2014

Mayflower Lake Management Plan

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

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

Mayflower Lake Management Plan

The Mayflower Lake Management plan was prepared after obtaining input from residents and lake users at a series of public planning sessions held at the Norrie Town Hall in Birnamwood, Wisconsin on November 12 and December 10, 2013 and January 21 and February 11, 2014. The inclusive community sessions were designed to identify key community concerns, assets, opportunities, and priorities. Representatives of state and local agencies, as well as nonprofit organizations also attended the planning sessions to offer their assistance to the group in developing a strategic lake management plan (LMP).

The plan was adopted by the Town of Norrie on: July 13, 2015
Date

The plan was adopted by Marathon County on August 18, 2015
Date

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

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

Marathon Lake Management Planning Committee Members and Resources

Planning Committee

Matt Alwes
Ken Bukowski
Charles Fischer
Keith Frederick
Cheryl Fredlund
Bill Greenwood
Julie Greenwood
Kathi Meidam
Kolby Muscha
Hank Ritter
Patricia Schwede
Joseph Suchon
Delores Thayer
Thomas Wahl

Town Board Members

Alfred King
Mike Melotik

Marathon County

Department of Conservation, Planning and Zoning

County Conservation Specialists –
Shawn Esser, Diane Hanson, Angela Wenninger

UW – Stevens Point

Center for Watershed Science and Education

Water Resource Specialists – Ryan Haney and Danielle Rupp
Water Resource Scientist – Nancy Turyk

UW – Extension Lakes

Director – Eric Olson

Wisconsin Department of Natural Resources

Fisheries Biologist – Tom Meronek
Water Resources Management Specialist – Scott Provost
Lake Planning Specialist – Buzz Sorge

Golden Sands RC&D, Inc.

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

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

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

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Overarching Vision for Mayflower Lake

Mayflower Lake will host a balanced aquatic plant community that benefits the health of the lake and provides quality habitat, but does not impede lake users' enjoyment of the lake or outdoor activities. Clean, clear water will support abundant fish and wildlife. Beauty and peacefulness will be preserved in the lake's natural setting and promote quality of life spent with family and friends, resting and relaxing. Residents and lake lovers will work together on behalf of the lake.

Mayflower Lake is located in quiet, rural southeastern Marathon County, Wisconsin. The lake is a central part of the community, providing residents and visitors with opportunities to boat, swim, fish, relax, and find retreat at the two campgrounds that are situated on the lake. Although the residences and camping areas make Mayflower Lake one of the more developed lakes in eastern Marathon County, natural beauty is equally present on the western, more undeveloped side of the lake which boasts forests and wetlands. Mayflower Lake residents strongly value the wildlife that visits their lake, and the quality of the water it contains. In 2013 and 2014, these values inspired the community members of Mayflower Lake to come together in partnership with local professionals to learn about Mayflower Lake and to create a lake management plan to protect and improve their lake for generations to come.

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

- Reduce and maintain aquatic plant growth in Mayflower Lake
- Improving shoreland habitat
- Enhance the sport fishery in the lake

Introduction and Background

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

Many individuals and organizations are involved in assuring that the Mayflower Lake ecosystem is 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 Mayflower Lake can have the greatest influence on the lake by understanding and choosing lake-friendly options to manage their land and the lake.
- **Mayflower Lake Protection and Rehabilitation District:** This plan provides the District with a well thought out plan for the whole lake and lists options that can easily be prioritized. Annual review of the plan will also help the District to realize its accomplishments. Resources and funding opportunities for District management activities are made more available by placement of goals into the lake management plan, and the District can identify partners to help achieve their goals for Mayflower Lake.
- **Neighboring lake groups**: Neighboring groups with similar goals for lake stewardship can combine their efforts and provide each other support, improve competitiveness for funding opportunities, and make efforts more fun.
- **The Town of Bevent**: The Town can utilize the visions, wishes, and goals documented in this lake management plan when considering town-level management planning or decisions within the watershed that may affect the lake.
- **Marathon County:** County professionals will better know how to identify needs, provide support, base decisions, and allocate resources to assist in lake-related efforts documented in this plan. This plan can also inform county board supervisors in decisions related to Marathon County lakes, streams, wetlands, and groundwater.
- **Wisconsin Department of Natural Resources (WDNR)**: 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.

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 (WDNR) 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 WDNR 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 for future reference.

Several reports from the Mayflower Lake Study 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.Mayflower

The purpose of this plan is to learn about Mayflower Lake and identify features important to the Big Bass Lake community in order to provide a framework for the protection and improvement of the lake. This framework will enable the committee to achieve its vision for Mayflower Lake in the years to come. The planning process included a series of four public planning sessions which were held at the Bevent Town Hall to assist area residents, Mayflower Lake Management District members, lake users, and representatives of local municipalities with the development of the lake management plan. Four meetings took place between November 2013 and February 2014. Participation in the planning process was open to everyone and was encouraged by letters sent directly to Mayflower Lake waterfront property owners and by press releases in local newspapers.

The purpose of this plan is to learn about Mayflower Lake, identify factors important to lake residents and users, and develop goals to protect and improve Mayflower Lake. for future generations.

Guest experts and professionals were invited to attend the planning sessions. They presented information and participated in discussions with participants to provide context, insight and recommendations for the lake management plan, including environmental and regulatory considerations. Information provided by the professionals was organized with the survey results into discussion topics, which included: the fishery and recreation; the aquatic plant community; water quality and land use; shoreland health; and communication. After learning about the current conditions of each topic, participants identified goals, objectives, and actions for the lake management plan that were recorded by professionals from UW-Stevens Point. Planning session notes and presentations were posted to the Marathon County website.

The Mayflower Lake Planning Committee consisted of Mayflower Lake Management District and town board members.

Technical assistance during the planning process was provided by professionals from the Marathon County Conservation Department, Wisconsin Department of Natural Resources (WDNR), Golden Sands Resource Conservation and Development, Inc., UW Extension-Lakes, and the UW-Stevens Point Center for Watershed Science and Education (CWSE).

Goals, Objectives and Actions

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

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

In-Lake Habitat and a Healthy Lake

Aquatic Plant Community—habitat, food, health, native species, and invasive species
Fish Community—fish species, abundance, size, important habitat and other needs
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, Lake District

Lead persons and resources are given under each objective of this plan. These individuals and organizations are able to provide information, suggestions, or services to accomplish objectives and achieve goals. The following table lists organization names and their common acronyms used in this plan. This list should not be considered all-inclusive – assistance may also be provided by other entities, consultants, and organizations. Contact information for organizations and individuals who 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
CLMN	Citizen Lake Monitoring Network
CWSE	UWSP Center for Watershed Science and Education
CPZ	Marathon County Planning and Zoning (includes Land Conservation Department)
MC	Marathon County
NCCT	North Central Conservancy Trust
NRCS	USDA Natural Resources Conservation Service
RC&D	Golden Sands Resource Conservation and Development Council, Inc.
UWSP	University of Wisconsin-Stevens Point
UWEX	UW-Extension
WEAL	UWSP 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 Mayflower Lake for its fishing, wildlife, and good water quality. These attributes are all interrelated; the health of one part of the lake system affects the health of the rest of the plant and animal community, the experiences of the people seeking pleasure at the lake, and the quality and quantity of water in the lake. Habitat is the structure for a healthy fishery and wildlife community. It can provide shelter for some animals and food for others.

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

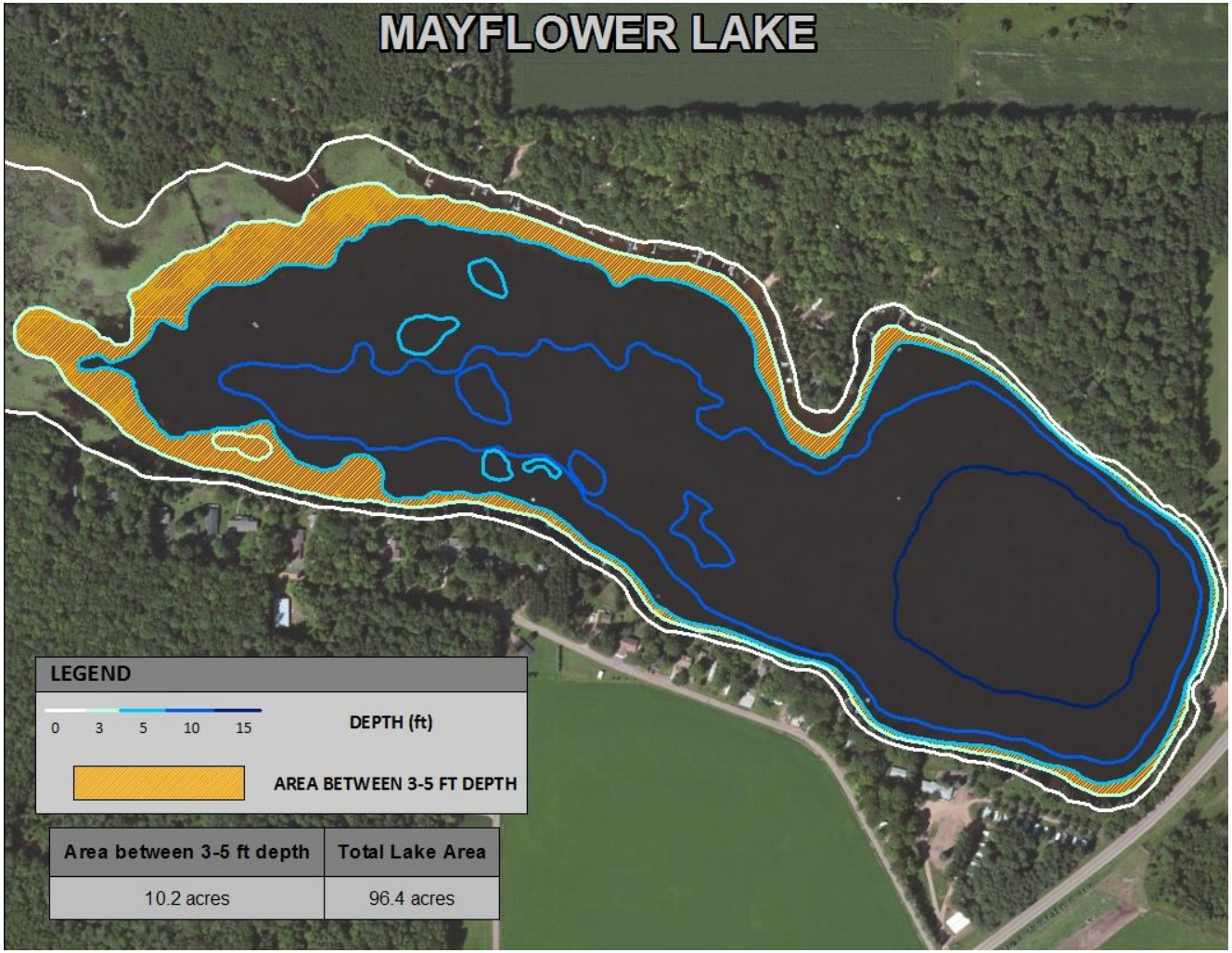


Figure 1. Harvestable areas in Mayflower Lake between 3-5 feet. No harvesting in critical habitat areas or areas less than 3 feet of water.

Aquatic Plants

Aquatic plants provide the forested landscape within Mayflower Lake. They provide food and

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

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

Residents of Mayflower Lake have written to the WDNR as early as 1948 seeking advice on aquatic plant control. The Mayflower Lake District was originally established to address periodic winter fish kills and problem aquatic plant growth following winter fish kills in 1972, 1974 and 1975. The District levied its first tax in 1976, using these funds to finance a feasibility study. The study, conducted by Northern Lake Service of Crandon, Wisconsin, identified potential alternatives for managing the fish kills and excessive plant growth. At the August annual meeting in 1980, the Lake District decided to install a permanent aeration system which has eliminated winter fish kills since its installation. Aquatic plant harvesting began in 1984 with the purchase of a harvester (harvesting is now done by a contractor).

23 species of aquatic plants were identified in Mayflower Lake or wet areas of the shore during the 2011 survey. This is average compared to other eastern Marathon County lakes, but Mayflower Lake has by far the most species of floating vegetation.

The dominant plant species in the survey was white water lily, followed by Fries' pondweed and muskgrass. The seeds of the white water lily provide food to waterfowl. The broad, floating leaves of this aquatic species offer shade and shelter to fish. Fries' pondweed is also an important food source for waterfowl and provides protective cover for fish and invertebrates. Muskgrass is a favorite food source for a wide variety of waterfowl, and is especially important cover and food for young trout, largemouth bass and smallmouth bass.

The native Northern water milfoil is abundant in Mayflower Lake, particularly in areas of less than 10 feet depth that is not already dominated by water lilies. Like the other aquatic milfoils, it has feather-like leaves below water, and flowers and tiny leaves arranged on emergent stalks. Northern milfoil can often resemble and be confused with Eurasian milfoil, sometimes to the point where chemical analysis is required to distinguish them. In general, however, northern milfoil tends to be a more robust plant and has fewer and more widely spaced leaflets pairs than Eurasian milfoil. It is an important part of the lake's aquatic plant community providing cover for fish and invertebrates and supports insects and other small animals. The abundance of the plant has become a nuisance, however, to certain recreational activities in Mayflower Lake. Harvesting certain areas (particularly the 3-5 foot depth) is a common approach to minimize recreational conflicts. An aquatic plant management plan has been prepared to address this issue. Some of the actions outlined in the aquatic plant management plan have been incorporated into the goals and actions listed below; however, for a more detailed description of the aquatic plant study and aquatic plant management options, reference the Mayflower Lake Aquatic Plant Management Plan (UWSP 2014).

Mayflower Lake had been historically identified by the Wisconsin DNR as having curly-leaf pondweed populations. A special survey of Mayflower Lake was conducted in June 2012 to specifically inventory populations of this non-native species. However, during the survey, no curly-leaf pondweed was found in the lake. During the survey, variable-leaf pondweed and clasping-leaf pondweed were found in Mayflower Lake. These native species closely resemble curly-leaf pondweed. Mayflower Lake was also inventoried for non-native aquatic species during the full aquatic plant survey in August of 2012. Once again, no aquatic invasive species were found.

Overall, the aquatic plant community in Mayflower Lake can be characterized as having good species diversity when compared with the other lakes in the Eastern Marathon County Lakes Study. The habitat, food source, and water quality benefits of this diverse plant community should be the focal points in future decision-making concerning lake management strategies.

Guiding Vision for Aquatic Plants in Mayflower Lake

Mayflower Lake will host a diverse, balanced native aquatic plant community that provides quality habitat while still allowing for recreational use.

Goal 1: Reach a balance between high quality, unimpeded recreation (swimming, boating) and a healthy, balanced aquatic plant community

Objective 1.1: Mechanically harvest plants in designated "nuisance" areas while minimizing disturbance of native aquatic vegetation.

Actions	Lead person/group	Resources	Timeline
Follow outlined actions in aquatic plant management plan.	Lake District Commission	WDNR Water Resources Management Specialist	
Explore the purchase of a harvester (new/used) for Mayflower Lake.	Lake District Commission	WDNR Water Resources Management Specialist	
Contract to harvest in designated areas >3 feet in depth using GPS (~$150/hour).	Lake District Commission	WDNR Water Resources Management Specialist, contractor	1-3 times per season
Ensure plants are removed from the lake by the performance of a second pass with the harvester to remove floating plants.	Lake District Commission, Contractor	Contractor	During harvesting events
Avoid plant removal in and around bulrush beds.	Lake District Commission, Contractor	Harvester/contractor, WDNR Fisheries Biologist	Ongoing

Perform radial cuts or transects with harvester to maintain 18% open water for bluegill size structure improvement, with preference around docks.	Lake District Commission, Contractor, WDNR Fisheries Biologist	WDNR Fisheries Biologist, harvester/contractor	1-3 times per season
Maintain at least 20% of littoral zone (near-shore) vegetation for bass habitat.	Lake District Commission, Contractor	WDNR Fisheries Biologist, harvester/contractor	Ongoing

Objective 1.2: Use milfoil weevils (*Euhrychiopsis lecontei*) to help balance native aquatic plant bed density with recreational desires.

Actions	Lead person/group	Resources	Timeline
Ask RC&D* to conduct a stem count for milfoil weevil presence.	Lake District Commission, Contractor	RC&D*	
Explore rearing milfoil weevils.	Lake District Commission	RC&D*	

Goal 2: Prevent the establishment of aquatic invasive species through community awareness and sustainable management of aquatic plants.

Objective 2.1: Be prepared to detect early invasion by monitoring, informing others, and protecting the existing ecosystem.

Actions	Lead person/group	Resources	Timeline
Protect and leave in place as much native aquatic vegetation as possible.	Lake District Commission		Ongoing
Reference Rapid Response Plan (located in the Appendix) when aquatic invasive species are found.	Lake District Commission	RC&D*, WDNR Water Resources Management Specialist	Ongoing
Include information about the threat of aquatic invasive species 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.	Lake District Commission	UWEX Lakes	Ongoing
Learn to monitor for invasive species.	RC&D*, interested citizens	RC&D*	Ongoing
Consider enrolling in Clean Boats, Clean Waters program.	Lake District Commission	RC&D*	Ongoing during boating months

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

The Fish Community

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

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

Managing a lake for a balanced fishery can result in fewer expenses to lake stewards and the public. While some efforts may be needed to provide a more suitable environment to meet the needs of the fish, they usually do not have to be repeated on a frequently reoccurring basis. Protecting existing habitat such as emergent, aquatic, and shoreland vegetation, and allowing trees that naturally fall into the lake to remain in the lake are free of cost. Alternatively, restoring habitat in and around a lake can have an up-front cost, but the effects will often continue for decades. Costs in time, travel, and other expenses are associated with routine efforts such as fish stocking and aeration. Ideally, a lake contains the habitat, water quality, and food necessary to support the fish communities that are present within the lake and provide fishing opportunities for people without a lot of supplemental effort and associated expenses to maintain these conditions.

Species	1958	1962	1964	1970	1972	1983	1985	1988	1989	2000	2012
Black Bullhead											x
Black Crappie	x	x		x	x			x	x	x	x
Bluegill		x	x	x	x		x		x	x	x
Bluegill x Pumpkinseed hybrid											x
Bullhead	x	x		x	x		x	x	x		
Common Shiner								x			
Golden Shiner				x				x			
Green Sunfish										x	
Largemouth Bass				x		x	x	x	x	x	x
Central Mudminnow				x							
Northern pike				x	x	x	x	x	x		x
Pumpkinseed		x			x		x		x	x	x
Walleye	x	x	x	x	x	x	x	x	x	x	x
White Sucker	x			x			x	x		x	
Yellow Perch	x	x	x	x	x		x		x		x

Mayflower Lake supports a warm water fish community. In the 2012 survey, 9 fish species were sampled and identified out of the 14 total species that have been recorded in surveys dating back to 1958. Although most species observed had previously been reported in Mayflower Lake, the black bullhead and the bluegill-

pumpkinseed hybrid were newly documented.

A variety of management techniques were attempted historically on Mayflower Lake to maintain fisheries and minimize aquatic nuisance plants. In 1959 WDNR noted good potential to manage populations of northern pike, largemouth bass, and bluegill. In 1957 and 1958 adult northern pike were stocked, and public opinion noted an increase in catchable-size bluegill with the introduction of predator fish. Due to this success, recommendations for a complete renovation program with chemical treatment were proposed; however, the proposal was declined. In 1972, basic management focused on populations of northern pike, largemouth bass, and panfish. As a result of frequent winterkill events, a permanent aeration system was installed on Mayflower Lake in 1979. A 1989 fisheries report indicated largemouth bass were abundant, yet growth was slow. Walleye recruitment was noted as variable across years leading up to the 1989 report.

Fish stocking records for Mayflower Lake date back to 1938 according to WDNR files. Stocking efforts have largely focused on walleye; however, largemouth bass, yellow perch and smallmouth bass have also been stocked. In spite of stocking efforts, walleye reproduction was not observed in the 2012 survey.

Mayflower Lake was first listed as an impaired water on 4/1/98 for the atmospheric deposition of mercury identified in fish tissue.

Guiding Vision for the Fish Community in Mayflower Lake

Mayflower Lake will have a balanced fish community, providing a quality fishing experience.

Goal 3: To have balanced, healthy fish communities supported by quality habitat and water quality conditions necessary for survival.

Objective 3.1: Prevent winter fish kills by use of an aerator.

Actions	Lead person/group	Resources	Timeline
Continue current aerator use as documented historically.	Lake District	WDNR Water Resources Management Specialist	Ongoing
Monitor dissolved oxygen concentrations every 7-14 days during winter months (weather dependent) and periodically throughout the year.	Lake District Commission	WDNR Water Resources Management Specialist	Ongoing
Maintain records of aerator use and maintenance.	Lake District Commission		Ongoing

Objective 3.2: Protect and enhance habitat to support a balanced, healthy fish community.

Actions	Lead person/group	Resources	Timeline
Work with the WDNR to strategically place radial cuts or transects in densely vegetated areas to maintain 18% open water for bluegill size structure improvement.	Lake District Commission, WDNR Fisheries Biologist	WDNR Fisheries Biologist	Annually
Maintain at least 20% of littoral zone (near-shore) vegetation for bass habitat.	Lake District Commission, private contractor (harvesting)	WDNR Fisheries Biologist	Ongoing
Enhance/protect existing woody habitat (logs, stumps, sticks, etc.).	Lake District Commission, WDNR	WDNR Fisheries Biologist	Ongoing
Apply for permits from the WDNR to place tree drops and/or fish sticks on south end of lake.	Lake District Commission, WDNR	WDNR Fisheries Biologist	2014/2015, Ongoing
Protect and restore emergent vegetation (bulrushes) in littoral (near-shore) zone.	Lake District Commission	WDNR Fisheries Biologist, CPZ	Ongoing
Explore enhancement of walleye spawning habitat on eastern end of lake by addition of fish sticks (WDNR permit needed), spawning reef, and/or bulrush enhancements.	Lake District Commission	Walleyes for Tomorrow, WDNR Fisheries Biologist	Ongoing

Objective 3.3: Understand and support the existing fish community.

Actions	Lead person/group	Resources	Timeline
Collaborate with WDNR to conduct more frequent fish surveys.	Lake District Commission, WDNR	WDNR Fisheries Biologist	Ongoing, at least once every 5 years
Request that the WDNR conduct a fall/spring survey to more accurately measure walleye population.	Lake District Commission, WDNR	WDNR Fisheries Biologist	Spring/Fall 2014 or 2015
Seek evaluation of largemouth bass fishery.	Lake District Commission, WDNR	WDNR Fisheries Biologist	
Coordinate walleye/fish stocking efforts with the WDNR to avoid overlap and improve records of stocking.	Lake District Commission, WDNR	WDNR Fisheries Biologist	Starting Spring 2014, Ongoing
Coordinate efforts with WDNR if stocking larger walleye. Currently stocking biannually (odd years). 10-15”=$4.25 each.	Lake District Commission, WDNR	WDNR Fisheries Biologist	
Review current regulations; determine if other options exist that might better suit the lake.	Lake District Commission	WDNR Fisheries Biologist	Ongoing, annually review

Critical Habitat

Special areas of lake harbor habitat that is essential to the health of a lake and its inhabitants. In many lakes in Wisconsin, critical habitat areas are identified by biologists and other lake professionals with the WDNR 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. Designating areas of the lake as critical habitat results in the ability to identify these areas on maps and share information about their importance to inform others about the locations and significance of these areas that could 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.

Biologists with the Wisconsin Department of Natural Resources (WDNR) visited Mayflower Lake in October 2003 to identify special areas in the lake that were "sensitive and fragile areas that support the wildlife and fish habitat, provide mechanisms that protect the water quality in the lake, harbor quality plant communities and preserve the places of serenity and aesthetic beauty for the enjoyment of lake residents and visitors". The report identifies two areas, CH1 and CH2, considered "sensitive and fragile areas that support the wildlife and fish habitat, provide mechanisms that protect the water quality in the lake, harbor quality plant communities and preserve the places of serenity and aesthetic beauty for the enjoyment of lake residents and visitors". CH1 encompasses the wetland complex on the western end of the lake, and CH2 highlights the area on the northern shore adjacent to the wetland that remains relatively undeveloped. These sensitive areas (now referred to as Critical Habitat Designations) are outlined in Figure 2. In general, recommendations in the report include:

1. Maintain aquatic vegetation in undisturbed condition.
2. Protect the emergent vegetation.
3. Prohibit logging in shoreline cedars.
4. No alteration of littoral zone except for improvement of spawning habitat.
5. Minimize removal of any shoreline or aquatic vegetation.
6. Do not remove fallen trees along shoreline.
7. Restore shrub cover on the shore to control nutrient run-off.
8. Do not use fertilizers.
9. Do not permit rip-rap, bank grading, dredging, retaining walls, gravel beds or sand blankets.

CHD 1 was designated as critical habitat for the near-shore terrestrial habitat, shoreline habitat, and shallow water habitat found in this area. This type of habitat is important for maintaining water quality, a diverse aquatic plant community, valuable fish and wildlife habitat and outstanding natural scenic beauty. CHD 2 has a unique deep-water marsh that also provides important shallow water habitat.

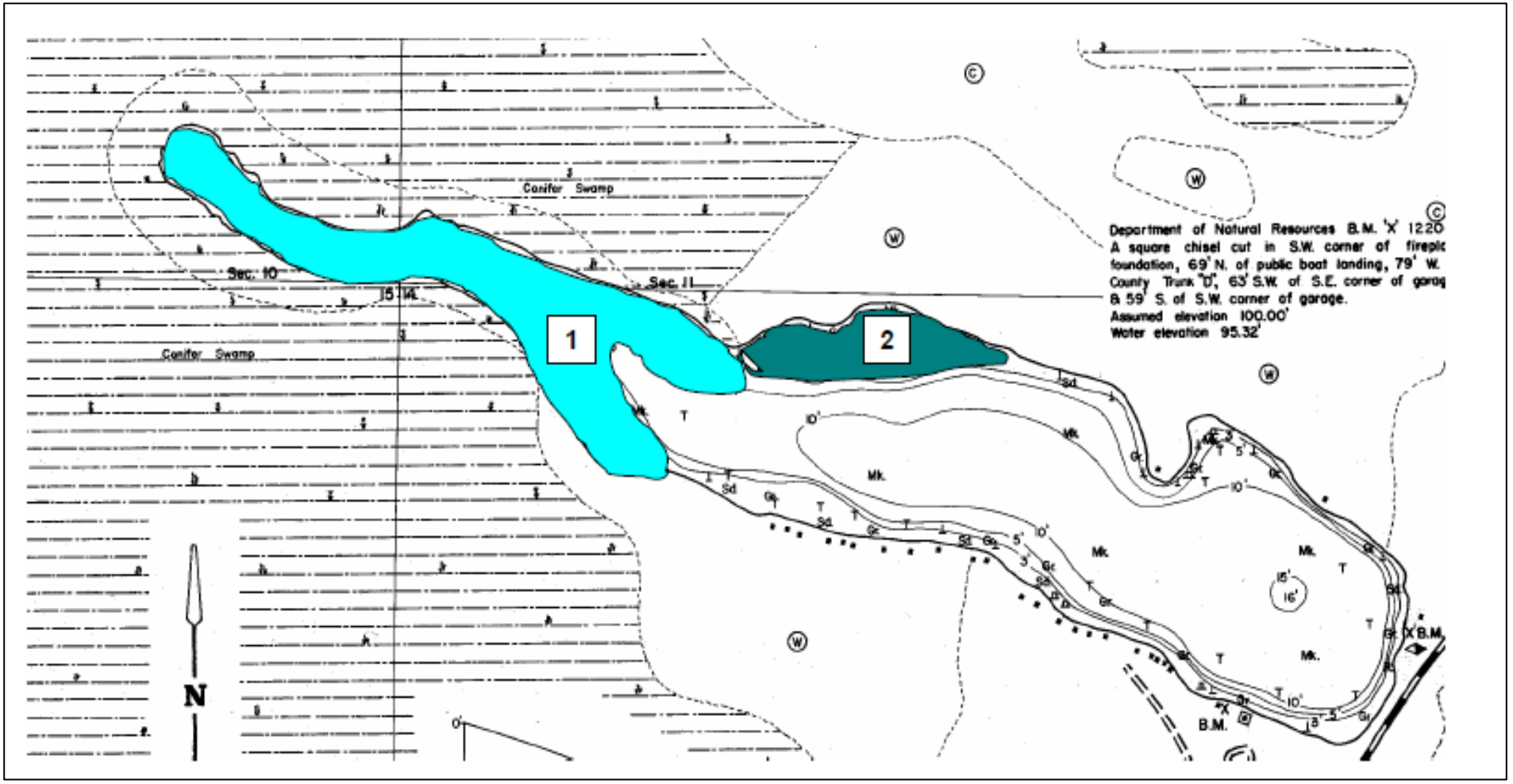


Figure 2 Critical Habitat Designations (formerly Designated Sensitive Areas) on Mayflower Lake, Marathon County. WDNR 2003.

Guiding Vision for Mayflower Lake's Critical Habitat

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

Goal 4: Protect existing important habitat for fish and wildlife such as ducks, geese, loons, eagles, sand hill cranes, frogs, turtles and deer. 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
Provide information about CHDs and their importance to the lake via welcome packets, newsletter, etc.	Lake District Commission	UWEX Lakes, WDNR	Ongoing
Support protection of land surrounding the wetlands on the western end of the lake.	Lake District Commission	NCCT NRCS WDNR Lake Protection Grants Wisconsin Stewardship Program	
Increase plants/bulrushes in critical habitat designation (II)	Lake District Commission	CPZ WDNR	Starting 2014

Landscapes and the Lake

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

Shoreland vegetation is critical to a healthy lake 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

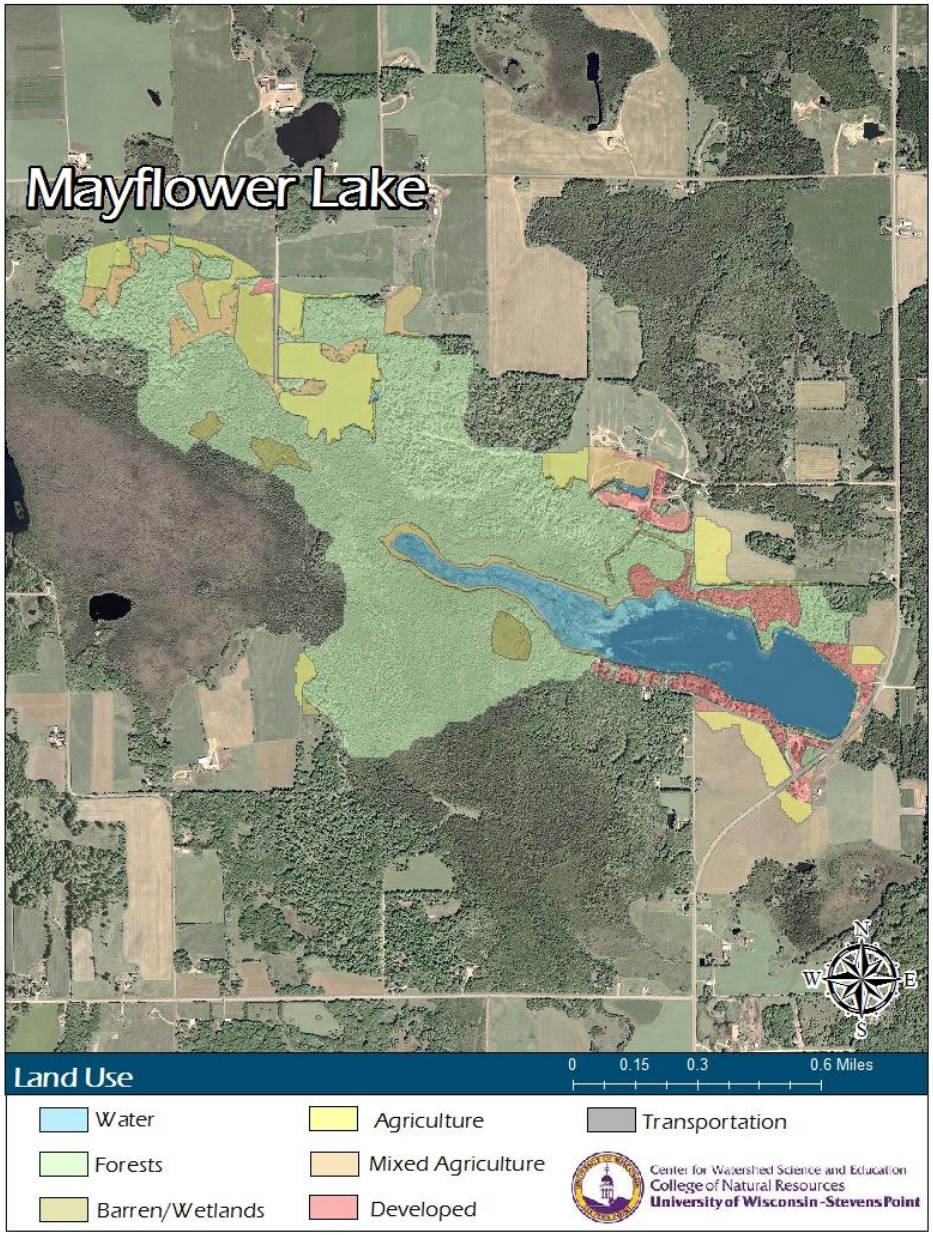


Figure 3 Mayflower Lake's watershed and surrounding land use.

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 Mayflower 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 Mayflower 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

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

Dissolved oxygen is an important measure in Mayflower 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 Mayflower Lake ranged from plentiful to limited, depending upon depth and time of year. Dissolved oxygen was mixed from the lake surface to the lake bottom during spring and fall during overturn events. In winter of both years, at the deep hole, dissolved oxygen concentrations fell below levels needed to support many fish species. Following spring overturn, dissolved oxygen concentrations varied with depth as biological processes in the lake consumed or generated oxygen. Algal blooms produced periodic spikes in dissolved oxygen concentrations at depths typically between 2 and 8 feet.

In Mayflower Lake, water clarity ranged from 5 to 10 feet. When compared with historic data, the average water clarity measured during the study was slightly better in April, August and October, similar in September, and poorer during the growing season months of June and July. Fluctuations throughout the summer are normal, as algal populations and sedimentation (primary influences on water clarity) increase and decrease. The natural stained brown color of water in Mayflower Lake also contributes to reduced water clarity.

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, average sodium concentrations were observed at natural levels for central Wisconsin lakes, and average concentrations of chloride and potassium were slightly elevated. Although these elements are not detrimental to the aquatic ecosystem, they indicate that sources of contaminants such as road salt, fertilizer, animal waste and/or septic system effluent may be entering the lake from either surface runoff or via groundwater.

Phosphorus is an element that is essential in trace amounts to most living organisms, including aquatic plants and algae. Sources of phosphorus can include naturally-occurring phosphorus in soils and wetlands, and groundwater. Common sources from human activities include soil erosion, animal waste, fertilizers, and septic systems. Although a variety of compounds are important to biological growth, phosphorus receives so much attention because it is commonly the "limiting nutrient" in many Wisconsin lakes. Due to its relatively short supply compared to other substances necessary for growth, relatively small increases in phosphorus result in significant increases in aquatic plants and algae.

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

Total phosphorus concentrations in Mayflower Lake ranged from a high of 34 µg/L in June 2011 to a low of 10 µg/L in August 2012, with median growing season concentrations of 22.5 µg/L and 18 µg/L in 2011 and 2012, respectively. This is below Wisconsin's phosphorus standard for shallow seepage lakes of 40 µg/L.

Managing nitrogen, phosphorus and soil erosion throughout the Mayflower 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 Mayflower 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 Mayflower Lake

Mayflower Lake will have clear, clean water with minimal contamination and oxygen sufficient to support fish populations through the winter.

Goal 5: Maintain and improve current water quality conditions in the lake.

Objective 5.1: Routinely record water quality to show trends over time and track measurable improvement or degradation.

Action	Lead person/group	Resources	Timeline
Continue water clarity (Secchi depth) monitoring every 3 weeks during summer months.	CLMN Lake District Commission	CLMN Coordinator	Every 3 weeks during summer months
Continue ice off/ice on monitoring.	CLMN Lake District Commission	CLMN Coordinator	Annually

Begin routine water quality sampling at least once per month May-September (Total Phosphorus and Chlorophyll-a).	CLMN Lake District Commission	CLMN Coordinator	Once/month May-September
Continue use of aerator during winter months (records attached). Maintain records of aerator use, maintenance, etc.	CLMN Lake District Commission		Annually, ongoing
Monitor and record dissolved oxygen concentrations year-round in multiple locations (once/week during long, hard winters or every 7 to 14 days during average winters).	Lake District Commission, aerator operator	WDNR UWSP CLMN Coordinator	Ongoing throughout the year; more frequently in winter

Objective 5.2: Reduce phosphorus loading to Mayflower Lake to help reduce plant and algae growth and improve water clarity. The goal will be achieved when the summer median total phosphorus concentration (5 samples taken monthly during May-September) falls below 20 µg/L for at least 3 consecutive years.

Action	Lead person/group	Resources	Timeline
Decrease/eliminate personal use of fertilizers around the lake and in the watershed.	Lake District Commission		Ongoing
Inform residential landowners around the lake and in the watershed about the impact of phosphorus-containing fertilizers on the lake by means of newsletter, picnic/summer event, posting, etc.	Lake District Commission	UWEX Lakes	Ongoing
Continue routine maintenance and improvements of septic systems around the lake.	CPZ	CPZ	At least once every 3 years, Ongoing
Encourage the installation of rain barrels, rain gardens, and native shoreland vegetation to slow the movement of storm water, soil, and nutrients toward the lake.	Lake District Commission CPZ	CPZ	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 extend at least 35 feet landward from the water's edge

Mayflower Lake has 2.8 miles of shoreline. The overall findings show that 3,872 linear feet (26%) of shoreline were classified as having an unmowed grass/forb buffer depth extending less than 35 feet from the water's edge (Appendix). Similar results exist for the shrubs layer. The tree layer was found to be abundant, but 5,709 linear feet (38%) were classified as having a buffer depth of only 5-15 feet inland. Mayflower Lake's shoreland vegetation has been significantly altered, especially along the southern and eastern shorelines. Most of the taller grasses, forbs and shrubs have been removed from these portions of the lake, leaving very little taller vegetation for stormwater infiltration, erosion protection, and wildlife habitat. The western shoreline vegetation remains primarily in a natural state with adequate vegetative buffers. If more development occurs on Mayflower Lake, changes in the amount of healthy shoreland can easily occur. Minimizing impacts to Mayflower Lake from future development should include planning to ensure that prospective developers have the right information to make good decisions and that zoning is in place to achieve habitat, water quality and aesthetic goals. In the figure to the right, the shorelands were color-coded to show their overall health based on natural and physical characteristics observed during the 2011 survey. Blue shorelands identify healthy areas with sufficient vegetation and few human disturbances. Red, orange, or yellow shorelands indicate locations where the shoreland could benefit from restoration or plantings. The map displaying the results of the 2011 survey of the Mayflower Lake shoreland is located in the Appendix.

Guiding Vision for Mayflower Lake's Shorelands

Mayflower Lake will have a healthy shoreland that protects water quality and complies with zoning ordinances and a community that understands the significance.

Goal 6: Restore and protect healthy shoreland habitat around Mayflower Lake.

Objective 6.1: Improve shoreland health in residential areas and near impervious surfaces.

Actions	Lead person/group	Resources	Timeline
Restore the shoreland with native plants from local plant nurseries.	Lake District Commission	Local plant nurseries CPZ Consultant	Ongoing
Explore funding options for shoreland restorations: WDNR grant if there is enough interest? Raise enough awareness and interest in a grant for a community restoration effort via newsletter, annual picnic, etc.	Lake District Commission	CPZ WDNR Lake Management Grant	
Focus on the southeastern end of the lake for shoreland restorations, rain gardens, etc. because of proximity to impervious highway. Consider a restoration demonstration site (near boat launch).	Lake District Commission CPZ	CPZ	2014
Invite a shoreland specialist to annual meeting to talk about	Lake District	CPZ	Annual picnic/meeting

shoreland restoration and/or do property walks.	Commission UWEX Lakes	WDNR UWEX Lakes Consultant	
Initiate incentives program or contest for shoreland restoration?	Lake District Commission		Ongoing, Annual review
Continue to educate lake district and shoreland residents about the purpose and content of local shoreland zoning ordinances via newsletters and annual meetings. Include this information in a welcome packet to new lakeshore residents.		CPZ UWEX Lakes (educational material)	

Objective 6.2: Protect quality habitat and existing healthy shoreland vegetation.

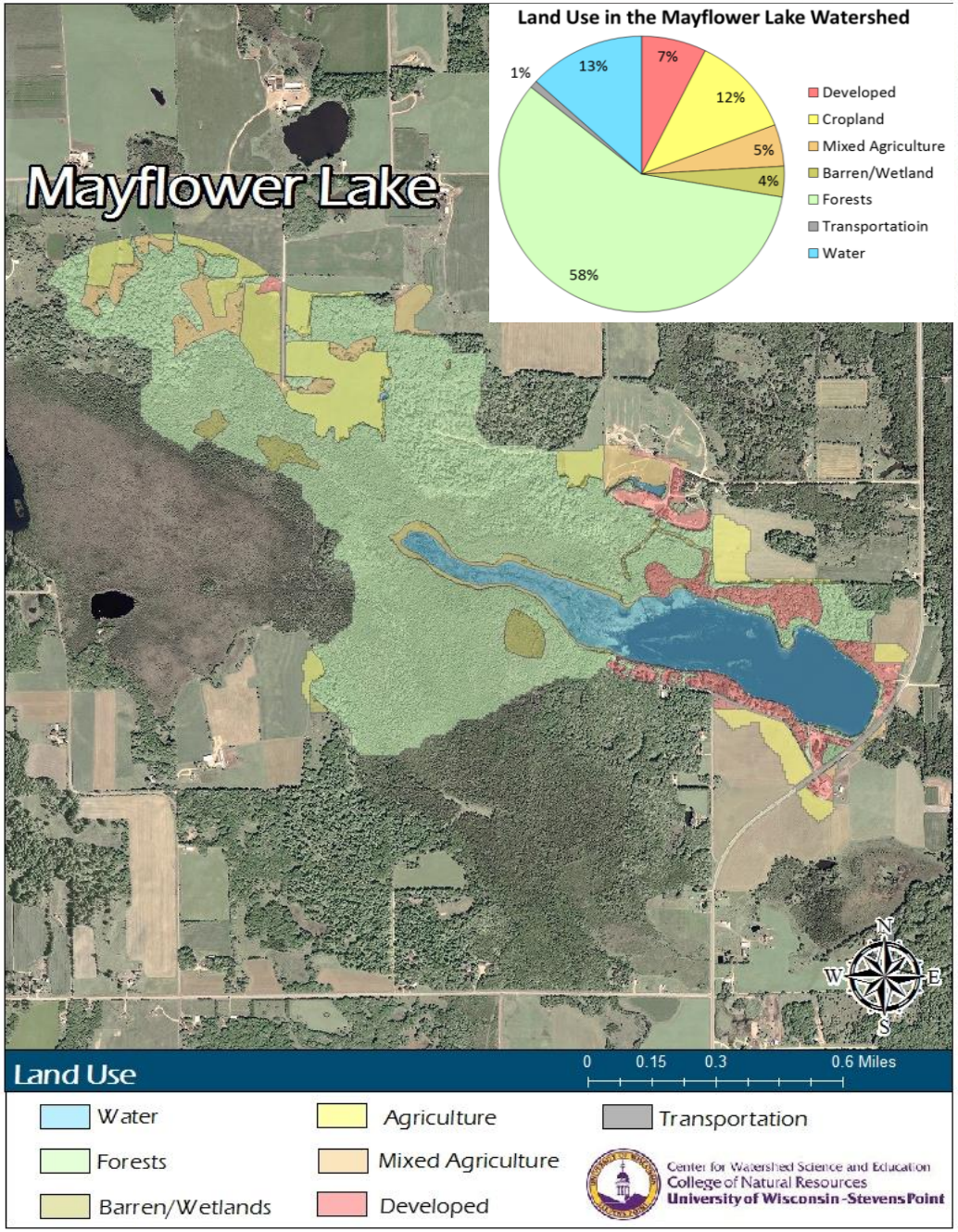
Actions	Lead person/group	Resources	Timeline
Explore options for protecting existing shoreland habitat, including wetland complex on the northwestern end of the lake.	Lake District Commission	CPZ	Ongoing

Watershed Land Use

It is important to understand where Mayflower 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 Spring Lake; its land area may be slightly different than the surface watershed.

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

The surface watershed of Mayflower Lake is 1,652 acres. Primary



land use is forest and agriculture with residential development scattered throughout. The lake's shoreland is comprised of residential development and forests and wetlands. In general, the land closest to the lake has the greatest immediate impact on water quality.

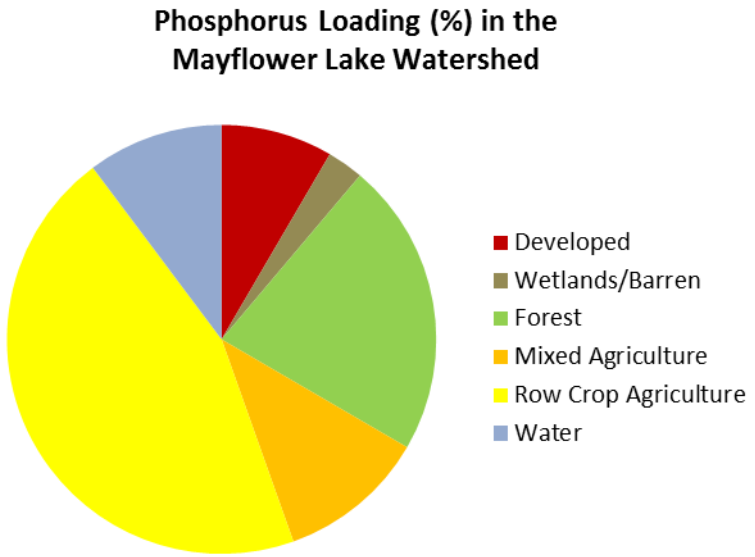


Figure 4. Estimated phosphorus loads from land uses in the Mayflower Lake watershed

Guiding Vision for Mayflower Lake's Watershed

Land in the Mayflower Lake watershed will be managed such that it supports clean water and a healthy lake.

Goal 7: Reduce fertilizer use in the watershed.

Objective 7.1: Educate and inform watershed residents of the impacts of fertilizers and phosphorus on lake water quality.

Actions	Lead person/group	Resources	Timeline
Inform watershed residents of the impacts of fertilizers on the lake via mailing, newsletter, annual picnic, etc.	Lake District Commission	UWEX Lakes UWSP	Ongoing

Encourage landowners to test their soil and explore implementation of best management practices that are designed to improve water quality.	Lake District Commission	CPZ UWEX	Ongoing
Support watershed property owners interested in conservation easements or other conservation programs.	Lake District Commission Town of Norrie	CPZ NCCT	Ongoing
Encourage the County to work with property owners to install best management practices that improve water quality.	Lake District Commission CPZ	CPZ	

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.

People are drawn to Mayflower Lake for many reasons but frequently the beauty and peace describe their motivation. They enjoy spending time on it with family, friends, and alone. With a variety of uses and interests, conflicts of use may arise on a lake from time to time; discussions about potential or existing conflicts and identifying ways to resolve them can make a visit to a lake pleasant for everyone. Sometimes verbal agreements are enough but other times guidance such as rules help to reduce conflicts. Boating hours and fishing rules 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

Mayflower Lake is enjoyed by residents and visitors who swim, boat, fish, and appreciate its beauty. The lake is used and enjoyed year-round. Mayflower has one public boat ramp on its east end. Town regulations state that boats are not to exceed 10 mph between 6:00 pm and 10:00 am.

Guiding Vision for Recreation at Mayflower Lake

Residents and visitors to Mayflower Lake will be aware of, appreciate and respect the lake and recreate responsibly.

Goal 8: To have a quality and responsible recreational experience on Mayflower Lake.

Objective 8.1: Improve the boat launch area for lake users and include information about important features of the lake, lake protection, and recreational courtesy.

Action	Lead person/group	Resources	Timeline
Explore funding options for the improvement of the boat landing.	Town of Norrie	WDNR Fisheries Biologist MC Environmental Impact Fund	
Maintain signage (Plexiglas) about aquatic invasive species at boat launch.	Lake District Commission	WDNR RC&D* UWEX Lakes	Ongoing
Maintain healthy shorelands at boat launch; consider restoring demonstration site; explore expansion of vegetated buffer: 15-20 feet?	Town of Norrie	CPZ Consultants WDNR Lakes Protection Grant	Ongoing
Produce and install signage (Plexiglas) for boat launch specifying no power loading.	Lake District Commission	UWEX Lakes	Ongoing
Produce signage (Plexiglas) that details designated jet ski areas (at least 200 ft. from shore and critical habitat areas); post at boat launch.	Lake District Commission	UWEX Lakes CPZ	Ongoing

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

Communication/Organizations

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

Guiding Vision for Communication

The Mayflower Lake District will efficiently and effectively communicate with lake residents and users to foster participation and stewardship in the community.

Goal 9: Waterfront property owners and watershed residents will understand basic information about Mayflower Lake and how to best manage their land to minimize impacts to the lake.

Objective 9.1: Develop effective and creative ways to inform residents of important lake information.

Action	Lead person/group	Resources	Timeline
Produce and distribute a periodic Lake District newsletter to be distributed to lake district residents.	Lake District Commission	UWEX Lakes	Ongoing
Compile and distribute "welcome packets" for existing and new residents providing information about the Mayflower Lake District, important information about the lake, etc.	Lake District Commission	CPZ	Ongoing
Lake notifications in the town newsletter.	Lake District Commission, Town Board	UWEX Lakes	Periodically
Organize annual picnic at the campground as a venue for information distribution.	Lake District Commission	UWEX Lakes	Annually
Create and maintain social media with Mayflower Lake activities, information, notices, etc.	Lake District Commission	UWEX Lakes	Ongoing

Updates and Revisions

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

Guiding Vision for Updates and Revisions

Mayflower Lake's updated and relevant plan will capture all management activities and results providing a comprehensive 'story' of the lake.

Goal 10: Update the lake management plan annually or as needed.

Objective 10.1: Communicate updates with community members and members of the District

Action	Lead person/group	Resources	Completion Status
Include plan update as a regular agenda item at the District annual meeting.	Lake District Commission		Annually
Notify Lake District members of any potential changes in the management plan.	Lake District Commission		Annually, Ongoing

Governance

This section will identify plans, ordinances, and regulations that affect the lake and responsible authorities including the Lake 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 Town of Norrie: Marathon County as well as the Town of Norrie adopted Comprehensive Plans in 2006. 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 Norrie 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 Norrie residents are very concerned about preservation of natural resources in light of increased development pressure. Residents are particularly concerned with water bodies in the Town of Norrie, including the Plover River and numerous lakes. The Town of Norrie has developed the following goal, objectives, and policy recommendations to demonstrate its support:

Goal: Protect the aesthetic and environmental qualities of the Town of Norrie's many lakes.

- Objective: To minimize intensive development around the Town of Norrie's lakes in order to protect views, water and shoreline quality, habitat or natural vegetation on the lakes.
- Objective: To support the rehabilitation of Mayflower Lake by seeking funds to support rehabilitation activities.
- Objective: To support the Mayflower Lake District as a way to manage issues at the lake.

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

1. **Reduce Agricultural Nonpoint Runoff**. Reduce the discharge of soil sediment, organic materials, pesticides and nutrients into surface and ground waters.
2. **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.
3. **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.
4. **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.
5. **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.

Mayflower Lake District

Lake districts are special purpose units of government. The purpose of a district is to maintain, protect, and improve the quality of a lake and its watershed for the mutual good of the members and the lake environment. Lake districts are established by town and county boards and usually based on a formal petition of lake area owners. Lake District formation and operations must comply with Chapter 33 of the Wisconsin Statutes and are considered governmental bodies with elected or appointed leaders and annual budgets funded from tax levies or special assessments. Districts also have some capabilities to regulate lake use, such as local boating ordinances and sewage management. Within a lake district all property owners share in the cost of management activities undertaken by the district. Residents who live in the district and are eligible voters and all property owners have a vote in the affairs of the district. This is accomplished at an annual meeting.

The Mayflower Lake District was founded in 1974 and has been active in weed management as well as aeration of the lake. This plan provides the district with goals and objectives to pursue for the betterment of the lake. The Lake District can work towards pursuing resources and funding to help achieve the plans goals.

Lake Management Plan Approval

The final draft of the lake management plan will be approved through a vote of the Lake District 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 Lake District 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 and Important Documentation to Review:

McFarlane, D. 2011. *Marathon County Shoreline Inventory*. Center for Land Use Education.

Turyk, Nancy. 2014. Mayflower Lake: 2010-2012 Lake Study Results. Presentation. Given November 12, 2013 at the Norrie Town Hall.

Turyk, Nancy. 2014. Aquatic Plants in Mayflower Lake. Presentation. Given December 10, 2013 at the Norrie Town Hall.

Turyk, Nancy. 2014. Water Quality in Mayflower Lake. Presentation. Given January 21, 2014 at the Norrie Town Hall.

Esser, Shawn. 2014. Eastern Lakes Study. Presentation. Given January 21, 2014.

Meronek, Tom. 2014. The Fishery in Mayflower Lake. Presentation. Given February 11, 2014.

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

Wisconsin Department of Natural Resources. 2003. Designation of Sensitive Areas, Mayflower Lake, Marathon County. Eau Claire, WI.

UW-Stevens Point Center for Watershed Science and Education, 2014. Mayflower Lake Aquatic Plant Management Plan. Final plan to Marathon County and Wisconsin Department of Natural Resources.

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

UW-Stevens Point Center for Watershed Science and Education, 2013. Mayflower Lake 2010-2012 Mini-Report. Report to Marathon County and Wisconsin Department of Natural Resources.

Appendices

Appendix A: Marathon County Lake Information Directory

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

Contact: Wisconsin Department of Health Services
Phone: 608-267-3242
Address: PO 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, WI Dept. of Natural Resources
Phone: 715-421-7881
Address: 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, Stevens Point, WI 54481
Website: http://www.goldensandsrcd.org/

Contact: Scott Provost, WI Dept. of Natural Resources
Phone: 715-421-7881
Address: 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, WI Dept. of Natural Resources
Phone: 715-421-7881
Address: 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: 715-261-6010
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, WI Dept. of Natural Resources
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, WI Dept. of Natural Resources
Phone: 715-839-3794
Address: PO 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: PO 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, WI Dept. of Natural Resources
Phone: 715-839-3794
Address: PO 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 and Elderon
Contact: Town of Reid (Kittie Milanowski, Clerk)
Phone: 715-446-3767
Address: 7089 Plover River Rd., Hatley, WI 54440
E-mail: kitmil46@yahoo.com
Website:
http://www.co.marathon.wi.us/Home/AboutMarathonCounty/Municipalities/Towns.aspx

Contact: Town of Elderon (Mary Ostrowski, Clerk)
Phone: 715-454-6845
Address: 2021 Cherry Dr., 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, WI Dept. of Natural Resources
Phone: 715-359-7582
Address: 5103 Rib Mt. Dr., Wausau, WI 54401
E-mail: Thomas.Meronek@wisconsin.gov
Website: http://dnr.wi.gov/fish/

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

Grants
Contact: Buzz Sorge, WI Dept. of Natural Resources
Phone: 715-839-3794
Address: PO Box 4001, Eau Claire, WI 54702
E-mail: Patrick.Sorge@wisconsin.gov
Website:

Contact: Marathon County CPZ
Phone: 715-261-6010
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 Center for Watershed Science and Education
Phone: 715-346-4276
Address: TNR 224, 800 Reserve St., Stevens Point, WI 54481
E-mail: kmasarik@uwsp.edu
Website: http://www.uwsp.edu/cnr/watersheds/

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

Contact: Scott Provost, WI Dept. of Natural Resources
Phone: 715-421-7881
Address: 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 Center for Watershed Science and Education
Phone: 715-346-2497
Address: 224A TNR, 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/

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, WI Dept. of Natural Resources 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: Diane Hanson, Marathon County CPZ
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 Conservation, Planning, and Zoning
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: PO Box 124, Stevens Point, WI 54481
E-mail: info@ncctwi.org
Website: http://www.ncctwi.org/

Purchase of Land
Contact: Buzz Sorge, WI Dept. of Natural Resources
Phone: 715-839-3794
Address: PO 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 Conservation, Planning, and Zoning
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 Conservation, Planning, and Zoning
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 Conservation, Planning, and Zoning
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, WI Dept. of Natural Resources
Phone: 715-839-3794
Address: PO 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 WI Dept. of Natural Resources
Phone: 715-839-3794
Address: PO Box 4001, Eau Claire, WI 54702
E-mail: Patrick.Sorge@wisconsin.gov
Website:
http://dnr.wi.gov/environmentprotect/water.html

Contact: Nancy Turyk, UWSP Center for Watershed Science and Education
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, 800 Reserve St., Stevens Point, WI 54481
E-mail: ejudziewica@uwsp.edu

Woody Habitat
Contact: Tom Meronek, WI Dept. of Natural Resources
Phone: 715-359-7582
Address: 5103 Rib Mt. Dr., 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, 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: Invasive Species Rapid Response Plan 2014

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., Suite #150 Stevens Point, WI 54481 Phone: 715-343-6278 E-Mail: info@goldensandsrcd.org
2. Survey/monitor the lake monthly/seasonally/annually.	If you find a suspected invasive species, report it as soon as possible using the procedure below.

REPORTING A SUSPECTED INVASIVE SPECIES

1. Collect specimens or take photos. Regardless of the method used, provide as much information as possible. Try to include flowers, seeds or fruit, buds, full leaves, stems, roots and other distinctive features. In photos, place a coin, pencil or ruler for scale. Deliver or send specimen ASAP.	Collect, press and dry a complete sample. This method is best because a plant expert can then examine the specimen. **-OR-** Collect a fresh sample. Enclose in a plastic bag with a moist paper towel and refrigerate. **-OR-** Take detailed photos (digital or film).
2. Note the location where the specimen was found. If possible, give the exact geographic location using a GPS (global positioning system) unit, topographic map, or the Wisconsin Gazetteer map book. If using a map, include a photocopy with a dot showing the plant's location. You can use TopoZone.com to find the precise location on a digital topographic map. Click the cursor on the exact collection site and note the coordinates	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,

(choose UTM or Latitude/Longitude).	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 water body is located.
  Town of: Norrie
  Contact Name:
  Contact Phone:

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

- **Local Residents**

- **Mayflower Lake Management District**
  Secretary

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

- **Newspapers**: Wausau Daily Herald, Wittenberg Birnamwood Enterprise

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

Appendix C: 2014 Mayflower Lake Aquatic Plant Management Plan

Mayflower Lake hosts a complex ecosystem with notable features of ecological importance including a diverse plant community, a variety of wildlife, good water quality, and a large wetland bordering the western end of the lake. However, some areas on the western end of the lake also exhibit dense aquatic plant growth which at times impedes recreation. In response, this aquatic plant management strategy was developed as part of a process to develop a lake management plan for the lake. The plans were developed during winter 2013/14 by the Mayflower Lake Management District, interested citizens, and the bordering camp. Technical guidance was provided by professionals from the Wisconsin Department of Natural Resources, UW-Stevens Point's Center for Watershed Science and Education, and the Marathon County Land Conservation Department.

In Mayflower Lake, a successful aquatic plant management strategy will include minimal inputs and will achieve a balance between healthy aquatic habitat, good water quality, and recreation activities with minimal management.

Background Information

The two most recent aquatic plant surveys conducted in Mayflower Lake provided guidance for the development of this plan. These surveys were conducted in 2012: the June survey targeted the non-native curly leaf pondweed (*Potamogetan crispus*), previously reported as present in Mayflower Lake, while the July survey was a comprehensive survey of all aquatic plant species. Twenty-three aquatic plant species were found in Mayflower Lake, with the greatest diversity located in the shallows on the western side of the lake (Table 1 and Figure 5). White water lily (*Nymphaea odorata*), Fries' pondweed (*Potamogeton friesii*), and muskgrass (*Chara* spp.) were the most commonly occurring plants in this study. Overall, Mayflower Lake exhibits good species diversity and hosts a healthy native aquatic plant community. During the July 2012 survey, 69% (180 of 260) of the sample sites had vegetative growth. The average depth of the sample sites was 8 feet, with a maximum depth of 15 feet. The densest vegetative growth occurred on the western end of Mayflower Lake (Figure 6).

The findings of the July 2012 survey were similar to those of the 2002 aquatic plant survey in which the most prevalent species included northern water-milfoil, muskgrass, and white water lily (Konkel 2002). A report for the 2012 survey contains additional information about the aquatic plant community in Mayflower Lake (McNelly 2012).

No aquatic invasive species were found in Mayflower Lake during the June 2012 survey which targeted the non-native species curly leaf pondweed (*Potamogeton crispis*). Curly leaf pondweed was reported to the Wisconsin Department of Natural Resources in 1993, but it has not been observed in the lake during point-intercept surveys conducted by UW-Stevens Point (2012) or visual surveys conducted by Golden Sands RC&D (Skawinski 2013); however, naispecies closely resembling curly leaf pondweed were present.

During the development of this plan in winter 2014, committee members identified nuisance areas of aquatic plant growth, which have impeded some recreational activities and reduced their enjoyment of the lake. These

areas are located in the shallower western end of the lake (Figure 8). Beds of northern water-milfoil and filamentous algae are the primary causes of recreational limitations in this area.

Table 1. List of aquatic plants found in Mayflower Lake during 2002 and 2012 surveys.

Common Name	Scientific Name	2012 Survey	Observed in 2002 Survey (Konkel, 2002)	Coefficient of Conservatism Value (C Value)
Emergent Species				
Sedge	*Carex rostrata*		X	10
Spike rush	*Eleocharis sp.*		X	5
Reed canary grass	*Phalaris arundinacea L.*		X	0
Common arrowhead	*Sagittaria latifolia*	X	X	3
Softstem bulrush	*Schoenoplectus tabernaemontani*	X		4
Softstem bulrush	*Scirpus validus Vahl.*		X	4
Broad leaved cattail	*Typha latifolia*	X	X	1
Floating Leaf Species				
Watershield	*Brasenia schreberi*	X		6
Spatterdock	*Nuphar variegata*	X		6
White water lily	*Nymphaea odorata*	X	X	6
Submergent Species				
Coontail	*Ceratophyllum demersum*	X	X	3
Muskgrasses	*Chara*	X	X	7
Common waterweed	*Elodea Canadensis Michx.*		X	3
Slender waterweed	*Elodea nuttallii*	X		3
Water star-grass	*Heteranthera dubia*	X		6

Northern water-milfoil	*Myriophyllum sibiricum*	X	X	6
Slender naiad	*Najas flexilis*	X	X	6
Northern naiad	*Najas gramicillima*	X		7
Nitella	*Nitella sp.*		X	
Fries' pondweed	*Potamogeton friesii*	X		8
Variable pondweed	*Potamogeton gramineus*	X	X	7
Floating-leaf pondweed	*Potamogeton natans*	X	X	5
Sago pondweed	*Potamogeton pectinatus L.*		X	3
White-stem pondweed	*Potamogeton praelongus*	X	X	8
Small pondweed	*Potamogeton pusillus L.*		X	7
Clasping-leaf pondweed	*Potamogeton richardsonii*	X	X	5
Flat-stem pondweed	*Potamogeton zosteriformis*	X	X	6
Sago pondweed	*Stuckenia pectinata*	X		3
Creeping bladderwort	*Utricularia gibba*	X		9
Common bladderwort	*Utricularia vulgaris*	X	X	7

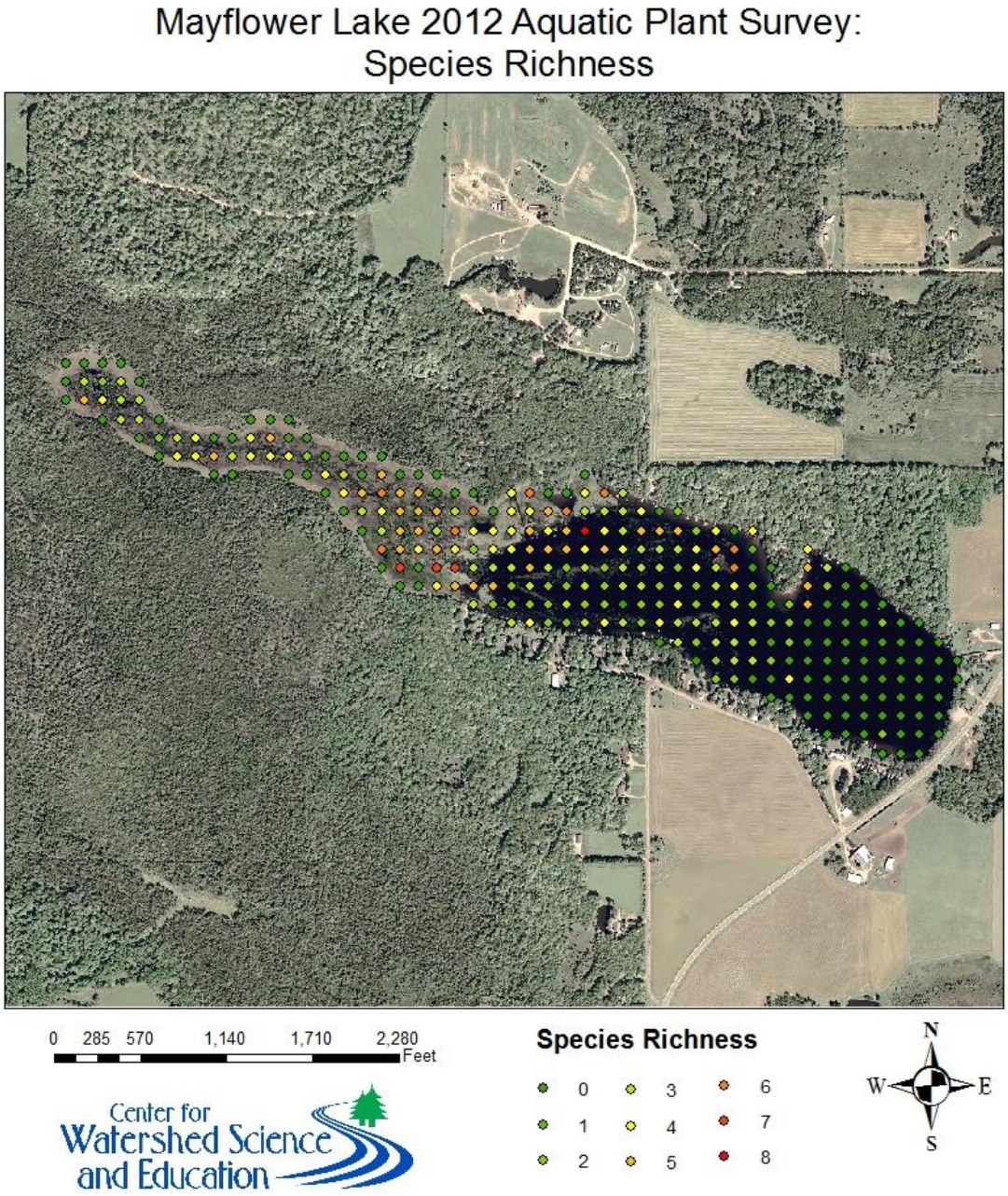


Figure 5. Species richness (number of species) at each sample point in Mayflower Lake, 2012.

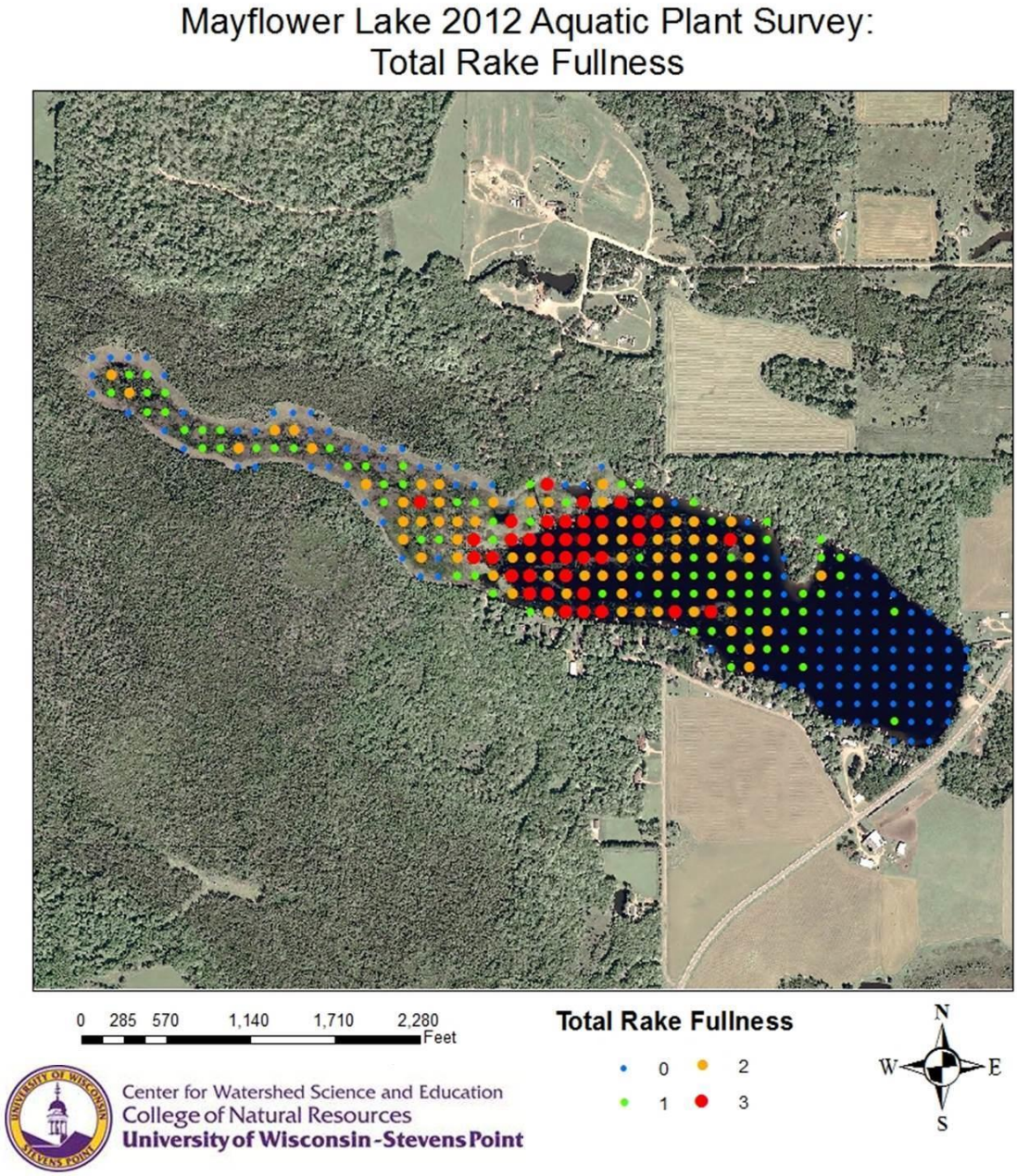


Figure 6. Aquatic plant rake fullness in Mayflower Lake 2012. Red indicates sites with denser vegetation and blue indicates sites that lacked vegetation.

Plant Highlights - Northern Water-milfoil

Northern water-milfoil is a native plant which commonly grows in lakes and ponds throughout Wisconsin. Like many other aquatic plants, it has feather-like leaves below water, and flowers and tiny leaves arranged on emergent stalks. Northern water-milfoil can often resemble, or even hybridize with, the non-native Eurasian water-milfoil. Eurasian water-milfoil has not been documented in Mayflower Lake. In general, northern water-milfoil tends to be a more robust plant and has fewer and more widely spaced leaflet pairs than Eurasian water-milfoil.

Figure 7 Northern Water-milfoil

The leaves and fruit of northern water-milfoil are consumed by a variety of waterfowl and the beds offer shade, shelter and foraging opportunities for fish. Dense stands can inhibit recreational uses, however. If control is absolutely necessary, hand-pulling, raking, or cutting can be effective.

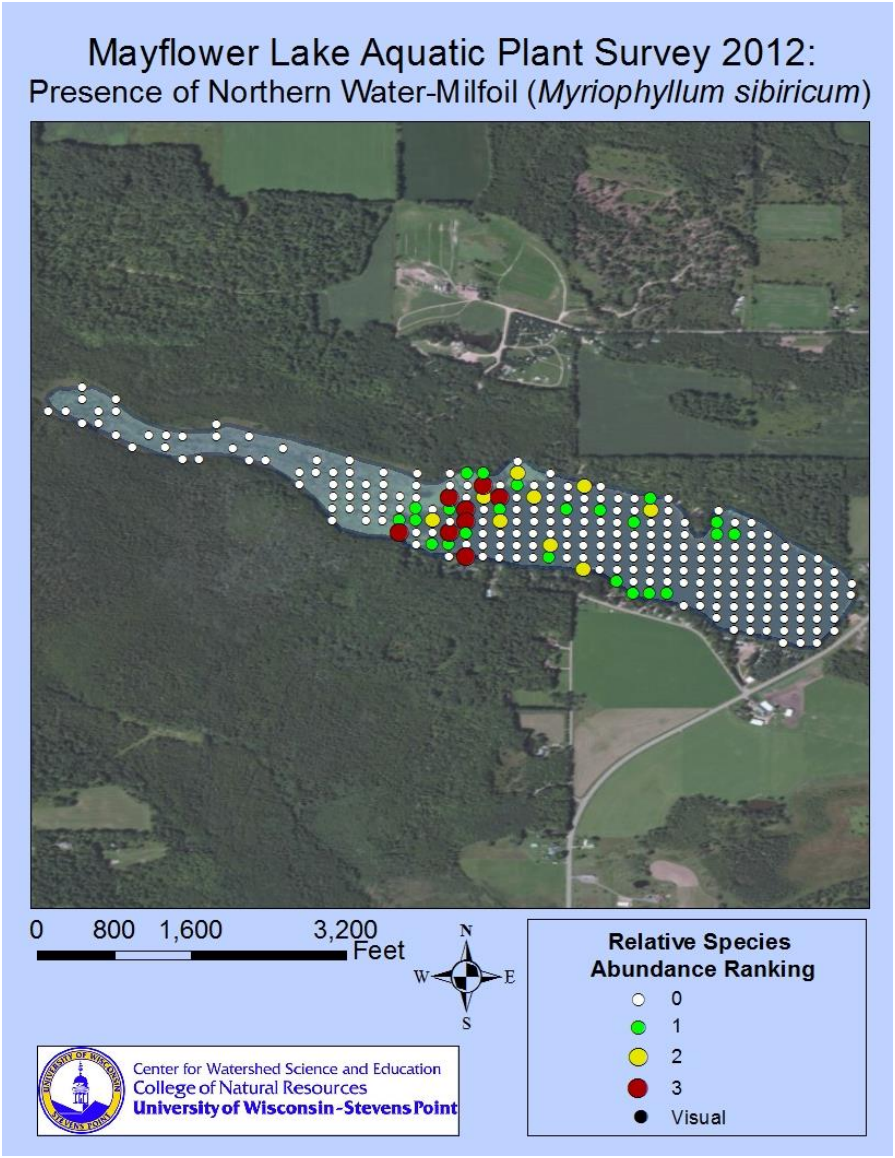


Figure 8. Abundance of northern water-milfoil in Mayflower Lake, 2012. Red markers indicate areas of densest growth.

Critical Habitat Areas

Some areas of developed lakes can have exceptional qualities. Two areas around Mayflower Lake have been identified by the Wisconsin Department of Natural Resources as having significant value to the lake's ecosystem (WDNR 2003). These areas support wildlife and fish habitat, provide mechanisms that protect water quality in the lake, harbor quality plant communities and preserve the places of serenity and aesthetic beauty for the enjoyment of lake residents and visitors. A special designation of sensitive areas within a lake provides a means to protect the sites that are most important for preserving the very character and qualities of the lake and its ecosystem that initially attracted development to the lake.

Mayflower Bog and the adjacent north shore of the lake comprise the areas designated as 'Critical Habitat' in Mayflower Lake (WDNR, 2003) (Figure 9). Mayflower Bog includes the entire shallow upper end of the lake, approximately 15 acres, averaging two feet in depth. The north shore extends 1,500 feet along the lakeshore on the north shore, just east of the bog, averaging five feet in depth. For more details about these important areas, see the full WDNR critical habitat report ("Sensitive Areas") attached in Appendix B: Designation of Sensitive Areas.

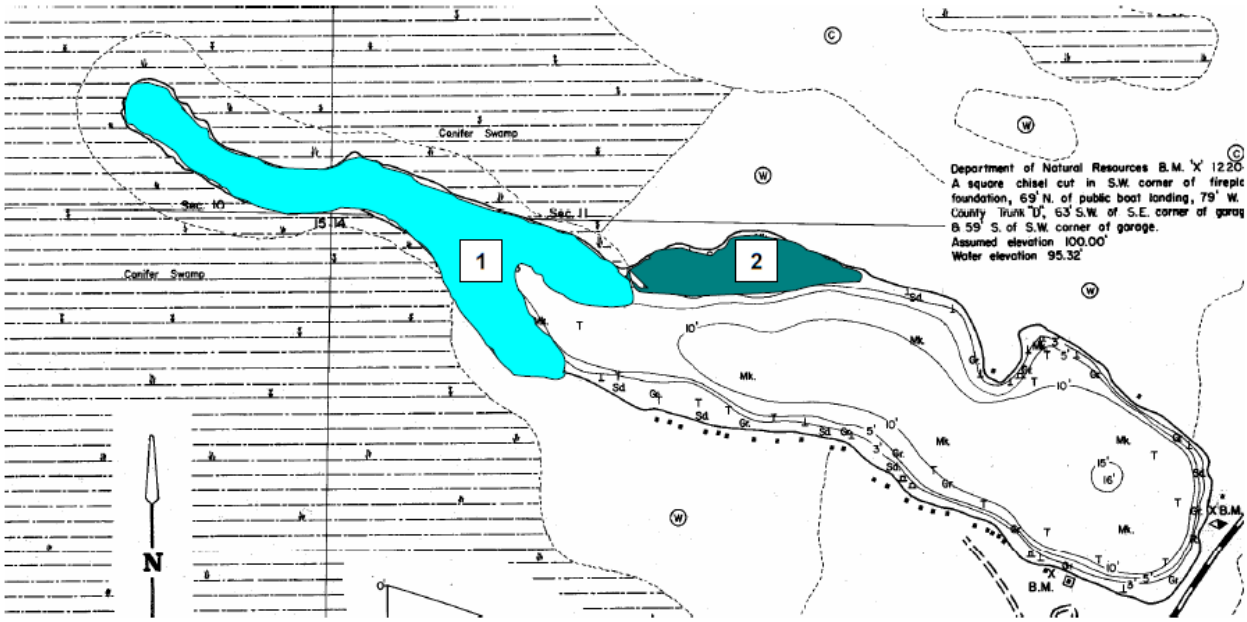


Figure. Location of Designated Sensitive Areas on Mayflower Lake, Marathon County

Figure 9. Critical Habitat Designations in Mayflower Lake (WDNR 2003).

Aquatic Plant Management Areas

Management strategies in Mayflower Lake were designed to achieve a balance between healthy aquatic habitat, good water quality, and recreation. With a permit from the Wisconsin Department of Natural Resources, aquatic plant management may occur in areas of the lake exhibiting heavy aquatic plant growth that restricts boating and other recreational activities. A variety of management options were discussed during the development of this plan, some of which were rejected due to the nature of the lake. See the notes from this discussion detailed in Appendix A: Summary of December 10, 2013 Planning Session Discussion.

Following are aquatic plant management options for Mayflower Lake. Some of these options require a permit from the Wisconsin Department of Natural Resources:

Mechanical Harvesting (permit required)

Benefits of mechanically harvesting aquatic plants include the removal of nutrients and oxygen-demanding wastes from the lake system, and the temporary recreational relief from dense aquatic plant beds. Harvesting may also negatively affect native aquatic plants that provide valuable habitat, such as *Potomogeton* spp. (pondweeds).

Plan: Harvesting is permitted in depths of water greater than three feet up to three times per year. A second pass with the harvester should be run on all harvested areas to remove plant fragments and floaters.

The **critical habitat designation** (see previous section) will not limit access, but will limit the amount of aquatic plant control that can be accomplished while minimizing impacts to habitat and water quality. Access lanes between open water and docks could be provided by harvesting in this area (if needed).

Situations in which harvesting may occur:

Access lanes may be provided between docks and naturally occurring open water.

Radial cuts should be strategically placed near docks and/or in areas of dense vegetation to enhance fish habitat and help balance the fish community.

Hand Pulled Plants (in limited areas permit not required)

Although this technique is an option, it should be employed with caution because areas of denuded lakebed provide ideal habitat for aquatic invasive species to become established. Individuals may hand-pull aquatic plants at their shoreline for the purpose of clearing a channel for access adjacent to their dock (thirty feet or less) without a permit. Any hand-pulled aquatic plants should be removed from Mayflower Lake and composted away from the lake.

Plan: Provide a pick-up service for hand-pulled plants from docks with the harvester.

Weevils

Milfoil weevils (*Euhrychiopsis lecontei*) are insects native to some Wisconsin lakes that feed on both the native northern water-milfoil and the invasive Eurasian water-milfoil. They require nearby natural healthy shoreline vegetation to overwinter and survive, and are not likely to survive in areas where vegetation has been removed or mowed to the water's edge. No survey of weevil abundance has been conducted in Mayflower Lake to date. This option should only be considered in areas of native or restored shoreline. Milfoil weevils are commercially available but are expensive so obtaining a starter population and rearing them in predator-free conditions can be desirable from a financial standpoint. Professional assistance should be sought if stocking is pursued.

Plan: Conduct a stem count for resident weevils. Consider use of weevils for keeping northern water-milfoil in balance in the following circumstances:

Primarily minimally disturbed/ unmowed shoreline

Areas of concentrated northern water-milfoil

Areas where harvesting is not occurring

Shallow water less than five feet in depth

Additional Activities

Provide opportunities for residents and lake users to learn about shoreland land use practices, phosphorus, aquatic invasive plants (residents and boat landing), and how they relate to a healthy aquatic plant community.

Develop a team of knowledgeable people to identify aquatic invasive species and monitor the lake routinely.

Conduct citizen-based water quality monitoring.

Improve the fishery by establishing emergent vegetation (such as bulrush) and encouraging more vegetation in shallow water near shore.

Aquatic Invasive Species Prevention Strategies

Aquatic invasive species (AIS) are typically introduced to a lake on boats, trailers, or water in live wells, boat motors, fishing equipment, etc. Although the presence of invasive aquatic plants has not been confirmed in Mayflower Lake, it is important to monitor regularly for early occurrences. It is recommended that information be posted and/or maintained at entry points to Mayflower Lake to remind boaters to clean their boats before entering the lake.

Plan: Learn how to monitor for AIS, post informational materials and signage at boat landings and if suspected AIS are found, refer to Invasive Species Rapid response Plan.

Aquatic Plant Management Plan Review

A good aquatic plant management plan strategy should reduce the amount of management activity needed as time goes on. In Mayflower Lake, a successful strategy would lead to a balance between healthy aquatic habitat, water quality and recreation with minimal management. To evaluate if management strategies are making progress, updates to aquatic plant surveys should be conducted every five years at a minimum. Because Mayflower Lake contains aquatic plant growth that is perceived as problematic at the time of plan development, it is recommended that surveys be conducted more frequently than the minimum. Work with the Aquatic Plant Specialist with the Wisconsin Department of Natural Resources or a contractor to update surveys.

Tracking historical conditions, changes in the lake, and how those changes have affected current conditions is very important to the development of management strategies for the lake. Progress or change that occurs due to management activities documented in a plan, aquatic plant surveys, and updates to both will support future strategic decision-making. This aquatic plant management plan was developed in conjunction with a lake management plan. The following documents contain additional information about aquatic plants and other aspect of the lake.

Mayflower Lake Management Plan (2014).

Mayflower Lake Management Plan. 2014. Center for Watershed Science and Education. UW-Stevens Point. http://www.co.marathon.wi.us/Departments/ConservationPlanningZoning/ConservationServices/LakePrograms.aspx

Designation of Sensitive Areas (**Appendix B: Designation of Sensitive** Areas *Designation of Sensitive Areas. Mayflower Lake, Marathon County*. 2003. Wisconsin Department of Natural Resources. http://dnr.wi.gov/lakes/criticalhabitat/Project.aspx?project=10419316

AIS survey results 2013

Skawinski, Paul. 2013. *Mayflower Lake—Marathon County AIS survey results*. Golden Sands Resource Conservation & Development Council, Inc. September 19, 2013. http://www.goldensandsrcd.org

Marathon County Aquatic Invasive Species Plan.

Skawinski, Paul. 2011. *Marathon County Aquatic Invasive Species Plan.* Golden Sands Resource Conservation & Development Council, Inc. http://www.co.marathon.wi.us/Portals/0/Departments/CPZ/Documents/Marathon_County_AIS_Plan.pdf

The Aquatic Plant Community in Mayflower Lake, Marathon County (2002)

Konkel, Deborah. 2002. *The Aquatic Plant Community in Mayflower Lake, Marathon County*. Wisconsin Department of Natural Resources. http://dnr.wi.gov/lakes/documents/fishandplantreports/marathonmayflowerlake2002.pdf

Annually, the Mayflower Lake aquatic plant management committee should review the aquatic plant management plan and discuss any potential adjustments with the Aquatic Plant Specialist with the Wisconsin Dept. of Natural Resources. Harvesting records (dates and estimated volume of harvesting) and maps should be included in the review.

References (Aquatic Plant Management Plan)

Designation of Sensitive Areas. Mayflower Lake, Marathon County. 2003. Wisconsin Department of Natural Resources.

Konkel, Deborah. 2002. *The Aquatic Plant Community in Mayflower Lake, Marathon County*. Wisconsin Department of Natural Resources.

McNelly, Jen. 2012. *Mayflower Lake Aquatic Plant Survey 2012*. Center for Watershed Science and Education.

Skawinski, Paul. 2013. *Mayflower Lake—Marathon County AIS survey results*. Golden Sands RC&D. September 19, 2013.

APPENDIX

Appendix A: Summary of December 10, 2013 Planning Session Discussion

Various aquatic plant management techniques were discussed regarding the current concerns, including herbicide application, drawdown, bottom barriers, mechanical harvesting, dredging, and weevils.

Mechanical harvesting is a feasible option for aquatic plant management in Mayflower Lake in areas **deeper than three feet**. The pros of harvesting aquatic plants include the removal of nutrients and oxygen-depleting biomass from the lake. This would be a temporary solution to be completed 1-3 times per year, dependent upon annual conditions. Typical harvesting operations include the harvesting of a navigational lane with exit/entry lanes leading into/out of docks. In the past, problems have arisen with loose plants washing up onto the shoreline. As much plant material as possible should be removed from the lake by a second pass by the harvester to pick up any floating cut plants. Cooperatively purchasing a shared harvester between area lakes was discussed and decided against due to concerns regarding the potential spread of aquatic invasive species. Purchase of a harvester specifically for Mayflower Lake was discussed. New and used harvesters can be purchased ($6,000-50,000). The WDNR Water Resources Specialist can assist the group with finding resources to carry through with purchase. Any harvesters purchased should have a depth finder on the blade side of the harvester and a GPS. It is recommended that the group contract a harvester to accurately complete the work. Recent rates in the area have been around $150/hour.

Hand harvesting is permissible in water less than three feet deep for personal docks, etc.

The use of **weevils** (*Euhrychiopsis lecontei**as***) as a biological control for northern water-milfoil was discussed. The pros for the use of weevils include the native status of the beetles and their tendency to feed specifically on both Eurasian water-milfoil and northern water-milfoil. Weevils inhabit the top of the plants; therefore, introductions should not be located in areas where harvest occurs. Chemical treatments will also negatively influence weevil populations, so pairing of these management strategies is strongly discouraged. Weevils require intact vegetated shorelines for survival and sustained populations, so introduction should only be considered for shallower areas in which a) there is intact/restored shoreline, and b) harvesting is not allowed. Weevils are likely already present in the lake in small densities. A stem count for weevil presence will need to be completed before consideration of introduction proceeds, to be completed by Golden Sands RC&D.

Herbicide application (not selected) was discussed and strongly discouraged due to the native plant community and lack of invasive species. Concerns were also raised about remnant contaminants in the sediment, release of nutrients into the water column, and opening an opportunity for invasion by aquatic invasive plants. Chemicals will not remove dead vegetation, which will consume oxygen, re-release nutrients into the water column and add to the build-up of muck. This may also lead to additional aquatic plant and algae growth.

Drawdown (not selected) is not an option in Mayflower Lake due to the lack of a controlling structure.

Bottom barriers (not selected) are not permitted because of the harm done to aquatic invertebrates and young fish.

Dredging is the most expensive option ($15-20/cubic yard) and there are issues with where to place dredged material and potential contaminants in the sediment.

Appendix B: Designation of Sensitive Areas

Mayflower Lake, Marathon County

Wisconsin Department of Natural Resources

Eau Claire, WI Sensitive Area Designation

Mayflower Lake, Marathon County

I. INTRODUCTION

Designation of sensitive areas within lakes provide a holistic approach to the protection of those sites within a lake that are most important for preserving the very character and qualities of the lake that initially attracted developments on the lake. These sites are those sensitive and fragile areas that support the wildlife and fish habitat, provide the mechanisms that protect the water quality in the lake, harbor quality plant communities and preserve the places of serenity and aesthetic beauty for the enjoyment of lake residents and visitors. The sensitive area designation will provide a framework for management decisions that impact the ecosystem of the lake.

A Sensitive Area Study was conducted October 13, 2003 on Mayflower Lake, Marathon County.

The study team included:

Robert Hujik, DNR Fish Supervisor

Deborah Konkel, DNR, Aquatic Plant Specialist

Buzz Sorge, DNR Lakes Manager

Rick Weide, DNR Wildlife Biologist

Keith Patrick, DNR Water Regulation and Zoning Specialist

Mark Hazuga, DNR Water Resource Specialist

Mayflower Lake is a 98-acre lake with a maximum depth of 16 feet and an average depth of 7 feet.

II. THE SENSITIVE AREAS

The reasons for selection of each sensitive area varied among the sites; all sites were selected because of their importance for fish habitat (Figure).

All of the sensitive areas that were selected have the potential to be used for educational purposes.

Sensitive Area ML1 – Mayflower Bog

This sensitive area includes the entire, shallow upper end of the lake, approximately 15 acres, averaging 2 feet in depth and supports important near-shore terrestrial habitat, shoreline habitat and shallow water habitat (Figure). This habitat is found in the deep-water marsh, the shallow-water marsh and the tamarack/cedar bog. The sediment is sand, silt, and gravel. Fallen woody material is present in the shallow zone for habitat.

Reasons for site selection:

1) its importance for maintaining water quality;

2) its distinctly unique site of outstanding natural scenic beauty

3) the diverse aquatic plant community

4) the unique terrestrial vegetation community

5) its value for wildlife habitat

6) its value for fish habitat.

7) The site provides a visual and audible barrier from structures, roads and boat traffic.

The site is currently in compliance with shoreline zoning and does not require any erosion control or nutrient run-off control at this time.

The Plant Community:

Tamarack and white cedar colonize the shoreline.

Soft-stem bulrush, northern lake sedge, spike rush, arrowheads and cattails emerge from the shallow water.

White water lily floats on the surface.

Coontail, common waterweed, bushy pondweed, great bladderwort, northern water-milfoil, small pondweed, floating-leaf pondweed, variable-leaf pondweed, white-stem pondweed, flat-stem pondweed and sago pondweed colonize the underwater habitat up to a depth of 5 feet.

Muskgrass and filamentous algae are present.

Water Quality

Maintaining the integrity of this sensitive area is important for protecting the water quality of Mayflower Lake.

1) The submerged and floating-leaf vegetation in this area ties up nutrients in their tissues that would otherwise be available for algae growth.

2) The wetlands are filtering water that enters the lake and preventing shoreline erosion.

3) The submergent vegetation is protecting the lake bottom from resuspension of the sediments by boat traffic and wind action, thus maintaining clarity.

4) The wetland is a seepage inlet, providing water for Mayflower Lake

5) The variety of plant species provides more micro-habitats that increase diversity.

6) The healthy plant community occupying the site will make it more difficult for exotic species to invade

Fish Habitat

The mosaic of emergent, submergent and floating-leaf vegetation provides a diversity of habitat and feeding opportunities for the fish community.

This area provides

1) The outer edge of the plant beds provide cover and feeding areas for walleye and spring spawning sites, spring to summer nursery sites , cover and feeding sites for yellow perch

2) spring through fall nursery areas, feeding sites and cover for large-mouth bass, bluegill, pumpkinseed

3) Spring through fall spawning sites, feeding areas and cover for crappie

4) Spring nursery area, feeding areas and cover for white suckers.

Wildlife Habitat

The wooded bog provides great wildlife cover. The bog along with the emergent vegetation and scattered snag and perch trees provide important habitat resources for wildlife

1) winter shelter and feeding area for upland wildlife such as deer

2) shelter and cover, nesting areas and feeding areas for furbearers such as muskrat and mink

3) migrating habitat for waterfowl

4) feeding area for herons, bitterns and rails

5) potential cover, nesting and feeding areas for eagles and osprey

6) feeding area for loons

7) cover, nesting areas (mallards and wood ducks) for ducks and geese

8) the wooded edge, cattails and sedges provide shelter, cover, nesting and feeding sites for songbirds

9) habitat for turtles, snakes, salamanders, toads and frogs, such as bullfrogs, spring peepers, wood frogs, green frogs

Recommendations

1) Maintain the aquatic vegetation in an undisturbed condition for wildlife habitat, fish cover and as a nutrient buffer for water quality protection.

2) Protect the emergent vegetation as habitat an erosion buffer.

3) Maintain shoreline vegetation, especially cavity and snag trees for wildlife habitat and wildlife corridors.

4) Prohibit logging in the shoreline cedars.

5) Recommend slow-no-wake zone in the cove.

6) No alteration of the littoral zone except for improvement of spawning habitat

7) Minimize removal of any shoreline or aquatic vegetation.

8) Leave site undeveloped and do not permit any rip-rap, bank grading, retaining wall, dredging, pier placement, boat ramp placement, recreational floating devices, pea gravel beds or sand blankets.

9) Prohibit drain or filling of wetland

Sensitive Area ML2 – North Shore

This sensitive area extends for 1500 feet along the lakeshore on the north shore, just east of the bog, averaging 5 feet in depth (Figure). The shoreline is wooded with about 10% of the shore developed. The deep-water marsh at this site provides shallow water habitat. The sediment is comprised of sand and silt. Large woody debris is present in the littoral zone for habitat.

Additional reasons for site selection:

1) natural scenic beauty

2) the diverse aquatic plant community

3) the terrestrial vegetation community

4) its value for wildlife habitat

5) its value for fish habitat.

6) The area provides visual and sound buffers.

The Plant Community:

Trees colonize the shoreline.

Soft-stem bulrush and arrowheads emerge from the shallow water.

White water lilies float on the surface.

Coontail, common waterweed, bushy pondweed, northern water-milfoil, white-stem pondweed, flat-stem pondweed, small pondweed, clasping-leaf pondweed and floating-leaf pondweed colonize the underwater habitat up to a depth of 11 feet.

Filamentous algae and muskgrass present.

Water Quality

Maintaining the integrity of this sensitive area is important for protecting the water quality of Mayflower Lake.

1) The shoreline and submergent vegetation protect the shoreline from erosion.

2) The submergent vegetation is protecting the lake bottom from resuspension of the sediments by boat traffic and wind action, thus maintaining clarity.

3) The variety of plant species provides more micro-habitats that increase diversity.

4) The healthy plant community occupying the site will make it more difficult for exotic species to invade

5) This site is a seepage inlet of groundwater to the lake

Fish Habitat

The large woody cover along the shore and the mosaic of emergent, submergent and floating-leaf vegetation provides a diversity of habitat and feeding opportunities for the fish community.

This area provides

1) The outer edge of the plant beds provide cover and feeding areas for walleye and spring spawning sites, spring to summer nursery sites , cover and feeding sites for yellow perch

2) spring through fall nursery areas, feeding sites and cover for large-mouth bass, bluegill, pumpkinseed

3) Spring through fall spawning sites, feeding areas and cover for crappie

4) Spring nursery area, feeding areas and cover for white suckers.

Wildlife Habitat

The emergent vegetation, floating-leaf vegetation, fallen logs, shoreline trees and shrubs provide important habitat resources for wildlife

1) The wooded shoreline provides shelter and feeding area for upland wildlife such as deer and bear

2) shelter and cover, nesting areas and feeding areas for furbearers such as muskrat and mink and cover for beaver

3) feeding area for loons, herons and eagles

4) cover, limited nesting areas and feeding areas ducks and possibly geese

5) trees and shrubs on the shoreline provide shelter, cover, nesting and feeding sites for songbirds

6) shelter, cover, nesting and feeding areas for salamanders, toads and frogs

7) shelter and feeding areas for turtles

The site is currently in compliance with shoreline zoning and requires no erosion control

Recommendations

1) Maintain the aquatic vegetation in an undisturbed condition for wildlife habitat, fish cover and as a buffer for water quality protection.

2) Do not remove fallen trees along shoreline.

3) Maintain snag and cavity trees to provide wildlife habitat

4) Restore shrub cover on the shore to control nutrient run-off, improve habitat and increase wildlife corridor

5) Protect emergent vegetation

6) Minimize removal of any shoreline or aquatic vegetation.

7) No alteration of littoral zone except for improvement of spawning habitat

8) Do not use lawn fertilizers

9) Restrict location and size of pier construction

10) Do not permit any rip-rap, bank grading, retaining wall, dredging, boat ramp placement, recreational floating devices, pea gravel beds or sand blankets

Appendix D: History of Aquatic Plant Management

According to Wisconsin Department of Natural Resources records, there has been a history of chemical treatments documented in Mayflower Lake. Five different chemicals are reported to have been used and were summarized in Konkel, 2002 (Table 2). Mechanical harvesting was documented in 1988 and 2009.

Table 2 History of herbicide application in Mayflower Lake (Konkel 2002).

	Cutrine+ (gal.)	Aquathol	Diquat (gal.)	2, 4-D (gal.)	Rodeo (qt.)
1971		750 lbs	4.5		1
1988	2		2		2
1991	9.5	5.75 gal	7.25	1.5	1.5
1992	6	6 gal 40 lbs	6		
Total	17.5	790 lbs 11.75 gal	19.75	1.5	4.5

Appendix D: 2011 Mayflower Lake Shoreland Survey

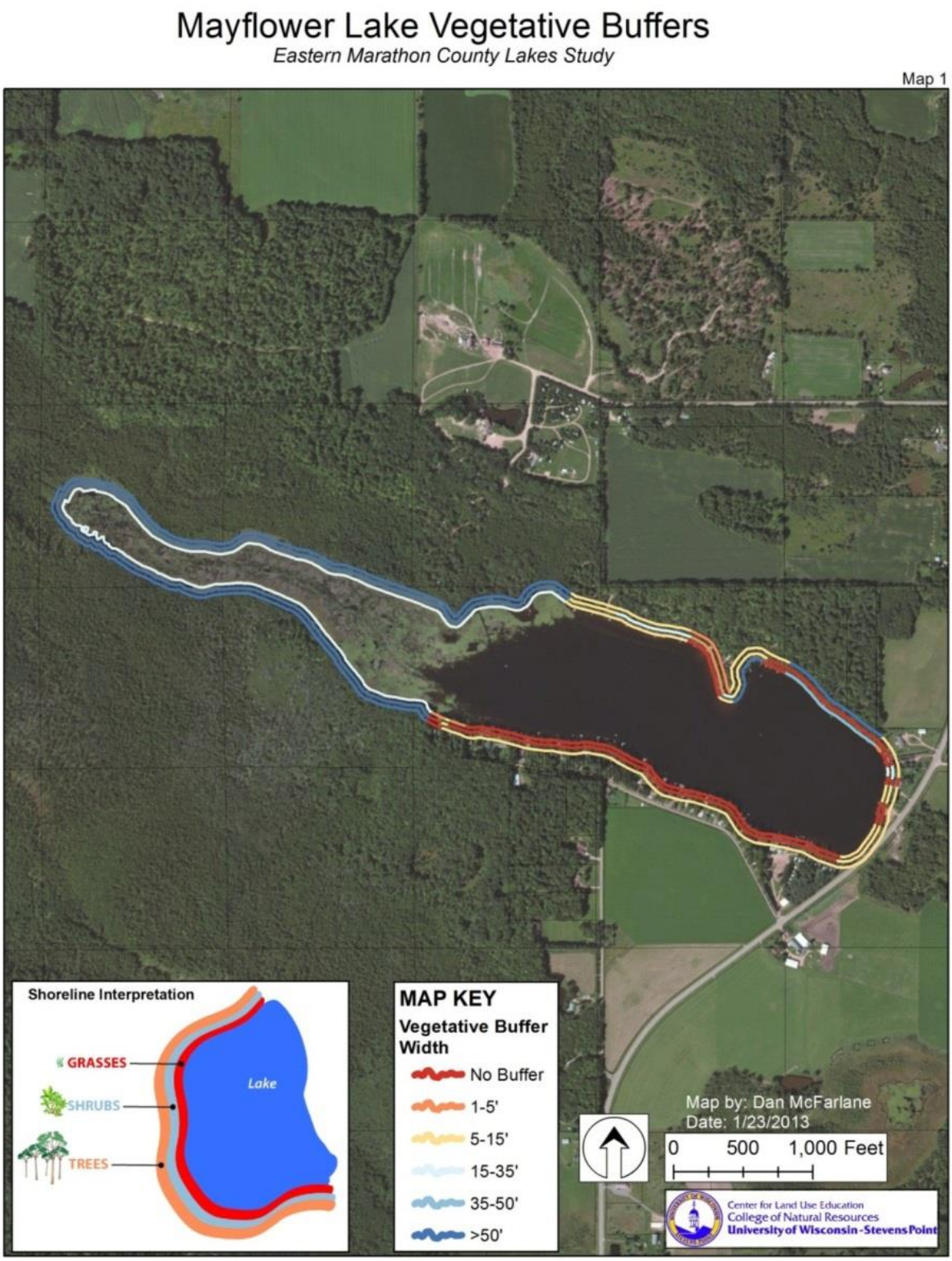


Figure 10 Shoreland Vegetation around Mayflower Lake, 2011 Survey.

Figure 11. Modeling data used to estimate phosphorus inputs from land uses in the Mayflower Lake watershed (low and most likely coefficients used to calculate range in pounds).

Mayflower Lake Land Use	Phosphorus Export Coefficient (lbs/acre-yr)	Land Use Area Within the Watershed		Phosphorus Load	
		Acres	Percent	Pounds	Percent
Water	0.10	95	13	9-26	11
Developed	0.13	53	7	7-14	**9**
Wetland/Barren	0.09	26	4	2-7	**3**
Forest	0.04	419	59	19-34	**25**
Mixed Agriculture	0.27	35	5	9-25	**12**
Row Crop Agriculture	0.45	85	12	38-76	**50**
*Values are not exact due to rounding and conversion.					

Appendix E: Aerator Diagram