Beans 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.
Water Flow

- Beans Lake is a seepage lake; most of its water enters via groundwater. Surface water runoff and direct precipitation also contribute water to lesser extents.
- Most of the water exits Beans Lake through groundwater flow.
Land uses and land management practices occurring in a watershed can affect the water quality in a 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 Beans Lake is 4,557 acres. Forests and agriculture are the primary land uses throughout the watershed. Forests, wetlands, and agriculture border Beans Lake. Generally, the land closest to the lake has the greatest immediate impact on water quality.

Surface Watershed: The area where water runs off the surface of the land and drains toward the lake.
Groundwater provides water to lakes in Waushara County throughout the entire 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 move slowly towards a lake or river.

On the map below, arrows indicate the general direction of groundwater flow to and from Beans Lake.
Shoreland vegetation is critical to a healthy lake’s ecosystem. It provides habitat for many 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.

Shorelands around Beans Lake were surveyed in 2011. Most of the shorelands around Beans Lake are in need of restoration.
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 levels in the water and utilize nutrients that would otherwise be used by algae. A healthy lake typically has a variety of aquatic plant species creating diversity that can help to prevent the establishment of aquatic invasive species.

The aquatic plant community in Beans Lake is characterized by above-average diversity of plant species when compared to other lakes in the Waushara County Lakes Study. A 2011 aquatic plant survey documented 11 species.

Much of the diversity observed in Beans Lake was found in the southwestern and northeastern corners of the lake.

The aquatic plant survey of Beans Lake documented no non-native species. This is a good indicator of overall aquatic health within the lake and demonstrates diligence by lake users in cleaning watercraft before entering the lake to prevent non-native species transfer.
During the 2011 aquatic plant survey of Beans Lake, 97 percent of the sites sampled had vegetative growth. The average depth of sampled sites was 7.6 feet, with a maximum depth of 16 feet.

The most frequently encountered plant species were muskgrass, flat-stem pondweed, and common waterweed. All three species are native to Wisconsin.

**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.

**Bladderworts** are carnivorous plants. They use special trigger hairs to sense an insect—which then is sucked into digestive “bladders” in the plant.

Emergent plants such as **hardstem bulrush** are important spawning habitat for northern pike and nesting cover for largemouth bass and bluegill. Bulrushes attract marsh birds and songbirds and provide food for ducks, geese, and swans.
Beans 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.
Beans Lake – Water Quality

**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.

The graph to the left summarizes water clarity measurements taken between April and November. It is typical for water clarity to vary throughout the year.

During the summer of 2012, on average, the poorest water clarity in Beans Lake was approximately 9 feet in August and the best was 11 feet in June. In comparison to measurements taken prior to 2011, water clarity had increased slightly during the summers.

**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 summarizes water clarity measurements taken between April and November. It is typical for water clarity to vary throughout the year.

During the summers of 2011 and 2012, on average, the poorest water clarity in Beans Lake was approximately 9 feet in August and the best was 11 feet in June. In comparison to measurements taken prior to 2011, water clarity had increased slightly during the summers.
Beans Lake – What can you do to help?

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.

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
Beans 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