Pleasant Lake

Summary Report 2013

University of Wisconsin–Stevens Point

and

Waushara County Staff and Citizens
To protect the lake we must protect the "watershed," the land that drains or sheds its water into the lake.
Pleasant Lake – Location

Pleasant Lake
West of Highway 51
Township of Coloma

Surface Area: 120 acres
Maximum Depth: 30 feet

Water Flow

- Pleasant Lake is a seepage lake with most of the water entering the lake from groundwater.
- Surface water runoff and direct precipitation also contribute water, but to lesser extents.
- Most water exits Pleasant Lake through groundwater.

Pleasant Lake

WAUSHARA COUNTY LAKES STUDY –

1. Pine (Springwater)
2. Twin
3. Gilbert
4. Long (Saxeville)
5. Long (Oasis)
6. Huron
7. Wilson
8. Kusel
9. Silver (Springwater)
10. Round
11. Big Hills
12. Napowan
13. Beans
14. Morris
15. Pine (Hancock)
16. Fish
17. Marl
18. W. Branch Mill Pond
19. Porters
20. Pearl
21. Johns
22. Bughs
23. Irogami
24. Alpine
25. Silver (Wautoma)
26. Deer
27. Little Hills
28. White Riv. Flowage
29. Witters
30. Lucerne
31. Spring
32. Curtis
33. Pleasant

Pleasant Lake is a seepage lake with most of the water entering the lake from groundwater. Surface water runoff and direct precipitation also contribute water, but to lesser extents. Most water exits Pleasant Lake through groundwater.
Land uses and land management practices occurring in the watershed can affect the water quality in the lake.

Land uses and land management also play major roles in how water moves across the landscape and how much water soaks into the ground (for long-term storage) or quickly runs off the land.

The surface watershed of Pleasant Lake is 1,545 acres.

Forests are the primary land use in the watershed.

There is developed land, forests, and wetlands bordering the lake. Generally, the land closest to the lake will have the greatest immediate impact on its water quality.
Groundwater provides water to lakes in Waushara County throughout the year. Hard surfaces on the landscape prevent water from soaking into the ground and becoming groundwater. This results in less water flowing to the lake during the winter and between rains. Groundwater pumping can also reduce the amount of water entering lakes.

The quality of groundwater reflects what is happening on the land surface. Precipitation falling on forested land produces clean groundwater, whereas precipitation falling on lands that have chemical use can leach contaminants to groundwater. Groundwater contamination in central Wisconsin may include nitrogen, pesticides, herbicides and other soluble chemicals originating from septic systems, crops, barnyards, road maintenance, etc. Once in the groundwater, these chemicals slowly move towards a lake or river.

On the map below, arrows indicate the direction of groundwater flow to and from the lakes. Much of the groundwater flowing towards Pleasant Lake comes from the north and the west.
Shoreland vegetation is critical to a healthy lake’s ecosystem. It provides habitat for aquatic and terrestrial animals including birds, frogs, turtles and many 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 tall grasses/flowers, shrubs, and trees.

A few stretches of the shoreland around Pleasant Lake have healthy shoreland vegetation (displayed in green); however, most stretches could benefit the lake by being restored.
Aquatic plants are the forest landscape within a lake. They provide food and habitat for terrestrial and aquatic creatures such as fish, ducks, turtles, invertebrates and other animals. They increase oxygen in the water and utilize nutrients that would otherwise be used by algae. A healthy lake typically has a variety of aquatic plants creating diversity that can help to prevent the establishment of aquatic invasive species.

- The aquatic plant community in Pleasant Lake is characterized by an above-average diversity of plant species when compared to other lakes in the Waushara County Lakes Study, although most of the plants present are relatively common.
- A total of 28 aquatic plant species were identified in the survey. The most frequently encountered plant species was *Chara* spp., present at 84% of the sampled sites.
- The aquatic plant community in Pleasant Lake is healthy and diverse.
Species Richness is a count of the number of plant species found at a survey point. A greater number of species in a lake helps to make the aquatic plant community more resilient to year-to-year changes and aquatic invasive species. More plant species means more diverse habitat and food sources are available.
Pleasant Lake – Water Quality

Lakes go through a natural aging process that results in increased aquatic plant growth, fish, and wildlife over time. Within a lake’s watershed, human activity on the land, in a wetland, or in the lake can dramatically accelerate this process. Depending on land management practices, changes in a lake that may have normally taken centuries to occur may take place in decades or even years. The amounts of nutrients, algal growth, and water clarity measurements help to define the age of a lake. Based on these measures, lakes can be classified for comparison to one another.

### Oligotrophic Lakes

**Common uses:**
- Swimming
- Skiing
- Boating

**Vegetation of oligotrophic lakes:**
- Very little vegetation

### Mesotrophic Lakes

**Common uses:**
- Boating
- Fishing

**Vegetation of mesotrophic lakes:**
- Increased vegetation
- Occasional algal blooms

### Eutrophic Lakes

**Common uses:**
- Fishing
- Wildlife watching

**Vegetation of eutrophic lakes:**
- Lots of aquatic plants
- Frequent algal blooms

Winter fish kills can occur in shallow lakes due to low oxygen levels.
Phosphorus is a major nutrient that can lead to excessive algae and rooted aquatic plant growth in lakes. In fact, one pound of phosphorus entering a lake can result in 500 pounds of algal growth. All Waushara County lakes have either sufficient or excessive nutrients for aquatic plant growth, so these lakes will benefit from limiting the addition of more nutrients. Sources of phosphorus include septic systems, animal waste, storm water runoff, soil erosion, and fertilizers for lawns, gardens and agriculture.

- Total phosphorus concentrations measured when Pleasant Lake was well-mixed during spring and fall are displayed in the graph to the left.
- During fall and spring 2010-2012, the average total phosphorus concentrations were higher compared to earlier measurements. This indicates that Pleasant Lake may be transitioning towards a mesotrophic state.

Water clarity is a measure of how deep light can penetrate (secchi depth). Clarity is affected by water color, turbidity (suspended sediment), and algae. Water clarity helps determine where rooted aquatic plants can grow.

- The graph to the left shows water clarity data. It is typical for water clarity to vary throughout the year.
- During the summers of 2011 and 2012, the average water clarity in Pleasant Lake ranged between 10.2 and 12 feet. In comparison to measurements prior to 2011, water clarity has decreased.
Lake sediment can help to tell the history of a lake and changes that may have affected the lake related to water quality, the abundance of aquatic plants, and sedimentation or land disturbance in the watershed. These changes are assessed by evaluating the content of the upper layer of the sediment versus lower layers. This information can help to guide management decisions for a lake.

- Analysis of Pleasant Lake’s sediment core suggests increased disturbance in the lake basin since the time of land clearing. These activities peaked in recent decades, but may have stabilized in recent years.
- Diatom species and communities as well as sediment properties reflect an increase in phosphorus. An increase in aquatic plants and filamentous algae were found in the top of the sediment core.
- Pleasant Lake has experienced limited increased phosphorous concentrations, but large changes in habitat, during the last century.

Diatoms are a type of algae commonly found in sediment. They are well-preserved in sediments due to silica-based cell walls which resist degradation.

Different species of diatoms are sensitive to water quality; thus, changes in the diatom community from the bottom to the top of the sediment core can reveal how water quality in the lake has changed over time.
Pleasant Lake – What can you do to help?

Lake Users:
- Run boat engines efficiently
- Observe no/low wake zones
- Refuel away from water
- Dispose of trash properly
- Remove all aquatic plants from boats and trailers
- Respect wildlife and other lake users

Land Owners:
- Control soil erosion
- Keep livestock out of lakes and streams
- Control manure runoff
- Carefully manage nutrients and pesticides
- Leave natural shoreland vegetation in place or restore if it has been removed
- Learn to identify and look for invasive species

Home Owners:
- Leave natural shoreland vegetation in place or restore if it has been removed
- Leave woody habitat for young fish, turtles and frogs
- Eliminate the use of fertilizer or use no phosphorus fertilizer
- Eliminate or minimize use of pesticides
- Control soil erosion
- Control runoff from rooftops and hard surfaces
- Clean up after pets
- Learn to identify and look for invasive species

Stop the Spread of Aquatic Invasive Species!

Wetlands and Shorelands:
- LEARN how to identify invasive plants and animals, and know who to contact if found.
- DO NOT PURCHASE prohibited and restricted species! Whenever possible purchase native plants.
- NEVER transplant water garden plants or aquarium plants into lakes, streams, wetlands, or storm water ponds. Properly dispose of unwanted plants and animals!
- REMOVE invasive exotic plants from your landscape and replace them with native plants or non-invasive exotic plants. Scout annually for new invasive plants.
- AVOID using garden plants from other regions whose invasive potential is poorly understood.

Lakes and Rivers:
- LEARN what Wisconsin invasive plants and animals look like and who to contact if seen in a lake or river.
- INSPECT your boat, trailer and equipment when traveling to different water bodies and REMOVE any attached aquatic plants or animals (before launching, after loading, and before transporting on a public highway).
- DRAIN all water from boats, motors, and all equipment after use at a lake.
- NEVER release live fish, bait or pets into a wetland or water body.
- BUY minnows from a Wisconsin bait dealer. Only use leftover minnows at that same water body.
Pleasant Lake – Primary Authors

Authors listed are from the UW-Stevens Point unless otherwise noted.

Aquatic Plants
Jen McNelly

Sediment Core
Samantha Kaplan
Paul Garrison (Wisconsin Department of Natural Resources)

Shoreland Assessments
Ed Hernandez and Waushara County Land Conservation Department Staff
Dan McFarlane

Water Quality and Watersheds
Nancy Turyk, Paul McGinley, Danielle Rupp and Ryan Haney
Ed Hernandez and Waushara County Land Conservation Department Staff

UW-Stevens Point Students: Melis Arik, Nicki Feiten, Sarah Hull, Chase Kasmerchak,
Justin Nachtigal, Matt Pamperin, Scott Pero, Megan Radske, Anthony Recht,
Cory Stoughtenger, Hayley Templar, Garret Thiltgen

Acknowledgments

We are grateful to many people for supporting this project by providing insight,
enthusiasm, and funding. We would like to recognize our project partners:

Waushara County Watershed Lakes Council

Waushara County Staff and Citizens

Wisconsin Department of Natural Resources Professionals, Mark Sessing and Ted Johnson

Wisconsin Department of Natural Resources Lake Protection Grant Program

Dr. Samantha Kaplan and Dr. Paul McGinley

UW-Stevens Point Water and Environmental Analysis Lab

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

Welcome to Waushara County
For All Seasons