TOWNHOUSE POND

2013 SAMPLING HIGHLIGHTS

MILTON, NH

NEW HAMPSHIRE
LAKES LAY MONITORING

Townhouse Pond volunteers collected water quality data between April 30 and October 8, 2013. A more in depth water quality survey of Townhouse Pond was conducted by the Center for Freshwater Biology on July 16, 2013.

Light Blue = Outstanding = Ultraoligotrophic

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Light Gray = No Data

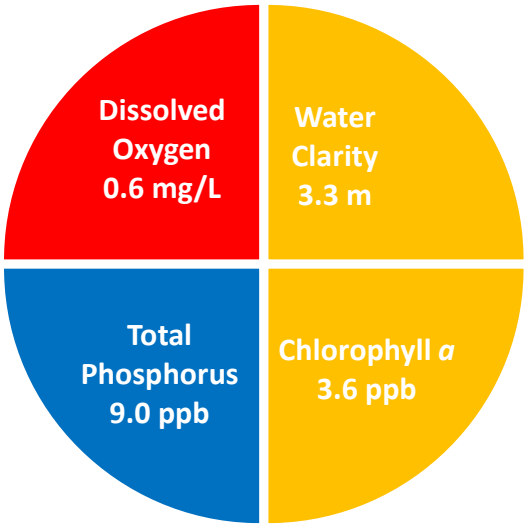

Figure 1. Average Water Quality Conditions

2013 RESULT HIGHLIGHTS

WATER CLARITY: Water clarity, measured as Secchi disk depth, averaged 3.3 meters (m) in Townhouse Pond. The 2013 Townhouse Pond water clarity was shallower than the 2012 water clarity.

CHLOROPHYLL: Chlorophyll *a*, a measure of microscopic plant life within the lake, averaged 3.6 parts per billion (ppb) in Townhouse Pond. The 2013 Townhouse Pond chlorophyll *a* concentration was lower (less green water) than the 2012 level.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. Total phosphorus concentrations collected from the Townhouse Pond surface waters averaged 9.0 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 measured in the bottom waters ranged from 0.1 to 1.9 milligrams per liter (mg/L) on July 16, 2013. Dissolved oxygen concentrations became reduced below 5.0 mg/L near the lake bottom. A dissolved oxygen concentration of 5.0 mg/L is considered the threshold for the growth and reproduction of cold water fish that include trout and salmon.

COLOR: Color is a result of naturally occurring "tea" color substances from the breakdown of soils and plant materials. The Townhouse Pond color averaged 33.7 color units (CPU).

ALKALINITY: Alkalinity measures the resistance the lake has against acid rain. The Townhouse Pond alkalinity averaged 9.8 milligrams per liter (mg/L) and indicated a low to moderate vulnerability to acid rain. The Townhouse Pond **pH**, a measure of lake acidity, ranged from 6.9 to 7.0 units in the surface waters and remained within the acceptable range for most aquatic organisms

SPECIFIC CONDUCTIVITY: Specific conductivity is a general indicator of pollution. The Townhouse Pond specific conductivity ranged from 83.5 to 86.2 micro-Siemans per centimeter (*u*S/cm). The Townhouse Pond specific conductivity indicates moderate to high concentrations of dissolved substances such as nutrients (e.g. phosphorus and nitrogen) and other dissolved salts (e.g. sodium and chloride).

CYANOBACTERIA: Cyanobacteria are potentially harmful plant-like bacteria. Townhouse Pond was not sampled as part of the 2013 cyanobacteria monitoring program. Please refer to the recommendation section for further information.

Note: For a more detailed discussion of water quality measurements, refer to the executive summary within the annual Milton Three Ponds report. The report includes a discussion of data collected in Depot, Northeast and Townhouse Pond, as well as, data collected at stream inlet sampling locations.

Table 1. 2013 Townhouse Pond 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"	Townhouse Pond Average (range)	Townhouse Pond Classification
Water Clarity (meters)	> 7.0	4.0 – 7.0	2.5 - 4.0	< 2.5	**3.3** meters (range: 2.4 – 3.9)	Mesotrophic
Chlorophyll *a* (ppb)	< 2.0	2.0 - 3.0	3.0 - 7.0	> 7.0	**3.6** ppb (range: 2.3 – 4.7)	Mesotrophic
Total Phosphorus (ppb)	< 7.0	7.0 – 15.0	15.0 - 25.0	> 25.0	**9.0** ppb (range: 7.1 – 11.0)	Oligotrophic
Dissolved Oxygen (mg/L)	> 7.0	5.0 – 7.0	2.0 – 5.0	<2.0	**0.6** mg/L (range: 0.1 – 1.3)	Eutrophic
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 measured in the bottom layer**

LONG TERM TRENDS

WATER CLARITY: The Townhouse Pond water clarity data display a trend of decreasing water clarity over the past twenty-three years. The trend is not statistically significant.

CHLOROPHYLL: The Townhouse Pond chlorophyll *a* data display a trend of increasing chlorophyll *a* concentrations over the past twenty-three years. The trend is not statistically significant.

COLOR: The Townhouse Pond color data display a relatively stable trend over the twenty-two years color data have been collected. The trend is not statistically significant.

TOTAL PHOSPHORUS: The Townhouse Pond total phosphorus data display a trend of decreasing concentrations over the eight years total phosphorus data have been collected. The trend is not statistically significant.

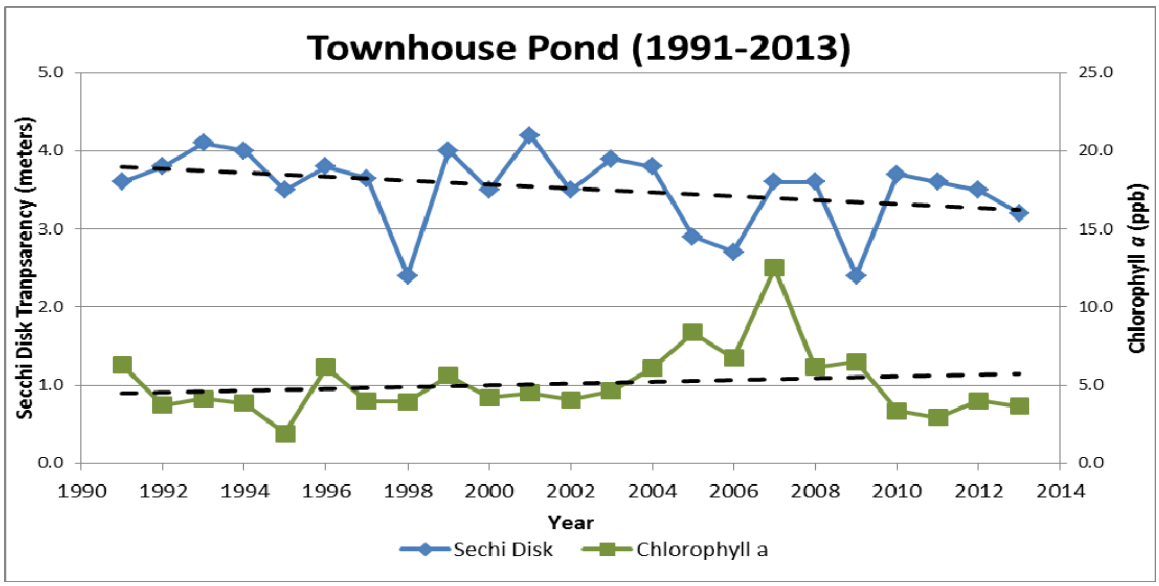

Figure 2. Changes in water clarity (Secchi disk depth) and chlorophyll *a* measured between 1991 and 2013 in Townhouse Pond. The long-term water clarity data indicate a trend of decreasing water clarity (dashed line). The long-term algal growth (chlorophyll *a*) indicate a trend of increasing concentrations (dashed line). Neither the Secchi Disk transparency nor the chlorophyll *a* trend is statistically significant.

Recommendations:

- Implement Best Management Practices within the Townhouse Pond 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 suggestions that can help reduce nutrient loading caused by overland run-off.
    - http://extension.unh.edu/resources/files/Resource004159_Rep5940.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 spring through 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 or via email, bob.craycraft@unh.edu.

- Continue early season sampling (April/May) to document Townhouse Pond's reaction to the heavy spring runoff period. Most lakes receive a large percentage of the phosphorus and water inputs during this high flow period and collecting early season data will continue to document the Townhouse Pond response to early season nutrient, color and sediment loading.

Townhouse Pond

Milton, NH

2013 Deep water sampling sites with average water clarity

Aerial Orthophoto Source: NH Granit
Site Locations GPS coordinates collected by the UNH Center for Freshwater Biology

University of New Hampshire
Cooperative Extension