2011

Boelter Lake/Wetland Management Plan

Boelter Lake/Wetland Management Planning Committee

5/13/2011

Plan approved by the Boelter Lake/Wetland Management Planning Committee on

Adopted by Town of Lanark on

Adopted by Portage County on

A special thanks to all those who helped to create the Boelter Lake/Wetland Management Plan and provided the necessary data in the Portage County Lake Study.

Boelter Lake/Wetland Management Planning Committee Members and Resources

Boelter Lake Management Planning Committee

Alan and Joan Baumann
Mitchell Craven
Carrie Duffield
Erica Feldt
Jim Haferman
Herb Hoppe
Bruce and Marj Jefferson
Norman and Sharon McNew
Jessica Meshak
Amy Moore
Dave Moore
Jere Onsgard
Richard Phillips
John and Mary Beth Shea
Mary Stolpa
David & Barbara Worzalla

Portage County

Ralph Loeffler – On-site wastewater specialist
Ray Schmidt – Groundwater Specialist
Randy Slagg – Conservation Technician

University of Wisconsin –Stevens Point

Dr. George Kraft, Nancy Turyk, Jen McNelly– Center for Watershed Science and Education
Linda Stoll – Center for Land Use Education
Kim Becken, UWEX Lakes

Golden Sands RC&D

Paul Skawinski – Regional Aquatic Invasive Species Coordinator

Portage County Lake Study Researchers/Authors

Becky Cook – Water Quality/Watersheds
Dr. Paul McGinley – Water Quality/Watersheds
Dr. Byron Shaw - Water Quality/Watersheds and Upland Sensitive Areas
Dick Stephens – Water Quality/Watersheds and Upland Sensitive Areas
Nancy Turyk – Water Quality/Watersheds/Final Report
Dr. Glenn Bowles – Near Shore Summary
Dr. Alan Haney – Upland Sensitive Areas
Dr. Vince Heig – Upland Sensitive Areas
Dr. Kent Hall – Upland Sensitive Areas
Dr. Bob Bell – Algae
Dr. Robert Freckmann – Aquatic Plants and Upland Sensitive Areas
Dr. Tim Ginnett – Birds
Brad Bulin (Graduate Student) – Birds
Dr. Ron Crunkilton – Fishery and In-lake Habitat
Steve Bradley (Portage County Conservationist) – Land Use Coverages/Watersheds
Lynn Markham – Planning Assistance
Mike Hansen – Portage County Planning Assistance
Dr. Erik Wild – Reptiles and Amphibians/Near Shore Habitat
Rori Paloski (Graduate Student) – Reptiles and Amphibians/Near Shore Habitat

Introduction

Boelter Lake/Wetland is located in the Town of Lanark in Portage County. It is valued by those who use and enjoy the lake for its natural beauty, peace and tranquility, and wildlife viewing.

The purpose of this management plan is to provide guidance to protect current good conditions, address existing problems, and prevent future problems that may be detrimental to the Boelter Lake/Wetland ecosystem. This management plan was written as part of the second phase of the Portage County Lakes Project. The first phase of the Portage County Lakes Study involved data collection from Boelter Lake/Wetland and 28 other lakes throughout the county. The study provided information on water quality, shoreline development, amphibian habitat, fisheries, aquatic plants, and other parameters. This plan was developed by a committee of interested citizens, local organizations, and professionals. Prior to the current lake plan development, a citizen survey was conducted to gather information on citizens' values, opinions, and perceived issues with Boelter Lake/Wetland. A survey was sent to 130 residences within the Boelter Lake/Wetland watersheds and was available online where any interested person could take the survey. Thirty-one citizen surveys were returned for a response rate of24%. The members of the Boelter Lake/Wetland management planning committee met monthly over three months to learn about topics related to the lake and to develop this lake/wetland management plan. Background

The purpose of this plan is to provide guidance to protect current good conditions, address existing problems and prevent future problems that may be detrimental to the Boelter Lake/Wetland ecosystem.

Information in this section was taken from the Portage County Lakes Study and the citizen surveys. The complete lake study document and summarized survey results can be found at: http://www.co.portage.wi.us/planningzoning/PCL/Main%20Page/Main%20Page.shtml

The background information provided from the Portage County Lakes Study helps to give us a good understanding of Boelter Lake/Wetland and its ecosystem. A healthy lake/wetland ecosystem is comprised of many components that include in-lake habitat and vegetated shorelands that support aquatic plants, fish, wildlife, good water quality and quantity, absence of aquatic invasive species and more. These components are not only found in Boelter Lake/Wetland but also extend to where the water meets the land and beyond into the watershed. Boelter Lake/Wetland is a reflection of the health and activities that occur in the lake, near the shore, and in the watershed.

Boelter Lake/Wetland is a small, moderately hard water groundwater drainage lake located south of Amherst in the town of Lanark. At the time of the lake study in 2002, the lake had a maximum depth of 4 feet and roughly 14 surface acres. By the end of 2003 the lake had very little water in it. Low groundwater levels combined with a lack of snow, a dry summer, and the effects of urban land use practices have hastened the process of Boelter Lake becoming a wetland.

Watershed

A surface watershed is an area of land where water from precipitation drains from higher elevations towards the lake. Boelter Lake/Wetland's surface watershed is approximately 572 acres and occurs all the way around the lake (Figure 1).

As water moves across the landscape, the quality can either improve or degrade depending upon what it comes in contact with en route to the lake/wetland. Land use types and associated management practices can have a significant impact on water quality. **Though land uses may not easily be changed, land management practices can be modified to improve water quality.**

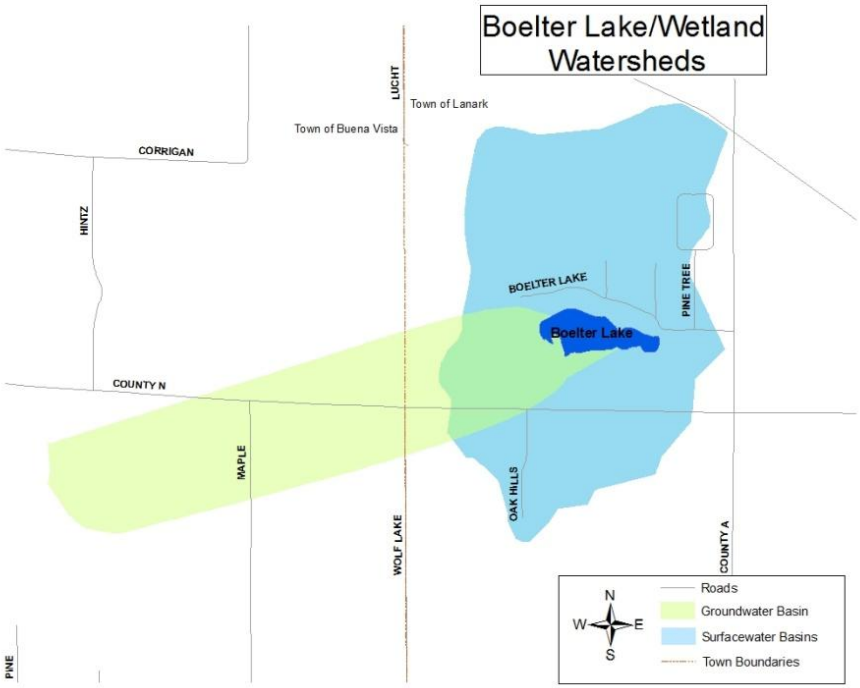


Figure 1. Boelter Lake/Wetland groundwater and surface watersheds.

Land uses within the surface watershed are predominantly forested areas (37%) followed by shrub vegetation (35%). There are 65.7 acres (11.5% of the surface watershed) in residential land use. The areas near shore have the most direct impact on habitat and water quality. This area is currently heavily developed with homes and cottages (See Appendix A).

A groundwater watershed is similar to a surface watershed, except that it is an area of land where the groundwater drains to Boelter Lake/Wetland. Within the groundwater watershed, precipitation soaks into the ground and recharges the groundwater. The groundwater slowly moves towards the lake, and enters it via springs and seeps. During dry periods, this provides the majority of water in Boelter Lake/Wetland. Often surface watersheds and groundwater watersheds do not match each other, which is the case with Boelter Lake/Wetland. Boelter Lake/Wetland's groundwater watershed is approximately 388 acres and stretches to the southwest of the lake/wetland (Figure 1). The land cover within the groundwater watershed is primarily comprised of non-irrigated agriculture (32%), forested areas (25%), and shrub wetland vegetation (24%) (See Appendix A). According to the records in 2002, based on age there is one potentially failing septic system present within the surface watershed of Boelter Lake/Wetland. However, there were concerns expressed in the citizen survey and during the planning process that there were a number of older, failing septic systems around the lake that may be contributing excess phosphorus and nitrogen to Boelter Lake/Wetland.

Survey respondents indicated a willingness to change how they manage their land to protect/improve the Boelter Lake/Wetland ecosystem. The top motivators included providing habitat for fish/wildlife, increasing property value, increasing natural beauty, improving water quantity, and improving water quality.

Sensitive Areas

The sensitive areas associated with Boelter Lake/Wetland are defined as lands adjacent to the lake that are particularly valuable to the lake's ecosystem or that would be significantly impacted by most disturbances or development. These areas include a large wetland complex on the

western side of the lake (See Appendix B). The wetland complex continues west to include Peters Lake and Riley Lake.

The habitats of amphibians and reptiles are of importance because they utilize both aquatic and terrestrial habitats and the shoreline interface between the two. **These areas of habitat are not only important for reptiles and amphibians but also other aquatic and terrestrial species.**

The primary amphibian habitat on Boelter Lake/Wetland is located on the west and southeast sides of the lake in wetland areas. Key features of this habitat include undeveloped areas of the shoreline with submergent and emergent vegetation. The good news about the amphibian populations on Boelter Lake/Wetland is that several stretches of shoreline provide ideal habitat for amphibian and reptile populations. However, some areas of altered shoreline also exist due to development (See Appendix C).

Shoreline

Surfaces such as roofs, driveways, roads, patios, and compacted soils increase the amount of runoff moving across the landscape towards Boelter Lake/Wetland. Runoff that enters the lake can carry a variety of pollutants into the water. Some of the negative impacts in the lake due to additional runoff may include: increased nutrients (such as phosphorus), which can cause algae blooms and excessive plant growth, and increased amounts or changes in the type of sediment. This in turn can lead to cloudy or turbid water and sediment transporting additional contaminants such as bacteria, debris, metals, and pesticides.

According to the citizen survey, 16 of the 31 respondents owned shoreline property. Eleven of those respondents who owned shoreline property indicated their shorelines were undeveloped or natural. Respondents indicated the depth of their shoreline buffers around Boelter Lake/Wetland varied greatly. Only four respondents indicated their buffers were less than 35 feet, which is required by the county/state shoreline zoning ordinances. These special rules, the shoreland zoning ordinances, apply to the near shore area of the lake. These rules were developed to help protect water quality and habitat of lakes while allowing for access to a lake.

Aquatic Plants

Aquatic plants play many important roles in aquatic ecosystems including providing habitat for aquatic and semi-aquatic organisms; food for fish, waterfowl, and other animals; use of nutrients that would otherwise be used by algae; and modifying/cooling water temperatures on hot days.

According to R. Freckmann (UWSP), there are **32** species of aquatic macrophytes or plants that have been identified in Boelter Lake/Wetland or on the wet areas of shore. This is below average when compared to other Portage County lakes.

Water Quality and Land Use

When asked about Boelter Lake/Wetland's water quality, the majority of survey respondents felt the water quality was poor. Survey respondents also indicated the quality of lake water had major impact both economically and on their personal enjoyment of the lake.

The assessment of water quality in a lake involves a number of measures including temperature, dissolved oxygen, water chemistry, chlorophyll *a*, and algae. Each of these measures plays a part in the lakes overall water quality.

Chloride concentrations, and to a lesser degree sodium and potassium concentrations, are commonly used as indicators of how strongly a lake is being impacted by human activity. In Boelter Lake/Wetland all levels measured in 2002/2003 were elevated.

Atrazine, an agricultural herbicide, was detected in Boelter Lake/Wetland. Some toxicity studies have indicated that even at low levels reproductive system abnormalities can occur in frogs. The presence of atrazine indicates that other agri-chemicals may also be entering and present in Boelter Lake/Wetland.

The temperature in Boelter Lake/Wetland was mixed throughout all of the year, which is not surprising given the shallow nature of the water body. In 2002/2003 dissolved oxygen levels in the Boelter Lake/Wetland were often below the 5 mg/L needed to support most aquatic biota. These anoxic conditions are fairly typical of wetlands.

Water clarity is a measure of how deep light can penetrate the water. It is an aesthetic measure and is related to the depth that rooted aquatic plants can grow. Water clarity can be affected by sediment, algae, and color in water. Clarity measurements in Boelter Lake/Wetland ranged from one and a half to two feet, with a 2003/2004 average of 1.8 feet. May had the best water clarity and September had the poorest. The water clarity of Boelter Lake/Wetland during the 2002/2003 growing season was poorer than the historic growing season average, although on some occasions this was due to the maximum lake depth being shallower than the depth of the historic reading.

Chlorophyll *a* is a measure of algae in Boelter Lake/Wetland. Chlorophyll *a* concentrations in Boelter Lake/Wetland ranged from 3.36 to 45.39 mg/L. Any reading above 5 mg/L is considered to be high.

The 35 algal genera identified during the sample periods were relatively common. However, the algal community when considered relative to the cholorphyll, phosphorus, and nitrogen values for Boelter Lake/wetland presents a picture of a very eutrophic body that is barely lake. The vegetation choked lake is becoming a wetland with poor water clarity and an algal flora increasingly dominated by Cyanobacteria or Blue-Green Algae (B. Bell).

Nutrients (nitrogen and phosphorus) are important measures of water quality in lakes because they are used for growth by algae and aquatic plants. In Boelter Lake/Wetland the phosphorus concentrations were elevated which can enhance the growth the plants. Nitrogen concentrations and inorganic nitrogen (nitrate plus ammonium) was relatively low.

Nitrogen concentrations in Boelter Lake/Wetland were low, including nitrate, which is easily used for growth by aquatic plants and algae (Figure 2). Concentrations were well below the 0.3 mg/L needed to fuel algae growth (Figure 2).

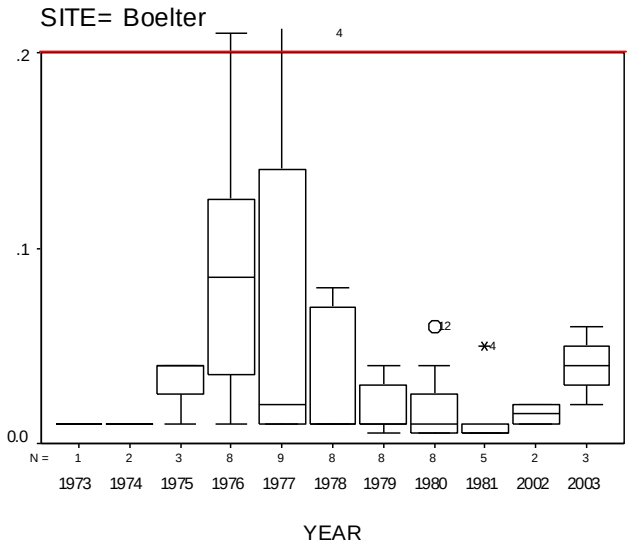


Figure 2. Median Nitrate-N concentrations (mg/L) in Boelter Lake/Wetland, 1973-2003. Red line indicates nitrate level needed to fuel algae growth.

Phosphorus is an element that is essential to most living organisms including plants. Sources of phosphorus can include naturally occurring phosphorus in soils, wetlands, and small amounts in groundwater. Sources from human influence include soil erosion, agricultural and residential runoff, septic systems, and animal waste.

In Boelter Lake/Wetland the aquatic plant and algae growth is most responsive to phosphorus due to its relative limited supply with respect to other elements necessary for growth. Increases of small amounts of phosphorus can result in increased abundance of aquatic plants and algae. Phosphorus concentrations in Boelter Lake/Wetland are variable throughout the year. Average total phosphorus (TP) concentrations in spring/fall for 2002/2003 were 82.9 ug/L.

The Wisconsin DNR's phosphorus criteria value for shallow groundwater drainage lakes is 40 ug/L. Average summer concentrations at or above this value would result in noticeably degraded water quality. The average summer total phosphorus concentrations in Boelter Lake/Wetland was 68 ug/L in 2002/03 (Figure 3).

Managing phosphorus in the Boelter Lake/Wetland watershed is key to protecting the lake itself. Positive land management practices and land uses can result in good water quality. Phosphorus inputs to the lake can be controlled through the use of many different Best Management Practices (BMP's) that minimize the movement of runoff, nutrients, and pesticides to the lake. BMPs that should be used near shore and throughout the watershed include the development of water quality-based nutrient management plans for agricultural land, only applying phosphorus and nitrogen from fertilizer or manure based on soil tests for turf or specific crops, providing cover on the landscape and/or appropriate mitigation when open soils are necessary during construction or cropping, use of cover crops, properly storing manure, and manure application only when the ground is not frozen.

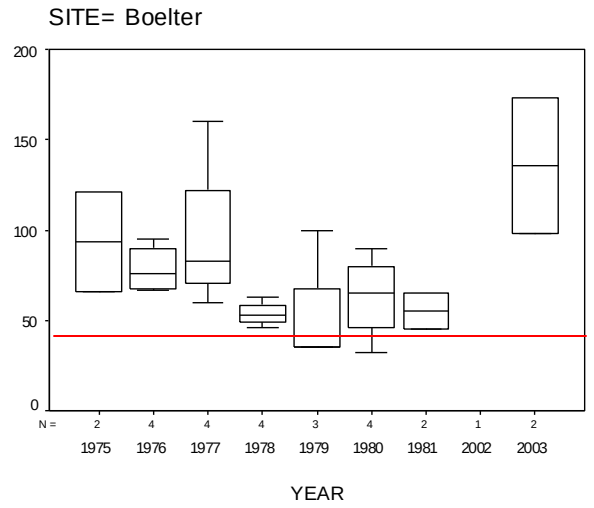


Figure 3. Median total phosphorus concentrations (ug/L) in Boelter Lake/Wetland in samples collected in summer, 1973-2003. Red line is WDNR criteria value for phosphorus for deep groundwater seepage lakes.

Some of the near shore land use practices that can decrease the inputs of phosphorus to Boelter Lake/Wetland include leaving native vegetation (trees, bushes, and grasses), eliminating the use of fertilizer, minimizing runoff/increasing infiltration, minimizing and securing exposed soil, and increasing the setback of septic drain fields. The Portage County Land Conservation Department is a local organization that can provide assistance to landowners that want to reduce impacts to Boeler Lake/Wetland from their property.

Future degradation of water quality in Boelter Lake/Wetland can be minimized with thoughtful land use planning throughout the watershed. This includes locating roads away from the lake, diverting runoff to areas where it can infiltrate rather than runoff to the lake, limiting

withdrawal of groundwater, and controlling runoff, nutrient, and chemical inputs from new and existing developments and agriculture.

Recreation

According to respondents of the citizen survey, the **most popular activities at Boelter Lake/Wetland include enjoying wildlife, solitude, enjoying scenery, and walking.**

Boelter Lake/Wetland is also noted as being an important location for migrating waterfowl.

While Boelter Lake has had only a small amount of water in it, until recently, recreation on and the fisheries in Boelter Lake should be monitored. Once water has remained in the lake for over a year this section of the plan should be revisited and goals, objectives, and actions should be set for Boelter Lake.

Goals, Objectives, and Actions

The following goals, objectives, and actions were derived from the values and concerns of the members of the Boelter Lake/Wetland Planning Committee including citizens and are based on the science used to assess Boelter Lake/Wetland and its ecosystem. Implementing the goals, objectives, and actions of the Boelter Lake/Wetland Management Plan should protect the scenic beauty, peacefulness, recreational opportunities, and water quality for current and future generations. These goals are intended to be met through education, encouragement, actions, and incentives.

Resources that are listed within the plan include primary organizations or individuals that would be able to provide information, suggestions, services and/or support to accomplish an action.

A management plan is a living document that changes over time to meet the current needs, challenges, and desires. **The goals, objectives, and actions listed in this plan will be reviewed and updated with any necessary changes by the Boelter Lake/Wetland planning committee, interested citizens, and representatives from municipalities and agencies in the Summer of 2012 with the assistance of UWSP and Portage County. Updates will be provided to the Town of Lanark, Portage County, the Wisconsin DNR, and any other entity adopting the plan.**

Aquatic Plants

Aquatic plants comprise an essential part of Boelter Lake/Wetland's ecosystem; some fish and other aquatic biota and water dependent terrestrial life depend on aquatic plants for habitat, food, and spawning areas. Healthy aquatic plant communities, along with a vigilant watch, will help to limit any aquatic invasive species from becoming established in Boelter Lake/Wetland. .

Vision: The planning committee envisions a healthy native aquatic plant community in Boelter Lake that is free of invasive species.

Goal 1: Shoreland landowners and lake users are informed about the importance of native aquatic plants.

Objective 1.1: Provide information about the quality of native aquatic plants in Boelter Lake/Wetland.

Actions	Lead person/group	Start/end dates	Resources
Learn about native and invasive aquatic plants in Boelter Lake through plant identification workshops.			Golden Sands RC&D Invasive Species Coordinator
Share information about the importance and maintenance of native aquatic plants in Boelter Lake			UWEX Lakes WI DNR Lakes Specialist UWSP
Establish volunteer monitoring for invasive species			UWSP
Share information through welcome packets about aquatic plants and the role they play in the ecosystem			UWSP UWEX Lakes

Shorelands and Critical Habitat

Shorelines are some of the most important habitat near lakes for aquatic and terrestrial wildlife, such as turtles, frogs, birds, and many other creatures. Shoreline vegetation helps to slow runoff moving to the lake and filter runoff before it enters the lake. Restoring and protecting shorelines can also help to provide scenery, solitude, and privacy, as well as natural space for lake residents to enjoy nature. Boelter Lake/Wetland faces a unique challenge with such low water levels, large amounts of shoreland are exposed and have become infested with aggressive terrestrial invasive species.

Critical habitat areas or sensitive areas are important places in and near Boelter Lake/Wetland that are essential to keeping a healthy sustainable ecosystem. These critical habitat areas around Boelter Lake/Wetland offer critical or unique fish and wildlife habitat or offering water quality or erosion control benefits to Boelter Lake/Wetland.

Vision: The planning committee envisons protecting and re-establishing the shorelines around Boelter Lakes so that they are all naturally vegetated.

Goal 2: Protect healthy stable shoreland habitats near and around Boelter Lake/Wetland.

Objective 2.1: Shore landowners around Boelter Lake/Wetland will understand their roles in protecting this important land and will make informed land management decisions.

Actions	Lead person/group	Start/end dates	Resources
Share information on importance of native vegetation and buffers			Portage County Land Cons Dept UWEX Lakes
Support conservation easements and land purchase for willing shoreland owners , especially for the marshy land northeast of the lake			North East Conservancy Trust North Central Conservancy Trust NRCS WDNR
Participate in shoreland zoning ordinance revisions in Portage County			Portage County Planning and Zoning
Work with the Town of Lanark Board and Planning commission so that they understand county and state shoreland zoning ordinances and will make decisions accordingly			Town of Lanark Board and Planning Commission
Participate in the Portage County Shoreland planting program to revegetate shorelines with native vegetation around Boelter Lake			Portage County Land Cons Dept
After one year of having water present in Boelter Lake, set shoreland vegetation goals			UWSP
After water has remained in Boelter Lake for over a year, revist the shoreland goals, objectives, and actions to update them with relevant materials			UWSP

Objective 2.2: Learn about and control terrestrial invasive species

Actions	Lead person/group	Start/end dates	Resources
Explore ways to control honeysuckle, spotted knapweed, poison ivy, and Buckthorn around the lake			Portage County Land Cons Dept
Host a workshop on controlling the "bad" vegetation and encouraging the "good" vegetation on exposed lake shorelines			UWEX UWSP

Water Quality and Land Use

Boelter Lake/Wetland is host to a variety of plants, insects, fish, amphibians, and a variety of other animals that all depend on good water quality in the lake. Survey respondents indicated that water quality influenced their enjoyment of the lake and impacted their perceived aesthetic and economic value of Boelter Lake/Wetland. Survey respondents felt that the water quality in the lake was poor. Data shows that water quality in Boelter Lake/Wetland could use improvement. Currently, Boelter Lake/Wetland has high concentrations of phosphorus that could fuel excess plant and algae growth in the lake. The majority of the water entering Boelter Lake/Wetland originates in its watershed; therefore, water quality in the lake is directly related to the land uses in the watershed and especially near shore.

Vision: The planning committee envisions a lake with good water quality that is able to support a healthy eco-system.

Goal 3: Try to keep phosphorus and nitrogen levels at or below the state recommended standards.

Objective 3.1: Monitor the water quality in Boelter Lake/Wetland to evaluate if phosphorus and nitrogen goals are being met.

Action	Lead person/group	Start/end dates	Resources
Develop a monitoring program to determine he frequency of monitoring for Phosphorus and Nitrogen. Acquire money to cover cost for testing			UWSP

Objective 3.2: Riparian and watershed landowners will minimize their impacts to Boelter Lake/Wetland through land management practices.

Action	Lead person/group	Start/end dates	Resources
Educate shoreland owners on positive changes they could make on their shoreland through welcome packetsand town newsletters			UWEX Lakes Portage County Land Cons. Dept.
Distribute information on "Green" products (to reduce the impacts of septics on the lake)			UWSP
Encourage shoreland owners to have their soil tested through information in town newsletters and welcome packets			UWEX Ag Office
Work with Portage County to help determine potentially failing systems by age & type. Share this information with appropriate residents			Portage County On-Site Waste Specialist
Explore frequent voluntary pumping of septic systems around the lake to make "grandfathered" systems consistent with the county septic system maintence oridnence			Portage County On-Site Waste Specialist
Provide information on tertiary treatment and 2nd settling tanks that would remove phosphorus for septic systems			Portage County On-Site Waste Specialist
Explain to lake residents about getting specific reports on condition and functionality about your septic system from pumpers when they inspect them			Portage County On-Site Waste Specialist
Put information regarding septic systems, additional treatment methods and pumping in the town newsletter			Portage County On-Site Waste Specialist UWSP
Work with the Portage County Land Conservation Dept. to encourage the use of water quality based nutrient management plans and best management practices throughout the Boelter Lake Watershed			Portage County Land Cons Dept.

Water Levels

Fluctuating water levels in lakes are natural responses to changes in climate and weather patterns. In Portage County some of the lakes have historically experienced fluctuations in water levels and the plant and animal life in these lakes have adapted to and sometimes depend on these fluctuations for survival. The area surrounding Boelter Lake began experiencing drought like conditions in 2002/2003 that contributed to low lake levels. However, excess withdrawal of groundwater can potentially add to these natural fluctuations, effecting the extent and duration of low water levels. Boelter Lake/Wetland's low water levels have been so drastic that the lake virtually dried up until the summer of 2011.

Vision: The planning committee of Boelter Lake envisions having a better understanding of the water fluctuations in Boelter Lake and creating strategies to deal with man-made impacts.

Goal 4: Understand water fluctuations (natural vs. man made) in and near Boelter Lake/Wetland.

Objective 4.1: Evaluate water quantity related to natural and human induced reductions in and near Boelter Lake/Wetland.

Action	Lead person/group	Start/end dates	Resources
Provide information on what is currently happening with water withdrawls and impacts on lake levels			UWSP Center for Watershed Science and Ed.
Monitor lake levels in Boelter Lake			UWSP
Work with other lake organizations /lake residents/agriculture on groundwater legislation and to reduce groundwater withdrawls (Wisconsin Association of Lakes and group of interested citizens from Portage and Waushara Counties)			UWEX Lakes Wisconsin Association of Lakes UWSP Central Wisconsin Lakes Working Group
Work with local legislators on groundwater legislation, give legislators more support and representation at discussions on groundwater issues			UWSP
Provide information and have dialogue with irrigators and other players about low water levels and pumping			Central Wisconsin Lakes Working Group

Fisheries and Recreation

Until the springof 2011 Boelter Lake had extremely low water levels. Boelter Lake was not accessible for recreational use, aside from walking, observing wildlife and the scenic beauty; and could not support a fishery population. However, water levels have begun to rise in Boelter Lake. Fisheries experts have noted that some fish species may be able to re-populate Boelter Lake. Boelter Lake will surely beging to experience recreational use, especially new and different forms of recreation that were not recognized in the citizen survey conducted in 2011. If the water remains at higher levels in Boelter Lake for over a year, the Boelter Lake Planning Committee should revisit the fisheries and recreation to set appropriate goals that address the current situation on Boelter Lake.

Action	Lead person/group	Start/end dates	Resources
Explore dredging the lake to deepen for recreational puposes			UWEX Lakes
Leave the rustic boat access as is on Boelter Lake			Town of Lanark

Organization/Communication

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 Boelter Lake/Wetland that is enjoyed by many people. There is no single best way to distribute information to those that enjoy and/or affect the lake so the planning committee has identified a variety of options to communicate with one another and in the community. Working together on common values will help to achieve the goals that have been outlined in this plan.

Goal 5: Every riparian or watershed resident is able to access/obtain information regarding BBoelter Lake and the actions outlined in the management plan.

Objective 5.1: Reach out to Boelter Lake landowners, lake users and the community using a variety of communication methods.

Action	Lead person/group	Start/end dates	Resources
Request assistance from UW Lakes on re-establishing the lake organization			UWEX Lakes
Put together and distribute welcome packets to shoreland and near shore landowners around Boelter Lake that have Boelter Lake information and distribute to new landowners			UWEX Lakes UWSP
Host a social get together for near lake areas around Boelter Lake			UWEX Lakes
Distribute information through the Town of Newsletter and Community Spirit in Amherst			Town of Lanark Community Spirit
Work with the Almond School district on projects, sharing information			Almond School District

Boelter Lake/Wetland Aquatic Invasive Species Rapid Response Plan 2010

Survey/Monitor

1. **Learn to survey/monitor the lake** from:

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

   Portage County Aquatic Invasive Species (AIS) Coordinator
   Golden Sands RC&D
   1462 Strongs Ave.
   Stevens Point, WI 54481
   Phone: 715-343-6278
   E-Mail: skawinsp@co.portage.wi.us

2. **Survey the Lake monthly/seasonally/annually**

What to Do When You Find a Suspected Invasive Species

1. **Collect Specimens or Take Pictures**

   - 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) and send them by mail or e-mail.

   Regardless of 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.

   Note Location
   (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

   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).

Boelter Lake/Wetland Aquatic Invasive Species Rapid Response Plan 2010

2. **To Positively I.D. the species send or bring specimen and additional information**
    - Collection date & 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 (estimate number of plants, area covered)
    - Habitat type(s) where found (forest, field, prairie, wetland, open water)

Send or bring specimen to:

Portage County AIS Coordinator
Golden Sands RC& D
1462 Strongs Ave.
Stevens Point, WI 54481
Phone: 715-343-6214
E-Mail : skawinsp@co.portage.wi.us

Wisconsin Dept. Natural Resources
Invasive Plant Education, Early Detection, and Mapping Specialist
Brendon Panke
WI Dept. of Natural Resources
P.O. Box 7921
Madison, WI 53707-7921
Phone: (608) 267-7438
E-Mail: invasiveplants@mailplus.wisc.edu

UW-Stevens Point Herbarium
301 Daniel O. Trainer Natural Resources Building
Stevens Point, WI 54481
Phone: 715-346-4248
E-Mail: ejudziew@uwsp.edu

3. **Once the specimen is dropped off or sent for confirmation, make sure to contact:**
Portage County AIS Coordinator
Golden Sands RC& D
Contact: Paul Skawinski
Address: 1462 Strongs Ave. Stevens Point, WI 54481
Phone: 715-343-6214
E-Mail : skawinsp@co.portage.wi.us

4. **If an invasive species is confirmed, Paul Skawinski will contact the following people along with the contact list of citizens.**

Wisconsin Department of Natural Resources
Water Resources Management Specialist
Scott Provost
473 Griffith Ave.
Wisconsin Rapids, WI, 54494
Phone: 715-421-7881
E-Mail: Scott.provost@wisconsin.gov
Who will contact them: Portage County AIS Coordinator

The town in which the waterbody is situated
Town of: Lanark
Contact: Michael Pagel- Chair
Address: 10408 Otto Rd. Amherst, WI 54406
Phone: 715-824-5231
E-mail: chairperson@townoflanark.org
Who will contact them: Portage County AIS Coordinator

University of Wisconsin-Stevens Point – Water Resource Scientist
Contact: Nancy Turyk
Address: 216 TNR 800 Reserve St. Stevens Point, WI
Telephone: 715-346-4155
E-mail: pclakes@uwsp.edu
Who will contact them: Portage County AIS Coordinator

Boelter Lake/Wetland Aquatic Invasive Species Rapid Response Plan 2010

Newspapers
Who will contact them: Portage County Invasive Species Coordinator

Amherst Our Community Spirit
Portage County Gazette
Stevens Point Journal

Post notice at the access points to the waterbody

Literature Cited

Fassbender, R.L., and L.M. Nelson. 1971. Surface Water Resources of Portage County. Wisconsin Department of Natural Resources, Madison, Wisconsin.

Turyk, N; R. Bell; R. Cook; T. Ginnett; R. Crunkilton; L. Markham; P. McGinley; B. Shaw; and E. Wild; 2006. Final report to Portage County and Wisconsin DNR. http://www.co.portage.wi.us/plzo/lakes.html

Glossary

Algae:

One-celled (phytoplankton) or multi-cellular plants either suspended in water (Plankton) or attached to rocks and other substrates (periphyton). Their abundance, as measured by the amount of chlorophyll *a* (green pigment) in an open water sample, is commonly used to classify the trophic status of a lake. Numerous species occur. Algae are an essential part of the lake ecosystem and provide the food base for most lake organisms, including fish. Phytoplankton populations vary widely from day to day, as life cycles are short.

Atrazine:

A widely used herbicide.

Blue-Green Algae:

Algae often associated with problem blooms in lakes. Some produce chemicals toxic to other organisms, including humans. They often form floating scum as they die. Many can fix nitrogen (N_2) from the air to provide their own nutrient.

Calcium (Ca++):

The most abundant cation found in Wisconsin lakes. Its abundance is related to the presence of calcium-bearing minerals in the lake watershed. Reported as milligrams per liter (mg/l) as calcium carbonate ($CaCO_3$), or milligrams per liter as calcium ion (Ca++).

Chloride (Cl-):

Chlorine in the chloride ion (Cl-) form has very different properties from chlorine gas (Cl2), which is used for disinfecting. The chloride ion (Cl-) in lake water is commonly considered an indicator of human activity. Agricultural chemicals, human and animal wastes, and road salt are the major sources of chloride in lake water.

Chlorophyll *a*:

Green pigment present in all plant life and necessary for photosynthesis. The amount present in lake water depends on the amount of algae and is therefore used as a common indicator of algae and water quality.

Clarity:

See "Secchi disc".

Color:

Measured in color units that relate to a standard. A yellow-brown natural color is associated with lakes or rivers receiving wetland drainage. The average color value for Wisconsin lakes is 39 units, with the color of state lakes ranging from zero to 320 units. Color also affects light penetration and therefore the depth at which plants can grow.

Concentration units:

Express the amount of a chemical dissolved in water. The most common ways chemical data is expressed is in milligrams per liter (mg/l) and micrograms per liter (ug/L). One milligram per liter is equal to one part per million (ppm). To convert micrograms per liter (ug/l) to milligrams per liter (mg/l), divide by 1000 (e.g. 30 ug/l = 0.03 mg/l). To convert milligrams per liter (mg/l) to micrograms per liter (ug/l), multiply by 1000 (e.g. 0.5 mg/l = 500 ug/l). Microequivalents per liter (ueq/l) is also sometimes used, especially for alkalinity; it is calculated by dividing the weight of the compound by 1000 and then dividing that number into the milligrams per liter.

Cyanobacteria:

See “Blue-Green Algae”.

Dissolved Oxygen:

The amount of oxygen dissolved or carried in the water.

Drainage Basin:

The total land area that drains towards a lake.

Drainage lakes:

Lakes fed primarily by streams and with outlets into streams or rivers. They are more subject to surface runoff problems but generally have shorter residence times than seepage lakes. Watershed protection is usually needed to manage lake water quality.

Emergent:

A plant rooted in shallow water that has most of its vegetative growth above water.

Eutrophication:

The process by which lakes and streams are enriched by nutrients, and the resulting increase in plants and algae. The extent to which this process has occurred is reflected in a lake's trophic classification: oligotrophic (nutrient poor), mesotrophic (moderately productive), and eutrophic (very productive and fertile).

Groundwater Drainage Lake:

Often referred to as a spring-fed lake, has large amounts of groundwater as its source, and a surface outlet. Areas of high groundwater in-flow may be visible as springs or sand boils. Groundwater drainage lakes often have intermediate retention times with water quality dependent on groundwater quality.

Hardness:

The quantity of multivalent cations (cations with more than one +), primarily calcium (Ca++) and magnesium (Mg++), in the water expressed as milligrams per liter of CaCO3. Amount of hardness relates to the presence of soluble minerals, especially limestone, in the lake watershed.

Intermittent:

Coming and going at intervals, not continuous.

Macrophytes:

See "Rooted aquatic plants."

Marl:

White to gray accumulation on lake bottoms caused by precipitation of calcium carbonate (CaCO3) in hard-water lakes. Marl may contain many snail and clam shells, which are also calcium carbonate. While it gradually fills in lakes, marl also precipitates phosphorus, resulting in low algae populations and good water clarity. In the past, marl was recovered and used to lime agricultural fields.

Mesotrophic:

A lake with an intermediate level of productivity. Commonly clear water lakes and ponds with beds of submerged aquatic plants and medium levels of nutrients. See also “eutrophication”.

Nitrate (NO3-):

An inorganic form of nitrogen important for plant growth. Nitrate often contaminates groundwater when water originates from manure, fertilized fields, lawns, or septic systems. High levels of nitrate-nitrogen (over 10 mg/L) are dangerous to infants and expectant mothers. A concentration of nitrate-nitrogen (NO3-N) plus ammonium-nitrogen (NH4-N) of 0.3 mg/L in spring will support summer algae blooms if enough phosphorus is present.

Oligotrophic:

Lakes with low productivity, the result of low nutrients. Often these lakes have very clear waters with lots of oxygen and little vegetative growth. See also “eutrophication”.

Overturn:

Fall cooling and spring warming of surface water increases density, and gradually makes temperature and density uniform from top to bottom. This allows wind and wave action to mix the entire lake. Mixing allows bottom waters to contact the atmosphere, raising the water's oxygen content. However, warming may occur too rapidly in the spring for mixing to be effective, especially in small, sheltered kettle lakes.

Phosphorus:

Key nutrient influencing plant growth in more than 80% of Wisconsin lakes. Soluble reactive phosphorus is the amount of phosphorus in solution that is available to plants. Total phosphorus includes the amount of phosphorus in solution (reactive) and in particulate form.

Rooted Aquatic Plants: (macrophytes)

Refers to multi-celled plants growing in or near water. Macrophytes are beneficial to lakes because they produce oxygen and provide substrate for fish habitat and aquatic insects. Overabundance of such plants, especially problem species, is related to shallow water depth and high nutrient levels.

Secchi Disc (Secchi Disk):

An 8-inch diameter plate with alternating quadrants painted black and white that is used to measure water clarity (light penetration). The disc is lowered into water until it disappears from view. It is then raised until just visible. An average of the two depths, taken from the shaded side of the boat, is recorded as the Secchi disc reading. For best results, the readings should be taken on sunny, calm days.

Sedimentation:

Materials that are deposited after settling out of the water.

Stratification:

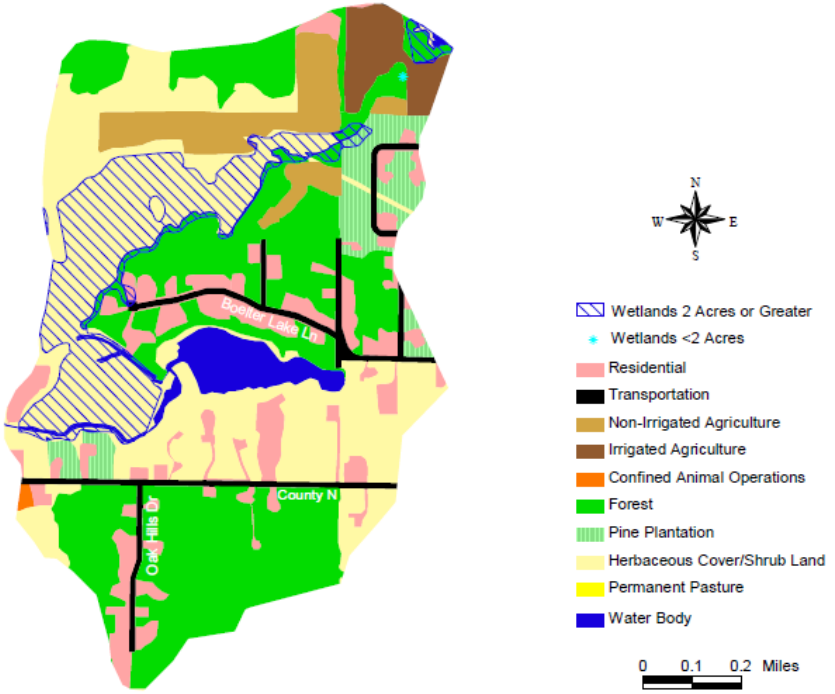
The layering of water due to differences in density. Water's greatest density occurs at 39 Deg.F (4 Deg.C). As water warms during the summer, it remains near the surface while colder water remains near the bottom. Wind mixing determines the thickness of the warm surface water layer (epilimnion), which usually extends to a depth of about 20 ft. The narrow transition zone between the epilimnion and cold bottom water (hypolimnion) is called the metalimnion or thermocline.

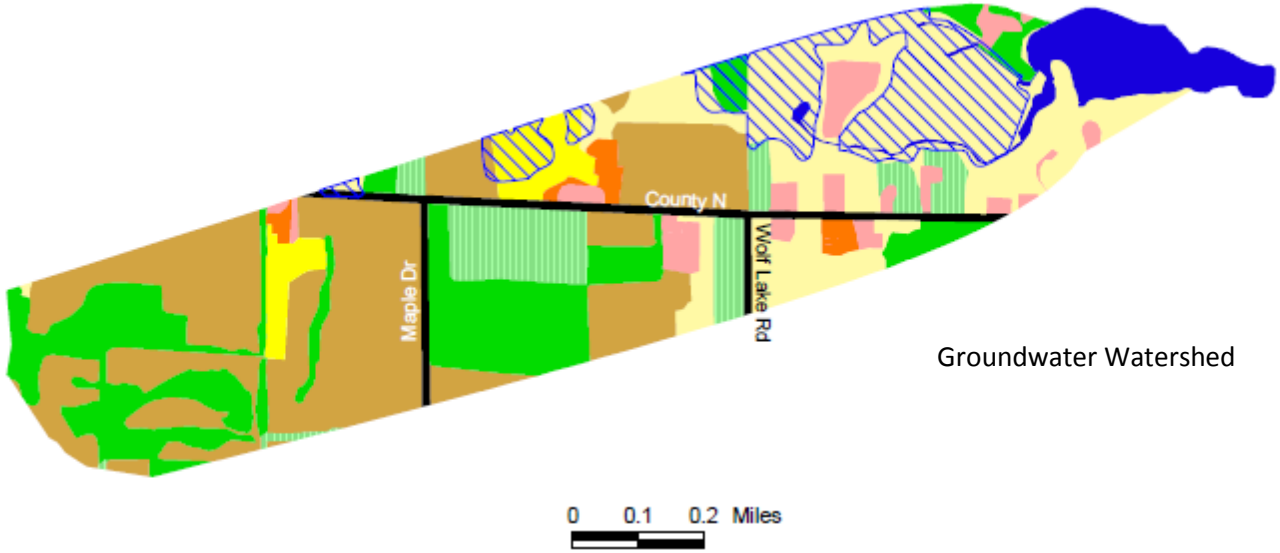
Watershed: See “drainage basin”.

Appendix A

Boelter Lake/Wetland Watershed Land Uses

Surface Water Watershed

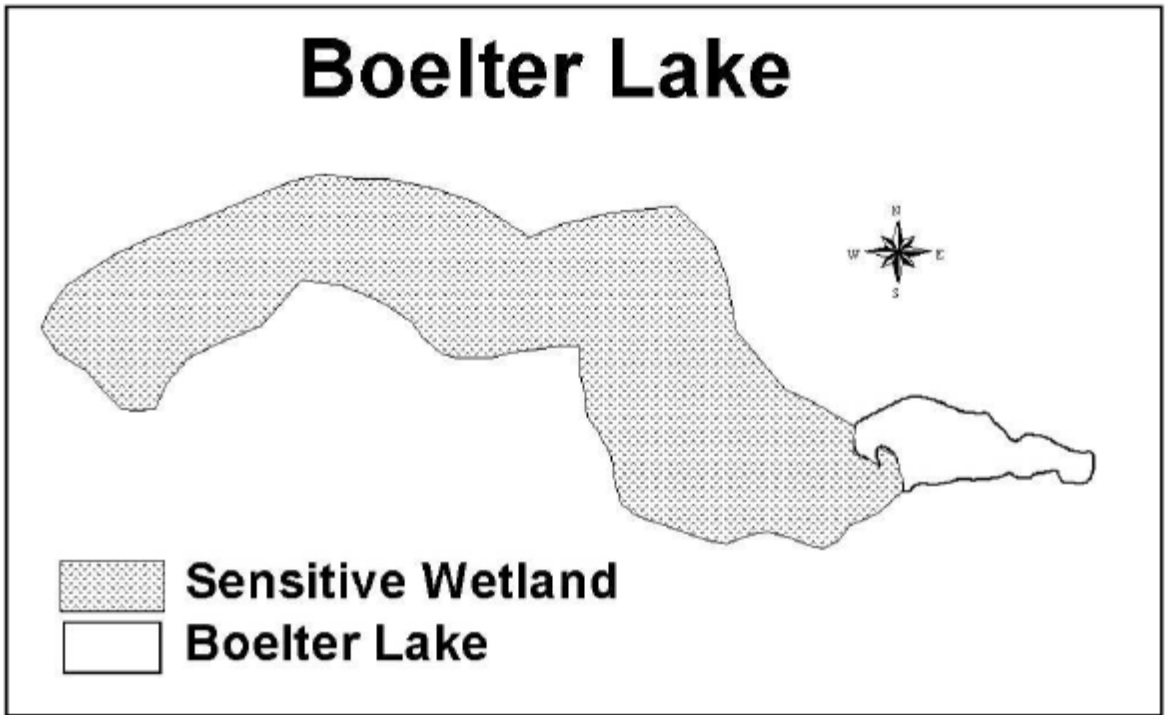




Groundwater Watershed

Appendix B

Boelter Lake/Wetland Sensitive Areas.



Appendix C

Boelter Lake Amphibian Habitat (highlighted in red).