

Boelter Lake/Wetland

Final Results Portage County Lake Study

March 31, 2005.

*University of Wisconsin-Stevens Point
Portage County Staff and Citizens*

What can you learn from this study?

You can learn a wealth of valuable information about:

- *Critical habitat that fish, wildlife, and plants depend on*
- *Water quality and quantity of your lake*
- *The current diagnosis of your lake – good news and bad news*

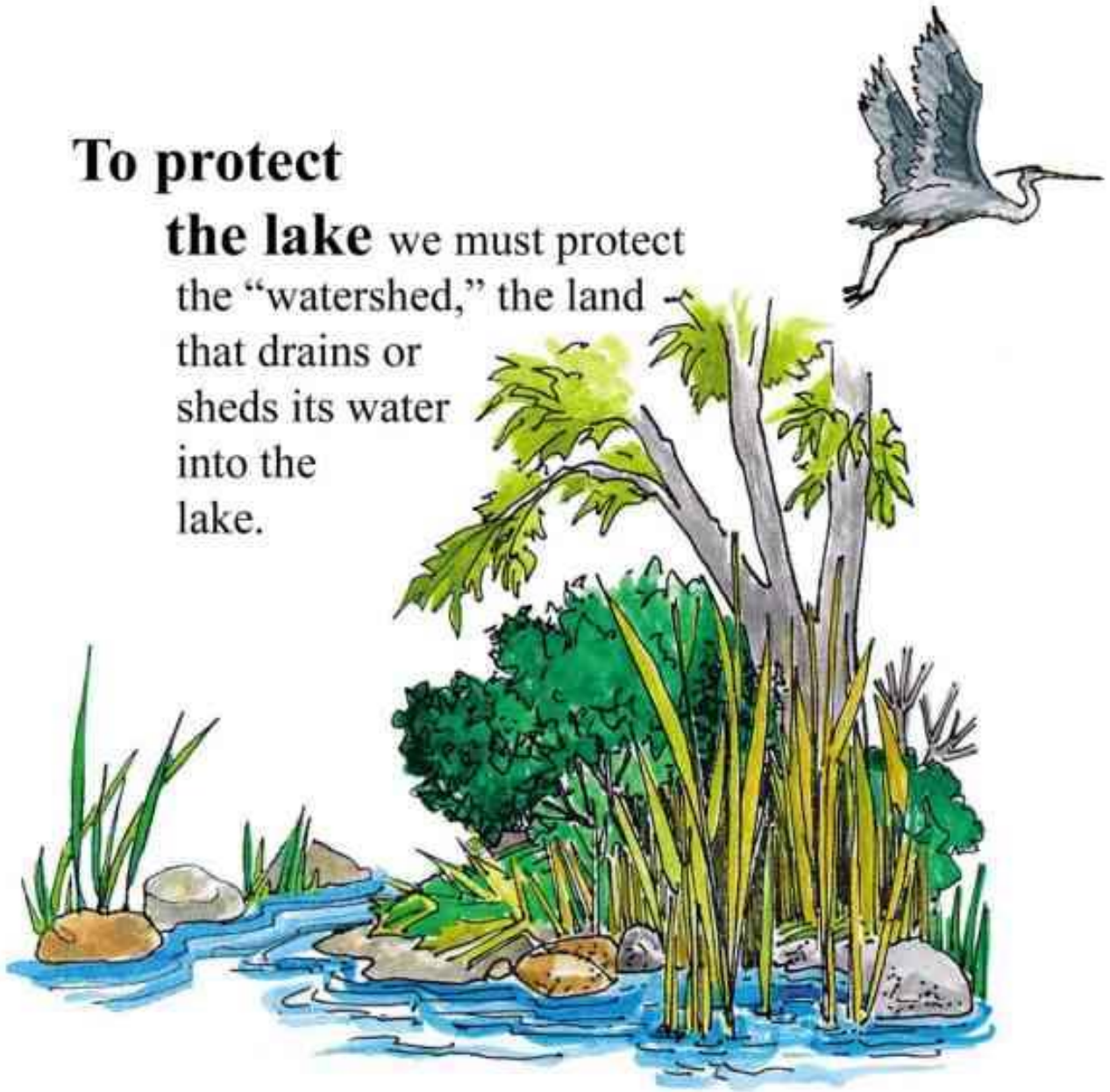
What can you DO in your community?

You can share this information with the other people who care about your lake and then plan together for the future.

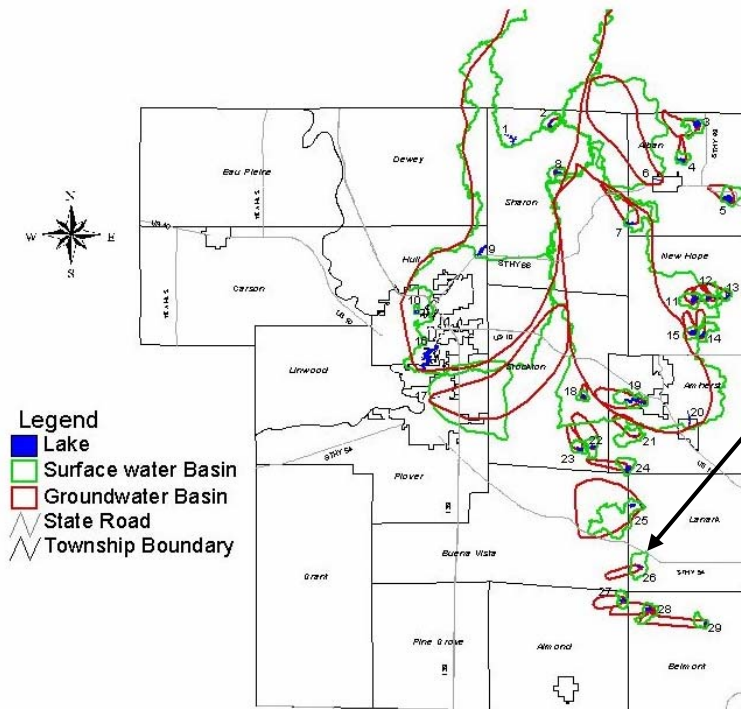
- ✓ *Develop consensus about the local goals and objectives for your lake.*
- ✓ *Identify available resources (people, expertise, time, funding).*
- ✓ *Explore and choose implementation tools to achieve your goals.*
- ✓ *Develop an action plan to achieve your lake goals.*
- ✓ *Implement your plan.*
- ✓ *Evaluate the results and then revise your goals and plans.*

To protect

the lake we must protect the “watershed,” the land that drains or sheds its water into the lake.



Boelter Lake ~ Location



Boelter Lake
 South of Highway 54, 9 miles south of
 Stevens Point, Town of Lanark
Surface Area: 40 acres
Maximum Depth: 5 feet
Lake Volume: 102 acre-feet

Boelter Lake

Water Flow

- Boelter Lake is a drainage wetland/lake
- Water enters Boelter Lake from groundwater, one intermittent creek at the west end of the lake, with some runoff, and precipitation
- Water exits the lake through groundwater
- This lake experiences fluctuating water levels as the groundwater table fluctuates

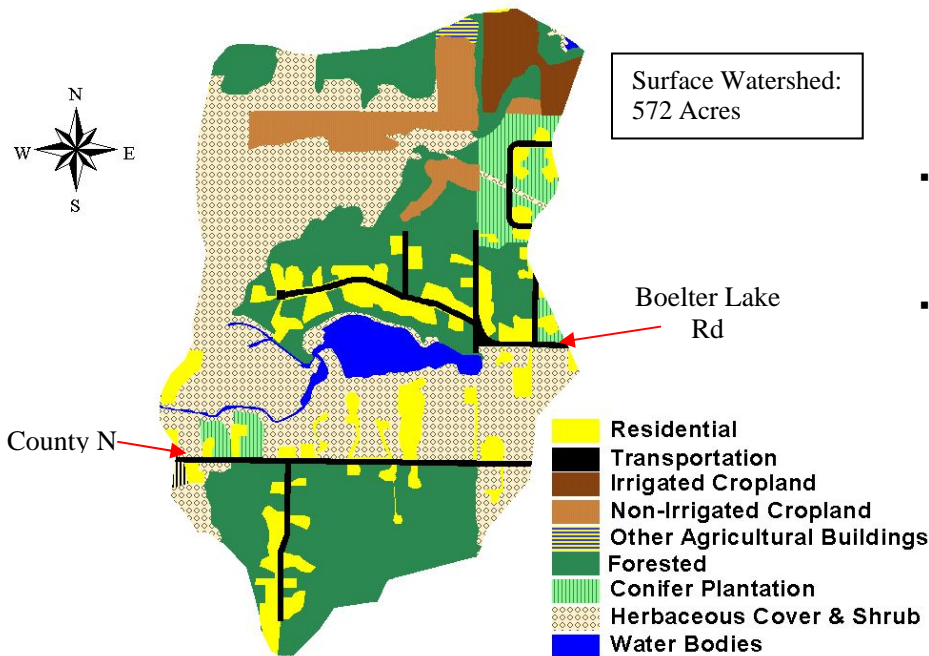


Boelter Lake ~ Land Use in the Surface Watershed



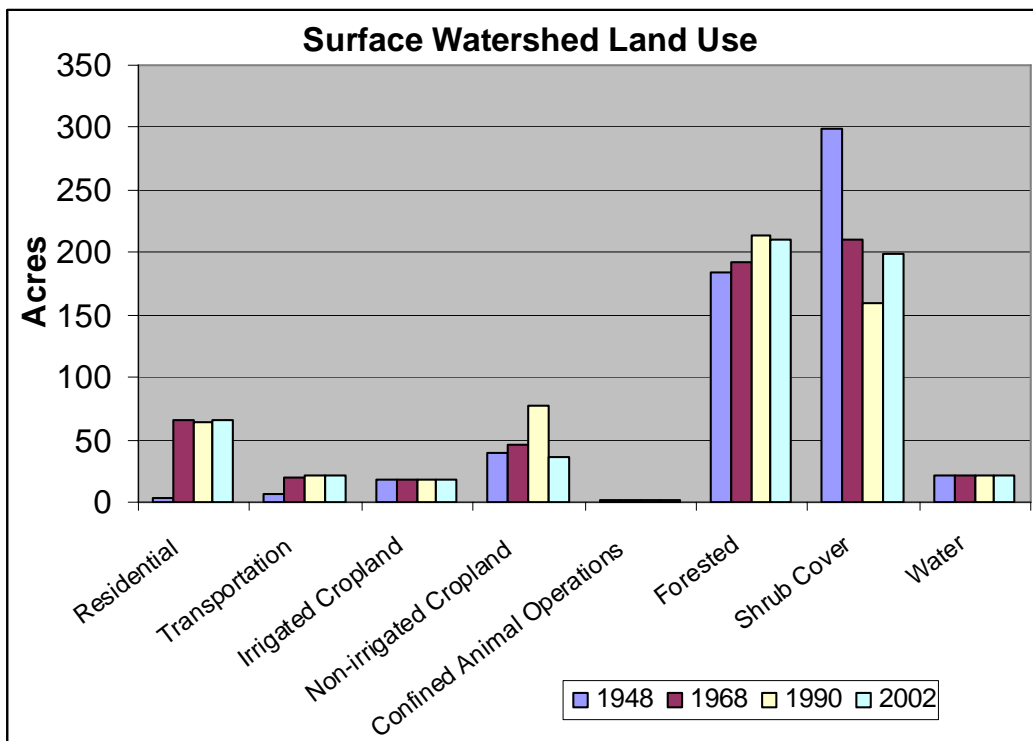
Surface Watershed: The land area where water runs off the surface of the land and drains toward the lake.

Boelter Lake Land Use



Current Predominant Land Use

- Around the lake: shrub cover, forestland, and residential land
- In the watershed: shrub cover, forestland, residential and agricultural



Surface Watershed Land Use

- Forestland and shrub cover have always been the dominant land uses
- Irrigated cropland has remained steady while non-irrigated cropland peaked in 1990 and is now lower than 1948
- Residential and transportation uses are increasing



Boelter Lake ~ Land Use in the Groundwater Shed

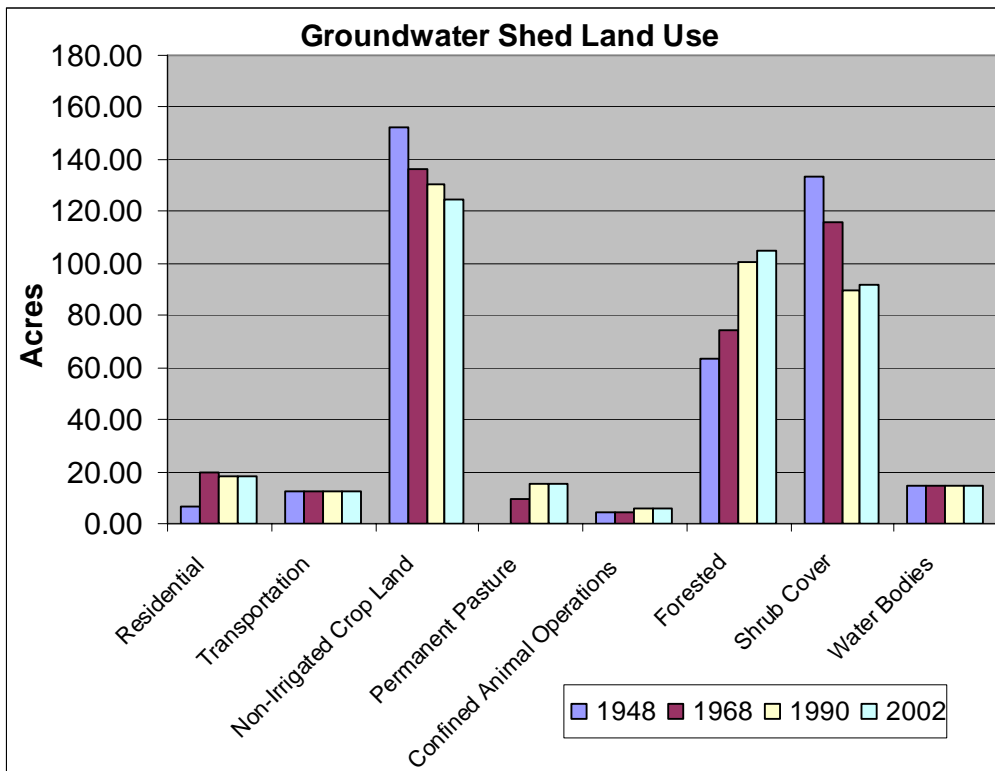
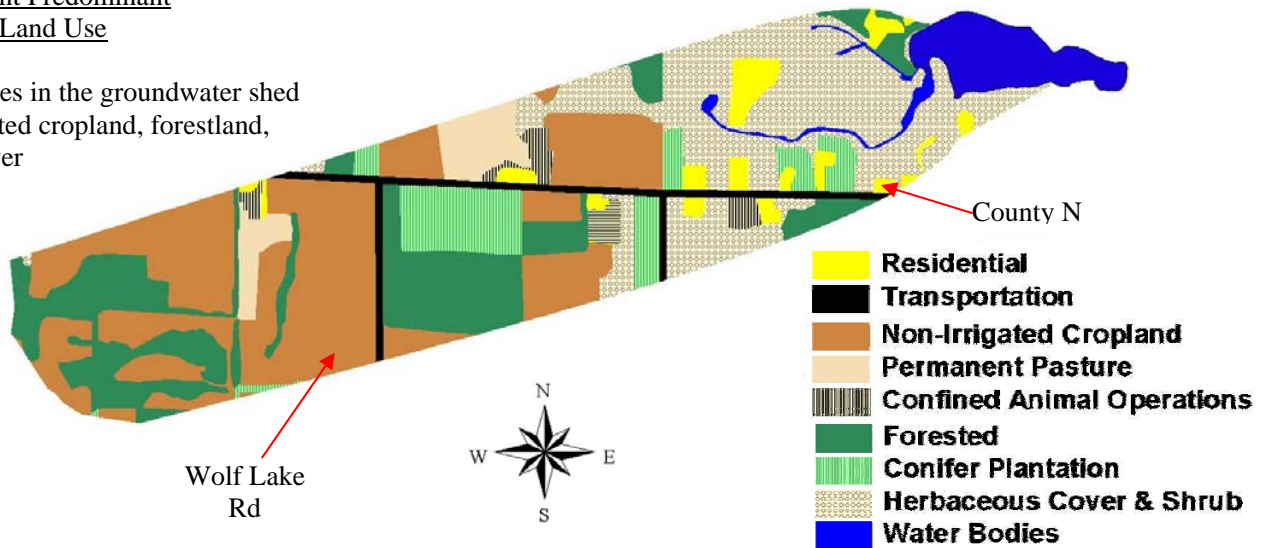


Groundwater Shed: The land area where water soaks into the ground and travels underground to the lake.

Boelter Lake Groundwater Land Use

Current Predominant Land Use

- Major land uses in the groundwater shed are non-irrigated cropland, forestland, and shrub cover



Groundwater Shed Land Use

- Forest, non-irrigated cropland, and shrub cover have dominated the land use since 1948
- Confined animal operations, permanent pasture, and transportation have remained a small fraction of the land use
- Non-irrigated cropland and shrub cover have decreased in area since 1948
- Residential and forested land has increased in area since 1948



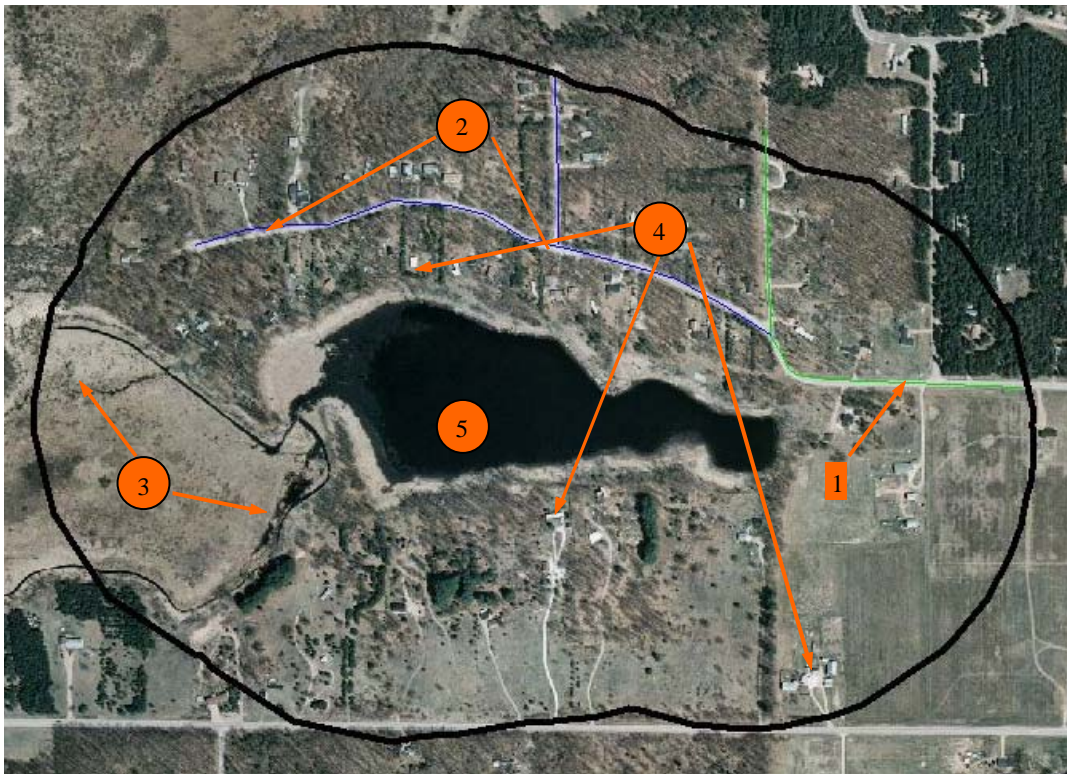
Boelter Lake ~ Taking a closer look (Within a 1,000 feet of lake)



1960 Air Photo Image



1968 Air Photo Image



Points of Interest

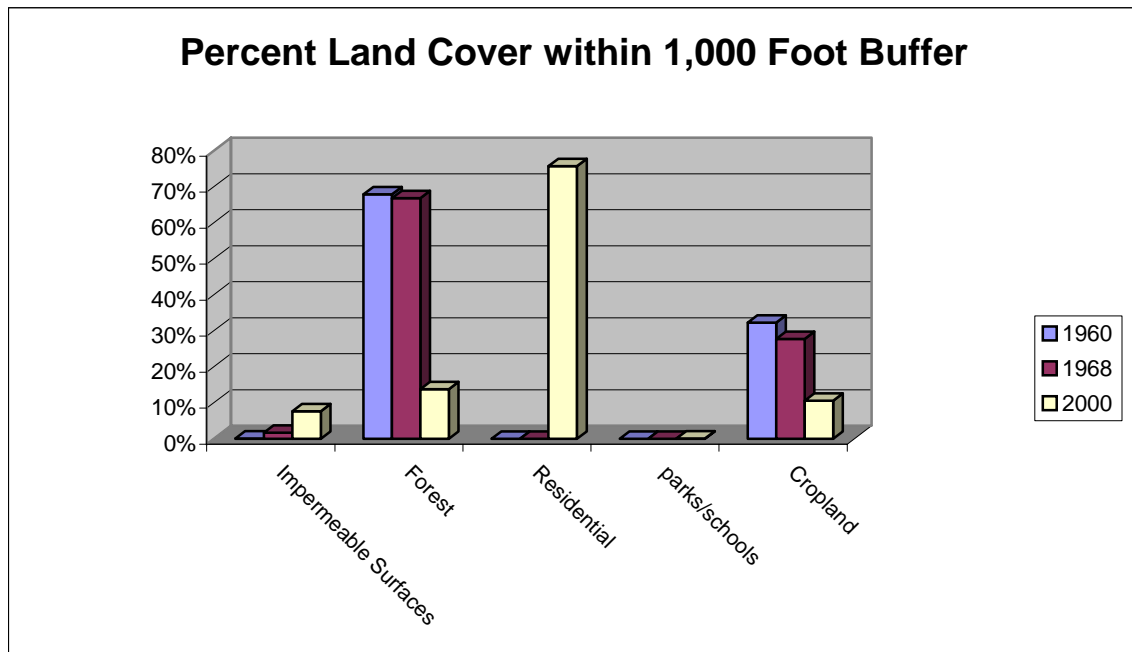
1. Green line is the only access road to the lake in 1960.
2. Blue line indicates new access roads as of 1968 and the subdivisions near the lake.
3. A natural watershed limits the amount of development on the west side of the river.
4. All development near the lake occurred after 1968.
5. Lake level changes between 1968 and 2000.



Boelter Lake ~ Taking a closer look (Within a 1,000 feet of lake)

Changes from 1960 to 2000

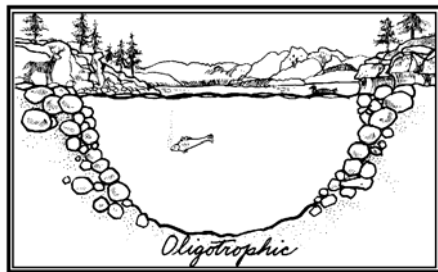
	1960	1968	2000
# of Docks	0	0	1
Impervious Surfaces (acres)	<1	3	13
Residential (acres)	0	0	129
Parks (acres)	0	0	<1
Cropland (acres)	59	53	18
Forest (acres)	124	127	23



Boelter Lake ~ Water Quality

Total Phosphorus

In more than 80% of Wisconsin's lakes phosphorus is the key nutrient affecting aquatic plant and algae growth. Once in a lake system phosphorus levels are difficult to reduce, so limiting phosphorus input is key. Phosphorus at levels above 30 parts per billion (ppb) can lead to nuisance aquatic plant growth and accelerate a lake's change from oligotrophic to eutrophic. Sources of phosphorus include septic systems, detergents, animal waste, farmland and storm sewer runoff, soil erosion, and fertilizers for lawns, gardens, and agriculture.



Oligotrophic Lakes

Common uses:

- ✓ Swimming
- ✓ Skiing
- ✓ Boating

Vegetation of oligotrophic lakes:

- ✓ Very little vegetation



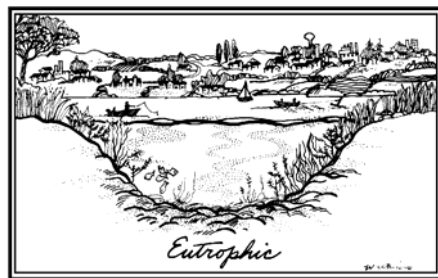
Mesotrophic Lakes

Common uses:

- ✓ Boating
- ✓ Fishing

Vegetation of mesotrophic lakes:

- ✓ Increased vegetation
- ✓ Occasional algal blooms



Eutrophic Lakes

Common uses:

- ✓ Fishing
- ✓ Wildlife watching

Vegetation of eutrophic lakes:

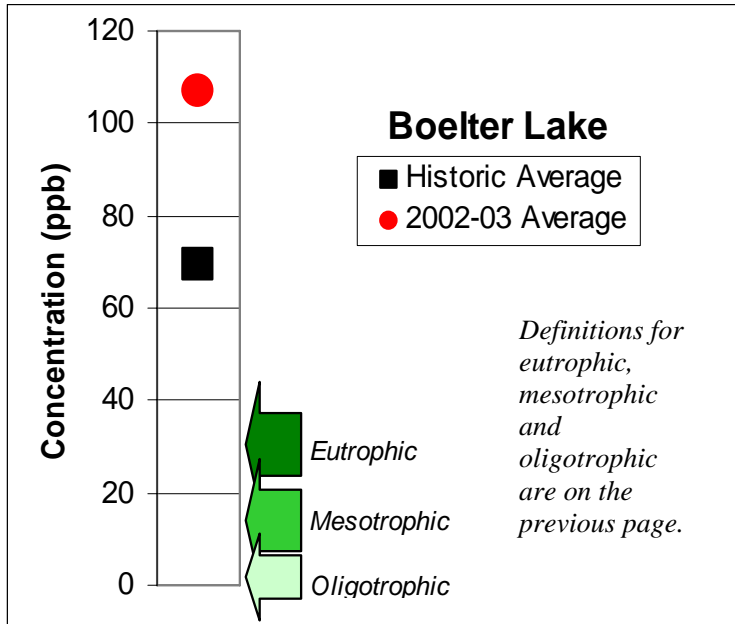
- ✓ Lots of aquatic plants
- ✓ Frequent algal blooms

Winter kill is most common in shallow lakes



Boelter Lake ~ Water Quality

Average Total Phosphorus Levels



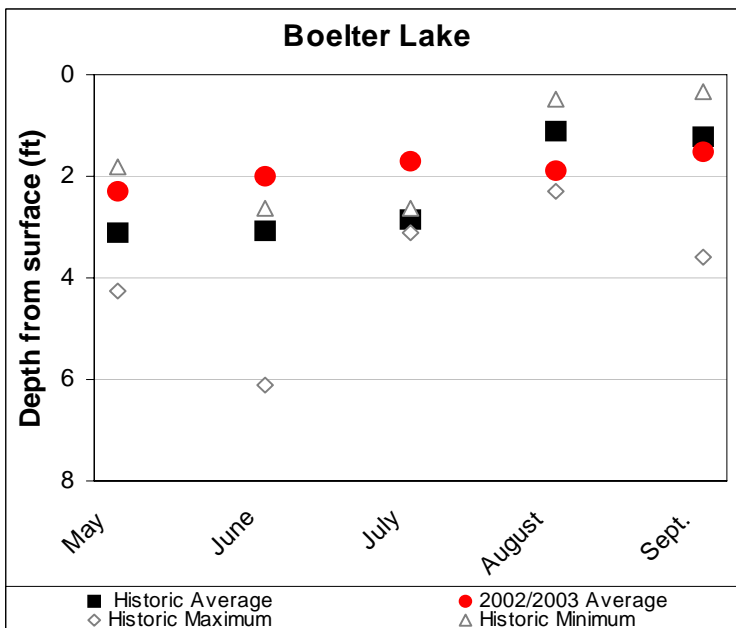
The graph to the left shows total phosphorus levels measured when the lake is well mixed (overturn). Phosphorus levels in Boelter Lake in 2002-03 were significantly higher than the average historic levels, and are much higher than other lakes in the county. Levels of phosphorus above 30 ppb are high enough to categorize a lake as eutrophic, making it subject to aquatic plant growth that results in better fishing and wildlife viewing than swimming.



Overturn: uniform temperature from top to bottom in the lake

Water Clarity

Water clarity (Secchi disc depth) is an indicator of water quality. The two main components affecting water clarity are materials dissolved in the water and materials suspended in the water. Water clarity can indicate overall water quality, especially the amount of algae and suspended sediment present.



The water clarity in Boelter Lake is considered poor. This very shallow lake, partly fed by drained wetland, is not similar to other lakes in the county. Boelter Lake is very shallow and fertile resulting in poor clarity. The water clarity of Boelter Lake during 2002-03 growing season was poorer than the historic growing season average. Fluctuations in clarity throughout the summer are normal as algae populations and sedimentation increase and decrease.



2002 Amphibian Distribution at Portage County Lakes

This summary provides preliminary information on the amphibian species present and their distribution at the twenty-nine Portage County lakes. Surveys were conducted from April 2002 - August 2002, the typical breeding period of the frogs and salamanders found in the county.

Twelve frog species have been documented in Wisconsin, nine of which currently inhabit Portage County: American toad, chorus frog, spring peeper, eastern gray treefrog, Cope's gray treefrog, green frog, pickerel frog, northern leopard frog, and wood frog. Historically, Blanchard's cricket frog inhabited Portage County but is believed to now exist only in southeastern Wisconsin. Of all species believed to inhabit Portage County, only the pickerel frog was not found during the spring and summer of 2002. The pickerel frog has been listed as a species of special concern in Wisconsin. No new species to Portage County were recorded in 2002.

Seven salamander species have been documented in Wisconsin, all of which currently inhabit Portage County: blue-spotted salamander, spotted salamander, tiger salamander, central newt, mudpuppy, northern redback salamander and four-toed salamander. The four-toed salamander is listed as a species of special concern in Wisconsin.

Large sections of continuous natural shoreline on lakes are ideal habitats for frog and salamander populations. Natural areas with large amounts of submergent, emergent and floating-leaf vegetation provide protection for amphibians. Many species also use the vegetation for attachment of eggs during the breeding season. Green frogs, bullfrogs, pickerel frogs and leopard frogs depend on the shoreline area throughout the year. In contrast, American toads, spring peepers, tree frogs, wood frogs and chorus frogs depend on the shoreline area in the spring for breeding and then move to other areas for the rest of the year.

Undisturbed areas of shoreline that are also connected to large natural upland areas provide ideal habitat for many amphibian species because they lessen frogs' exposure to predators. Many frog and salamander species migrate to the lakes in the spring to breed and spend the summer months foraging in the uplands. Many amphibian species will also over winter in the uplands.



Boelter Lake ~ Frogs



Boelter Lake Frogs

Number of species: 4

Species observed to date: spring peeper, American toad, gray treefrog, Cope's gray treefrog

Location of primary habitat: west and southeast sides of lake

Key features of habitat: undeveloped areas of shoreline with submergent and emergent vegetation

Map Key

Red outlined areas = primary frog habitat

Good news

Several portions of shoreline provide ideal habitat for amphibian and reptile populations

Bad news

Some areas of altered shoreline exist due to development



Boelter Lake ~ Aquatic Plants

Aquatic plant surveys were conducted in each lake more detailed information is available in the final report.

Aquatic Plant Survey

There were 32 species found around Boelter Lake; most of these were growing on the extensive wetland and exposed wet soil; a few species were submersed or rooted in the remaining small areas of water or free floating on open water.

The UWSP herbarium has only a few specimens and few observations made when water levels were higher. Most collection and observations were made in 2003. At this time, following dry years, little water was present in the lake and only a few submersed plants were found: coontail, common bladderwort, and water star-grass. A few plants of white waterlily were growing in pockets of water one to three feet deep, but most plants were stranded on shore or on the mud-flat and were becoming desiccated.

The extensive exposed wet soil, wet sand, and mud-flat was dominated by woolly sedge, spikerushes, broad-leaved cattail, reed canary-grass, and golden dock. However, except for a moderate amount of canary-grass, the flora of Boelter Lake is free of invasive exotic species. Given the open, early successional stage of the vegetation and its vulnerability to establishment of invasive plants, this area should be monitored to remove any exotic plants before they become established. It is also notable that Boelter Lake is the only known location in Portage County for wheelwort toothcup, golden dock, and one of only two locations for slender fringe-rush.

Invasive Exotic Aquatic Plants

Invasive species displace native species, disrupt ecosystems, and affect citizen's livelihoods and quality of life. They hamper boating, swimming, fishing, and other water recreation, and take an economic toll on commercial, agricultural and aquatic resources.

(Wisconsin DNR)

Aquatic plants surveys revealed that some of the lakes in the study have invasive aquatic plants present.

Eurasian milfoil (*Myriophyllum spicatum*) was present in Bear Lake, Lake Emily, Lake Joanis, Jordan Pond, McDill Pond, Springville Pond and Thomas Lake.

Curly leaf pondweed (*Potamogeton crispis*) was identified in Spring Lake and Amherst Millpond.

Contact the Portage County Land Conservation Department for additional information.



Boelter Lake ~ What can you do to help?

We Can All Help Take Care Of Our Lake

A lake is a magnificent water resource. The quality of its water is a reflection of what happens on the land that surrounds it.



Lake Users:

- ✓ Run boat engines efficiently.
- ✓ Observe no/low wake zones.
- ✓ Refuel away from water.
- ✓ Dispose of trash property
- ✓ Remove all aquatic plants from boats and trailers.



Land Owners:

- ✓ Control soil erosion.
- ✓ Keep livestock out of lakes and streams.
- ✓ Control manure runoff.
- ✓ Carefully manage nutrients and pesticides.
- ✓ Learn to identify and look for invasive species.



Home Owners:

- ✓ Leave natural vegetation buffers in place or replace them if they have been removed.
- ✓ Eliminate the use of fertilizer or use low/no phosphorus fertilizer.
- ✓ Eliminate or minimize use of pesticides.
- ✓ Control soil erosion.
- ✓ Clean up after pets.
- ✓ Learn to identify and look for invasive species.



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- Wisconsin DNR Lake Protection grants
- UW-Stevens Point
- Portage County
- Portage County Citizens

Study Contacts:

Portage County: Steven Bradley at 346-1334

UW- Stevens Point: Nancy Turyk at 346-4155



Boelter Lake ~ Primary Researchers

Algae

Dr. Bob Bell

Aquatic Plants

Dr. Robert Freckmann

Birds

Dr. Tim Ginnett

Brad Bulin (Graduate Student)

Fish

Dr. Ron Crunkilton

Land Use Coverages/Watersheds

Steve Bradley (Portage County Conservationist)

Planning Assistance

Lynn Markham

Mike Hansen

Reptiles and Amphibians/Near Shore Habitat

Dr. Erik Wild

Rori Paloski (Graduate Student)

Water Quality/Watersheds

Becky Cook

Dr. Paul McGinley

Dr. Byron Shaw

Dick Stephens

Nancy Turyk

Near Shore Summary

Dr. Glenn Bowles

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