GOOSE POND

2013 SAMPLING HIGHLIGHTS

CANAAN & HANOVER, NH

NEW HAMPSHIRE
LAKES LAY MONITORING

Goose Pond volunteers collected water quality data between June 17 and September 15, 2013.

Light Blue = Outstanding = Ultraoligotrophic

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Light Gray = No Data

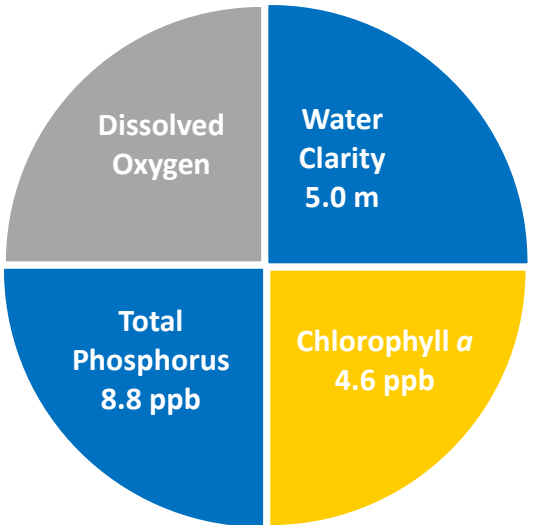

Figure 1. Average Water Quality Conditions

2013 RESULT HIGHLIGHTS

WATER CLARITY: Water clarity, measured as Secchi disk depth, averaged 5.0 meters in Goose Pond. The 2013 water clarity measurements decreased relative to the 2012 measurements.

CHLOROPHYLL: Chlorophyll *a*, a measure of microscopic plant life within the lake, averaged 4.6 parts per billion (ppb) in Goose Pond. The 2013 chlorophyll a concentrations increased relative to 2012 levels.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. Total phosphorus concentrations collected in Goose Pond averaged 8.8 parts per billion (ppb). However, some total phosphorus measurements were near or above 10 parts per billion (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 submitted to the Lakes Lay Monitoring Program in 2013.

COLOR: Color is a result of naturally occurring "tea" color substances from the breakdown of soils and plant materials. The Goose Pond color averaged 29.0 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 Goose Pond alkalinity measured 8.3 milligrams per liter (mg/L) indicating a moderate vulnerability to acid precipitation.

SPECIFIC CONDUCTIVITY: Specific conductivity is a general indicator of pollution. Specific conductivity measurements were not submitted to the Lakes Lay Monitoring Program in 2013.

CYANOBACTERIA: Cyanobacteria are the measure of potentially harmful plant-like bacteria. Goose Pond was actively involved with the cyanobacteria monitoring and collected samples on a monthly basis. The average Goose Pond cyanobacteria density measured 5,038 cyanobacteria cells per milliliter (cells per mL). The average Goose Pond cyanobacteria concentration remained well below harmful concentrations identified by the Massachusetts Department of Health and the New Hampshire Department of Environmental Services.

Note: Site 1 Deep (see map) was used as the reference point to give an overall representation of the Goose Pond water quality discussed above. For a more detailed discussion of water quality measurements, please refer to the executive summary within the Annual Goose Pond Water Quality Report.

Table 1. 2013 Goose 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"	Goose Pond Average (range)	Goose Pond Classification
Water Clarity (meters)	> 7.0	4.0 – 7.0	2.5 - 4.0	< 2.5	**5.0** meters (range: 4.5 – 6.3)	Oligotrophic
Chlorophyll *a* (ppb)	< 2.0	2.0 - 3.0	3.0 - 7.0	> 7.0	**4.6** ppb (range: 3.6 – 6.1)	Mesotrophic
Total Phosphorus (ppb)	< 7.0	15.0 – 7.0	15.0 - 25.0	> 25.0	**8.8** ppb (range: 7.1 – 11.4)	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 TRANSPARENCY: Over the past twenty-five years of sampling water clarity has increased. However, the trend is not statistically significant.

CHLOROPHYLL: The chlorophyll *a* concentration decreased over the past twenty-five years. However, the trend is not statistically significant.

COLOR: The Color data collected over the past twenty-five years do not indicate a long-term trend. However, the annual color concentrations vary significantly from year to year. Such variations are commonly associated with highly colored wetland runoff that oftentimes increases during wet years. Furthermore, years with elevated color concentrations generally correspond to years with elevated total phosphorus concentrations.

TOTAL PHOSPHORUS: Total phosphorus concentrations do not exhibit a long term trend over the past twenty-five years.

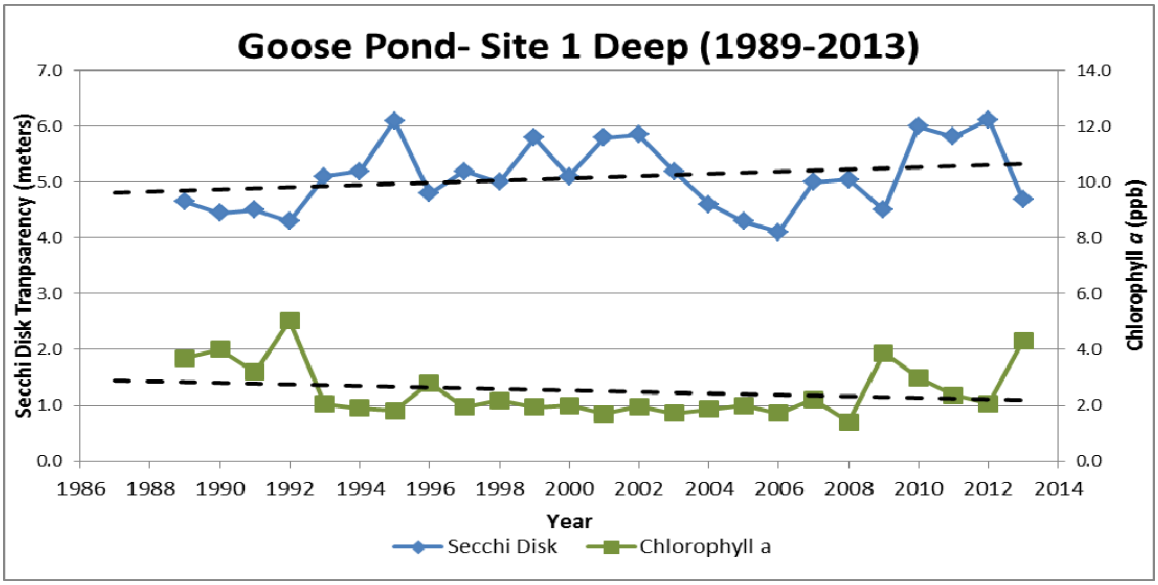

Figure 2. Changes in water clarity (Secchi disk depth) and chlorophyll *a* measured from 1989-2013 at Site 1 Deep. There has been an increasing trend in water clarity with time, although not statistically significant (dashed line). Increasing water clarity is a positive trend for lakes if it is caused by a decrease in algae or polluted runoff. Algal growth (chlorophyll; dashed line) has decreased slightly when comparing early years to more recent years, however, this trend has not been consistent, nor significant with time.

Recommendations:

- Conduct early season sampling (April/May) to document Goose Pond's reaction to the period of spring thaw and periods of high streamflow.
- Continue to collect cyanobacteria samples that are providing insight into the seasonal variation and concentrations of potentially nuisance plant like bacteria.
- Review the New Hampshire Department of Environmental Services Volunteer Lake Assessment Report that contains additional data interpretation and recommendations.

Goose Pond

Canaan & Hanover, NH

2013 Deep sampling sites with average seasonal water clarity

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

University of New Hampshire
Cooperative Extension

New Hampshire Lakes Lay Monitoring