

GOOSE POND

2017 SAMPLING HIGHLIGHTS

Station 1 Deep

Canaan and Hanover, NH



Blue = Excellent =
Oligotrophic

Yellow = Fair =
Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

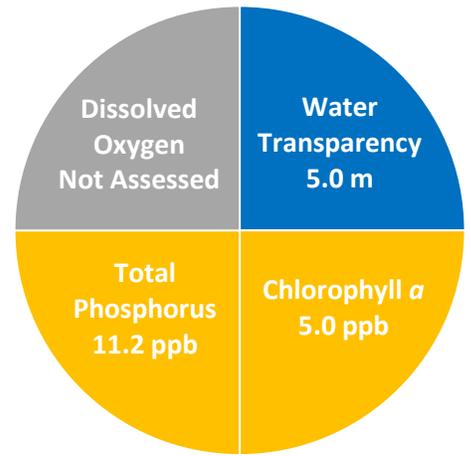


Figure 1. Goose Pond Water Quality (2017)

Station 1 Deep (Figure 8) was used as a reference point to represent the overall Goose Pond water quality. Water quality data displayed in Tables 1 and 2 are surface water measurements with the exception of the dissolved oxygen concentrations that were collected near the lake bottom

Table 1. 2017 Goose Pond Seasonal Averages and NH DES Aquatic Life Nutrient Criteria¹

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Goose Pond Average (range)	Goose Pond Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	5.0 meters (4.5 – 5.8)	Oligotrophic
Chlorophyll <i>a</i> ¹ (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	5.0 ppb (2.6 – 10.5)	Mesotrophic
Total Phosphorus ¹ (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	11.2 ppb (8.0 – 20.4)	Mesotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	Not Measured	Not Assessed

* Dissolved oxygen concentrations in the deep water layer are the basis for the dissolved oxygen classification criteria.

Table 2. 2017 Goose Pond Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Goose Pond Average (range)	Goose Pond Classification
	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored		
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	31.4 color units (range: 29.0 – 33.4)	Lightly tea colored
Alkalinity (mg/L)	< 0.0 acidified	0.1 – 2.0 extremely vulnerable	2.1 – 10 moderately vulnerable	10.1 – 25.0 low vulnerability	> 25.0 not vulnerable	6.7 mg/L (range: 6.2 – 7.5)	Moderately vulnerable

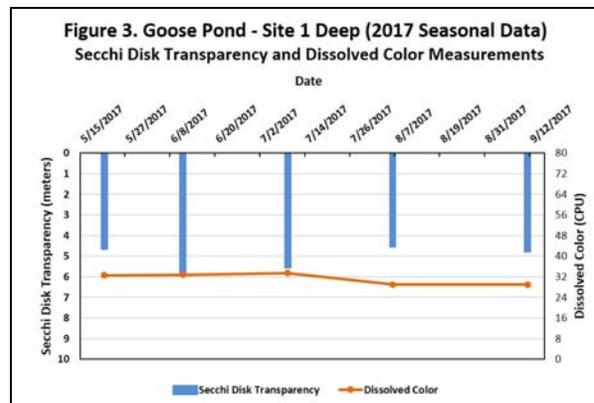
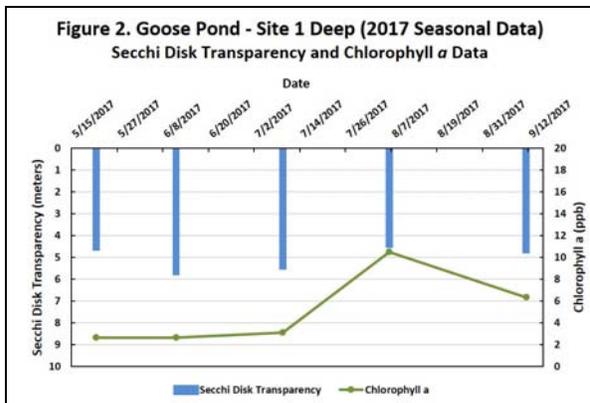


Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations.

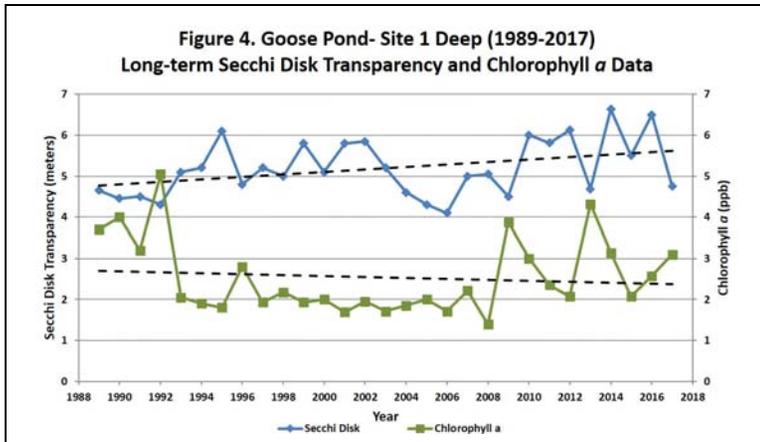
LONG-TERM TRENDS

WATER CLARITY: The Goose Pond water clarity measurements, measured as Secchi Disk transparency, display a trend of increasing water clarity over a twenty-nine year span from 1989 to 2017 (Figure 4).

CHLOROPHYLL: The Goose Lake chlorophyll *a* concentrations, a measure of microscopic plant life within the lake, display a trend of decreasing concentrations over a twenty-nine year span from 1989 and 2017 (Figure 4). However, there are some indications of a slight increase in the chlorophyll *a* concentrations in recent years.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The Goose Pond total phosphorus concentrations have oscillated among years but display a stable long-term trend over a twenty-nine year span from 1989 to 2017 (Figure 5).

COLOR: The Goose Pond color data, the result of naturally occurring “tea” color substances from the breakdown of soils and plant materials, display a trend of decreasing concentrations over a twenty-nine year span from 1989 to 2017 (Figure 5).



Figures 4 and 5. Changes in the Goose Pond water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1989 and 2017. **These data illustrate the relationship among plant growth, water color and water clarity. Total phosphorus data are also displayed and are oftentimes correlated with the amount of plant growth.**

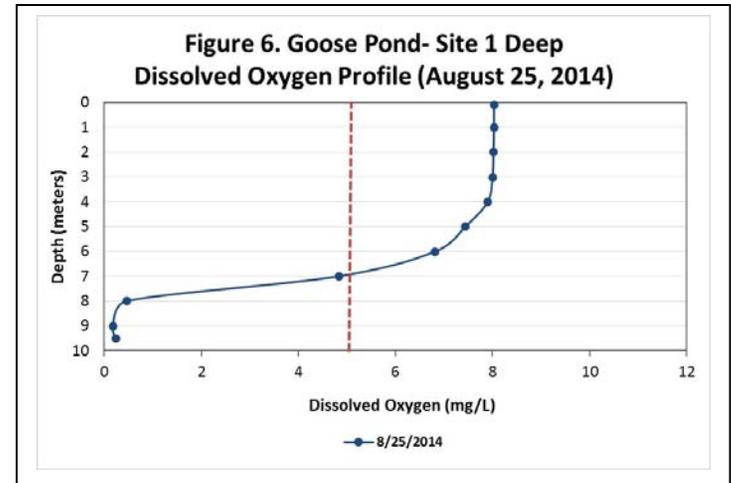


Figure 6. August 25, 2014 Goose Pond dissolved oxygen profile. The vertical red line indicates the oxygen concentration commonly considered the threshold for successful growth and reproduction of cold water fish. *Notice the low oxygen concentrations near the lake bottom. The most recent dissolved oxygen data were collected through the New Hampshire Department of Environmental Services Volunteer Lake Assessment Program on August 25, 2014.*

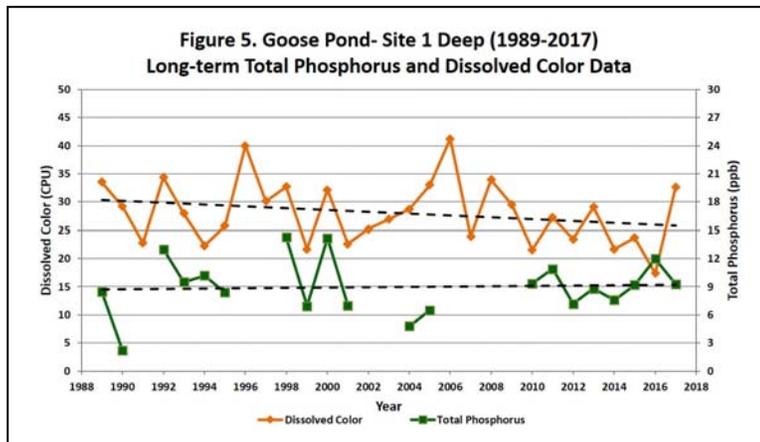
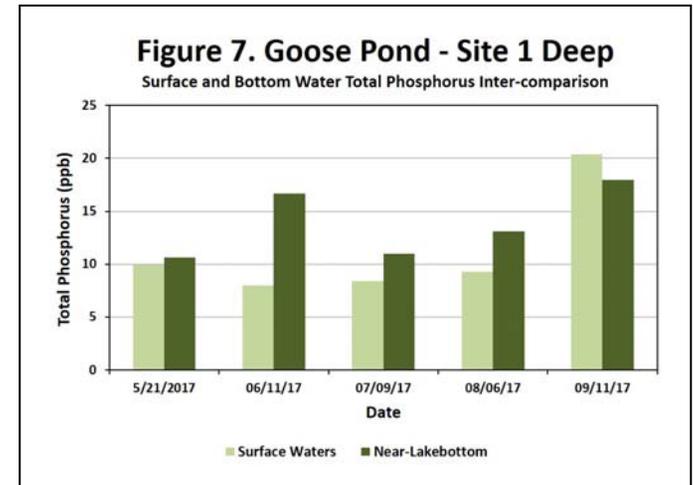


Figure 7. Goose Pond surface water and bottom water total phosphorus inter-comparison. *Notice the difference between the surface water and bottom water total phosphorus concentrations. The increasing deep water total phosphorus concentrations may be associated with the phenomenon known as internal nutrient loading that is typically associated with low dissolved oxygen concentrations near the lake bottom.*



Recommendations

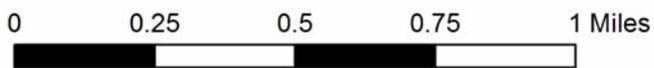
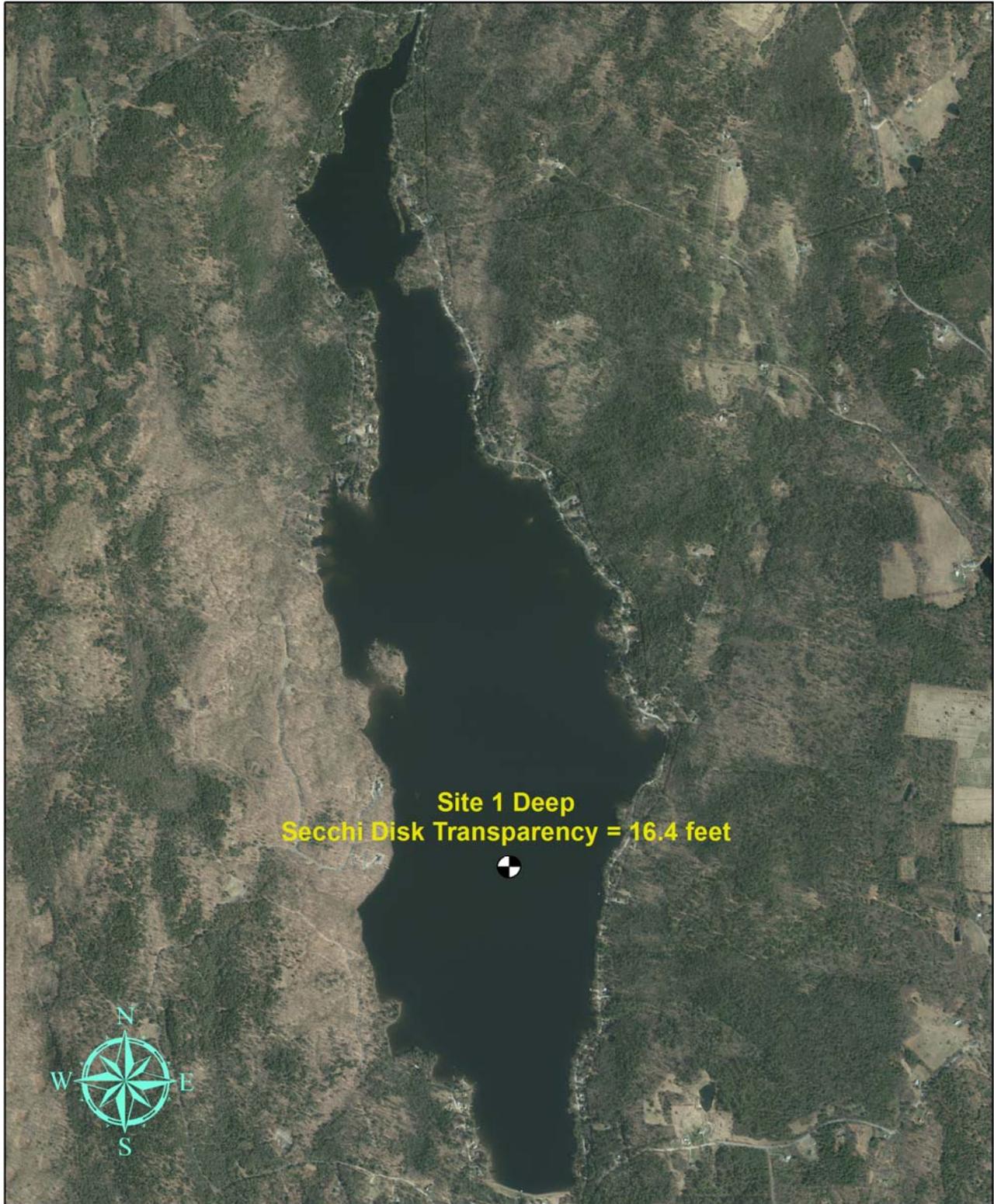
Implement Best Management Practices within the Goose Pond watershed to minimize the adverse impacts of polluted runoff and erosion into Goose Pond. Refer to “Landscaping at the Water’s Edge: An Ecological Approach” and “New Hampshire Homeowner’s Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home” for more information on how to reduce nutrient loading caused by overland run-off.

- http://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- <https://www4.des.state.nh.us/SoakNH/wp-content/uploads/2016/04/NH-Homeowner-Guide-2016.pdf>

Figure 8. Goose Pond

Canaan & Hanover, NH

2017 Deep sampling site with seasonal average water clarity



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



Extension

