SWAINS LAKE

2013 SAMPLING HIGHLIGHTS

BARRINGTON, NH

NEW HAMPSHIRE
LAKES LAY MONITORING

Swains Lake volunteers collected water quality data between August 2 and October 9, 2013.

Light Blue = Outstanding = Ultraoligotrophic

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Light Gray = No Data

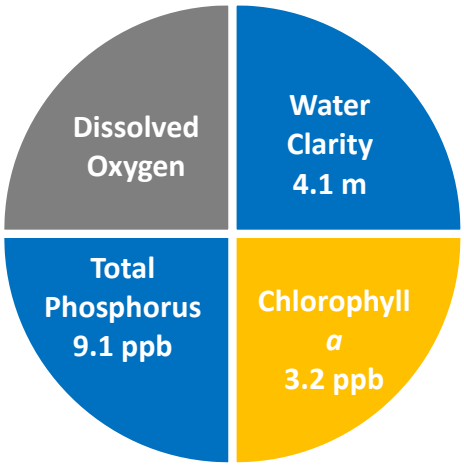

Figure 1. Average Water Quality Conditions

2013 RESULT HIGHLIGHTS

WATER CLARITY: Water clarity, measured as Secchi disk depth, averaged 4.1 meters in Swains Lake. The 2013 water clarity increased relative to the 2012 level.

CHLOROPHYLL: Chlorophyll *a*, a measure of microscopic plant life within the lake, averaged 3.2 parts per billion (ppb) in Swains Lake. The 2013 chlorophyll *a* concentration decreased relative to the 2012 level.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. Total phosphorus concentrations collected in Swains Lake averaged 9.1 parts per billion (ppb). The 2013 Swains Lake total phosphorus concentrations were near 10 ppb, which is considered sufficient to support green water events that are referred to as algal blooms.

DISSOLVED OXYGEN: Dissolved oxygen is important for the health of fisheries. Dissolved oxygen measurements were not collected in 2013.

COLOR: Color is a result of naturally occurring "tea" color substances from the breakdown of soils and plant materials. The Swains Lake color averaged 41.6 color units (CPU). Wet years tend to increase wetland drainage and the associated dissolved colored substances that enter the lake. This increase in the "tea" color reduces light penetration, and is oftentimes associated with reduced water clarity.

ALKALINITY: Alkalinity measures the lake's resistance against acid rain. The average Swains Lake alkalinity measured 3.8 milligrams per liter (mg/L). The 2013 alkalinity indicates Swains Lake has a moderate vulnerability to acid rain.

SPECIFIC CONDUCTIVITY: Specific conductivity is a general indicator of pollution. Specific conductivity was not monitored in Swains Lake in 2013.

CYANOBACTERIA: Cyanobacteria are the measure of potentially harmful plant-like bacteria**.** Cyanobacteria measurements were not collected in 2013.

Note: Site B (see map) was used as the reference point to give an overall representation of the Swains Lake water quality discussed above. For a more detailed discussion of water quality measurements, please refer to the executive summary within the annual Swains Lake report.

Table 1. 2013 Swains Lake Seasonal Average Water Quality Readings and Trophic Level Classification Criteria used by the New Hampshire Lakes Lay Monitoring Program

Parameter	Ultraoligotrophic "Outstanding"	Oligo "Excellent"	Meso "Fair"	Eutrophic "Poor"	Swains Lake Average (range)	Swains Lake Classification
Water Clarity (meters)	> 7.0	4.0 – 7.0	2.5 - 4.0	< 2.5	4.1 meters (range: 3.5 – 4.8)	Oligotrophic
Chlorophyll *a* (ppb)	< 2.0	2.0 - 3.0	3.0 - 7.0	> 7.0	3.2 ppb (range: 1.2 – 4.6)	Mesotrophic
Total Phosphorus (ppb)	< 7.0	15.0 – 7.0	15.0 - 25.0	> 25.0	9.1 ppb (range: 8.5 – 10.1)	Oligotrophic
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.		

LONG TERM TRENDS

WATER CLARITY: Over twenty-three years of sampling, the long-term water clarity trend has been relatively stable. However, the trend is not statistically significant.

CHLOROPHYLL: The chlorophyll *a* concentration has increased over 2.0 parts per billion (ppb) over twenty-three years of sampling. However, the trend is not statistically significant.

COLOR: Color values indicate an increasing trend over the twenty-three years of sampling. However, the trend is not statistically significant.

TOTAL PHOSPHORUS: Total phosphorus concentrations indicate an increasing trend over the past twenty years of sampling. The long-term increasing total phosphorus trend is not statistically significant.

In summary, the long-term Swains Lake water quality data indicate a slight decline in water quality since 1989. The total phosphorus and chlorophyll *a* concentrations have increased.

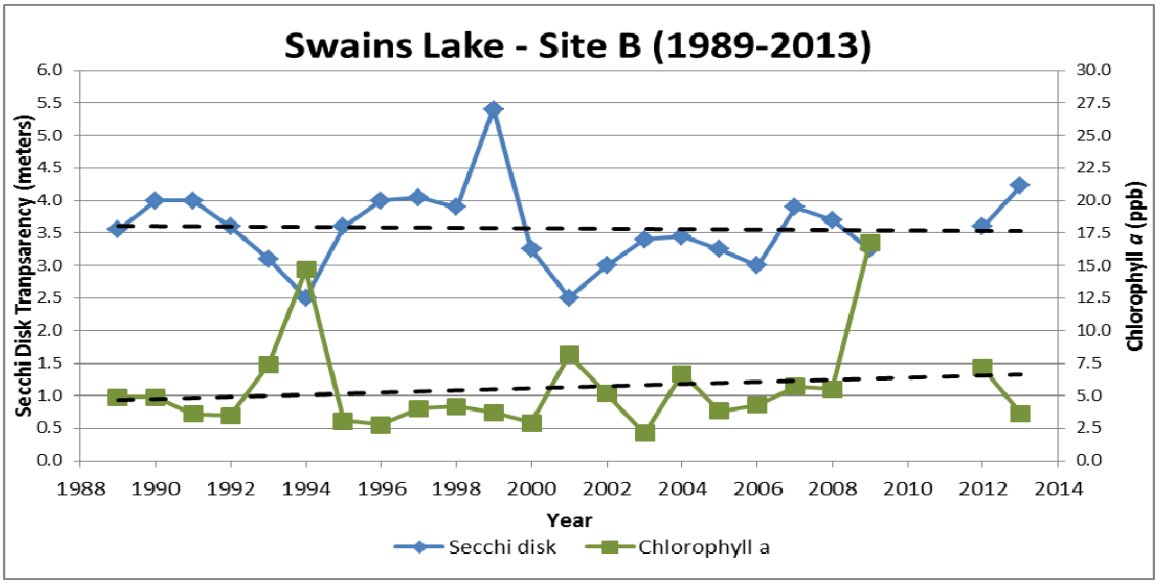

Figure 2. Changes in water clarity (Secchi disk depth) and chlorophyll *a* measured from 1989-2013 at Site B. There has been a relatively stable water clarity trend although the trend is not statistically significant (dashed line). Decreasing water clarity is a negative trend for lakes if caused by increased algae or polluted runoff. Algal growth (chlorophyll *a*; dashed line) has increased over the past twenty-three years of sampling. However, the chlorophyll *a* trend is not statistically significant.

Recommendations:

- Implement Best Management Practices within the Swains 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 guidance on how to stabilize and improve water quality.
  https://extension.unh.edu/resources/files/Resource001799_Rep2518.pdf
  http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf
- Schedule a **Center of Freshwater Biology** field team visit during which a more in depth water quality survey would be conducted.
- Consider adding a simple cyanobacteria monitoring program that uses existing water quality sample collection protocols. Cyanobacteria collections from the spring through fall months can give insight into 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 @ 862-3696 or bob.craycraft@unh.edu.

Swains Lake

Barrington, NH

2013 Deep water sampling sites with average seasonal water clarity

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

University of New Hampshire
Cooperative Extension

New Hampshire Lakes Lay Monitoring