LAKE WINNISQUAM

2013 SAMPLING HIGHLIGHTS

Belmont, Laconia, Meredith, Sanbornton and Tilton, NH

NEW HAMPSHIRE
LAKES LAY MONITORING

Lake Winnisquam volunteers collected water quality data between June 22 to September 28, 2013. Water Quality sampling was performed at the Waldron Bay, Gilson Cove and Bartlett Cove sampling sites.

Light Blue = Outstanding = Ultraoligotrophic

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Light Gray = No Data

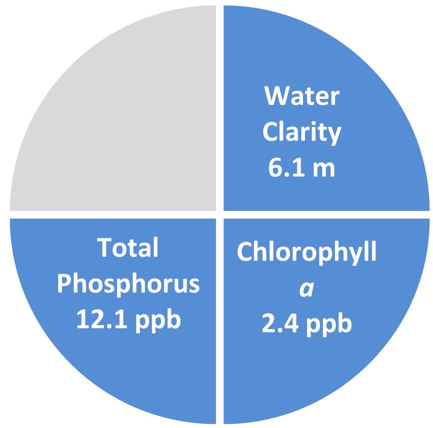

Figure 1. Average Water Quality Conditions

2013 RESULT HIGHLIGHTS

WATER CLARITY: Water clarity, measured as Secchi disk depth, averaged 6.1 meters (m) among the three Lake Winnisquam sampling locations. The 2013 Lake Winnisquam water clarity was slightly shallower than the 2012 water clarity at the Waldron Bay and Bartlett Cove sampling locations. On the other hand, the water clarity was visible deeper into the water column at Site 20 Gilson Cove.

CHLOROPHYLL: Chlorophyll *a*, a measure of microscopic plant life within the lake, averaged 2.4 parts per billion (ppb) in Lake Winnisquam. The 2013 Winnisquam chlorophyll *a* concentrations were higher (greener water) than the 2012 concentrations at each of the three deep sampling locations.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. Total phosphorus concentrations average 12.1 parts per billion (ppb) in the surface waters among the three sampling locations. With the exception of Site 10 Waldron Bay, the surface water total phosphorus concentrations remained below 10 parts per billion (ppb) that is considered sufficient to support green water events that are referred to as algal blooms.

COLOR: Color is a result of naturally occurring "tea" colored substances from the breakdown of soils and plant materials. The Lake Winnisquam color averaged 11.2 color units (CPU). The low Lake Winnisquam color concentrations suggest that variations in Lake Winnisquam water clarity are generally associated with fluctuating algal growth and suspended sediment levels.

ALKALINITY: Alkalinity measures the lake's resistance against acid rain. The Lake Winnisquam alkalinity measured 8.4 milligrams per liter (mg/L). The 2013 alkalinity indicates Lake Winnisquam has a moderate vulnerability to acid rain.

Parameter	Ultraoligotrophic "Outstanding"	Oligo "Excellent"	Meso "Fair"	Eutrophic "Poor"	Lake Winnisquam Average (range)	Lake Winnisquam Classification
Water Clarity (meters)	> 7.0	4.0 – 7.0	2.5 - 4.0	< 2.5	**6.1** meters (range: 5.0 – 7.1)	Oligotrophic
Chlorophyll *a* (ppb)	< 2.0	2.0 - 3.0	3.0 - 7.0	> 7.0	**2.4** ppb (range: 1.0 – 4.9)	Oligotrophic
Total Phosphorus (ppb)	< 7.0	15.0 – 7.0	15.0 - 25.0	> 25.0	**12.1** ppb (range: 6.0 – 33.1)	Oligotrophic
Cyanobacteria (cell counts, microcystin concentration & Water safety)	The Massachusetts Department of Public Health considers dangerous microcystin (MC) levels to be 14 micrograms per liter (ug/l) lake water, and/or 70,000 cyanobacteria cells per milliliter lake water.			The New Hampshire Department of Environmental services posts warnings at State beaches when cyanobacteria cell numbers exceed 70,000 cells per milliliter lake water.		

LONG TERM TRENDS

WATER CLARITY: The Lake Winnisquam water clarity has decreased over the past 17 years of water quality monitoring. The trend is statistically significant at Sites 10 Waldron Bay, 20 Gilson Cove and 30 Bartlett Cove.

CHLOROPHYLL: The Lake Winnisquam chlorophyll *a* concentration displays a trend of decreasing chlorophyll a concentrations over the past 17 years of water quality monitoring. However, the trend is not statistically significant at Sites 10 Waldron Bay, 20 Gilson Cove or 30 Bartlett Cove.

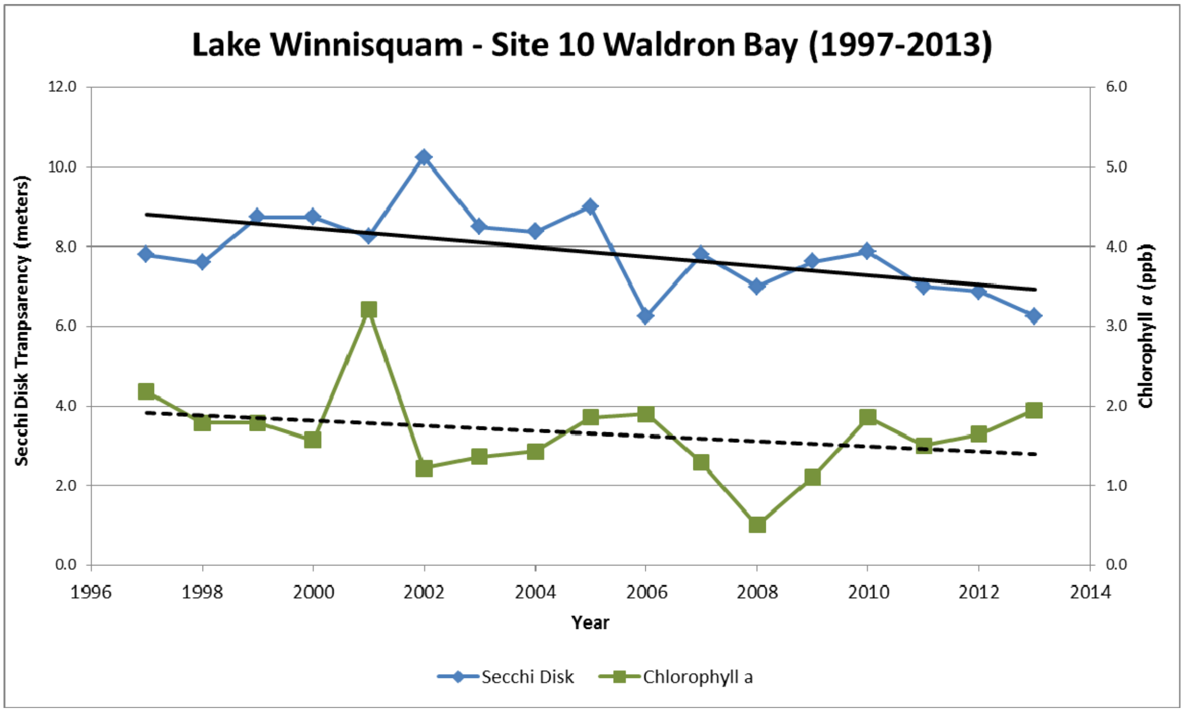

Figure 2. Changes in water clarity (Secchi disk depth) and chlorophyll *a* measured between 1997-2013 at Site 10 Waldron Bay. There has been a decreasing water clarity trend shown by deeper Secchi disk depth through time. The trend is statistically significant (solid line). Algal growth (chlorophyll; dashed line) has decreased over the past seventeen years of sampling. However the trend is not statistically significant. *Note: Sites 20 Gilson Cove and 30 Bartlett Cove display similar trends over the past seventeen years of water quality monitoring.*

Recommendations:

- Begin sampling early in the season (April/May) to document Lake Winnisquam's reaction to the period of spring thaw and periods of high streamflow. Whenever possible, collect bi-weekly water transparency measurements. Monthly chlorophyll *a*, total phosphorus and dissolved color measurements are also suggested.
- Consider adding a simple cyanobacteria monitoring routine that is based on the existing water quality monitoring methods. Cyanobacteria collections throughout the summer and fall months can give insight as to how these populations are distributed throughout the seasons and when they are most likely to reach potentially harmful levels. If you are interested in discussing additional water quality monitoring options that would meet your needs please contact Bob Craycraft @ 862-3696 or bob.craycraft@unh.edu.
- Implement Best Management Practices within the Lake Winnisquam watershed to minimize the adverse impacts of polluted runoff and erosion into the lake. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home" for more information on how to reduce nutrient loading caused by overland run-off.
  - https://extension.unh.edu/resources/files/Resource001799_Rep2518.pdf
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