

2019 Update

Big Bass Lake Management Plan Marathon County, Wisconsin



Created: Spring 2014
Updated: Fall 2019

Big Bass Lake Management Plan

The Big Bass Rehabilitation District adopted the lake management plan on May 24, 2014, after obtaining input from residents and lake users at a series of public planning sessions held at the Bevent Town Hall in Bevent, Wisconsin on January 30, February 27, March 27, April 24, and May 13, 2014. The inclusive community sessions were designed to identify key community concerns, assets, opportunities, and priorities. Representatives of state and local agencies, as well as nonprofit organizations also attended the planning sessions to offer their assistance to the group in developing a strategic Lake Management Plan (LMP). The original plan was prepared by staff from the Center for Watershed Science and Education University of Wisconsin-Stevens Point.

This plan was adopted by the Town of Bevent on: September 3, 2014

This plan was adopted by Marathon County on: August 18, 2015

This plan was approved by the Wisconsin Dept. of Natural Resources on: January 7, 2019

This updated plan was approved by Big Bass Lake Protection and Rehabilitation District on: October 9, 2019

This updated plan was approved by the Wisconsin Dept. of Natural Resources on: November 12, 2019

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

Big Bass Lake Management Update Participants

Big Bass Lake Protection and Rehabilitation District

Commissioner – Joe Pyzyk
Treasurer – Linda Hordyk
Treasurer – Becca Franzen
Secretary – Gerry Gabor
Town of Bevent – Perry Cebula

Marathon County

Department of Conservation, Planning and Zoning
Shoreland Protection Technician – Lauren Nichols

Golden Sands RC&D, Inc.

Regional Aquatic Invasive Species Specialist–
Chris Hamerla

Big Bass Lake Management Planning Committee Members and Resources

Planning Committee

Ron Arndt
Debbie Arndt
Dave Chekouras
Joyce Chekouras
Bob Clabough
Tony Trzebiatowski
Don Fox
Gerry Gabor
Linda Hordyk
Steve Hordyk
Joe Pyzyk
Dale Ruston
Sandra Ruston
Thomas Slagoski
Gerald Stedl
Bryan Wulk

Marathon County

Department of Conservation, Planning and Zoning
County Conservation Specialists –
Shawn Esser, Diane Hanson, Angela Wenninger

Wisconsin Department of Natural Resources

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

UW – Stevens Point

Center for Watershed Science and Education
Water Resource Specialists – Ryan Haney and Danielle Rupp
Water Resource Scientist – Nancy Turyk
Director, Professor Water Resources – Dr. George H. Kraft

Golden Sands RC&D, Inc.

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

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Big Bass Lake

Big Bass Lake is a 180 acre lake located in rural eastern Marathon County, Wisconsin. Residing in a mix of predominantly agricultural and forested land, there is a close-knit lake culture in this area of the county that binds many community members together. Especially important to many who enjoy Big Bass Lake are the fish, good water quality, and the variety of recreational activities visitors and residents of the lake can enjoy. The importance of the health of the lake is evident in the review of its history of management. The Big Bass Lake Association was formed in August 1980 to address problems including mild to severe winter fish kills and surface water use controversies. The Big Bass Lake Protection and Rehabilitation District was formed in 1986. In 2014, the values of the community surrounding Big Bass Lake inspired residents and users to come together to form a lake management plan for their beloved common resource.

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

- Maintain a healthy and sustainable sport fishery in Big Bass Lake
- Preserve the semi-secluded aesthetic of the lake

Overarching Vision for Big Bass Lake

Big Bass Lake will be valued in future generations for its balance of natural beauty and recreational accessibility to all. It will host a variety of fish and wildlife, and will have adequate shoreline and in-lake habitat to support both.

Introduction and Background

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

The goals, objectives and actions of this lake management plan provide a framework that can be used by a wide variety of citizens, elected representatives and professionals in achieving the people's overarching vision for Big Bass Lake.

Many individuals and organizations are involved in assuring that the Big Bass 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 Big Bass Lake can have the greatest influence on the lake by understanding and choosing lake-friendly options to manage their land and the lakes.
- **Big Bass Lake Protection and Rehabilitation District:** Resources and funding opportunities for District management activities are made more available by placement of goals into the lake management plan and the District can identify partners to help achieve their goals for Big Bass 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 Bevent:** The Town can reference the visions, wishes, and goals documented in the lake management plan when considering town-level planning or decisions within the watershed which may affect the lake. The Town can work with requests to best represent the documented wishes of the lake community.
- **Marathon County:** County professionals can identify needs, provide support, base decisions, and allocate resources to assist with some of the lake-related actions documented in this plan. This plan can also inform county board supervisors in decisions related to Marathon County lakes, streams, wetlands, and groundwater.
- **Wisconsin Department of Natural Resources:** Professionals working with lakes in Marathon County can use this plan as guidance for management activities and decisions related to the management of the resource, including the fishery, and invasive species. Lake management plans help the WDNR identify and prioritize needs within Wisconsin's lake community, and decide where to best apply resources and funding. A well thought out lake management plan increases an application's competitiveness for funding from the State – if multiple Marathon County

lakes have similar goals in their lake management plans, they can join together when seeking grant support to increase competitiveness for statewide resources. Information about WDNR grants is located on their website <http://dnr.wi.gov/lakes/grants/>. Grant contacts are also listed in Appendix A.

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

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

Several reports from the Big Bass 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 Big Bass Lake and identify features important to the Big Bass Lake community in order to provide a framework for the protection and improvement of the lake. This framework will enable the committee to achieve its vision for Big Bass Lake in the years to come. A series of meetings were held at the Bevent Town Hall to assist area residents, Big Bass Lake Management District members, lake users, and representatives of local municipalities with the development of the lake management plan. Five meetings took place between January and May 2014 which enabled participants to learn about and discuss the topics of fishery and recreation, the algal and aquatic plant community, current and historic water quality and land use, shoreland health, lake levels and communication.

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

Participation in the planning process was open to everyone and was encouraged by letters sent directly to Big Bass Lake waterfront property owners and nearby residents, press releases to local newspapers, and emails.

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

The Big Bass Lake Planning Team consisted of Big Bass Lake Management District and town board members who were assisted by professionals from the Marathon County Conservation, Planning, and Zoning Department (CPZ), Wisconsin Department of Natural Resources (WDNR), Golden Sands Resource Conservation and Development, Inc., and the UW-Stevens Point Center for Watershed Science and Education (CWSE). These professionals provided participants with insight and recommendations to consider in their lake management plan, as well as environmental and regulatory considerations. After learning about the current condition of each topic for Big Bass Lake, the group identified goals, objectives, and actions to place in the lake management plan. This plan is intended to identify opportunities for ensuring that the lake's ecological, aesthetic, and recreational opportunities are plentiful into the future, as recorded in the planning meetings by professionals from UW-Stevens Point.

In 2018, citizens involved with the Eastern Lakes Project, Golden Sands RC&D, and Marathon County CPZ, met to review the Eastern Lakes Management Plans in preparation for the five year update goal. In the spring of 2019, the Big Bass Lake Management Plan was updated to reflect the accomplishments over the past five years. The update committee consisted of Big Bass Lake Protection and Rehabilitation District Commissioners, Marathon County CPZ, and Golden Sands RC&D. Since 2014, these organizations have worked closely together to meet the goals and objectives outlined with this plan.

Goals, Objectives, and Actions

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

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

In-Lake Habitat and a Healthy Lake

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

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

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

Landscapes and the Lake

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

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

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

People and the Lake

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

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

Updates and Revisions—continuing the process

Governance—protection of the lake, constitution, state, county, local municipalities, Lake District

Resources listed within the plan identify the primary organizations or individuals that are able to provide information, suggestions, or services to accomplish the goals and objectives. This list should not be considered all-inclusive – assistance may also be provided by other entities, consultants, and/or organizations.

Acronym	Organization/Resource
BBL	Big Bass Lake
BBLD	Big Bass Lake Protection and Rehabilitation District
CBCW	Clean Boats Clean Waters
CLMN	Citizen Lake Monitoring Network
CWSE	UWSP Center for Watershed Science and Education
CPZ	Marathon County Conservation, Planning and Zoning Dept.
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

The plants and animals living in and near Big Bass Lake are interrelated with the lake and with one another. Because of these important connections, considerations need to be taken in relation to the effects of management actions on other inhabitants of the lake. The types and abundance of aquatic plants and animals that comprise the lake community also vary based on the water quality, shoreland health, and characteristics of the watershed.

Healthy habitat in Big Bass Lake and adjacent wetlands includes the aquatic plants, branches, and tree limbs above and below the water. Many animals that live in the lake are only successful if they have a place to hide from predators. Some of the lake visitors such as birds, frogs, and turtles use tree limbs sticking out of the water for perches or to warm themselves in the sun. Aquatic plants also provide oxygen to the water and food for fish, waterfowl, and mammals.

The Fish Community

A variety of fish management techniques were attempted in the past in Big Bass Lake. Fish stocking records for Big Bass Lake date back to 1952 according to WDNR files. Historic stocking primarily consisted of adult northern pike, but walleye, largemouth bass, smallmouth bass, and black crappie were also stocked. In 1952, the WDNR stocked the lake with walleye fry in attempts to make Big Bass Lake into a walleye rearing pond. Remaining walleye did well, and the effort was noted as a success. Several years later (1957), the entire lake was treated with toxaphene to reset the system. The goal of the treatment was to destroy the small panfish community and stock the lake with golden shiners. Northern pike were then stocked in 1959. As time progressed and stocking efforts continued (mainly northern pike and walleye), several winter kill events (1964, 1975, 1986) struck Big Bass Lake and stocking efforts were discontinued. During these struggles with winter kill, the lake was often opened up to the public for dip netting. As a result of frequent winter fish kill, the lake installed an aerator system in 1988 to help maintain healthy dissolved oxygen levels during the winter months. In the early 1980s, a dam was installed along the ridge on the eastern side of the lake to maintain water levels and prevent wash-out of fish into the marsh below during ice thaw. In 1994, the control of the dam was given to the Town of Bevent and

Species	1955	1957	1985	1986	1968	1993	2000	2002	2005	2006	2012
Black bullhead				x	x		x				x
Black crappie	x	x	x			x	x		x	x	x
Blacknose dace							x				
Bluegill			x	x	x	x	x	x	x	x	x
Brown bullhead					x						
Bullheads		x	x		x						
Golden shiner	x	x		x		x	x				x
Green sunfish							x		x		
Iowa darter											x
Largemouth bass		x	x	x	x	x	x	x	x	x	x
Northern pike			x		x	x	x			x	
Pumpkinseed	x	x	x	x	x	x	x	x		x	
Rainbow Darter							x				
Walleye	x					x	x			x	x
White sucker	x	x	x	x	x	x	x				
Yellow bullhead											x
Yellow perch	x		x	x	x	x	x		x	x	x

wood boards were installed to maintain the water level 2" below the high water mark.

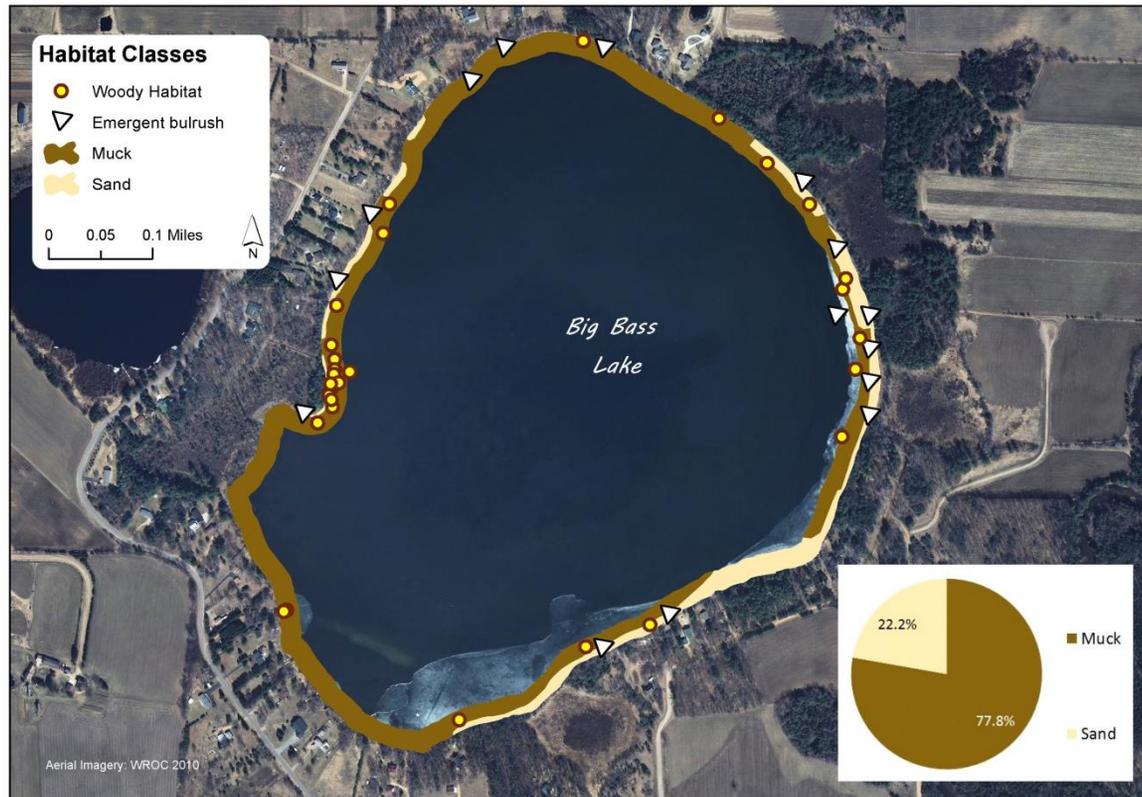


Figure 1. Distribution of substrate, coarse woody habitat, and bulrush in Big Bass Lake, 2012 survey.

nest on woody habitat swept clear of sediments. The presence of young bass and abundant sunfish during sampling indicates that successful reproduction of these species is occurring in Big Bass Lake. Conclusions could not be made about walleye and northern pike reproductive success without additional sampling efforts.

Coarse woody habitat (CWH), including downed trees and logs, is sparse in Big Bass Lake. This structure is used by young prey fish and other aquatic organisms for foraging, protection, and spawning. The addition of CWH cover in Big Bass Lake would likely benefit the fish community.

Big Bass Lake supports a warm water fish community. In 2006, seven fish species were sampled and identified (Drach and Meronek, 2007) out of the seventeen total species that have been recorded in surveys obtained from the WDNR that date back to 1955. In 2012, nine fish species were sampled and

Substrate in Big Bass Lake consists of marl/muck (78%) and sand (22%) (Figure 1). When available, gravel areas are used as spawning habitat by many sunfish (bluegill, pumpkinseed, black bass), where males will construct nests and guard their young. Northern pike, which do not provide parental care, use areas with emergent and floating-leaf vegetation in shallow or flooded areas for spawning. Black crappie also use bulrush habitat on gravel or sand substrates where they construct nests and guard young (bulrush is present along areas of the shoreline in Big Bass Lake). Yellow perch and walleye prefer near-shore cobble substrate in oxygen-rich environments for spawning activity and do not provide parental care. In the absence of sand and coarser substrates such as gravel, largemouth bass and sunfish are known to build nests on marl. Depressions are deepened until small amounts of coarser substrate, mostly fragments of snail shells, accumulate in the bottom of the nests. In areas of soft substrate, largemouth bass are also reported to

identified. Although most species identified in 2012 had been previously reported, yellow bullhead and Iowa darter were newly documented. Bluegills were most abundant during the 2012 survey, with a maximum length of 10 inches reached by this species. Although infrequently encountered, walleye was the largest fish species sampled in Big Bass Lake, with individuals reaching 25.3 inches. Least commonly sampled were the black bullhead and golden shiner. Crayfish were not encountered during the sampling period. In 2014, the WI DNR did an electrofishing survey to assess the largemouth bass fishery for any post regulation change from a 14 inch size minimum to a slot limit. Results showed that the largemouth bass population improved since the new regulation and that bluegill population remained unchanged.

A 2019 fish survey recorded five species caught, the most abundant being largemouth bass with 213 individuals caught in 1 hour. Bluegill were the second most prevalent species with 104 caught, then yellow perch at 12, northern pike at 3, and black crappie at 2. Size structure comparison showed 99 bluegill of 6 inches or greater and 66 bluegill of 8 inches or greater. The largemouth bass size structure showed 39 individuals of 12 inches or greater and 22 fish of 15 inches or greater. The largest fish caught during the survey was a northern pike measuring 33 inches.

Big Bass Lake was listed as an impaired water in 2002 because of the atmospheric deposition of mercury identified in fish tissue.

Guiding Vision for the Fish Community in Big Bass Lake

Big Bass Lake will have a healthy sustainable fishery that supports a positive fishing experience.

Goal 1. Create a sustainable fishery structure in Big Bass Lake.

Objective 1.1. Increase fish spawning habitat in the lake.

Actions	Lead person/group	Resources	Timeline
Encourage shoreland property owners to consider tree drops.	BBL residents BBLD	WDNR Fisheries Biologist Local fishing clubs	Ongoing 2014-2019: Several tree drops were completed.
Explore the installation of a multilingual sign reinforcing catch and release of northern pike and largemouth bass slot limit.	Interested citizen	WDNR Fisheries Biologist CPZ UWSP Human Dimensions	2014-2019: Not addressed
Maintain littoral (lake shallows) zone and emergent aquatic plants by educating lake	BBL residents BBLD	UWEX Lakes WDNR Biologists	Ongoing

users about the importance of habitat via newsletters/e-mails.	RC & D CPZ		2014-2019: Lake users were educated via newsletters, presentations at annual meetings, and boat tours.
Educate residents about shoreland restoration and critical woody habitat and fish sticks via the annual meeting and newsletters.	BBL residents BBLD CPZ	UWEX Lakes WDNR Fisheries Biologist	Ongoing 2014-2019: Residents were educated via newsletters, presentations, and site visits from the CPZ shoreland protection technician. Three shoreland restoration projects were completed through the CPZ cost-share program. Several residents restored their shorelines outside of the program.
Continually maintain and evaluate records of aeration in Big Bass Lake.	BBLD	WDNR Fisheries Biologist	Ongoing 2014-2019: Annual documentation is kept for thermostat values and electric use. The aeration system was upgraded with a new motor and other equipment.

Objective 1.2. Collect additional data to understand the dynamics and structure of the fish community in Big Bass Lake.

Actions	Lead person/group	Resources	Timeline
Continue to work with UW-Stevens Point and/or WDNR biologists to continue fish community surveying efforts at least every 5 years.	WDNR Fisheries Biologist BBLD BBL residents	WDNR Fisheries Biologist UWSP Fisheries Faculty	Ongoing 2014-2019: Northern pike, perch, and crappies have been stocked per consultation between BBLD and WDNR. BBLD conducts creel surveys with residents to determine species natural reproduction.
If warranted, adjust regulations to support a sustainable fishery.	WDNR Fisheries Biologist BBLD	Conservation Congress local representatives	Ongoing

Objective 1.3. Increase populations of panfish and lower populations of largemouth bass/bluegill (*recommended by WDNR Fishery Biologist*).

Actions	Lead person/group	Resources	Timeline
Explore size limit or catch-and-release regulations for northern pike for control of largemouth bass populations.	WDNR Fisheries Biologist BBLD	WDNR Fisheries Biologist Conservation Congress local representatives Local fishing clubs	Ongoing
Review efficacy of bass slot limit.	WDNR Fisheries Biologist BBLD	WDNR Fisheries Biologist Conservation Congress local representatives Local fishing clubs	Ongoing
Evaluate northern pike stocking history and success, and seek guidance from the WDNR Fisheries Biologist.	BBLD WDNR Fisheries	WDNR Fisheries Biologist Local fishing clubs	Ongoing

Aquatic Plants

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

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

Twenty-five species of aquatic plants were identified in Big Bass Lake or wet areas of the shore during the 2012 survey. This is above average compared to other lakes in the Eastern Marathon County Lakes Study, ranking 3rd out of the 11 lakes. The dominant plant species in the survey was white-stem pondweed, followed by slender naiad and muskgrass. White-stem pondweed is an important source of food for waterfowl, muskrat, beaver, and trout. This aquatic plant is considered an indicator species for water quality due to its sensitivity to disturbances within the aquatic system. The stems, leaves, and seeds of slender naiad are also important food sources for waterfowl and marsh birds. This common aquatic species provides habitat for fish as well. 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).

During the aquatic plant survey of Big Bass Lake, no non-native species were found. This is a good indicator of the overall aquatic health within the lake. The absence of non-native species also demonstrates diligence by lake users in cleaning watercraft before entering the lake to prevent non-native species transfer; however, efforts will need to be continued to keep aquatic invasive species out of Big Bass Lake in the future.

Overall, the aquatic plant community in Big Bass Lake can be characterized as having very good species diversity and is impacted by some development along its shoreline. The dominance of white-stem pondweed within the lake is a positive sign of overall lake health. The habitat, food source, and water quality benefits of the diverse plant community should be the focal points in future decision-making concerning lake management strategies.

Guiding Vision for Aquatic Plants in Big Bass Lake

The native aquatic plants will be diverse and healthy. Aquatic invasive species will not be present.

Goal 2. Maintain/restore a healthy native aquatic plant community.

Objective 2.1. Limit removal/destruction of aquatic plants by shoreland property owners and lake users.

Actions	Lead person/group	Resources	Timeline
Educate shoreland property owners on the value of aquatic plants at annual meeting and through newsletter.	CPZ BBLD	UWEX Lakes (educational materials)	Ongoing 2014-2019: Residents were educated via newsletters, presentations, and the Mayflower Lake Boat Tour Event.
Conduct any aquatic plant removal by hand.	Shoreland property owners	WDNR Aquatic Plant Biologist	2014-2019: Not necessary

Goal 3. Prevent aquatic invasive species (AIS) from entering Big Bass Lake.

2014-2019 Update: Residents are educated and reminded regularly about AIS identification and prevention through newsletters, annual meeting reminders, presentations/events, e-mail, and CBCW volunteers. Residents are advised not to allow friends or relatives to launch any watercrafts if they have recently been in other waters. CBCW volunteers and Golden Sands RC&D have also been involved with boat checks at the landing throughout the boating seasons. BBLD has secured funds for a rapid response invasive plant pull if invasives are discovered in the lake, and works together with CPZ and RC&D in educating residents and monitoring.

An AIS Early Detection Survey was conducted on July 29th by Golden Sands RC&D using standardized DNR protocols. No new AIS populations were observed. Banded mystery snails are known to be in Big Bass Lake and they were observed during the survey.

AIS prevention signage was installed at the boat landing in 2005 and is still in good condition.

Objective 3.1. Educate lake users about AIS prevention.

Actions	Lead person/group	Resources	Timeline
Educate residents and their guests to only put clean boats into the lake.	BBL residents BBLD RC&D	CBCW RC&D	Ongoing 2014-2019: Residents educated via newsletters, social media, e-mail, annual meetings, and presentations.

Coordinate with RC&D for CBCW volunteers during heavy boating weekends.	BBL residents BBLD RC&D		Ongoing 2014-2019: CBCW volunteers and Golden Sands RC&D completed several monitoring sessions each year from May through September.
Maintain signage at boat landing.	BBLD	Town of Bevent	Ongoing
Continue to include AIS information in welcome packet/shoreland owner's guide (County). (See Communication section.)	CPZ	CPZ	Ongoing 2014-2019: Shoreland owner folders are given to new property owners

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

2014-2019 Update: No aquatic invasive species have been found in BBL.

Actions	Lead person/group	Resources	Timeline
Refer to the Big Bass Rapid Response Plan (Appendix A).	BBLD	Big Bass Rapid Response Plan	As Needed
Learn about identification and proper manual removal techniques for AIS.	BBLD RC&D CPZ BBL Residents	RC&D	Ongoing

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

Critical Habitat

Critical habitat areas are special areas that are designated by the WDNR to protect features in a lake that are important to the overall health of the aquatic plants, animals, and lake itself. Every lake contains important natural features, but not all lakes have official critical habitat designations. Designating areas of the lake in this way creates special protections for these areas, and recognizes these areas by mapping and sharing information about them so people can know the locations and importance of areas that could be vulnerable to damage by too much human activity. Having a critical habitat designation on a lake can help lake groups and landowners plan waterfront projects to avoid and protect habitat and help ensure the long-term health of the lake. Big Bass Lake does not currently have any officially designated critical habitat areas.

Guiding Vision for Big Bass Lake's Critical Habitat

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

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

Objective 4.1. Identify potentially critical habitat on Big Bass Lake.

Actions	Lead person/group	Resources	Timeline
Request critical habitat designations.	Interested citizen	WDNR Aquatic Biologist and Lake Managers	2014-2019: Not addressed
Once identified, help others understand the value of these areas.	Interested citizen	UWEX Lakes (educational materials) WDNR Aquatic Biologist and Lake Managers	2014-2019: Not addressed

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 better water quality, other types of land use practices may result in increased runoff and less groundwater recharge, and may 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 or cover fish spawning beds. Soil also contains nutrients that increase the growth of algae and aquatic plants. Development on the land often results in changes to natural drainage patterns, alterations to vegetation on the landscape, and may be a source of contaminants. 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. Septic systems, 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.

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 small and large mammals. Healthy shoreland vegetation includes a mix of unmowed grasses/flowers, shrubs and trees which may include wetlands. This vegetation should extend at least 35 feet landward from the water's edge.

The water quality in Big Bass Lake is a 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, positive changes to land management practices are the primary actions that can have positive impacts on the lake's water quality. The water quality in Big Bass 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 as management planning decisions were made.

Water Quality and Water Quantity

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

Temperature profiles in Big Bass Lake indicated that the lake water remains mixed from top to bottom throughout the year. Historically, Big Bass Lake has experienced winter fish kills, so an aerator is operated during the winter months (Appendix B: Big Bass Lake District Aeration System). The dissolved oxygen in Big Bass Lake was sufficient to support a variety of fish and aquatic biota throughout the 2010-2012 study.

In Big Bass Lake, water clarity ranged from 4.5 to 10 feet. When compared with historic data, the average water clarity measured during the study was slightly better in all months sampled. Fluctuations throughout the summer are normal, as algal populations and sedimentation (primary influences on water clarity) increase and decrease.

Chloride levels, and to a lesser degree sodium and potassium levels, are commonly used as indicators of how strongly a lake is being impacted by human activity. Potassium concentrations in Big Bass Lake were low, but sodium and chloride concentrations were somewhat elevated. Although these elements are not detrimental to the aquatic ecosystem, they indicate that sources of contaminants such as road salt, fertilizer, animal waste and/or septic system effluent may be entering the lake from surface runoff and/or via groundwater.

Phosphorus is an element that is essential in trace amounts to most living organisms, including aquatic plants and algae. Sources of phosphorus can include naturally-occurring phosphorus in soils and wetlands, and in groundwater. Common sources from human activities include soil erosion, animal waste, fertilizers, and septic systems. Although a variety of compounds are important to biological growth, phosphorus gets 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.

Total phosphorus concentrations in Big Bass Lake ranged from a high of 48 µg/L in April, 2012 to a low of 13 µg/L in February-April, 2011, with summer median concentrations of 28.5 and 22 µg/L in 2011 and 2012, respectively. This is below Wisconsin's phosphorus standard for shallow lakes of 40 µg/L, but above the proposed flag value of 15 µg/L.

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

One pound of phosphorus entering a lake can result in as much as 500 pounds of algal growth!
Vallentyne, 1974.

Nitrogen is also a nutrient that can impact water quality and plant and algae growth. Springtime concentrations of inorganic nitrogen above 0.3 mg/L indicate that there is sufficient nitrogen present in the lake to support summer algae blooms. In Big Bass Lake, inorganic nitrogen concentrations averaged 0.5 mg/L in samples collected during spring 2011-2012. Inorganic nitrogen is likely to be entering Big Bass Lake in groundwater. Common sources include fertilizers, septic systems, and animal waste.

2014-2019 Update: As Big Bass Lake is a DNR Long Term Trend Lake, regular water quality data is available from 1999 to present. Starting in 2019, Gerry Gabor, a Big Bass Lake shoreland landowner assumed the monitoring responsibilities that DNR has been collecting up to date. Anecdotally, shoreland owners on Big Bass Lake have noticed better water quality in recent years which is supported by the monitoring data below. Nutrient concentrations may lower more in upcoming years due to a new septic system maintenance program that will be introduced by CPZ in early 2020, starting with shoreland systems.

Total phosphorus concentrations have decreased in recent years:

2016: Springtime measurement of 16 µg/L in April, summertime average of 18 µg/L, and a fall measurement of 22 µg/L.

2017: April average of 15 µg/L, summertime average of 27µg/L, and a fall measurement of 29 µg/L.

2018: Springtime measurement of 18 µg/L in April, summertime average of 23 µg/L, and a fall measurement of 24 µg/L.

2019: Springtime measurement of 15 µg/L in April, summertime average of 18µg/L.

Inorganic nitrogen concentrations have also been decreasing in recent years. See below for springtime (April and May) averages of inorganic nitrogen concentrations. No springtime nitrogen samples were taken in 2018 or 2019.

2014: 0.8mg/L

2015: 0.2 mg/L

2016: 0.02 mg/L

2017: 0.05 mg/L

Guiding Vision for Water Quality in Big Bass Lake

Big Bass Lake will have clear, clean water with minimal contaminants.

Goal 5. Maintain or improve current water quality in Big Bass Lake.

Objective 5.1. Maintain or improve (reduce) current median summer concentrations of total phosphorus (25 µg/L).

Action	Lead person/group	Resources	Timeline
Decrease or eliminate use of fertilizers containing phosphorus on shoreland properties and throughout the watershed by providing educational material about the effects of phosphorus on water quality via newsletters and e-mail. Make personal contacts with local stores selling fertilizers. Consider putting a reminder to “Check for phosphorus” in fertilizers on the lake sign.	BBLD	CPZ MC Extension WDNR	2014-2019: Not addressed
Investigate local interest in a community-wide soil testing study or effort.	BBLD	MC Extension CPZ	2014-2019: Not addressed
Encourage the county to encourage landowners to implement water quality-based best management practices (BMPs) throughout the watershed.	BBLD CPZ	CPZ State grant programs NRCS	Ongoing 2014-2019: Lake users were educated via newsletters, presentations at annual meetings, and boat tours.
Encourage the Marathon County CPZ to work with area shoreland landowners and farmers to test soil before applying fertilizers.	BBLD	MC Extension CPZ	2014-2019: Not addressed
Restore shoreland vegetation around the lake (see Shorelands section).	BBLD	CPZ Consultants	Ongoing 2014-2019: See Goal 7

Objective 5.2. Monitor and reduce inorganic nitrogen concentrations in Big Bass Lake to less than 0.3 mg/L during spring overturn. We will know we have achieved this goal when three consecutive years of monitoring in spring are below 0.3 mg/L NO₂+NO₃-N.

Action	Lead person/group	Resources	Timeline
Encourage watershed landowners to test soil before applying fertilizers.	BBLD	CPZ	2014-2019: Not addressed
Decrease or eliminate personal use of fertilizers containing nitrogen on shoreland properties.	Interested citizen		2014-2019: Not addressed
Encourage the county to reduce excess nitrogen being applied on lands by working with producers in the watershed to improve timing	BBLD	CPZ MC Extension agricultural agent	2014-2019: Not addressed

of application, form of nitrogen, and nitrogen budgets that meet the needs of crops without over-applying.			
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Objective 5.3. Continue and begin new annual monitoring efforts to track changes, improvement or identify decline in water quality.

Action	Lead person/group	Resources	Timeline
Begin water clarity monitoring efforts (Secchi measurements). Collect at least five observations during the summer and submit to WDNR database.	Gerry Gabor DNR	CLMN coordinator WDNR Lakes Manager	Ongoing 2014-2018: Measurements taken inconsistently. 2019: A CLMN volunteer was trained and started sampling consistently for water clarity as well as chemical and nutrient testing. Additionally, algae samples were analyzed.
Continue collecting samples during overturn in spring and fall for analysis of phosphorus and nitrogen.	Gerry Gabor	DNR	Ongoing
Conduct ice-on/ice-off monitoring each fall and spring. Submit the information to the WDNR database.	Gerry Gabor Shoreland owners	CLMN coordinator	Ongoing 2015-2019: sampling completed.

Goal 6. Learn about lake levels and groundwater issues and advocacy in Big Bass Lake, Marathon County, and Wisconsin.

Objective 6.1. Learn about monitoring lake levels and local groundwater pressures.

Action	Lead person/group	Resources	Timeline
Continue water level monitoring using benchmark and laser level. Consider submitting this data to the WDNR website/database.	Interested citizen	WDNR Lakes Manager	Ongoing 2015-2019: Monitoring completed.
Consider a lake level monitoring program that would require taking lake level measurements several times a year and archiving the data.	Interested citizen	WDNR Lakes Manager	2014-2019: Not addressed
Learn about local and state legislation regarding groundwater.	Interested citizen	Friends of the Central Sands UWEX Lakes	Ongoing 2014-2019: Information and updates sent to residents.

Be aware of any land use changes, or additional stress to groundwater resources due to pumping, by checking postings on the WDNR web page.	Interested citizen	WDNR Lakes Manager	Ongoing
Refrain from removing newly exposed shoreland vegetation during low water years.	Shoreland property owners CPZ	UWEX RC&D	Ongoing
Work with area legislators to develop comprehensive groundwater pumping management laws that allow groundwater pumping consistent with healthy lakes and streams.	Interested citizen	UWEX	2014-2019: Not addressed
Work with other groups advocating lake and stream friendly groundwater pumping policies.	Interested citizen	Friends of the Central Sands	2014-2019: Not addressed

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.

Big Bass Lake has 2.1 miles of shoreline. Big Bass Lake was one of the more developed lakes in the lake study, with 46 developed waterfront lots. Despite being developed, nearly 40 percent of the shoreline had unmowed grass/flower vegetation extending at least 50 feet landward from shore, along the undeveloped northern shore and portions of the western side of the lake (Figure 2). However, 45% of the lake shoreland had unmowed grass/flower vegetation extending less than 15 feet landward, which is less than the 35 feet minimum depth required by Wisconsin and Marathon County shoreland zoning ordinances. Shoreline shrubs appeared to be the least abundant vegetative layer. More than one-half of the lake had a shrub buffer depth of only 5-15 feet from shore. The tree layer appeared to be very abundant on Big Bass Lake, but significant tree thinning resulted in reduced canopy density in certain areas. Most of this occurred along the northwestern and southwestern developed portions of the lake.

Along Big Bass Lake's shoreline, changes can easily occur as development takes place. In order to minimize impacts to Big Bass Lake from future development, prospective developers should have access to accurate information to make good decisions, and zoning should be in place to achieve habitat, water quality, and aesthetic goals.

Big Bass Lake Vegetative Buffers

Eastern Marathon County Lakes Study

Map 1

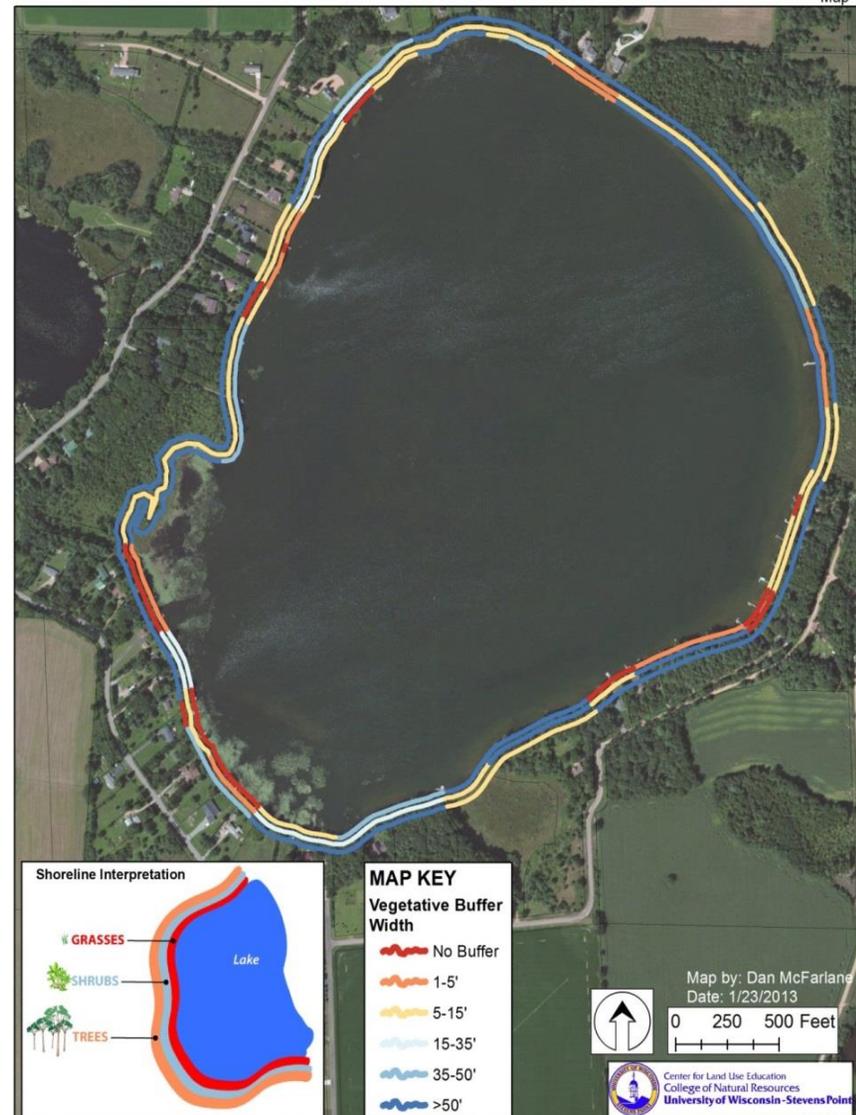


Figure 2. Shoreland vegetation around Big Bass Lake.

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 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 sediment to the lake. Alone, each human-made feature may not greatly impact a lake, but on developed lakes where these features are numerous around the lake, their collective impact can be a problem for the lake habitat and water quality.

2014-2019 Update: Marathon County CPZ offered a shoreland buffer restoration 70% cost share program through a DNR Lake Protection Grant. BBLD offered to cost share the remaining cost to the landowner. Through this program, four properties on Big Bass Lake were restored to a 35 foot buffer depth with 1 tree, 2 shrubs, and 70 groundcovers per every 100 square feet. Part of this program also included outreach and education regarding shoreland habitat and overall lake health through newsletters, meetings and presentations, social media, and technical assistance.

Guiding Vision for Big Bass Lake’s Shorelands

Big Bass Lake will have healthy shoreland vegetation sufficient to help protect water quality and meet shoreland zoning ordinances. Community members will understand the importance of shoreland vegetation to lake health, habitat, and state and county shoreland zoning.

Goal 7. Protect and restore healthy shorelands around Big Bass Lake.

Objective 7.1. Restore 30% of shoreline footage over the next five years, with a goal of 100% compliance with the shoreland zoning ordinance in 20 years (35 feet of vegetation extending inland from the ordinary high water mark, with the exception of a 30 foot wide corridor per parcel).

Actions	Lead person/group	Resources	Timeline
Enhance and/or restore shoreline vegetation with an ultimate goal of at least 35 feet of vegetation from the water’s edge inland to meet NR 115 state shoreland ordinance requirements and improve water quality.	Shoreland property owners	CPZ Consultants	Ongoing 2014 – 2019: 270 feet of shoreline was restored to NR 115 shoreland zoning buffer standards.
Continue to educate lake district and shoreland residents about the purpose and content of local shoreland zoning ordinances via newsletters and annual meetings.	BBLD CPZ	CPZ	Ongoing

Consider inviting a county representative to a meeting to present shoreland zoning code in layperson’s language.		UWEX Lakes (educational material)	2014-2019: Information regarding shorelands and zoning ordinances are relayed to shoreland owners via newsletters and e-mail.
Explore options within the district, town, and county to provide incentives for shoreland restorations.	BBLD CPZ	Town of Bevent CPZ UWEX Lakes	Ongoing 2016-2019: Marathon County offered a voluntary cost-share program through a DNR Lake Protection Grant. Three properties were restored through this program, which totaled 270 feet of shoreline.
Help ensure that high quality shorelands remain intact by communicating concerns with the CPZ.	Shoreland owners	CPZ MC Board Supervisors	Ongoing
Identify local sources for native plants. Obtain handouts about sources for native vegetation for distribution at the annual meeting.	CPZ	UWEX Lakes	Ongoing

Objective 7.2. Reduce the amount of contaminants moving toward the lake in runoff.

Actions	Lead person/group	Resources	Timeline
Minimize the amount of impervious surfaces on personal properties.	Interested citizen	CPZ	2014-2019: CPZ zoning and conservation staff regulate shoreland mitigation due to impervious surface limits.
Explore the installation of rain gardens, rain barrels, and other management practices that slow and filter water as it travels toward the lake.	Interested citizen	CPZ Consultants	2014-2019: CPZ zoning and conservation staff regulate shoreland mitigation due to impervious surface limits.
Keep septic systems maintained and up to date.		CPZ	Ongoing
Explore incentives and programs for shoreland restorations. Consider contests, shoreland “open houses”, tax incentives/dues reductions, etc.	Interested citizen	WDNR Lake Grants	See shoreland chapter 2014-2019 update.

Watershed Land Use

It is important to understand where Big Bass 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 Big Bass Lake; its land area may be 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 native vegetation in the shoreland, and using erosion control practices.

The surface watershed of Big Bass Lake is 1,568 acres. Primary land use is forest and cropland with residential development scattered throughout (Figure 3). The lake's shoreland is comprised of residential development and wetlands. In general, the land closest to the lake has the greatest immediate impact on water quality.

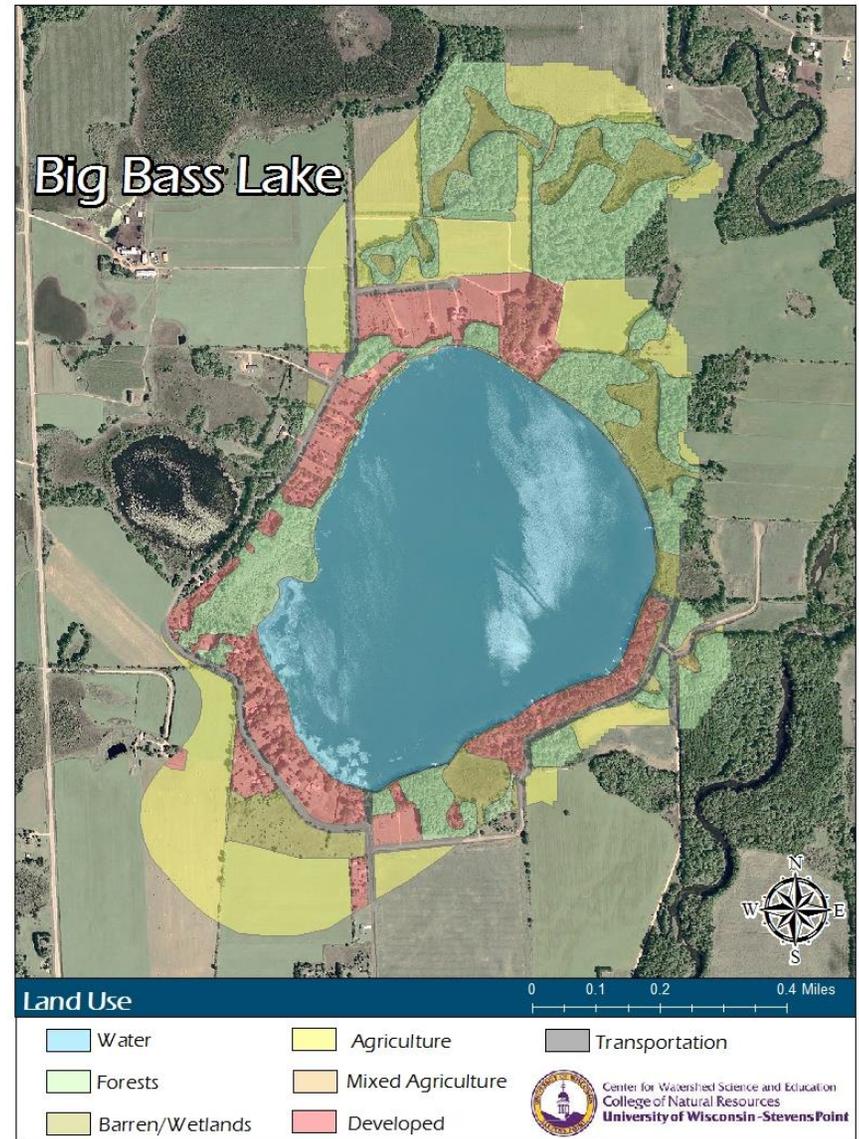


Figure 3. Land use in the Big Bass Lake watershed.

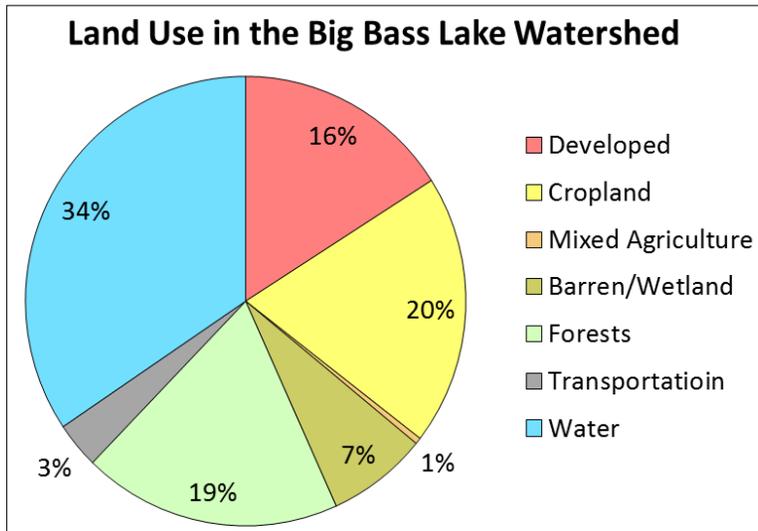


Figure 4. Land use in the Big Bass Lake watershed.

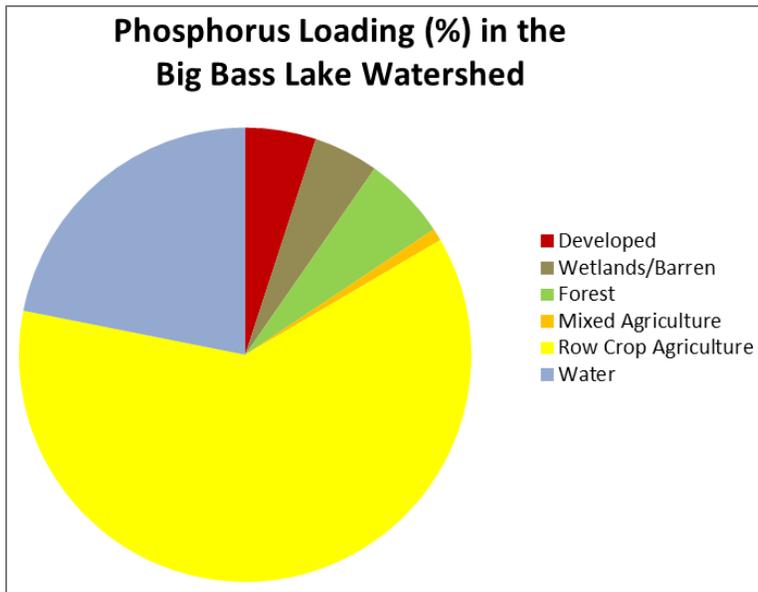


Figure 5. Estimated phosphorus loads from land uses in the Big Bass Lake watershed

Guiding Vision for Big Bass Lake’s Watershed

Big Bass Lake will be part of a community that practices sustainable land management activities and supports lake stewardship in county and town-wide decision-making processes.

Goal 8. Support local decision-making processes that affect lake health.

Objective 8.1. Be involved in county and town activities that can influence land management in the watershed of Big Bass Lake.

Actions	Lead person/group	Resources	Timeline
Participate in future planning activities with the County and the Town of Bevent in regard to revisions to zoning decisions that may affect Big Bass Lake. Development and shoreland practices are a few examples.	Interested citizen	Town of Bevent MC Supervisor CPZ	2014-2019: Not addressed/necessary
Participate in County and local comprehensive planning processes.	Interested citizen	Town of Bevent MC Supervisor CPZ	2014-2019: Not applicable
Explore overlay zoning to better protect the lake and its shorelands around the lake which may not be covered by the existing zoning ordinances.	Interested citizen	CPZ	2014-2019: Not addressed
Encourage County staff to support the installation and maintenance/follow-up of water quality-based best management practices (BMPs) within the watershed (see Water Quality section).	BBLD CPZ BBLD Residents	CPZ NRCS	Ongoing
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 BBLD CPZ	Town of Bevent CPZ MC Supervisor Wisconsin Wetlands Association	2014-2019: Not addressed/necessary
Encourage protection of land in the watershed by supporting property owners that seek conservation easements.	BBLD	NCCT CPZ	Ongoing
Explore County communication options for the District to receive notifications of projected road/development projects near the	Interested citizen	CPZ	2014-2019: Not addressed/necessary

lake (prior to design) to provide input on road/development drainage directed away from the lake.			
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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 indicate how they would like the lake to be positively impacted by people. This 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 increase positive impacts; therefore, communication and cooperation between the lake district, community, other lake, sport, and conservation clubs, and suites 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

Big Bass Lake has a 10 mile per hour speed limit before 11am and after 3 pm. There is no speed limit between the hours of 11am and 3pm. There is one public boat landing located on the southern side of the lake.

Guiding Vision for Recreation at Big Bass Lake

Recreational activities on Big Bass Lake will be in balance with the health of the lake.

Goal 9. Ensure/preserve mutual enjoyment of recreational activities.

Objective 9.1. Increase lake accessibility to the elderly and/or handicapped.

Actions	Lead person/group	Resources	Timeline
Explore funding options for installation of a public dock with handicapped access at the boat landing.		WDNR Fisheries Biologist	2014-2019: Not addressed

Objective 9.2. Maintain recreational harmony on the lake.

Actions	Lead person/group	Resources	Timeline
Maintain signage about No Wake hours.	BBLD		Ongoing

Explore dredging/hydrovac to deepen lake for various recreational experiences.	BBLD	WDNR Lake Professionals	2014-2019: This was explored, but deemed too expensive to pursue.
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Communication/Organizations

Many of the goals outlined in this plan are focused on disseminating information to lake and watershed residents and lake users, ultimately to help them make informed decisions that will result in a healthy ecosystem in Big Bass Lake enjoyed by many people. Working together on common values will help to achieve the goals that have been outlined in this plan.

Guiding Vision for Communication

Changes, updates, and important information about Big Bass Lake and the lake management plan will be communicated to those that live around the lake, the township, and lake users.

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

Objective 10.1. Communicate important lake information in a variety of venues.

Action	Lead person/group	Resources	Timeline
Inform property owners within the watershed about the effects of fertilizers, impervious surfaces, and septic systems on the lake.	CPZ BBLD	UWEX Lakes Wisconsin Lakes	Ongoing
Inform property owners within the watershed about the importance of shoreland vegetation and information about shoreland restoration.	CPZ BBLD	CPZ UWEX Lakes Wisconsin Lakes	Ongoing
Inform the County about issues that may lead to problems within the lake community, i.e. activities that may lead to erosion like residents clear cutting shorelines, dumping sand on shorelines or other shoreline disturbance; septic failures; non-compliance with setbacks; new construction, and/or new irrigation wells. Encourage lake residents to call in concerns to the County to provide “extra eyes” on the landscape.	BBL Residents	CPZ	Ongoing

Continue to hold annual meeting.	BBLD	UWEX Lakes Wisconsin Lakes	Ongoing
Consider organizing periodic picnics, backyard walks, and other social activities to grow the community, including annual Fourth of July gathering/celebration.	Interested citizen		
Continue to maintain an e-mail listserv.	BBLD		Ongoing
Work with County to ensure the distribution of welcome packets to new residents. Consider a Lake District or watershed welcome packet.	CPZ	CPZ UWEX Lakes Wisconsin Lakes Realtors	Ongoing
Explore the formation of a lakes subcommittee on the town board, and/or a county-wide lake group.	Interested citizen	Town of Bevent CPZ MC Extension	2014-2019: Not addressed
Encourage attendance at the Lakes Convention and Lake Leaders Institute, and announce educational events such as these.	BBLD	UWEX Lakes	Ongoing
Consider identifying a volunteer to research and compile the history of the lake and lake practices.	Interested citizen		2014-2019: Not addressed
Identify a volunteer to produce and maintain a website and official Facebook page.	BBL residents BBLD		Ongoing
Communicate with district leaders to get historical perspective, reference—strong communications between newcomers and historical.	Interested citizen		2014-2019: Not addressed

Updates and Revisions

Guiding Vision for Updates and Revisions

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

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

Objective 11.1. Communicate updates with community members and members of the District, Town, county, and state.

Actions	Lead person/group	Resources	Timeline
Include update of plan as a regular agenda item at the District annual meeting.	BBLD	CPZ	Ongoing
Notify Lake District members, the Town, the County, and WDNR of any potential changes in the management plan.	CPZ BBLD	CPZ	Ongoing
Explore funding options for plan updates, such as DNR Lake Protection Grants.	CPZ	CPZ DNR	

Governance

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

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

- Develop comprehensive planning and zoning ordinances that provide towns with value so that 100% request participation in county planning and zoning.
- Improve water quality and residential, commercial, and industrial waste management resulting in 100% of all households, businesses, and industry sites meeting water quality standards.
- Inventory water resources, determine where we have adequate supplies, and encourage development in those areas.

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

Comprehensive Plans – Marathon County: Marathon County adopted a Comprehensive Plan in 2006. This plan outlines the direction of future growth within the County.

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:

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

Marathon County Land & Water Resource Management Plan

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

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

A. Goals and Objectives

1. **Reduce Agricultural Nonpoint Runoff.** Reduce the discharge of soil sediment, organic materials, pesticides and nutrients into surface and ground waters.
2. **Groundwater Protection.** Educate the public and users about groundwater use and resource management challenges. In April 2001, the Marathon County Groundwater Guide was updated to reflect the changing programs and policies within the county as well as to acknowledge the increased level of regulation by state agencies to protect the groundwater resources of Marathon County.
3. **Forestry.** Sustain private and public forests. The Marathon County Forest Comprehensive Land Use Plan (2006-2020) includes recommendations to guide management of forest land in Marathon County in accordance with the Parks, Recreation and Forestry Department's mission to manage and protect the county forest on a sustainable basis for ecological, economic, educational, recreational, and research needs of present and future generations.
4. **Land Conversion.** Minimize the conversion of prime agricultural lands and forests to other land uses to support watershed management and to maintain economic value of the working lands.
5. **Lake and Reservoir Management.** Support local communities to understand the environmental opportunities and challenges facing lakes. This resource concern encompasses the areas of wetland management and aquatic invasive species. There is a great participation by local landowners in securing information and resources to better protect our water resources.

B. Conservation Programs and Partnerships

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

2. **Managed Grazing Project.** Marathon County Conservation, Planning and Zoning Department, UW-Extension, and the Natural Resources Conservation Service have joined forces to support the Central Wisconsin River Graziers Network. The Network promotes the feasibility of grazing-based farming as a profitable way of farming that enhances lifestyles and protects and improves the environment.
3. **Managed Forest Law (MFL) Program.** The MFL program provides incentives to protect privately owned woodlands from destructive timber cutting practices and over-harvesting and prevents land from becoming developed and/or converted to agricultural land use.
4. **Farmland Preservation Program.** Marathon County adopted its Farmland Preservation Plan in 2013. The goals of the program are twofold: to preserve Wisconsin farmland for production of commodities by means of local land use planning and soil conservation practices, and; to provide tax relief to landowners. For the landowner to receive tax credits they must be in compliance with current and applicable State Agricultural Performance Standards.
5. **Nutrient Management Program.** Nutrient management is defined as managing the amount, form, placement, and timing of applications of plant nutrients. The purpose of this program is to ensure a proper supply of plant nutrients for crop production while minimizing the entry of nutrients to surface water and groundwater. Marathon County requires nutrient management plans for landowners constructing and operating waste storage facilities.
6. **Federal Soil and Water Conservation Programs.** The Conservation, Planning and Zoning (CPZ) Department works closely with the United States Department of Agriculture through the Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA). The NRCS, FSA, UW-Extension and CPZ staffs work together in the Local Work Group to identify program and funding priorities for federal and local conservation programs such as the Environmental Quality Incentive Program, Comprehensive Nutrient Management Planning, Conservation Reserve Enhancement Program and grazing initiatives.

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

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

2. **Marathon County Livestock Siting Ordinance.** In October 2006, Marathon County adopted the General Code of Ordinances for Marathon County Chapter 13.01 Livestock Facilities Licensing Ordinance. The purpose of the ordinance is to establish the authority, technical standards, performance standards, and monitoring protocols necessary to protect public health, safety, and the environmental resources in Marathon County.
3. **Marathon County Zoning Ordinance (Chapter 17) and Land Division and Surveying Regulations (Chapter 18).** The Marathon County Zoning Ordinance (Chapter 17) is adopted to promote and protect public health, safety, comfort, convenience, aesthetics and other aspects of the general welfare of the population. More specifically, the ordinance establishes standards for buildings, structures, setbacks, lot coverage, land uses, streets and highways and other land use aspects. These regulations apply to all unincorporated areas that have adopted Marathon County Zoning. However, where a town has not adopted Marathon County Zoning but has adopted local regulations, the local regulations apply. In addition, the County regulates the division of land in accordance with Chapter 18 Land Division and Surveying Regulations. The County's land division regulations apply in all unincorporated areas of the County. However, where a town has land division regulations that are more restrictive than the County's, the local regulations apply.
4. **Floodplain and Shoreland Ordinance.** Shoreland, wetland, and floodplain regulations are applicable in all unincorporated areas of the County. Wisconsin law mandates counties to adopt and administer a zoning ordinance that regulates land use in shoreland/wetland and floodplain areas for the entire area of the county outside of villages and cities.
5. **Nonmetallic Mining Reclamation Ordinance.** Marathon County adopted the General Code of Ordinances for Marathon County Chapter 21 Nonmetallic Mining Reclamation Code in 1989. The ordinance applies to approximately 400 operating or abandoned excavations of sand, gravel, decomposed granite and stone. The ordinance requires restoration of the site to a purposeful and acceptable landscape appearance and use.
6. **Private Sewage System Ordinance.** Marathon County adopted Marathon County General Code of Ordinances Chapter 15 Private Sewage Systems in 1968. This ordinance is adopted to promote and protect public health and safety by assuring the proper siting, design, installation, inspection, and management of private sewage systems and non-plumbing sanitation systems, and to assure the timely repair or replacement of failing private sewage systems. All structures or premises in the County that are permanently or intermittently intended for human habitation or occupancy, which are not serviced by a public sewer or a privately owned wastewater treatment facility regulated by the Department of Natural Resources, shall have a system for holding or treatment and dispersal of sewage and wastewater which complies with the provisions of this ordinance.
7. **Construction Site Erosion – WI Administrative Code NR 216.** Construction site erosion and uncontrolled storm water runoff from land disturbing activities can have significant adverse impacts upon local water resources. Under subchapter III of NR 216, Wis. Adm. Code, a notice of intent shall be filed with the DNR by any landowner who disturbs one or more acres of land.

Lake Management Plan Approval

The final draft of the lake management plan will be approved through a vote of the Lake District/Association membership or board. The final draft will be approved by the Wisconsin Department of Natural Resources (DNR) to ensure compliance lake management plan requirements and grant requirements. The completed plan that has been approved by the Lake District/Association and the DNR will be presented to the municipalities containing the lake and Marathon County. The municipality may reference the lake management plan or parts of the plan in their comprehensive plan to guide municipal or county decisions.

Lake Assistance

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

References and Important Documentation to Review

- Boat Ed. 2013. The Handbook of Wisconsin Boating Laws and Responsibilities. Approved by Wisconsin Department of Natural Resources. www.boat-ed.com
- Borman, Susan, Robert Korth, and Jo Temte. 2001. Through the Looking Glass, a Field Guide to Aquatic Plants. Reindl Printing, Inc. Merrill, Wisconsin.
- Drach, Garrett, and T. Meronek. 2007. Lake Survey Report for Big Bass Lake, Marathon County, WI. Wisconsin Department of Natural Resources.
- McFarlane, D. 2011. *Marathon County Shoreline Inventory*. Center for Land Use Education. Final Report to Marathon County and Wisconsin Department of Natural Resources.
- Meronek, Tom. 2014. The Fishery in Big Bass and Wadley Lakes. Unpublished Data. Presentation given March 27, 2014 at the Bevent Town Hall, Marathon County Wisconsin. Wisconsin Department of Natural Resources. Unpublished data.
- Provost, Scott. 2014. Managing Aquatic Plants in a Lake. Presentation given March 27, 2014 at the Bevent Town Hall.
- Kraft, George. 2014. The Groundwater, Groundwater Pumping, and How it Affects Lakes and Streams. Presentation given May 13, 2014. at the Bevent Town Hall, Marathon County Wisconsin. UW-Stevens Point Center for Watershed Science and Education
- UW-Stevens Point Center for Watershed Science and Education. 2014. Eastern Marathon County Lake Study – Big Bass Lake 2010-2012. Final Report to Marathon County and Wisconsin Department of Natural Resources.
- UW-Stevens Point Center for Watershed Science and Education. 2013. Eastern Marathon County Lake Study – Big Bass Lake 2010-2012 Mini-Report. Report to Marathon County and Wisconsin Department of Natural Resources.
- Wetzel, R.G. 2001. Limnology, Lake and River Ecosystems, Third Edition. Academic Press. San Diego, California.
- Vallentyne, J.R. 1974. The Algal Bowl-Lakes and Man. Ottawa Department of the Environment.
- Presentations and notes from the planning meetings can be found on the Marathon County website. Access the lake information by selecting 'Conservation Planning Zoning' under the 'Departments' tab, then selecting 'Eastern Lakes Project' on the left-side pane.

Appendices

Appendix A: Invasive Species Rapid Response Plan

SURVEY/MONITOR

1. Learn how to survey/monitor the lake.	Contacts: Water Resources Management Specialist Wisconsin Department of Natural Resources Scott Provost 473 Griffith Ave. Wisconsin Rapids, WI, 54494 Phone: 715-421-7881 E-Mail: Scott.provost@wisconsin.gov Marathon County Aquatic Invasive Species (AIS) Coordinator Golden Sands RC&D 1100 Main St., Suite #150 Stevens Point, WI 54481 Phone: 715-343-6278 E-Mail: info@goldensandsrcd.org
2. Survey/monitor the lake monthly/seasonally/annually.	If you find a suspected invasive species, report it as soon as possible using the procedure below.

REPORTING A SUSPECTED INVASIVE SPECIES

1. Collect specimens or take photos.

Regardless of the method used, provide as much information as possible. Try to include flowers, seeds or fruit, buds, full leaves, stems, roots and other distinctive features. In photos, place a coin, pencil or ruler for scale. Deliver or send specimen ASAP.

Collect, press and dry a complete sample. This method is best because a plant expert can then examine the specimen.

-OR-

Collect a fresh sample. Enclose in a plastic bag with a moist paper towel and refrigerate.

-OR-

Take detailed photos (digital or film).

2. Note the location where the specimen was found.

If possible, give the exact geographic location using a GPS (global positioning system) unit, topographic map, or the Wisconsin Gazetteer map book. If using a map, include a photocopy with a dot showing the plant's location. You can use TopoZone.com to find the precise location on a digital topographic map. Click the cursor on the exact collection site and note the coordinates (choose UTM or Latitude/Longitude).

Provide one or more of the following:

- Latitude & Longitude
- UTM (Universal Transverse Mercator) coordinates
- County, Township, Range, Section, Part-section
- Precise written site description, noting nearest city & road names, landmarks, local topography

3. Gather information to aid in positive species identification.

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

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

Digital photos may be emailed.

Wisconsin Dept. Natural Resources
Water Resources Management Specialist
Scott Provost
Wisconsin Rapids Service Center
473 Griffith Ave
Wisconsin Rapids, WI 54494
Phone: (715) 421-7881
E-Mail: Scott.Provost@wisconsin.gov

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

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

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

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

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

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

- **Wisconsin Department of Natural Resources**
Water Resources Management Specialist
Scott Provost
Wisconsin Rapids Service Center
473 Griffith Ave
Wisconsin Rapids, WI 54494
Phone: (715) 421-7881
E-Mail: Scott.Provost@wisconsin.gov
- **The town** in which the waterbody is located.
Town of: Bevent
Contact: Supervisor
Phone: 715-454-6303
- **University of Wisconsin-Stevens Point**
Water Resource Scientist
Trainer Natural Resources Building
800 Reserve Street
Stevens Point, WI 54481
Phone: 715-346-4155
E-mail: cnr@uwsp.edu
- **Local Residents**

Secretary of Big Bass Lake District to contact all lake residents:

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

- **Newspapers:** Wausau Daily Herald, Stevens Point Journal

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

Appendix B: Big Bass Lake District Aeration System Operation

(Submitted by Dale Ruston, May 2014)

The aeration system was put in place in the summer of 1988. It was because of a huge fish kill in 1986. Funding was secured by establishing the Big Bass Lake Rehabilitation and Protection District and also with a grant from the State of Wisconsin. The District members were land owners, home owners, renters of property within 300 feet of the shoreline.

The aeration system consists of a small concrete block building (8 feet by 8 feet) on the northwest side of the lake. (The District has a permanent easement for the placement of the system on this land.) The building contains the blower that provides the air and it is powered by a 5 HP electric motor. The air goes out of the building through a metal underground pipe and into the lake. The metal pipe has a "T" connection on the lake side end that allows for 4 PVC pipes to be attached and they each continue out into the lake. There are 2 of the pipes at about 1700 feet in length and 2 that at about 1500 feet. The last 200 feet of each PVC pipe has small holes drilled in them (approximately 20 feet apart) to let the air bubble up in a steady stream to the surface when in operation. This creates constant mixing of the water with the result of an opening in the ice of approximately 2 or 3 acres during critical winter months. We start the blower each year about the 3rd week in November and turn it off about the 3rd week of March. It, of course, can vary with weather conditions if warranted. Because the hole in the ice is created, a warning fence must be erected after sufficient ice thickness is achieved to venture out there on the lake. Signs about the open water are also at put up to warn lake users. Costs for the operation and maintenance of the system are born by the members of the District.

The dissolved oxygen levels have been good. No large fish kills have happened since installation.

Phosphorus Modeling

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

Big Bass Lake Land Use	Phosphorus Export Coefficient (lbs/acre-yr)	Land Use Area Within the Watershed		Phosphorus Load	
		Acres	Percent	Pounds	Percent
Water	0.10	179	36	16-48	28
Developed	0.04	83	17	4-7	6
Wetland/Barren	0.09	38	8	3-10	6
Forest	0.04	99	20	4-8	8
Mixed Agriculture	0.27	2	0	1-2	1
Row Crop Agriculture	0.45	101	20	45-90	79

*Values are not exact due to rounding and conversion.

Marathon County Lake Information Directory

For the directory, please visit the Lake Program Page at Marathon County Conservation, Planning & Zoning Department's website at <http://www.co.marathon.wi.us/Departments/ConservationPlanningZoning/ConservationServices/LakePrograms.aspx> and scroll to 'Shoreland Resources.'