Little Hills 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.
Little Hills Lake – Location

Southeast of Wautoma
East of Highway 73
South of Highway 21
Township of Marion

Surface Area: 79 acres
Maximum Depth: 23 feet

Water Flow

- Little Hills Lake is a seepage lake; most water enters via groundwater. Surface water runoff and direct precipitation contribute water to lesser extents.
- Water exits Little Hills Lake via groundwater.

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

Waushara County Lakes Study - Summary Report 2013
Little Hills Lake – Land Cover in the Surface Watershed

Surface Watershed: The area where water runs off the surface of the land and drains toward the lake.

- 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 Little Hills Lake is 956 acres.
- Forests and agriculture account for the primary land use in the watershed.
- Even though developed land occupies a small area compared to forested land, it is still possible that development is impacting Little Hills Lake. 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. Groundwater enters Little Hills Lake from the northwest.
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.

Only a few stretches of the shoreland around Little Hills Lake have healthy shoreland vegetation (displayed in green). Most of the shoreland 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 Little Hills Lake is characterized by below-average diversity of plant species when compared to other lakes in the Waushara County Lakes Study. Most of the plants present are relatively common.
- In a survey conducted in 2011, only 9 species of plants were observed. The plant communities show impact from the relatively heavy development observed on the lake.
During the 2011 aquatic plant survey of Little Hills Lake, 51 percent of the sites sampled had vegetative growth. The average depth of sampled sites was 12 feet, with plants found at a maximum depth of 27 feet.

The most frequently encountered plant species was *Chara* spp., which was found at 88 percent of the vegetated sites.

No invasive species were identified. This indicates diligence by lake users in cleaning watercraft to prevent non-native species transfer.

**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.

*Illinois pondweed* can be a locally important food source for a variety of ducks and geese, muskrat, deer and beaver. It also offers excellent shade and cover for fish, and good surface area for invertebrates.
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.

![Phosphorus Levels Graph](image)

- Total phosphorus levels measured when the lake was well-mixed during spring and fall are displayed in the graph to the left.
- During fall 2010 and spring 2012, average total phosphorus levels increased compared to historic measurements. These levels indicate that Little Hills Lake is transitioning towards a mesotrophic lake.

**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.

![Water Clarity Graph](image)

- 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 poorest water clarity in Little Hills Lake was 11 feet in August and the best was 19.6 feet in June. In comparison to measurements taken prior to 2011, water clarity was similar during most of the summer.
Little Hills 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.
Little Hills Lake – Primary Authors

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