GREAT EAST LAKE

2016 SAMPLING HIGHLIGHTS

Station – 1 Center

Acton, ME and Wakefield, NH

Station 1 Center was used as a reference point to represent the overall Great East 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 near the lake bottom.

Blue = Oligotrophic

Yellow = Mesotrophic

Red = Eutrophic

Gray = No Data

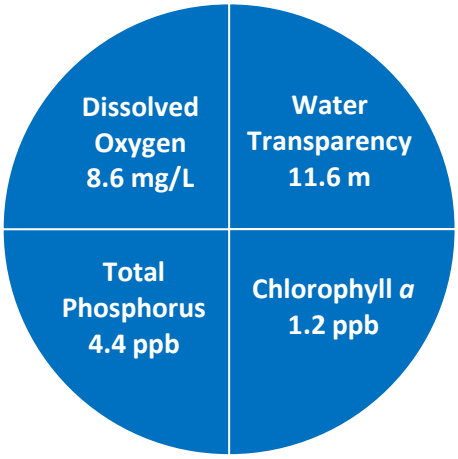


Figure 1. Great East Lake Water Quality (2016)

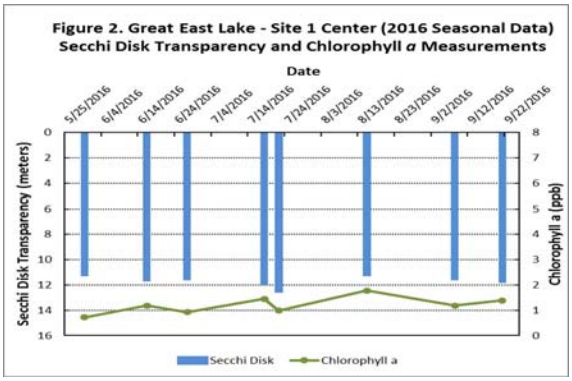
Table 1. 2016 Great East Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

Parameter	Oligotrophic	Mesotrophic	Eutrophic	Great East Lake Average (range)	Great East Lake Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	**11.6** meters (11.2 – 12.5)	Oligotrophic
Chlorophyll *a* [1] (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	**1.2** ppb (0.7 – 1.8)	Oligotrophic
Total Phosphorus [1] (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	**4.4** ppb (2.9 – 6.8)	Oligotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	**8.6** mg/L (6.1 – 10.4)	Oligotrophic

* Dissolved oxygen concentrations were measured between 13.0 and 30.0 meters, in the deep cold water layer, on July 22, 2016.

Table 2. 2016 Great East Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Great East Lake Average (range)	Great East Lake Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	**7.4** color units (5.0 – 10.6)	Uncolored
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	**8.3** mg/L (8.2 – 8.3)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			**7.4** standard units (7.4 – 7.4)	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		**74.6** *u*S/cm (71.3 – 74.9)	Lakes with some human influence



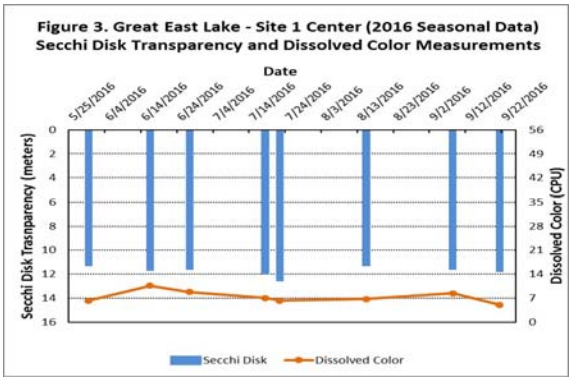


Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* concentrations and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases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

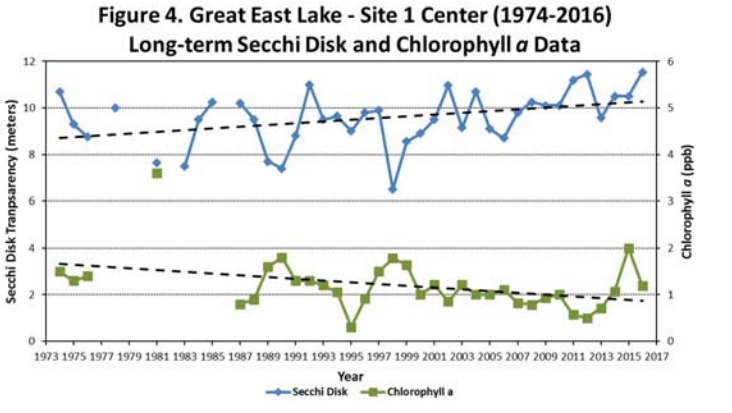
LONG-TERM TRENDS

WATER CLARITY: The Great East Lake water clarity measurements, measured as Secchi Disk transparency, display a trend of increasing water clarity (Figure 4).

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

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The Great East Lake total phosphorus concentrations have varied among years (Figure 5). The total phosphorus data do not display a long-term water quality trend.

COLOR: The Great East Lake color data, the result of naturally occurring "tea" color substances from the breakdown of soils and plant materials, display a trend of decreasing concentrations (Figure 5).



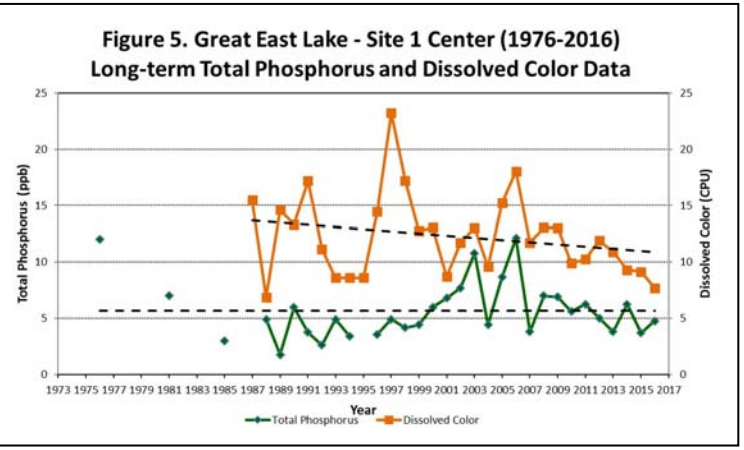


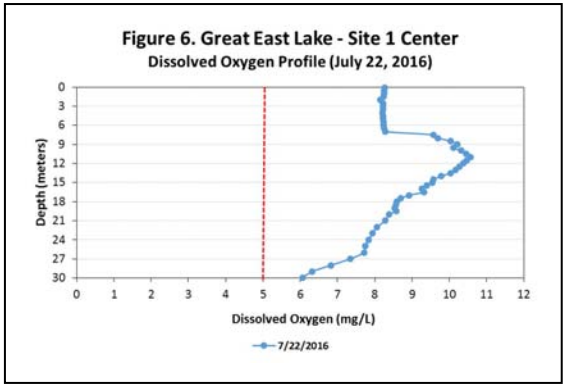
Table 3. Salmon Falls Headwaters Seasonal Average Water Quality Inter-comparison (2016)

Lake	Average Secchi Disk Transparency (meters)	Average Chlorophyll *a* (ppb)	Average Total Phosphorus (ppb)	Average Dissolved Oxygen (ppm)
Great East Lake	11.6	1.2	4.4	8.6
Wilson Lake	7.0	2.4	5.5	0.1
Lovell Lake	7.5	2.8	6.5	1.7
Horn Pond	7.3	1.9	5.7	2.9
Lake Ivanhoe	4.1	3.9	7.9	------

- Water quality data are reported for a deep reference sampling location in each water body
- Dissolved oxygen measurements were collected in the summer (late July and August) in the bottom water layer (metalimnion or hypolimnion).
- ------ Indicates the site is too shallow to form a bottom water layer (metalimnion or hypolimnion) during the summer months.

Figures 4 and 5. Changes in the Great East Lake water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1974 and 2016. **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.** Trendlines are displayed when sufficient data are available.

Figure 6. Great East Lake dissolved oxygen profile collected on July 22, 2016. The vertical red line indicates the oxygen concentration of five milligrams per liter that is commonly considered the threshold for successful growth and reproduction of cold water fish such as trout and salmon.



Recommendations

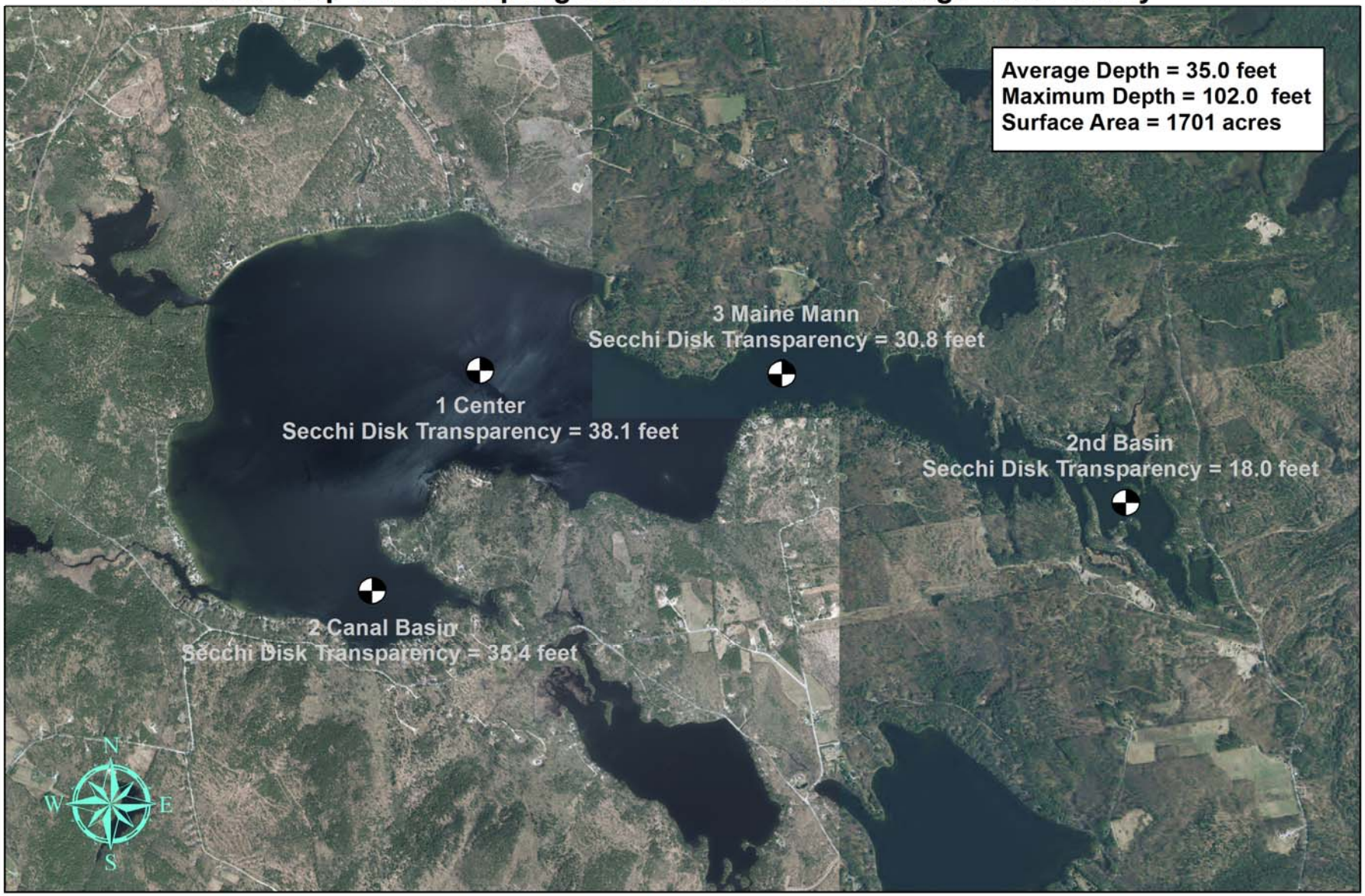
Implement Best Management Practices within the Great East Lake watershed to minimize the adverse impacts of polluted runoff and erosion on the lake. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home" for more information on how to reduce nutrient loading caused by overland run-off. The Acton Wakefield Watershed Alliance also offers technical assistance to help design and implement erosion control projects that protect and improve the water quality.

- http://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- http://soaknh.org/wp-content/uploads/2016/04/NH-Homeowner-Guide-2016.pdf
- http://awwatersheds.org/healthy-lakes/conservation-practices-for-homeowners/

Figure 7. Great East Lake

Acton, ME & Wakefield, NH

2016 Deep water sampling sites and seasonal average water clarity



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

NH Extension

NEW HAMPSHIRE LAKES LAY MONITORING