

NATICOOK LAKE

2014 SAMPLING HIGHLIGHTS

Station – 1 Deep

Merrimack, NH



Blue = Excellent =
Oligotrophic

Yellow = Fair =
Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

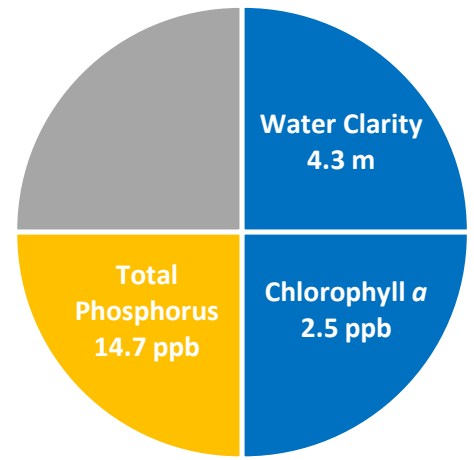


Figure 1. Naticook Lake Water Quality (2014)

Station 1 Deep (Figure 8) was used as a reference point to represent the overall Naticook Lake water quality. Water quality data displayed in Tables 1 and 2 are surface water measurements with the exception of the Dissolved Oxygen data.

Table 1. 2014 Naticook Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Naticook Lake Average (range)	Naticook Lake Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	4.3 meters (3.0 – 6.0)	Oligotrophic
Chlorophyll <i>a</i> (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	2.5 ppb (1.4 – 4.4)	Oligotrophic
Total Phosphorus (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	13.5 (11.9 – 14.8)	Mesotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	N/A	N/A

* Naticook Lake did not develop a deep water layer that is the basis for the dissolved oxygen classification criteria.

Table 2. 2014 Naticook Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Naticook Lake Average (range)	Naticook Lake 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	22.0 color units (19.2 – 24.4)	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	19.0 mg/L (18.0 – 20.2)	Low vulnerable
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: 7.1 – 7.2)	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		205 uS/cm (range: 204 - 205)	Characteristic of lakes experiencing human disturbances

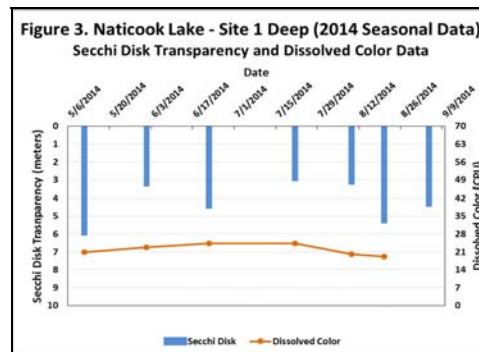
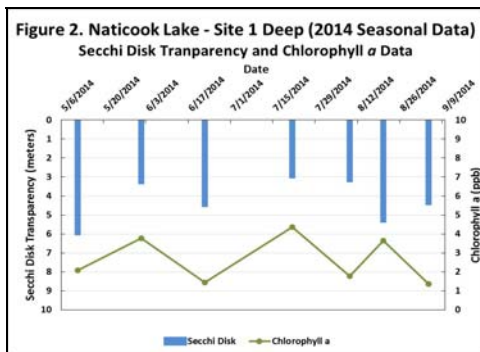


Figure 2 and 3. Seasonal Secchi Disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in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

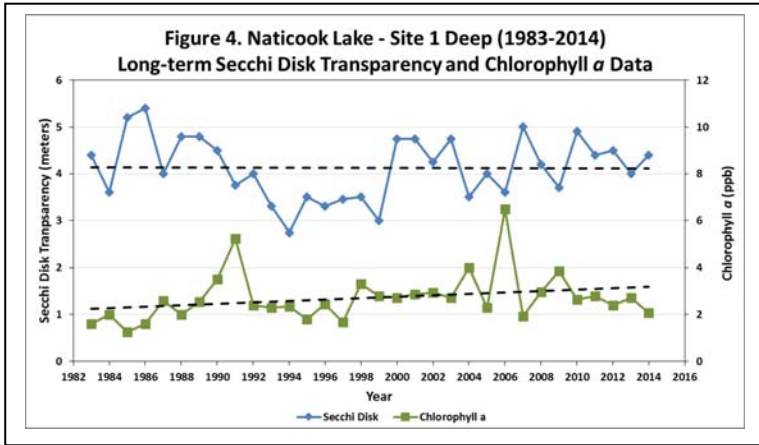
LONG-TERM TRENDS

WATER CLARITY: The Naticook Lake water clarity measurements, measured as Secchi Disk transparency, display a trend of relatively stable long-term Secchi Disk transparency (Figure 4). However, annual variations are clearly evident.

CHLOROPHYLL: The Naticook Lake chlorophyll *a* concentrations, a measure of microscopic plant life within the lake, display a trend of increasing concentrations (Figure 4).

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The Naticook Lake total phosphorus concentrations display a trend of increasing concentrations (Figure 5).

COLOR: The Naticook 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 (Figure 5).



Figures 4 and 5. Changes in the Naticook Lake water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1983 and 2014. **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.**

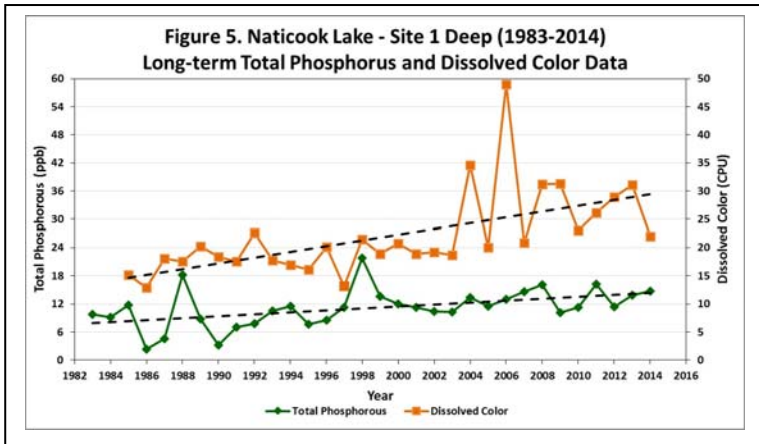
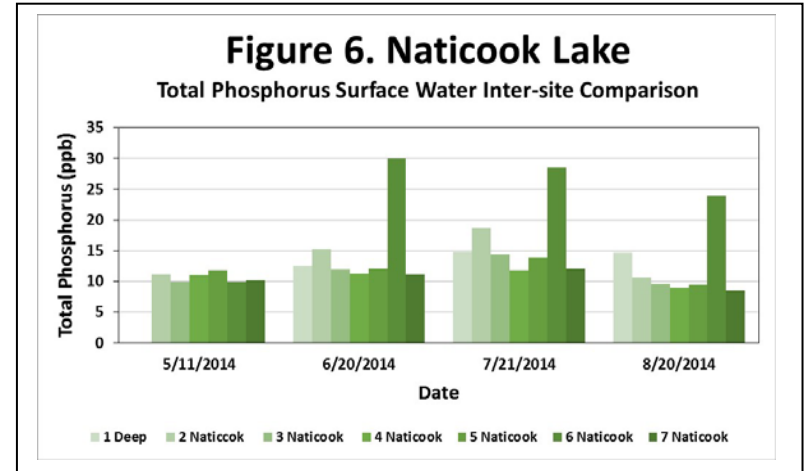
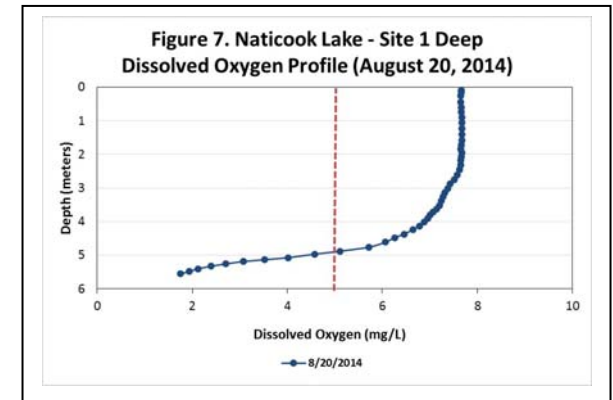


Figure 6. Naticook Lake surface water total phosphorus inter-site comparison. *Notice the difference in total phosphorus concentrations among sampling locations.*

Figure 7. Naticook Lake dissolved oxygen profile collected on August 20, 2014. The vertical red line indicates the dissolved oxygen concentration commonly considered the threshold for successful growth and reproduction of cold water fish such as trout and salmon. *Notice the decreasing dissolved oxygen concentrations near the lakebottom.*

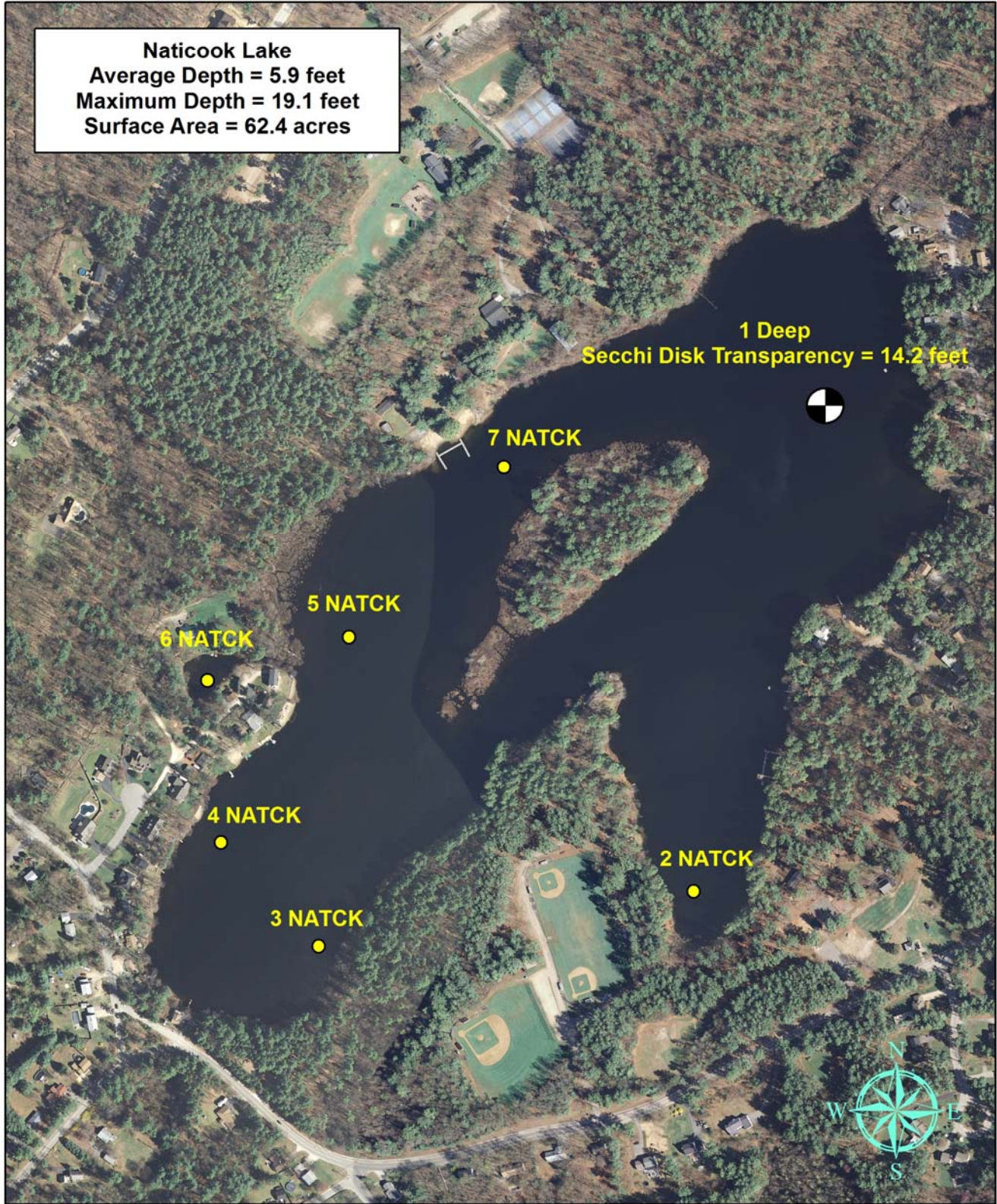


Reccomendations

Implement Best Management Practices within the Naticook Lake watershed to minimize the adverse impacts of polluted runoff and erosion into Naticook 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.

- http://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- <http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf>

Figure 8. Naticook Lake
Merrimack, NH
2014 Deep and near-shore sampling sites.



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