BABOOSIC LAKE

2017 SAMPLING HIGHLIGHTS

Station – 3 Sharks Tooth

Amherst and Merrimack, NH

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.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

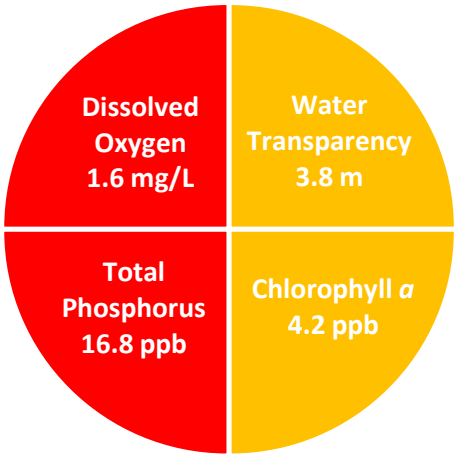


Figure 1. Baboosic Lake Water Quality (2017)

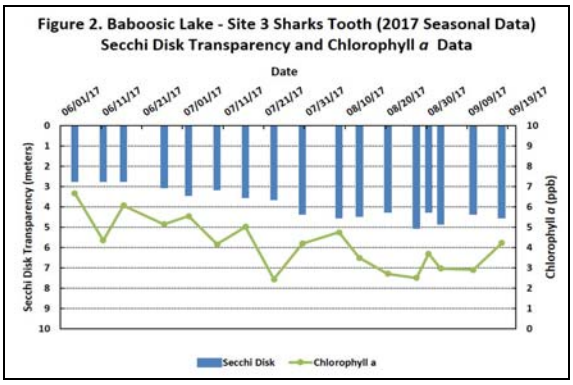
Table 1. 2017 Baboosic Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

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	**3.8** meters (2.7 – 5.0)	Mesotrophic
Chlorophyll *a* [1] (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	**4.2** ppb (2.4 – 6.7)	Mesotrophic
Total Phosphorus [1] (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	**16.8** ppb (11.2 – 27.0)	Eutrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	**1.6** mg/L (0.2 – 5.4)*	Eutrophic*

* Dissolved oxygen concentrations were measured on August 13, 2017 between 4.0 and 7.5 meters, in the layer of rapidly decreasing temperatures.

Table 2. 2017 Baboosic Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Baboosic Lake – 3 Sharks Average (range)	Baboosic Lake – 3 Sharks Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	**44.5** color units (32.2 – 62.9)	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	**12.1** mg/L (11.4 – 12.7)	Low vulnerability
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			**7.2** standard units (range: 7.2 – 7.2)	Optimal range for fish growth and reproduction
Specific Conductivity (*u*S/cm)	< 50 *u*S/cm Characteristic of minimally impacted NH lakes		50-100 *u*S/cm Lakes with some human influence	> 100 *u*S/cm Characteristic of lakes experiencing human disturbances		**136.6** *u*S/cm (range: 128.4 – 141.5)	Characteristic of lakes experiencing human disturbances



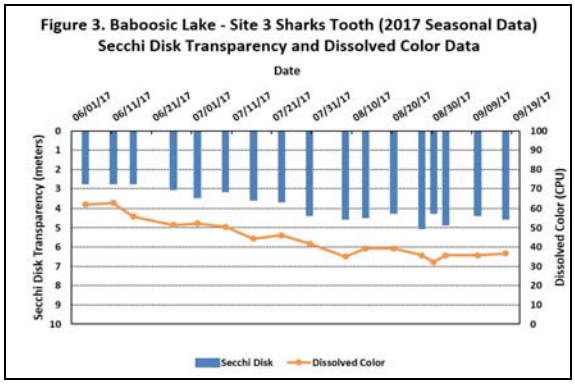


Figure 2 and 3. Seasonal Secchi Disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in 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 12 years (2006-2017) indicate a more 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 2017 (Figure 4). On a more positive note, the chlorophyll *a* measurements documented over the past 12 years (2006-2017) 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 have oscillated among years but the overall trend is stable over the period of regular sampling between 2000 and 2017 (Figure 5).

COLOR: The Baboosic Lake color data, the result of naturally occurring "tea" color substances from the breakdown of soils and plant materials, have oscillated among years while the long-term trend is stable between 1985 and 2017 (Figure 5).

Figure 4. Baboosic Lake - Site 3 Sharks Tooth (1983-2017)
Long-term Secchi Disk Transparency and Chlorophyll *a* Data

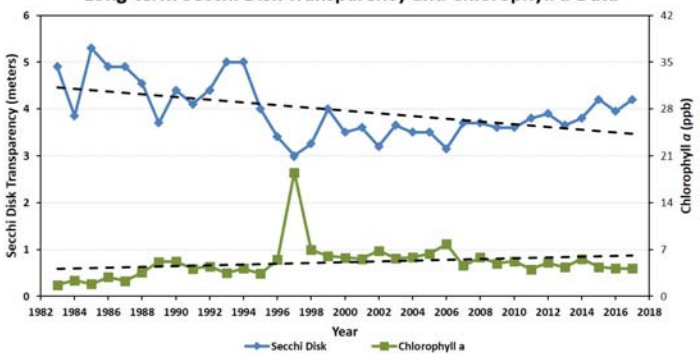


Figure 5. Baboosic Lake - Site 3 Sharks Tooth (1985-2017)
Long-term Total Phosphorus and Dissolved Color Data

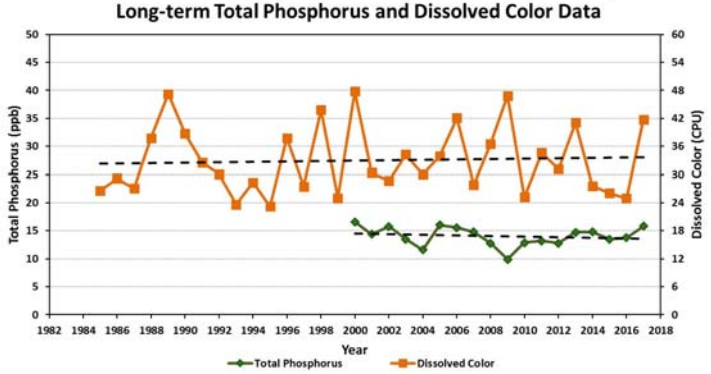


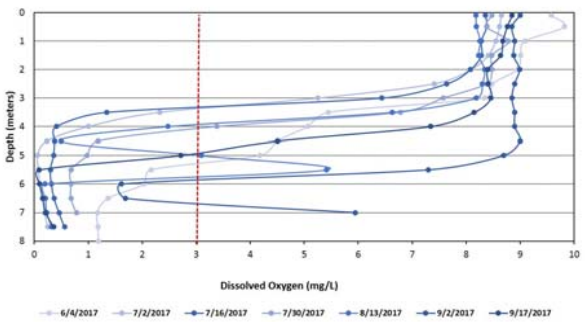
Table 3. Baboosic Lake Seasonal Average Water Quality Inter-Site Comparison (2017)

Sampling Station	Average (range) Total Phosphorus (ppb)	Average (range) Chlorophyll *a* (ppb)	Average (range) Water Clarity (meters)
1 Clarks	**16.1** ppb (range: 12.9 – 20.5)	**3.7** ppb (range: 2.0 – 5.9)	**3.8** m (range: 2.7 – 4.8)
2 Center	**16.3** ppb (range: 12.9 – 24.5)	**4.2** ppb (range: 2.2 – 6.9)	**3.8** m (range: 2.7 – 5.2)
3 Sharks Tooth	**16.8** ppb (range: 11.2 – 27.0)	**4.2** ppb (range: 2.4 – 6.7)	**3.8** m (range: 2.7 – 5.0)
4 Washer Cove	**15.6** ppb (range: 12.2 – 20.7)	4.7 ppb (range: 3.1 – 7.7)	**3.3** m (range: 2.8 – 3.6)

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 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. Monthly Baboosic Lake dissolved oxygen profiles collected between June 4 and September 17, 2017. 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.*

Figure 6. Baboosic Lake- Site 3 Sharks
Dissolved Oxygen Profiles (June 4 to September 17, 2017)



Recommendations

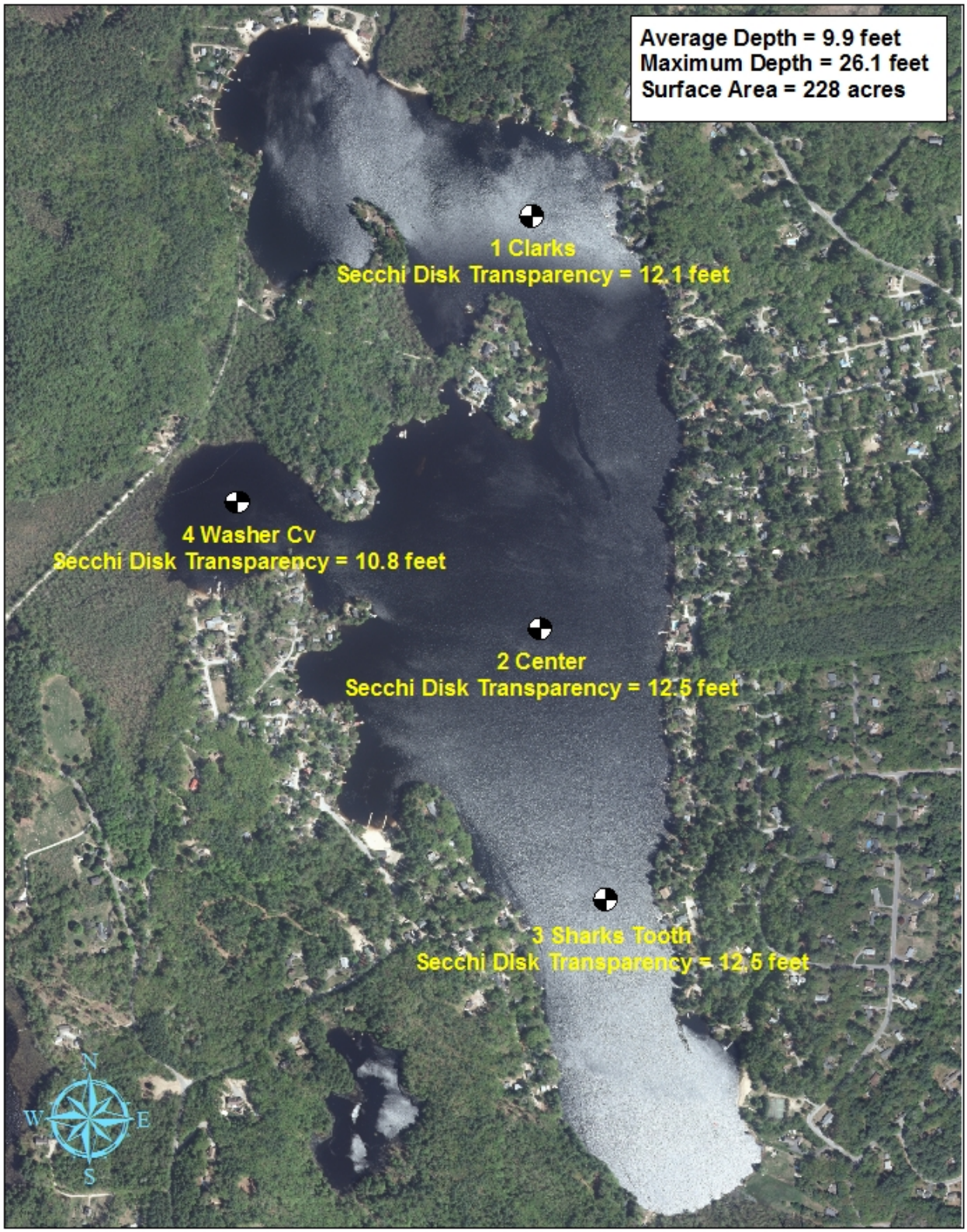
Implement Best Management Practices within the Baboosic Lake watershed to minimize the adverse impacts of polluted runoff and erosion into Baboosic Lake. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater 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://soaknh.org/wp-content/uploads/2016/04/NH-Homeowner-Guide-2016.pdf
- http://www.nashuarpc.org/files/4414/2143/6758/2014_Baboosic_Lake_Watershed_Plan_Update.pdf

Figure 7. Baboosic Lake

Amherst & Merrimack, NH

2017 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 for Freshwater Biology