2015

Pike Lake and Rice Lake Management Plan
Marathon County, Wisconsin

Roger Zimmermann

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

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Pike Lake and Rice Lake Management Plan

The Pike Lake Sportsman Club adopted the lake management plan on _____. The Pike Lake Fishing Club adopted the lake management plan on _____. Adoption took place after obtaining input from residents and lake users at a series of four public planning sessions held at the Reid Town Hall in Hatley, Wisconsin in June, July, August and September 2014. The inclusive community sessions were designed to identify key community concerns, opportunities, assets and priorities. Representatives of state and local agencies, as well as nonprofit organizations, also attended the planning sessions to offer their assistance to the group in developing a strategic lake management plan (LMP).

The plan was adopted by the Town of Reid on _____
Date

The plan was adopted by the Town of Elderon on July 7, 2015
Date

The plan was adopted by Marathon County on _____
Date

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

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

Marathon County Concerned Citizens and Property Owners

Mayflower Lake District, Pike Lake Sportsman Club and
Wadley Lake Sportsman Club

Marathon County Environmental Fund

Wisconsin Department of Natural Resources Lake Protection Grant Program

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

Pike and Rice Lake Management Planning Committee Members and Resources

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Regional Aquatic Invasive Species Specialist – Kaycie Stushek

Special thanks to Roger Zimmermann for the photos!

Contents

Overarching Vision for Rice Lake

Rice Lake will retain its current conditions including undeveloped or minimally developed adjacent land boasting quality native habitat in and around the lake. Community appreciation for the preservation of the lake will grow with educational opportunities, citizen action, mindful decision-making within the watershed, and balanced use of the lake.

Rice Lake is located in the township of Elderon, south of County Highway II. One public boat launch, owned by the Town of Elderon, is located on its northwestern side. Rice Lake is a 25 acre groundwater drainage lake with groundwater and surface runoff contributing most of its water. The surface watershed extends into the Town of Reid to the west. Water exits the lake from a small outlet on the southern side, which drains into Pike Lake. The maximum depth in Rice Lake is 13.5 feet; the lakebed has a moderate slope and its bottom sediments are comprised entirely of muck. The undeveloped lakeshore consists of densely wooded uplands and bogs which frame the lake in a serene setting.

Based on discussions throughout the planning process, Rice Lake planning session participants identified several priority issues and goals that they would like to focus on in upcoming years:

- Preserve the lake's rich and unique native plant biodiversity
- Protect and enhance the unique and secluded nature of the lake
- Monitor and prevent the spread of aquatic invasive species
- Improve water quality by focusing on land use management practices within the watershed

Overarching Vision for Pike Lake

People will work together on behalf of the lake to protect the natural beauty, water quality and quantity, fish and wildlife, and recreational opportunities in Pike Lake by promoting action that will benefit lake health in a changing landscape for lake enthusiasts in generations to come.

Pike Lake is located in the townships of Reid and Elderon, east of County Highway Y, north of Bevent and south of Hatley. One public boat launch, owned by the Town of Elderon, is located on its southeastern side. Pike Lake is a 206 acre drainage lake with an inflow stream from Rice Lake, surface runoff and groundwater contributing most of its water. A control structure on the lake's south end (at the outflow) raises the lake level by about 2 feet. The maximum depth in Pike Lake is 31 feet; the lakebed has a moderate to steep slope, especially on the western side. Its bottom sediments are mostly muck, with sand along the northern and eastern shores and rock sampled throughout.

Based on discussions throughout the planning process, Pike Lake planning session participants identified several priority issues and goals that they would like to focus on in upcoming years:

- Harvesting and controlling invasive curly-leaf pondweed
- Reducing the nutrient load to the lake
- Improving shoreland habitat

Introduction and Background

This lake management plan (LMP) and its planning process allows communities to guide the fate of their lakes; following the steps laid out in a plan is most critical. The LMP is a dynamic document that identifies goals and action items for the purpose of maintaining, protecting and/or creating desired conditions in a lake within a given period of time. It can correct past problems, improve on current conditions, and provide guidance for future boards, lake users, and technical experts by identifying which issues have been addressed and how successful previous efforts were. Each plan is unique, dependent upon the conditions of the lake, its watershed, and the interests of the stakeholders involved. The actions identified in this lake management plan serve as a gateway for obtaining grant funding and other resources to help implement activities outlined in the plan.

Many individuals and organizations are involved in assuring that Pike and Rice Lake ecosystems are healthy. It is essential for key partners who are responsible for lake and land management work together to achieve this goal. The planning process and content of this plan have been designed to identify where some of the key assistance exists. Following is a list of key partners; this list is not all inclusive.

- **Individuals**: Individuals can use this plan to learn about the lake they love and their connection to it. People living near Pike and Rice lakes can have the greatest influence on the lakes by understanding and choosing lake-friendly options to manage their land and the lakes.
- **Pike Lake Sportsman Club:** This plan provides the Club with a well thought out plan for the whole lake and lists options that can easily be prioritized. Annual review of the plan will also help the Club to realize its accomplishments. Resources and funding opportunities for District management activities are made more available by placement of goals into the lake management plan, and the Club can identify partners to help achieve their goals for Pike Lake.
- **Neighboring lake groups, sporting and conservation clubs**: Neighboring groups with similar goals for lake stewardship can combine their efforts and provide each other with support, improve competitiveness for funding opportunities, and make efforts more fun.
- **The Towns of Reid and Elderon**: 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.
- **Marathon County:** County professionals can identify needs, provide support, base decisions, and allocate resources to assist with some of the lake-related actions documented in this plan. This plan can also inform county board supervisors in decisions related to Marathon County lakes, streams, wetlands, and groundwater.
- **Wisconsin Department of Natural Resources**: Professionals working with lakes in Marathon County can use this plan as guidance for management activities and decisions related to the management of the resource, including the fishery, and invasive species. Lake management plans help the WDNR identify and prioritize needs within Wisconsin's lake community, and decide where to best apply resources and funding. A well thought out lake management plan increases an application's competitiveness for funding from the State – if multiple Marathon County lakes have similar goals in their lake management plans, they can join together when seeking grant support to increase competitiveness for statewide resources. Information about WDNR grants is located on their website http://dnr.wi.gov/lakes/grants/. Grant contacts are also listed in Appendix A.

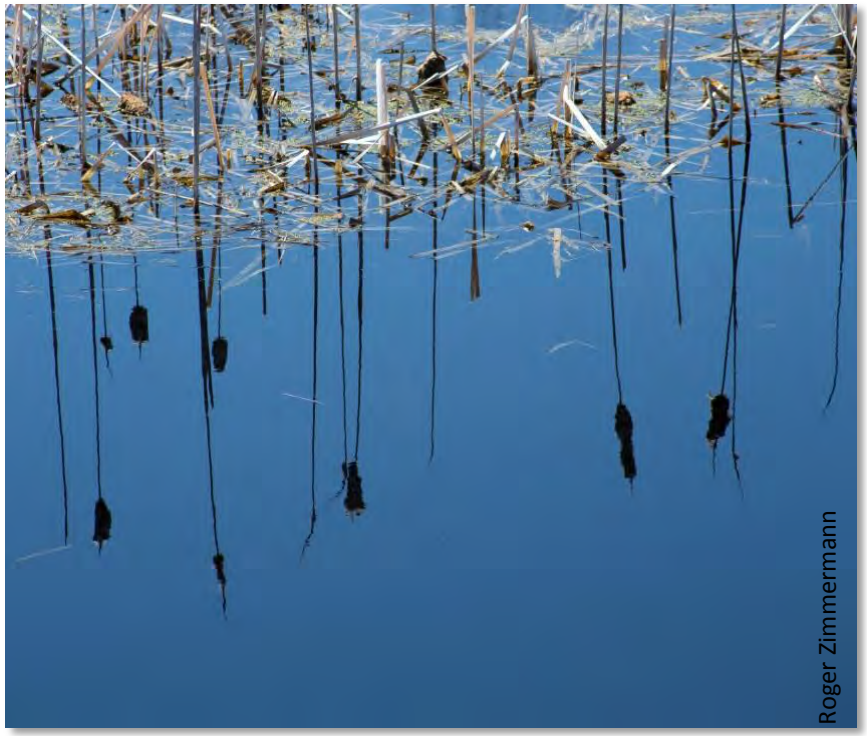
One of the first steps in creating the Pike and Rice Lake management plan was to gather and compile data about the lake and its ecosystem to understand past and current lake conditions. The Eastern Marathon County Lakes Project was initiated by citizens who encouraged Marathon County to work in partnership with UW-Stevens Point to assess 11 lakes located in the eastern portion of the county, with funding from the Wisconsin Department of Natural Resources Lake Protection Grant Program, the county's environmental fund, and monetary and in-kind contributions from citizens. One of the first steps of the project was the Eastern Marathon County Lakes Study (2010-12), which gathered and compiled data about the 11 lakes and their ecosystems in order to understand past and current lake conditions. Prior to this study, most of the lakes had limited data available to evaluate current water quality concerns, shoreland health, surrounding land use, aquatic plant communities, invasive species, and the fishery. Professionals and students from UW-Stevens Point conducted the study and interpreted the data for use in lake management planning. The results of this project (including this document) will assist citizens, municipalities, Marathon County, and State staff to efficiently manage their water resources and help make informed decisions and policies that affect their lakes.

In addition to the Eastern Marathon County Lakes Study, data collected by citizens, consultants and professionals from the Wisconsin Department of Natural Resources were incorporated into the planning process to provide a robust set of information from which informed decisions were made in this plan. Sources of information used in the planning process are listed at the end of this document.

Several reports from the Pike Lake and Rice Lake studies, and the materials associated with the planning process and reports, can be found on the Marathon County website: http://www.co.marathon.wi.us/Departments/ConservationPlanningZoning/ConservationServices/LakePrograms.aspx.

The purpose of this plan is to identify features important to the lake community in order to provide a framework for the protection and improvement of the lakes. This framework, or lake management plan, will enable citizens and other supporters to achieve the vision for Pike and Rice lakes now and in the years to come. A series of four public planning sessions were held between June and September 2014 at the Reid Town Hall to assist area residents, Pike Lake Sportsman Club members, lake users, and representatives of local municipalities with the development of the lake management plan. The sessions enabled participants to learn about and discuss the topics of the fishery and recreation, the algal and aquatic plant community, water quality and land use, shoreland health, and communication.

The purpose of this plan is to identify factors important to Pike and Rice lake residents and users, and layout implementation strategies needed to protect and improve Pike and Rice lakes for future generations.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Participation in the planning process was open to everyone and was encouraged by letters sent directly to Pike Lake waterfront property owners and nearby residents, press releases to local newspapers, and emails.

Guest experts and professionals from various organizations (listed below) were invited to attend the planning sessions, present information, and respond to questions from participants. In addition to environmental and regulatory considerations, experts were able to provide context, insight and recommendations for planning participants to consider in their lake management plan. This information was incorporated into planning session discussion topics, which included the fishery and recreation, the aquatic plant community, water quality and land use, shoreland health, and communication. After learning about the current conditions of each topic, participants identified goals, objectives and actions for the lake management plan. Planning session notes and presentations were posted to the Marathon County website.

The Pike and Rice Lake Planning Committee consisted of property owners, Sportsman Club members, recreational users, and town board members. Technical assistance during the planning process was provided by the Marathon County Conservation Planning and Zoning Department, the Marathon County Community, Natural Resources and Economic Development Extension Agent, and professionals from the Wisconsin Department of Natural Resources, Golden Sands Resource Conservation and Development Council, Inc., University of Wisconsin-Extension, and the University of Wisconsin-Stevens Point Center for Watershed Science and Education.

Goals, Objectives and Actions

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

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

In-Lake Habitat and a Healthy Lake

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

Landscapes and the Lake

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

People and the Lake

Recreation—access, sharing the lake, informing lake users, rules
Communication and Organization—maintaining connections for partnerships, implementation, community involvement
Updates and Revisions—continuing the process
Governance—protection of the lake, constitution, state, county, local municipalities, Pike Lake Sportsmen's Club, Pike Lake Fishing Club

Resources listed within the plan identify the primary organizations or individuals that are able to provide information, suggestions or services to accomplish the goals and objectives. This list should not be considered all-inclusive – assistance may also be provided by other entities, consultants and/or organizations. Listed below are common acronyms for the resources mentioned in the following pages. Complete contact information for many organizations that support lake management in Marathon County can be found in Appendix A. This list should not be considered all-inclusive – assistance may also be provided by other entities, consultants, and organizations.

Acronym	Organization/Resource
CBCW	Clean Boats Clean Waters
CWSE	UWSP Center for Watershed Science and Education
CPZ	County Planning and Zoning (includes Land Conservation Department)
MC	Marathon County
NCCT	North Central Conservancy Trust
NRCS	USDA Natural Resources Conservation Service
PLSC	Pike Lake Sportsman Club
PLFC	Pike Lake Fishing Club
RC&D	Golden Sands Resource Conservation and Development Council, Inc.
UWSP	University of Wisconsin-Stevens Point
UWEX	UW-Extension
WEAL	Water and Environmental Analysis Lab
WDNR	Wisconsin Department of Natural Resources
WDOT	Wisconsin Department of Transportation

In-Lake Habitat and a Healthy Lake

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

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

The Fish Community

A balanced fish community has a mix of predator and prey species, each having different food, habitat, nesting substrate and water quality needs in order to flourish. A sustainable fishery is one that seeks to be in balance with the lake's natural ability to support the fish community, and in which populations do not noticeably decline over time because of fishing practices or other human activity. Ultimately, the fish community is able to adapt to fishing without additional stocking or input because its reproductive and growth needs are met within the lake.


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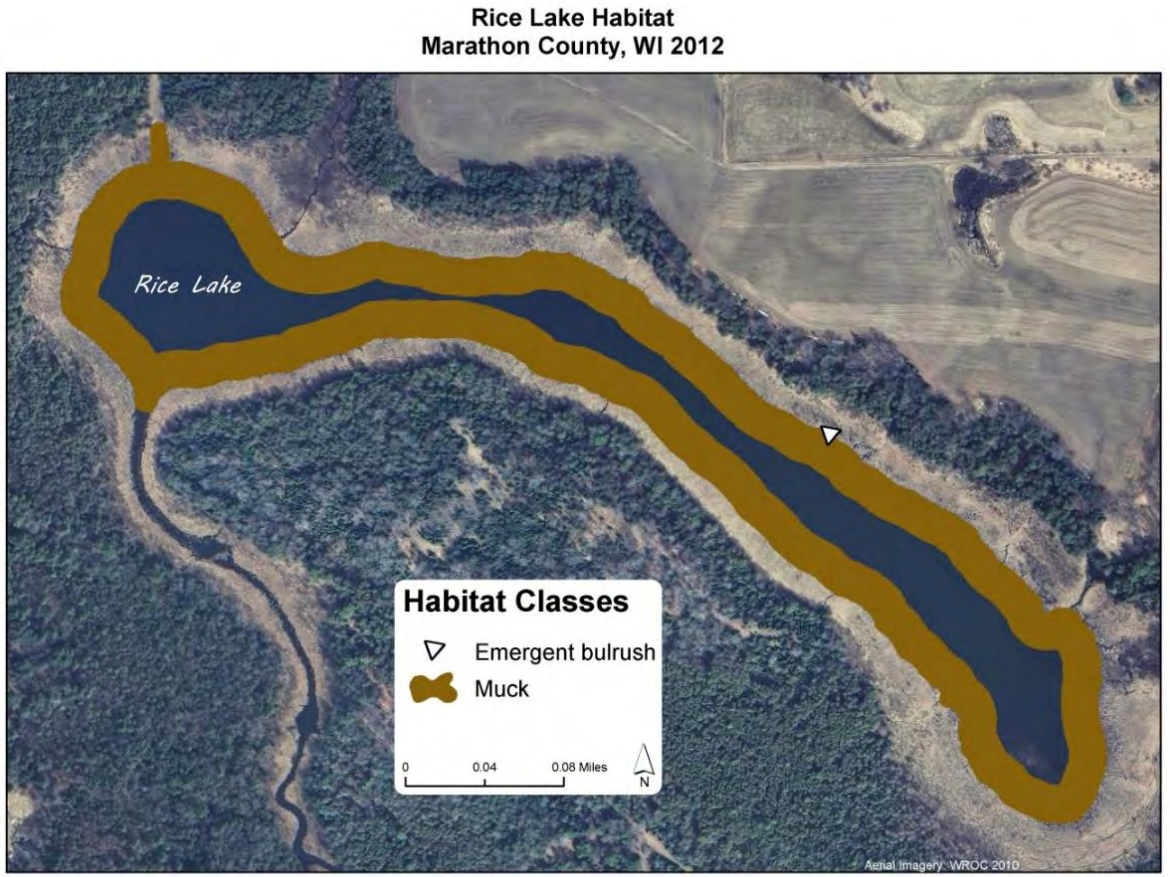
Activities in and around a lake that can affect a fishery may come from disturbance of the native aquatic plant community or substrate, excessive additions of nutrients or harmful chemicals, removal of woody habitat, shoreline alterations, and/or an imbalance in the fishery. Shoreland erosion can cause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

People are an important part of a sustainable fish community. Their actions on the landscape and the numbers and sizes of fish taken out of the lake can influence the entire lake ecosystem. Putting appropriate fishing regulations into place is one way to provide for excellent fishing. Adhering to regulations can help to balance the fishery with

healthy prey and predatory species, and regulations can also be adjusted if the fish community changes.

Managing a fishery in a sustainable fashion results in fewer expenses to lake stewards and the public. While some efforts may be necessary to provide a more suitable environment for fish, sustainable practices need not be repeated frequently. Protecting existing habitat such as emergent, aquatic and shoreland vegetation, or simply allowing trees to remain where they naturally fall in a lake is free of cost. Restoring habitat in and around a lake can have an up-front cost, but the effects will last for decades.

Labor, travel and other expenses are associated with routine efforts such as fish stocking and aeration. Ideally, a lake will contain the habitat, water quality and food necessary to support the fish communities present within the lake and provide fishing opportunities without requiring supplemental efforts (and expense) to maintain these conditions.



Rice Lake

Rice Lake supports a warm water fish community. In 2011, six fish species were sampled and identified out of the eight total species that were recorded in previous surveys dating back to 1960 obtained from the Wisconsin Department of Natural Resources. Four fish species were newly documented in 2011: yellow bullhead, brown bullhead, golden shiner and central mudminnow. Two fish species were documented previously, but not observed during the 2011 survey: black bullhead and white sucker. Bluegill was most abundant during the 2011 survey; maximum length of this species was 8.5 inches. Although infrequently encountered, northern pike reached 30.8 inches. Crayfish were not encountered during the survey.

A review of Wisconsin Department of Natural Resources records revealed little fisheries management information for Rice Lake. In 1960, a Wisconsin Department of Natural Resources fisheries report indicated northern pike and largemouth bass were common in this system. In the same year, management recommendations were made to focus on northern pike and largemouth bass management, along with common panfish. Shortly after 1960, public access to the lake was approved and constructed. Fish stocking records for Rice Lake date back to 1962 in Wisconsin Department of Natural Resources files. Historic stocking consists of adult northern pike and muskellunge fingerlings.

Species	1960	1975	2011
Black Bullhead		x	
Black Crappie	x	x	x
Bluegill	x	x	x
Brown Bullhead			x
Golden Shiner			x
Largemouth Bass	x	x	x
Central Mudminnow			x
Northern Pike	x	x	x
Pumpkinseed	x	x	x
White Sucker	x	x	
Yellow Bullhead			x
Yellow Perch	x	x	x

Bottom substrate and woody habitat were examined from the shoreline lakeward for a distance of 30 meters. Substrate in Rice Lake is soft muck (100%). In the absence of sand and coarser substrates such as gravel, largemouth bass and sunfish are known to build nests on soft bottoms. Depressions are deepened until some small amounts of coarser substrate, or fragments of snail shells, accumulate in the bottom of the nests. In areas of soft substrate, largemouth bass are also reported to nest on woody habitat swept clear of sediments. Gravel areas are used by many fish for spawning habitat, including sunfish (bluegill, pumpkinseed, and black bass), where males will construct nests and guard their young. Northern pike, which do not offer parental care, use areas with emergent and floating leaf vegetation in shallow or flooded areas for spawning. Black crappie also use bulrush habitat on gravel or sand substrates where they construct nests and guard their young. Yellow perch seek near-shore cobble in oxygen-rich environments for spawning activity; no parental care is offered. Sparse areas of soft stem bulrush were present in Rice Lake. Sand can be important habitat for reproduction of non-game minnow. The absence of young northern pike in the 2011 sampling may be an indicator of poor reproduction, although more intense population sampling over several seasons would be required to determine the reproductive success for individual fish species. The presence of young bass and abundant sunfish sampling indicate successful reproduction of these species.

Coarse woody habitat (CWH), including downed trees and logs, was not present in Rice Lake. This structure would be used by young prey fish and other aquatic organisms for foraging, protection and spawning. The addition of CWH cover in Rice Lake would likely benefit the fish community.

Guiding Vision for the Fish Community of Rice Lake

Rice Lake will have a well-balanced, sustainable fishery.

Goal 1. Support conditions that provide healthy habitat.

Objective 1.1. Enhance and improve fish habitat in Rice Lake.

Actions	Lead person/group	Resources	Timeline
Identify areas for tree drops or placement of fish sticks. Work with fisheries biologist to obtain permit.	PLSC PLFC	WDNR	Winter 2015-2016

Pike Lake

Pike Lake supports a warm water fish community. The Pike Lake fish species assemblage is more diverse than neighboring lakes in eastern Marathon County because it is a drainage lake and fish have opportunities to enter from upstream and downstream systems. In 2012, fourteen fish species were sampled and identified out of the eighteen total species that were recorded in previous surveys dating back to 1956 obtained from the Wisconsin Department of Natural Resources. Four fish species were newly documented in 2012: bluegill x pumpkinseed hybrid, brown bullhead, bluntnose minnow and Iowa darter. Four fish species were documented previously, but not observed during the 2012 survey: channel catfish, rock bass, slender madtom and spotfin shiner. Bluegill, yellow perch and yellow bullhead were abundant during the survey. Golden shiner, brown bullhead, Iowa darter, spottail shiner, common shiner and white sucker were infrequently encountered. Two rusty crayfish were captured during the sampling period.

Species	1956	1969	1973	1975	1976	1977	1990	1996	2002	2005	2008	2012
Black Bullhead		x		x			x	x	x			x
Black Crappie	x	x	x	x	x	x	x	x	x		x	x
Bluegill	x	x	x	x	x	x	x	x	x	x	x	x
Bluegill x Pumpkinseed hybrid												x
Brown Bullhead												x
Bluntnose Minnow												x
Channel Catfish								x				
Common Shiner										x		x
Golden Shiner	x	x					x	x	x			x
Iowa Darter												x
Johnny Darter					x							x
Largemouth bass	x	x	x	x	x	x	x	x	x	x	x	x
Northern pike	x	x	x	x	x	x	x	x	x	x	x	x
Pumpkinseed		x			x		x	x	x	x	x	x
Rock Bass									x			
Slender Madtom										x		
Spotfin Shiner									x			
Spottail shiner										x		x
Walleye		x	x	x		x	x	x	x		x	x
White sucker	x	x		x	x			x	x			x
Yellow bullhead									x			x
Yellow Perch	x	x	x	x	x	x	x	x	x	x	x	x

Fish species in Pike Lake, 2012 survey and historical Wisconsin Department of Natural Resources records.

In 1971, it was reported that eutrophication of Pike Lake was occurring more rapidly than expected because of algae blooms and occasional winterkills of fish due to low dissolved oxygen. The concern over eutrophication continues today as evidenced by continuing sporadic

reports of winterkills. In the winter of both 2011 and 2012, dissolved oxygen fell below concentrations needed to support many fish species at the deep hole; however, the aeration system operated during the winter months in Pike Lake, helping to ensure that the fishery had sufficient oxygen for survival.

Fish stocking records for Pike Lake date back to 1938 in Wisconsin Department of Natural Resources files. Walleye have been prevalently stocked from 1938 through recent years. Stocking management has switched from primarily fry walleye to fingerling size, including more fry stocking in recent years. Yellow perch have also been stocked in recent years and an abundant population of perch was present during 2012 sampling. It is not possible to evaluate the effectiveness of these stocking efforts with the limited sampling conducted during this study.

Bullheads were reported to be the dominant fish species in terms of biomass at times from 1960-1970. In order to reduce the bullhead population, considerable efforts were made to increase the walleye population through stocking and natural reproduction. With Wisconsin Department of Natural Resources approval, a walleye spawning reef was installed by the Pike Lake Sportsman Club in 1981 along the eastern shore; however, this did not improve the natural reproduction of walleye. After 2006, Walleyes for Tomorrow installed a second artificial walleye spawning reef adjacent to the southern inlet with better contouring and a larger surface area for the same purpose. In 2006, Boy Scouts installed three fish cribs constructed of wooden pallets anchored to the bottom.

Bottom substrate and woody habitat were examined from the shoreline lakeward for a distance of 90 feet using side-scan sonar. Substrate distribution in Pike Lake is approximately one-half soft bottom (55.6% muck) and one-half hard bottom (26.4% sand, 15% sand/gravel/cobble, <1% cobble or boulder). Harder surfaces are present mainly along the eastern shoreline. Gravel areas are used by many fish for spawning habitat, including sunfish (bluegill, pumpkinseed, black bass), where males will construct nests and guard their young. Northern pike, which do not offer parental care, use areas with emergent and floating leaf vegetation in shallow or flooded areas for spawning. Black crappie also use bulrush habitat on gravel or sand substrates where they construct nests and guard their young. Yellow perch and walleye seek near-shore cobble in oxygen-rich environments for spawning activity; no parental care is offered. Bulrush is present along areas of the western shoreline in Pike Lake. Sand

Distribution of substrate and coarse woody habitat near shore in Pike Lake, 2012.

can be important habitat for reproduction of non-game minnow.

The presence of young bass and abundant sunfish sampling indicate successful reproduction is occurring in Pike Lake. The absence of young northern pike in 2012 may be an indicator of poor reproduction, although more intense population sampling efforts over several seasons would be required to determine the reproductive success for individual fish species. Walleye reproduction has been variable in Pike Lake, and no young walleyes were observed during the sampling period.

Coarse woody habitat (CWH), including downed trees and logs, are sparse in Pike Lake. CWH is an important component of the lake ecosystem, as it is used by fish and other aquatic organisms for spawning, foraging and protective cover. The addition of CWH cover into Pike Lake would benefit the fish community.

Pike Lake has been selected for research associated with the Wisconsin Walleye Initiative by the Wisconsin Department of Natural Resources based on its stocking history, current structure of the fishery and lake type. Approximately 1,000 walleye fingerlings will be stocked in Pike Lake every other year for six years starting in 2015. Local fishing clubs are asked to not stock walleye during this time (including off years). Additionally, new panfish regulations are being proposed for Pike Lake (15 bag limit, no more than 5 fish of any one species) to address the decreasing size trend of bluegill. If passed, the regulations would take effect in 2016.

Guiding Vision for the Fish Community of Pike Lake

Pike Lake will have a healthy, well-structured fishery that provides great angling.

Goal 1. Support conditions that provide a healthy fishery.

Objective 1.1. Enhance and improve fish habitat.

Actions	Lead person/group	Resources	Timeline
Encourage shoreland property owners to consider tree drops/fish sticks. Identify willing property owners and explore a lake-wide permit.	PLSC PLFC	WDNR Fishery Biologist	Winter 2015-2016
Maintain littoral (lake shallows) zone and emergent aquatic plants by educating lake users about the importance of habitat via newsletters/e-mails.	PLSC PLFC	UWEX Lakes (educational materials)	Ongoing
Educate residents about shoreland restoration and critical woody habitat and fish sticks via the annual meeting and newsletters.	LCD	UWEX Lakes (educational materials)	Ongoing

Continually maintain and evaluate records of aeration in Pike Lake.	PLSC		Ongoing

Objective 1.2. Continue to supplement the fishery as needed.

Actions	Lead person/group	Resources	Timeline
Continue stocking efforts on an annual basis. Confer with WDNR fisheries biologist on results of latest fish surveys.	PLFC	WDNR Fishery Biologist	

Aquatic Plants

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

Purple pitcher plant (*Sarracenia purpurea*)

Sundew (*Drosera* spp.)

Aquatic plants near shore

provide food, shelter and nesting material for shoreland mammals, shorebirds and waterfowl. It is not unusual for otters, beavers, muskrats, weasels and deer to be seen along a shoreline in their search for food, water or nesting material.

Rice Lake

Twenty-two species of aquatic plants were identified in Rice Lake or wet areas of the shore during the 2012 survey, with the greatest diversity located in shallows along the perimeter of the lake. This is slightly above average compared to other lakes in the Eastern Marathon County Lakes Study, ranking 5th out of the 11 lakes. The dominant plant species in the survey was coontail, followed by flat-stem pondweed and white water lily. Coontail offers an important food source to a wide range of waterfowl species. A number of invertebrates and fish use the bushy stems and stiff whorls of leaves as habitat, especially in the winter when other aquatic plants have died back. Flat-stem pondweed also provides a food source for waterfowl. This native and widespread aquatic plant provides cover and grazing opportunities for fish. The seeds produced by white water lily are also a food source for waterfowl. The broad, floating leaves of the plant provide shade and shelter to fish and other species (Borman et al., 2001). Many interesting bog species have been documented by area residents around Rice Lake, including carnivorous pitcher plants and sundew (see photos).

Guiding Vision for Aquatic Plants in Rice Lake

Rice Lake will have a diversity of high quality native aquatic plants that support a thriving fishery and excellent water quality.

Goal 2. Maintain or enhance the existing native plant community in Rice Lake.

Objective 2.1. Preserve/protect the high quality plant community, bogs and wildlife at Rice Lake.

Actions	Lead person/group	Resources	Timeline
Inform visitors about the lake's unique and vibrant native aquatic plant community with a brochure available at the public access that includes interesting facts, an interpretive tour (by boat?), and/or other.	LCD	UWEX Lakes (educational materials) WDNR Lake Protection Grants Paul Skawinski	
Inform visitors about the lake's unique and vibrant native aquatic plant community with a sign near the public access about rare species identified in the area.	PLSC	UWEX Lakes (educational materials) Town of Reid	
Explore ways to preserve the undisturbed shoreland by working with the Town/County to establish	PLSC	Town of Reid CPZ	

conservancy zoning (either setback or overlay).			
Explore ways to preserve the undisturbed shoreland by identifying land for conservation easements/land purchase/deed restriction.	PLSC	NCCT Town of Reid	
Minimize removal of aquatic plants, particularly near the boat launch by informing residents and visitors via signage, brochure, or other.	PLSC	UWEX Lakes (educational materials) Town of Reid	

Objective 2.2. Minimize or eliminate disturbance to the native aquatic plant community.

Actions	Lead person/group	Resources	Timeline
Refrain from disturbance of native aquatic plants.			
Inform visitors to the lake about protection of quality aquatic plants through a brochure or signage at boat landing.		UWEX Lakes (educational materials) Town of Reid	
Inform existing and new lakeshore owners about the protection of the native aquatic plant community.		UWEX Lakes (educational materials)	

Pike Lake

During the 2012 aquatic plant survey of Pike Lake, twenty-one species of aquatic plants were found in Pike Lake, with the greatest diversity located in the western and southwestern sides of the lake. The dominant plant species during the survey was flat-stem pondweed (*Potamogeton zosteriformis*), followed by coontail (*Ceratophyllum demersum*) and muskgrass (*Chara* spp.). Flat-stem pondweed provides a food source for waterfowl. This native and widespread aquatic plant also provides cover and grazing opportunities for fish. Coontail offers an important food source to a wide range of waterfowl species. A number of invertebrates and fish use the bushy stems and stiff whorls of coontail leaves as habitat, especially in the winter when other aquatic plants have died back. Muskgrass 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 (Borman et al., 2001).

Overall, the aquatic plant community in Pike Lake can be characterized as having good species diversity. The habitat, food source and water quality benefits of this diverse plant community should be focal points in decision-making concerning future lake management strategies.

According to Wisconsin Department of Natural Resources records, aquatic plant management efforts have been conducted in Pike Lake since the 1940s, with varying degrees of success. Harvesting, primarily for curly-leaf pondweed, began in 2003. In 2006, the Pike Lake Sportsman Club held a series of meetings to develop a plan to manage aquatic plants that impeded recreation. The goals of the plan and the planning processes included: 1) promote a healthy aquatic plant community; 2) reduce algae blooms; 3) reduce negative (invasive) aquatic plants (i.e. curly-leaf pondweed), if possible; 4) better understand the lake ecology; 5) improve water quality; 6) enhance the panfish population; and, 7)support a core group who will learn to identify aquatic plants and monitor for aquatic invasive plant species and changes in the aquatic plant community. In 2013, the Pike Lake Sportsman Club board members reviewed the aquatic plant management plan (APM) and the 2012 aquatic plant survey results. They felt the strategies outlined in the APM would provide the desired results in the lake in terms of water quality improvements and navigation while providing habitat and ecological integrity for the lake's inhabitants. Portions of the APM are appended to this plan. More detailed information can be found in the Pike Lake Aquatic Plant Report or the Pike Lake 2010-2012 Lake Study Report, and the 2007 Pike Lake Aquatic Plant Management Plan (King and Turyk, 2007).

White water lily (*Nymphaea alba*)

In addition to the most recent plant survey, aquatic plant surveys were conducted in Pike Lake in 1999, 2002 and 2006. According to these studies and surveys, the overall number and species composition had shifted over time. Not only were aquatic plant management efforts damaging native plants, they were unsuccessful in achieving desired conditions. As a result, a plan for aquatic plant management in Pike Lake was developed.

The aquatic plant management plan was a collaborative effort between citizens living around and near Pike Lake, the Pike Lake Sportsman Club, the towns of Reid and Elderon, and the Marathon County Conservation, Planning, and Zoning Department. Guidance was provided by professionals from the Wisconsin Department of Natural Resources and the UW-Stevens Point Center for Watershed Science and Education. The plan addressed non-native aquatic plant species control with the harvesting of curly-leaf pondweed, and access lanes between docks and open water developed in balance with the protection of critical habitat areas and the conservancy area around the island at the southern end of Pike Lake. Through these actions, citizens will be able to enjoy the lake while the fishery and wildlife in and around the lake benefit. The aquatic plant management plan developed in 2007 and updated in 2012 was reviewed at the aquatic plant planning session in 2014.

See the Aquatic Plant Management Plan for Pike Lake in Appendix D for further details.

Guiding Vision for Aquatic Plants in Pike Lake

Pike Lake will support a healthy native aquatic plant community, balanced fishery and abundant wildlife that enhances the recreational interests of lake users.

Goals: Aspire to the goals laid out in the Aquatic Plant Management Plan for Pike Lake: 1) promote a healthy aquatic plant community; 2) reduce algae blooms; 3) reduce negative (invasive) aquatic plants (i.e. curly-leaf pondweed), if possible; 4) better understand the lake ecology; 5) improve water quality; 6) enhance the panfish population; and, 7) support a core group who will learn to identify aquatic plants and monitor for aquatic invasive plant species and changes in the aquatic plant community.

Objective 1. Follow the strategies laid out in the Pike Lake APM and formally adjust APM if necessary.

Actions	Lead person/group	Resources	Timeline
Monitor aquatic plant community prior to APM updates.	RC&D*	Consultant	Every 5 years - starting summer 2017
Update APM every 5 years	PLSC	WDNR Aquatic Plant Specialist	2018
Explore the restoration of bulrush beds to provide habitat and reduce energy creating shoreline erosion.	PLSC	WDNR Aquatic Plant Specialist – Scott Provost Master Gardeners	
Interested volunteers learn to identify native aquatic plant species in Pike Lake.	PLSC	RC&D*	2015
Restore areas of erosion with a 'plant barrier'. Focus shoreland restoration efforts in these places first.	Shoreland Property Owners	CPZ Consultant	Ongoing

***** Note: Services offered by Golden Sands RC&D are dependent on available funds through grants or lake groups.

Aquatic Invasive Species (AIS)

Aquatic invasive species are non-native aquatic plants and animals that are most often unintentionally introduced into a lake via lake users. This most commonly occurs on trailers, boats and equipment, and from the release of bait.

Rice Lake

Rice Lake has confirmed populations of curly-leaf pondweed, banded mystery snail and Chinese mystery snail. A special survey was conducted in June 2011 to inventory curly-leaf pondweed (CLP). CLP was found in multiple locations throughout the lake, and in some areas it was dense. During the full vegetation survey conducted in the summer of 2012, CLP was also found in a few locations with cold groundwater flow. CLP can have an impact on a lake's

ecosystem because of its life cycle: CLP grows under the ice during late winter/early spring and starts to die back in late June/early July, releasing phosphorus as algae and new plants are beginning to grow, possibly fueling algae blooms and excessive plant growth.

Guiding Vision for Aquatic Invasive Species in Rice Lake

Rice Lake will not be adversely impacted by aquatic invasive species (AIS).

Goal 3. Existing AIS in Rice Lake will be controlled or eradicated.

Objective 3.1. Monitor existing populations of aquatic invasive species in Rice Lake and effectively manage or eliminate these populations through administrative and manual techniques.

Actions	Lead person/group	Resources	Timeline
Conduct regular AIS surveys to track/map change.	RC&D*	WDNR Aquatic Plant Specialist	
Conduct training for interested residents on the identification and proper removal techniques of AIS (CLP).	PLSC	RC&D*	2015
Protect and leave in place as much native aquatic vegetation as possible.			Ongoing
Include information about the threat of AIS in a welcome packet or newsletter and remind lake users to clean plants off trailers, drain motors and live wells, and wash boats before and after entering/leaving the lake.	CPZ	RC&D* WDNR Clean Boats, Clean Waters Program	Ongoing
Enhance the native aquatic plant community (see AP chapter).	CPZ	WDNR Aquatic Plant Specialist	

Goal 3. Prevent other aquatic invasive species from entering Rice Lake.

Objective 3.2. Educate and encourage visitors to Rice Lake about how to control the transport of invasive species between water bodies.

Actions	Lead person/group	Resources	Timeline
Work with RC&D to identify volunteers and receive training for Wisconsin's Clean Boats Clean Waters program.		RC&D* WDNR Clean Boats, Clean Waters Program	
Improve/enhance signage at boat landing.	CPZ	Town of Reid	
Closely monitor for and take immediate action if a new AIS is	PLSC	RC&D*	

observed in the lake.			

* Note: Services offered by Golden Sands RC&D are dependent on available funds through grants or lake groups.

Pike Lake

Yellow iris (*Iris pseudacorus*)

Pike Lake has been home to the non-native species curly-leaf pondweed (*Potamogeton crispus*) since 1989, according to Wisconsin Department of Natural Resources records. A special survey of Pike Lake was conducted in June 2012 to inventory populations of this species (a map of abundance and location of curly-leaf pondweed can be found in the appendices). During the survey, curly-leaf pondweed was found along the entire length of the lake's western shore. This non-native species grows under the ice during late winter and early spring and typically begins to die back in late June and early July. This die-back releases nutrients into the water just as other species of aquatic plants and algae are beginning to grow. The input of nutrients fuels algal blooms and excessive plant growth.

Curly-leaf pondweed (*Potamogeton crispus*)

A shoreland invasive, the yellow iris, was also identified in Pike Lake by Golden Sands Resource Conservation and Development Council, Inc. in June 2010, along the shorelines on the southern end and in the outlet stream channel. A map of yellow iris presence is located in Appendix D.

Guiding Vision for Aquatic Invasive Species in Pike Lake

Pike Lake will not be adversely affected by aquatic invasive species.

Goal 2. Pike Lake will reduce current populations of invasive aquatic species without the use of chemicals to levels that do not significantly impact the lake.

Objective 2.1. Remove curly-leaf pondweed by mechanical and manual means before turions are developed in mid-summer.

Actions	Lead person/group	Resources	Timeline
Continue annual harvesting operations as outlined in the Pike Lake APM.	PLSC	Lake Renewal Corporation	Ongoing
Provide training to residents to identify CLP and encourage appropriate manual removal techniques.	PLSC	RC&D* Consultant	
Continue rusty crayfish removal.	PLSC	RC&D*	Ongoing
Include a list of current AIS in annual report.	PLSC	RC&D*	Annually

Goal 3. No new populations of aquatic invasive species will be introduced into Pike Lake.

Objective 3.1. Educate lake users about AIS prevention.

Actions	Lead person/group	Resources	Timeline
Educate residents and their guests to only put clean boats into the lake.	PLSC	RC&D* WDNR Clean Boats, Clean Waters Program	Ongoing
Train residents to identify AIS and what to do if they believe they see one.	PLSC	RC&D*	Ongoing
Coordinate with RC&D* for Clean Boats, Clean Waters volunteers during heavy boating weekends.	PLSC	RC&D* WDNR Clean Boats, Clean Waters Program	Ongoing
Maintain signage at boat landing.	PLSC	Town of Reid	Ongoing
Include AIS information in a welcome packet/shoreland owner's guide (MC). (See Communication section.)	PLSC LCD	RC&D* Marathon County CPZ Dept.	Ongoing

Objective 3.2. If new aquatic invasive species are found, take proactive measures for early detection and removal.

Actions	Lead person/group	Resources	Timeline
Refer to the Pike and Rice Lake Rapid Response Plan (Appendix C).	PLSC	Pike and Rice Lake Rapid Response Plan (Appendix C).	As needed
Learn about identification and proper manual removal techniques for AIS.	PLSC	RC&D*	

* Note: Services offered by Golden Sands RC&D are dependent on available funds through grants or lake groups.

Critical Habitat

Special areas of a lake contain habitat essential to the health of the lake and its inhabitants. In many lakes in Wisconsin, critical habitat areas are identified by biologists and other lake professionals with the Wisconsin Department of Natural Resources to protect features in a lake that are important to the overall health and integrity of the lake, including aquatic plants and animals. While every lake contains important natural features, not all lakes have official critical habitat designations. The critical habitat designation can be used to raise awareness and identify locations on maps that may be vulnerable to damage by certain activities. Having a critical habitat designation on a lake can help lake groups and landowners plan waterfront projects in a way that will minimize impact to this important habitat, ultimately helping to ensure the long-term health of the lake.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Rice Lake

Rice Lake does not currently have any officially designated critical habitat areas.

Guiding Vision Rice Lake's Critical Habitat

Sensitive areas on Rice Lake will be enhanced and protected from degradation.

Goal 4. Preserve and redevelop high quality habitat for fish and wildlife.

Objective 4.1. Identify potentially critical habitat on Rice Lake.

Actions	Lead person/group	Resources	Timeline
Request critical habitat designations.	PLSC	WDNR Aquatic Plant Specialist and Lake Manager	
Once identified, help others understand the value of these areas.	PLSC	UWEX Lakes (educational materials) WDNR Aquatic Plant Specialist and Lake Managers	

Pike Lake

A critical habitat study of Pike Lake was conducted on October 5, 2006 by the Wisconsin Department of Natural Resources, during which three areas were designated as critical habitat. Multiple years of aquatic plant, water quality, and fish survey data were used in the designation of critical habitat during the study. Attributes common to the critical habitat areas include benefits to water quality, wildlife habitat, and fish habitat.

Critical Habitat Area 1 contains the island and south outlet. This area has a very high quality and diverse plant community with both deep and shallow marsh wetlands, providing excellent habitat for fish and wildlife. Three sensitive species were recorded in Critical Habitat Area 1: pickerelweed (*Pontederia cordata*), small bladderwort (*Utricularia gibba*), and flat-leaf bladderwort (*Utricularia intermedia*). A special recommendation for Critical Habitat Area 1 was to designate a slow no-wake area behind the island, but it has never been implemented.

Critical Habitat Area 2 includes the West Shore, which hosts deep and shallow marsh wetland habitat and high quality shoreland habitat in areas where understory, woody cover, and unmowed grassy cover were located.

Critical Habitat Area 3 includes the North Shore Reef, encompassing about 12 acres of the northeastern shore. Important shallow water habitat can be found here, containing sediment with a mixture of gravel, sand silt, and muck—some of which may be important spawning habitat for fish. When surveyed in 2007, it was noted that much of the woody habitat important to fish (logs, sticks, stumps, etc.) had been removed from the area. The area's shoreline is also dominated by mowed/manicured lawn, which can lead to the detriment of this habitat area via entry of sediment and nutrients.

Critical habitat designations in Pike Lake by the Wisconsin Department of Natural Resources, 2007.


Roger Zimmermann

Recommendations for all Critical Habitat Areas included restoring unmowed shoreland vegetation, refraining from the use of lawn care products on properties adjacent to Critical Habitat Areas, maintaining aquatic vegetation for wildlife habitat, no additional pier placement, no approval for rip-rap or retaining walls, and no removal of lake bed materials.

Guiding Vision Pike Lake's Critical Habitat

Sensitive areas in and around Pike Lake will remain intact and protected.

Goal 4. Protect existing important habitat for fish and wildlife. Ensure a healthy lake ecosystem is sustained by protecting critical habitat areas.

Objective 4.1. Support critical habitat designations (CHDs) designated by WDNR professionals.

Actions	Lead person/group	Resources	Timeline
Restore shorelands in CHA 3. Identify locations for CWH placement.	PLSC		
Provide information about CHDs and their importance to the lake via welcome packets, newsletter, etc.	PLSC	UWEX Lakes WDNR	Ongoing
Support protection of land surrounding the wetlands on the western end of the lake through conservation easements and other means.	PLSC PLFC Township	NCCT NRCS WDNR Lake Protection Grants Wisconsin Stewardship Program	As opportunities arise
Increase plants/bulrushes in critical habitat designation	PLSC	CPZ WDNR	

Landscapes and the Lake

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

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

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

Water Quality

Rice Lake

Water quality was assessed during the 2010-2012 lake study, and past water quality data were acquired and reviewed to determine trends in Rice Lake's water quality. These data included a number of measures such as temperature, dissolved oxygen, water chemistry, and phosphorus. Each of these interrelated measures plays a part in the lake's overall water quality.

Based on temperature, the lake was somewhat stratified during the growing season (May-September) as surface water warmed. The stratification was weak enough that strong winds could have mixed the water. This is not ideal during the summer as the bottom water is often rich with nutrients from the sediment, and bringing this water into warmer conditions at the top may result in algal blooms.

Water clarity in Rice Lake was considered fair with the poorest measurements occurring in September and the best in October. Sporadic past water clarity data (1999-2007) suggested similar values with clarity slightly better today in August and poorer in September. Fluctuations throughout the summer are normal, as algal populations and sedimentation (primary influences on water clarity) increase and decrease.

Chloride levels, and to lesser degrees sodium and potassium levels, are commonly used as indicators of how strongly a lake is being impacted by human activity. Chloride and potassium concentrations were quite elevated and sodium concentrations were slightly elevated (compared to typical background levels). Although these elements are not detrimental to the aquatic ecosystem, they indicated that sources of contaminants such as road salt, fertilizer, animal waste and/or septic system effluent may be entering the lake from surface runoff and/or via groundwater.

Phosphorus is an element that is essential in trace amounts to most living organisms, including aquatic plants and algae. Sources of phosphorus can include naturally-occurring phosphorus in soils, 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, relatively small increases in phosphorus result in significant increases in aquatic plants and algae.

Total phosphorus concentrations in Rice Lake ranged from a high of 82 µg/L in April 2012 (following spring runoff) to a low of 23 µg/L in February 2011, with summer median concentrations of 53 µg/L and 23.5 µg/L in 2011 and 2012, respectively. Concentrations in 2011 exceeded Wisconsin's phosphorus standard of 40 µg/L for shallow seepage lakes.

Managing phosphorus in the Rice Lake watershed is the key to protecting the lake itself. Watershed activities that increase the input of phosphorus to the lake include fertilizing, removing native vegetation (trees, bushes and grasses), mowing grass and increasing the amount of exposed soil. Phosphorus inputs to Rice Lake can be controlled through the use of management practices that minimize the movement of phosphorus to the lake.

Nitrogen is also a nutrient that can impact water quality and plant and algae growth. Springtime concentrations of inorganic nitrogen above 0.3 mg/L indicated that there is sufficient nitrogen present in the lake to support summer algae blooms. In Rice Lake, inorganic nitrogen concentrations averaged 0.82 mg/L in samples collected during spring 2011-2012. Inorganic nitrogen is likely entering Rice Lake in groundwater. Common sources include fertilizers and animal waste.

Guiding Vision for Water Quality in Rice Lake

Rice Lake will have water quality that reflects the pristine nature of the lake.

Goal 5. Improve water quality in Rice Lake.

Objective 5.1. Reduce phosphorus concentrations to consistently be below the standard of 40 mg/L for shallow groundwater drainage lakes within the next 5 years. Reduce concentrations of inorganic nitrogen to 0.3 mg/L over the next 15 years.

Actions	Lead person/group	Resources	Timeline
Support the farm operators to implement water-quality based nutrient strategies for their farms and fields to reduce excess nitrogen and chemical exports.	CPZ Townships	CPZ MC UWEX Ag Agent NRCS	Ongoing

Objective 5.2: Monitor water quality to evaluate improvements, declines, and trends over time. Currently, no routine monitoring is being done.

Actions	Lead person/group	Resources	Timeline
Conduct annual monitoring of water clarity using a Secchi disk.		WDNR	
Contact the regional Citizen Lake Monitoring Network (CLMN) coordinator to learn more about lake monitoring options and to become a volunteer lake monitor.		WDNR	
Explore participation in county (or state) -wide lake level studies. Explore involvement in an Eastern Marathon County Lakes group/association.		CPZ WDNR	
Explore the installation of rain gardens, rain barrels, and other management practices that slow and filter water as it travels toward the lake.		CPZ MC UWEX Ag Agent NRCS	

Pike Lake

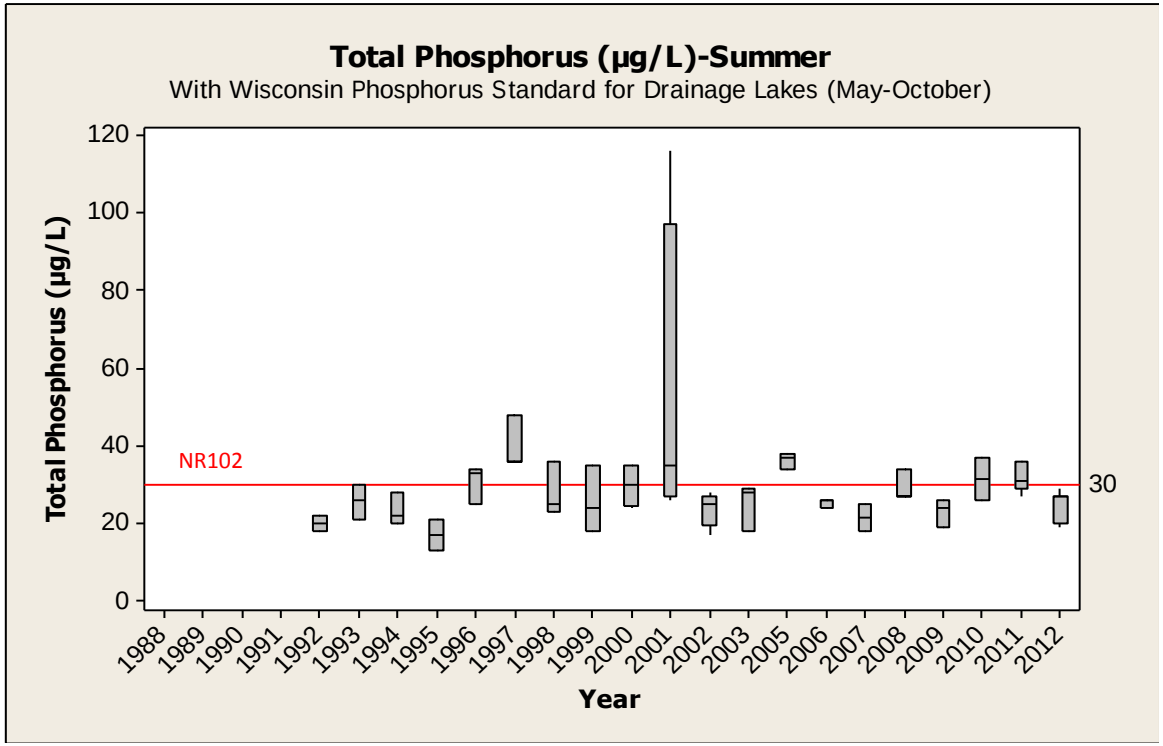
Dissolved oxygen is an important measure in Pike Lake because a majority of organisms in the water depend on oxygen to survive. Oxygen is dissolved into the water from contact with air, which is increased by wind and wave action. Algae and aquatic plants also produce oxygen when sunlight enters the water, but the decomposition of dead plants and algae reduces oxygen in the lake. Dissolved oxygen concentrations in Pike Lake ranged from plentiful to limited, depending upon depth and time of year. Dissolved oxygen was mixed from top to bottom during spring and fall. In the winter of both 2011 and 2012, dissolved oxygen fell below concentrations needed to support many fish species at the deep hole; however, the aeration system operated during the winter months in Pike Lake, helping to ensure that the fishery had sufficient oxygen for survival. Following spring overturn, dissolved oxygen concentrations began to drop sharply at depths of 6-10 feet as biological processes in the sediment consumed oxygen.

The variability in water clarity throughout the year in Pike Lake was primarily due to fluctuating algae concentrations and re-suspended sediment following storms or heavy boating activity. The water clarity in Pike Lake is considered fair. During the growing season, the average water clarity measurements collected from Pike Lake were poorest in August and best in July. A relatively complete dataset of water clarity measurements has been collected for Pike Lake since 1988. When compared with this historic data, the average water clarity measured during the study was slightly better in May and September and poorer in June and October.

Chloride, sodium and potassium concentrations are commonly used as indicators of how a lake is being impacted by human activity. The presence of these compounds where they do not naturally occur indicates sources of water contaminants. Over the monitoring period, concentrations of potassium, chloride and sodium were elevated. These concentrations are not harmful to aquatic organism, but indicated that pollutants are entering the lake. Sources of chloride and potassium include animal waste, septic systems, fertilizer and road-salting chemicals. Atrazine (DACT), an herbicide commonly used on corn, was below the detection limit (<0.01 ug/L) in the samples that were analyzed from Pike Lake.

Phosphorus is an element that is essential in trace amounts to most living organisms, including aquatic plants and algae. Sources of phosphorus can include naturally-occurring phosphorus in soils, 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, relatively small increases in phosphorus result in significant increases in aquatic plants and algae.

Total phosphorus concentrations during the study period in Pike Lake ranged from a high of 99 µg/L in April 2012 (following spring runoff) to a low of 19 µg/L in August 2012. The summer median total phosphorus concentrations were 31 µg/L and 26 µg/L in 2011 and 2012, respectively. These are very close to Wisconsin’s phosphorus standard of 30 µg/L for deep drainage lakes. This is relatively stable when compared to historical phosphorus data going back to 1992 (see the figure at the top of the next page).



Boxplot of summer phosphorus in Pike Lake.

During the study, inorganic nitrogen concentrations in samples collected during the spring averaged 0.6 mg/L. Concentrations above 0.3 mg/L are sufficient to enhance algal blooms throughout the summer (Shaw et al., 2000). Inorganic nitrogen typically moves to lakes with groundwater.

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

Guiding Vision for Water Quality in Pike Lake

Pike Lake will have clear, clean water that supports a healthy fishery and uninhibited recreational opportunities.

Goal 5. Pike Lake's water quality will continue to improve.

Objective 5.1. Reduce phosphorus concentrations to consistently be below the standard of 30 mg/L for deep drainage lakes within the next 5 years. Reduce concentrations of inorganic nitrogen to 0.3 mg/L over the next 15 years.

Actions	Lead person/group	Resources	Timeline
Decrease/eliminate the use of fertilizers on lawns around the lake to reduce inputs of nitrogen and	PLSC	MC UWEX (educational materials)	Ongoing

phosphorus.			
Explore the use of lake water as fertilizer for shoreland residents.	PLSC	WDNR Lake Management Specialist	2015
Encourage landowners to minimize impervious surfaces, utilize rain gardens/rain barrels and restore vegetation.	PLSC	CPZ	2015
Improve shoreland vegetation to reduce phosphorus loading to lake (See shoreland section).	PLSC	Property owners CPZ Consultants	2015
Offer/facilitate soil testing for interested landowners at the Labor Day annual meeting.	PLSC CPZ		2015
Support County and Town in working with farm operators to implement water-quality based nutrient strategies for their farms and fields to reduce excess nitrogen and chemical exports.	CPZ Townships	CPZ MC UWEX Ag Agent NRCS	Ongoing
County and Town will enforce septic system compliance.	MC Townships		Ongoing

Objective 5.2. Continue current water quality monitoring and begin new monitoring programs.

Actions	Lead person/group	Resources	Timeline
Continue water chemistry (phosphorus, SRP, nitrogen) and temperature monitoring twice a year during spring and fall overturn. Continue regular Secchi disc measurements.	PLSC CLMN Volunteer	UWSP Water and Environmental Analysis Lab (Package B) CLMN Coordinator for MC	Ongoing
Begin Ice on/Ice off monitoring. Continue water clarity monitoring.	PLSC	CLMN Coordinator for MC	
Encourage property owners to test their well water for nitrate.	PLSC	MC UWEX Certified Labs	Ongoing

Shorelands

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

Rice Lake

Rice Lake has approximately 8,415 feet of shoreline. The overall findings showed that 8,371 linear feet of shoreline were classified as having a grasses/forbs buffer depth of greater than 35 feet, which is the minimum depth required by Wisconsin administrative rules and Marathon County shoreland zoning ordinances. Although Rice Lake's shoreland was observed to be in good shape during the survey, changes can easily occur as development takes place. In order to minimize impacts from future development, prospective developers should have the information needed to make good decisions, and zoning should be in place to achieve habitat, water quality, and aesthetic goals for Rice Lake.

Guiding Vision for Rice Lake's Shorelands

Rice Lake's shorelands will remain natural and undisturbed.

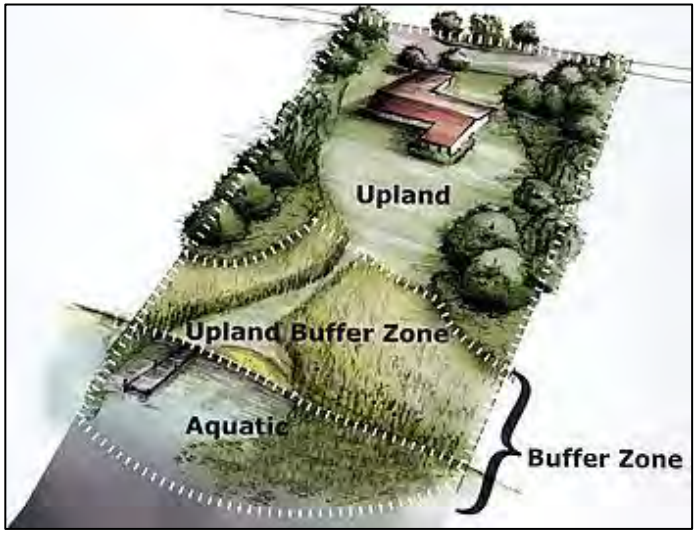
Goal 6. Keep Rice Lake's shorelands natural and undisturbed.

Objective 6.1. Protect healthy, stable shoreland habitat near and around Rice Lake.

Actions	Lead person/group	Resources	Timeline
Explore strengthening vegetative buffer language in zoning regulations affecting Rice Lake.		MC CPZ Wisconsin Lakes	
Encourage shoreland restoration by property owners.		CPZ Consultants	

Pike Lake

Pike Lake has approximately 12,200 feet, or 2.3 miles, of shoreline. The survey indicated that 10,550 linear feet (86%) of shoreline were classified as having a grasses/forbs buffer depth of less than 35 feet. Similar results were classified for the shrubs layer as well. The grasses, forbs and shrubs vegetation buffers are required to be at least 35 feet, according to Wisconsin administrative rules and Marathon County shoreland zoning ordinances. Trees represented the most abundant vegetative layer around the lake, with 7,633 linear feet classified as having a buffer width greater than 50 feet. Shoreland survey results are displayed in Appendix B. Although Pike Lake's shoreland has abundant development, efforts can be made to improve the shoreland. In order to minimize impacts from current and future development, prospective developers should have the information needed to make good decisions, and zoning should be in place to achieve habitat, water quality, and aesthetic goals for Pike Lake.



On the same day the shoreland vegetation survey was conducted, an assessment of manmade disturbances was conducted on Pike Lake. Surveyors paddled along the shoreline and documented artificial beaches, docks, rip-rap, seawalls, erosion, and any structures built near the water's edge. A table in Appendix B documents the manmade disturbances found on Pike Lake. Structures such as seawalls, rip-rap (rocked shoreline), and artificial beaches often result in habitat loss. Docks and artificial beaches can result in altered in-lake habitat, and denuded lakebeds provide opportunities for invasive species to become established and reduce habitat important to fish and other lake inhabitants. Erosion can contribute sediment to the lake, altering spawning habitat and carrying nutrients into the lake. Unmanaged runoff from the rooftops of structures located near shore can also contribute more sediment to the lake. Alone, each manmade feature may not pose a problem for a lake, but on developed lakes, the collective impact of manmade disturbances can be a problem for lake habitat and water quality.

Shoreland ordinances were enacted to improve water quality and habitat, and to protect our lakes. County shoreland ordinances and State administrative rules (related to NR 115) state that vegetation should extend at least 35 feet inland from the water's edge, with the exception of an optional 30 foot viewing corridor for each shoreland lot. Although some properties were grandfathered in when the county ordinance was initiated in 1966, following this guidance will benefit the health of the lake and its inhabitants.

Guiding Vision for Pike Lake's Shorelands

Pike Lake will have healthy shorelines that encourage a healthy lake ecosystem for aquatic and terrestrial wildlife and to minimize runoff.

Goal 6. Maintain vegetated shorelines where they already exist, and encourage shoreland restoration where it does not.

Objective 6.1. Show support for healthy shoreland maintenance and restoration.

Actions	Lead person/group	Resources	Timeline
Provide materials to property owners re: shoreland buffer vegetation in welcome packets and at the annual meeting.	CPZ Township PLSC	UWEX Lakes (educational materials)	Ongoing
Maintain information and get assistance re: shoreland vegetation, help with restoration/plantings for interested property owners.	PLSC	CPZ Consultants Master Gardeners	Ongoing
Commend property owners who maintain/restore a shoreland vegetation buffer in the Pike Lake newsletter.	PLSC		Annually
Explore specific locations/dates/times that can be viewed for examples of healthy shoreland vegetation buffers		CPZ Master Gardeners	
Explore obtaining a grant to conduct a beginning phase of a demonstration shoreland restoration project. Continue project through stages if possible with grant/landowner permission.	PLSC	Marathon County CPZ Consultants	
Utilize resident Master Gardener for consulting on landscaping techniques.			Ongoing

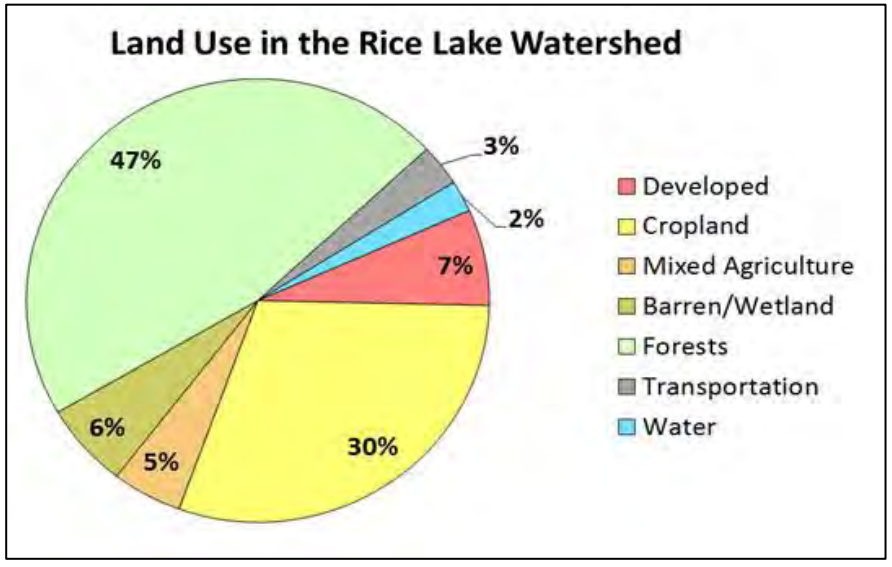
Objective 6.2. Reduce the effects of impervious surfaces on properties surrounding the lake.

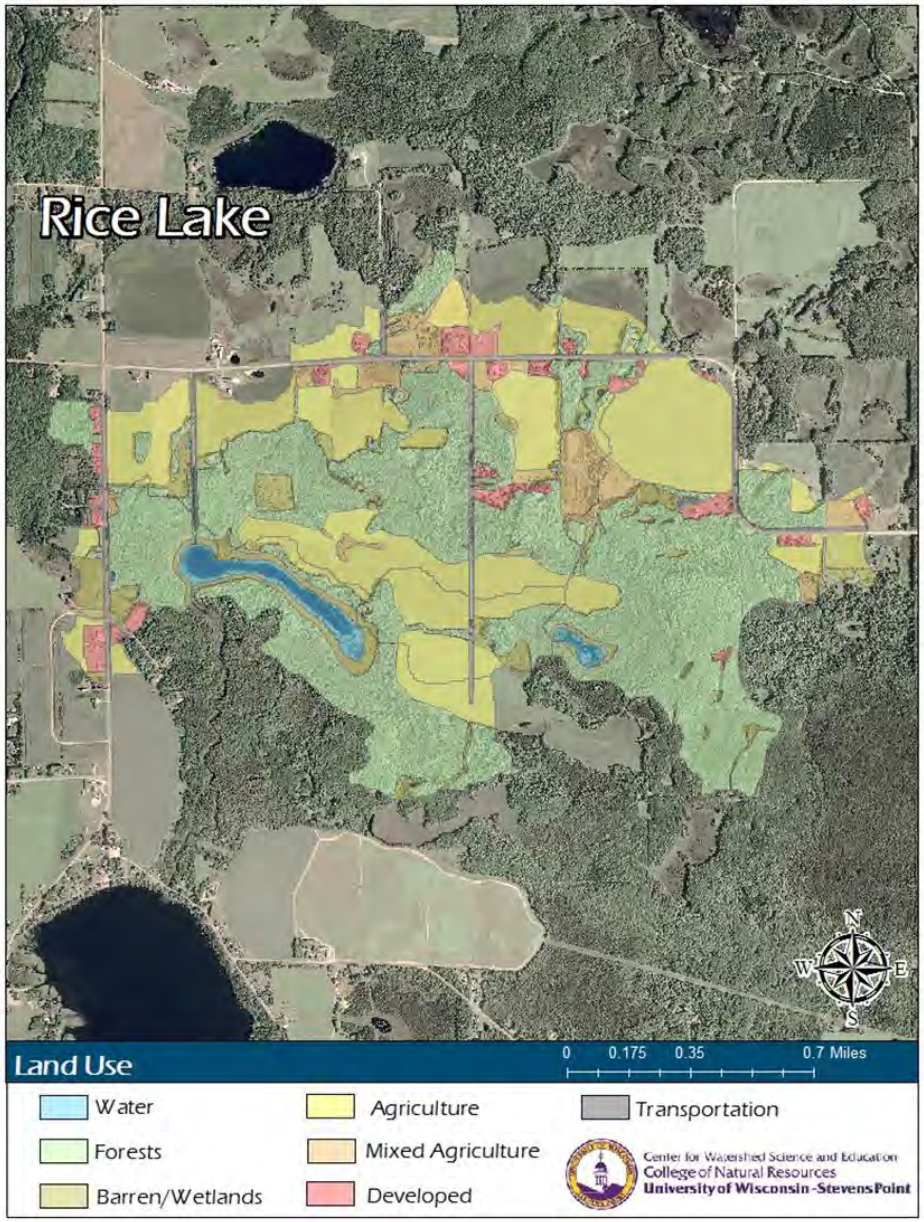
Actions	Lead person/group	Resources	Timeline
Encourage installation of rain gardens and native vegetation around the lake. Provide information about rain gardens and shoreline restoration; direct those interested to contact LCD.	PLSC	CPZ Consultants	Ongoing

Watershed Land Use

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

The capacity of the landscape to shed or hold water and contribute or filter particles determines the amount of erosion that may occur, the amount of groundwater feeding a lake, and ultimately, the lake's water quality and quantity. Essentially, landscapes with greater capacities to hold water during rain events and snowmelt slow the delivery of the water to the lake. Minimizing excess runoff is desirable because it allows more water to recharge the groundwater, which feeds the lake year-round - even during dry periods or when the lake is covered with ice.





A variety of land management practices can be put in place to help reduce impacts to our lakes. Some practices are designed to reduce runoff. These include protecting/restoring wetlands, installing rain gardens, swales, rain barrels, and routing drainage from pavement and roofs away from the lake. Some practices are used to help reduce nutrients from moving across the landscape towards the lake. Examples include manure management practices, eliminating/reducing the use of fertilizers, increasing the distance between the lake and a septic drainfield, protecting/restoring wetlands and native vegetation in the shoreland, and using erosion control practices.

Rice Lake

The surface watershed of Rice Lake is 1,308 acres. Primary land use is forest and cropland with residential development scattered throughout. The lake's shoreland is comprised of forest and wetlands with no near shore development.

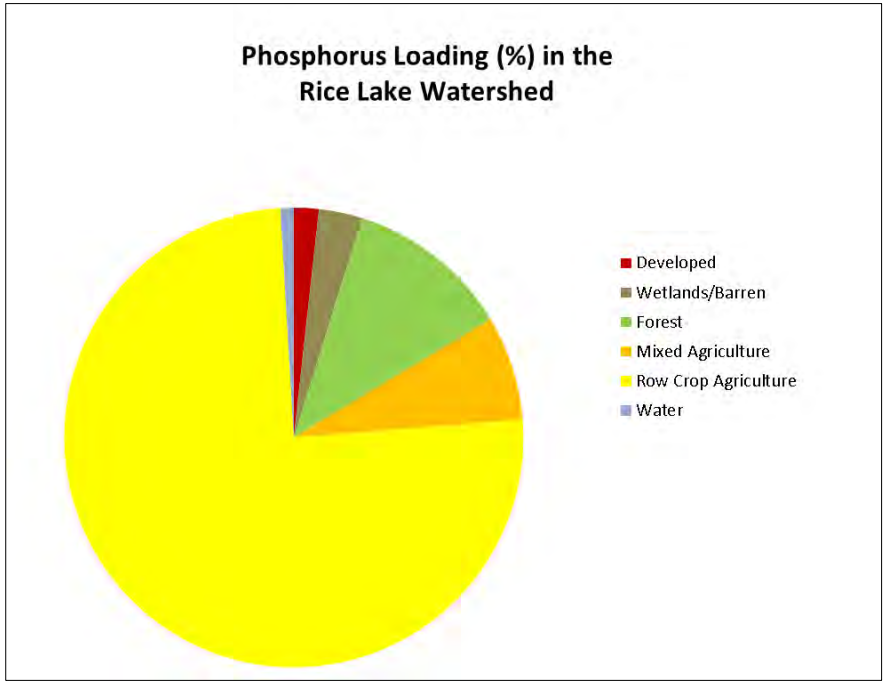


Figure 1 Estimated phosphorus loads from land uses in the Rice Lake watershed

Guiding Vision for Rice Lake's Watershed

Rice Lake will be minimally impacted by land use in its watershed.

Goal 7. Protect quality habitat and natural areas within the watershed from future degradation to enhance water quality, aesthetics and the wildlife community.

Objective 7.1. Encourage watershed landowners to restore and/or enter land into conservation programs.

Actions	Lead person/group	Resources	Timeline
Identify quality natural land and shoreland within the watershed and encourage landowner entry into conservation programs (Purchase of Development Rights, Conservation Easement, etc.).		NCCT Marathon County CPZ Dept.	Ongoing
Explore funding options for land purchase within the watershed for conservation, preservation, or restoration purposes.		NCCT Marathon County CPZ Dept.	As needed

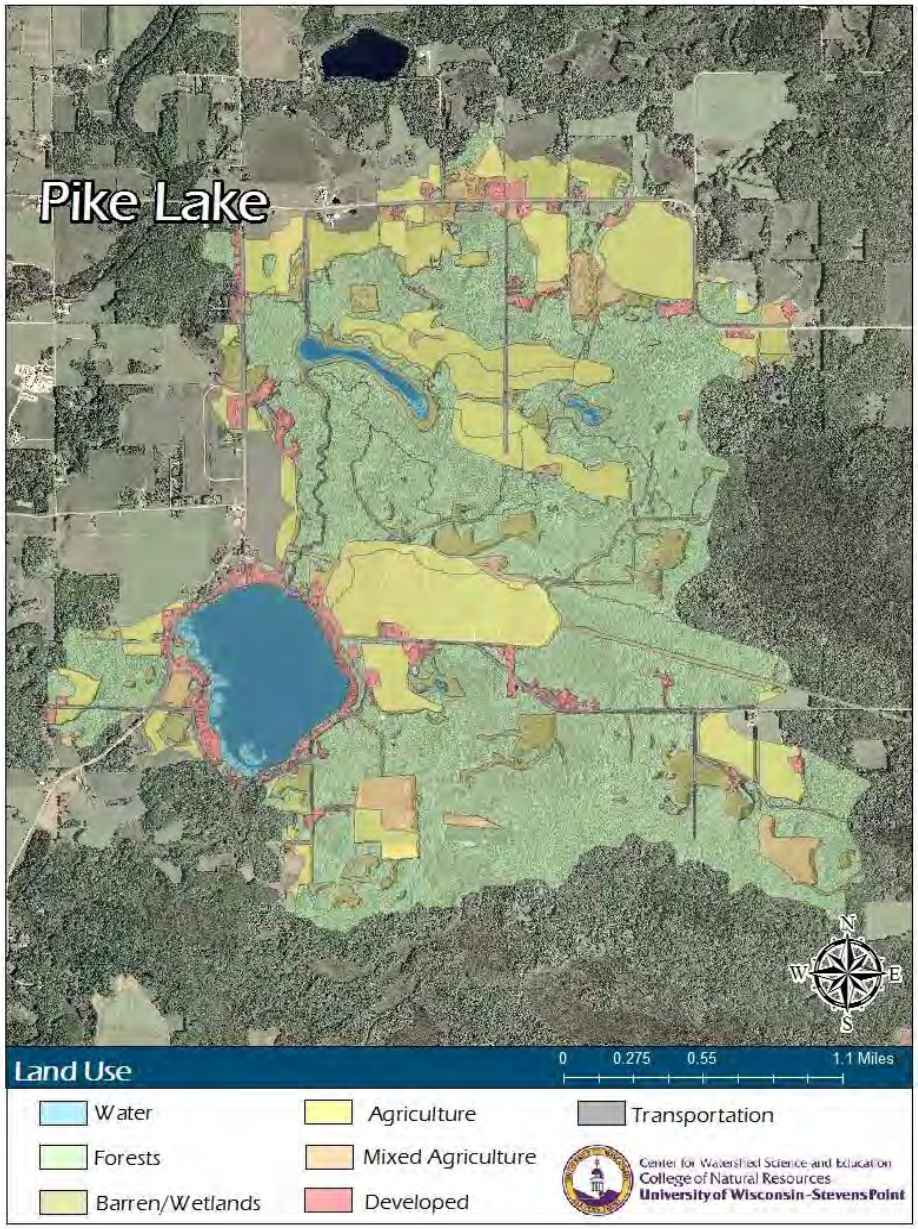
Goal 8. Property owners in the watershed will understand their relationship to Rice Lake and will manage their lands in ways that minimize impacts to Rice Lake.

Objective 8.1. Current and future land use will put measures into place to minimize their impacts on Rice Lake. Spring chloride concentrations will be reduced by 50% in the next 10 years.

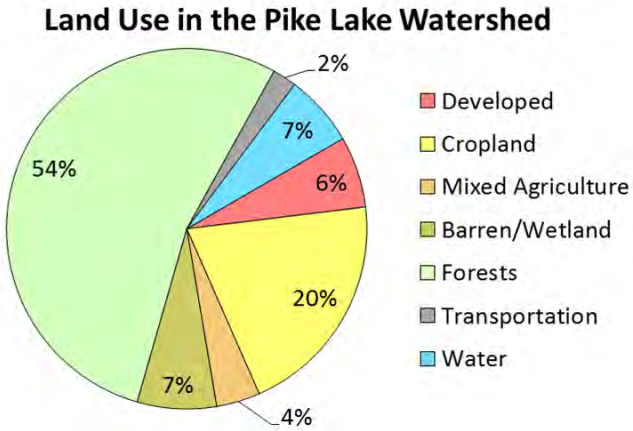
Actions	Lead person/group	Resources	Timeline
Encourage County to support water-quality based best management practices within the watershed.		Marathon County CPZ	Ongoing
Minimize impervious surfaces in the Rice Lake watershed.		Marathon County CPZ	Ongoing
Encourage the installation of rain barrels, rain gardens, and other lake-friendly storm water runoff management practices throughout the Rice Lake watershed.		Marathon County CPZ. Consultants	Ongoing
Encourage private well owners to have their wells tested for nitrate.		Marathon County UWEX Agent	

		UWEX Groundwater Educator WEAL and other labs	
Participate in future planning activities with MC and the Town of Elderon in regard to revisions to zoning decisions than may affect Rice Lake. Development and shoreland practices are a few examples.		Marathon County CPZ.	
Participate in county and town comprehensive planning processes.		Marathon County CPZ. Towns	
Explore overlay zoning to better protect the lake and its shorelands around the lake which may not be covered by the existing zoning ordinances.		Marathon County CPZ Towns	

Pike Lake



The surface watershed for Pike Lake is approximately 3,766 acres. The dominant land uses in the watershed are forests (54%) and agriculture (24%). The lands closest to the lake often have the greatest impact on water quality and habitat; land uses near Pike Lake's shoreland include mostly residential development. Participants emphasized the desire to maintain the rural character of the area.



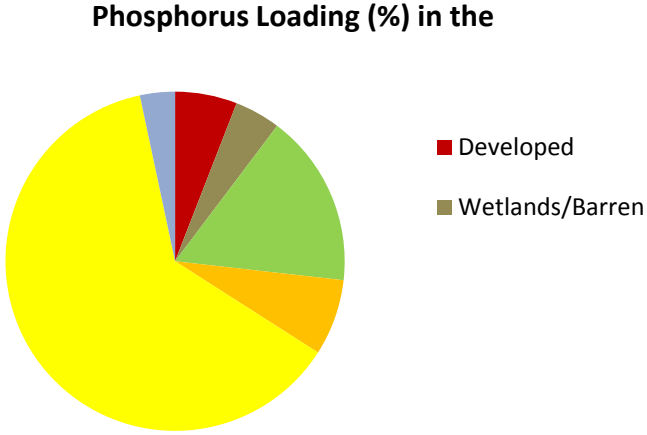


Figure 2. Estimated phosphorus loads from land uses in the Pike Lake watershed

Guiding Vision for Pike Lake's Watershed

Pike Lake will be minimally impacted by land use within its watershed.

Goal 7. Protect quality habitat and natural areas within the watershed from future degradation to enhance water quality, aesthetics and the wildlife community.

Objective 7.1. Support healthy land management practices within the Pike Lake watershed.

Actions	Lead person/group	Resources	Timeline
Encourage private well owners to conduct well water testing for nitrate on an annual basis.	PLSC	Marathon County UWEX Agent UWEX Groundwater Educator WEAL and other labs	
LCD will work with Highway Department to minimize runoff to Pike Lake when opportunities arise.	Towns	Marathon County CPZ Marathon County Highway Dept.	Ongoing
Encourage Marathon County to support water-quality based best management practices within the watershed.	Towns	Marathon County CPZ NRCS UWEX Ag Agent	Ongoing
Minimize impervious surfaces in the Rice Lake watershed.	CPZ	Marathon County CPZ Towns	Ongoing
Encourage the installation of rain barrels, rain gardens, and other lake-friendly storm water runoff management practices throughout the Rice Lake watershed.	CPZ PLSC	Marathon County CPZ Towns	Ongoing

People and the Lake

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

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

Recreation

Rice Lake

There is one public boat landing located at the northwestern end of the lake. Being less than 50 acres in size, no wake is allowed (Chapter 30.635, Wisconsin Administrative Code).

Guiding Vision for Recreation on Rice Lake

Rice Lake will remain a sanctuary for quiet encounters with Nature.

Goal 8. Preserve the solitude found at Rice Lake.

Objective 8.1. Work with municipality to protect the lake.

Actions	Lead person/group	Resources	Timeline
Install a descriptive sign at the boat launch highlighting the beauty and value of the lake and asking visitors to respect it a recreate responsibly.			

Pike Lake

Pike Lake's boating hours are from 9 a.m. to 6 p.m. The lake is enjoyed by people who swim, boat, water/jet ski, fish, participate in the Pike Lake Sportsman Club, appreciate its beauty, and spend quality time with their families on the lake. Participants at the planning session were content with the present boating hours, but were looking for ways to enforce these rules with periodic violators.

Some concerns did arise concerning trash around the lake, specifically firework residue, garbage related to ice fishing, and beer bottles. Additional concerns about beach use were brought up in the survey, including suggested rules such as no nudity rules, a nighttime curfew, and rules limiting dogs on the beach.

Limited parking (<8 autos/trailers) is available at the boat launch. While some residents and the Pike Lake Sportsman Club support this as a way to limit boats on the lake, the Pike Lake Fishing Club that stocks the lake expressed interest in parking improvements. Currently, when the parking area becomes filled, autos/trailers start parking along the road and in front of residents' homes, which is undesirable. A second, private boat launch is located at the Pike Lake Resort on the northern end of the lake.

Guiding Vision for Recreation on Pike Lake

Recreational activities on Pike Lake will be abundant and in balance with lake health.

Goal 8. Ensure mutual enjoyment of recreational activities.

Objective 8.1. Maintain recreational harmony on Pike Lake.

Actions	Lead person/group	Resources	Timeline
Explore options for resolving parking issues at the public boat launch.	PLSC	Town WDNR	
Maintain signage about No Wake hours and fishing regulations, especially those unique to Pike Lake.	Town	WDNR	Ongoing

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 Pike Lake enjoyed by many people. Working together on common values will help to achieve the goals that are outlined in this plan.

Guiding Vision for Communication

Changes, updates, and important information about Rice and Pike lakes and the lake management plan will be communicated to those that live around the lakes, the townships, and to lake users.

Goal 10. Provide open and easily accessible opportunities for communicating lake information, recommendations, and educational materials.

Objective 10.1. Build partnerships and communicate important lake information in a variety of venues.

Action	Lead person/group	Resources	Timeline
Inform property owners within the watershed about the effects of fertilizers, impervious surfaces, and septic systems on Pike Lake.	PLSC PLFC	MC CPZ UWEX Lakes Wisconsin Lakes	2015
Inform property owners within the watershed about the importance of shoreland vegetation and information about shoreland restoration.	PLFC CPZ	MC CPZ UWEX Lakes Wisconsin Lakes	2015
Monitor issues that may lead to problems within the lake community, i.e. activities that may lead to erosion such as clear-cutting shorelines, dumping sand on shorelines or other shoreland disturbance; septic failures; non-compliance with setbacks; new construction, and/or new irrigation wells. Inform residents about how to mitigate adverse effects from such activities and report major problems to MC.	PLSC	MC CPZ	Ongoing
Continue to hold annual meeting.	PLSC	UWEX Lakes Wisconsin Lakes	Annually
Consider organizing periodic picnics, backyard walks, and other social activities to grow the community, including annual Fourth of July gathering/celebration.	PLSC		

Continue to maintain an e-mail listserv.	PLSC		Ongoing
Work with Marathon County to ensure new residents have access to information through the distribution of welcome packets. Consider a watershed welcome packet.	PLSC	MC CPZ UWEX Lakes Wisconsin Lakes Realtors	Ongoing
Explore the formation of a lakes subcommittee on the town boards, and/or a county-wide lake group.	PLSC	Towns MC CPZ MC UWEX	
Encourage attendance at the Lakes Convention and Lake Leaders Institute, and announce educational events such as these.	PLSC	UWEX Lakes	Annually
Identify a volunteer to produce and maintain a website and official Facebook page (Pike Lake).	PLSC		

Updates and Revisions

A management plan is a living document that changes over time to meet the current needs, challenges and desires of the lake and its community. The goals, objectives and actions listed in this plan should be reviewed annually and updated with any necessary changes.

Guiding Vision for Updates and Revisions on Rice Lake

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

Goal 11. Review plan annually and update as needed.

Objective 11.1. Communicate updates with community members and members of the sportsmen's club, Towns, county, and state.

Actions	Lead person/group	Resources	Timeline
Notify the Town, MC, and WDNR of any potential changes in the management plan.			Ongoing

Guiding Vision for Updates and Revisions on Pike Lake

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

Goal 11. Review plan annually and update as needed at the annual meeting.

Objective 11.1. Communicate updates with community members and members of the sportsmen's club, Towns, county, and state.

Actions	Lead person/group	Resources	Timeline
Incorporate discussions about the implementation of this plan and updates to this plan as a regular agenda item at the PLSC annual meeting.	PLSC	MC CPZ	Ongoing
Notify PLSC members, the Town, MC, and WDNR of any potential changes in the management plan.	PLSC		

Governance

This section will identify plans, ordinances, and regulations that affect the lake and responsible authorities including the Lake Associaton/District, local municipalities, state, and federal agencies.

Marathon County Strategic Plan: Marathon County's strategic plan states a clear intent to provide leadership and services focusing on improving land use and resource planning. This will assure the orderly development of retail and manufacturing business, agriculture/agribusiness, and residential growth while retaining the rural character of Marathon County. Specific objectives to support this leadership role are as follows:

Develop comprehensive planning and zoning ordinances that provide towns with value so that 100% request participation in county planning and zoning.

Improve water quality and residential, commercial, and industrial waste management resulting in 100% of all households, businesses, and industry sites meeting water quality standards.

Inventory water resources, determine where we have adequate supplies, and encourage development in those areas.

Develop an educational program on the quantity and quality of water supplies for local and state policy makers.

Comprehensive Plans – Marathon County and the Towns of Reid and Elderon: Marathon County as well as the Towns of Reid and Elderon adopted Comprehensive Plans in 2006/2007. These plans outline the direction of future growth within the County and Town.

During the planning process, a set of guiding principles that describe broad characteristics of a desired future for local communities and Marathon County were developed. These guiding principles were used to provide a general framework for developing local and countywide goals and objectives. The guiding principles outlined in the Marathon County Comprehensive Plan are:

Respect Local Governance **-** Planning in Marathon County should build on local town, village and city government as a system that is unique, has served residents well, and is a strong component of local identity.

2. Preserve Working Agriculture **-** Agriculture has been central to the culture and economy of Marathon County for over 100 years. Farming has been a way of life for generations of county residents and is fundamental to both community and individual identity. Efforts such as protecting prime farmland from development, exploring niche markets, and supporting cooperative practices can be implemented at the local level to help maintain and preserve working agriculture.

3. Maintain a Sense of Place **-** As Marathon County's population grows and changes, communities will need to ensure that important physical features, buildings, and landscapes that exemplify their local identity are retained. These features provide a sense of heritage and continuity that contribute to a community's identity and sense of place.

4. Preserve Rural Character **-** Shifts in the farm economy and urban expansion are altering the County's rural landscape characterized by working farms, woodlands, rolling hills, marsh areas, and plentiful water bodies. As open spaces, farms, and woodlands are being lost or fragmented by development, Marathon County communities will need to make some important choices in order to preserve the qualities and character of the rural landscape.

5. Safeguard Natural Resources **-** Marathon County is graced with abundant natural resources including numerous rivers, wetlands, forests, and wildlife. Careful stewardship of natural resources is essential to protect against fragmentation and degradation and ensure these resources continue to contribute to the ecology, character, quality of life, and economy of Marathon County into the future.

6. Foster Managed Growth and Coordinated Development **-** Managing growth is important to ensure that no area is overwhelmed by development, land use conflicts are minimized, and development occurs in a quality manner that minimizes impacts on natural resources. Managing growth requires coordination of land uses and infrastructure, within and between communities,

From these Guiding Principles, the following goals were developed that are directly related to lake management planning and protection:

Goal 1: Enhance the natural character of Marathon County.

Objective: To encourage establishment of an open space network connecting woodlands, wetlands, shorelands, grasslands, and other natural areas.

Goal 2: Protect and enhance surface water resources and natural habitat areas.

Objective: To minimize development impacts that could affect the water quality and habitat of rivers, floodplains, and wetlands.

Objective: To provide leadership in disseminating information about shoreland, floodplain, and wetland preservation and management to County residents.

Goal 3: Protect and enhance the quantity and quality of potable groundwater and potable surface water supplies.

Objective: To continue to enforce, and update as necessary, ordinances and development standards to protect the quantity and quality of groundwater resources.

Objective: To continue to encourage local municipalities to protect groundwater quality and quantity.

Objective: To continue to work with the WDNR and others to address known contamination problems and ensure that sufficient measures are taken to prevent additional groundwater contamination.

Goal 7: Improve coordination regarding natural resource protection.

Objective: To foster coordinated and effective enforcement of the various regulations aimed at protecting natural resources.

Objective: To continue to serve as a liaison between State and Federal agencies and local municipalities

regarding natural resource regulations and permitting procedures.

Objective: To ensure timely and effective communication of changes to natural resource regulations and

permitting procedures.

The Town of Reid and Elderon adopted a Comprehensive Plan to guide the community's physical, social, and economic development. The Comprehensive Plan also serves to identify important physical and cultural resources that need to be protected and enhanced to maintain a desired quality of life. Comprehensive plans are not meant to serve as land use regulations in themselves; instead, they provide a rational basis for local land use decisions with a twenty-year vision for future planning and community decisions.

Town of Reid residents are very concerned about preservation of natural resources, especially water resources, woodlands and prime farmland. The Town of Reid has developed the following goal, objectives, and policy recommendations to demonstrate its support:

Goal: Protect and enhance the Outstanding Resource Waters (ORW) and Exceptional Resource Waters (ERW) from intensive development.

Objective: To support private sector efforts that enhance ORWs and ERWs.

Objective: To protect and enhance the Plover River as a particularly important waterway and natural habitat.

Objective: To the extent possible, limit uncontrolled runoff, overuse of fertilizers and other waterway contaminants to surface water.

Goal: Protect wetlands and lakes from development activity.

Objective: To continue working with the WDNR and marathon County to ensure appropriate preservation of wetlands and shorelines.

Objective: To minimize intensive development around lakes that could affect views, water quality, habitat or natural vegetation on the lakes.

Town of Elderon residents place a high priority on protection of its agriculture, forestry and water resources and wishes to protect these resources from intensive development. The Town of Elderon has developed the following goal, objectives, and policy recommendations to demonstrate its support:

Goal: Protect the aesthetic and environmental qualities of Elderon's lakes.

Objective: To minimize intensive development around Elderon's lakes that could affect water quality, habitat or natural vegetation near the lakes.

Goal: Protect natural resources, including forest, wetland and lake communities from intensive development.

Objective: To continue working with Marathon County to ensure appropriate preservation of wetlands and shorelines.

The lake management plan, along with any proposed changes to the comprehensive plan, will be presented to the local municipality for review and possible incorporation into their comprehensive plans. Zoning, subdivision, and official mapping decisions must be consistent with the comprehensive plan.

Marathon County Land & Water Resource Management Plan

The Conservation, Planning and Zoning Department's mission is to create, advocate, and implement strategies to conserve natural and community resources. The department administers programs to implement the Land and Water Resource Management Plan which includes the Farmland Preservation Program, Managed Intensive Grazing, Lake Districts, Wildlife Damage and Abatement, as well as regulatory activities associated with the Waste Storage Facility and Nutrient Management Ordinance and the Livestock Facilities Licensing Ordinance.

The Land & Water Resource Management Plan outlines the following goals, objectives, programs, and regulations to support the implementation of the Lake Management Plan:

A. Goals and Objectives

Reduce Agricultural Nonpoint Runoff. Reduce the discharge of soil sediment, organic materials, pesticides and nutrients into surface and ground waters.

Groundwater Protection. Educate the public and users about groundwater use and resource management challenges. In April 2001, the Marathon County Groundwater Guide was updated to reflect the changing programs and policies within the county as well as to acknowledge the increased level of regulation by state agencies to protect the groundwater resources of Marathon County.

Forestry. Sustain private and public forests. The Marathon County Forest Comprehensive Land Use Plan (2006-2020) includes recommendations to guide management of forest land in Marathon County in accordance with the Parks, Recreation and Forestry Department's mission to manage and protect the county forest on a sustainable basis for ecological, economic, educational, recreational, and research needs of present and future generations.

Land Conversion. Minimize the conversion of prime agricultural lands and forests to other land uses to support watershed management and to maintain economic value of the working lands.

Lake and Reservoir Management. Support local communities to understand the environmental opportunities and challenges facing lakes. This resource concern encompasses the areas of wetland management and aquatic invasive species. There is a great participation by local landowners in securing information and resources to better protect our water resources.

B. Conservation Programs and Partnerships

1. Aquatic Invasive Species. In 2010, Marathon County has entered into a working relationship with the Golden Sands Resource Conservation & Development agency to conduct an inventory of lakes and flowages unassociated with the Wisconsin River for aquatic species. The inventory efforts involve educational outreach efforts to Park Department employees and students.

2. Managed Grazing Project. Marathon County Conservation, Planning and Zoning Department, UW-Extension, and the Natural Resources Conservation Service have joined forces to support the Central Wisconsin River Graziers Network. The Network promotes the feasibility of grazing-based farming as a profitable way of farming that enhances lifestyles and protects and improves the environment.

3. Managed Forest Law (MFL) Program. The MFL program provides incentives to protect privately owned woodlands from destructive timber cutting practices and over-harvesting and prevents land from becoming developed and/or converted to agricultural land use.

4. Farmland Preservation Program. Marathon County adopted its Farmland Preservation Plan in 2013. The goals of the program are twofold: to preserve Wisconsin farmland for production of commodities by means of local land use planning and soil conservation practices, and; to provide tax relief to landowners. For the landowner to receive tax credits they must be in compliance with current and applicable State Agricultural Performance Standards.

5. Nutrient Management Program. Nutrient management is defined as managing the amount, form, placement, and timing of applications of plant nutrients. The purpose of this program is to ensure a proper supply of plant nutrients for crop production while minimizing the entry of nutrients to surface water and groundwater. Marathon County requires nutrient management plans for landowners constructing and operating waste storage facilities.

6. Federal Soil and Water Conservation Programs. The Conservation, Planning and Zoning (CPZ) Department works closely with the United States Department of Agriculture through the Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA). The NRCS, FSA, UW-Extension and CPZ staffs work together in the Local Work Group to identify program and funding priorities for federal and local conservation programs such as the Environmental Quality Incentive Program, Comprehensive Nutrient Management Planning, Conservation Reserve Enhancement Program and grazing initiatives.

C. Regulations: The lake management plan is superseded by federal, state, county, and municipal laws and court rulings; however, the plan may influence county and municipal ordinances and enforcement. 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 rules and regulations are primarily enforced by the US Army Corps of Engineers, the Wisconsin Department of Natural Resources, the

Marathon County Sheriff's Department, and the Marathon County Conservation, Planning and Zoning (CPZ) Department. If considering development near or on a lake, addressing problem plants or animals, or altering the lake bottom contacts the Marathon County CPZ Department and/or the Wisconsin Department of Natural Resources.

1. Waste Storage Facility and Nutrient Management Ordinance. Dairy cattle in the county produce over 4,000,000 gallons of manure per day. To assure that this organic matter and nutrient source is contained and managed with sound practices, Marathon County has regulated these activities since 1985.

2. Marathon County Livestock Siting Ordinance. In October 2006, Marathon County adopted the General Code of Ordinances for Marathon County Chapter 13.01 Livestock Facilities Licensing Ordinance. The purpose of the ordinance is to establish the authority, technical standards, performance standards, and monitoring protocols necessary to protect public health, safety, and the environmental resources in Marathon County.

3. Marathon County Zoning Ordinance (Chapter 17) and Land Division and Surveying Regulations (Chapter 18). The Marathon County Zoning Ordinance (Chapter 17) is adopted to promote and protect public health, safety, comfort, convenience, aesthetics and other aspects of the general welfare of the population. More specifically, the ordinance establishes standards for buildings, structures, setbacks, lot coverage, land uses, streets and highways and other land use aspects. These regulations apply to all unincorporated areas that have adopted Marathon County Zoning. However, where a town has not adopted Marathon County Zoning but has adopted local regulations, the local regulations apply. In addition, the County regulates the division of land in accordance with Chapter 18 Land Division and Surveying Regulations. The County's land division regulations apply in all unincorporated areas of the County. However, where a town has land division regulations that are more restrictive than the County's, the local regulations apply.

4. Floodplain and Shoreland Ordinance. Shoreland, wetland, and floodplain regulations are applicable in all unincorporated areas of the County. Wisconsin law mandates counties to adopt and administer a zoning ordinance that regulates land use in shoreland/wetland and floodplain areas for the entire area of the county outside of villages and cities.

5. Nonmetallic Mining Reclamation Ordinance. Marathon County adopted the General Code of Ordinances for Marathon County Chapter 21 Nonmetallic Mining Reclamation Code in 1989. The ordinance applies to approximately 400 operating or abandoned excavations of sand, gravel, decomposed granite and stone. The ordinance requires restoration of the site to a purposeful and acceptable landscape appearance and use.

6. Private Sewage System Ordinance. Marathon County adopted Marathon County General Code of Ordinances Chapter 15 Private Sewage Systems in 1968. This ordinance is adopted to promote and protect public health and safety by assuring the proper siting, design, installation, inspection, and management of private sewage systems and non-plumbing sanitation systems, and to assure the timely repair or replacement of failing private sewage systems. All structures or premises in the County that are permanently or intermittently intended for human habitation or occupancy, which are not serviced by a public sewer or a privately owned wastewater treatment facility regulated by the Department of Natural Resources, shall have a system for holding or treatment and dispersal of sewage and wastewater which complies with the provisions of this ordinance.

7. Construction Site Erosion – WI Administrative Code NR 216. Construction site erosion and uncontrolled storm water runoff from land disturbing activities can have significant adverse impacts upon local water resources. Under subchapter III of NR 216, Wis. Adm. Code, a notice of intent shall be filed with the DNR by any landowner who disturbs one or more acres of land.

Lake Management Plan Approval

The final draft of the lake management plan will be approved through a vote of the Pike Lake Sports Club membership or board. The final draft will be approved by the Wisconsin Department of Natural Resources (DNR) to ensure compliance lake management plan requirements and grant requirements. The completed plan that has been approved by the Sports Club and the DNR will be presented to the municipalities containing the lake and Marathon 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/. Marathon County offers technical and financial assistance through the Conservation, Planning and Zoning Department and University of Wisconsin-Extension Department. Additional assistance may be available from other agencies and organizations, including DNR, UW-Extension Lakes Program, Golden Sands RC&D, Wisconsin Wetlands Association, and Wisconsin Trout Unlimited. Etc.

References

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Borman, Susan, Robert Korth, and Jo Temte, 2001. Through the looking glass, a field guide to aquatic plants. Reindl Printing, Inc. Merrill, Wisconsin.

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

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Vallentyne, J.R., 1974. The Algal Bowl-Lakes and Man. Ottawa Department of the Environment.

Wetzel, R.G., 2001. Limnology, Lake and River Ecosystems, Third Edition. Academic Press. San Diego, California.

Wisconsin Department of Natural Resources, 2007. Designation of Critical Habitat Areas: Pike Lake, Marathon County.

Presentations and notes from the planning meetings can be found on the Marathon County website. Access the lake information by selecting 'Conservation Planning Zoning' under the 'Departments' tab, then selecting 'Eastern Lakes Project' on the left-side pane.

Appendices

Appendix A: Marathon County Lakes Information Directory

Algae - Blue-Green
Contact: Scott Provost, WDNR
Phone: 715-421-7881
Address: WDNR 473 Griffith Ave. Wisconsin Rapids, WI 54494
E-mail: scott.provost@wisconsin.gov
Website: http://dnr.wi.gov/lakes/bluegreenalgae/

Contact: Wisconsin Dept. of Health Services
Phone: 608-267-3242
Address: P.O. Box 2659, Madison, WI 53701
E-mail: dhswebmaster@dhs.wisconsin.gov
Website:
www.dhs.wisconsin.gov/eh/bluegreenalgae/index.htm

Aquatic Invasive Species /Clean Boats Clean Water
Contact: Golden Sands RC&D
Phone: 715-343-6215
E-mail: info@goldensandsrcd.org
Address: 1100 Main Street, Suite #150 Stevens Point, WI 54481
Websites:
http://www.goldensandsrcd.org/
http://dnr.wi.gov/invasives/

Aquatic Plant Management (Native and Invasive)
Contact: Scott Provost, Wisconsin Department of Natural Resources
Phone: 715-421-7881
Address: WDNR 473 Griffith Ave. Wisconsin Rapids, WI 54494
E-mail: scott.provost@wisconsin.gov
Website: http://dnr.wi.gov/lakes/plants/

Aquatic Plant Identification
Contact: Golden Sands RC&D
Phone: 715-343-6215
E-mail: info@goldensandsrcd.org
Address: 1100 Main Street, Suite #150
Website: http://www.goldensandsrcd.org/

Aquatic Plant Identification (cont'd)
Contact: Scott Provost, WDNR
Phone: 715-421-7881
Address: WDNR 473 Griffith Ave. Wisconsin Rapids, WI 54494
E-mail: scott.provost@wisconsin.gov
Website: http://dnr.wi.gov/lakes/plants/

Aquatic Plant Management
Contact: Scott Provost, WDNR
Phone: 715-421-7881
Address: WDNR 473 Griffith Ave. Wisconsin Rapids, WI 54494
E-mail: scott.provost@wisconsin.gov
Website: http://dnr.wi.gov/lakes/plants/

Best Management Practices (Rain gardens, shoreland buffers, agricultural practices, runoff controls)
Contact: Marathon County CPZ
Phone: 715-261-6000
Address: 210 River Dr. Wausau, WI 54403
E-mail: cpz@co.marathon.wi.us
Website:
http://www.co.marathon.wi.us/Departments/ConservationPlanningZoning.aspx

Boat Landings (County) (Signage, permissions, etc.)
Contact: William Duncanson
Phone: 715-261-1550
Address: 212 River Dr., Suite 2, Wausau, WI 54403
E-mail: parkforestry@co.marathon.wi.us
Website:
http://www.co.marathon.wi.us/Departments/ParksRecreationForestry.aspx

Boat Landings (State)
Contact: Tom Meronek, WDNR
Phone: 715-359-7582
Address: 5103 Rib Mt. Drive, Wausau, WI 54401
E-mail: Thomas.Meronek@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
Phone: 608-251-9131
Address: 211 S. Paterson St. Suite 270 Madison, WI 53703
E-mail: info@gatheringwaters.org
Website: http://gatheringwaters.org/

Contact: Buzz Sorge, WDNR
Phone: 715-839-3794
Address: P.O Box 4001 Eau Claire, WI 54702
E-mail: Patrick.Sorge@wisconsin.gov
Website: http://dnr.wi.gov/aid/easements.html

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

Contact: NRCS Wausau Service Center
Phone: 715-848-2330
Address: 326 River Dr. Wausau, WI 54403

Critical Habitat and Sensitive Areas
Contact: Buzz Sorge, WDNR
Phone: 715-839-3794
Address: P.O Box 4001 Eau Claire, WI 54702
E-mail: Patrick.Sorge@wisconsin.gov
Website: http://dnr.wi.gov/lakes/criticalhabitat/

Dams (Pike Lake) Town of Reid
Contact: Town of Reid (Kittie Milanowski, Clerk)
Phone: 715-446-3767
Address: 7089 Plover River Road, Hatley, WI 54440
E-mail: kitmil46@yahoo.com
Website:
http://www.co.marathon.wi.us/Home/AboutMarathonCounty/Municipalities/Towns.aspx

Dams (Pike Lake) Town of Elderon
Contact: Town of Elderon
Phone: 715-454-6845 (Mary Ostrowski, Clerk)
Address: 2021 Cherry Drive, Eland, WI 54427
E-mail: tnelderon@aol.com
Website:
http://www.co.marathon.wi.us/Home/AboutMarathonCounty/Municipalities/Towns.aspx

Fertilizers/Soil Testing
Contact: Marathon County UW-Extension
Phone: 715-261-1230
Address: 212 River Drive, Suite 3
Wausau, WI 54403-5476
Website:
http://marathon.uwex.edu/agriculture/agriculture-news-in-marathon-county/

Contact: NRCS Wausau Service Center
Phone: 715-848-2330
Address: 326 River Dr. Wausau, WI 54403

Fisheries Biologist (management, habitat)
Contact: Tom Meronek, WDNR
Phone:715-359-7582
Address: 5103 Rib Mt. Drive, Wausau, WI 54401
E-mail: Thomas.Meronek@wisconsin.gov
Website: http://dnr.wi.gov/fish/

Frog Monitoring—Citizen Based
Contact: Andrew Badje, WDNR
Phone: 608-266-3336
E-mail: Andrew.badje@wisconsin.gov
E-mail: WFTS@wisconsin.gov

Grants
Contact: Buzz Sorge, WDNR
Phone: 715-839-3794
Address: P.O Box 4001 Eau Claire, WI 54702
E-mail: Patrick.Sorge@wisconsin.gov

Contact: Marathon County CPZ
Phone: (715)261-6000
Address: 210 River Dr. Wausau, WI 54403
E-mail: cpz@co.marathon.wi.us
Website:
http://www.co.marathon.wi.us/Departments/ConservationPlanningZoning.aspx

Groundwater Quality
Contact: Kevin Masarik, UWSP CWSE
Phone: 715-346-4276
Address: 224 TNR 800 Reserve St. Stevens Point, WI 54481
E-mail: kmasarik@uwsp.edu
Website:
http://www.uwsp.edu/cnr/watersheds/

Groundwater Quantity
Contact: George Kraft, UWSP
Phone: 715-346-2984
Address: TNR 224C, 800 Reserve St. Stevens Point, WI 54481
E-mail: George.kraft@uwsp.edu

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

Informational Packets
Contact: Ryan Haney, UWSP CWSE
Phone: 715-346-2497
Address: 224A TNR UWSP 800 Reserve St. Stevens Point, WI 54481
E-mail: mclakes@uwsp.edu

Lake Groups – Friends, Associations, Districts
Contact: Patrick Goggin, UWEX Lakes
Phone: 715-365-8943
Address: 107 Sutliff Ave. Rhinelander, WI 54501
E-mail: pgoggin@uwsp.edu
Website:
http://www.uwsp.edu/cnr/uwexlakes/

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

Lake Groups (Cont'd)
Contact: Susan Tesarik, Wisconsin Lakes
Phone: 1-800-542-5253
Address: 4513 Vernon Blvd. Suite 101, Madison, WI 53705
E-mail: lakeinfo@wisconsinlakes.org
Website: http://wisconsinlakes.org/

Lake Levels
See: Groundwater

Lake Related Law Enforcement (No-wake, transporting invasives, etc.)
Contact: Ben Harzfeldt or Paul Leezer, WDNR State Conservation Wardens
Phone: 715-359-1030 or 715-401-0644
Website:
http://dnr.wi.gov/org/es/enforcement/

Land Use Planning and Shoreland Zoning
Contact: Dean Johnson, Marathon County CPZ
Phone: (715)261-6000
Address: 210 River Dr. Wausau, WI 54403
E-mail: dean.johnson@co.marathon.wi.us
Website:
http://www.co.marathon.wi.us/Departments/ConservationPlanningZoning.aspx

Contact: Marathon County CPZ
Phone: 715-261-6000
Address: 210 River Dr. Wausau, WI 54403
Website:
http://www.co.marathon.wi.us/Departments/ConservationPlanningZoning.aspx

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

Nutrient Management Plans
Marathon County CPZ
Contact: Kirk Langfoss
Phone: 715-261-6008
Address: 210 River Dr. Wausau, WI 54403
E-mail: kirk.langfoss@co.marathon.wi.us
Website:
http://www.co.marathon.wi.us/Departments/ConservationPlanningZoning.aspx
http://dnr.wi.gov/runoff/ag/manure.html

Parks (County)
Contact: William Duncanson
Phone: 715-261-1550
Address: 212 River Drive, Suite #2 Wausau, WI 54403
E-mail: parkforestry@co.marathon.wi.us
Website:
http://www.co.marathon.wi.us/Departments/ParksRecreationForestry.aspx

Purchase of Development Rights
Contact: North Central Conservancy Trust
Phone: 715-341-7741
Address: P.O. Box 124 Stevens Point, WI 54481
E-mail: info@ncctwi.org
Website: http://www.ncctwi.org/

Purchase of Land
Contact: Buzz Sorge, WDNR
Phone: 715-839-3794
Address: P.O Box 4001 Eau Claire, WI 54702
E-mail: Patrick.Sorge@wisconsin.gov
Website:
http://dnr.wi.gov/org/land/facilities/realestate/acquire.html

Rain Barrels – Order
Contact: Golden Sands RC&D
Phone: 715-343-6215
Address: 1462 Strongs Ave. Stevens Point, WI 54481
Website:
http://www.goldensandsrcd.org/downloads/rain_barrel_order_form.pdf

Rain Gardens and Runoff
Marathon County CPZ
Phone: 715-261-6000
Address: 210 River Dr. Wausau, WI 54403
E-mail: cpz@co.marathon.wi.us
Website:
http://www.co.marathon.wi.us/Departments/ConservationPlanningZoning.aspx

Septic Systems
Marathon County CPZ
Contact: Dale Dimond
Phone: 715-261-6028
Address: 210 River Dr. Wausau, WI 54403
E-mail: dale.dimond@co.marathon.wi.us
Website:
http://www.co.marathon.wi.us/Departments/ConservationPlanningZoning.aspx

Shoreland Management
Marathon County CPZ
Phone: 715-261-6000
Address: 210 River Dr. Wausau, WI 54403
E-mail: cpz@co.marathon.wi.us
Website:
http://www.co.marathon.wi.us/Departments/ConservationPlanningZoning.aspx
http://www.uwsp.edu/cnr/uwexlakes/ecology/shorelands/default.asp

Shoreland Zoning Ordinances
See: Land Use Planning and Shoreland Zoning Ordinances

Soil Fertility Testing
See Fertilizers/Soil Testing

Water Quality Monitoring
Contact: Buzz Sorge, WDNR
Phone: 715-839-3794
Address: P.O Box 4001 Eau Claire, WI 54702
E-mail: Patrick.Sorge@wisconsin.gov
Website:
http://dnr.wi.gov/environmentprotect/water.html
http://watermonitoring.uwex.edu/index.html

Water Quality Problems
Contact: Buzz Sorge, WDNR
Phone: 715-839-3794
Address: P.O Box 4001 Eau Claire, WI 54702
E-mail: Patrick.Sorge@wisconsin.gov
Website:
http://dnr.wi.gov/environmentprotect/water.html

Contact: Nancy Turyk, UWSP CWSE
Phone: 715-346-4155
Address: 216 TNR 800 Reserve St. Stevens Point, WI 54481
E-mail: nturyk@uwsp.edu

Wetlands
Contact: Wisconsin Wetland Association
Phone: 608-250-9971
Address: 214 N. Hamilton St. #201 Madison, WI 53703
E-mail: info@wisconsinwetlands.org
Website: www.wisconsinwetlands.org
http://dnr.wi.gov/wetlands/

Wetland Inventory
Contact: Emmet Judziewicz, UWSP Freckmann Herbarium
Address: 310 TNR UWSP 800 Reserve St.
Stevens Point, WI 54481
E-mail: ejudziewica@uwsp.edu

Woody Habitat
Contact: Tom Meronek, WDNR
Phone: 715-359-7582
Address: 5103 Rib Mt. Drive, Wausau, WI 54401
E-mail: Thomas.Meronek@wisconsin.gov

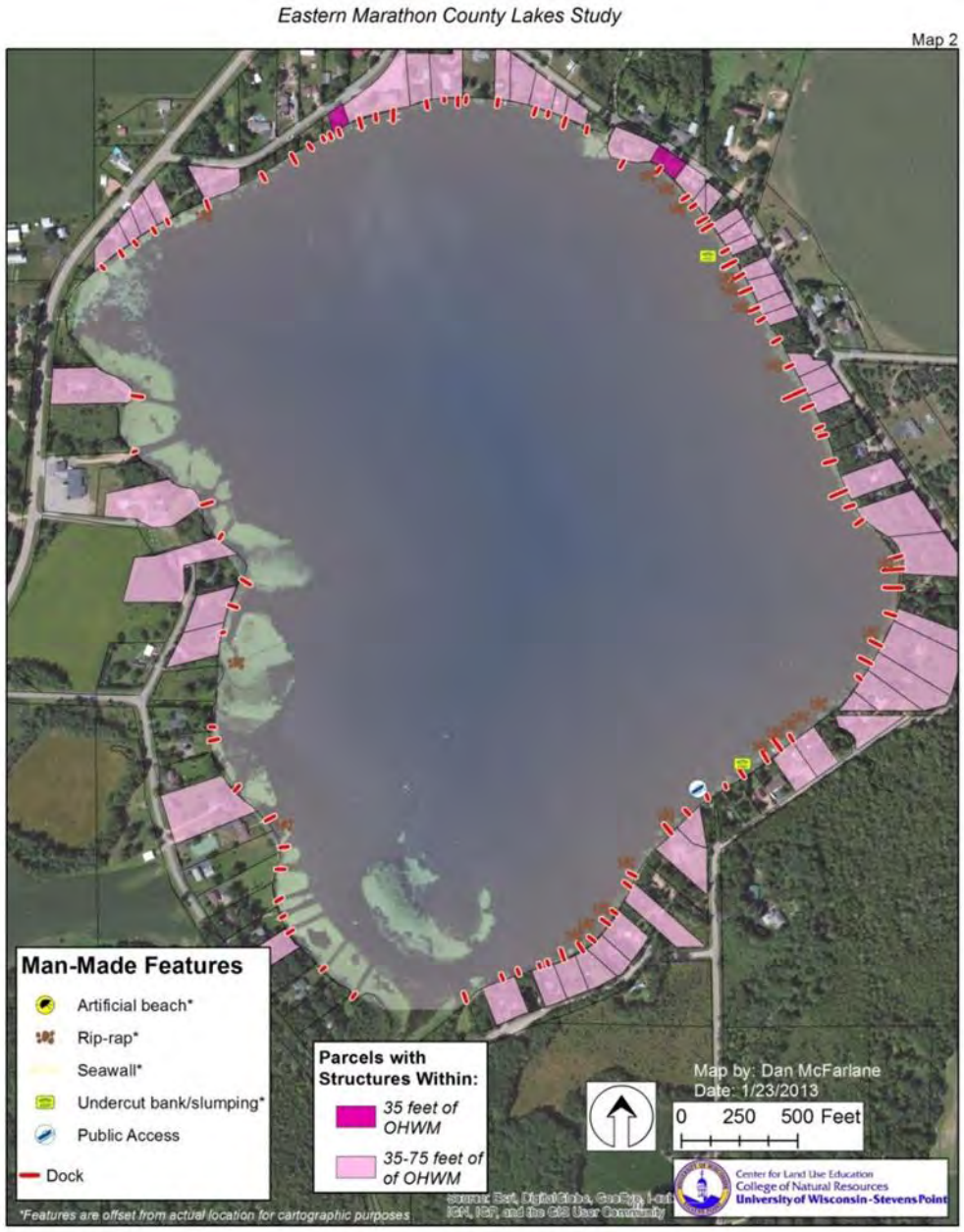
If you are looking for any information that is not listed in this directory, please contact:

Ryan Haney, **UWSP Center for Watershed Science and Education**
224 TNR UWSP 800 Reserve St. Stevens Point, WI 54481
Phone: 715-346-2497
E-mail: mclakes@uwsp.edu

or

Marathon County Conservation, Planning and Zoning
210 River Dr. Wausau, WI 54403
Phone: 715-261-6000
E-mail: cpz@co.marathon.wi.us

Appendix B: Shoreland Survey – 2011



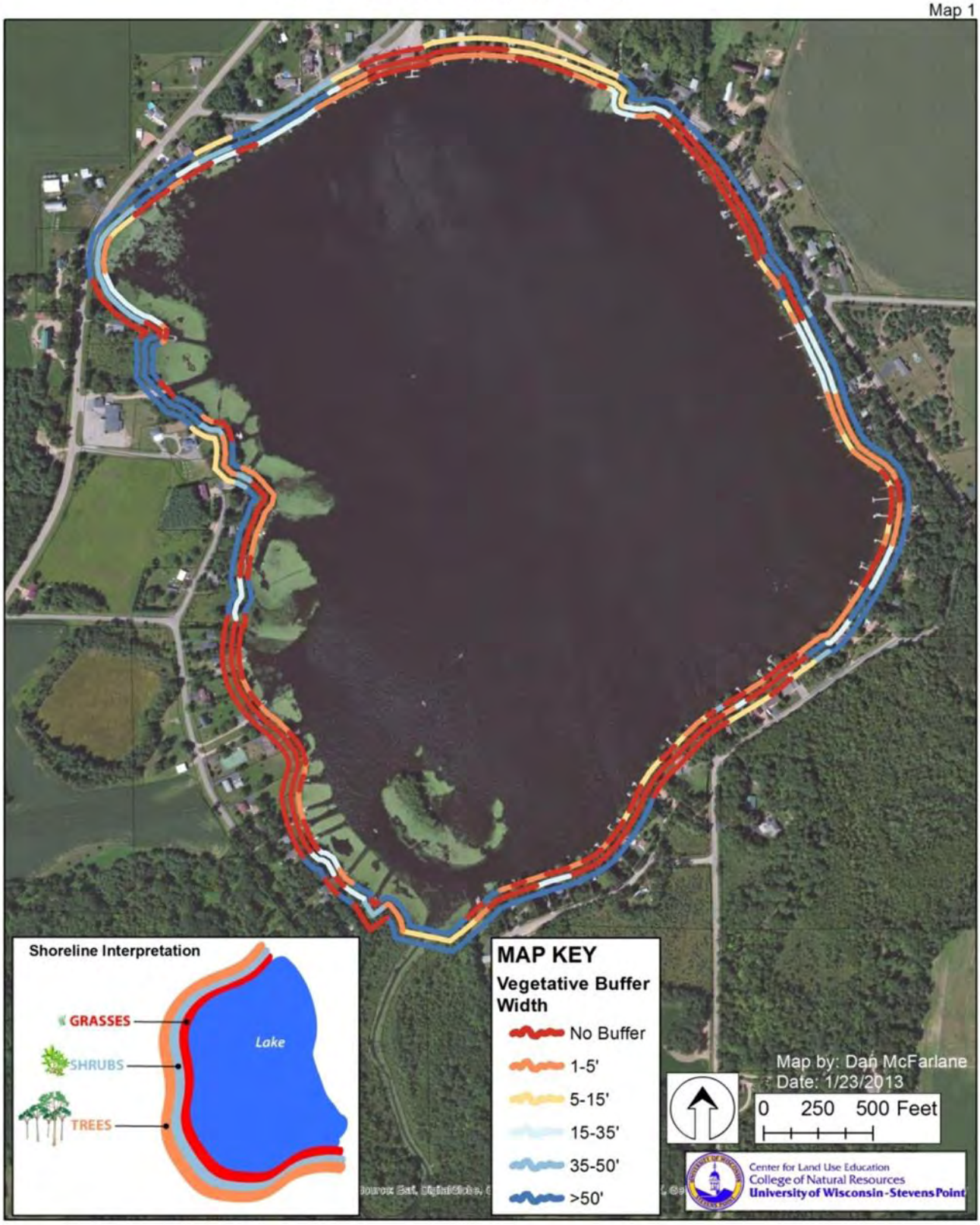
Pike Lake, 2011.

Type of Disturbance	No. of Occurrences
Artificial Beach	0
Dock	91
Riprap	22
Seawall	0
Erosion	2
Structures w/in 35'	16
Structures 35-75'	53

Pike Lake Vegetative Buffers

Eastern Marathon County Lakes Study

Map 1



Appendix C: Rapid Response Plan

SURVEY/MONITOR

1. Learn how to survey/monitor the lake.	**Contacts:** **Water Resources Management Specialist** Wisconsin Department of Natural Resources Scott Provost 473 Griffith Ave., Wisconsin Rapids, WI, 54494 Phone: 715-421-7881 E-Mail: Scott.provost@wisconsin.gov **Marathon County Aquatic Invasive Species (AIS) Coordinator** Golden Sands RC&D 1100 Main St., Ste.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** Scott Provost Water Resources Management Specialist 473 Griffith Ave. Wisconsin Rapids, WI 54494 Phone: (715) 421-7800 E-Mail: scott.provost@wisconsin.gov **Marathon County 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:	**Marathon County 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 Marathon County AIS Coordinator will make the following public information contacts:

- **Wisconsin Department of Natural Resources**
  Water Resources Management Specialist
  Scott Provost
  473 Griffith Ave.
  Wisconsin Rapids, WI, 54494
  Phone: 715-421-7881
  E-Mail: Scott.provost@wisconsin.gov

- **The town** in which the waterbody is located.
  Town of: Reid
  Contact:
  Phone:

  Town of: Elderon
  Contact:
  Phone:

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

- **Local Residents**

If an invasive species is confirmed, the Lake District and/or Marathon County Land Conservation will make the following public information contacts:

- **Newspapers**:

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

Appendix D: Aquatic Plant Management Plan for Pike Lake

(Excerpt from 2013 Aquatic Plant Management Plan for Pike Lake)

The Pike Lake Committee presented the following information to lake association members and the public for review and input. Overwhelming majority supported the options recommended by the committee. All of the options that were discussed are included in the appendix for reference.

Pike Lake is a complex ecosystem that has extraordinary features in some parts of the lake and areas that provide challenges to recreation in other parts of the lake. The APM Committee reviewed surveys and maps provided by lake users to help construct the aquatic plant management plan for Pike Lake.

The Pike Lake Aquatic Management Plan has 7 major areas of focus. The map at the end of this appendix indicates regions of the lake to be treated in different ways and should be used along with the descriptions below.

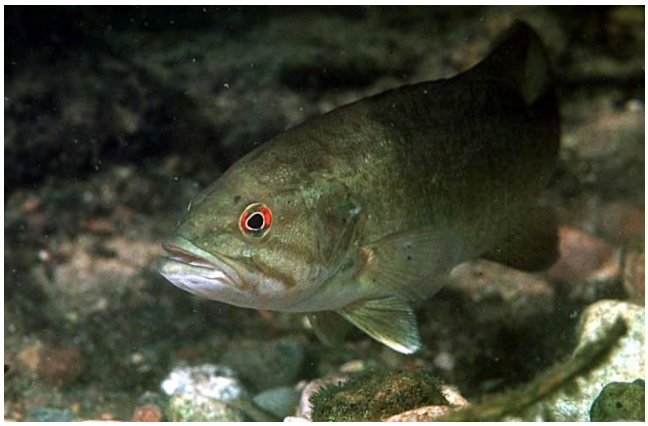
Lily Pads

Lily pads are a type of aquatic plant that plays an important role in the aquatic ecosystem. They provide shelter and cool water for fish and aquatic biota and food for muskrats, beaver, and waterfowl. Because they float on top of the water they break waves which reduces shoreline erosion. Their dense stands help to prevent the establishment of invasive aquatic plant species. Lily pad beds can be as old as 100 years. Some "thinning" can be done without harming the entire bed.

Plan: Leave lily pad beds alone but provide access lanes from docks for boating (width approx. 30 feet). Upon request by dock owners, removal will only occur when large obstructive amounts are present.

Conservancy Areas

Several areas around the lake have been identified by the citizen survey and Committee as having significant value to the lake's ecosystem because they provide food and habitat for fish and wildlife. The area around the island was identified in the citizen survey as the area with the majority of wildlife observations. These animals included turtles, ducks, eagles, loons, geese, muskrats, fish, snails, and birds. Recognizing that healthy habitat on land and in the adjacent water is necessary to support the wildlife that is enjoyed by so many lake users, the Committee designated the area around the island as a conservancy zone. This area comprises 25 acres.



Photos courtesy of Wisconsin Lakes Partnership

Plan: This designation will not limit access but restricts harvesting and chemical application for aquatic plant control. Access between the island and shoreland could be provided by harvesting (if needed), however aquatic plant harvesting is limited to areas of greater than 5 feet of water depth. The exception to this limitation is the harvesting of an access path to the private boat docks (if desired by adjacent land owners).

Chara

Chara is a type of algae that is often mistaken for an aquatic plant. It can become abundant in areas of a lakebed that have been disturbed by raking, boating activity, or chemical treatment. Chemical treatment kills many aquatic plants, but does not affect chara, leaving it behind to dominate the plant community.

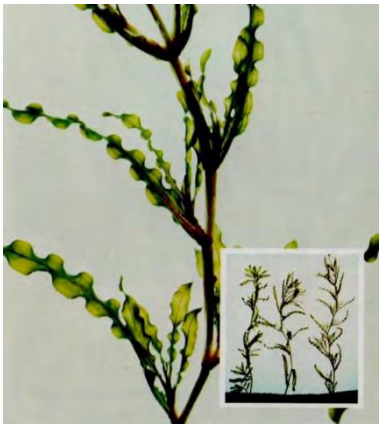
Chara provides habitat for aquatic invertebrates (fish, turtle, and waterfowl food) and small fish. In addition, it "ties up" phosphorus which reduces algae blooms and growth of filamentous algae. Like aquatic plants, chara produces oxygen into the lake system, but does not have a lot of biomass to decompose and use up oxygen when it dies back in the winter.

Chara is generally low growing and therefore does not interfere with lake use. Removal of large areas of chara could open the exposed lake bed up to opportunistic plants including aquatic invasive species. Oftentimes aquatic invasive species are difficult if not impossible to remove once they are established.

Plan: Leave chara in place to avoid the potential establishment of invasive species.

Curly Leaf Pondweed (*Potomageton crispus*)

Curly leaf pondweed can be an invasive non-native species of aquatic plant. It grows early in the year so it out-competes native species of plants. It dies back in June and as the tissue decomposes it releases phosphorus into the water. This frequently leads to enhanced growth of algae/filamentous algae.



Plan: Harvest in late April or early May (as soon as harvester can remove the top 15 nodes) to prevent the formation of turions. Harvesting in this fashion should result in the reduction of new plants. Plant material will be removed rather then left to decay and release nutrients to the lake, eventually reducing algae blooms.

"Nuisance" Aquatic Plant Areas

These areas of the lake were identified as regions with heavy aquatic plant growth that restricts boating and may limit the success of predator fish predation of pan fish. The latter can have an effect on the health of the fishery.

Plan: Provide access lanes between docks and naturally occurring open water plus reduction of aquatic beds in some areas of the lake. Harvesting would occur in three to five feet depth of water.

Strategically placed radial cuts will be done to balance the fish community by enhancing the ability of predatory species of fish to feed.

Considerations:

- Harvesting may negatively affect *Potomogeton* spp. (pondweeds) which are native aquatic plants that provide good habitat.
- Chemicals will not remove dead vegetation adding, to the build-up of muck and keeping nutrients in the lake system. This may lead to additional aquatic plant and algae growth.
- Some chemicals may remain in the sediment and the lake's ecosystem.

Inlet Vegetation

Lake residents are concerned about the quality of water and possibility that filamentous algae may be entering Pike Lake via the inlet. Reducing nutrient inputs in the watershed may help to reduce/eliminate this issue.

Plan: Leave aquatic plants in place to act as a filter to remove filamentous algae and utilize nutrients from the water.

The Pike Lake Sportsman Club may investigate the use of an additional man-made filter.

Hand Pulled Plants

Individuals can hand harvest aquatic plants at their shoreline; a channel (thirty feet or less) out as far as needed for access without a permit. The channel must be adjacent to their dock. Any hand harvested aquatic plants should be removed from Pike Lake and composted away from the lake.

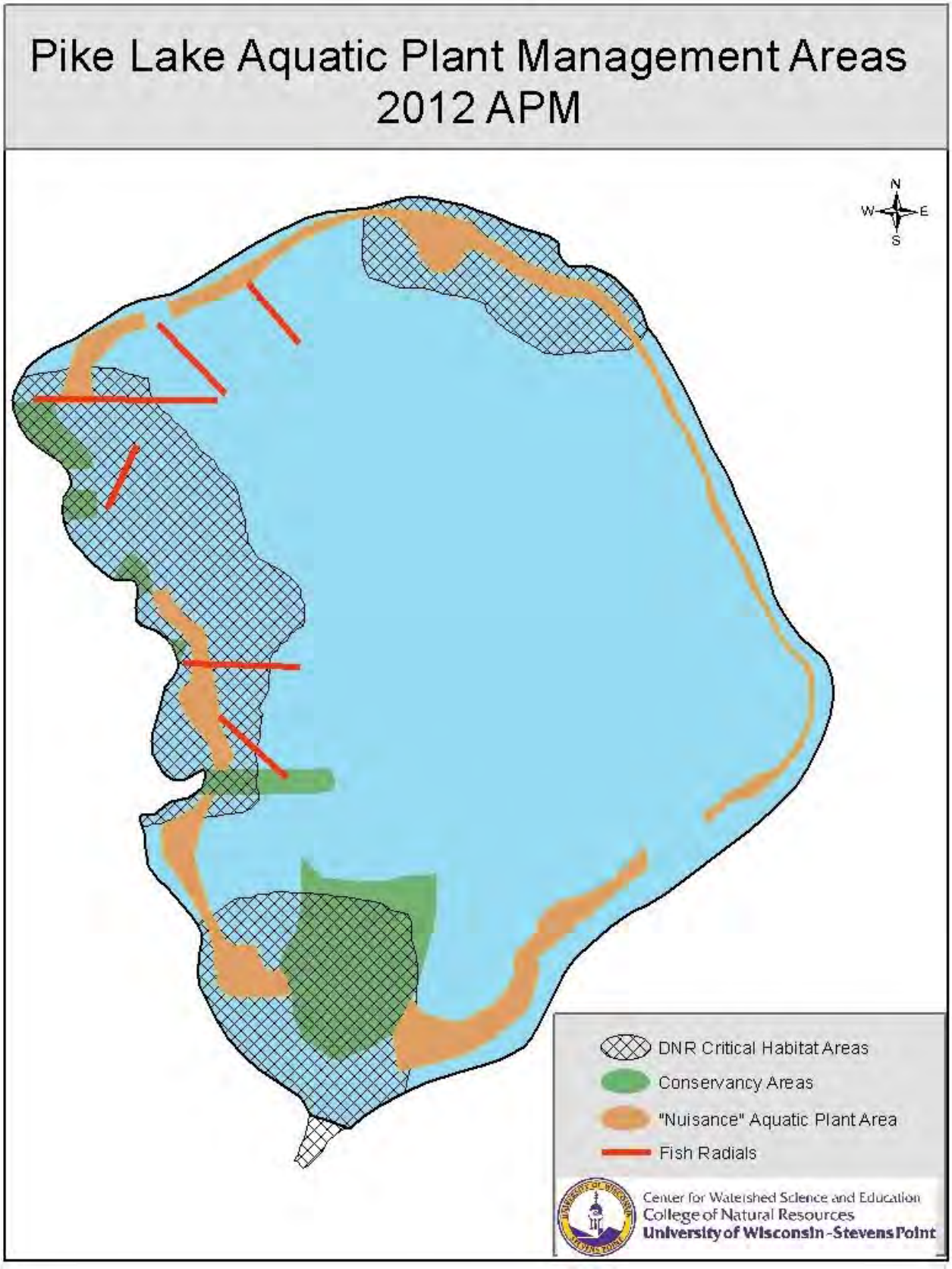
Plan: Provide a pick-up service for hand pulled plants from docks by the harvester after the first cutting of each year.

Additional Activities

1. Keep existing shoreland buffers intact and encourage landowners to restore vegetative buffers for better water quality and habitat.
2. Eliminate the use of fertilizer on shoreland properties and/or encourage annual soil tests prior to application of fertilizer.
3. Conduct a lake management study for a better understanding of internal and external nutrient loading.
4. Provide opportunities for residents and lake users to learn about shoreland land use practices, phosphorus, aquatic invasive plants (residents and boat landing), etc. The survey results indicate many topics that should be addressed.
5. Develop a corps of knowledgeable people to identify aquatic invasive species and monitor the lake routinely.
6. Continue to conduct citizen based water quality monitoring.
7. Improve the fishery by re-establishing emergent vegetation (such as bulrush) and allowing more vegetation in the 1.5 – 5 foot littoral zone.

APM Plan Review

On an annual basis the Pike Lake APM committee will review the APM plan and discuss any potential adjustments with the WDNR. Harvesting records (dates and estimated volume of harvesting) and maps should be included in the review. A monitoring strategy should be developed to provide data to the review process.



Map of Pike Lake showing aquatic plant management/protection areas.

Locations of yellow iris in Pike Lake encountered during the 2010 survey completed by Golden Sands Resource Conservation & Development Council, Inc..

Phosphorus Modeling

Table 1. Modeling data used to estimate phosphorus inputs from land uses in the Pike Lake watershed (low and most likely coefficients used to calculate range in pounds).

Pike Lake Land Use	Phosphorus Export Coefficient (lbs/acre-yr)	Land Use Area Within the Watershed		Phosphorus Load	
		Acres	Percent	Pounds	Percent
Water	0.10	246	**7**	18-55	**3**
Developed	0.13	244	**7**	33-65	**6**
Wetland/Barren	0.09	271	**7**	24-72	**5**
Forest	0.04	2043	**55**	91-164	**17**
Mixed Agriculture	0.27	150	**4**	40-107	**8**
Row Crop Agriculture	0.45	775	**21**	346-692	**65**
*Values are not exact due to rounding and conversion.					

Rice Lake Land Use	Phosphorus Export Coefficient (lbs/acre-yr)	Land Use Area Within the Watershed		Phosphorus Load	
		Acres	Percent	Pounds	Percent
Water	0.10	31	**2**	2-7	1
Developed	0.13	95	**7**	4-8	**2**
Wetland/Barren	0.09	83	**6**	7-22	**3**
Forest	0.04	626	**48**	28-50	**12**
Mixed Agriculture	0.27	66	**5**	18-47	**7**
Row Crop Agriculture	0.45	407	**31**	182-363	**76**
*Values are not exact due to rounding and conversion.					

Figure 3. Modeling data used to estimate phosphorus inputs from land uses in the Rice Lake watershed (low and most likely coefficients used to calculate range in pounds).