

CRYSTAL LAKE

2013 SAMPLING HIGHLIGHTS

EATON, NH



Light Blue = Outstanding
= Ultraoligotrophic

Blue = Excellent =
Oligotrophic

Yellow = Fair =
Mesotrophic

Red = Poor = Eutrophic

Light Gray = No Data

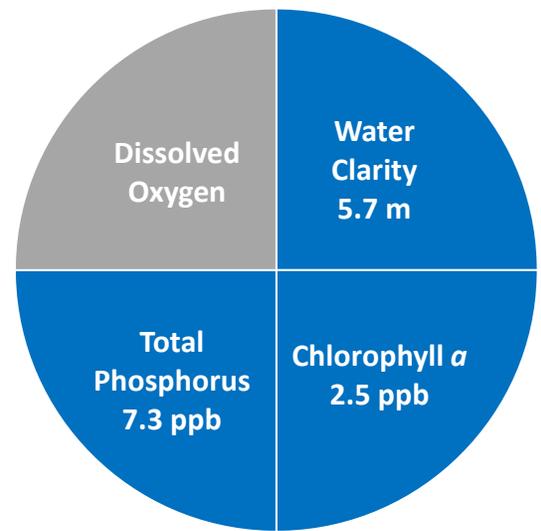


Figure 1. Average Water Quality Conditions

Crystal Lake volunteers collected water quality data between May 5 and September 19, 2013.

2013 RESULT HIGHLIGHTS

WATER CLARITY: Water clarity, measured as Secchi disk depth, averaged 5.7 meters (m) in Crystal Lake. The 2013 Crystal Lake water clarity was clearer than the last sampling conducted in 2005.

CHLOROPHYLL: Chlorophyll *a*, a measure of microscopic plant life within the lake, averaged 2.5 parts per billion (ppb) in Crystal Lake. The 2013 Crystal Lake chlorophyll *a* concentration was higher (greener water) than the 2005 level.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. Total phosphorus concentrations taken from the surface waters averaged 7.3 parts per billion (ppb) and remained low.

DISSOLVED OXYGEN: Dissolved oxygen is important for healthy fisheries. Dissolved oxygen concentrations were not measured during the 2013 sampling season.

COLOR: Color is a result of naturally occurring “tea” color substances from the breakdown of soils and plant materials. The Crystal Lake color averaged 13.4 color units (CPU).

ALKALINITY: Alkalinity measures the resistance the lake has against acid rain. The Crystal Lake alkalinity averaged 7.7 milligrams per liter (mg/L) and indicates a low vulnerability to acid rain.

SPECIFIC CONDUCTIVITY: Specific conductivity is a general indicator of pollution. Specific Conductivity ranged from 45.1 to 46.7 micro-Siemans per centimeter ($\mu\text{S}/\text{cm}$) in Crystal Lake. The Crystal 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: Crystal Lake did not take part in the 2013 cyanobacteria monitoring program. Please refer to the recommendation section for further information.

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

Parameter	Oligotrophic “Excellent”	Mesotrophic “Fair”	Eutrophic “Poor”	Crystal Lake Average (range)	Crystal Lake Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	5.7 meters (range: 4.5 – 7.0)	Oligotrophic
Chlorophyll <i>a</i> (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	2.5 ppb (range: 1.2 – 3.7)	Oligotrophic
Total Phosphorus (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	7.3 ppb (range: 4.7 – 9.1)	Oligotrophic
Dissolved Oxygen (mg/L)	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 ($\mu\text{g}/\text{l}$) 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 Crystal Lake water clarity data display a trend of increasing water clarity over the eleven years of volunteer water quality monitoring. The trend is not statistically significant.

CHLOROPHYLL: The Crystal Lake chlorophyll *a* data display a trend of relatively stable long-term chlorophyll *a* concentrations over the eleven years of volunteer water quality monitoring. The trend is not statistically significant.

COLOR: The Crystal Lake color data display a trend of decreasing concentrations over the eleven years of volunteer water quality monitoring. The trend is not statistically significant.

TOTAL PHOSPHORUS: The Crystal Lake total phosphorus concentrations display a trend of increasing concentrations over the eleven years of volunteer water quality monitoring. The trend is not statistically significant.

In summary, the Crystal Lake water quality data continue to exhibit conditions characteristic of a high quality water body characterized by high clarity measurements with corresponding low phosphorus and microscopic plant concentrations. Annual water quality sampling is suggested to better assess whether or not water quality conditions are changing.

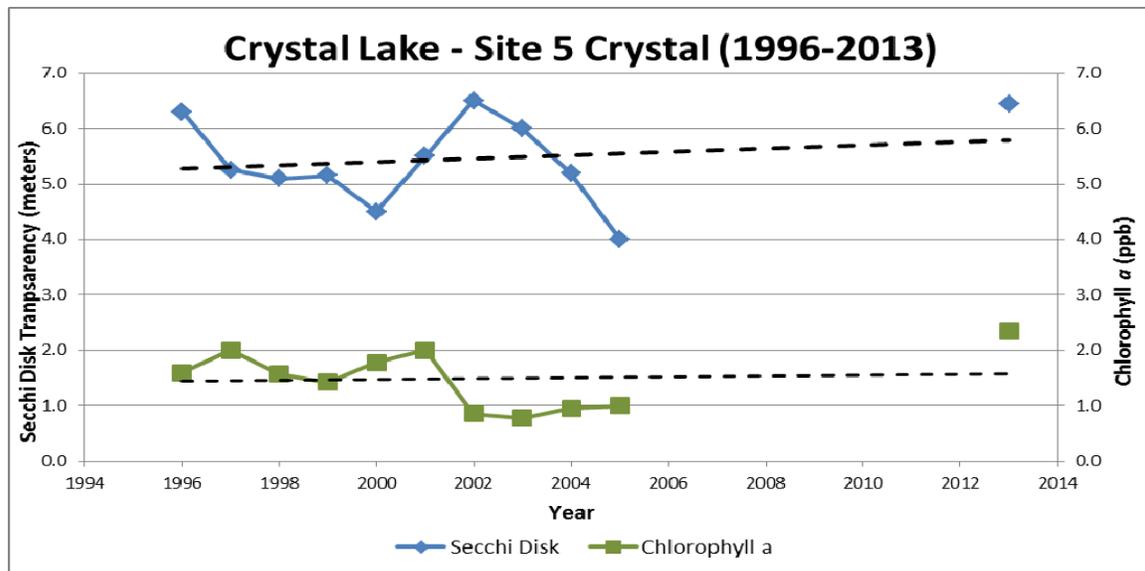


Figure 2. Changes in water clarity (Secchi disk depth) and chlorophyll *a* measured between 1996 and 2013 at Site 5 Crystal. The long-term water clarity data indicate a trend of increasing water clarity (dashed line). The long-term algal growth (chlorophyll *a*) indicate a stable trend (dashed line). Neither trend is statistically significant.

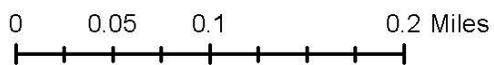
Recommendations:

- Collect multiple measurements during the sample season (May – September) to document the seasonal water quality variations that are important when evaluating the condition of a water body.
- Implement Best Management Practices within the Crystal 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>
- Implement a simple cyanobacteria monitoring routine into the conventional water quality monitoring methods. Cyanobacteria collections throughout the summer and fall months can give insight into how these populations are distributed throughout 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

Crystal Lake

Eaton, NH

2013 Deep sampling site with annual seasonal water clarity



Aerial Orthophoto Source: NH GRANIT
Site location GPS coordinates collected by the UNH Center of Freshwater Biology