2015

Pleasant Lake, Waushara County, Wisconsin
Lake Management Plan

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

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

Lake Management Plan for Pleasant Lake, Waushara County, Wisconsin

The Pleasant Lake Management Plan was developed with input from residents and lake users at a series of five public planning sessions held at the Waushara County Courthouse in Wautoma, Wisconsin and the Coloma Community Center in November and December 2013, and in January, February and May 2014. The inclusive community sessions were designed to identify key community concerns, assets, opportunities, 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 Pleasant Lake Management District on: September 5, 2015.

The plan was adopted by the Town of Coloma on: September 1, 2015.

The plan was adopted by the Town of Springfield on: June 8, 2016.

The plan was adopted by Waushara County on: June 1, 2016.

The plan was approved by the Wisconsin Department of Natural Resources on: February 1, 2016.

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

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Wisconsin Department of Natural Resources Lake Protection Grant Program
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Overarching Vision for Pleasant Lake

Pleasant Lake and Turtle Bay wetland will have abundant clean and clear water. The lake will be home to healthy plants, fish, invertebrates and wildlife. On- and off-water recreational experiences will provide enjoyment to individuals, families and future generations. People will work together to protect the natural beauty, water quality and quantity, fish and wildlife, and recreational opportunities in Pleasant Lake and Turtle Bay by promoting actions that will benefit lake health for generations to come.

Pleasant Lake Management Mission

To protect and improve the water quantity, water quality and biota of Pleasant Lake through programs promoting safety, cleanliness and environmental health.

Introduction

Pleasant Lake is located in Waushara and Marquette counties, Wisconsin. Situated near the sub-continental divide that separates the Lake Michigan and Mississippi basins, Pleasant Lake sits in the Lake Michigan basin approximately 985 feet above sea level (according to the USGS topographic quadrangle). Seepage lakes located near a major divide typically experience fluctuations in water levels. Pleasant Lake is a 131-acre mesotrophic seepage lake with an average depth of 15 feet and a maximum depth of 30 feet when the water elevation is at the ordinary high water mark (Butterfield, 2014). Pleasant Lake is fed by groundwater and surface water runoff, and contains approximately 170 million gallons of water. Land in the towns of Coloma and Springfield lie in the Pleasant Lake watershed, which is part of the larger Upper Fox River watershed.

Public access points include a swimming beach, two boat launches, and three walk-in sites. The swimming beach is a Coloma town park; Waushara and Springfield counties each maintain a boat launch on the lake; and the walk-in access points are maintained by the town of Coloma.

Pleasant Lake includes several areas of special concern highly valued by its residents and visitors. The southwestern corner of Pleasant Lake, locally known as Turtle Bay, includes a wetland complex comprised of a spring pond that feeds the lake and surrounded by a sedge meadow. Turtle Bay springs provide groundwater to the lake and is home to many birds, amphibians, reptiles, and young-of-the-year fish populations (Linton, 2012). The north

shore sand point is a unique lake feature that offers habitat for amphibians, bird, and fish spawning. The southeastern corner of the lake provides shallow areas for pan fish spawning, young-of-the-year fish, and wildlife.

Of special concern to the Pleasant Lake community is the increase in high capacity groundwater pumping within the watershed and its effects on lake levels. Pleasant Lake residents have observed steadily declining water levels in Pleasant Lake during the last 20 years. In order to better understand this phenomenon, the Pleasant Lake Management District requested assistance from staff with UW-Extension, Montgomery Associates Resources Solutions, Onterra, LLC, and others.

Hydrological studies of the area that include Pleasant Lake and other Central Sands lakes concluded that pumping from high capacity wells in the area is having an impact on Pleasant Lake, and on other Waushara County and Central Sands lakes (Kraft and Mechenich, 2010; Kraft et al., 2012). The Pleasant Lake Management District (PLMD) continues to be very active in this issue, as well as in other lake stewardship activities.

Visitors and residents alike value Pleasant Lake's tranquility and peacefulness, beauty, clear water, and recreational activities. In 2013, the PLMD and other community members were inspired to come together in partnership with local professionals, experts and county staff to develop this lake management plan (LMP).

The purpose of this plan is to provide a framework for the protection and improvement of Pleasant Lake. Implementing the content of this LMP will enable citizens and other supporters to achieve the vision for Pleasant 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 Pleasant 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 Pleasant 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 Pleasant Lake can have the greatest influence on the lake by understanding and choosing lake-friendly options to manage their land and the lake.
- **Pleasant Lake Management District:** Completion of this lake management plan opens opportunities for resources and funding opportunities for District management activities. The identification of specific goals within the lake management plan, and identification of partners will help the District achieve their goals for Pleasant Lake. Annual review of the plan will help the District to identify its accomplishments and focus future activities and funding needs.

- **Neighboring lake groups, conservation clubs, and sporting clubs**: Neighboring groups with similar lake stewardship goals can combine their efforts and provide each other with support and improve funding opportunities.
- **The Town of Coloma and Springfield**: The Towns can utilize the visions, wishes, and goals documented in this lake management plan when considering town-level management planning or decisions within the watershed that may affect the lake. The Towns can work with requests by individuals or developers to best represent the documented wishes of the lake community.
- **Waushara County:** This plan can inform County Board Supervisors in decision making related to Waushara County lakes, streams, wetlands, and groundwater. County professionals will better know how to identify needs, provide support, base decisions, advocate for, and allocate resources to assist in lake-related efforts documented in this plan.
- **Wisconsin Department of Natural Resources**: Professionals working with Waushara County lakes can use this plan as a guide for management activities and decisions. The Wisconsin Department of Natural Resources requires a lake management plan be in place to provide funding for certain lake stewardship activities. A lake plan generally increases an application's competitiveness for various state-level funding.

Background

One of the first steps in creating this plan was to gather and compile data about the lake, its watershed, and its ecosystem. 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 professionals at the Wisconsin Department of Natural Resources were also incorporated into the planning process to provide a robust set of information from which informed decisions could be made. Sources of information used in the planning process are listed at the end of this document.

Water quantity is an ongoing concern for Pleasant Lake. Declining lake levels have presented the Pleasant Lake Management District with significant challenges as they address important aspects of the lake's management, including water quality, water chemistry, shoreline habitat, aquatic invasive species control, Turtle Bay wetland issues, lake navigation, and the loss of water itself. Addressing these challenges led the District to consult multiple experts in diverse areas to provide input and background to inform this plan. Onterra, LLC collected and analyzed data on the impact of falling water levels on the lake's littoral zone and developed strategies for non-native plant species management. Onterra also conducted a mollusk inventory and an aquatic plant inventory. Tim Ehlinger, UW-Milwaukee, David Marshall, and the Wisconsin Department of Natural Resources contributed to the assessment and review of the lake's fishery. Mary Linton conducted frog, turtle and wetland surveys (Butterfield et al., 2014).

Several reports from the Pleasant 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 2014 report *Waushara County Lakes Study - Pleasant Lake*, University of Wisconsin-Stevens Point.

The Planning Process

The planning process included a series of five public planning sessions held between November 2013 and May 2014 at the Waushara County Courthouse in Wautoma, Wisconsin and the Coloma Community Center. The Pleasant Lake Management Planning Committee consisted of property owners, recreational users, and members of the Pleasant Lake Management District. 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), Onterra LLC, Golden Sands Resource Conservation & Development Council, Inc. (RC&D), University of Wisconsin-Extension (UWEX), and the University of Wisconsin-Stevens Point Center for Watershed Science and Education (CWSE).

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

Participation in the planning process was open to everyone and was encouraged by letters mailed to Pleasant Lake waterfront property owners and by press releases in local newspapers. In addition, participants were sent emails about upcoming meetings which could be forwarded to others. In order to involve and collect input from as many people as possible, a survey was conducted prior to each planning session which sought feedback on the upcoming planning session's topic(s). The public was informed about the surveys via postcards (waterfront property owners) and press releases in local newspapers. The surveys could be completed anonymously online or on paper upon request. Survey questions and responses were shared at the planning sessions and can be found in Appendix F.

Guest experts and professionals attended the planning sessions. They presented information and participated in discussions 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.

Onterra, LLC (contracted by PLMD) supplemented the planning effort by examining several aspects of Pleasant Lake management that were incorporated into this plan. Their contributions included an investigation into the impact of falling water levels on the lake's littoral (near-shore) area, and the development of management strategies for hybrid water milfoil (HWM), curly-leaf pondweed (CLP), and other non-native species in and around Pleasant Lake. The Onterra studies included an acoustic survey of the lake, population assessments of EWM/HWM and CLP, and a freshwater mussel survey. The full report from these studies, as well as the supplemental management plan, is titled *Pleasant Lake Supplemental Lake Management Planning Project*, and can be found in Appendix E.

Goals, Objectives and Actions

The following goals, objectives, and associated actions were derived from the values and concerns of citizens interested in Pleasant Lake and members of the Pleasant Lake Management District Planning Committee, and the known science about Pleasant Lake, its ecosystem and the landscape within its watershed. 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. Implementing and regularly updating the goals and actions in the Pleasant Lake Management Plan will ensure that the vision is supported and that changes or new challenges are incorporated into the plan. **The goals, objectives and actions listed in this plan should be reviewed and updated as changing conditions warrant.**

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

Landscapes and the Lake

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

In-Lake Habitat and a Healthy Lake

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

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, Lake District

The following goals have been identified as 'high priority':

Pleasant Lake will have sufficient water quantity to maintain the lake's health, support it biota, enable recreational enjoyment and maintain economic value of properties as well as economic contributions to local and state economies.

Goal 2. Minimize detrimental impacts to Pleasant Lake ant its habitats, biota, water quality, Floristic Quality Index, and property values by maintaining lake surface water elevations of 983-984 feet above sea level. (OHWM 985.4 feet above sea level).

Objective 2.1 Monitor and report groundwater and lake surface elevations to inform management decisions.
Objective 2.2. Maintain groundwater recharge to the lake of 7,032 million gallons annually (Papadopulos & Associates, Inc. 2012).
Objective 2.3. Inform those within and outside the Pleasant Lake watershed about groundwater-related information and issues.
Objective 2.4. Enhance groundwater infiltration by utilizing best practices for conservation of surface water runoff.
Objective 2.5. Limit surface water withdrawal from Pleasant Lake to maintain surface water elevation as noted in Goal 2.

Pleasant Lake's water quality will remain exceptional for the enjoyment of all.

Goal 3. Improve water quality in Pleasant Lake and the Turtle Bay Wetland.

Objective 3.1. Reduce current median total phosphorus concentrations (14 ug/L) over the next 10 years.
Objective 3.2 Improve water clarity as measured by Secchi disk to at least 20 feet in early spring and at least 10 feet in late summer.
Objective 3.3. Develop and maintain citizen water quality monitoring programs.
Objective 3.4. Work with the Town of Coloma, the Town of Springfield, Waushara County and Marquette County on nutrient management within the watershed.

Pleasant Lake hybrid and Eurasian water milfoil will be managed to limit or eliminate existing populations. Invasion of new aquatic invasive species will be prevented in Pleasant Lake.

Goal 8. Manage existing and prevent further introductions of aquatic invasive species (AIS) to Pleasant Lake.

Objective 8.1. Enact hybrid water milfoil (HWM) monitoring and control strategy to preserve and protect native plant community (detailed in the Supplemental Plan produced by Onterra LLC, found in Appendix E).
Objective 8.2. Manage invasive giant reed and canary grass in Turtle Bay wetland and south east shoreline.
Objective 8.3. Monitor annually for known and new invasive species infestations in and around Pleasant Lake (detailed in the Supplemental Plan produced by Onterra, LLC found in Appendix E).
Objective 8.4. Prevent new aquatic invasive species from entering Pleasant Lake.

Lead organizations and individuals are identified as resources for the actions in this plan. These resources can provide information, suggestions or services to help accomplish objectives and achieve goals. The following table lists acronyms used in this plan. This list should not be considered all-inclusive – assistance may also be provided by other entities, consultants and organizations.

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

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

Landscapes and the Lake

Land use and land management practices within a lake's watershed can affect both the lake's water quantity and quality. In general, the land nearest the lake has the greatest impact on the lake's water and habitats. Development and agricultural activities in the watershed may result in changes to natural drainage patterns, alterations of vegetation on the landscape, and may be a source of pollutants. Forests, grasslands and wetlands allow precipitation to soak into the ground, resulting in more groundwater and good water quality. The addition of impervious surfaces (roads/driveways, rooftops, and compacted soil) result in increased runoff and reduced groundwater recharge. Areas of land with exposed soil can lead to soil erosion. Soil entering the lake can make the water cloudy, cover fish spawning beds, and contain nutrients that increase the growth of algae and aquatic plants. The increased runoff from impervious (hard) surfaces can carry pollutants to the lake. Wastewater from septic systems, animal waste and fertilizers used on lawns, gardens and crops also contribute nutrients that enhance the growth of algae and aquatic plants in our lakes. Management practices that mimic natural processes can be put into place to preserve water quantity and quality. The reduction or elimination of added nutrients to the landscape will help prevent nutrients from reaching the water. Other activities beyond Pleasant Lake's watershed may also impact its water quantity and quality. Commercial fertilizer and herbicides placed on farm fields, groundwater extraction for irrigation, and the spreading of manure in and nearby can potentially impact Pleasant Lake.

Shorelands adjacent to the lake extend well inland of the location where land meets the water. On Pleasant Lake, they include shorelines, adjacent wetlands, woodlands, and developed lands. Shoreland vegetation is critical to a healthy lake's ecosystem. It helps to improve water quality by filtering the runoff that is flowing across the landscape to the lake, and 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 landward from the water's edge. Wetlands serve the lake by reducing contaminants, providing shelter for fish and wildlife, and decreasing shoreline erosion by providing a favorable habitat for deep rooted plants that hold soil in place and provide a shoreline barrier from the actions of waves and wind.

The water quality in Pleasant Lake is the result of many factors, including the underlying geology, the quality of groundwater seeping into the lake basin, the climate, and local land management practices. Land management practices are the primary actions that can impact the lake's water quantity and quality. Water quantity in Pleasant Lake is dependent upon the groundwater in the underling aquifer (66.3%), direct precipitation (22.8%), and surface runoff (10.9%) (Papadopulos, 2012). Water quality in Pleasant Lake is primarily the result of non-point source pollution, and residential and agricultural activities occurring above the aquifer. The Pleasant Lake water quality data reported here assessed five different characteristics: temperature, dissolved oxygen, water clarity, water chemistry, and chlorophyll. All of these were taken into consideration when management planning decisions were made.

Watershed Land Use

It is important to understand where Pleasant Lake's water originates in order to understand the lake's health. During snowmelt or rainstorms, water moves across the surface of the watershed (runoff) towards lower elevations such as lakes, streams, and wetlands. The Pleasant Lake surface watershed encompasses 1,443 acres (Papadopulos, 2012) and lies mostly to the west of the lake (Figure 1). Pleasant Lake is fed primarily by groundwater; the groundwater recharge area does not include the same land area as 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.

Of Pleasant Lake users responding to the planning process survey, 54 of 58 respondents agreed the way they manage their land affects other users. In addition, 15 of 15 respondents indicated they believed Pleasant Lake's water quality had a major impact on their personal enjoyment value, and 14 of 15 respondents claimed water quality greatly impacted the economic value of the lake. Finally, 13 of 15 respondents believed the water quality had declined since their first time on the lake. Perceived causes for the water quality decline were water level change, heavy recreation, and loss of aquatic plants.

A variety of land management practices can be put in place to help reduce impacts to our lakes. Some practices are designed to reduce

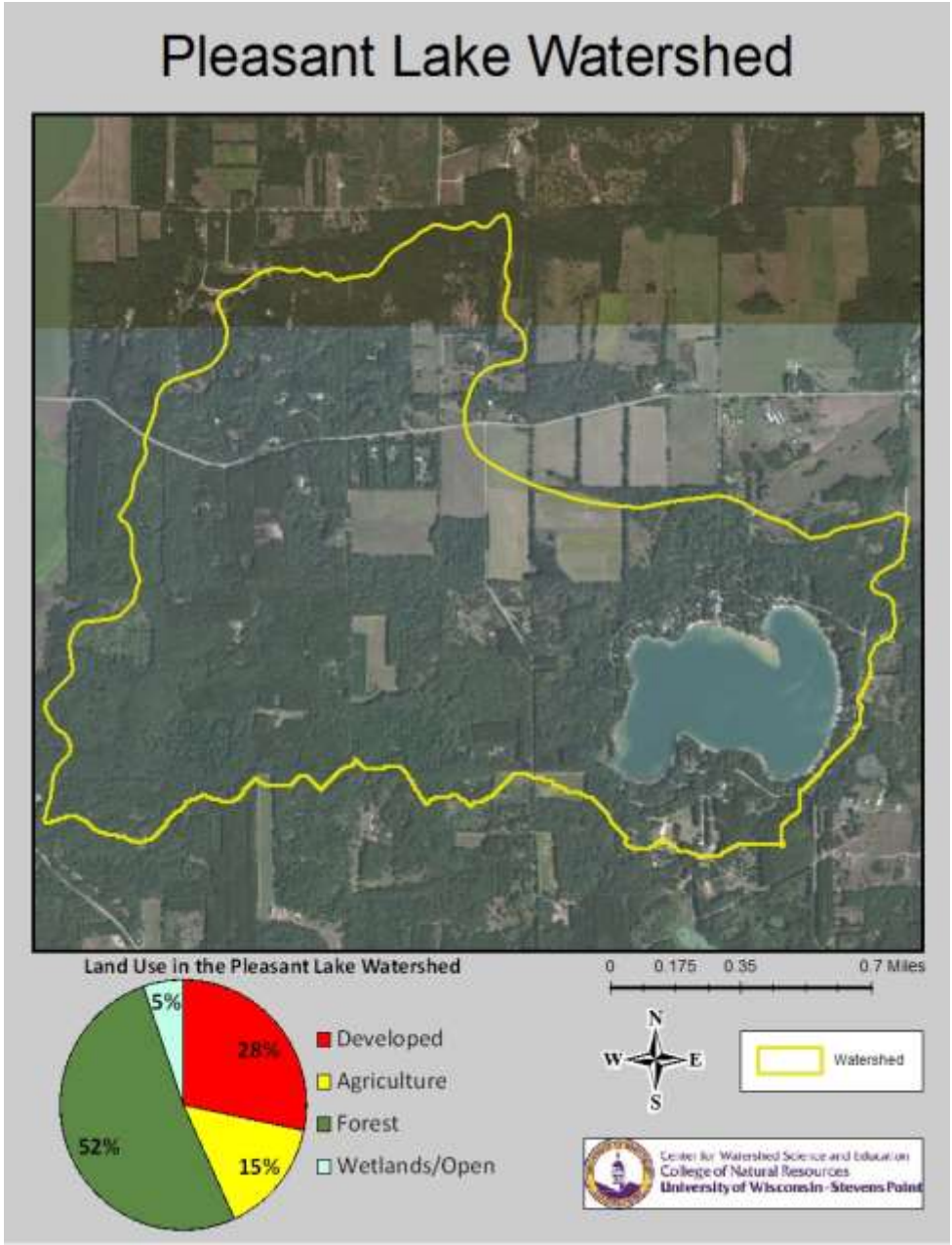


Figure 1 . Surface watershed of Pleasant Lake.

runoff. These include protecting/restoring wetlands; installing rain gardens, swales and/or rain barrels; and, and routing drainage from pavement and roofs away from the lake. Other practices help reduce nutrients 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 native vegetation in the shoreland, and using erosion control practices.

The primary land uses within the Pleasant Lake watershed is forest, followed by residential development. Agricultural lands comprise approximately 15% of the watershed, with a large tract (over 200 acres) north of the lake. A contiguous wetland and sedge meadow complex is found in the southwestern corner of the lake, and developed land encompasses much of the lake. In general, the land closest to the lake has the greatest immediate impact on water quality.

Guiding Vision for Pleasant Lake's Watershed

Land around Pleasant Lake will be managed in a way that supports a healthy lake.

Goal 1. Improve water quantity and quality by protecting Pleasant Lake watershed undeveloped land from development.

Objective 1.1. Maintain or increase percent of natural forests, wetlands, non-irrigated agriculture, and undeveloped areas within the watershed.

Actions	Lead person/group	Resources	Timeline
Explore and pursue options to work with property owners to place lands around the lake into conservancy land trusts, deed restrictions, and property purchase options for the purpose of protection and preservation of Pleasant Lake water quantity.	PLMD Board	WDNR Lake Protection Grants Knowles Nelson Stewardship Funds NCCT Other private funding sources Property owners	December 2015
Support the placement of land around the lake and within the watershed into conservation easements and North Central Conservancy Trust	PLMD Board	NCCT MFL and other programs County Forester, WDNR Foresters	On-going
Encourage the preservation of watershed woodlands by property owners.	PLMD	MFL and other programs County Forester WDNR Forester	On going

Monitor and control invasive species (gypsy moth, emerald ash borer) that threaten watershed woodlands.	PLMD	County Forester WDNR Foresters Seek available grant opportunities to support invasive species control	On-going

Objective 1.2. PLMD will take an active role in protecting water quality and quantity in the Pleasant Lake watershed.

Actions	Lead person/group	Resources	Timeline
Monitor and contest new high capacity well applications within five miles of Pleasant Lake.	PLMD Board		On-going
Seek groundwater sensitive area designation for the Pleasant Lake watershed.	PLMD Board	WDNR staff	December 2016
Decrease non-point source pollution by opposing the spreading of manure within the watershed. Pursue options to limit land application of manure.	PLMD		On-going
Encourage and support Waushara and Marquette Counties to pass ordinances banning manure spreading via irrigation system spraying. (Include local government where allowed by law.)	PLMD Board, property owners, and community partners.		
Support the formation of a groundwater management district for the Central Sands region of the state.	PLMD		
Influence the Wisconsin legislature and the governor to support and protect Wisconsin's lakes.	PLMD		

Water Quantity

Fluctuating water levels in seepage lakes located near divides are natural responses to changes in climate and weather patterns. Many Waushara County lakes have historically experienced these water level fluctuations, but not the declines observed recently in many of the county's lakes. Some plant and animal life in these lakes may benefit from water fluctuations, but excessive water loss may change the composition of the aquatic plant community and lead to a population explosion of invasive species already present in a lake. "Excessive" withdrawal of groundwater can intensify natural fluctuations, affecting both the extent and duration of low water levels. Increased groundwater pumping has affected Pleasant Lake's water budget, resulting in decreased water volume over the past twenty years (Kraft et al., 2012). Lake management planning participants and survey respondents identified low water levels as a primary concern for Pleasant Lake. The Pleasant Lake planning committee identified goals and implementation steps intended to improve water levels in Pleasant Lake. The focus is to maintain or improve aquifer volumes by increasing recharge to the extent that groundwater levels would rebound to "normal" levels.

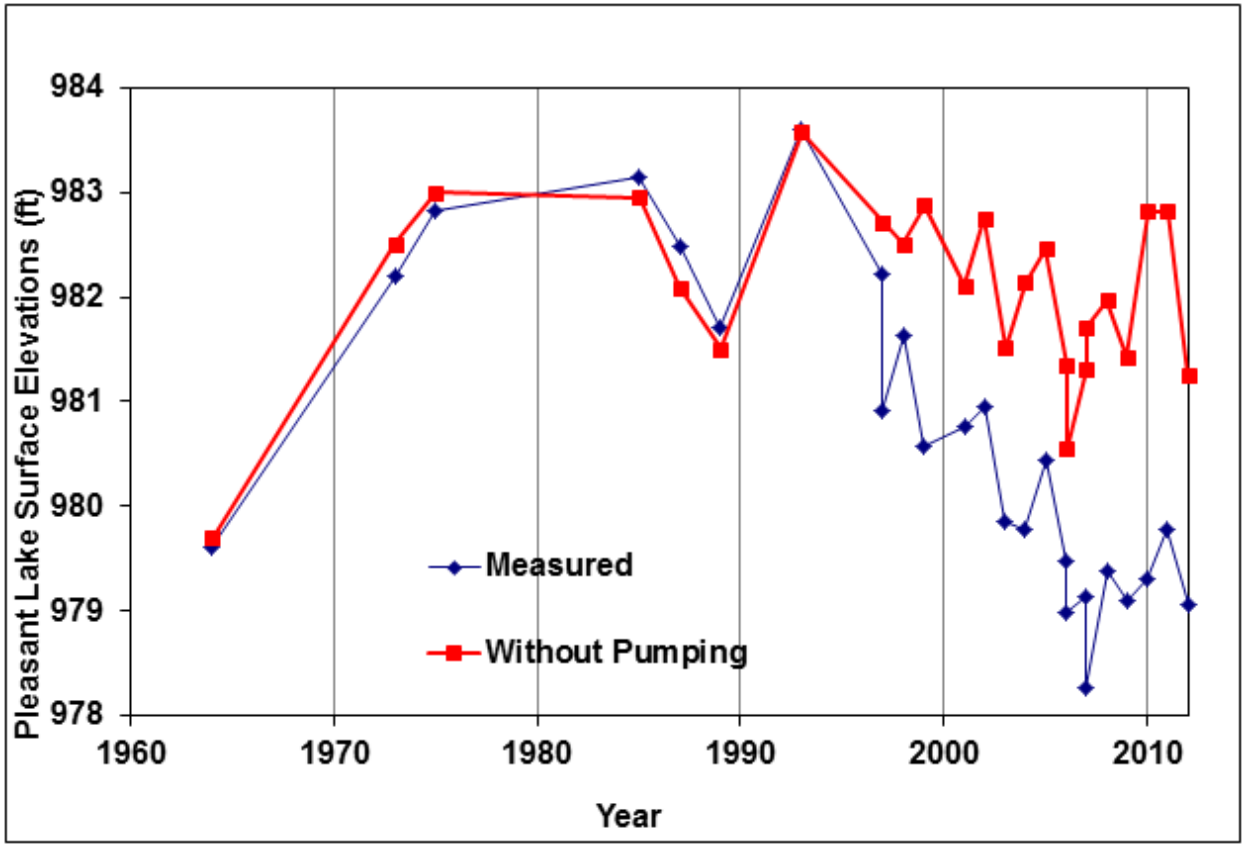


Figure 2. Pleasant Lake measured historical water levels (Waushara County data) compared to lake levels without high capacity well pumping (modeled by G. Kraft, UW-Stevens Point).

Lake levels can have a significant effect on water quality. High water, resulting from runoff within the watershed, may increase nutrient and pollutant loads, erode shorelands, and flood septic systems. In shallow lakes, low water levels may stress fisheries by reducing habitat and altering thermal gradients (Shaw et al., 1995). The water level in a lake fluctuates naturally due to precipitation, which varies widely from season to season and year to year (Figure 2). Lakes with inflow streams respond to rainfall almost immediately, while water levels in seepage lakes that are fed primarily by groundwater may not exhibit a response for months. Human influences have also been shown to affect lake water levels. In some cases, lake water loss can be correlated with pumping water for irrigation or consumption, either directly from the lake or from groundwater nearby (Winter et al., 1998).

The Central Sands region of Wisconsin is renowned for its abundant groundwater resources. A thick layer of coarse-grained glacial outwash deposits overlying low permeability bedrock provides the geologic strata of its aquifer. The Central Sands region is a five-county area that includes most of Waushara County. Because of the abundant water, it is one of the regions in Wisconsin where vegetable agriculture thrives. The aquifer in this region has been and continues to be pumped by high capacity wells to irrigate approximately 200,000 acres of farmland. Despite an increase in average precipitation in the Central Sands since 1970, this pumping has decreased groundwater levels and some lake levels (beyond climatically driven conditions) by an estimated 1.5 to 3.6 feet (Kraft et al., 2010). Pleasant Lake is in a region of the aquifer where the model predicts decreases in water table elevations from 0.5 to 1 foot for each inch of recharge consumed by irrigation (Kraft et al., 2010). Pleasant Lake was included in the 2010 Kraft study; study data showed water levels dropped 1.5 feet from the early 1990s to 2007. According to a WDNR floodplain report dated October 21, 1997, the ordinary high water mark (OHWM) for Pleasant Lake is 985.4 feet MSL (DNR Map Panel No. 55137C0310C). A brass cap benchmark is located in a 6" diameter concrete post 21 feet south of the centerline of 3rd Lane and 26 feet east of the public access centerline. As of June 16, 2015, the water level in Pleasant Lake was 979.36 feet MSL as reported by Central Staking, Inc. from Stevens Point, Wisconsin.

According to Butterfield (2014), long-term water level decline may lead to detrimental effects on near-shore and littoral zone habitat. The littoral area in a lake is where most life (aquatic plants, insects, fish and wildlife) occurs. In 2014, Onterra, LLC conducted an acoustic survey of Pleasant Lake and modeled potential changes in littoral habitat with long-term water level decline. Their findings suggested littoral areas in the lake would increase as more of the deeper areas became shallow enough to support aquatic plants and associated wildlife. The increase was predicted to continue until the water level reached 5 feet below the Ordinary High Water Mark (OHWM). Because of the change in slope of the lakebed, reductions in water levels greater than 5 feet were predicted to result in a decline in littoral habitat. The current lake level is nearly a 5-foot reduction from the DHWM; therefore, it is anticipated the littoral zone is near its maximum size, suggesting that any changes (positive or negative) in the lake level would reduce the littoral area. Changes in lake levels may also affect plant and animal populations that have preferable substrate composition and/or aquatic plant cover (Butterfield et al., 2014).

Guiding Vision for Water Quantity in Pleasant Lake

Pleasant Lake will have sufficient water quantity to maintain the lake's health, support its biota, enable recreational enjoyment and maintain economic value of properties as well as economic contributions to local and state economies.

Goal 2. Minimize detrimental impacts to Pleasant Lake ant its habitats, biota, water quality, Floristic Quality Index, and property values by maintaining lake surface water elevations of 983-984 feet above sea level. (OHWM 985.4 feet above sea level).

Objective 2.1 Monitor and report groundwater and lake surface elevations to inform management decisions.

Actions	Lead person/group	Resources	Timeline
Monitor lake water levels and watershed activities and record changes over time. Submit data for on-line access	Waushara County PLMD Fred Erickson Dana Hanaman	WDNR SWIMS database	
Monitor and report lake level through the use of staff gauges and monitoring wells • North shore monitoring well • Lake level staff gauge	Fred Erickson Dana Hanaman	WDNR SWIMS database	Every two weeks On-going
Maintain water quantity database.	WDNR – SWIMS	State funding	Ongoing
Pursue the installation of watershed monitoring wells beyond the lake shore and record data on a monthly basis.	PLMD	Consultant USGS Lake protection grant	
Report monitoring to appropriate agencies and organizations.	Fred Erickson Dana Hanaman PLMD	WDNR SWIMS database	Ongoing
Monitor high capacity well inventory for wells within five miles of Pleasant Lake; request DNR notification of changes to existing wells.	PLMD Board	WDNR high capacity well application web page	
Request DNR notification of high capacity well permit applications that are made within the Town of Coloma.			

Objective 2.2. Maintain groundwater recharge to the lake of 7,032 million gallons annually (Papadopulos & Associates, Inc. 2012).

Action	Lead person/group	Resources	Timeline
Seek regulations and management that will maintain Pleasant Lake water level at no less than 2 feet below the ordinary high water mark. (See water elevation chart below.)	PLMD Board	WDNR staff Montgomery Associates	Fall 2016

Objective 2.3. Inform those within and outside the Pleasant Lake watershed about groundwater-related information and issues.

Action	Lead person/group	Resources	Timeline
Monitor, evaluate, and share information about activities/regulations/legislation related to groundwater pumping.	PLMD Board	WCWLC	
Support legislation to define a "groundwater protection area" (NR 181) that would include Pleasant Lake.		Legislators Governor	
Participate in community advocacy for improved state groundwater legislation by distributing information, letter writing, and networking with other lake groups and partners.	PLMD Board	WCWLC CSWAC Wisconsin League of Conservation Voters	
Participate in community advocacy, education, and networking related to groundwater and Pleasant Lake.			

Objective 2.4. Enhance groundwater infiltration by utilizing best practices for conservation of surface water runoff.

Actions	Lead person/group	Resources	Timeline
Work with the Towns of Coloma and Springfield to ensure that impervious surfaces are minimized and runoff is mitigated on Lake District properties and township roads.	PLMD Board	Town boards – Coloma and Springfield Highway Departments WCLCD	Ongoing
Inform property owners about ways they can improve groundwater infiltration and minimize water withdrawal.			

Objective 2.5. Limit surface water withdrawal from Pleasant Lake to maintain surface water elevation as noted in Goal 2.

Actions	Lead person/group	Resources	Timeline
Inform lake users and landowners about ways they can minimize impacts to the lake during periods of low water levels.	PLMD	UWEX Lakes Wisconsin Lakes	As needed – periods of low lake levels
Inform lake users about the importance of minimizing disturbance to the lake bed by refraining from power boat use in shallow waters. (signs, brochures at boat launches, rental homes, and property owners)	PLMD	UWEX Lakes Wisconsin Lakes	
Explore the creation of no power boat zone(s), marked with buoys; understand any liability of the PLMD.	PLMD	Town of Coloma and Springfield UWEX Lakes	

Water Quality

Water quality was assessed during the 2010-2012 lake study and involved a number of measures including temperature, dissolved oxygen, water chemistry, nutrients, and minerals. Each of these interrelated measures plays a part in the lake's overall water quality. Citizen survey respondents indicated water quality in Pleasant Lake has a major impact on their personal enjoyment of the lake.

Dissolved oxygen is an important measure in Pleasant 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 during photosynthesis, which occurs when sunlight enters the water; however, once the aquatic plants and algae die, decomposition of the plant material reduces oxygen levels in the lake bottom. The temperature and dissolved oxygen profiles for Pleasant Lake indicated weak seasonal stratification (layering) while maintaining sufficient oxygen in the water column to support a warm water fishery. During winter and summer when the lake stratifies, the amount of dissolved oxygen is lower towards the bottom of the lake. Throughout the year, dissolved oxygen concentrations near the surface of Pleasant Lake remained between 8 mg/L and 12 mg/L, with concentrations below 5 mg/L only in the deepest parts of the lake. Even toward the end of the winter in February 2012, the upper 12 feet of water retained sufficient oxygen to support fish.

During the 2010-2012 study, water clarity in Pleasant Lake ranged from 19.8 feet on June 5, 2011 to 4.7 feet on June 27, 2011. When compared with past data (1994-2009), monthly water clarity averages during the study were considerably poorer except in April, when the current average was similar to the historic average. Water clarity in Pleasant Lake typically declines during the summer months, which is common for many lakes in Wisconsin. Water clarity is most commonly affected by particulates in the water column, such as algae and sediment that is re-suspended or in runoff. Increased sediments in the water column can be a result of winds, storms, and/or heavy motorized boating activity, and marl production during parts of the summer. Indications of algal concentrations (chlorophyll *a*) were low throughout the summers during the study period. The "historic" data set for Pleasant Lake ranged from 1994 to 2009.

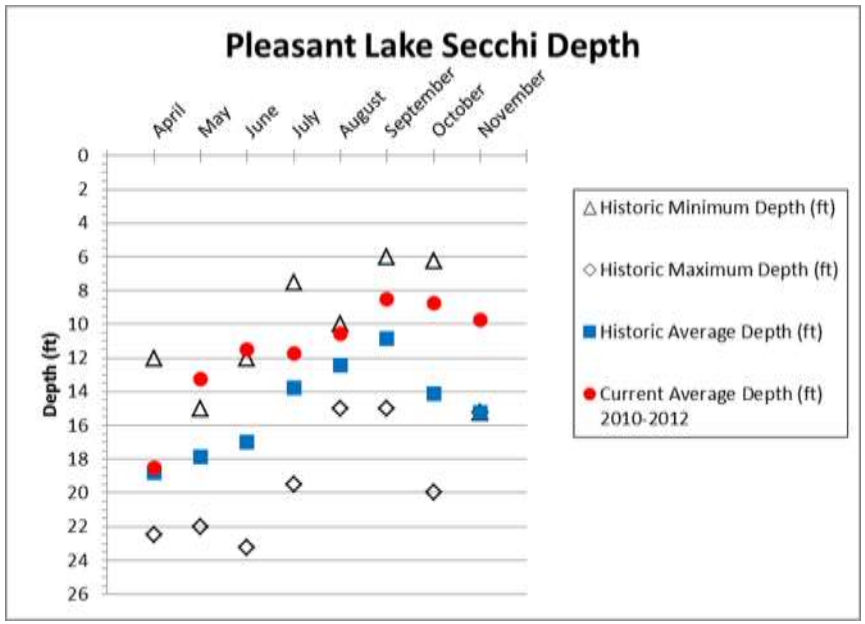


Figure 3. Water clarity depths for Pleasant Lake by month. "Historic" measurements were 1994-2009.

Chloride concentrations, and to lesser degrees, sodium and potassium concentrations, are commonly used as indicators of impacts to a lake from human activity. Typically, naturally-occurring concentrations are low in Wisconsin's water, so elevated concentrations indicate other pollutants may also be present. Common sources of chloride, sodium, and potassium may include animal waste, septic systems, fertilizer, and road de-icing chemicals. In Pleasant Lake, potassium, chloride, and sodium concentrations were all low. Atrazine, an herbicide commonly used on corn, was below the detection limit (<0.01 ug/L DACT) in the two samples analyzed from Pleasant Lake.

Phosphorus and nitrogen are elements that are essential in trace amounts to most living organisms, including aquatic plants and algae. Sources of phosphorus can include naturally-occurring phosphorus in soils, 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 gets the most 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, small increases in phosphorus result in increased aquatic plant and algal growth.

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

During the study, total phosphorus concentrations in Pleasant Lake ranged from a high of 24 µg/L in May 2012 to a low of 7 µg/L in February 2012. The summer median total phosphorus concentrations were 14.5 µg/L and 13 µg/L in 2011 and 2012, respectively. Both are below Wisconsin's phosphorus standard of 40 ug/L for shallow seepage lakes. Inorganic nitrogen concentrations measured during the study do not present a concern.

Managing phosphorus, nitrogen, and soil erosion throughout the Pleasant 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. Phosphorus inputs to Pleasant Lake can be controlled by using lake-friendly land management decisions, such as the restoration of shoreland vegetation, the elimination/reduction of fertilizers, and the use of water quality-based management practices.

The geologic composition that lies beneath Pleasant Lake has the ability to influence the temperature, pH, minerals, and other properties in a lake. As groundwater moves, some substances are filtered out while other materials in the soil dissolve into the groundwater. Minerals such as calcium and magnesium in the soil around Pleasant Lake are dissolved in the water, making the water hard. The average hardness for Pleasant Lake during the 2010-2012 sampling period was 133 mg/L. Hard water provides the calcium necessary for building bones and shells for animals in the lake. It can also help reduce the amount of phosphorus in the water column. The average alkalinity was 134 mg/L which is considered moderate; higher alkalinity in inland lakes can support greater species productivity.

Guiding Vision for Water Quality in Pleasant Lake

Pleasant Lake will continue to have good water quality for the enjoyment of all.

Goal 3. Improve water quality in Pleasant Lake and the Turtle Bay Wetland.

Objective 3.1. Reduce current median total phosphorus concentrations (14 ug/L) over the next 10 years.

Action	Lead person/group	Resources	Timeline
Inform landowners within the watershed of the importance of maintaining their septic systems and septic system impacts on lake and groundwater quality.	PLMD Board	WDNR Wisconsin Lakes	
Inform lake users on the detrimental effects of phosphorus to water quality and the responsible use of detergents, lawn fertilizers, soaps, and shampoos containing phosphorus.	PLMD Board	WDNR Wisconsin Lakes	

Inform residents within the watershed as to the impact of wood ash (which contain phosphorus from burned leaves, fire pits, etc.) to the lake.	PLMD Board	WDNR Wisconsin Lakes	

Objective 3.2. Improve water clarity as measured by Secchi disk to at least 20 feet in early spring and at least 10 feet in late summer.

Action	Lead person/group	Resources	Timeline
Monitor lake water clarity at least 5 times during each summer season.	PLMD	CLMN coordinator	Annually-summer
Educate boat users on the impacts of heavy boat traffic in shallow area of the lake and WDNR boating distance regulation from shore and piers. (signs, brochures)	PLMD Town of Coloma and County	WDNR UWEX Lakes	Ongoing
Explore feasibility of restricting boat traffic in shallow areas of the lake.	PLMD Board	WDNR Town of Coloma	
Maintain the local ordinance of 3:00 p.m. to 11:00 a.m.-- no-wake boating restrictions on the lake.	PLMD Board	WDNR Town of Coloma	
Improve enforcement of power boat no-wake regulations and WDNR distance restrictions.	PLMD Board Town of Coloma	WDNR Warden	
Investigate limiting horse power and decibel limits for power boats.	PLMD Board		

Objective 3.3. Develop and maintain citizen water quality monitoring programs.

Action	Lead person/group	Resources	Timeline
Continue to participation in the Clean Lake Monitoring Network CLMN: Secchi (water clarity), total phosphorus, chlorophyll, dissolved oxygen, nitrogen, temperature.	PLMD	CLMN Coordinator	Annually
Seek funding to install groundwater monitoring well network to the west and north of the Pleasant Lake to track water quality and quantity changes. (Testing including nitrogen, total phosphorus, potassium, chloride, and calcium.)	PLMD	Consultant USGS WDNR Lake Protection Grant Local property owners	
Explore options to maintain calcium/hardness in the lake.	PLMD	WDNR Consultants	
Investigate restriction status on atrazine and other organic herbicides/pesticides as well as their use and presence in the groundwater, lake and the watershed.	PLMD		

Institute periodic monitoring of *E.coli* and other microbes at the north boat ramp and the swim beach; pursue funding for such activity.		Waushara County Health Department	Summer
Work to achieve a private well water testing program. Each year obtain 25% of watershed residents (approx. 50 households) will test private well water for nitrates, phosphates, bacteria, Atrazine, and heavy metals.	Property owners/residents		25% of residents each year for the next four years.
Facilitate testing bottle availability and collection to meet goals; testing at private landowner's expense.	PLMD Board	Waushara and Marquette Counties	Begin Spring 2016

Objective 3.4. Work with the Town of Coloma, the Town of Springfield, Waushara County and Marquette County on nutrient management within the watershed.

Action	Lead person/group	Resources	Timeline
Work with the Town of Coloma to adopt a water quality standards ordinance (phosphorus and inorganic nitrogen) within the township.	PLMD Board	USEPA WDNR	
Manage the Canada geese population at the lake in order to protect water quality. Inform shoreline property owners of shoreline management practices that will reduce the presence of geese on Pleasant Lake and their shoreland.	Fred Erickson	UWEX Lakes – informational materials	
Encourage and support adopting an ordinance in Waushara and Marquette Counties to ban manure spraying in irrigation systems; particularly aerial application.	PLMD Board		

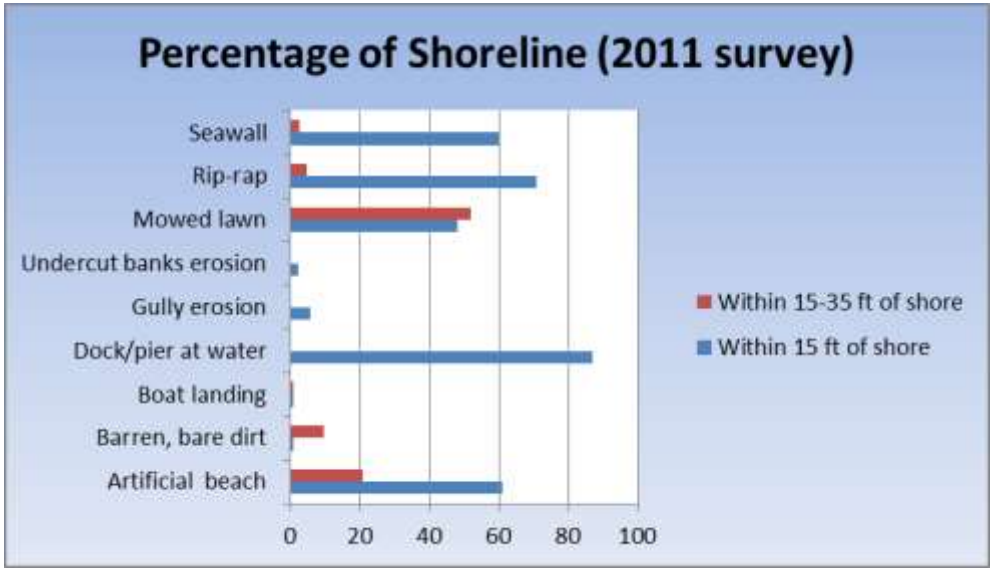
Shorelands

Shoreline vegetation is critical to a healthy lake ecosystem. Healthy shoreline vegetation includes a mix of unmowed grasses, flowers, shrubs and trees which extends landward from the water's edge. It provides habitat for many aquatic and terrestrial animals including birds, frogs, turtles, and small and large mammals. It helps to improve water quality by slowing the runoff flowing into the lake.

To better understand the Waushara County lakes, the health of lake shorelines was evaluated. The surveys inventoried the type and extent of shoreline vegetation. Areas with erosion, rip-rap, barren ground, sea walls, structures and docks were also inventoried. A scoring system was developed to provide a holistic assessment. The intent was to develop strategies to keep healthy areas healthy, and identify areas with problem where management and conservation may be warranted. The scoring system developed was 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 healthier shorelines with good land management practices. These areas should be targeted for protection and/or conservation. On the other hand, areas with 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 Pleasant Lake is displayed on the map in Appendix B. Pleasant Lake's shoreland vegetation has been significantly altered due to development, with the overall shoreland score for the lake being 6.2 out of 15. Very little of Pleasant Lake's shorelands ranked as good and some stretches ranked in the poorest category. The map in Appendix B indicates locations where changes in management or mitigation may be warranted, including several areas ranked as poor.



Shoreland ordinances were enacted to improve water quality and habitat, and 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 89 lakefront lots, 2,670 feet (22%) of disturbed shoreland would be permitted. Based on the 2011 shoreland inventory, 52% (6,253 feet) of Pleasant Lake's shoreland was mowed lawn. Although some properties were "grandfathered in" when the ordinance was initiated in 1966, the health of the lake and its inhabitants will benefit from following this guidance.

Guiding Vision for Pleasant Lake's Shorelands

Pleasant Lake's shoreline vegetation will be maintained to support lake biota, water quality, and recreation.

Goal 4. Protect and improve shoreland plant communities.

Objective 4.1. Restore and rehabilitate shoreline vegetation to support the fishery, wildlife, and general lake health.

Actions	Lead person/group	Resources	Timeline
Seek out property owners willing to support restoration of natural shoreline habitats to support lake biota.	PLMD	UWEX Lakes – informational materials	Ongoing
Inform property owners about the value of shoreland vegetation to support fishery, amphibians, birds, pollinators, water quality, and general lake health. (demos, speakers, mailings, etc.)	PLMD	UWEX Lakes – informational material	
Encourage and educate property owners on the availability of grants and cost share through the County and WDNR for attractive and proactive shoreland restoration and rehabilitation.	PLMD	WCWLC Waushara County UWEX Lakes – informational materials WDNR Healthy Lakes Grants	
Continue to inform shoreland residents of the state shoreline zoning ordinance and encourage participation and support (restricted to 30 linear feet of frontage to be manicured).	PLMD	WCWLC	

Goal 5. Shoreland property owners will understand the value shoreline vegetation contributes to the lake and make informed land management decisions.

Objective 5.1. Educate land owners of state and local requirements, availability to funds and value of shoreline restoration.

Actions	Lead person/group	Resources	Timeline
Inform shoreland property owners about the impact of human activities on the lake's shoreland. For example: • Location of piers • Removal of vegetation (in and at lakeshore) • Mowed and manicured lawns • Rip-rap installation • Artificial beaches • Litter and detritus • Erosion • Seawalls • Animal waste • Burning (fires & leaves) on the lake shore	PLMD Board	WDNR Wisconsin Lakes Lake Tides WCWLC PLMD Newsletters UWEX Lakes – informational materials and speakers	Ongoing

In-Lake Habitat and a Healthy Lake

Healthy lake habitats include those below the water's surface (aquatic plants, *Chara* beds, submerged branches, etc.) and those above the water (woody structures, shoreline vegetation, and upland trees and shrubs). The plants and animals living in and near Pleasant Lake are dependent on the lake and on one another. The Turtle Bay wetland, contiguous to the lake, provides excellent habitat for fish spawning, young-of-the-year, safety, and food. Aquatic plants provide oxygen and food for fish, waterfowl and small mammals. Birds, frogs and turtles make use of fallen and over-hanging shrubs and trees for cover, perches and to warm themselves in the sun. The types and abundance of plants and animals vary based on water quantity, water quality, shoreland health, and watershed characteristics. Because invertebrates, fish, and wildlife are supported by the lake's available habitats, the management of those spaces is critical to maintaining a healthy ecosystem, living community and biotic interaction.

Critical Habitat

Critical habitat areas are special areas in and near a lake. For some lakes, this designation is made by biologists with the WDNR to protect features in a lake that are important to the overall health of the aquatic plants, animals, and the lake itself. Every lake contains important natural features, but not all lakes have official critical habitat designations. Designating areas of the lake in this way results in special protections for these areas, and recognizes these areas by mapping and sharing information about them so many can know the locations and importance of areas that could be vulnerable to damage by human activity. Having a critical habitat designation on a lake can help lake groups and landowners plan waterfront projects to avoid and protect habitat and help ensure the long-term health of the lake. Pleasant Lake currently does not have any officially-designated critical habitat areas; however, the Turtle Bay wetland, sedge meadow, and the north shore sand point are all candidates for designation.

Planning committee members highlighted the Turtle Bay wetland as a special area meriting protection. Several unique plants and amphibians have been identified within the wetland, and it provides ideal habitat for a variety of species because of its spring-fed waters and nearby warmer lake water (Linton, 2012). There is concern that further declines in water levels will have a detrimental effect on this unique habitat area (Butterfield et al., 2014). The banded killifish population, a state species of special concern, has been documented in Pleasant Lake by the WDNR. It breeds in the quiet, clear backwaters of Turtle Bay. The declining numbers of this fish can be linked to loss of shoreline habitat and declining water quality (Marshall, 2005). The Pleasant Lake population should be given special care and protection.

Banded killifish - Sea Grant

Guiding Vision for Pleasant Lake's Critical Habitat

Pleasant Lake's users and property owners will protect, maintain, and improve its high quality habitats.

Goal 6. Identify, preserve, and protect Pleasant Lake's sensitive and critical habitats.

Objective 6.1. Official identification of sensitive and critical habitat areas.

Actions	Lead person/group	Resources	Timeline
Identify and confirm suspected sensitive and critical habitat areas including: Turtle Bay, north shore sand point, southeast wetland, and west shore.		WDNR professionals Consultants	Summer 2016
Request to the appropriate agencies that the north shore sand point, and the Turtle Bay spring pond and sedge meadow, be designated as Pleasant Lake "sensitive areas" from WDNR (ch. NR 107).	PLMD	WDNR Lake Specialists	Summer 2016
Designation of critical habitat following DNR habitat protocols.	PLMD Board	WDNR professionals Consultants	
Restrict wakes by boats in Turtle Bay area. Preserve and improve habitats for threatened species, endangered species, and species of special concern including the banded killifish by working with appropriate agencies, partners, funders and land owners.	PLMD	Town of Coloma WDNR USEPA	On going
Establish citizen monitoring for wildlife around Pleasant Lake (i.e., Lake Wisconsin Frog and Toad Surveys, Mussel Monitoring Program of Wisconsin, Odonata Survey, Wisconsin Turtle Conservation Program, Wisconsin Marsh Bird Survey)		local schools and partner/citizen groups	
Create/maintain, and post educational information and maps at boat launch highlighting sensitive habitat areas.	PLMD	WDNR grants UWEX Lakes Town of Coloma Waushara County	
Investigate protecting Turtle Bay spring pond and sedge meadow via deed restriction or conservation easement.		Property owners NCCT WDNR Lake Protection Grant Knowles-Nelson Stewardship Fund	

Objective 6.2. Preserve and protect Turtle Bay wetland, sedge meadow, and spring pond.

Actions	Lead person/group	Resources	Timeline
Protect Turtle Bay's vegetation by maintaining lake water level at no lower than 1.5 feet below the OHWM (985.4 ft.). Note previous objective referencing lake level	PLMD Board		
Maintain lake calcium levels to support *Chara* and other calcium-loving plants by maintaining groundwater input from springs. Refer to Water Quality and Water Quantity	PLMD Board		
Protect Turtle Bay's ability to support young-of-the-year, water quantity and quality as well as an open channel between the spring pond and the lake by maintaining lake water level at no lower than 1.5 feet below the OHWM (985.4 ft.).	PLMD Board		
Protect Turtle Bay's ability to support amphibians and reptiles. by maintaining lake water level at no lower than 1.5 feet below the OHWM (985.4 ft.).	PLMD Board		
Routinely monitor for aquatic invasive species (AIS) and follow the rapid response plan (Appendix) if any new species are suspected.			

Objective 6.3. Preserve and protect north shore sand point habitats.

Actions	Lead person/group	Resources	Timeline
Preserve bluegill spawning beds south of north shore point by educating boaters to avoid the area.	PLMD Board	Boat launches – Town of Coloma Waushara County	

Objective 6.4. Preserve and protect south east wetland.

Actions	Lead person/group	Resources	Timeline
Preserve and protect the southeast wetland by maintaining lake water level at no lower than 1.5 feet below the OHWM (985.4 ft).	PLMD Board Property Owners		

Objective 6.5. Preserve and protect west shoreline.

Actions	Lead person/group	Resources	Timeline
Preserve and protect west shoreline which is currently the least developed shoreline of Pleasant Lake by encouraging conservation measures (easement, purchase, PDR).	PLMD Board Property Owners	NCCT WDNR Lake Protection Grant Knowles-Nelson Stewardship Funds	

Aquatic Plants

Aquatic plants provide the forested landscape and the foundation of the living community within Pleasant Lake. They provide food and habitat for breeding, spawning, and survival for a wide range of lake inhabitants. Lake visitors including waterfowl, turtles, amphibians, as well as invertebrates and other animals live in and feed off of the plant community. Aquatic plants 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 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 lake.

The aquatic plant section of the lake management plan was completed in partnership with Onterra, LLC. Onterra, LLC conducted an aquatic plant survey in 2009, and a point-intercept survey was conducted as part of the Waushara County Lakes Study by UW-Stevens Point in summer 2012. Onterra, LLC conducted aquatic community mapping surveys in 2009 and 2013, as well as a bathymetric and littoral habitat assessment. For detailed information about the Onterra, LLC surveys and studies, see the *Pleasant Lake Supplemental Lake Management Planning Project* in Appendix E.

Thirty-six aquatic plant species were encountered during the 2012 plant survey conducted by UW-Stevens Point and the 2013 community mapping survey conducted by Onterra, LLC. The dominant aquatic plant species in the 2012 survey was common muskgrass, followed by flat-stem pondweed and wild celery.

Muskgrass (*Chara*) is a favorite food source for a wide variety of waterfowl. Beds of muskgrass offer cover and food for fish, especially young trout, largemouth bass, and smallmouth bass. Flat-stem pondweed also provides food for waterfowl. Invertebrates and fish make use of the plant for cover and habitat. Wild celery is a premiere source of food for waterfowl, marsh birds, and shore birds. Beds of this submerged macro-algae also provide habitat for fish by providing shade, shelter and feeding opportunities.

The Floristic Quality Index (FQI) evaluates the closeness of a plant community to undisturbed conditions. Each plant is assigned a coefficient of conservatism value (C-value) that reflects its sensitivity to disturbance. These numbers are used to calculate the FQI. C-values range from 0 to 10. The higher the number, the more intolerant the plant is of disturbance. A C-value of zero is assigned to non-native species. The C-values in Pleasant Lake ranged from 0 to 8, with an average C-value of 6. Three species with a C-value of 8 were identified during the survey: southern naiad (*Najas guadalupensis*), white-stem pondweed (*Potamogeton praelongus*), and Fries' pondweed (*Potamogeton friesii*). The 2012 FQI for Pleasant Lake was 28.6, which was above average when compared with other lakes in the Waushara County Lakes Study. No species of special concern in Wisconsin were found in Pleasant Lake.

During the aquatic plant survey in 2012, the aquatic invasive species (AIS) Eurasian watermilfoil (EWM) and curly-leaf pondweed (CLP) were found in Pleasant Lake. DNA analysis in 2009 confirmed that the EWM was actually a cross between Eurasian watermilfoil and native northern watermilfoil known as hybrid watermilfoil (HWM). Neither the HWM nor the CLP was found growing in dense patches; instead, they were observed as a few plants scattered in several locations in the lake. Curly-leaf pondweed can have an impact on a lake's ecosystem because of its life cycle, releasing nutrients into the water from decaying plant material in June. More detailed information can be found in the *Aquatic Plant Survey of Pleasant Lake, Waushara County; Waushara County Lakes Study - Pleasant Lake*; Appendix D. Aquatic Plants; and, Appendix E. Pleasant Lake Supplemental Lake Management Planning Project (Onterra, LLC).

Overall, the aquatic plant community in Pleasant Lake can be characterized as having excellent species diversity with species that are common to central Wisconsin lakes. The identification of CLP and EWM/HWM within the lake should cause some concern, and the densities and populations of each species should continue to be monitored and managed to prevent further propagation and population explosions. The aquatic plant community in Pleasant Lake should be a focal point in future decision-making, as it provides habitat and food, and contributes to good water quality. To date, the CLP population has not become a problem, although EWM has. Thus, EWM/HWM management undertaken by the Pleasant Lake Management District has included chemical treatment and hand pulling with root removal. Details for management are in the *Pleasant Lake Supplemental Lake Management Planning Project* report in Appendix E.

Guiding Vision for Aquatic Plants in Pleasant Lake

A healthy aquatic plant community is the foundation of Pleasant Lake's ecosystem.

Goal 7. A diverse, healthy plant community (submergent, emergent, and floating) will be maintained in Pleasant Lake.

Objective 7.1. Maintain current species richness (36) and maintain or improve percentage of aquatic plants in the littoral (near shore) zone.

Actions	Lead person/group	Resources	Timeline
Inventory and monitor the native and invasive aquatic plants in Pleasant Lake.	PLMD Board Aquatic Plant Committee	WDNR Lake Specialist Consultant	Every 2 years
Maintain Pleasant Lake's current calcium levels to promote marl deposition and support of calcium loving plants. See Water Quality	PLMD Board Aquatic Plant Committee		
Develop vegetation maps that illustrate boat traffic patterns that will protect plants and support boating regulations.	PLMD Board Aquatic Plant Committee	Town of Coloma WDNR Warden	
Protect *Chara* beds by reducing boat traffic in shallow waters.	PLMD Board	Town of Coloma	

Inform property owners about the benefits native aquatic plants bring to the lake (fish habitat, invertebrate breeding grounds, oxygen production, etc.)	PLMD Board Aquatic Plant Committee	UWEX Lakes – informational materials and speakers RC&D	

Objective 7.2. Control white water lilies at Town of Coloma beach.

Actions	Lead person/group	Resources	Timeline
Maintain the Town of Coloma swim beach plant removal permit for white water lilies within the buoyed swim area.	Fred Erickson	WDNR Lake Specialist	Permit updated every 5 years

Aquatic Invasive Species (AIS)

Aquatic invasive species are non-native aquatic plants and animals that are most often unintentionally introduced to the lake by lake users. In some lakes, aquatic invasive plant species can co-exist as part of the plant community, while in other lakes populations can explode, creating dense beds that can damage boat motors, make areas non-navigable, inhibit activities like swimming and fishing, and disrupt the lakes' ecosystems.

Eurasian watermilfoil (EWM) was first identified in Pleasant Lake in 2007. This plant can produce viable seeds; however, it often spreads by fragmentation. Just a small stem fragment 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. EWM was again identified in the 2012 survey. The locations of 2012 EWM populations are displayed in the map in Appendix D. Hybrid watermilfoil, a hybrid between native watermilfoil and EWM, was identified in a 2013 survey completed by Onterra, LLC (Butterfield et al., 2014) and Golden Sands RC&D, Inc. (Skawinski and Hamerla, 2013).

Curly-leaf pondweed was identified in Pleasant Lake in the June 2012 aquatic plant study. The life cycle of curly-leaf pondweed can impact a lake's ecosystem. CLP begins to grow under the ice during late winter/early spring before many native species emerge, and starts to die back in late June to early July. Phosphorus is released from the dying tissue at a time when other plants and algae are beginning to grow. This phosphorus release may fuel algal blooms and enhance aquatic plant growth. CLP has been known to exist in harmony with the native plant community. The locations of CLP populations in 2012 are displayed in the map in Appendix D.

In September 2013, Onterra, LLC conducted an aquatic plant community mapping survey and encountered the invasive plants HWM, giant reed, and canary grass. In late June 2014, professionals from Onterra, LLC met with Pleasant Lake residents, PLMD members and the PLMD board of directors. During this meeting, results of the 2013 study conducted by Onterra, LLC were presented, and the group identified goals and action items to include in the aquatic plant management plan. The full report of the Onterra, LLC study and important action item details can be found in the *Pleasant Lake Supplemental Lake Management Planning Project* in Appendix E. The majority of the goals and actions below were taken from the 2013 Onterra Aquatic Plant Management Plan.

Guiding Vision for Aquatic Invasive Species

Pleasant Lake hybrid and Eurasian water milfoil will be managed to limit or eliminate existing populations. Invasion of new aquatic invasive species will be prevented from becoming established in Pleasant Lake.

Goal 8. Manage existing and prevent further introductions of aquatic invasive species (AIS) to Pleasant Lake.

Objective 8.1. Enact hybrid water milfoil (HWM) monitoring and control strategy to preserve and protect native plant community (detailed in the Supplemental Plan produced by Onterra LLC, found in Appendix E).

Actions	Lead person/group	Resources	Timeline
Conduct lake-wide assessment of CLP. EWM, and HWM. (Early-Season AIS Survey) in June each year to assess HWM and CLP.	PLMD Board	Onterra, LLC WDNR AIS Grant Program	Begin 2015 (June)
Conduct lake-wide assessment of EWM, and HWM while plants are at or near peak biomass (July-August).	PLMD Board	Onterra, LLC	Begin 2015 (July-August)
Enhance and maintain EWM/HWM hand pulling program.	RC&D, interested citizens	RC&D Onterra, LLC	On-going
Develop an herbicide treatment strategy (if warranted) for the AIS plant management. Educate landowners on chemicals detriment to native species.	PLMD Board	RC&D Onterra, LLC WDNR Lake Specialist	Only if hand pulling is unable to control population
Following hand-pulling or herbicide treatments, assess results (summer after treatment) and modify plan accordingly.	PLMD Board	RC&D Onterra, LLC WDNR Lake Specialist	On-going Summer-following treatment

Retain qualified professional assistance to develop an adaptive AIS management approach discussed above.	PLMD Board	RC&D Onterra, LLC	
Apply for WDNR AIS Education, Planning and Prevention Grant based on developed project design.	PLMD Board	WDNR AIS Grant WDNR Lake Specialist	As needed
Continue to monitor boat landings for transported plants.	PLMD; CBCW Group	RC&D	
Seek grant support for AIS Established Population Control Grant.	PLMD Board		As needed
Revisit control plan every two years and fund accordingly.	PLMD Board		
Update aquatic plant management plan to reflect changes in AIS control needs and lake health.	PLMD Board	Consultant WDNR Lake Specialist	As needed
During periods of declining water levels, monitor areas once too deep for plant growth for AIS (i.e. EWM and CLP).		Trained individuals RC&D Consultants	As needed
Maintain Pleasant Lake's emergent and floating-leaf plant communities.		Consultant WDNR Lake Specialist	
Continue to monitor boat landings for transported plants.	PLMD; CBCW Group	RC&D	Ongoing

Objective 8.2. Manage invasive giant reed and canary grass in Turtle Bay wetland and southeast shoreline.

Actions	**Lead person/group**	**Resources**	**Timeline**
Control giant reed (*Phragmites australis subsp. australis*) on the shorelines of Pleasant Lake by contacting and volunteering with RC&D to initiate and learn giant reed control strategy and methodology. PLMD volunteers initiate giant reed control strategy annual as needed.	PLMD	RC&D WDNR Lake Specialist	Begin 2014, Ongoing
Monitor for invasive species • Giant reed grass • Reed canary grass	PLMD	RC&D WDNR Lake Specialist	Ongoing
Immediately foster a phragmites and canary grass plant removal project in Turtle Bay wetland.	PLMD	RC&D WDNR Lake Specialist	Begin 2015, Ongoing
Immediately foster a phragmites and canary grass plant removal project in south east wetland.	PLMD	RC&D WDNR Lake Specialist	Begin 2015, Ongoing

Objective 8.3. Monitor annually for known and new invasive species infestations in and around Pleasant Lake (detailed in the Supplemental Plan produced by Onterra, LLC found in Appendix E).

Actions	Lead person/group	Resources	Timeline
Monitor for purple loosestrife, Japanese Knot week, and other terrestrial plant populations as yet to be observed at Pleasant Lake, including shoreland plantings.		RC&D	Begin 2016
Monitor Pleasant Lake for zebra mussels. Order zebra mussel substrate sampler, follow protocols outlined in *Dreissenid (Zebra and Quagga) Mussel Monitoring Protocol*, and report any occurrences to the WDNR.		CBCW WDNR Lake Specialist	Begin 2016

Objective 8.4. Prevent new aquatic invasive species from entering Pleasant Lake.

Actions	Lead person/group	Resources	Timeline
Protect and leave in place as much native aquatic vegetation as possible	Shoreland property owners	UWEX Lakes informational materials	Ongoing
Inform property owners about the benefits of refraining from the removal of aquatic plants	PLM Board	UWEX Lakes informational materials	
Learn to monitor for aquatic invasive species	interested residents, lake users	RC&D CBCW	Ongoing
Continue CBCW watercraft inspections at Pleasant Lake's public boat launches; investigate ways to enhance recruitment.	PLMD Board	RC&D CBCW	Ongoing (spring-fall)
Notify property owners of training opportunities for CBCW watercraft inspections.	PLMD Board	RC&D	

The Fish Community, Mussels and other Aquatic Organisms

A balanced fish community has a mix of predator and prey species, each of which has different needs regarding food, habitat, nesting substrate, and water quality. A sustainable fishery is one that seeks to be in balance with the lake's natural ability to support the fish community. The fish community is able to adapt to fishing and other human activity without additional stocking or input because its reproductive and growth needs are met within the lake.

Activities in and around a lake that can affect a fishery may come from disturbances to aquatic plants or substrate, additions of harmful chemicals, removal of woody habitat, and shoreline alterations. Shoreland erosion can cause sediment to settle onto the substrate, causing the deterioration of spawning habitat. Ways in which habitat can be improved include 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, as their actions on the landscape and the numbers and sizes of fish taken out of the lake can influence the entire lake ecosystem. Putting appropriate fishing regulations in place and adhering to them can help balance the fishery with healthy prey and predatory species, can be adjusted as the fish community changes, and can provide for excellent fishing.

Managing a fishery in a sustainable fashion 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 do not have to be repeated frequently. Protecting existing habitat such as emergent, aquatic and shoreland vegetation, or allowing trees that naturally fall into the lake to remain in the lake is free of cost. Alternatively, restoring habitat in and around a lake can have an up-front cost, but the effects will last for decades. Labor costs, 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 supplemental efforts and the associated expenses to maintain these conditions.

During the 2012 fish survey completed by the WDNR on Pleasant Lake, largemouth bass growth was below average with a fair size structure and high abundance, and bluegill growth was below average with a good size structure and average abundance. One species of fish, the banded killifish, is a species of special concern in Wisconsin. Recommendations from the WDNR Fisheries Biologist included the protection and restoration of the area near shore and the use of large woody habitat in the littoral zone. The PLMD has been stocking 300-600 walleye annually since 2010, funded by the Coloma Lions Club and PLMD.

More than one-half of the 25 survey respondents believed declining water levels, agricultural chemicals, invasive species, and loss of shoreland habitat were the greatest threats to the fishery in the next ten years.

Onterra, LLC conducted a mussel survey in Pleasant Lake in 2013. One species of freshwater mussel, the giant floater mussel (*Pyganodon grandis*), was identified at various locations throughout the lake. Sand and gravel substrates are the preferred habitats for the giant floater mussel. Changes in habitat

due to declining water levels could affect the mussel population within Pleasant Lake. There are many species of invertebrates within Pleasant Lake, many of which are important food sources for fish, amphibians, birds and other wildlife.

Guiding Vision for Pleasant Lake Invertebrates

Pleasant Lake will host a healthy invertebrate community since they are an essential element of an aquatic system.

Goal 9. Maintain diverse, healthy invertebrate populations.

Objective 9.1. Maintain habitats in the lake and on the shoreline that will support mollusks, zooplankton, and arthropods (crayfish, insects, etc.).

Actions	Lead person/group	Resources	Timeline
Develop clam-friendly habitats that will support existing population of clams. Investigate ability to introduce beneficial clams to lake bed.	PLMD, shoreland property owners	Consultant	
Monitor snail population through periodic assessment	PLMD	Consultant WDNR Monitoring Division	
Monitor zooplankton populations through periodic assessment	PLMD	Consultant WDNR Monitoring Division	
Avoid the use of pesticides and herbicides in and near Pleasant Lake that might be harmful to invertebrates.	Shoreland and watershed property owners	UWEX Lakes – informational materials	Ongoing

Objective 9.2. Maintain lake habitats that support invertebrates and the fishery.

Actions	Lead person/group	Resources	Timeline
Educate individuals about the importance of woody habitat in shallow, near-shore waters of Pleasant Lake, and encourage its placement in appropriate areas.	PLMD	UWEX Lakes – informational materials	
Explore permits with the WDNR to place tree drops or "fish sticks" as habitat in appropriate mid-depth areas of Pleasant Lake.	PLMD	WDNR Fisheries Biologist	

Place submergent spruce or oak trees on shorelines where appropriate.	Shoreland property owners	WDNR Fisheries Biologist Local fishing clubs	
Work with Coloma Lions Club to consider funding for habitat restoration.	PLMD		
Pursue options for shoreline restoration grants/funding to provide resources for property owners who wish to improve the shoreline vegetation on their property.	PLMD, shoreland property owners	WDNR Healthy Lakes Grants WCLCD	

Goal 10. Lake users will understand the value and detriments of invertebrates within Pleasant Lake.

Objective 10.1. Inform lake users about invertebrates in Pleasant Lake.

Actions	Lead person/group	Resources	Timeline
Educate lake users about the value and detriments of invertebrates within the lake by providing information at the boat launch.	PLMD Board	WDNR Signage Town of Coloma Waushara County	

Guiding Vision for the Fish Community and other Aquatic Organisms

Pleasant Lake will have a healthy fish community.

Goal 11. Maintain a high quality and balanced fish community that includes predator, panfish and non-game species.

Objective 11.1. Maintain balance of predator species (largemouth bass and northern pike) with panfish species (bluegill, yellow perch, pumpkinseed sunfish, and black crappie).

Actions	Lead person/group	Resources	Timeline
Maintain fish populations abundance: Northern pike 3-5 fish per acre > 20 inches Largemouth bass. CPUE* of 20-40 per mile of fish > 8 inches	PLMD Fish Committee	WDNR Fisheries Biologist	

Bluegill. CPUE 75-100 fish per mile of fish > 3 inches Black crappie. CPUE 10-15 fish per mile of fish > 5 inches *CPUE = catch per unit effort			
Maintain a fish species richness --should be maintained at least 15 species including the following: Northern pike, largemouth bass, black crappie, bluegill, pumpkinseed, warmouth, yellow perch, banded killifish, white sucker, bluntnose minnow, Iowa darter, mimic shiner, golden shiner, brown bullhead, yellow bullhead.	PLMD Fish Committee	WDNR Fisheries Biologist	
Maintain, protect, and improve spawning habitats for sensitive species to maintain natural recruitment.	PLMD Fish Committee	WDNR Fisheries Biologist	
Perform fishery assessment surveys on 8-10 year rotation, including species age analysis.	WDNR Fisheries Biologist		
Adopt appropriate largemouth bass regulation that provides quality fishery and adequate predation on bluegill population to prevent pan fish overabundance, but does not create overabundance of largemouth bass.	WDNR Fisheries Biologist		

Objective 11.2. Maintain and improve fish species growth rates to increase productivity and quality of the fishery.

[Suggested metrics for fish growth rates per David Bartz, Fisheries Biologist, WDNR: Northern pike reach 24 inches by age 6; Largemouth bass reach 14 inches by age 6; Bluegill reach 7 inches by age 6; Black crappie reach 10 inches by age 6; Yellow perch reach 9 inches by age 6]

Actions	Lead person/group	Resources	Timeline
Improve littoral zone habitat by increasing and protecting native aquatic vegetation.	Shoreland property owners PLMD Fish Committee	WCLCD WDNR Fisheries Biologist WDNR Healthy Lakes Grants	
Improve littoral zone habitat by increasing and protecting large woody habitat.	Shoreland property owners PLMD Fish Committee	WCLCD WDNR	

Objective 11.3. Develop habitat for Pleasant Lake's non-game fish populations.

Actions	Lead person/group	Resources	Timeline
Improve killifish habitat area in Turtle Bay and in shallow areas	PLMD Fish Committee Shoreland property owners	WDNR Fisheries Biologist	
Reestablish, protect, and restore shallow near shore vegetation.	Shoreland property owners PLMD Fish Committee	WDNR Fisheries Biologist	

Objective 11.4. Improve predator and panfish size structure.

[Suggested metrics for fish size structure per David Bartz, Fisheries Biologist, WDNR: Northern Pike RSD 26 (proportion of sample greater than 12 inches that exceeds 26 inches) should be greater than 20; Largemouth bass RSD 14 (proportion of sample greater than 8 inches that exceeds 14 inches) should be between 30-50; Bluegill RSD 8 (proportion of sample greater than 3 inches that exceeds 8 inches) should be greater than 20]

Actions	Lead person/group	Resources	Timeline
Maintain current length limits for Northern Pike or discuss protected slot limit to protect fish between 24 and 30 inches with WDNR biologist.	PLMD Fish Committee	WDNR Fisheries Biologist	
Discuss alternative length limit for largemouth bass with WDNR biologist to allow harvest of smaller fish and protect size structure of fish 14-18 inches.	PLMD Fish Committee	WDNR Fisheries Biologist Local fishing clubs	

Objective 11.5. Support a healthy sport fishery in Pleasant Lake, with an emphasis on the lake's naturally occurring species.

Actions	Lead person/group	Resources	Timeline
Panfish and crappie: Support a healthy pan fish population by encouraging the catch and release of largemouth bass.	PLMD Fish Committee	WDNR Fisheries Biologist	
Largemouth bass: Angler education and enforcement regarding length limit of bass.	PLMD Fish Committee	WDNR Fisheries Biologist	
Northern pike: Improve and enhance forage base and aquatic vegetation.	PLMD Fish Committee	WDNR Fisheries Biologist	
Perch: Improve and add woody habitat to shorelines.	Shoreland property owners	WDNR Fisheries Biologist	
Fish stocking efforts to be coordinated with WDNR Fisheries Biologist. Fingerlings should be tested for VHS prior to stocking in the lake.	PLMD Fish Committee	WDNR Fisheries Biologist	

Objective 11.6. Pursue biological monitoring programs to learn more about the organisms in Pleasant Lake and to track changes in populations.

Actions	Lead person/group	Resources	Timeline
Consider pursuing volunteer monitoring opportunities for freshwater mussels (Mussel Monitoring Program of Wisconsin), Wisconsin Frog and Toad Survey, and others.	Interested lake users	Wisconsin Citizen-based Monitoring Network	

Guiding Vision for Pleasant Lake Wildlife

Pleasant Lake will have a habitat to support diverse, desirable wildlife.

Goal 12. Maintain local wildlife populations.

Objective 12.1. Maintain desirable habitat to attract favorable waterfowl, reptiles, mammals, and amphibians.

Actions	Lead person/group	Resources	Timeline
Identify and maintain habitat sufficient and of quality to support herons, ducks, loons, eagles, kingfishers, etc.	PLMD Shoreland property owners	WDNR Wildlife Biologists Consultants	
Amphibians: maintain Turtle Bay wetland and shoreline areas currently supporting frogs and toads. Increase shoreland vegetation to provide more connected habitat.	Shoreland property owners PLMD	WDNR Wildlife Biologists Healthy Lakes Grants	Ongoing
Reptiles: preserve and protect habitat areas that support the lake's turtle population. Provide woody structure for required sunning sites.	Shoreland property owners	WDNR Wildlife Biologists Healthy Lakes Grants	Ongoing

Guiding Vision for Invasive and Undesirable Wildlife Species

Control the Canada geese population on the lake.

Goal 13. Reduce Canada geese resident population.

Objective 13.1. Manage resident Canada geese population to one clutch per season.

Actions	Lead person/group	Resources	Timeline
Manage shorelands in a way that discourages use by geese (shoreland restoration, use of shrubs near shore, etc.)	Shoreland property owners	UWEX Lakes informational materials	Beginning 2015, ongoing
Spring management of nesting geese via WDNR protocol.	Fred Erickson	WDNR Wildlife Biologist	As needed

People and the Lake

People that interact with the lake and its living community are a key component of lake management. A lake management plan is a tool constructed by lake stakeholders to guide human activity on and in the lake. The plan outlines proactive steps to improve lake habitats and the preserve the lakes living community. Decisions made by lake residents and visitors can have positive impacts on the lake and on those who enjoy this common resource. Collaborative efforts can have greater positive impacts; therefore, communication and cooperation between a lake district, its township, the county, lake users, local clubs, and state specialists are essential to implement the plan and maximize its effect.

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

Recreation

Pleasant Lake has multiple public access points to enable lake access and enjoyment. Two public boat landings, one on the northern shore in Waushara County and a second on the southern shore in Marquette County, are available year-round for launching and removing watercraft. The Town of Coloma maintains a swim beach on the northern shore, and there are three additional walk-in access points around the lake.

Pleasant Lake is a popular recreational location throughout the year. It is enjoyed by many people who appreciate its natural scenic beauty. Fall provides beautiful sunsets, colorful leaves, and clear water to enjoy. Winter finds skaters, skiers, and an active fishing community drilling holes through the ice and catching fish. Spring and summer provide opportunities to swim, sail, paddle, and fish. Pleasant Lake provides natural scenic beauty that may be enjoyed by all year-round.

When Pleasant Lake stakeholders were asked what they valued most about Pleasant Lake, 36% of those surveyed (20 respondents) claimed they visited the lake to enjoy a leisurely paddle at least one to three times a month, while 44% (25 respondents) visited Pleasant Lake for the thrill of jet skiing. Recreational activities such as canoeing, kayaking and jet skiing are among the highest valued at Pleasant Lake. Several concerned respondents commented on safety hazards associated with overcrowding during busy weekends and summer months, especially for water skiers. To achieve a balance with different user activities, power boating activities are guided by the Town of Coloma with no-wake hours and traffic rules, in addition to WDNR boating regulations. No-wake hours identified by Town of Coloma ordinance occur between 3 pm and 11 am. A majority of survey respondents (19 of 24) indicated they were happy with these no-wake hours.

The current threat to Pleasant Lake's water quantity from new high capacity wells is a major concern to lake users. Water is a limited resource, the local aquifer is stressed, and in 2014 the lake level declined 1.5-2 feet as a result of existing pumping from the groundwater aquifer. As a result, property values have become a concern among shoreland property owners. Their view is that a lake with no water is not a lake. New high capacity well applications continue to appear, threatening Pleasant Lake's groundwater input. The tax base from Section 33 supports not only the Town of Coloma,

but also the Westfield school district, the technical college, and Waushara County. To maintain financial support for local government, it is important that Pleasant Lake be a lake, and not a prairie or lake remnant.

Guiding Vision for Recreation

Enable recreational opportunities in and on the lake while maintaining natural habitats and safety of lake users.

Goal 14. Encourage enjoyable and safe recreational activities on Pleasant Lake.

Objective 14.1. Maintain safe boating on Pleasant Lake.

Actions	Lead person/group	Resources	Timeline
Maintain current 3:00 pm to 11:00 am as no- wake lake hours.	Town of Coloma Boat patrol	WDNR Warden	Ongoing
Maintain lake's counterclockwise 11:00 am to 3:00 pm boat traffic pattern.	Town of Coloma Boat patrol	WDNR Warden	Ongoing
Inform shoreland property owners and lake users on WDNR boat traffic rules, safety regulations, and Town of Coloma no-wake ordinance.	PLMD web site	WCWLC Newcomers packets WDNR web site	Ongoing
Update and maintain boat ramp signage (both north and south shore) to educate lake users regarding invasive species and boating regulations.	PLMD Board	Town of Coloma	Ongoing
Consider buoying lake sensitive areas (bays) on a temporary basis (1-2 years or more depending on lake water levels) to re-train boaters.		WDNR Water Regulations	
Work with the Town of Coloma supervisors to maintain boat ramp.	PLMD Board Town of Coloma	WDNR Fisheries Biologist	As needed
Work with the Town of Springfield supervisors to maintain boat ramp.	PLMD Board Town of Springfield	WDNR Fisheries Biologist	As needed
Acknowledge the services of Town of Coloma boat regulation and monitoring program.	PLMD		Annually

Objective 14.2. Support the work of respective towns and counties to maintain public access points on the lake.

Actions	Lead person/group	Resources	Timeline
Work with the Town of Coloma to promote and maintain the quality of the Pleasant Lake's public beach and other officially mapped access points.	PLMD	Waushara Area Chamber of Commerce	

Objective 14.3. Support non-motorized recreational activities such as sailing, paddling, kayaking and stand boarding.

Actions	Lead person/group	Resources	Timeline
Maintain and enforce the current 3:00 pm to 11:00 am as no- wake lake hours.	Town of Coloma	PLMD WDNR Warden	Ongoing
Continue to promote and publicize Pleasant Lake Saturday Sailing regatta schedule in the PLMD Newsletter and other means.	PLMD	Waushara Area Chamber of Commerce	

Objective 14.4. Maintain natural scenic beauty of Pleasant Lake.

Actions	Lead person/group	Resources	Timeline
Continue to advocate for groundwater legislation that will preserve Wisconsin's surface waters, including Pleasant Lake.	PLMD		
Recognize the eagle population and importance the lake makes to their residency.	Lake users		

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 Pleasant Lake enjoyed by many people. National, state and county lake and land managers, highway departments, and local municipalities all play roles in the health of Pleasant Lake. Learning from and working with other lake groups can also be of benefit to the implementation of this plan. This large community of partners, working together on common values, will help to achieve the goals that are outlined in this plan.

Guiding Vision for Communication

Pleasant Lake enjoyers will be aware of important lake information and decisions.

Goal 15. Assure and enhance the communication and outreach of the Pleasant Lake Management District with lake stakeholders.

(This goal and associated actions were taken in part from the Onterra, LLC *Pleasant Lake Supplemental Lake Management Planning Project* found in Appendix E.)

Objective 15.1. Support an Education and Communication Committee to promote stakeholder involvement, inform stakeholders on various lake issues, as well as the quality of life on Pleasant Lake.

Actions	Lead person/group	Resources	Timeline
Investigate how WDNR Small-Scale Lake Planning and/or AIS Education, Planning, and Prevention Grants can be used to facilitate communication.	PLMD Board	PLMD Newsletter PLMD Web page WDNR Lake Specialist	
Continue to pursue with the Town of Coloma, the installation of kiosk/community bulletin board at Town of Coloma Swim Park.	PLMD Board	Town of Coloma UWEX Lakes	
Identify a base level of financial support for educational activities to be undertaken on an annual basis.	PLMD Board		
Recruit volunteers to improve communication and education of membership. Disseminate timely communications via various means—webpage, newsletters, public library, email blasts, educational brochures, kiosk/community bulletin board, text messages, Use “Survey Monkey”, to assure two-way communication beyond scheduled meetings.	PLMD Board	PLMD Newsletter PLMD Web page UWEX Lakes	

Objective 15.2. Provide lake stakeholders information about different topics.

Example topics include: Shoreline restoration and protection; Boating regulations and safety; Importance of maintaining course woody habitat; Effect lawn fertilizers/herbicides have on the lake; Pier regulations and responsible placement to minimize habitat disturbance; Importance of maintaining a healthy native aquatic plant community and minimizing impacts to it; Aquatic invasive species (AIS) prevention and updates for AIS in Pleasant Lake; and, Water quality monitoring updates from Pleasant Lake.

Actions	Lead person/group	Resources	Timeline
Include educational topics in district newsletter, e-mail, or separate educational materials and programs.	PLMD Board	UWEX Lakes	Ongoing
Consider inviting professionals who work with educational topics to speak at district annual meeting or hold workshops, if available.	PLMD Board	UWEX Lakes WDNR Consultants Educators/specialists	As needed
Increase signage and materials at boat launch directed toward educating lake users.	PLMD	Town of Coloma	As needed
Make available more hand-out materials at boat launch and at meetings (include DNR and County publications.)	PLMD	UWEX Lakes Consultants	As needed
Keep district property owner database up-to-date as well as email address listings.	PLMD		Ongoing
Continue to work with other lake groups, fishing or conservation clubs, both townships, counties, and the WDNR to enhance and promote communication.	PLMD	As noted	Ongoing
Charge the PLMD Board with writing more timely news releases and submit to local publications—Argus and Tribute, for example.	PLMD Board		As needed
Provide via the webpage more links to state and local lake regulations, new shoreland property owners information, educational opportunities, and the like.	PLMD		As needed
Conduct annual meeting in September	PLMD		

Objective 15.3. Communicate with and work with other lake-related groups.

Actions	Lead person/group	Resources	Timeline
Provide representation on the WCWLC	PLMD Board	WC UWEX	Ongoing
Encourage PLMD members to participate in the Wisconsin Lakes Convention	PLMD	UWEX Lakes Wisconsin Lakes	Annually

Encourage PLMD members to participate in the Lake Leaders Institute			Semi-annual
PLMD members subscribe to Lake Tides quarterly publication			

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 at least every 5 years.

Guiding Vision for Updates and Revisions

The Lake Management Plan will be revisited, reassessed and updated as the lake and its community evolve.

Goal 16. Review the lake management plan annually, document all management activities and effects.

Objective 16.1. Communicate updates with community members and members of the District.

Actions	Lead person/group	Resources	Timeline
Include plan updates as a regular Board agenda item and at the PLMD annual meeting.	PLMD Board	PLMD Newsletter PLMD Web site	
Notify PLMD property owners of any potential changes in the management plan via PLMD Newsletter.	PLMD Board	PLMD Newsletter PLMD Web site	
PLMD Board will report to the membership via Newsletter, web site, press release, or in person the status of plan action items.	PLMD Board	PLMD Newsletter PLMD Web site	
PLMD Board will employ "Survey Monkey" or similar on-line tool to receive information from lake stakeholders.	PLMD Board		

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 Resource Conservation and Development Council, Inc., Wisconsin Wetlands Association, and Wisconsin Trout Unlimited.

Lake Regulations

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

Comprehensive Plans

The lake management plan and changes to the plan will be presented to the County and the Municipality for review and possible incorporation into their comprehensive plans. The comprehensive plan is intended to be used to guide future decision. Zoning, subdivision, and official mapping decisions must be consistent with the comprehensive plan.

Process for Inclusion in the Municipal Comprehensive Plan

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

Process for Inclusion in the County Comprehensive Plan

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

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

The County Board will consider the recommendations from the Planning & Zoning Committee. The County Board may (a) adopt the amendment to the comprehensive plan by ordinance, (b) adopt the amendment with changes, or (c) request the Land Use Committee or Planning & Zoning Committee revisit the changes to the comprehensive plan.

Use of the Comprehensive Plan

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

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

References

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Appendices

Appendix A. Waushara County Lakes Information Directory

Algae - Blue-Green

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

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

Aquatic Invasive Species/Clean Boats Clean Water

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

Aquatic Plant Management (Native and Invasive)

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

Aquatic Plant Identification

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

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

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

Aquatic Plant Surveys/Management

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

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

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

Boat Landings, Signage, Permissions (County)

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

Boat Landings (State)

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

Boat Landings (Town)

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

Conservation Easements

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

Conservation Easements (cont'd)

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

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

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

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

Critical Habitat and Sensitive Areas

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

Dams

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

Fertilizers/Soil Testing

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

Fisheries Biologist (management, habitat)

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

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

Grants

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

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

Groundwater Quality

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

Groundwater Levels/Quantity

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

Groundwater Levels/Quantity (cont'd)

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

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

Informational Packets

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

Lake Groups – Friends, Associations, Districts

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

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

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

Lake Groups (cont'd)

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 Street, PO Box 487, Wautoma, WI 54982
Phone: 920-787-0416
E-mail: Ken.williams@ces.uwex.edu
Website: http://waushara.uwex.edu/index.html

Water Quality Monitoring

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

Contact: UWSP Wisconsin Environmental Analysis Laboratory
TNR 200, 800 Reserve St., Stevens Point, WI 54481
Stevens Point, WI 54481
Phone: 715-346-3209
E-mail: weal@uwsp.edu
Website: http://www.uwsp.edu/cnr-ap/weal/Pages/default.aspx

Water Quality Problems

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

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

Wetlands

Contact: 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

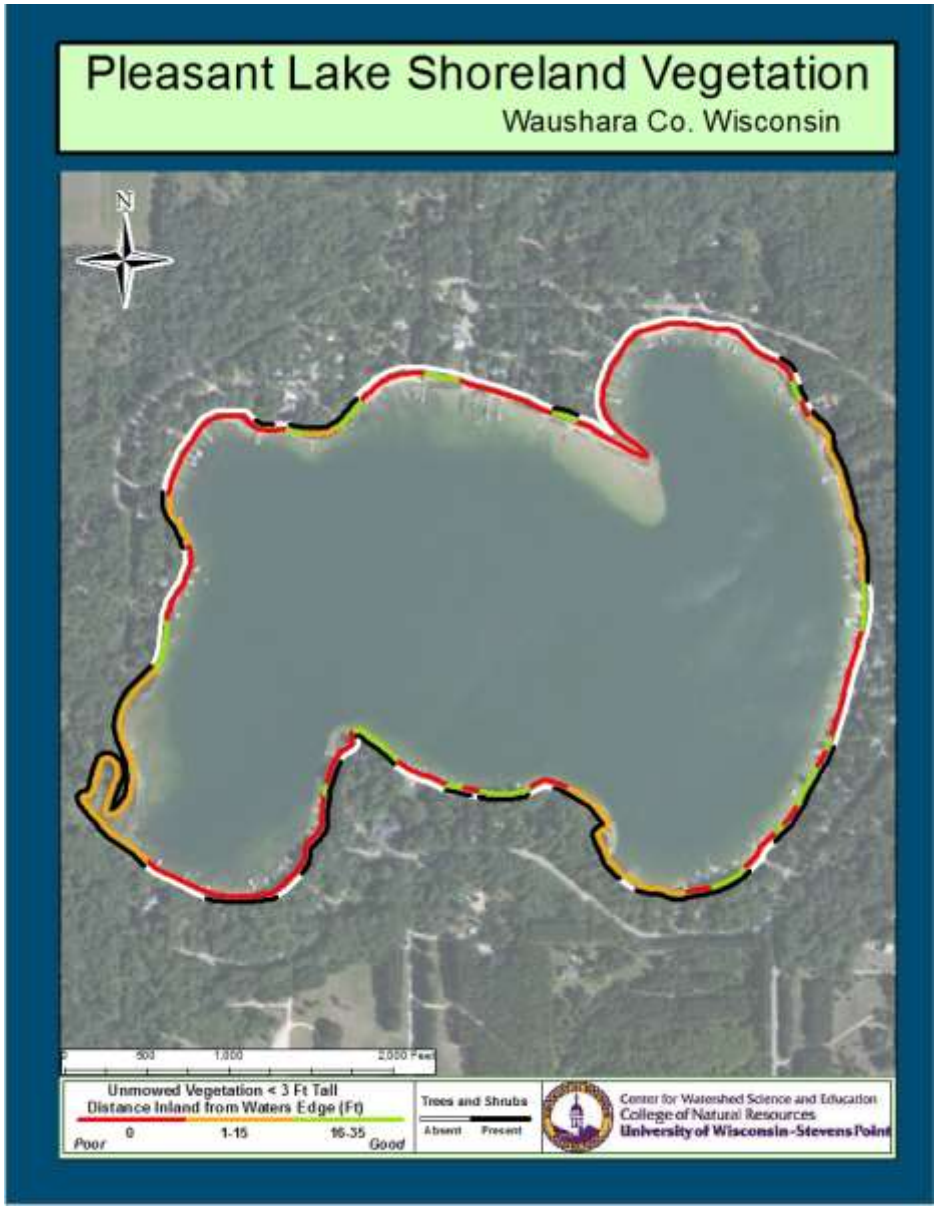
Woody Habitat

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. Shoreland Survey – 2010

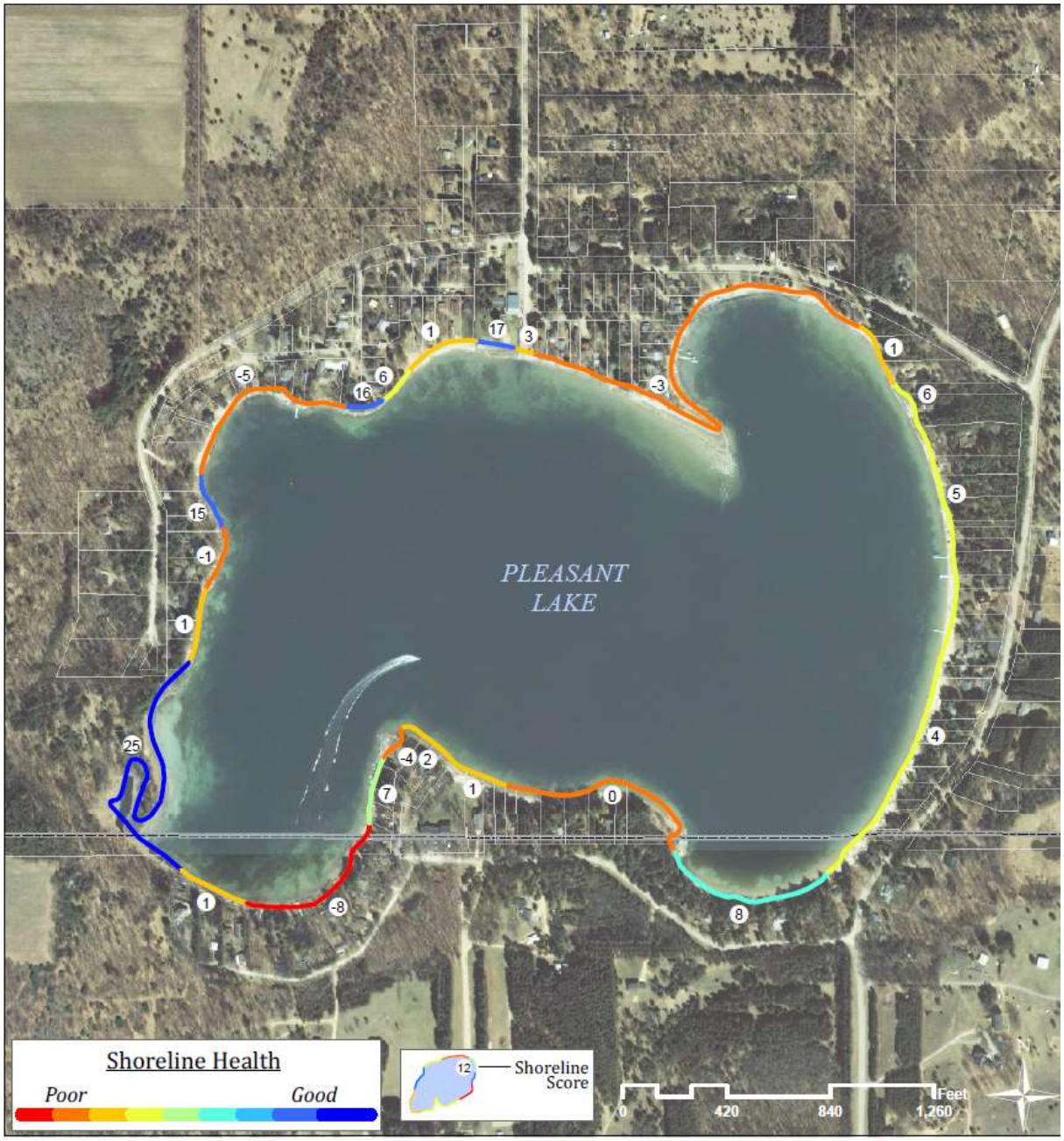
A scoring system was developed for the collected data to provide a more holistic assessment. Areas that are healthy will need strategies to keep them healthy, and areas with potential problem areas and where management and conservation may be warranted may need a different set of strategies for improvement. 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. In the figure on the next page, the shorelands were color-coded to show their overall health based on natural and physical characteristics observed during the 2010 survey. Blue shorelands identify healthy areas with sufficient vegetation and few human disturbances. Red, orange, or yellow shorelands indicate locations where the shoreland could benefit from restoration or plantings. Very little of Pleasant Lake's shorelands ranked as good and some stretches ranked in the poorest category. The map indicates locations where changes in management or mitigation may be warranted, including several areas ranked as poor. For a more complete understanding of the ranking, an interactive map showing results of the shoreland surveys can be found on Waushara County's website at http://gis.co.waushara.wi.us/ShorelineViewer/.



Waushara County Shoreline Assessment

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

PLEASANT LAKE



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 warrented. 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

Appendix C. Rapid Response Plan

SURVEY/MONITOR

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

REPORTING A SUSPECTED INVASIVE SPECIES

1. Collect specimens or take photos. Regardless of the method used, provide as much information as possible. Try to include flowers, seeds or fruit, buds, full leaves, stems, roots and other distinctive features. In photos, place a coin, pencil or ruler for scale. Deliver or send specimen ASAP.	Collect, press and dry a complete sample. This method is best because a plant expert can then examine the specimen. -OR- Collect a fresh sample. Enclose in a plastic bag with a moist paper towel and refrigerate. -OR- Take detailed photos (digital or film).
2. Note the location where the specimen was found. If possible, give the exact geographic location using a GPS (global positioning system) unit, topographic map, or the Wisconsin Gazetteer map book. If using a map, include a photocopy with a dot showing the plant's location. You can use TopoZone.com to find the precise location on a digital topographic map. Click the cursor on the exact collection site and note the coordinates (choose UTM or Latitude/Longitude).	Provide one or more of the following: • Latitude & Longitude • UTM (Universal Transverse Mercator) coordinates • County, Township, Range, Section, Part-section • Precise written site description, noting nearest city & road names, landmarks, local topography

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

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

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

- **The town** in which the waterbody is located.
  Town of: Coloma
  Contact: Mark Kerschner
  Phone: (715) 228-3144

- **Pleasant Lake Management District**
  Contact: Tom Kunes (Pleasant Lake Management District Board Vice President)
  Phone: 608-220-7963

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

- **Local Residents**

- **Irogami Lake Management District**

If an invasive species is confirmed, the District president 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 D. Aquatic Plants

Pleasant Lake aquatic plant survey summary, 2012.

	Lake Average	Statewide Average	North Central Hardwood Forests Ecoregion Average
Littoral Frequency of Occurrence (%)	72.35	74.3	76
Maximum Depth of Plant Growth (ft)	29	15.3	15.9
Species Richness (Including visuals)	28	16.8	16.2
Floristic Quality Index (FQI)	28.56	24.1	23.3

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

Scientific Name	Common Name	Coefficient of Conservatism Value (C Value)	2012 % Frequency of Occurrence
Emergent Species			
Eleocharis palustris	Creeping Spikerush	6	0.39
Floating Leaf Species			
Nymphaea odorata	White water lily	6	2.70
Potamogeton natans	Floating-leaf pondweed	5	1.16
Submergent Species			
Chara sp.	Muskgrass	7	84.17
Potamogeton zosteriformis	Flat-stem pondweed	6	16.99
Vallisneria Americana	Wild Celery	6	14.67
Potamogeton gramineus	Variable pondweed	7	14.29
Najas flexilis	Slender naiad	6	13.90
Potamogeton illinoensis	Illinois pondweed	6	13.13
Stuckenia pectinata	Sago pondweed	3	13.13
Potamogeton praelongus	White-stem pondweed	8	11.58
Heteranthera dubia	Water star-grass	6	7.34
Myriophyllum sibiricum	Northern water-milfoil	6	6.18
Najas guadalupensis	Southern naiad	8	6.18
Potamogeton foliosus	Leafy pondweed	6	5.02
Ceratophyllum demersum	Coontail	3	4.63
Myriophyllum spicatum	Eurasian watermilfoil	0	2.70
Potamogeton friesii	Fries pondweed	8	1.93
Eleocharis acicularis	Needle spikerush	5	1.93
Potamogeton amplifolius	Large-leaf pondweed	7	1.16
Elodea canadensis	Common waterweed	3	0.77
Potamogeton crispus	Curly-leaf pondweed	0	0.39
Potamogeton pusillus	Small pondweed	7	0.39
Potamogeton richardsonii	Clasping-leaf pondweed	5	0.39
Utricularia vulgaris	Common bladderwort	7	0.39

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	LIMITATIONS
∗ No associated cost. ∗ Least disruptive to lake ecosystem.	∗ May not be effective in achieving aquatic plant management objectives.

Hand Pulling

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

Hand Pulling Using Suction

ADVANTAGES	LIMITATIONS
∗ 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.	∗ Costs associated with hiring a diver may be comparable to chemical treatment expenses. ∗ Currently an experimental treatment – not readily available. ∗ If aquatic invasive species are not pulled properly, could worsen the problem.

Mechanical Harvesting

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

Water Level Manipulation

ADVANTAGES	*LIMITATIONS*
∗ Controls aquatic plants in shallower, near-shore areas. ∗ Can be low cost.	∗ Requires a controlling structure on the lake. ∗ May cause undesired stress on ecosystem. ∗ Cannot be used frequently.

Milfoil Weevils

ADVANTAGES	LIMITATIONS
∗ Natural, native maintenance of native and exotic milfoils. ∗ Prefers the aquatic invasive Eurasian Watermilfoil. ∗ Some lakes may already have a native population; need a professional stem count and assessment of shoreland health, structure of fishery, etc. ∗ Doesn't harm lake ecosystem.	∗ Require healthy shoreline habitat for overwintering. ∗ Cannot survive in areas of mechanical harvesting or herbicide application. ∗ Effectiveness highly variable between lakes (only works well for some lakes). ∗ Limited access to weevils for purchase in WI. ∗ Still considered experimental.

Chemical Treatment: Spot

ADVANTAGES	LIMITATIONS
∗ 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.

Chemical Treatment: Lake-wide

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

Pleasant Lake 2012 Aquatic Plant Survey:
Curly-leaf pondweed (Potamogeton crispus)

0 0.0425 0.085 0.17 0.255 0.34 Miles

Occurrence of Curly-leaf pondweed
(Potamogeton crispus)

0
1

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Pleasant Lake 2012 Aquatic Plant Survey:
Eurasian water-milfoil (Myriophyllum spicatum)

0 0.0425 0.085 0.17 0.255 0.34 Miles

Occurrence of Eurasian water-milfoil
(Myriophyllum spicatum)

0
1
2
3

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Appendix E. Pleasant Lake Supplemental Lake Management Planning Project (Onterra, LLC)