2015

Mission 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

Mission Lake Management Plan

The Mission Lake Management Plan was prepared after obtaining input from residents and lake users at a series of four public planning sessions held at the Reid Town Hall in Hatley, Wisconsin in October, November, December 2014 and January 2015. The inclusive community sessions were designed to learn about and identify key community opportunities, assets, concerns, and priorities. Representatives of state and local agencies, as well as nonprofit organizations, also attended the planning sessions to offer their assistance to the group in developing a strategic lake management plan (LMP).

The plan was adopted by the Town of Reid on: June 9, 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 Mission Lake Management Plan and provided guidance during the plan's development.

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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

Contents

Overarching Vision for Mission Lake

Mission Lake will remain a quiet, no-wake lake that hosts a healthy fishery, excellent swimming, and abundant wildlife.

Mission Lake is a 112 acre seepage lake with a maximum depth of 27 feet, located near Bevent, in the Town of Reid, Wisconsin. It is a beloved part of the community, and visitors from around the area and even neighboring counties speak fondly of the lake. Mission Lake County Park is an area attraction, located on the northwestern side of the lake, and includes a walking path from which area residents enjoy fishing and a swimming beach. The lake is surrounded by forested land and wetlands. A large wetland complex is located to the west of the lake, and the secluded Little Lake is located just east of Mission Lake.

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

- Increase awareness of aquatic invasive species at public access points
- Improve capacity building and lake stewardship between the municipal parks, lake residents, lake users
- Enhance awareness of this lake "gem" to encourage others to protect and properly manage 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 Mission Lake for within given period of time. Implementation strategies identified ways to 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 LMP is unique, dependent upon the conditions of the lake, its watershed, and the interests and capacity of the community. The actions identified in this LMP can serve as a gateway for obtaining grant funding and other resources to help implement activities outlined in the plan. 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 Mission 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 Mission Lake can have the greatest influence on the lake by understanding and choosing lake-friendly options to manage their land and the lake.
- **A future Mission Lake group or consortium:** This plan provides a lake group 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 lake group to realize its accomplishments. Resources and funding opportunities for management activities are made more available by placement of goals into the lake management plan, and the lake group can identify partners to help achieve their goals for Mission Lake.
- **Neighboring lake groups, sporting and conservation clubs**: Neighboring groups with similar goals for lake stewardship can combine their efforts and provide each other with support, improve competitiveness for funding opportunities, and make efforts more fun.
- **The Town of Reid**: 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 Eastern 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 first step in creating the Mission Lake management plan was to gather and compile data about the lake and its ecosystem to understand past and current lake conditions. The Eastern Marathon County Lakes Project was initiated by citizens who encouraged Marathon County to work in partnership with personnel from UW-Stevens Point to assess 11 lakes located in the eastern portion of the county. Finding for this effort was provided by the WDNR Lake Protection Grant program, Marathon County's environmental fund, and monetary and in-kind contributions from citizens. The Eastern Marathon County Lakes Study occurred between 2010 and 2012 (UWSP, 2014). It was designed to gain an improved understanding about lake health and their ecosystems including insight about past and current lake conditions. Many of the lakes had insufficient data available to help evaluate current water quality concerns, aquatic plant communities, invasive species, or fisheries. 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 collectively 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 that helped to guide decisions 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 Mission 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.

The purpose of this plan is to learn about Mission Lake and identify features important to the Mission Lake community in order to provide a framework for the protection and improvement of the lake. This framework, or lake management plan, will enable the community to achieve the vision for Mission Lake now and in the years to come.

This lake management plan will enable the community to achieve their vision for Mission Lake now and in the years to come.

The planning process included a series of four public planning sessions which were held at the Reid Town Hall to assist area residents, lake users, and representatives of local municipalities with the development of the lake management plan. These meetings took place between October 2014 and January 2015. Each session focused on different discussion topics, which included: the fishery and recreation; the aquatic plant community; water quality and land use; shoreland health; and communication. Guest experts presented information and participated in discussions with participants to provide context, insight and recommendations for the lake management plan, including environmental and regulatory considerations. 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. Participation in the planning process was open to everyone and was encouraged by letters sent directly to Mission Lake watershed property owners and by press releases in local newspapers. In addition, members of the planning committee were provided with emails about upcoming meetings which could be forwarded to others.

The Mission Lake Planning Committee consisted primarily of property owners and recreational users. Technical assistance during the planning process was provided by the Marathon County Conservation, Planning, and Zoning Department (CPZ) and professionals from the Wisconsin Department of Natural Resources (WDNR), Golden Sands Resource Conservation & Development, Inc. (RC&D), and the University of Wisconsin-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 Mission Lake Management Planning Committee, and the known science about Mission Lake, its ecosystem and the landscape within its watershed. Implementing and regularly updating the goals and actions in the Mission 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 every five years with any necessary changes.**

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

In-Lake Habitat and a Healthy Lake

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

Landscapes and the Lake

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

People and the Lake

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

Lead persons and resources are identified 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 the Appendix.

Table 1. Organizations and their acronym, identified as resources in this plan.

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


Photo: Kaycie Stushek

Many lake users value Mission Lake for its fishing, wildlife, and clear water. 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 Mission Lake includes the aquatic plants, branches, and tree limbs above and below the water.

The Fish Community

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

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

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

Mission Lake supports a warm water fish community. In 2012, 20 fish species were sampled and identified. Surveys have been conducted periodically by professionals from the Wisconsin Department of Natural Resources. Twenty-two fish species have been recorded in Mission Lake since 1950 (**Error! eference source not found.**). Although most species identified in 2012 had been previously reported, blackchin shiner (*Notropis heterodon*), blacknose shiner (*Notropis heterolepis*), bluegill (*Lepomis macrochirus*) x pumpkinseed (*Lepomis gibbosus*) hybrid, green sunfish (*Lepomis cyanellus*), and warmouth (*Lepomis gulosus*) were newly documented. Species documented previously but not detected during the 2012 survey included emerald shiner (*Notropis atherinoides*) and walleye (*Sander vitreus*). Bluegill were most abundant during both the fyke netting and shocking surveys in 2012, with a maximum size of 6.5 inches. Although infrequently encountered, muskellunge (*Esox masquinongy*) and northern pike (*Esox lucius*) were sampled in Mission Lake, with muskellunge reaching 33.3 inches and northern pike reaching 30 inches. White sucker (*Catostomus commersoni*), yellow bullhead (*Ameiurus natalis*), central mudminnow (*Umbra lima*), and bluegill x pumpkinseed hybrid were also infrequently encountered. Five rusty crayfish (Orconectes rusticus), a non-native and potentially invasive species, were captured during the sampling period.

Wisconsin Department of Natural Resources records have documentation for previous management in Mission Lake (also known as Crooked Lake). In 1970, a permit was submitted to dredge an area (presently the beach area of Mission Lake County Park) and install sand to create a beach. A 1971-1972 fisheries report indicated that panfish, particularly black crappie, were stunted. In 2004, professionals from the Wisconsin Department of Natural Resources identified sensitive areas along Mission Lake's shoreline that were valuable and worth protecting, including naturally forested and vegetated areas. Trees and vegetation protect water quality and prevent shoreline erosion. Fish stocking records for Mission Lake dated back to 1938 in Wisconsin Department of Natural Resources files. Prior to 1960, efforts were focused largely on stocking northern pike and largemouth bass. After 1960, muskellunge fingerlings were the sole focus of stocking in Mission Lake. An 11.7 inch individual was sampled during the fyke net survey in 2012. It is unclear whether this young individual is the product of stocking or natural reproduction. According to Tom Meronek, Fishery Biologist with the WDNR, current muskellunge stocking in Mission Lake by the WDNR is part of a paired feeding study. Prior to release, one-half of the stocked musky were fed pellets and the other half of the stocked musky had been fed minnows at the hatchery. Electroshocking surveys will be conducted each fall to evaluate the study results.

Guiding Vision for the Fish Community

Mission Lake will have a healthy, well-balanced fish community.

Goal 1. A healthy fishery will be present in Mission Lake.

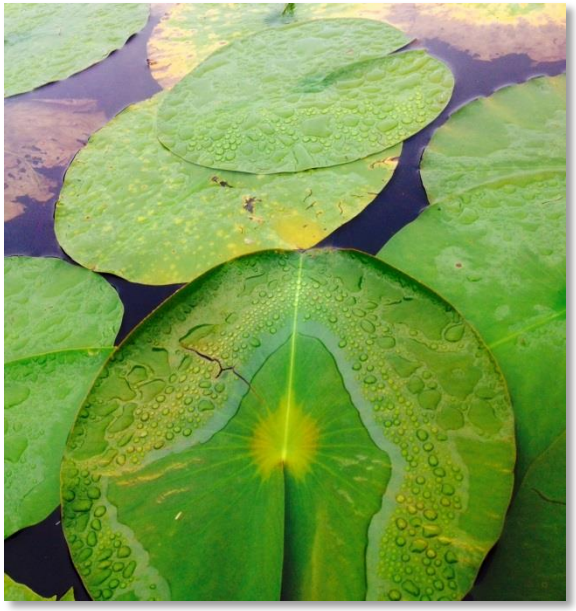
Objective 1.1. Protect and enhance fish habitat to encourage natural reproduction and growth.

Actions	Lead person/group	Resources	Timeline
Inform shoreland property owners about refraining from removing sticks, logs, tree trunks, and vegetation from the near-shore shallows.		UWEX Lakes (educational materials)	2015, Ongoing
Consider working with the WDNR to obtain permits to enhance woody habitat by tree drops, "fish sticks", and/or fish cribs.	Individuals	WDNR Fisheries Biologist Fishing Clubs MC Parks	2015
Encourage property owners with docks to safely place woody habitat beneath them to establish additional fish habitat.	Shoreland property owners	UWEX Lakes (educational materials) WDNR Fisheries Biologist	Ongoing
Provide habitat for young fish by minimizing the removal of aquatic plants in the lake. Some hand clearing near docks is permissible by WDNR guidelines.	Shoreland property owners	WDNR Aquatic Plant Biologist	Ongoing

Objective 1.1. Enhance the fishery to develop a balanced, well-structured fishery.

Actions	Lead person/group	Resources	Timeline
Continue the WDNR fish stocking program. Make adjustments based on annual qualitative review and discussions with the WDNR Fisheries Biologist.		WDNR Fisheries Biologist	Ongoing

Aquatic Plants



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

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

Mission Lake had the most aquatic plant species in the Eastern Marathon County Lakes Study. During the 2012 aquatic plant survey of Mission Lake, 31 species of aquatic plants were found, with the greatest diversity of species occurring near the shoreline. Fifty-seven percent (118 of 206) of the sampled sites had vegetative growth.

The dominant plant species in the survey was slender naiad (*Najas flexilis*), followed by white water lily (*Nymphaea odorata*) and muskgrass (*Chara* spp.). The stems, leaves, and seeds of slender naiad are important food sources for waterfowl and marsh birds. This common aquatic species provides habitat for fish as well. The seeds of the white water lily also provide food to waterfowl. The broad, floating leaves of this aquatic species offer shade and shelter to fish. Muskgrass is a favorite food source for a wide variety of waterfowl. Beds of muskgrass offer cover and food for fish, especially young trout, largemouth bass, and smallmouth bass (Borman et al., 2001).

Overall, the aquatic plant community in Mission Lake can be characterized as having an excellent variety of high quality species. The habitat, food source, and water quality benefits of this diverse plant community, as well as the control and removal of Eurasian water milfoil, should be focal points in future lake management strategies.

Additional information about the aquatic plant community can be found in the Mission Lake Aquatic Plant Report or the Mission Lake 2010-2012 Lake Study Report (UWSP, 2014).

Guiding Vision for Aquatic Plants in Mission Lake

Mission Lake will have a healthy native plant community that supports a balanced fishery and good water clarity.

Goal 2. The existing diverse native aquatic plant community in Mission Lake will remain in place.

Objective 2.1. Shoreland property owners and lake users will have an appreciation of the unique aquatic plant community in Mission Lake and will minimize disturbance.

Actions	Lead person/group	Resources	Timeline
Provide information to shoreland property owners about the value of aquatic plants at an annual meeting or through a newsletter.	CPZ	UWEX Lakes (educational materials)	
Conduct any aquatic plant removal near docks only by hand.	Shoreland property owners	WDNR Aquatic Plant Biologist	
Establish a 'water trail' that highlights unique or sensitive areas of the lake.	UWSP	WDNR Lake Protection Grant CPZ	

Aquatic Invasive Species (AIS)

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

During the 2012 aquatic plant survey, one aquatic invasive species, Eurasian water-milfoil (*Myriophyllum spicatum*), EWM, occupied a sparse patch at one location on the east side of Mission Lake (A map of the location of observed EWM can be found in the Appendix). First documented in Mission Lake in 2010 near the boat landing and on the north/northeast side of the lake, this aquatic invasive plant species begins its growth early in the spring and can quickly out-compete native species. EWM is effective at distributing its population in a lake. It has two mechanisms to create new plants: plant fragments broken off a parent plant that float to a new destination and take root, and seeds. The presence of EWM in Mission Lake highlights the

lake's vulnerability to infection by other aquatic invasive species. A strategy should be developed to prevent the introduction of aquatic invasive species along with a monitoring strategy that is designed to identify AIS before it becomes established. EWM can exist as part of the plant community or it can create dense beds that can damage boat motors, make areas non-navigable, and inhibit activities like swimming and fishing. This plant produces viable seeds; however, it often spreads by fragmentation. Just a small fragment of the stem is enough to start a new plant, so spread can occur quickly if plants are located near points of activity such as beaches and boat launches.

Guiding Vision for Aquatic Invasive Species

Mission Lake will not be detrimentally affected by aquatic invasive species.

Goal 3. Eradicate populations of aquatic invasive species in and around Mission Lake.

Objective 3.1. Eradicate Eurasian watermilfoil from Mission Lake.

Actions	Lead person/group	Resources	Timeline
Provide opportunities for volunteers to learn how to identify AIS and their proper removal techniques.		RC&D*	
Test samples of the milfoil plants to evaluate the presence of hybrid watermilfoil.		WDNR Aquatic Plant Biologist RC&D*	

Objective 3.2. Prevent any new populations of aquatic invasive species from becoming established.

Actions	Lead person/group	Resources	Timeline
Protect and leave in place as much native aquatic vegetation as possible.	Shoreland property owners	RC&D* MC Parks	Ongoing
Provide information to residents and their guests about making sure AIS-free boats are used in the lake and provide information on current populations of AIS and their identification. Work with MC Parks to add information to kiosk at boat landing and/or adding a kiosk to the beach area.	Individuals MC Parks	MC Parks CBCW UWEX Lakes (educational materials)	Ongoing

Provide opportunities for volunteers to learn how to identify AIS and proper removal techniques.		RC&D* WDNR AIS Grant CPZ	
Continue to interact with RC&D* when they survey Mission Lake to expand opportunities to learn about invasive species.	RC&D*	WDNR Aquatic Plant Biologist	Ongoing
Monitor for AIS regularly.	Trained volunteers RC&D*	WDNR AIS Grants CPZ	Ongoing
Work with RC&D* to coordinate volunteer monitoring shared with other area lakes through the Clean Boats, Clean Waters Program.	Individuals CPZ	RC&D* CBCW	Ongoing
Refer to Mission Lake Rapid Response Plan (Appendix).			As needed

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

Critical Habitat

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

The Wisconsin Department of Natural Resources designated eight sensitive areas (Critical Habitat Areas) on Mission Lake in 2004 (Appendix). The areas included the North Bog, located on the northern shoreline out to a water depth of 10 feet; the Southeast Bog located in the southeast corner of the lake out to a depth of 7 feet; a Panfish Spawning Area of with wooded shoreline located on the southwest portion of the lake out to a water depth of 6 feet; the South Bog on the south shore of the lake up to 12 feet in depth, the South Wooded Area, encompassing approximately 100 feet of wooded shoreline out to a water depth of 11 feet; the Southwest Bog encompassing 14 acres bordered by the southwest bay; the County Park Bog, on the west of the County park; and finally the Mid-Lake Plant bed, located in the middle of the east basin of Mission Lake and composed of deep water marsh habitat. All of these areas should be considered for extra protection, and efforts should be made to reduce negative impacts to sensitive areas. General recommendations for Mission Lake as a whole included in the Sensitive Area report (WDNR 2004) included:

- Maintain white pines for potential eagle and osprey nesting habitat, located on the steep shoreline between the North Bog Site and the Southeast Bog Site.
- Maintain wooded cover and buffer of unmowed shoreline in the County Park between the North Bog Site and the County Park Big Site.

- No chemical or fertilizer use on shorelines to prevent adverse impacts to aquatic vegetation and nutrient enrichment of Mission Lake.
- Lake residents or camp personal on Mission Lake contact the WDNR for participation in the Self-Help Volunteer Monitoring Program. Involving the camp in the program would be an ideal educational activity that would also provide important data on the water quality of the lake. If the camp director included this as camp activity, campers would learn about water testing and limnology while providing useful information about lake chemistry.

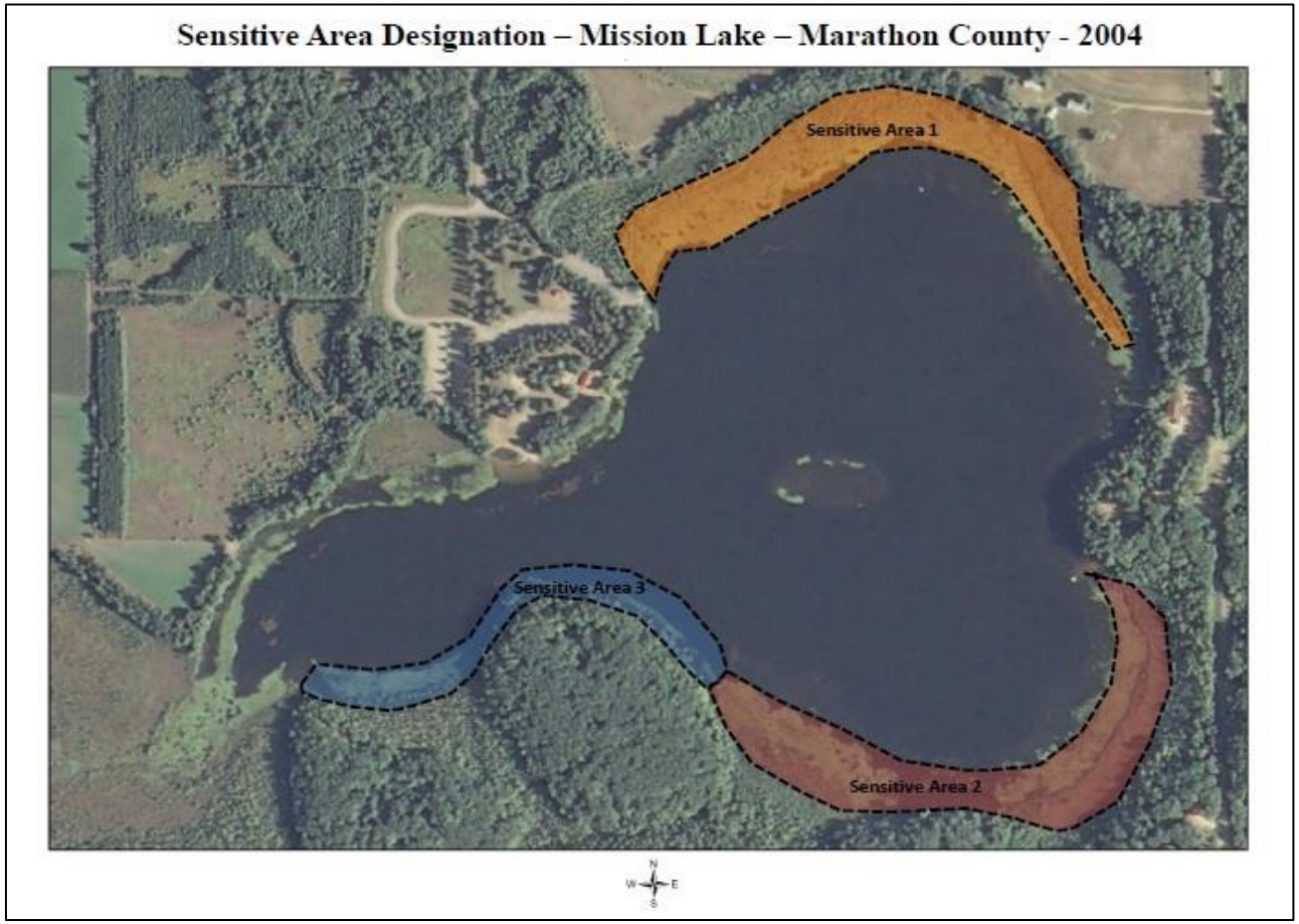


Figure 1. Location of WDNR critical habitat designations.

Guiding Vision Mission Lake's Critical Habitat

Mission Lake's sensitive areas will be enhanced and protected from degradation.

Goal 4. Protect and improve special areas of critical habitat in Mission Lake.

Objective 4.1. Sensitive areas and critical habitat near and in Mission Lake will remain intact and protected.

Actions	Lead person/group	Resources	Timeline
Inform lake users about these important areas by publishing brochures and distribute to current property owners, include in newcomer packets, and for use at boat landing and beach.		WDNR Aquatic Biologists and Lake Managers UWEX Lakes CPZ MC Parks	
Protect areas surrounding off-lake critical habitat areas by supporting enrollment in conservation programs.	Interested shoreland property owners	NCCT Town Plan Commission	
Explore options for making improvements to sensitive habitat by protection, restoration.	Shoreland property owners	WDNR Lake Management Specialist WDNR Fisheries Biologist UWEX Lakes (educational materials)	
Establish a 'water trail' that highlights unique or sensitive areas of the lake.		WDNR Lake Protection Grant CPZ	

Landscapes and the Lake

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

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

The water quality in Mission 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 Mission 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 Mission 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 Mission Lake's water quality.

Dissolved oxygen is an important measure in Mission 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. During the study, dissolved oxygen concentrations in Mission Lake were always plentiful in at least the upper nine feet of water.

The water clarity in Mission Lake was considered fair The average water clarity measurements in Mission Lake during the study were poorest in October and best in July. Water clarity data was submitted sporadically between 1999 and 2007. When compared with this historic data, the average water clarity measured during the study was poorer in August. Results of a sediment core analysis in 2011 suggest increasing organic material and decreased water clarity in recent time.

Chloride, sodium and potassium concentrations are commonly used as indicators of how a lake is being impacted by human activity. The presence of these compounds where they do not naturally occur indicates sources of water contaminants. Over the monitoring period, concentrations of potassium were slightly elevated, but chloride and sodium were low. Although these elements are not detrimental to the aquatic ecosystem, they can 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. Some of the water quality analyses indicated good quality in Mission Lake. Chloride, potassium, and sodium were all low, and Atrazine, an agricultural herbicide, was not present in the two samples analyzed.

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)

Mission Lake is clearly a nutrient-enriched lake. Total phosphorus concentrations in Mission Lake ranged from a high of 61 ug/L in February 2012 to a low of 8 ug/L in August 2012. The summer median total phosphorus was 30 ug/L and 16 ug/L in 2011 and 2012, respectively. The median concentration in 2012 was above Wisconsin's phosphorus standard of 20 ug/l for deep seepage lakes.

During the study, inorganic nitrogen concentrations in samples collected during the spring in Mission Lake were 0.12 mg/L in 2011 and 0.43 mg/L in 2012. Concentrations above 0.3 mg/L are sufficient to enhance algal blooms throughout the summer (Shaw et al., 2000). Inorganic nitrogen typically moves to lakes with groundwater and sources include fertilizers, animal waste, and septic systems.

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

Water quality in Mission Lake will support a healthy lake ecosystem.

Goal 5. Mission Lake will have nutrient concentrations that do not result in increased algal blooms or aquatic plant growth. Summer median phosphorus concentrations will remain below Wisconsin's phosphorus standard of 20 ug/L and spring inorganic nitrogen will remain below 0.3 mg/L for three consecutive years.

Objective 5.1. Minimize nutrient and sediment loading to Mission Lake by improving existing land management practices near the lake and in the watershed.

Actions	Lead person/group	Resources	Timeline
Shoreland property owners will be Informed about the effects of nutrients and land management on water quality through the distribution of a newsletter and neighborly discussions. Consider including information on a lake sign.		UWEX Lakes (educational materials) MC Parks	
Encourage the restoration of unmowed vegetation to slow and absorb runoff and pollutants from the road (see Shorelands section).	Shoreland property owners	CPZ Landscapers, Nurseries, Greenhouses	
Refrain from the use of fertilizers on shoreland properties (see Shorelands section). Consider distributing educational materials to shoreland property owners.	Shoreland property owners	UWEX Lakes (educational materials) CPZ MC Parks	
Encourage the Marathon County CPZ to work with area shoreland landowners and farmers to test soil before applying fertilizers.	Interested citizen	MC Extension	
Protect important habitat in the lake's watershed by informing landowners of options and opportunities (see Watershed section).	Interested citizen	UWEX Lakes (educational materials) NCCT	

Marathon County will encourage landowners to implement water quality-based best management practices (BMPs) throughout the watershed.	CPZ		Ongoing

Objective 5.2. Routinely monitor water quality in Mission Lake to track changes, improvement or decline in water quality.

Actions	Lead person/group	Resources	Timeline
Monitor water clarity (Secchi disc measurements). Collect at least five observations during the summer and submit to WDNR database.	Individual	CLMN coordinator WDNR Lakes Manager	Annually spring through fall, beginning in 2015
Monitor phosphorus during the summer following CLMN guidance. Submit the information to the WDNR database.	Individual	CLMN coordinator WDNR Lakes Manager	Annually in summer, beginning in 2016
Monitor for inorganic nitrogen during spring in accordance with WisCALM guidance. Submit the information to the WDNR database.	Individual	WDNR Lakes Manager WEAL and other labs	Annually during spring overturn, beginning in 2016
Conduct ice-on/ice-off monitoring. Submit the information to the WDNR database.	Individual	CLMN coordinator	Annually fall and spring, beginning in 2015

Shorelands

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

To better understand the health of the Eastern Marathon County lakes, shorelands were evaluated. Mission Lake has 3.1 miles of shoreline. The lake's shoreland vegetation was primarily in a natural state. Grasses and forbs were the most prominent vegetative layer due to the abundance of wetlands adjacent to Mission Lake (Figure 2). The limited shrubs and trees are the result of dense grasses, forbs, and wetland areas rather than human disturbances. Although Mission Lake's shoreland is in good shape now, changes can easily occur as development takes place. Minimizing impacts to Mission Lake from future development should include planning to ensure that perspective developers have the right information to make informed decisions and that zoning is in place to achieve habitat, water quality, and aesthetic goals.

Mission Lake has a very small amount of disturbance around its shores. However, considering the cumulative impacts of any future development is important when considering the future of Mission Lake's water quality and habitat. Docks and artificial beaches can result in altered in-lake habitat; denuded lakebeds provide good prospects for invasive species to become established and reduce habitat that is important to fish and other lake inhabitants. Erosion can contribute sediment to the

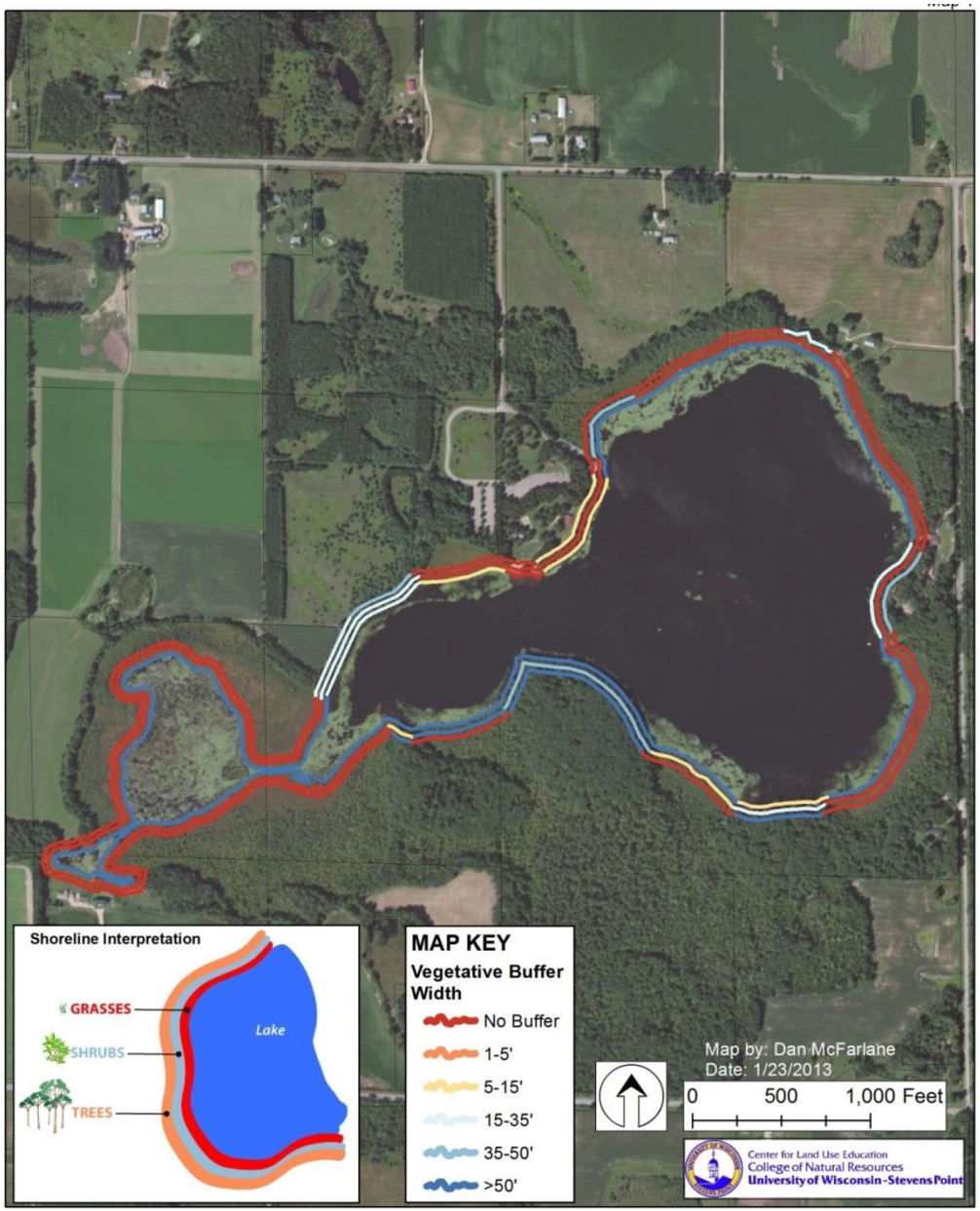


Figure 2. Results from the 2011 Shoreland vegetation survey of Mission Lake.

lake, which can alter spawning habitat and carry nutrients into the lake. Unmanaged runoff from the rooftops of structures located near shore can also contribute more sediment to the lake. Alone, each human-made feature typically is not a large problem to a lake, but on developed lakes where these features occur around the lake, their impacts can add up to be a problem for a lake's habitat and water quality.

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

Guiding Vision for Mission Lake's Shorelands

Mission Lake will have shorelands that provide aesthetic beauty and quality habitat.

Goal 6. Protect and restore healthy shorelands around Mission Lake. The amount of disturbed shoreland will be minimized while allowing for access to the lake. Disturbance will remain within the allowable limits identified in the Marathon County Shoreland Zoning Ordinance.

Objective 6.1. Maintain healthy shoreland vegetation and habitat and restore stretches of shoreland where needed.

Actions	Lead person/group	Resources	Timeline
Minimize and mitigate the amount of impervious surfaces on shoreland properties.	Shoreland property owners MC Parks	CPZ MC Parks	Ongoing
Explore the installation of rain gardens, rain barrels, and other management practices that slow and filter water as it travels toward the lake.	Shoreland property owners MC Parks	CPZ Consultants MC Parks	Ongoing
Keep septic systems maintained and up to date.	Individual property owners MC Parks	CPZ	Ongoing
Encourage MC Parks Dept to install a rain garden and/or conduct shoreland restoration in the Mission Lake park to serve as a demonstration and educational site for local waterfront property owners and visitors. This could be developed as a community restoration project involving a local school or scout group.	MC Parks	MC Parks CPZ	
Ensure that sufficient protection is in place around Mission Lake by actively participating in the public process of revising the MC Comprehensive Plan which will include revisions to the MC shoreland zoning ordinance.	Individuals and local stewardship groups	CPZ Town of Reid	2015

Watershed Land Use

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

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

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

The surface watershed for Mission Lake is 1,577 acres. Primary land use is agriculture and forested land (Figure 3). The lake's shoreland is

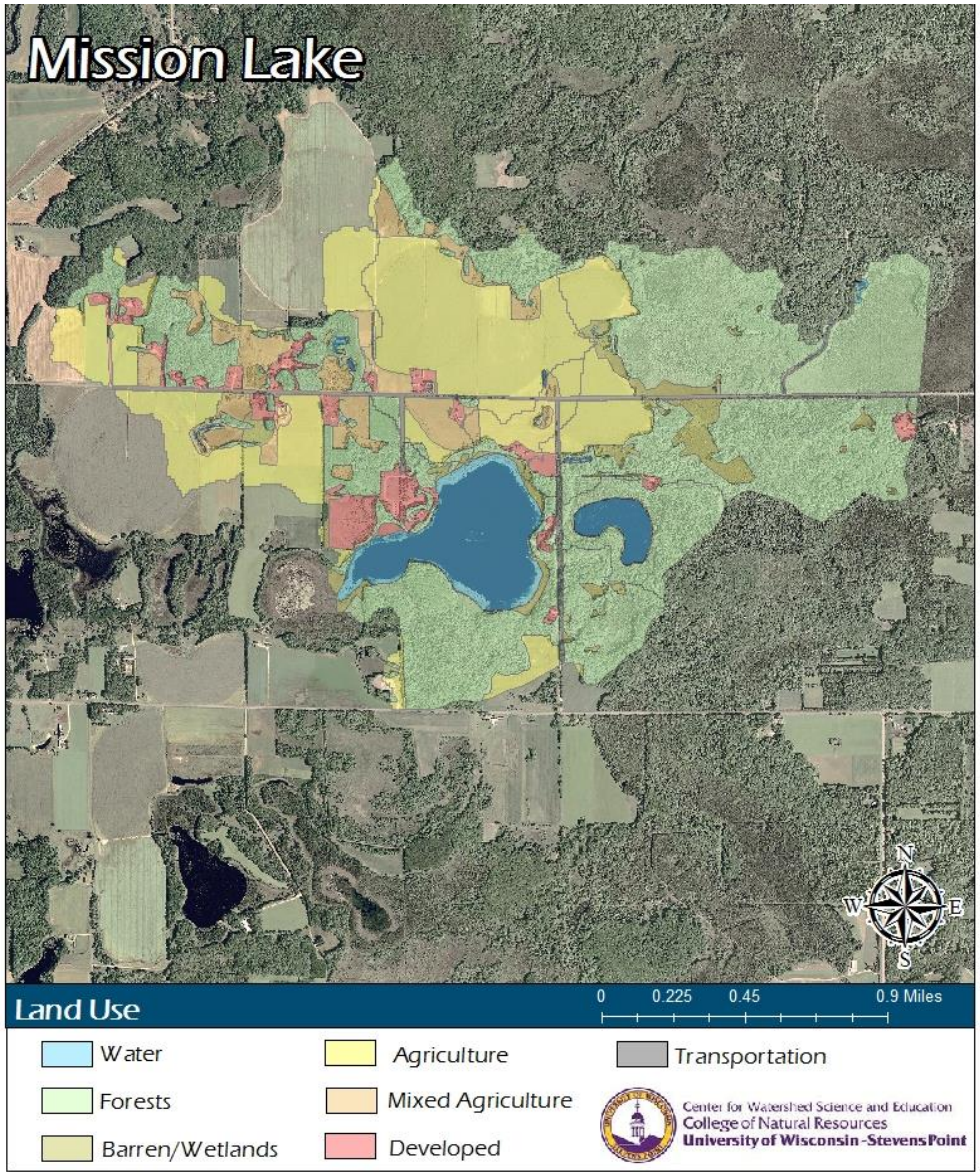


Figure 3. Surface watershed of Mission Lake.

surrounded primarily by wetlands, forests, and recreational development. In general, the land closest to the lake has the greatest immediate impact on water quality.

The groundwater watershed, or the area from which Mission Lake receives groundwater, extends to the northeast from the lake and encompasses approximately 368 acres. Land use practices in this area may have an effect on any contaminants or constituents traveling to the lake via groundwater.

Land use in the surface watershed was evaluated and used to populate the Wisconsin Lakes Modeling Suite (WILMS) model. In general, each type of land use contributes different amounts of phosphorus in runoff and through groundwater. The types of land management practices that are used and the distance from the lake also affect the contributions to the lake from a parcel of land. While forests comprised the greatest amount of land in the watershed, modeling results indicated agriculture had the greatest percentage of phosphorus contributions from the watershed to Mission Lake (Figure 4)

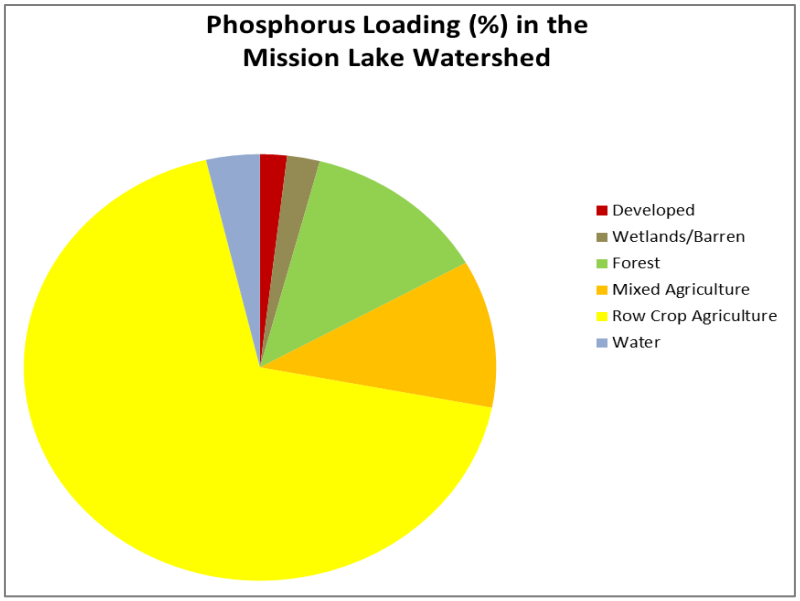


Figure 4. Estimated phosphorus loads from land uses in the Mission Lake watershed.

Guiding Vision for Mission Lake's Watershed

The land in Mission Lake's watershed will be managed in a way that it's high quality water and healthy habitat can be enjoyed by future generations.

Goal 7. Land management practices within the lake's watershed will not have negative impacts on Mission Lake.

Objective 7.1. Important habitat around Mission Lake and in its watershed will be protected.

Actions	Lead person/group	Resources	Timeline
Inform landowners in the lake's watershed of options and opportunities to protect important habitat and natural lands.		CPZ NRCS National Fish and Wildlife Service	

Raise awareness about the importance of wetlands and explore options with the County or Town to better protect, enhance, or restore wetlands in the watershed.	Interested citizen	Town of Reid CPZ County Supervisor Wisconsin Wetlands Assn.	
Support landowners interested in conservation easements or purchase of development rights.	Interested citizen	NCCT WDNR Lake Protection Grants Wisconsin Stewardship Funds	

Objective 7.2. Nutrient and sediment loading to Mission Lake will be reduced by working with property owners to design landscapes and land use that reduces runoff and encourages infiltration.

Actions	Lead person/group	Resources	Timeline
Participate in future planning activities with the County and the Town in regard to revisions to zoning decisions than may affect Mission Lake. Shoreland zoning ordinance updates and land use plans and are a few examples.	Individuals	Town of Reid MC Supervisor CPZ	2015 and ongoing
Explore the use of overlay zoning to better protect the lake and its shorelands around the lake which may not be covered by the existing zoning ordinances.	Individuals and Town of Reid	CPZ Town of Reid	
County staff will encourage property owners to utilize water quality-based best management practices (BMPs) within the watershed (see Water Quality section).	MC CPZ	NRCS DATCP	Ongoing
Reduce impacts of land management in the watershed by supporting property owners that seek conservation easements, purchase of development rights, etc.	Interested citizen	NCCT WDNR Lake Protection Grants Wisconsin Stewardship Funds	Ongoing
Develop County communication strategy for citizens to receive notifications of projected road/development projects near the lake (prior to design) to provide input on road/development drainage directed away from the lake.	Individuals	CPZ Town of Reid	Ongoing – as needed

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

Recreation

Mission Lake has one public boat launch on the northeast end of the lake which is well marked with signage indicating the maximum boating speed (5 mph) and the no-wake designation of the lake. There is a beautiful County Park (Mission Lake County Park) and walking path located on the northwestern side of the lake, including a small swimming area. Mission lake is enjoyed by people who swim, boat, fish, and appreciate its beauty.

Guiding Vision for Recreation

Mission Lake will host recreational opportunities while residents and visitors will continue to use the lake responsibly and appreciate its value.

Goal 8. Mission Lake will remain healthy while providing a variety of recreational opportunities.

Objective 8.1. Potential impacts from recreational use will be balanced by a combination of informed users and supportive regulations.

Actions	Lead person/group	Resources	Timeline
Support the No Wake designation on Mission Lake.	Individuals	Town of Reid	Ongoing
Fishing regulations will be enforced (i.e. valid fishing license, bag limits, etc.)		WDNR Warden	Ongoing
County to maintain the quality of the park and beach and mitigate impacts to the lake and its habitat.	MC Parks	CPZ Consultants	Ongoing
See also Fishing and AIS chapters.			

Communication and Organization

Many of the goals outlined in this plan focus on distributing information to lake and watershed residents and lake users in order to help them make informed decisions that will result in a healthy ecosystem in Mission 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 Mission Lake community will be connected, informed, and engaged in lake stewardship.

Goal 9. Lake stewardship capacity will continually be supported by the community.

Objective 9.1. Opportunities for capacity development will occur to ensure the implementation of this plan.

Actions	Lead person/group	Resources	Timeline
Take steps to continue to develop the partnership between citizens, the Town, County, WDNR, UWSP, elected officials, RC&D*, and others.		Watershed residents CPZ Town of Reid WDNR Lake Managers	Ongoing
Take steps to continue partnerships between all shoreland property owners.	MC Parks Citizens Camp	CPZ	Ongoing
Distribute a welcome packet/mailing to all lake residents with basic lake stewardship information/brochures.		CPZ	Ongoing
Communicate updates to lake management plan and management activities to residents and users of the lake via email list and/or newsletter.		Town of Reid	

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

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 every five years with any necessary changes.

Guiding Vision for Updates and Revisions

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

Goal 10. Review plan annually and update as needed.

Objective 10.1. Community members will discuss the state of Mission Lake.

Actions	Lead person/group	Resources	Timeline
Review plan at an annual gathering and discuss accomplishments and modification of goals/objectives.			Annually

Governance

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Goal 1: Enhance the natural character of Marathon County.

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

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

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

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

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

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

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

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

Goal 7: Improve coordination regarding natural resource protection.

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

Objective: To continue to serve as a liaison between State and Federal agencies and local municipalities regarding natural resource regulations and permitting procedures.

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

permitting procedures.

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

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

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

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

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

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

Goal: Protect wetlands and lakes from development activity.

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

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

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

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

Marathon County Land & Water Resource Management Plan

The Conservation, Planning and Zoning Department's mission is to create, advocate, and implement strategies to conserve natural and community resources. The department administers programs to implement the Land and Water Resource Management Plan which includes the Farmland

Preservation Program, Managed Intensive Grazing, Lake Districts, Wildlife Damage and Abatement, as well as regulatory activities associated with the Waste Storage Facility and Nutrient Management Ordinance and the Livestock Facilities Licensing Ordinance.

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

A. Goals and Objectives

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

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

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

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

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

B. Conservation Programs and Partnerships

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

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

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

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

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

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

C. Regulations: The lake management plan is superseded by federal, state, county, and municipal laws and court rulings; however, the plan may influence county and municipal ordinances and enforcement. Federal laws contain regulations related to water quality, wetlands, dredging, and filling. State laws contain regulations related to water quality, water and lake use, aquatic plants and animals, shoreline vegetation, safety, and development. County laws contain regulations related to development, safety, use, and aquatic plants and animals. Municipal laws contain regulation of use and safety. The rules and regulations are primarily enforced by the US Army Corps of Engineers, the Wisconsin Department of Natural Resources, the Marathon County Sheriff's Department, and the Marathon County Conservation, Planning and Zoning (CPZ) Department. If considering development near or on a lake, addressing problem plants or animals, or altering the lake bottom contacts the Marathon County CPZ Department and/or the Wisconsin Department of Natural Resources.

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

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

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

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

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

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

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

Lake Management Plan Approval

The final draft of the lake management plan will be approved through consensus of local citizens involved in the planning process. 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 DNR will be presented to the municipalities containing the lake and Marathon County. The municipality may reference the lake management plan or parts of the plan in their comprehensive plan to guide municipal or county decisions.

Lake Assistance

The lake management plan will enhance the ability of the lake to apply for financial assistance. The lake management plan will be considered as part of the application for grants through the Wisconsin Department of Natural Resources. Current listings of grants available from the DNR can be found at http://dnr.wi.gov/aid/. Marathon County offers technical and financial assistance through the Conservation, Planning and Zoning Department and University of Wisconsin-Extension Department. Additional assistance may be available from other agencies and organizations, including DNR, UW-Extension Lakes Program, Golden Sands RC&D, Wisconsin Wetlands Association, and Wisconsin Trout Unlimited. Etc.

References

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

Haney, Ryan, 2015. Healthy Shorelands. Presentation given January 6, 2015 at the Reid Town Hall.

Haney, Ryan, 2015. Land Management Practices to Improve Water Quality. Presentation given February 17, 2015 at the Reid Town Hall.

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Panuska and Lillie, 1995. Phosphorus Loadings from Wisconsin Watershed: Recommended Phosphorus Export Coefficients for Agricultural and Forested Watersheds. Bulletin Number 38, Bureau of Research, Wisconsin Department of Natural Resources.

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Stushek, Kaycie, 2014. Aquatic Invasive Species in Lilly, Lost and Mission Lakes. Presentation given December 2, 2014 at the Reid Town Hall.

Turyk, Nancy, 2015. Water Quality in Lilly, Lost and Mission Lakes. Presentation given February 17, 2015 at the Reid Town Hall.

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

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

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

Wisconsin Department of Natural Resources, 2004. Designation of Sensitive Areas: Mission Lake, Marathon County. Eau Claire, Wisconsin.

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

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

Boat Landings (State)
Contact: Tom Meronek, 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/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 Dr., 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

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

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

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

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

Nutrient Management Plans
Marathon County 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:

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

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

Appendix B: Aquatic Plant Management Strategies

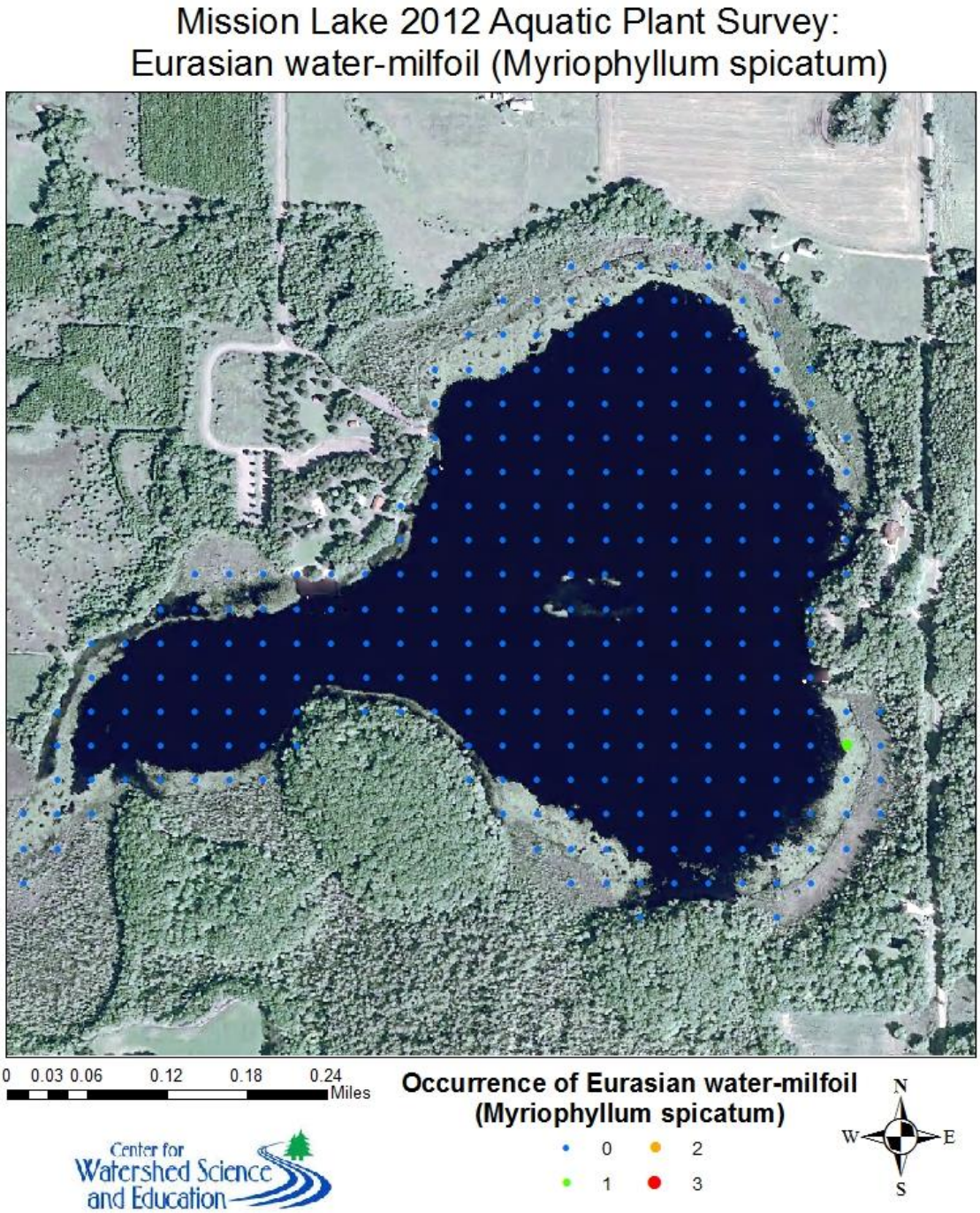

Figure 5. Locations of observed Eurasian water-milfoil in Mission Lake during the 2012 aquatic plant survey.

General recommendations:

- Reduce nutrients traveling to the lake from the landscape.
- Avoid increasing algal blooms by maintaining a healthy amount of aquatic plants.
- Don't denude the lakebed.
    - Increases potential for aquatic invasive species establishment.
    - Sediments can add phosphorus to the water which may lead to increased algal growth.
- Choose options that are appropriate for your lake's situation.
- Monitor and adjust your strategies if you are not making headway!

List of Aquatic Plant Management Options (selection of options varies with situation):

No Action

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

Hand Pulling

ADVANTAGES	LIMITATIONS
∗ Can be used for thinning aquatic plants around docks. ∗ Can target specific plants - with proper training. ∗ Can be effective in controlling small infestations of aquatic invasive species. ∗ No associated cost.	∗ Removes near-shore wildlife and fish habitat. ∗ Opens up areas where invasives to become established. ∗ If aquatic invasive species are not pulled properly, could worsen the problem.

Hand Pulling Using Suction

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

Mechanical Harvesting

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

Water Level Manipulation

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

Milfoil Weevils

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

Chemical Treatment: Spot

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

Chemical Treatment: Lake-wide

ADVANTAGES	LIMITATIONS
∗ May reduce aquatic invasives for a time. ∗ Treatment not needed as frequently.	∗ Only considered in lakes with aquatic invasive plants. ∗ Usually not fully effective in eradicating target species. ∗ Contaminants may remain in sediment. ∗ Does not remove dead vegetation, which depletes oxygen and releases nutrients, adds to build-up of muck. ∗ Extra nutrients may spur additional aquatic plant and algae growth. ∗ Negatively affects native vegetation. ∗ Effects on lake ecosystem not fully understood. ∗ Opens up space once taken up by natives for invasive species to colonize once again. ∗ ~$4000 per 5 acres.