Pine Lake (Springwater)

Final Study Results 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.
Pine Lake (Springwater) – Location

Northeast of Wild Rose
East of Highway 22
North of County Highway A
Township of Springwater

Surface Area: 137 acres
Maximum Depth: 48 feet

Water Flow

- Pine Lake is a seepage lake; most water enters via groundwater. Surface water runoff and direct precipitation also contribute water to lesser extents.
- Most water exits Pine Lake via groundwater.

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Pine Lake (Springwater) – Land Cover in the Surface Watershed

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 Pine Lake is 3,184 acres.

Forests are the primary land use in the watershed.

Developed land surrounds the lake’s perimeter and cropland is nearby. Generally, the land closest to the lake will have the greatest immediate impact on water quality.
**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 slowly move towards a lake or river.

On the map below, arrows indicate the direction of groundwater flow to and from the lakes. The majority of groundwater flows towards Pine Lake from the north.
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.

A stretch of the shoreland on the south side of Pine Lake has healthy shoreland vegetation (displayed in green); however, many stretches could benefit the lake by being restored.
Pine Lake (Springwater) – Aquatic Plants

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.

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- The aquatic plant community in Pine Lake (Springwater) is characterized by an average diversity of plant species when compared to other lakes in the Waushara County Lakes Study, with a total of 20 species in the survey.
- Four species found in Pine Lake had a C-value of 8, indicating good health in the aquatic plant community.
- Freshwater sponges were observed in Pine Lake (Springwater). Sponges are actually a primitive animal, not a plant, and are excellent water quality indicators.

AQUATIC PLANTS
Food and Refuge for Aquatic Life

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The 2013 aquatic plant survey of Pine Lake (Springwater), documented aquatic plants at 79 percent of the sites sampled. The greatest depth of aquatic plant growth was 36 feet.

The two most frequently encountered species were muskgrass (Chara spp.) and stoneworts (Nitella spp.). These are actually macroalgae which resemble higher plants.

Eurasian water milfoil (EWM) is present in low abundance in scattered populations in the western half of the lake. EWM can create dense beds which can stall or damage boat motors, make areas non-navigable, and prevent activities like swimming and fishing.

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.

Chara, sometimes called muskgrass, is a form of algae which resembles higher plants. It often grows in low, dense mats and is identified by its musky odor and rough texture. The water is often clear where Chara grows densely because of its ability to filter nutrients from water.
Aquatic Invasive Species are non-native plants or animals that may cause significant harm to a lake’s ecosystem. Typically, they are introduced to a lake by hitching a ride on clothing, boats, trailers and other water recreation equipment. Aquatic invasive species can be introduced to a lake accidentally or intentionally. Once in a lake, they may be impossible to completely remove and can be difficult and costly to remove. Prevention and early detection are the best ways to keep aquatic invasive species from establishing in a lake.

### Lakes with Aquatic Invasive Species in Waushara County, 2012

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<thead>
<tr>
<th>Lake Name</th>
<th>Banded Mystery Snail</th>
<th>Chinese Mystery Snail</th>
<th>Rusty Crayfish</th>
<th>Curly Leaf Pondweed</th>
<th>Eurasian Water Milfoil</th>
<th>Hybrid Eurasian/Northern Water Milfoil</th>
<th>Zebra Mussel</th>
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Learn to identify invasive species & look for them in your lake!
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 300 to 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 levels measured when the 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 level was similar to earlier measurements.

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 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 best water quality in Pine Lake was 16 feet in August and the poorest was 12.5 feet in July. In comparison to measurements prior to 2011, water clarity has decreased during the summer.
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.
Pine Lake (Springwater) – Primary Researchers

**Aquatic Plants**


**Sediment Core**

Dr. Samantha Kaplan (UW-Stevens Point) and Paul Garrison (Wisconsin DNR)

**Shoreland Assessments**

Ed Hernandez and Waushara County Land Conservation Department Staff

Dan McFarlane (UW-Stevens Point)

**Water Quality and Watersheds**

Nancy Turyk, Dr. Paul McGinley, Danielle Rupp and Ryan Haney (UW-Stevens Point)

Ed Hernandez and Waushara County Land Conservation Department Staff

**UW-Stevens Point Students**