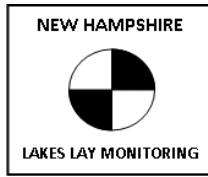


NEWFOUND LAKE

2013 SAMPLING HIGHLIGHTS

BRISTOL, ALEXANDRIA BRIDGEWATER &
HEBRON, NH



Newfound volunteers collected water quality data between August 8 and September 26, 2013 at the deep site. A more in-depth water quality survey of the Newfound Lake deep sampling stations was conducted by the **Center for Freshwater Biology** on August 8, 2013.

Blue = Excellent =
Oligotrophic

Yellow = Fair =
Mesotrophic

Red = Poor = Eutrophic

Light Gray = No Data

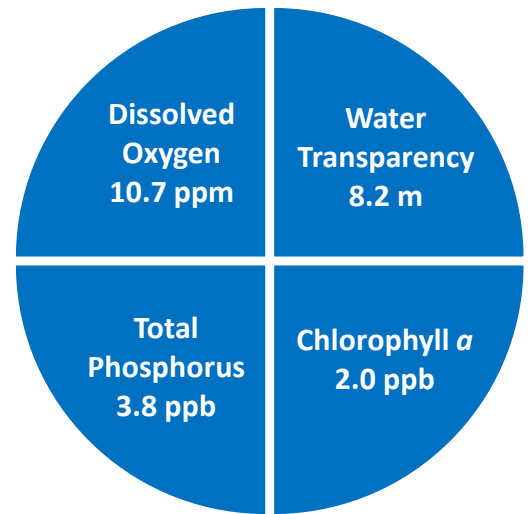


Figure 1. Average Water Quality Conditions

2013 RESULT HIGHLIGHTS

WATER CLARITY: Water clarity, measured as Secchi disk depth, averaged 8.2 meters (m) in Newfound Lake. The 2013 Newfound Lake water clarity was shallower than the 2012 water clarity.

CHLOROPHYLL: Chlorophyll *a*, a measure of microscopic plant life within the lake, averaged 2.0 parts per billion (ppb) in Newfound Lake. The 2013 Newfound Lake chlorophyll *a* concentration was higher (greener water) than the 2012 level.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. A total phosphorus sample collected in the surface waters measured 3.8 parts per billion (ppb) and remained well below 10 parts per billion (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 collected in the deeper waters ranged from 10.1 to 11.0 milligrams per liter (mg/L) on August 8, 2013. The dissolved oxygen concentrations remained well above 5 mg/L throughout the water column. A dissolved oxygen concentration of 5.0 mg/L is considered the threshold for the growth and reproduction of coldwater fish that include trout, salmon and whitefish.

COLOR: Color is a result of naturally occurring “tea” color substances from the breakdown of soils and plant materials. The Newfound Lake color averaged 11.7 color units (CPU).

ALKALINITY: Alkalinity measures the resistance Newfound Lake has against acid rain. The Newfound Lake alkalinity measured 4.3 milligrams per liter (mg/L) and indicated a moderate vulnerability to acid rain. The Newfound Lake **pH**, a measure of lake acidity, measured 7.0 in the surface waters and remained within the acceptable range for most aquatic organisms.

SPECIFIC CONDUCTIVITY: Specific conductivity is a general indicator of pollution. Specific conductivity measured 34.0 micro-Siemans per centimeter ($\mu S/cm$) in Newfound Lake. The Newfound Lake specific conductivity indicates low concentrations of dissolved substances such as nutrients (e.g. phosphorus and nitrogen) and other dissolved salts (e.g. sodium and chloride).

CYANOBACTERIA: Cyanobacteria are the measure of potentially harmful plant-like bacteria. Newfound Lake did not participate in the 2013 cyanobacteria-sampling season. Please refer to the recommendation section for further information.

Note: Site 1 Deep (see map) was used as Newfound Lake’s “reference site” to give an overall representation of the water quality.

Table 1. 2013 Newfound Lake Seasonal Average Water Quality Readings and Trophic Level Classification Criteria used by the New Hampshire Department of Environmental Services

Parameter	Oligotrophic “Excellent”	Mesotrophic “Fair”	Eutrophic “Poor”	Newfound Lake Average (range)	Newfound Lake Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	8.2 meters (range: 7.4 – 9.0)	Oligotrophic
Chlorophyll <i>a</i> (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	2.0 ppb (single value)	Oligotrophic
Total Phosphorus (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	3.8 ppb (single value)	Oligotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	10.7 ppm (range: 10.1 – 11.0)	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 ($\mu g/l$) 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 layer

LONG TERM WATER QUALITY TRENDS

WATER CLARITY: The Newfound Lake water clarity display a trend of decreasing water clarity over the seventeen years of sampling (1986–2013). The trend is not statistically significant.

CHLOROPHYLL: The Newfound Lake chlorophyll *a* data display a trend of increasing chlorophyll *a* concentrations over the seventeen years of sampling (1986–2013). The trend is not statistically significant.

COLOR: The Newfound Lake color data display a trend of increasing color concentrations over the thirteen years of sampling (1988–2013). The trend is not statistically significant.

TOTAL PHOSPHORUS: Total phosphorus concentrations have increased slightly over the past fifteen years of sampling (1986-2013). The trend is not statistically significant.

In summary, Newfound Lake continues to show excellent quality conditions at the centrally located sampling location. However, there are some indications of a slight decrease in the Newfound Lake water quality. The long-term water clarity has decreased while the chlorophyll *a* and the total phosphorus (nutrient) concentrations have increased. One should be aware that water quality data have not been collected on an annual basis and that data gaps among years exist (Figure 2).

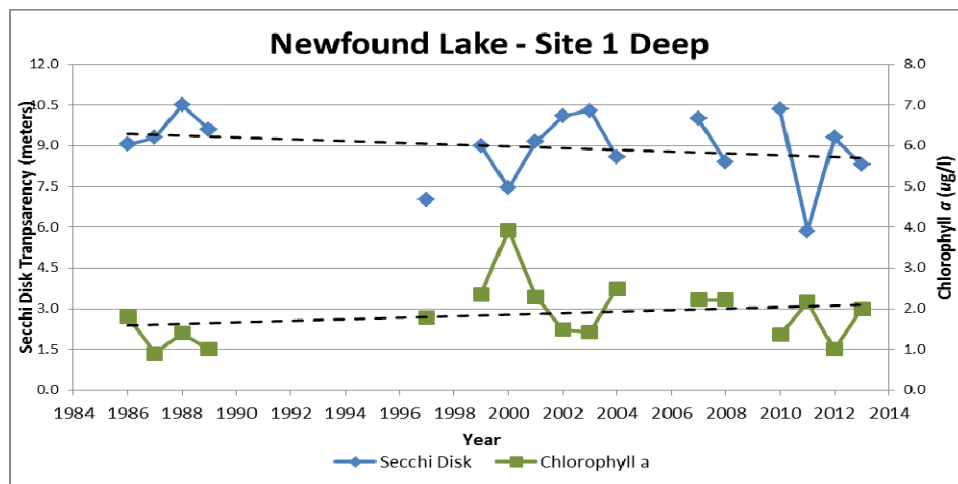


Figure 2. Changes in the Newfound Lake water clarity (secchi disk depth) and chlorophyll *a* concentrations measured between 1986 and 2013 at site 1 Deep. The long-term water clarity data indicate a trend of declining water clarity (dashed line). The long-term algal growth (chlorophyll *a*) data indicate a trend of increasing concentrations (dashed line). Neither the long-term water clarity nor the long-term chlorophyll *a* trend is statistically significant.

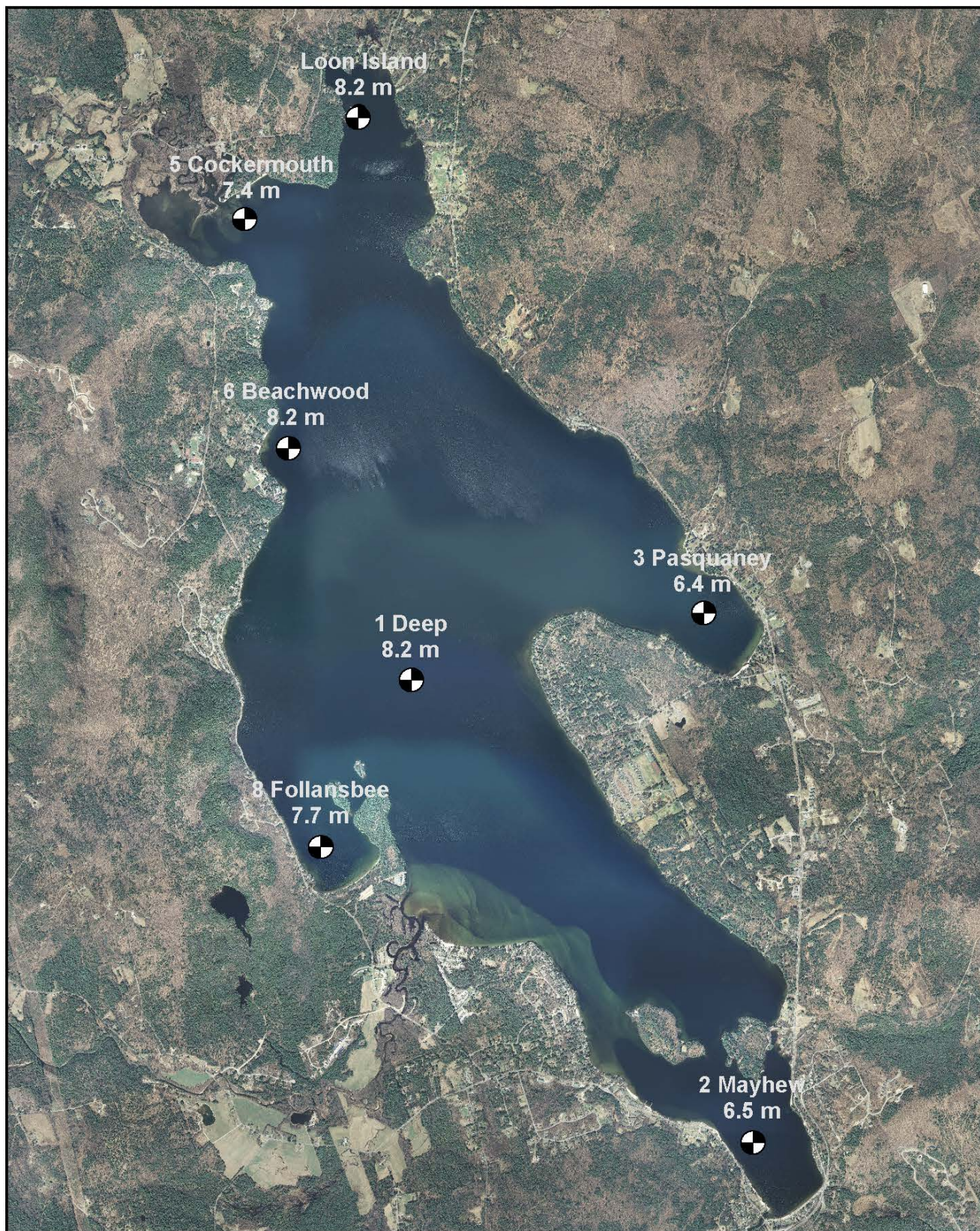
Recommendations:

- Conduct annual water quality testing at the deep and centrally located Newfound Lake sampling location, Site 1 Deep. Continued sampling of more near-shore locations are also encouraged to document localized water quality variations and to screen for potential problem areas around Newfound Lake.
- 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 through the seasons and when they are most likely to reach harmful levels. If you are interested in discussing additional water quality monitoring options that would meet your needs please contact [Bob Craycraft @ 862-3696](mailto:bob.craycraft@unh.edu) or via email, bob.craycraft@unh.edu.
- Implement Best Management Practices within the Newfound 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>

Newfound Lake

Bristol, Alexandria, Bridgewater & Hebron, NH

2013 Deep sampling sites with average seasonal water clarity



0 0.2 0.4 0.8 1.2 1.6 Miles