

Tree Lake

Final Results

Portage County Lake Study

University of Wisconsin-Stevens Point
Portage County Staff and Citizens

April 12, 2005

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.

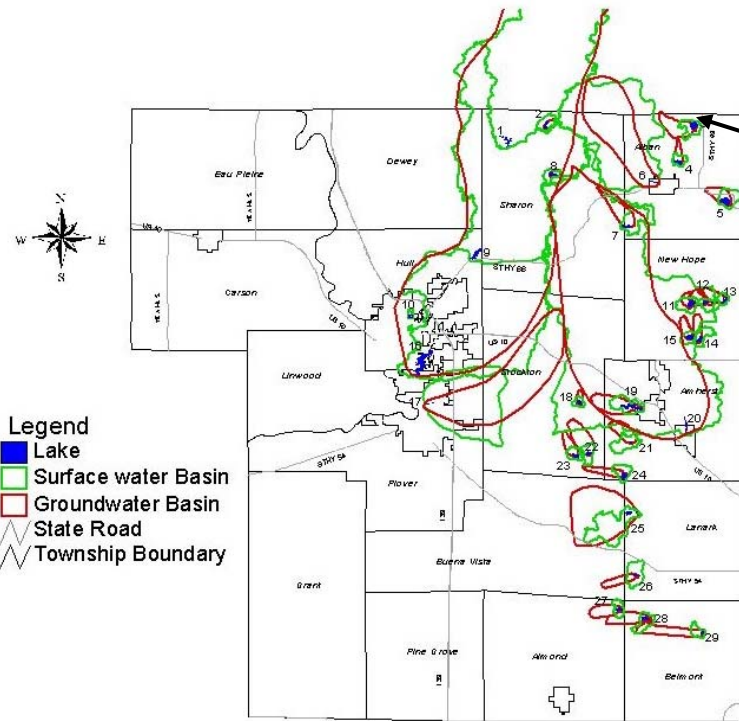
- ✓ *Develop consensus about the local goals and objectives for your lake.*
- ✓ *Identify available resources (people, expertise, time, funding).*
- ✓ *Explore and choose implementation tools to achieve your goals.*
- ✓ *Develop an action plan to achieve your lake goals.*
- ✓ *Implement your plan.*
-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



Tree Lake ~ Location



Tree Lake
 Southwest of Highway 49 and the Portage County / Marathon County Boarder. Four miles north of Rosholt in the Town of Alban

Surface Area: 73 acres
Maximum Depth: 33 feet
Lake Volume: 1051 acre-feet

Tree Lake

Water Flow

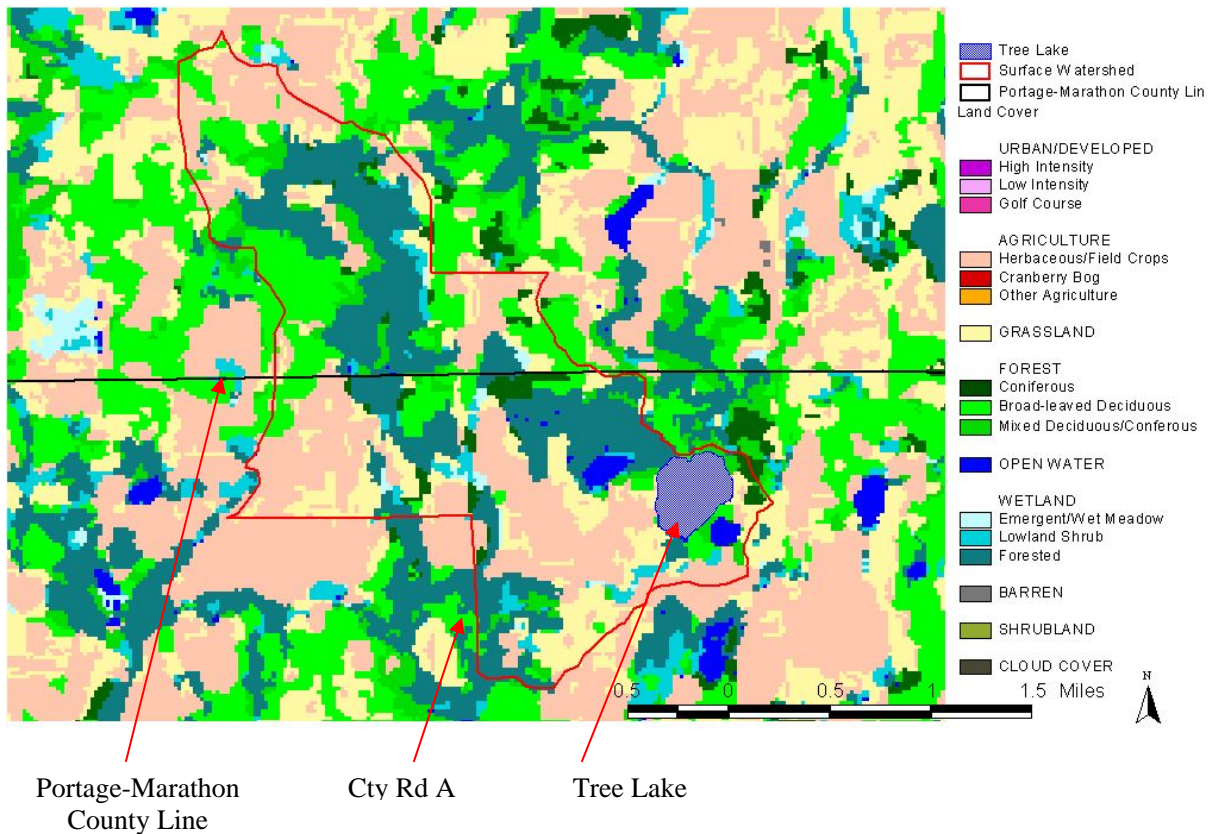
- Tree Lake is a drainage lake
- Water enters Tree Lake via groundwater and two inlets. One is in the northwest corner (which is also the outlet of Mud Lake) and the other at the south end. Additional sources of water are runoff, and precipitation
- Water exits the lake through the outlet to the north into the Little Wolf River's north fork, and to groundwater.



Tree 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. The watershed shown below also includes adjacent wetlands.



Current Predominant Land Use

- Around the lake: residential use is most prominent
- In the watershed: non-irrigated cropland, forests, and shrub cover are abundant
- Penny and Mud lakes are also in the Tree Lake watershed



Tree Lake ~ Land Use in the Groundwater Shed



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

Tree Lake Groundwater Landuse

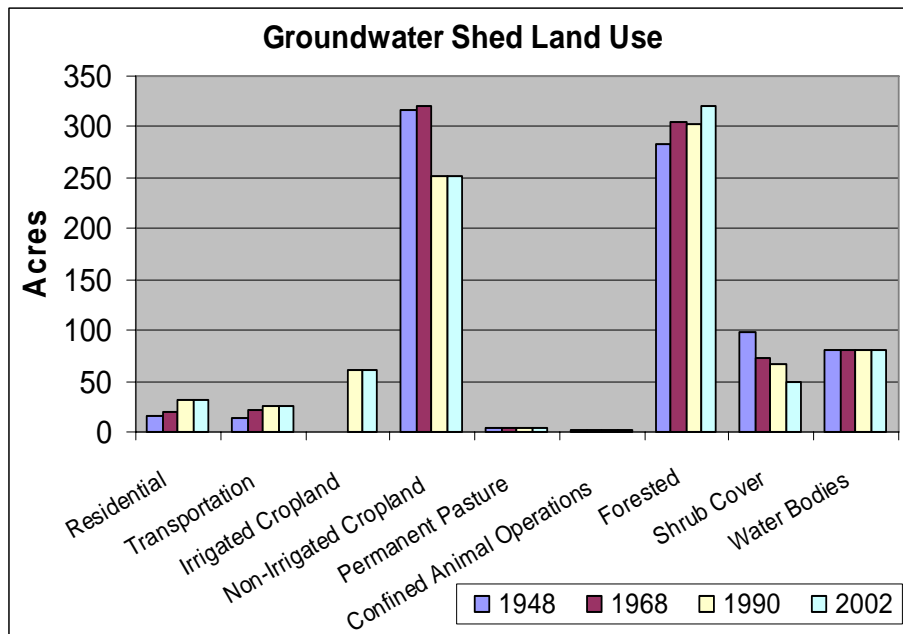
- Residential
- Transportation
- Irrigated Cropland
- Non-Irrigated Cropland
- Permanent Pasture
- Confined Animal Operations
- Other Agricultural Buildings
- Forested
- Conifer Plantation
- Herbaceous Cover & Shrub
- Water Bodies



Current Predominant Land Use

- Major land uses in the groundwater shed are forest and non-irrigated agriculture

Cty Rd A



Groundwater Shed Land Use

- Forest and non-irrigated cropland have dominated the land use since 1948
- Residential and transportation uses have increased while shrub cover has decreased
- Irrigated agriculture was introduced in this groundwater shed after 1968



Tree Lake ~ Taking a Closer Look

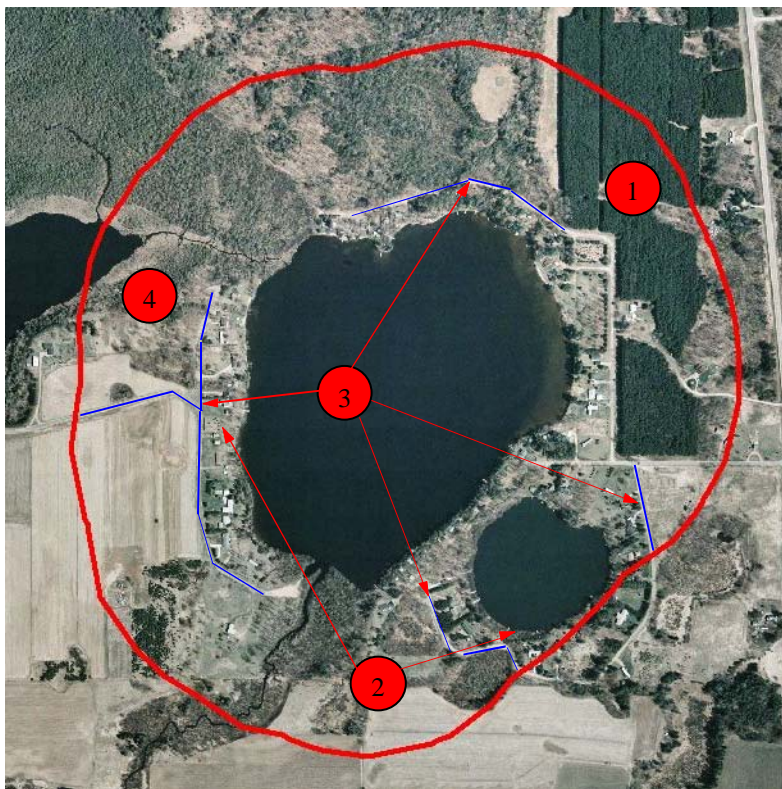
(Within 1,000 feet of the lake)



1960 Air Photo Image (9-6-1960)



1938 Air Photo Image (9-24-1938)



2000 Orthophoto (5-2000)

Noted Features	
	1000 Foot Buffer
	Road Network 2000

Points of Interest

1. The area surrounding this marker was once cropland. Now it is a pine plantation.
2. Penny Lake on the southeast side of Tree Lake, was developed after 1960. The west lakeshore underwent significant development.
3. The blue lines indicate road modifications since 1960. These modifications significantly increased the impervious surface surrounding Tree Lake.
4. There is a noticeable amount of reforestation adjacent to Mud Lake located northwest of Tree Lake.

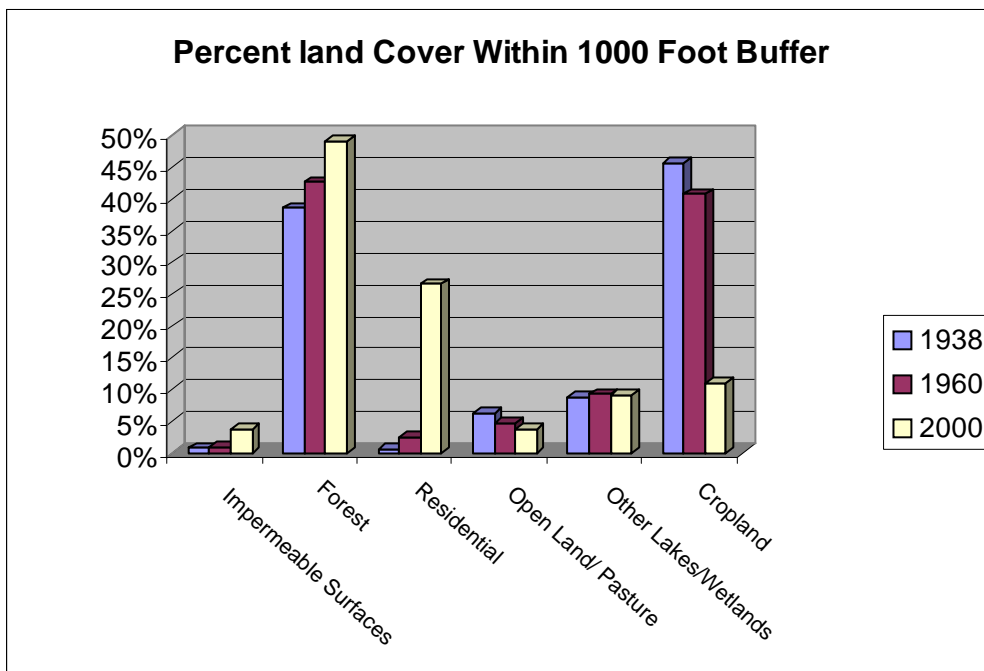


Tree Lake ~ Taking a Closer Look

(Within 1,000 feet of the lake)

Changes from 1938 to 2000

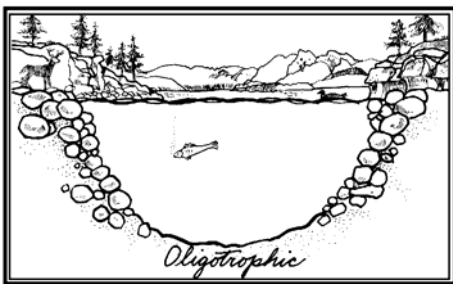
	1938	1960	2000
# of Docks	0	6	15
Impervious Surface (acres)	2	2	8
Residential (acres)	1	5	58
Cropland (acres)	99	89	24
Forest (acres)	84	93	107
Wetlands (acres)	19	20	20
Open Land (acres)	14	10	8



Tree 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.



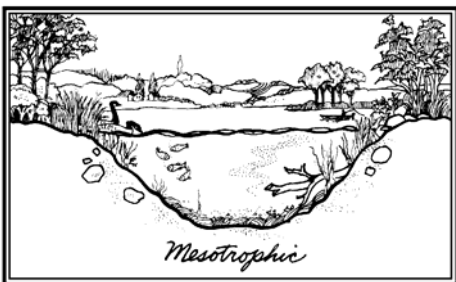
Oligotrophic Lakes

Common uses:

- ✓ Swimming
- ✓ Skiing
- ✓ Boating

Vegetation of oligotrophic lakes:

- ✓ Very little vegetation



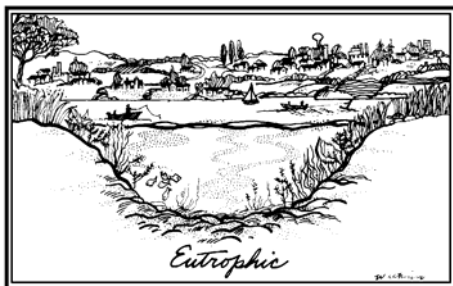
Mesotrophic Lakes

Common uses:

- ✓ Boating
- ✓ Fishing

Vegetation of mesotrophic lakes:

- ✓ Increased vegetation
- ✓ Occasional algal blooms



Eutrophic Lakes

Common uses:

- ✓ Fishing
- ✓ Wildlife watching

Vegetation of eutrophic lakes:

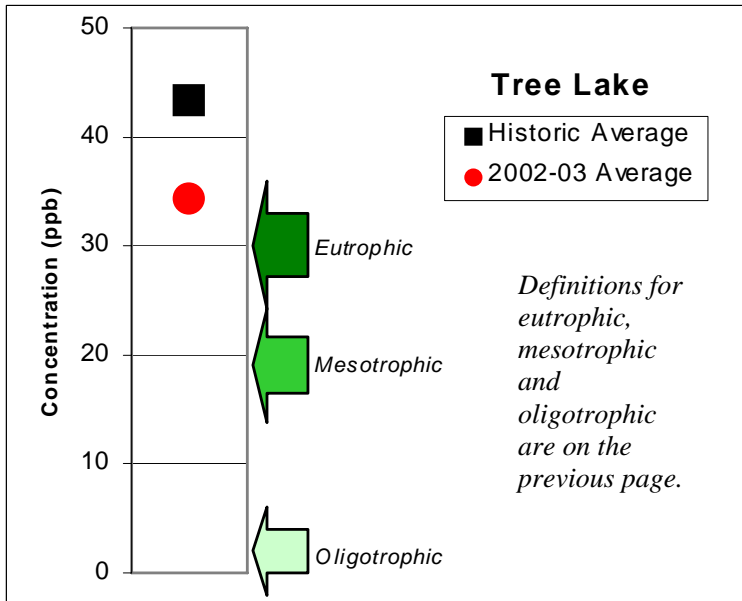
- ✓ Lots of aquatic plants
- ✓ Frequent algal blooms

Winterkill of fish can occur



Tree Lake ~ Water Quality

Average Total Phosphorus Levels



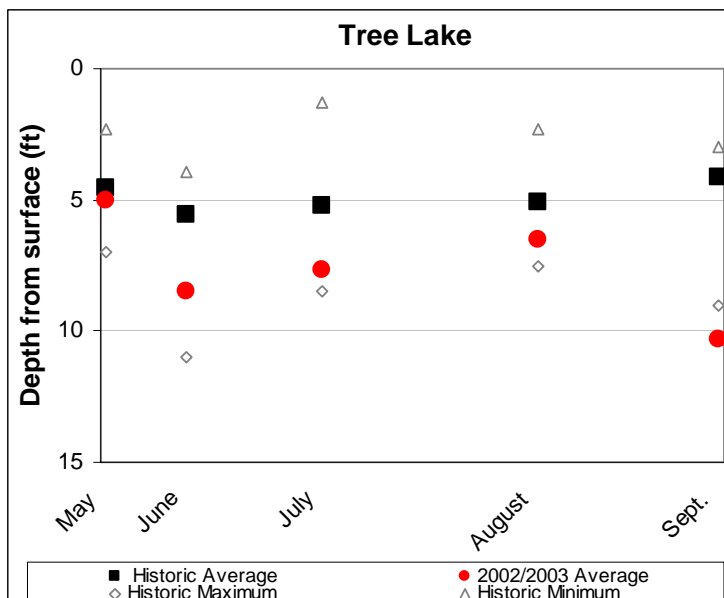
The graph to the left shows total phosphorus levels measured when the lake was well mixed (overturn). Phosphorus levels in Tree Lake in 2002-03 were lower than average historic levels, however they are still high. Levels of phosphorus above 30 ppb are high enough to categorize a lake as eutrophic, making it nuisance algae blooms and aquatic plant growth. Concentrations of phosphorus in Tree Lake during 2002-03 were similar the average of 36 ppb for similar lakes in the county.



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 Tree Lake is considered fair. The average Secchi depth reading for similar lakes in the region is 10 feet; Tree Lake appears to have worse clarity than this. The water clarity of Tree Lake during 2002-03 growing seasons was better than the historical growing season average. The month of September shows the best water clarity and the month of May the poorest. These fluctuations throughout the summer are normal as algae populations and sedimentation increase and decrease.



2002 Amphibian Distribution at Portage County Lakes

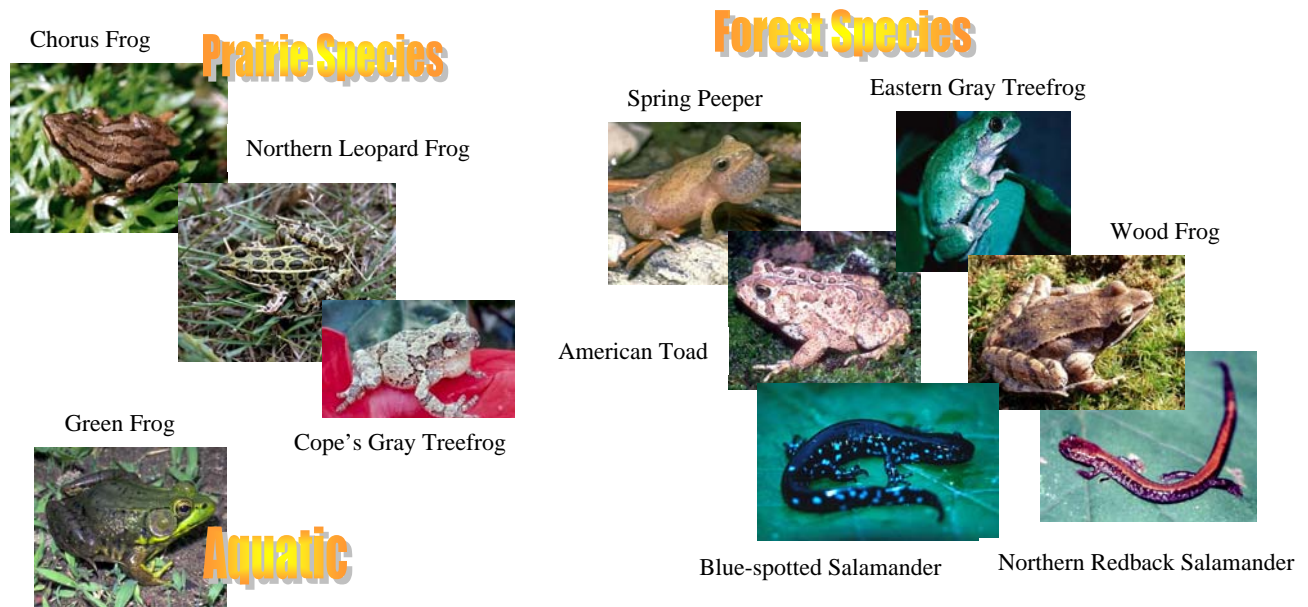
This summary provides preliminary information on the amphibian species present and their distribution at the twenty-nine Portage County lakes. Surveys were conducted from April 2002 - August 2002, the typical breeding period of the frogs and salamanders found in the county.

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.



Tree Lake ~ Frogs and Turtles



Tree Lake Frogs and Turtles

Number of frog species: 3

Frog species observed: spring peeper, American toad, green frog

Location of primary habitat: west side of lake

Key features of habitat: protected areas of marsh with large amounts of submergent, emergent, and floating-leaf vegetation

Number of turtle species: 2

Turtle species observed: snapping turtle, painted turtle

Map Key

Red outlined areas = primary frog habitat

Good News

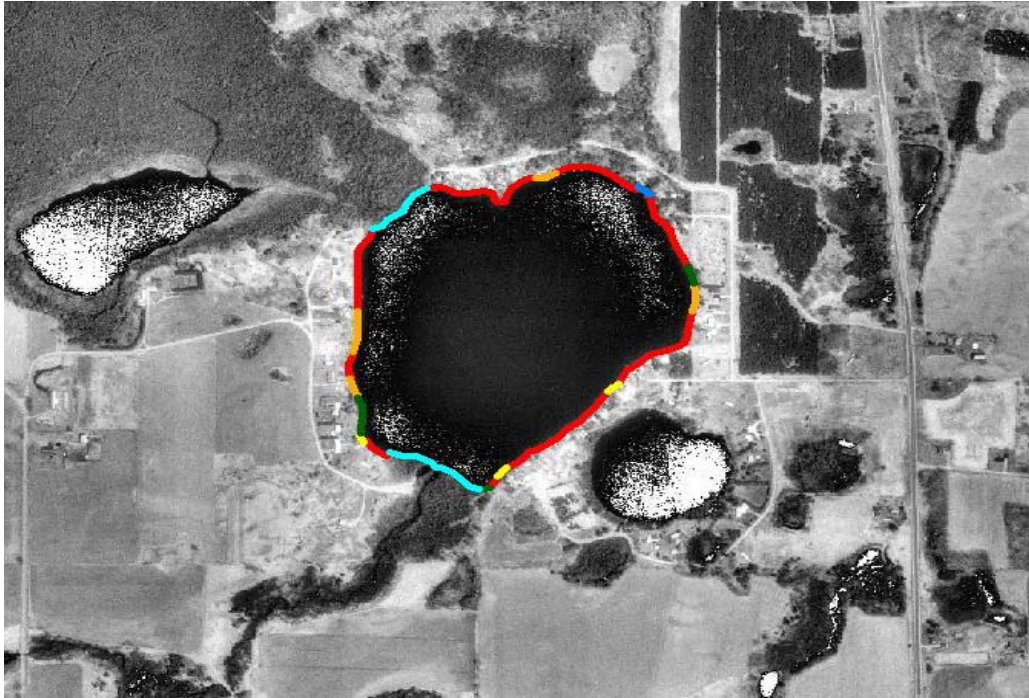
Some large sections of undisturbed, natural shoreline present


Bad News

High level of shoreline development



Tree Lake ~ Shoreline Vegetation



-  Cover 1 - Tamarack/Black Spruce
-  Cover 2 - Alder Shoreline
-  Cover 3 - Narrow Wetland Shoreline
-  Cover 4 - Vegetated Shoreline
-  Cover 5 - Grasses/Shrubs
-  Cover 6 - Low Disturbance
-  Cover 7 - Moderate Disturbance
-  Cover 8 - High Disturbance

Frogs and toads depend on shoreline and aquatic vegetation for:

- attachment of eggs during the breeding season,
- shelter for adults throughout the spring and summer,
- food for larvae,
- habitat for prey, and
- slowing evaporation and moderating temperature fluctuations.

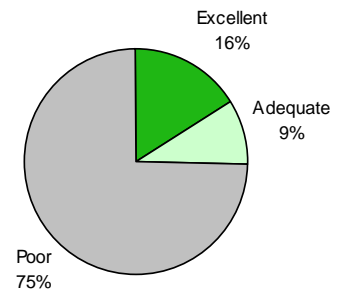
Frogs are commonly found in areas with large amounts of tree cover, aquatic plants, leaves, and downed branches, characteristics typical of natural areas. Frogs are not frequently found in sandy areas or open water, characteristics typical of altered areas. Though amphibians use drier prairies and woodlands near lakes and wetlands, this study focused on areas reaching from 16 feet into the lake to 33 feet inland.

Green frogs are used as an indicator for the health of aquatic life in Wisconsin lakes because they are abundant, live in many cover types, and remain along the edge of the lake throughout the spring and summer. While other amphibians may require more specific cover types, the green frog habitat is a useful indicator. Some cover types (as shown on map above) are better than others for green frogs. Specifically:

- Excellent green frog habitat = cover types 1 and 2
- Adequate green frog habitat = cover types 3, 4 and 6
- Poor green frog habitat = cover types 5, 7 and 8

Lakes with larger amounts of good green frog habitat will likely support more amphibians and more species of amphibians. Likewise, amphibians are more likely to be harmed or eliminated with increasing shoreland development.

Tree Lake Green Frog Habitat



Best Green Frog Habitat: Ebert Lake

33% excellent habitat + 67% adequate

Worst Green Frog Habitat: Helen Lake

2% excellent habitat + 6% adequate + 92% poor



Tree Lake ~ Aquatic Plants

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

Aquatic Plant Survey

There are 38 species of aquatic macrophytes (37 species of vascular plants plus one species of macrophytic algae) that have been found in Tree Lake or on the adjacent wet shore and wetland. This is below average for Portage County lakes.

Tree Lake has a relatively small aquatic flora, composed of species typical of fairly hard water lakes. No major invasive species have been found to date in the lake. Although much of the shoreline is developed or in park land, reed canary-grass is the only invasive alien species noted. Wetland complexes including swampy or boggy woods extend northwest from the northwestern shore and also along Klondike Creek to the southwest from the south shore of Tree Lake. If botanical inventories of these wetlands were added to the data for Tree Lake, the floristic quality index would probably increase substantially.

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
- Thomas Lake

Curly leaf pondweed (*Potamogeton crispis*) was identified in

- Spring Lake
- Amherst Millpond

Contact the Portage County Land Conservation Department for additional information.



Tree Lake ~ What can you do to help?

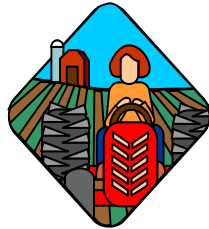
We Can All Help Take Care Of Our Lake

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 properly
- ✓ 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

Project support provided by:

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

Study Contacts:

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UW- Stevens Point: Nancy Turyk at 346-4155



Tree Lake ~ Primary Researchers

Algae

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Aquatic Plants

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Birds

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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

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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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for their assistance!

