LITTLE SQUAM LAKE

SITE 1B (EAST) 2013 SAMPLING HIGHLIGHTS

HOLDERNESS & ASHLAND, NH

NEW HAMPSHIRE LAKES LAY MONITORING

Little Squam Lake volunteers collected water quality data between May 19 and October 20, 2013 while more in depth water quality surveys of the Little Squam Lake sampling stations were conducted by the **Center for Freshwater Biology** on June 19, July 17, and August 20, 2013.

Light Blue = Outstanding = Ultraoligotrophic

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Light Gray = No Data

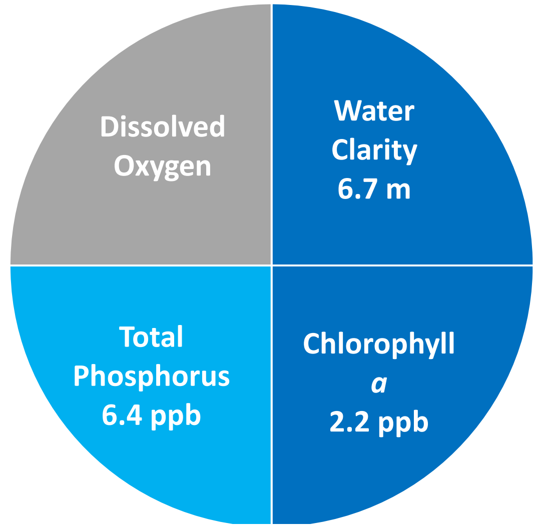


Figure 1. Average Water Quality Conditions

2013 RESULT HIGHLIGHTS

WATER CLARITY: Water clarity, measured as Secchi disk depth, averaged 6.7 meters (m) at the easterly sampling location, Site 1B . The 2013 1B water clarity was slightly deeper than the 2012 water clarity.

CHLOROPHYLL: Chlorophyll *a*, a measure of microscopic plant life within the lake, averaged 2.2 parts per billion (ppb) at Site 1B. The 2013 Site 1B chlorophyll *a* concentration was higher (greener water) than the 2012 level.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. Total phosphorus concentrations taken from the surface waters averaged 6.4 parts per billion (ppb) and remained below 10 ppb. A total phosphorus concentration of 10 ppb is considered sufficient to support green water events that are referred to as algal blooms.

DISSOLVED OXYGEN: Dissolved oxygen is important for healthy fisheries. Dissolved oxygen concentrations were not collected at Site 1B on any of the sampling dates.

COLOR: Color is a result of naturally occurring "tea" color substances from the breakdown of soils and plant materials. The 1B East color averaged 9.7 color units (CPU) and is characteristic of an uncolored lake water.

ALKALINITY: Alkalinity measures the resistance the lake has against acid rain. The Site 1B alkalinity averaged 6.5 milligrams per liter (mg/L) and indicated a moderate vulnerability to acid rain.

SPECIFIC CONDUCTIVITY: Specific conductivity is a general indicator of pollution. Specific Conductivity was not measured at Site 1B in 2013.

CYANOBACTERIA: Little Squam Lake did not take part in the 2013 cyanobacteria monitoring program. Please refer to the recommendation section for further information.

Note: For a more detailed discussion of water quality measurements and a discussion on the inter-comparison of sample sites, please refer to the executive summary within the annual Squam Lake report.

Table 1. 2013 Little Squam, Site 1B East Seasonal Average Water Quality Readings and Trophic Level Classification Criteria used by the New Hampshire Lakes Lay Monitoring Program

Parameter	Ultraoligo "Outstanding"	Oligo "Excellent"	Meso "Fair"	Eutrophic "Poor"	Site 1B East Average (range)	Site 1B East Classification
Water Clarity (meters)	> 7.0	4.0 – 7.0	2.5 - 4.0	< 2.5	**6.7** meters (range: 5.3 – 7.7)	Oligotrophic
Chlorophyll *a* (ppb)	< 2.0	2.0 - 3.0	3.0 - 7.0	> 7.0	**2.2** ppb (range: 1.6 – 2.9)	Oligotrophic
Total Phosphorus (ppb)	< 7.0	15.0 – 7.0	15.0 - 25.0	> 25.0	**6.4** ppb (range: 5.2 – 7.1)	Ultraoligotrophic
Dissolved Oxygen (mg/L)	> 7.0	5.0 – 7.0	2.0 – 5.0	<2.0	N/A	N/A
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.		

*** Dissolved oxygen concentrations taken from the bottom layers**

LONG TERM WATER QUALITY TRENDS

WATER CLARITY: Water clarity has decreased approximately 20 centimeters (cm) over the past thirty-one years of sampling. The trend of decreasing water clarity is statistically significant.

CHLOROPHYLL: Chlorophyll *a* has increased approximately 0.1 parts per billion (ppb) between 1983 and 2013. The chlorophyll *a* trend is not statistically significant.

COLOR: Color concentrations have decreased over the twenty-five years of sampling. The trend is not statistically significant.

TOTAL PHOSPHORUS: Total phosphorus has increased over twenty-seven years of sampling, however, not statistically significantly.

In summary, there are some indications of a slight decrease in the Little Squam Lake water quality over the past thirty-one years of water quality monitoring. The water clarity has decreased, while there has been a slight increase in chlorophyll *a* concentrations. Increases in long-term total phosphorus (nutrient) levels may be a threat to the high Little Squam Lake water quality.

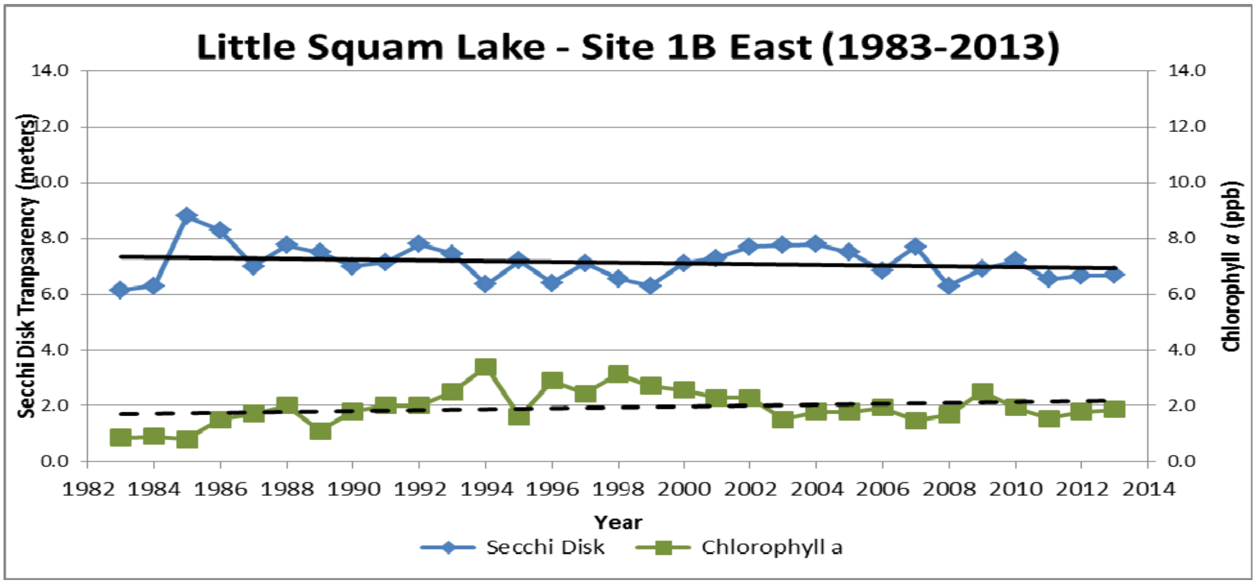


Figure 2. Changes in water clarity (Secchi disk depth) and chlorophyll *a* measured between 1983 and 2013 at Site 1B East. There has been a decreasing trend in water clarity that has been statistically significant with time (solid line). Algal growth (chlorophyll *a*) has increased since 1983, although the trend is not significantly significant (dashed line).

Recommendations:

- Conduct early season sampling (April/May) to document Little Squam's reaction to periods of high stream flow during and after spring thaw.

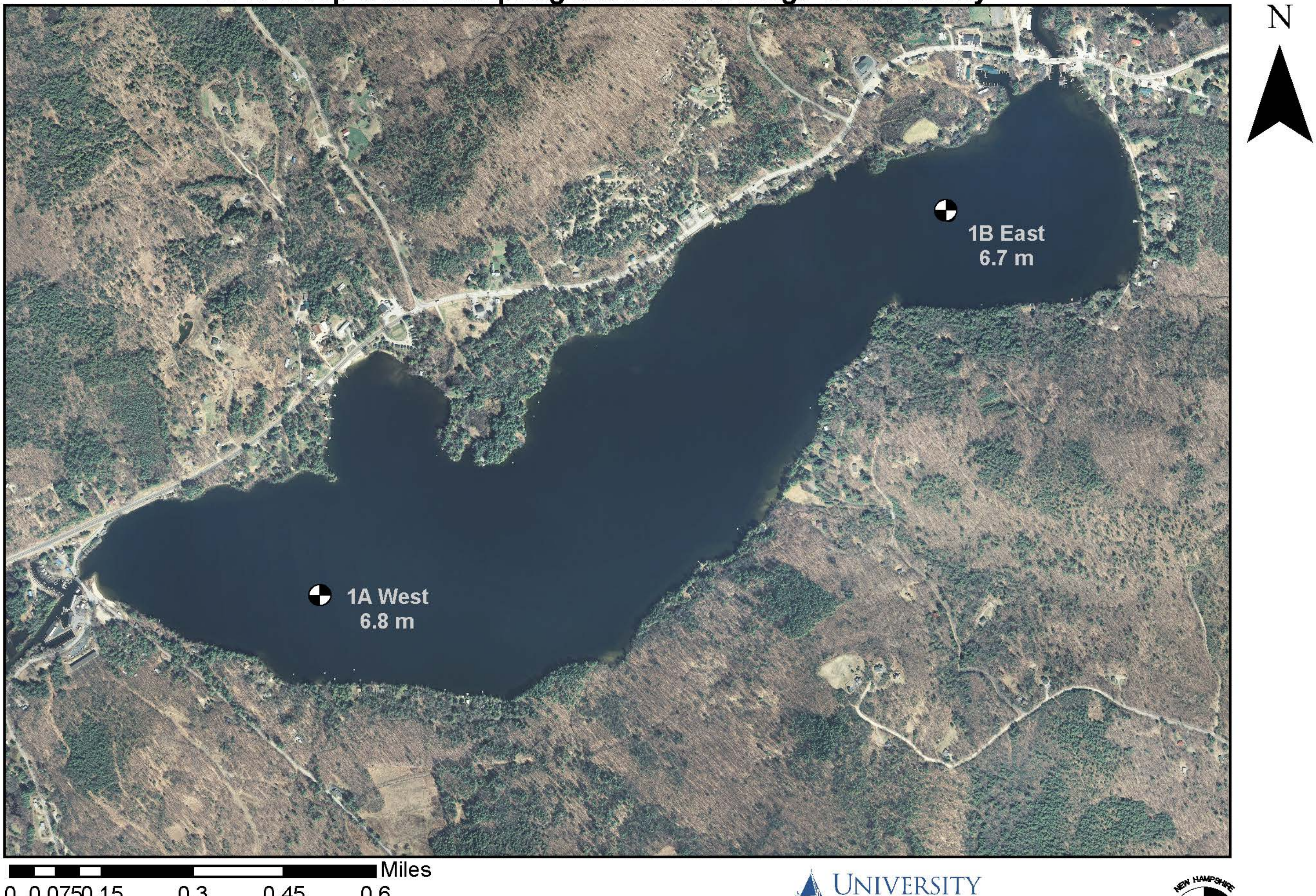
- Implement a simple cyanobacteria-monitoring routine into the conventional water quality monitoring methods including monthly water samples. Cyanobacteria collections throughout the summer and fall months can give insight as to how these populations are distributed throughout the seasons and when they are most likely to be at harmful levels. If you are interested in discussing additional water quality monitoring options that would meet your needs please contact Bob Craycraft by phone, 862-3696, or via email, bob.craycraft@unh.edu

- Implement Best Management Practices within the Little Squam Lake 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
  - http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf

Little Squam Lake

Holderness & Ashland, NH

2013 Deep water sampling sites and average water clarity



Aerial Orthophoto Source: NH GRANIT
Site locations GPSed by the UNH Center of Freshwater Biology

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