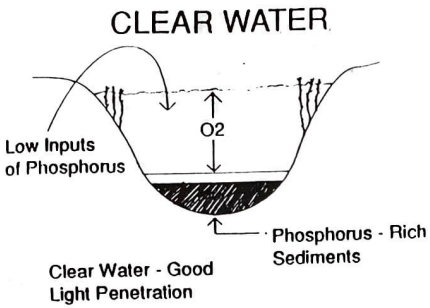
Is Little Sissabagama Lake Close to Reaching A Threshold–A Point of No Return?

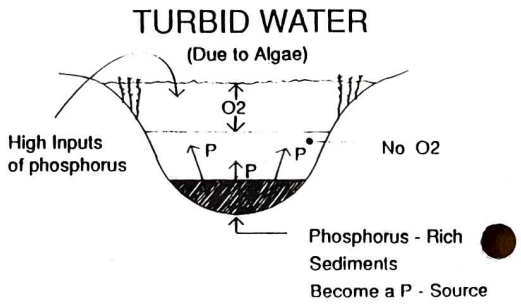
A Clear Water/Plant Condition is Generally More Desirable than a Turbid Water/Algae Condition.

Clear Water/Plant Phase: New lakes generally start out with clear water and macrophytes. An undisturbed watershed's nutrient input is low. Oxygen is found even in deep water throughout the year. Sediments accumulate phosphorus, but release very little. Clear water allows gamefish to control undesirable bottom feeding fish such as carp.

Turbid Water/Algae Phase: Development in the watershed can produce a greater nutrient input to a lake. Because of increased nutrient inputs spring algae blooms increase and when they die and settle to the lake bottom, bacteria use oxygen as they decompose the algae. If oxygen is depleted, iron then dissolves in the lake sediments, and phosphorus, that was formerly tied up with the iron, is now released. The phosphorus is used by summertime algae, increasing water turbidity. Rooted plants can no longer grow in deep water because of reduced light penetration. Fewer plants also mean reduced surface area for attached algae growth so more algae are now free-living than attached. Bottom feeding fish also recycle phosphorus from the lake sediments. The algae blooms that die at the end of the summer represent an organic phosphorus source that will be available for algae growth in the spring. Sometimes, even if watershed phosphorus inputs decrease, the lake sediment phosphorus will be sufficient to fuel spring growth.

Little Sissabagama Lake is currently in the clear water/plant phase.





Lake Sampling Results and Recommended Projects

Little Sissabagama Lake is in the fortunate position that it does not need any major water quality improvement projects at this time. Little Sissabagama is a good example of a lake at ecoregion values for phosphorus, algae, and water clarity. What Little Siss really needs is protection... protection from soil erosion and excessive nutrient inputs.

Future projects for Little Siss center around protection and maintenance. For example, make sure all new development strictly adheres to County and State regulations. Keeping the shoreline as natural as possible will help maintain spawning habitat for all fish in the lake including muskies.

Aquatic plants should be left in place with no herbicide application and no mechanical harvesting used (maintenance hand pulling along some of you frontage is okay).

In regard to fish, I have several recommendations. I would not recommend stocking walleyes, I think it is too risky to the natural reproducing muskie population. Stunted sunfish removal by using fyke nets is a potential project, but fairly expensive; about $10,000 (project would occur over 3 years) and there is no guarantee that muskie, smallmouth and largemouth bass numbers would increase. As long as fishing pressure is light and as long as there is a strong catch and release ethic, the gamefish community has a chance to remain an exciting fishery.

Acknowledgments

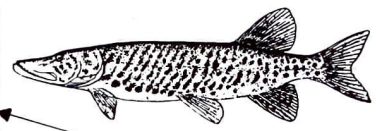
Contributors:
Little Sissabagama Lake Association
Del Anderson
Roger Lindberg
Jim Kissinger
Armond Schneider
Doug Dunlop
Wisconsin DNR
Frank Pratt

Consultant:
Blue Water Science
Steve McComas
Jo Schomaker
St. Paul, MN

Little Sissabagama Lake
Sawyer County, Wisconsin
May 1993 Project Summary

HOW LITTLE SISSABAGAMA WORKS

Fish: are the top predators in the lake. Big fish eat little fish, and little fish eat zooplankton. If the water is cloudy then fish have a hard time seeing their prey and gamefish can decrease.



Zooplankton: are small organisms that swim in the open water. Zooplankton eat open water algae, and are then fed upon by small fish.

Aquatic Invertebrates: are small organisms that graze on the algae growing on aquatic plant stems and leaves. Small fish will feed on these invertebrates as well.

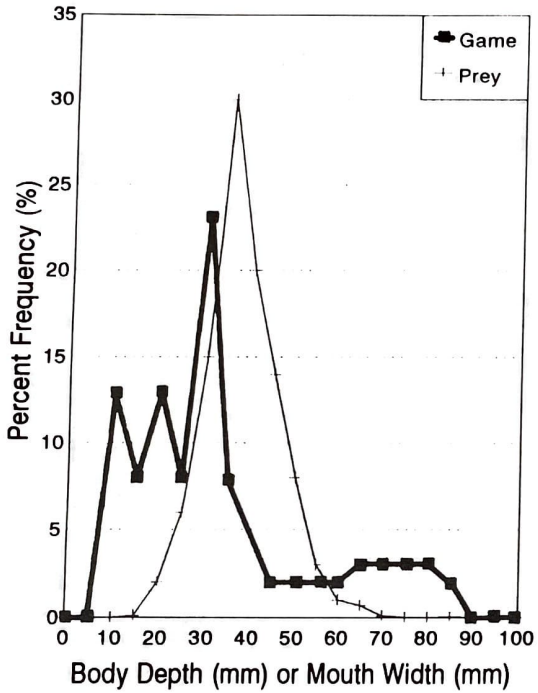
Algae: are microscopic plants that grow in the water and attached to plants. Their density depends on the amount of nutrients in the water. If the water has a greenish appearance, there are probably a lot of algae growing in the open water.

Plants (macrophytes): are important to lakes. They stabilize lake sediments and are used by aquatic bugs and small fish for protection. Algae grows on plant surfaces.

Phosphorus & Nitrogen: are the most important nutrients in the water. The higher the concentration of these two nutrients the greater the plant growth and the density of the algae.

Several ecological food webs operate in Little Sissabagama Lake. One web starts with nutrients leading to algae then to zooplankton and finally to fish. Another food web starts with nutrients which affect growth rates of attached algae (on plants) then to aquatic insects and to the fish. Over the years, excessive nutrient inputs (primarily phosphorus) have caused algae to become dominant creating poor overall water quality. The food web with aquatic plants has become less important. If the aquatic plant food web could regain importance, the algae dominated food web would become less dominant and so would the occurrence of nuisance algae.

1993 Fish Survey Results



The good news is big muskies are in Little Sissabagama, but an area of concern is that we did not find small ones. Preyfish (forage) are not plentiful for small gamefish and this is what the graph above shows. We have converted muskie and largemouth bass total lengths to their mouth widths (scientists have made these measurements). We then converted preyfish (minnows, sunfish, yellow perch, other small fish) to body depths. The idea is a gamefish can shallow a preyfish if its mouth is wider than the preyfish's body depth. Big fish (with mouth widths over 40 millimeters) have a lot of forage. Smaller gamefish (mouth widths less than 40 mm, do not have as much forage available). It takes a 19 inch muskie or a 14 inch largemouth bass to eat a prey fish with a 40 mm body depth (a 4.5 inch bluegill or a 6 inch perch have 40 mm body depths). This is one reason why I am hesitant to recommend stocking walleyes. Young walleyes would be competing with bass and muskies for a limited food source. We don't want muskie recruitment to fall below a critical level, otherwise natural reproduction could cease.

What do the Results Mean to Lake Users?

When first looking at the graph to the left and the table below (table below is from the May 1993 fish survey) one can ask what does it mean. I think one conclusion is that sunfish are stunted. Since the 1959 it appears that stunted bluegills have been living in Little Sissabagama. The last fish survey that the Wisconsin Department of Natural Resources (DNR) conducted on this lake was in the early 1970s. At that time the DNR was stocking large muskie fingerlings trying to control the bluegill situation. The stocking on Little Sissabagama stopped in the early 1970's. It appears that stocking large muskie fingerlings was not effective. However few strategies we have do work.

Results indicate that yellow perch and golden shiner are still present and also that muskies are naturally reproducing. It looks lake a largemouth bass population may also be on the rise.

May 1993 Fyke Net Survey

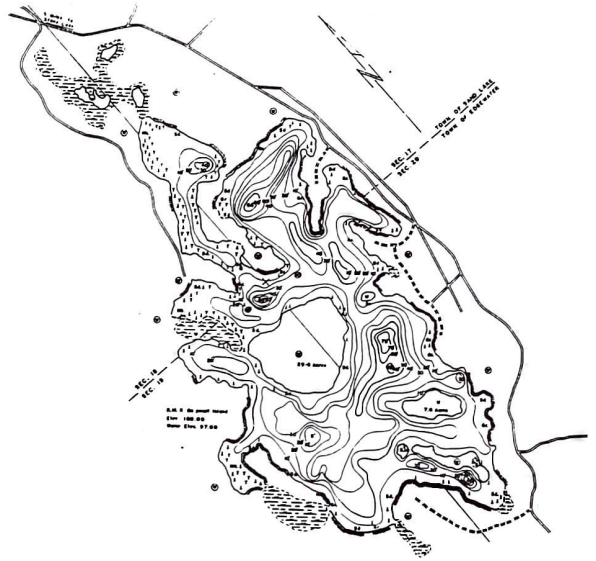
Fish	Number per lift	Size Range (cm)
Yellow Perch	21	8-24
Crappie	4	8-33
Golden Shiner	3	11-19
Pumpkinseed	3	9-19
Bluegill	200	6-17
Largemouth Bass	3	11-44
Smallmouth Bass	0.1	13-14
Rock Bass	1	11-24
Muskie	0.6	74-102
Bullheads	0.06	17
White Sucker	0.4	23-460

Little Sissabagama, Sawyer Co, Wisconsin

Lake Characteristics

Lake surface area:	299 acres
Watershed Size:	610 acres
Shoreline Length:	6.7 miles
Average Depth:	19.7 feet
Maximum Depth:	75 feet
Lake Volume:	5,900 acre-feet
Water Retention Time:	< 5 years
Water Transparency:	10 feet
Total Phosphorus:	10 ppb
Total Nitrogen:	1,280 ppb
pH:	7.6
Alkalinity:	9 mg/l
Residences:	23, 1 resort

All information was from a lake survey that was conducted in 1988 by Blue Water Science. Water chemistry analysis was conducted by ...ver of Wisconsin-Stevens Point.



Past Projects Indicate Good Water Quality

Little Sissabagama Lake has good water transparency (10 feet), so you might think problems are minimal. However, what you can't see sometimes can surprise you. Under the waters of Little Sissabagama lurks an interesting situation. It has to do with stunted panfish. These fish are amazing consumers. The more food available to the young fry the more that survive. But that's part of the problem. The panfish food source is zooplankton and small insects and all the panfish use the same food source. There is a limited amount of food and this limits the ... the panfish will grow to. The size these stunted panfish reach is too small for fishermen to catch on purpose, unless they want to clean a lot of fish for fish and chips, and the size is to large for most of the predator fish, gamefish, to eat. How can this be fixed? Large predator fish could take care of this but how do you get large predator fish? Thinning out the stunted panfish by netting is a possibility, but the aquatic plant community may offer too many hiding places thereby negating sunfish removal efforts. We may rely on largemouth bass to control sunfish.

August 1990 Fyke Net Survey

Fish	Number/ Lift	Range in Size (cm)
Yellow Perch	1	10-18
Crappie	1	10-30
Pumpkinseed	9	8-18
Bluegill	208	5-15
Largemouth Bass	1	10-28
Smallmouth Bass	4	10-36
Rock Bass	3	10-30
Muskie	0.1	69

This special newsletter was prepared by Blue Water Science, St. Paul, Minnesota, and is part of a gamefish study conducted by Blue Water Science. This study was funded by the Little Sissabagama Lake Association with a permit from the Wisconsin Department of Natural Resources.