

BABOOSIC LAKE

2015 SAMPLING HIGHLIGHTS

Station – 3 Sharks Tooth

Amherst and Merrimack, NH



Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

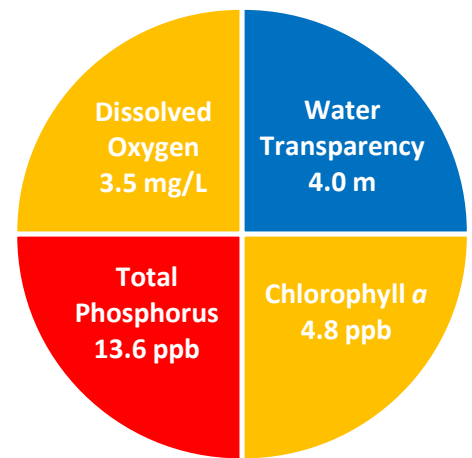


Figure 1. Baboosic Lake Water Quality (2015)

Station 3 Sharks Tooth (Figure 7) was used as a reference point to represent the overall Baboosic Lake water quality. Water quality data displayed in Tables 1 and 2 are surface water measurements with the exception of the dissolved oxygen data that were collected in the layer of rapidly decreasing temperatures.

Table 1. 2015 Baboosic Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria

| Parameter | Oligotrophic "Excellent" | Mesotrophic "Fair" | Eutrophic "Poor" | Baboosic Lake – 3 Sharks Average (range) | Baboosic Lake – 3 Sharks Classification |
|----------------------------|--------------------------|--------------------|------------------|--|---|
| Water Clarity (meters) | 4.0 – 7.0 | 2.5 - 4.0 | < 2.5 | 4.0 meters (2.7 – 5.1) | Oligotrophic |
| Chlorophyll <i>a</i> (ppb) | < 3.3 | > 3.3 – 5.0 | > 5.0 – 11.0 | 4.8 ppb (2.5 – 8.8) | Mesotrophic |
| Total Phosphorus (ppb) | < 8.0 | > 8.0 – 12.0 | > 12.0 – 28.0 | 13.6 ppb (6.6 – 26.5) | Eutrophic |
| Dissolved Oxygen (mg/L) | 5.0 – 7.0 | 2.0 – 5.0 | <2.0 | 3.5 mg/L (0.2 – 7.6) | Mesotrophic |

* Dissolved oxygen concentrations were measured on August 4, 2015 between 3.5 and 7.0 meters, in the layer of rapidly decreasing temperatures.

Table 2. 2015 Baboosic Lake Seasonal Average Accessory Water Quality Measurements

| Parameter | Assessment Criteria | | | | | Baboosic Lake – 3 Sharks Average (range) | Baboosic Lake – 3 Sharks 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 | 28.6 color units (18.4 – 44.8) | 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 | 12.7 mg/L (11.0 – 13.8) | Low vulnerability |
| pH (std units) | < 5.5 suboptimal for successful growth and reproduction | | 6.5 – 9.0 optimal range for fish growth and reproduction | | | 7.3 standard units (range: 7.3 – 7.3) | Optimal range for fish growth and reproduction |
| Specific Conductivity (uS/cm) | < 50 uS/cm Characteristic of minimally impacted NH lakes | | 50-100 uS/cm Lakes with some human influence | > 100 uS/cm Characteristic of lakes experiencing human disturbances | | 126.9 uS/cm (range: 112.4 – 135.2) | Characteristic of lakes experiencing human disturbances |

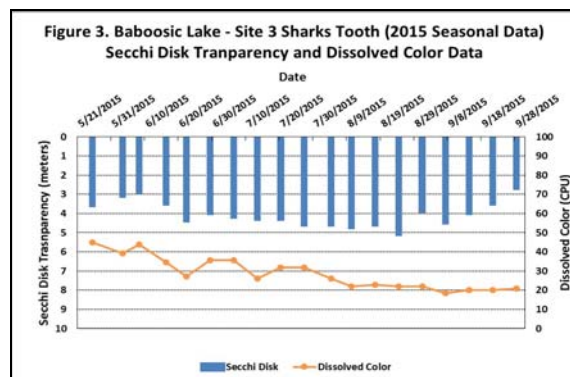
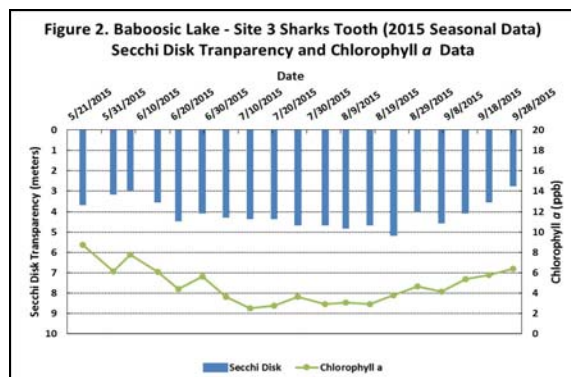


Figure 2 and 3. Seasonal Secchi Disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in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

LONG-TERM TRENDS

WATER CLARITY: The Baboosic Lake water clarity measurements, measured as Secchi Disk transparency, display a trend of decreasing water clarity since 1983 (Figure 4). On a more positive note, the Secchi Disk transparency measurements documented over the past 10 years (2006-2015) indicate a recent trend of increasing water transparency.

CHLOROPHYLL: The Baboosic Lake chlorophyll *a* concentrations, a measure of microscopic plant life within the lake, display a trend of increasing concentrations between 1983 and 2015 (Figure 4). On a more positive note, the chlorophyll *a* measurements documented over the past 10 years (2006-2015) indicate a recent trend of decreasing microscopic plant growth.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The Baboosic Lake total phosphorus concentrations display a trend of decreasing concentrations since the year 2000 (Figure 5).

COLOR: The Baboosic Lake color data, the result of naturally occurring “tea” color substances from the breakdown of soils and plant materials, display a trend of increasing concentrations since 1985 (Figure 5).

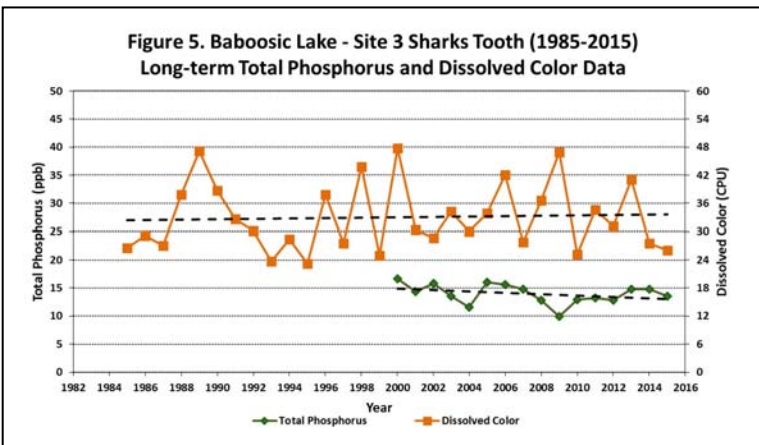
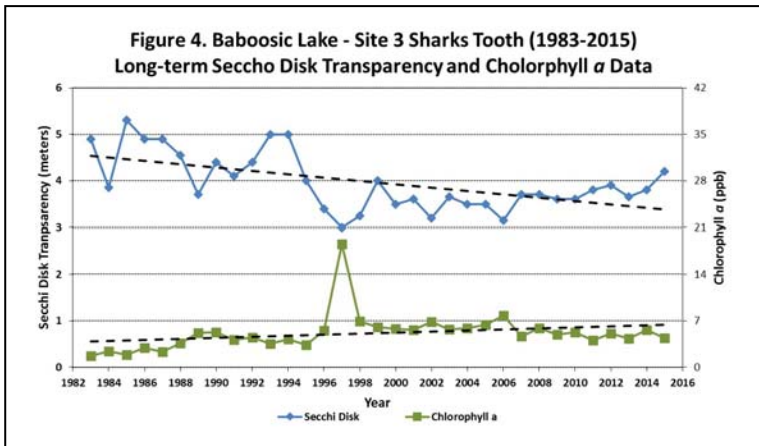


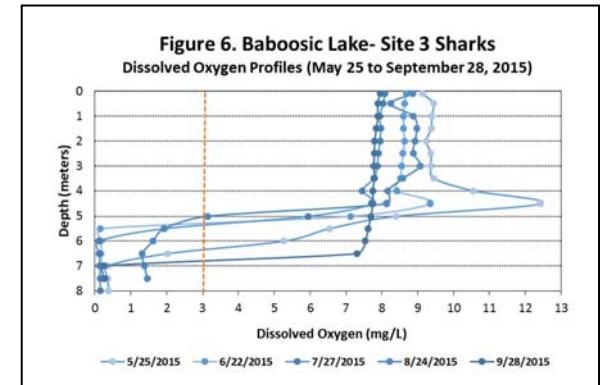
Table 3. Baboosic Lake Seasonal Average Water Quality Inter-Site Comparison (2015)

| Sampling Station | Average (range) Total Phosphorus (ppb) | Average (range) Chlorophyll <i>a</i> (ppb) | Average (range) Water Clarity (meters) |
|------------------|--|--|--|
| 1 Clarks | 14.6 ppb (range: 8.9 – 26.0) | 5.1 ppb (range: 2.1 – 15.9) | 4.0 m (range: 3.2 – 4.9) |
| 2 Center | 13.0 ppb (range: 8.0 – 18.7) | 4.9 ppb (range: 2.3 – 10.0) | 4.0 m (range: 3.0 – 4.8) |
| 3 Sharks Tooth | 13.6 ppb (range: 6.6 – 26.5) | 4.8 ppb (range: 2.5 – 8.8) | 4.0 m (range: 2.7 – 5.1) |
| 4 Washer Cove | 14.5 ppb (range: 5.1 – 29.5) | 4.1 ppb (range: 2.4 – 8.5) | 3.5 m (range: 3.1 – 3.7) |

Figures 4 and 5. Changes in the Baboosic Lake water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1983 and 2015.

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. Monthly Baboosic Lake dissolved oxygen profiles collected between May 25 and September 28, 2015. The vertical red line indicates the dissolved oxygen concentration commonly considered the threshold for successful growth and reproduction of warm water fish. *Notice the decreasing dissolved oxygen concentrations near the lakebottom.*



Recommendations

Implement Best Management Practices within the Baboosic Lake watershed to minimize the adverse impacts of polluted runoff and erosion into Baboosic 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. The Baboosic Lake Watershed Plan Update, prepared by the Strafford Regional Planning Commission in 2014, lists additional measures that can help reduce the phosphorus inputs into Baboosic Lake.

- http://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- <http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf>
- http://www.nashuarpc.org/files/4414/2143/6758/2014_Baboosic_Lake_Watershed_Plan_Update.pdf

Figure 7. Baboosic Lake

Amherst & Merrimack, NH

2015 Deep water sampling site locations and seasonal average water clarity



0 0.1 0.2 0.3 0.4
Miles

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



University of New Hampshire
Cooperative Extension

