials on the Town of Deerfield website and at Town Hall.	MLPRD	UWEX educational materials	Ongoing
Work with WDNR to explore permitting for tree drops and fish sticks.	MLPRD Interested citizens	Fisheries Biologists - WDNR	Ongoing
Explore the installation of woody habitat under and around docks.	MLPRD Interested citizens	Fisheries Biologists - WDNR	Ongoing

Objective 1.2. Protect and nurture a balanced fish population in Marl Lake.

Actions	Lead person/group	Resources	Timeline
Consider pursuing removal of the size limit for largemouth bass depending on results of 2015 fish survey.	MLPRD	Fisheries Biologists - WDNR	2016
Maintain open communication with WDNR regarding regulation non-compliance concerns.	MLPRD	WDNR Warden (see directory of lake contacts in Appendix A)	Ongoing
Inform area lake users of information and updates on any future fishing rule changes via e-mail, website, newsletter, and posting at public landings.	MLPRD		Ongoing

Aquatic Plant Community

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). Two invasive species, Eurasian water-milfoil and curly-leaf pondweed, were also documented.

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

Guiding Vision for Aquatic Plants in Marl Lake

Marl Lake will host a healthy aquatic plant community providing excellent food, habitat, and water quality benefits.

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

Objective 2.1. Minimize disturbance of the native aquatic plant community.

Actions	Lead person/group	Resources	Timeline
Minimize removal and disturbance of native vegetation via educational materials provided in annual mailing, newsletter and discussions at the annual meeting.	MLPRD	UWEX Lakes WCWLC	Ongoing
Conduct any aquatic plant removal by hand.	Property owners		Ongoing

If plants severely impede recreation, consider hand pulling small areas around personal docks.	Individuals	WDNR Aquatic Plant Biologist RC&D	Ongoing
Inform property owners to refrain from using fertilizers on shoreland properties to help prevent the growth of dense plant beds (see Shoreland Section of this plan).	MLPRD		Ongoing

Aquatic Invasive Species (AIS)

Aquatic invasive 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.



Curly-leaf pondweed (CLP) was discovered growing in a few isolated locations in Marl Lake by Onterra, LLC during a July 2010 aquatic plant point-intercept survey. 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. Multiple surveys conducted in May 2011 prior to a planned chemical treatment found no or very limited populations of CLP in the lake. This led to a change in strategy and manual removal using SCUBA was conducted later that year. A few previously undiscovered dense colonies were observed during this effort. A survey in June 2012 revealed that CLP had spread throughout the lake in both large and small colonies. A whole-lake chemical treatment (Endothall) was conducted by

Schmidt’s Aquatic Plant Control on May 8, 2013 to address CLP (and EWM/HWM, discussed below). CLP was not observed during a July 2013 AIS survey by Golden Sands RC&D.

Eurasian watermilfoil (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.



Each lake is different and its response to control of EWM may differ from lake to lake. No single approach will be appropriate for all lakes. Often multiple approaches and adaptive year-to-year changes in approach are most successful. The population of EWM should be evaluated using a 'point-intercept' method (accompanied by more thorough observations) before and after treatments to determine the effectiveness of an approach in a given year. Strategies for the subsequent year should be adjusted accordingly. EWM management involves evolving scientific knowledge; therefore the management strategies for the management of EWM in Marl Lake should be adapted as EWM populations in the lake change and as new information becomes available.

Hybrid watermilfoil (HWM) results from a hybridization of native watermilfoils with Eurasian watermilfoil. HWM tends to be more resilient and less effected by chemical treatment. HWM may be suspect in a lake if 1) the plants appearance is different than 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 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 the native aquatic plant population, and a waste of money.

EWM was first discovered in Marl Lake during the May 2011 pretreatment aquatic plant survey primarily growing in shallow water in the northwestern area of the lake. Laboratory analysis confirmed the presence of the hybrid strain of watermilfoil (HWM). An August 2012 survey indicated the milfoil had spread significantly, occupying large portions of the shoreline on the western and north/north-eastern sides of the lake. A whole-lake chemical treatment (Endothall) was conducted by Schmidt's Aquatic Plant Control on May 8, 2013 to address EWM/HWM (and CLP, discussed above). EWM/HWM was not observed during a July 2013 AIS survey by Golden Sands RC&D.

An Aquatic Plant Management Plan for Marl Lake was developed in addition to this comprehensive lake management plan.

Summary of Aquatic Plant Management Planning Session Discussion – January 12, 2015

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

- **Manual removal.** (Native plants, EWM or CLP) Property owners are permitted to clear an area up to 30' around their dock for boat and swimming access to open water. Additionally, those trained to properly identify and remove EWM and other aquatic invasive species 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.

- **Chemical spot treatment.** (EWM or CLP) Results of recent studies of the effectiveness of chemical spot treatment suggest the 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 in the future. If a hybrid milfoil (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 EWM is found to not be a hybrid, and are typically less than 5 acres, a contact herbicide such as endothall or diquat should be used. Systemic herbicides should not be used. Treatment should occur early in the season, prior to emersion of native plants. To reduce the chance of developing resilient strains of EWM; different treatments should be used each year.
- **Milfoil weevils.** (EWM) This option could be considered in areas of the lake with native or restored shorelines, but these areas are likely limited due to low water levels. Milfoil weevils are commercially available but are expensive so 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.
- **Do nothing.** Doing no active management is an option to see how the EWM may respond. Though EWM is present in the lake and typically behaves very aggressively, there have also been cases in other lakes where the population stabilized and did not present a significant issue to the lakes' users.

Techniques applied within the watershed and on shoreland property can reduce the nutrient loading responsible for aquatic plant growth in the lake. This is discussed further in the Shoreland and Watershed sections.

Guiding Vision for Aquatic Invasive Species

Marl Lake will not be adversely affected by invasive species.

Goal 3. Invasive species will be controlled or eliminated from Marl Lake.

Objective 3.1. Prevent the establishment of new species of AIS.

Actions	Lead person/group	Resources	Timeline
Use signs, newsletters, and other methods to educate lake visitors about invasives and removing aquatic hitchhikers.	Board or Project Committee	RC&D	Annually

Inform property owners of the importance of aquatic vegetation and to refrain from removing native aquatic vegetation to diminish the possibility of AIS colonization.	Individuals	UWEX Lakes (educational materials)	Ongoing
Learn to identify AIS and routinely look for it. If a new species is identified, refer to the Rapid Response Plan.	Board		2015, Ongoing
Work with area lakes to apply jointly for a grant to hire divers to hand pull invasives.	Board	WDNR Aquatic Plant Biologist RC&D	As needed
Consider the possibility of no action if invasives are not causing a nuisance or disrupting the native plant community.	Board	WDNR Aquatic Plant Biologist RC&D	Ongoing
Re-evaluate the aquatic plant community routinely to determine the next steps (or no action) in invasive species management.	Project Committee	WDNR Aquatic Plant Biologist RC&D	2017, Ongoing

Objective 3.2. Reduce or eliminate populations of EWM/HWM and CLP in Marl Lake.

Actions	Lead person/group	Resources	Timeline
Inform property owners about refraining from removing native aquatic vegetation to diminish the possibility of invasive species colonization.	Project Committee	UWEX Lakes (educational materials)	Ongoing
Re-evaluate plant community routinely to determine the next steps (or no action) in EWM/HWM and CLP management.	Project Committee	WDNR Aquatic Plant Biologist RC&D Consultants	Biannually
Consider the possibility of no action if AIS is not causing a nuisance or disrupting the native plant community.	Board	WDNR Aquatic Plant Biologist RC&D	Ongoing
If AIS populations exceed what is manageable by hand pulling, consider using herbicides in areas of denser infestation.	Project Committee/Board	WDNR Aquatic Plant Biologist Consultants	Ongoing
Work with area lakes to apply jointly for a grant to hire divers to hand pull AIS.	Project Committee	WDNR Aquatic Plant Biologist RC&D Consultants	2016

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.

Actions	Lead person/group	Resources	Timeline
Request critical habitat designations from WDNR.	MLPRD	WDNR Lake Specialists	2016
If critical habitat is designated on Marl Lake, communicate to property owners, visitors, and Town Board as to why these areas are important.	MLPRD	WDNR Critical Habitat Report	If applicable.

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.

One pound of phosphorus entering a lake can result in up to 500 pounds of algal growth!
(Vallentyne, 1974)

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*).

Actions	Lead person/group	Resources	Timeline
Refrain from the use of fertilizers on shoreland properties (see Shorelands section). Consider distributing educational materials around the lake.	MLPRD Board	UWEX Lakes (educational materials)	2016, Ongoing
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.	MLPRD Board	UWEX Lakes (educational materials)	2016, Ongoing
Encourage the restoration of unmowed vegetation between in shoreland areas to slow and absorb runoff and pollutants from the road (see Shorelands section).	MLPRD Board	UWEX Lakes (educational materials)	2016, Ongoing
Improve shoreland vegetation to reduce phosphorus and sediment loading to the lake (see Shorelands section).	Property owners		Ongoing
Encourage private well owners around Marl Lake to test their water for nitrates.	MLPRD		Ongoing
Establish a water monitoring program in accordance with WisCALM guidance for water clarity and nutrients.	MLPRD Interested citizen	CLMN	2016
Monitor dates of ice on/ice off and submit the information to the state database.	Interested citizen		Annually

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

Actions	Lead person/group	Resources	Timeline
See Shorelands section.			

Water Quantity

The Marl Lake Community has experienced a decline in water levels over the past few years, which is an item of concern for many Marl Lake residents and visitors. Fluctuating water levels in lakes are natural responses to changes in climate and weather patterns. In Waushara County some of the lakes have historically experienced fluctuations in water levels and the plant and animal life in these lakes have adapted to and sometimes depend on these fluctuations for survival. The area surrounding Marl Lake began experiencing drought like conditions in in the late 1990s that contributed to low lake levels. However, excess withdrawal of groundwater can add to these natural fluctuations, effecting the extent and duration of low water levels. Survey respondents identified low water levels as a primary concern for Marl Lake. The planning committee for Marl Lake envisions water level goals that contribute to improved water levels in Marl Lake through the maintenance of groundwater levels and limitations on groundwater withdrawals in the surrounding areas.

Guiding Vision for Water Quantity

Marl Lake will maintain historic water levels near the ordinary high water mark.

Goal 6. Understand water fluctuations (natural vs. manmade) in and near Marl Lake.

Objective 6.1. Evaluate water quantity related to natural and human induced reductions in and near Marl Lake.

Actions	Lead person/group	Resources	Timeline
Provide information on what is currently happening with water withdrawals and impacts on lake levels.	MLPRD		Ongoing
Begin monitoring lake levels in Marl Lake, share information with riparian landowners.	MLPRD		2016
Work with other lake organizations /lake residents/agriculture on groundwater legislation and to reduce groundwater withdrawals (Wisconsin Association of Lakes and group of interested citizens from Portage and Waushara Counties).	MLPRD		Ongoing

Work with local legislators on groundwater legislation, give legislators more support and representation at discussions on groundwater issues.	MLPRD Interested citizens		Ongoing
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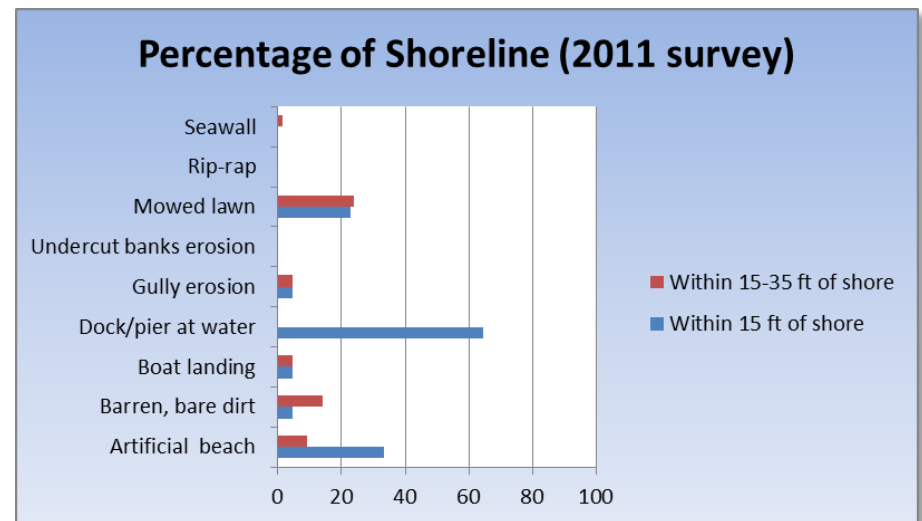
Shorelands

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 extends 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. With a total of 18 lakefront lots, 540 feet (11%) of disturbed shoreland is permitted. Based on the 2011 shoreland inventory, 24% (1,217 feet) of Marl Lake’s shoreland was mowed lawn. 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

Marl Lake will have shorelands that provide privacy, aesthetics, quality habitat and water quality benefits.

Goal 6. Protect and restore healthy, stable shoreland habitats in and around Marl Lake. Approximately 30% (203 feet) of currently mowed shoreland will be restored over the next 5 years.

Objective 6.1. Protect healthy shorelands around Marl Lake and encourage restoration in areas in need.

Actions	Lead person/group	Resources	Timeline
Provide information to property owners about the importance of maintaining vegetation/trees on the shoreline. Include technical and financial sources.	MLPRD	UWEX Lakes WCLCD WCWLC	2017, Ongoing
Provide information to property owners about proper erosion control methods on steep shorelines during new construction or lake access design.	MLPRD	WCLCD	Ongoing
Explore strengthening buffer language in zoning regulations around Marl Lake.	MLPRD	WCLCD WCWLC Wisconsin Lakes	2017

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.

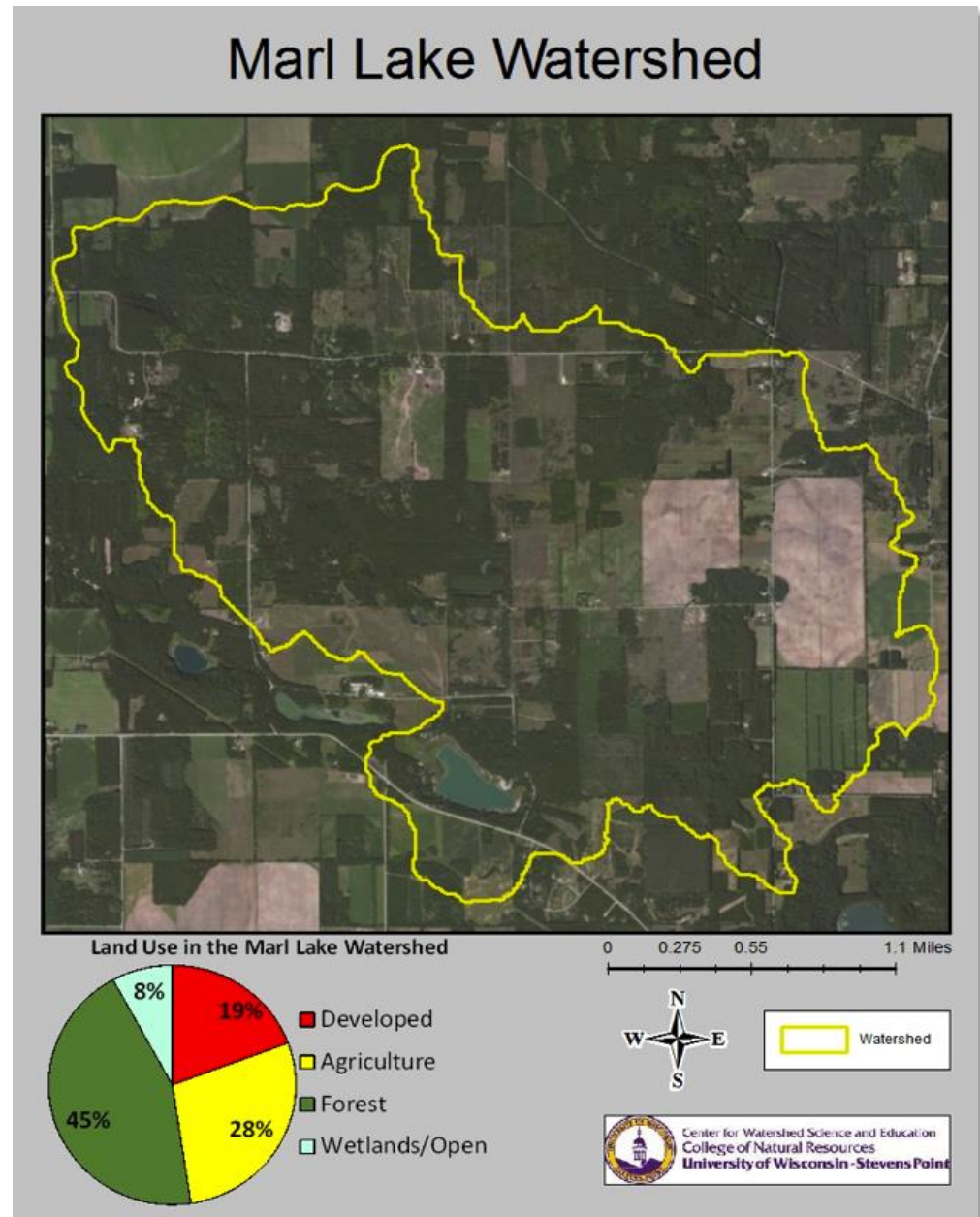
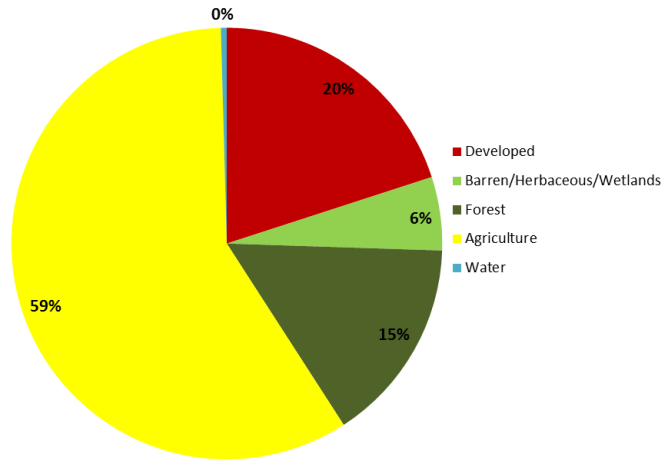


Figure 1. Surface watershed of Marl Lake.

Phosphorus Loading (%) in the Marl Lake Surface Watershed



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 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 Marl 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: Phosphorus Loading. The phosphorus export coefficients have been obtained from studies throughout Wisconsin (Panuska and Lillie, 1995).

Modifications to the outflow of Ueck Lake (upgradient and northwest of Marl Lake) by a private landowner have reduced/eliminated drainage to Marl Lake. The WDNR is aware of this issue, but no one from Marl Lake knows where this stands or if a correction will be required.

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.

Actions	Lead person/group	Resources	Timeline
Encourage the County to support and follow-up with water quality based Best Management Practices (BMPs) within the watershed.	MLPRD	WCLCD NRCS	Ongoing
Continue to use WCLCD as a resource for land management activities.	MLPRD	WCLCD	Ongoing

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 WCLCD.	MLPRD	NCCT NRCS WDNR Lake Protection Grants	Ongoing
Explore funding options for land purchase within the watershed for conservation, preservation, or restoration purposes.	MLPRD	Wisconsin Stewardship Fund, Knowles-Nelson Stewardship Fund, WDNR Lake Protection Grant Program, Waushara County	Ongoing
Pursue resolution of modified outflow from Ueeck Lake that reduces drainage to Marl Lake.	MLPRD	WDNR	2016

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

Marl Lake is a 28-acre No-Wake lake with public access from a boat landing on the east end. The lake is enjoyed by people who swim, boat, fish, and appreciate its beauty. At least ¼ of the lake frontage, including the public dock on the west side, is owned by the Waushara County Parks Department.

Guiding Vision for Recreation

Marl Lake will remain a place of solitude and quiet recreation.

Goal 8. Users of Marl Lake will appreciate and respect the lake and recreate responsibly.

Objective 8.1. Provide lake users with information and rules necessary to make responsible decisions.

Actions	Lead person/group	Resources	Timeline
Maintain signage at boat landings and around the lake with important lake, recreation, and habitat information.	MLPRD Town of Deerfield	WDNR, Town of Deerfield, volunteer property owners	Ongoing
Support enforcement of current fishing regulations (i.e. valid fishing license, bag limits, ice fishing regulations re: fish shanties, bag limit, tip-ups, etc.).	MLPRD	WDNR, Town of Deerfield	Ongoing
Work with WCPD to play a larger role in lake stewardship including assisting with CBCW inspection and monitoring park usage.	MLPRD	WCPD	As appropriate.

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

The Marl Lake Protection and Rehabilitation District and its members will maintain and build communications internally and within the community.

Goal 9. Maintain open communications with lake users to keep visitors and residents informed about responsible lake stewardship and encourage involvement.

Objective 9.1. Distribute important lake information to residents and lake visitors.

Actions	Lead person/group	Resources	Timeline
Continue distribution of a welcome packet to all new shoreland owners via WC or WCWLC.	MLPRD	WCWLC WCLCD	As needed.
Establish or continue an annual District newsletter to announce lake happenings and management activities.	MLPRD	UWEX Lakes	Ongoing

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

The lake management plan for Marl Lake will be reviewed annually and updated as needed.

Goal 10. Marl Lake will have an up-to-date, accurate and comprehensive lake management plan that is reviewed annually and documents all management activities and effects.

Objective 10.1. Communicate updates to District and community members.

Actions	Lead person/group	Resources	Timeline
The plan will be reviewed by the District board incorporating updates from the membership.	MLPRD	Membership	Annually
Continue to send regular updates to District membership via email and posting on website.	MLPRD		As needed.

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 (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 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.

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Appendices

Appendix A: 2015 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/>

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

Aquatic Invasive Species/Clean Boats Clean Water

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

Aquatic Plant Management (Native and Invasive)

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

Aquatic Plant Identification

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

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

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

Aquatic Plant Surveys/Management

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

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

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

Boat Landings, Signage, Permissions (County)

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

Boat Landings (State)

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

Boat Landings (Town)

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

Citizen Lake Monitoring Network

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

Conservation Easements

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

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

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

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

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

Critical Habitat and Sensitive Areas

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

Dams

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

Fertilizers/Soil Testing

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

Groundwater Levels/Quantity (cont'd)

Contact: Scott Provost
Wisconsin Department of Natural Resources
473 Griffith Ave., Wisconsin Rapids, WI 54494
Phone: 715-421-7881
E-mail: scott.provost@wisconsin.gov
Website:
[http://prodoasext.dnr.wi.gov/inter1/hicap\\$.st
artup](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/o
rgnizations/](http://www.uwsp.edu/cnr/uwexlakes/orgnizations/)

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/uwexlake
s/organizations/](http://www.uwsp.edu/cnr/uwexlake/s/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>

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: lcdzoning.courthouse@co.waushara.wi.us
Website: <http://www.co.waushara.wi.us/zoning.htm>

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

Parks (County)

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

Purchase of Development Rights

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

Purchase of Land

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

Rain Barrels – Order

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

Rain Gardens and Stormwater Runoff

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

Septic Systems/Onsite Waste

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

Shoreland Management

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

Shoreland Vegetation

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

Shoreland Zoning Ordinances

See: Land Use Plans and Zoning Ordinances

Soil Fertility Testing

Contact: Ken Williams
Waushara County UW- Extension
209 S St. Marie St, 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

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: Scott Koehnke
Wisconsin Department of Natural Resources 647
Lakeland Road, Shawano, WI 54166 Phone: 715-526-4232
E-mail: scott.koehnke@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: 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.

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

Mechanical Harvesting

ADVANTAGES

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

Water Level Manipulation

ADVANTAGES

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

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.

Chemical Treatment: Spot

ADVANTAGES

- * 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.

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.

LIMITATIONS

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

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.

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

- * 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.

LIMITATIONS

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 – 2011

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

The 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. 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 at <http://gis.co.waushara.wi.us/ShorelineViewer/>.

Waushara County Shoreline Assessment *MARL LAKE*

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



Summary
Shorelines are color-coded to show their overall health based on natural and physical characteristics. For example, shorelines shown in red indicate locations where management or mitigation may be warranted. Blue shorelines mark healthy riparian areas with natural vegetation and few human influences.

Calculating Shoreline Scores
Scores are based on the presence/absence of:
+ Natural vegetation
+ Human influences (docks, boathouses, etc)
+ Erosion
+ Structures

Center for Land Use Education
Map created by Dan McFarlane
Center for Land Use Education

Marl Lake Shoreland Vegetation

Waushara Co. Wisconsin



Unmowed Vegetation < 3 Ft Tall		Trees and Shrubs			Center for Watershed Science and Education College of Natural Resources University of Wisconsin - Stevens Point
Distance Inland from Waters Edge (Ft)					
Poor	0	1-15	16-35	Good	

Appendix D: Rapid Response Plan

SURVEY/MONITOR

1. Learn how to survey/monitor the lake.	Contacts: Water Resource Management Specialist Wisconsin Department of Natural Resources Phone: 920-424-2104 E-Mail: TedM.Johnson@wisconsin.gov Regional Aquatic Invasive Species (AIS) Coordinator Golden Sands RC&D 1100 Main St., Suite #150 Stevens Point, WI 54481 Phone: 715-343-6278 E-Mail: info@goldensandsrccd.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: <ul style="list-style-type: none">• Latitude & Longitude• UTM (Universal Transverse Mercator) coordinates• County, Township, Range, Section, Part-section• Precise written site description, noting nearest city & road names, landmarks, local topography

3. Gather information to aid in positive species identification.

- Collection date and county
- Your name, address, phone, email
- Exact location (Latitude/Longitude or UTM preferred, or Township/Range/Section)
- Plant name (common or scientific)
- Land ownership (if known)
- Population description (estimated number of plants and area covered)
- Habitat type(s) where found (forest, field, prairie, wetland, open water)

4. Mail or bring specimens and information to any of the following locations:

Digital photos may be emailed.

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

Regional AIS Coordinator
Golden Sands RC&D
1100 Main St., Suite #150
Stevens Point, WI 54481
Phone: 715-343-6214
E-Mail : info@goldensandsrccd.org

UW-Stevens Point Herbarium
301 Trainer Natural Resources Building
800 Reserve Street
Stevens Point, WI 54481
Phone: 715-346-4248
E-Mail: ejudziejew@uwsp.edu

Wisconsin Invasive Plants Reporting & Prevention Project
Herbarium-UW-Madison
430 Lincoln Drive
Madison, WI 53706
Phone: (608) 267-7612
E-Mail: invasiveplants@mailplus.wisc.edu

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

Regional AIS Coordinator
Golden Sands RC&D
1100 Main St., Suite #150
Stevens Point, WI 54481
Phone: 715-343-6214
E-Mail : info@goldensandsrccd.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: Deerfield
Town of: Wautoma

- **The Lake District/Association** in which the waterbody is located.
Contact: Jerry Rothermel
Phone: 239-254-7827

- **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**

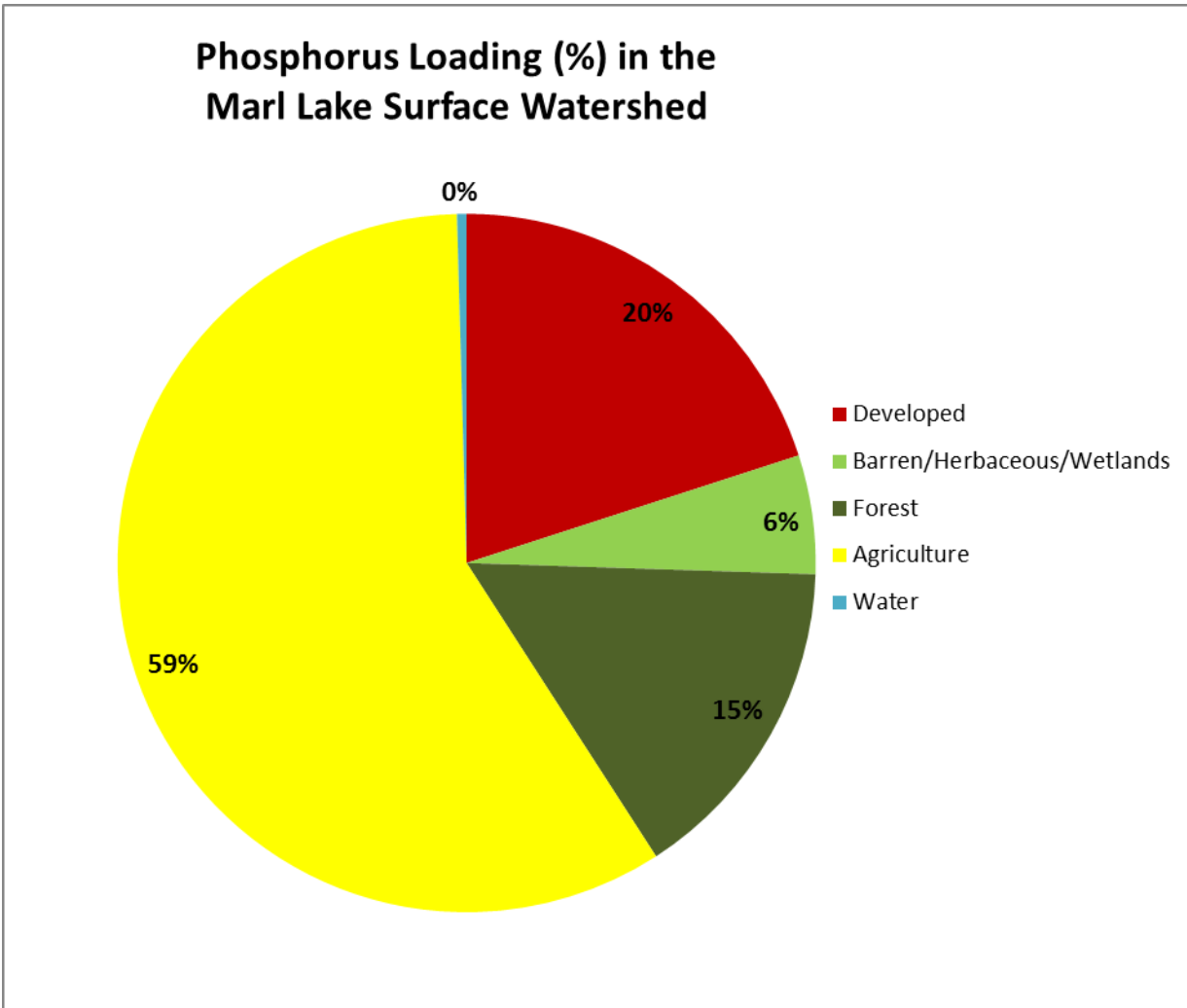
If an invasive species is confirmed, the president of the Marl Lake Protection & Rehabilitation District will make the following public information contacts:

- **Newspapers:** Argus, Resorter

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

Appendix E: Phosphorus Loading

Marl Lake	Phosphorus Export Coefficient (lbs/acre-yr)	Land Use Area Within the Watershed		Estimated Phosphorus Load	
Land Use		Acres	Percent	Pounds	Percent
Water	0.1	30	1	2-7	0
Developed	0.13	839	19	112-375	20
Barren/Herbaceous/Wetland	0.09	346	8	31-93	6
Forest	0.04	1932	44	86-154	15
Cultivated Agriculture	0.45	1231	28	329-877	59
*Values are not exact due to rounding and conversion					



Appendix F: Lake User Survey Results