GREAT EAST LAKE

2014 SAMPLING HIGHLIGHTS

Station – 1 Center

Acton, ME and Wakefield, NH

University of New Hampshire Cooperative Extension

Station 1 Center was used as a reference point to represent the overall lake quality.

Refer to the Great East Lake Annual Report (2014) for additional information.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

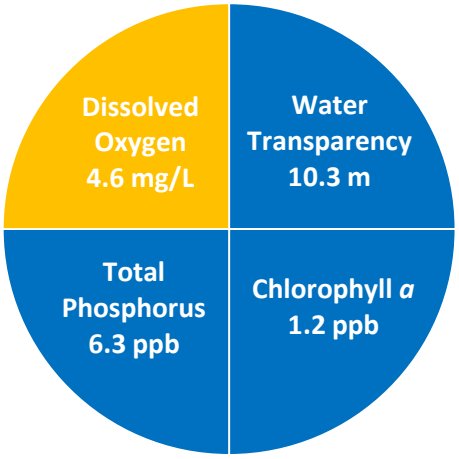


Figure 1. Great East Lake Water Quality (2014)

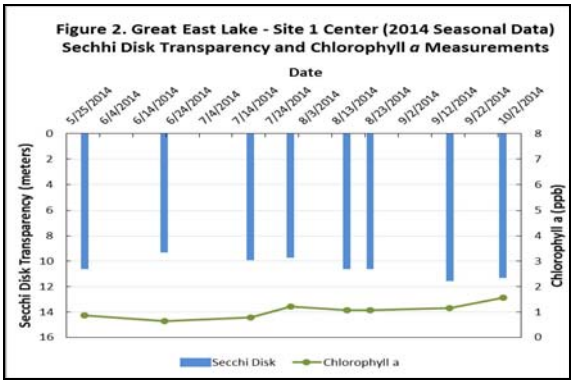
Table 1. 2014 Great East Lake Seasonal Averages and NH DES Trophic Level Classification Criteria

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Great East Lake Average (range)	Great East Lake Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	**10.3** meters (9.2 – 11.5)	Oligotrophic
Chlorophyll *a* (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	**1.1** ppb (0.6 – 1.6)	Oligotrophic
Total Phosphorus (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	**6.3** ppb (5.2 – 7.6)	Oligotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	**4.6** mg/L (2.6 – 9.7)	Mesotrophic

* Dissolved oxygen concentrations were measured between 12.5 and 29.5 meters, in the deep cold water layer on September 17, 2014.

Table 2. 2014 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	**9.6** color units (5.3 – 13.6)	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	**6.9** mg/L (5.3 – 13.6)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			**7.3** standard units (7.3 – 7.3)	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		**66.0** *u*S/cm (66.0 – 66.0)	Lakes with some human influence



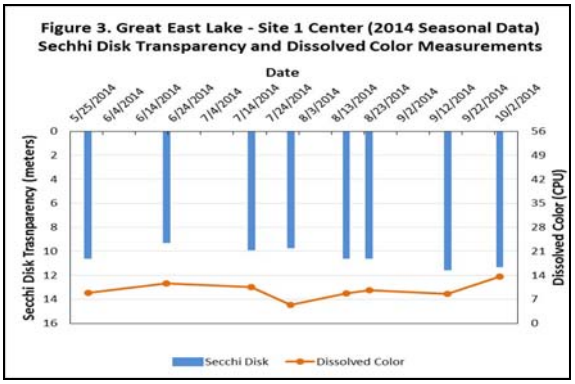


Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in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

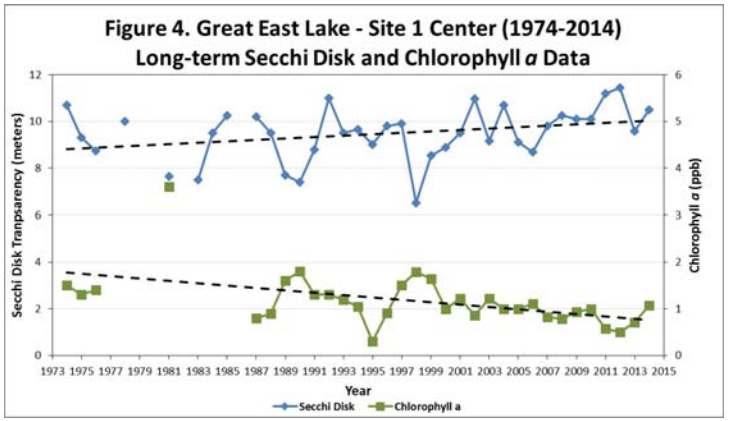
LONG-TERM TRENDS

WATER CLARITY: The Great East Lake water clarity measurements, measured as Secchi Disk transparency, display a trend of increasing water clarity over the thirty-six years of water quality sampling (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 over the past thirty-two years of water quality sampling (Figure 4).

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The Great East Lake total phosphorus concentrations display a trend of increasing concentrations over the twenty-nine year span (Figure 5).

COLOR: The Great East Lake color data, the result of naturally occurring "tea" color substances from the breakdown of soils and plant materials, have decreased slightly over the past twenty-eight years (Figure 5).



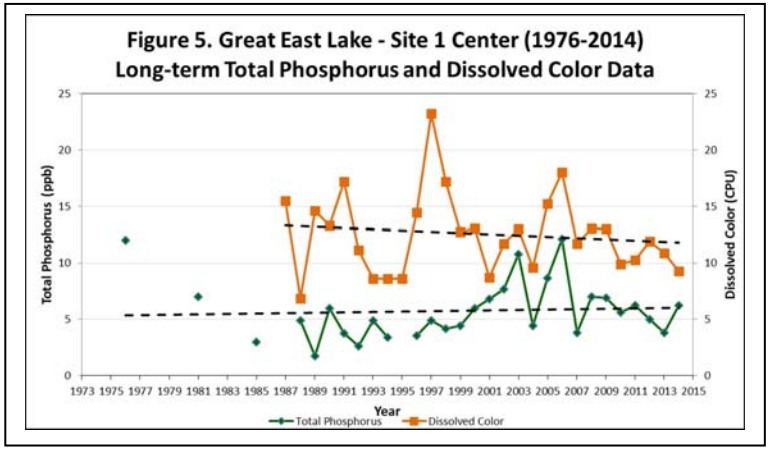


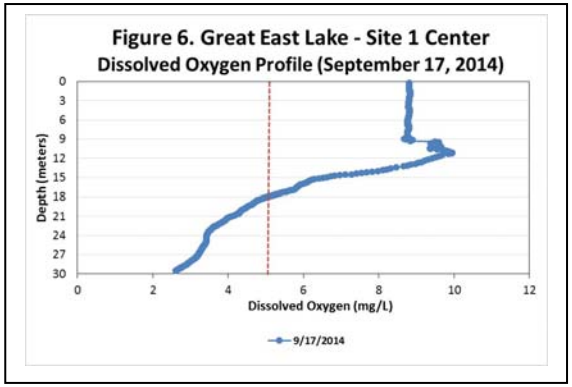
Table 3. Salmon Falls Headwaters Seasonal Average Water Quality Inter-comparison (2014)

Lake	Average Secchi Disk Transparency (meters)	Average Chlorophyll *a* (ppb)	Average Total Phosphorus (ppb)	Average Dissolved Oxygen (ppm)
Great East Lake	10.5	1.1	6.2	4.6
Wilson Lake	7.5	2.1	6.5	1.2
Lovell Lake	7.8	2.7	7.1	1.6
Horn Pond	8.1	2.1	6.7	1.3
Lake Ivanhoe	4.2	6.0	9.0	------

- Water quality data are reported for a deep reference sampling location in each water body
- Dissolved oxygen measurements were taken late season (early-mid September) and from the bottom water layer (hypolimnion).
- ------ Indicates the site is too shallow to form a bottom water layer (hypolimnion).

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 2014. **These data illustrate the relationship among plant growth, water color and water clarity. Total phopshorus 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 September 17, 2014. The vertical red line indicates the oxygen concentration commonly considered the threshold for successful growth and reproduction of cold water fish such as trout and salmon. *Notice the low oxygen concentations near the lake bottom.*



Recommendations

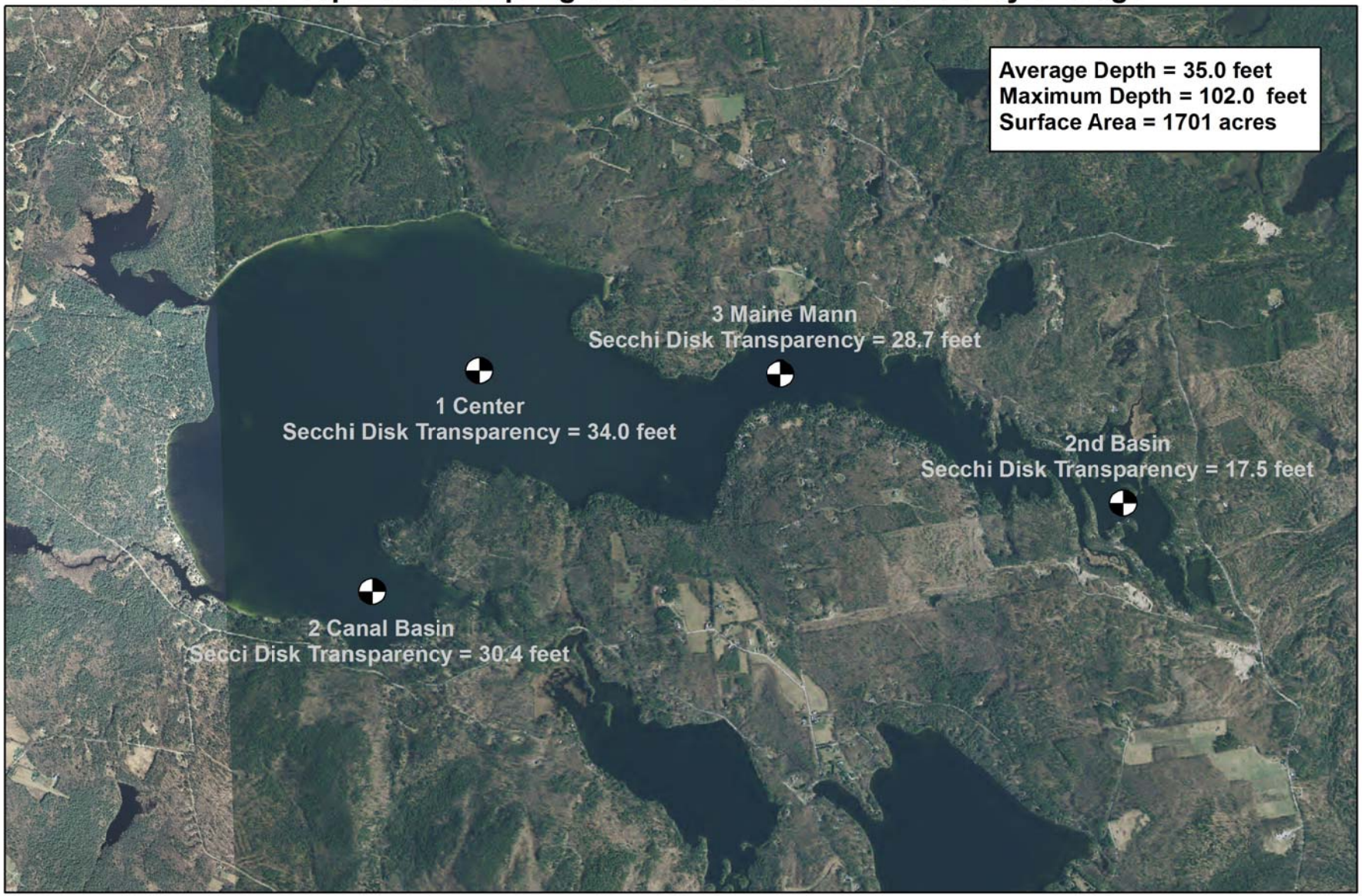
Implement Best Management Practices within the Great East Lake watershed to minimize the adverse impacts of polluted runoff and erosion into the lake. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater 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://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf
- http://awwatersheds.org/healthy-lakes/conservation-practices-for-homeowners/

Figure 7. Great East Lake

Acton, ME & Wakefield, NH

2014 Deep water sampling site with seasonal water clarity average



N

Miles
0 0.2 0.4 0.8 1.2 1.6

Aerial Orthophoto Source: NH GRANIT
Site locations GPSed by the UNH Center of Freshwater Biology

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