

SILVER LAKE

2014 SAMPLING HIGHLIGHTS

Station – 2 Deep

Madison, NH



Blue = Excellent =
Oligotrophic

Yellow = Fair =
Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

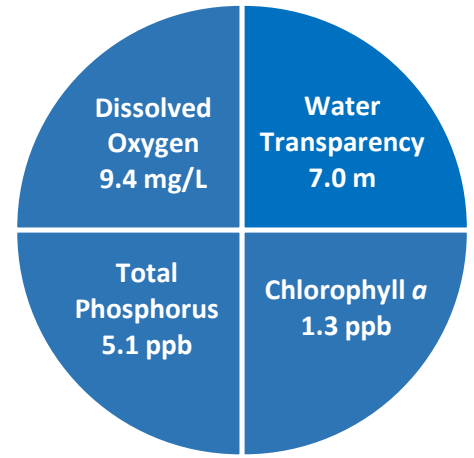


Figure 1. Silver Lake Water Quality (2014)

Station 2 Deep (Figure 7) was used as a reference point to represent the overall Silver Lake water quality. Water quality data displayed in Tables 1 and 2 are surface water measurements with the exception of the dissolve oxygen data that were collected near the lake bottom.

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

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Silver Lake – Site 2 Deep Average (range)	Silver Lake – Site 2 Deep Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	7.0 meters (5.5 – 8.3)	Oligotrophic
Chlorophyll a (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	1.3 ppb (0.6 – 1.9)	Oligotrophic
Total Phosphorus (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	5.1 ppb (single sample)	Oligotrophic
Dissolved Oxygen (mg/L)	> 5.0	2.0 – 5.0	<2.0	9.4 mg/L (9.1 – 10.2)	Oligotrophic

* Dissolved oxygen concentrations were measured on August 15, 2014 between 7.5 and 27.6 meters, in the bottom waters.

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

Parameter	Assessment Criteria					Silver Lake – Site 2 Deep Average (range)	Silver Lake – Site 2 Deep 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	20.6 color units (18.1 – 23.5)	Lightly 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	4.7 mg/L (4.3 – 5.3)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			6.8 standard units (range: 6.4 – 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		40.0 uS/cm (range: 40.0 – 40.0)	Characteristic of minimally impacted NH Lakes

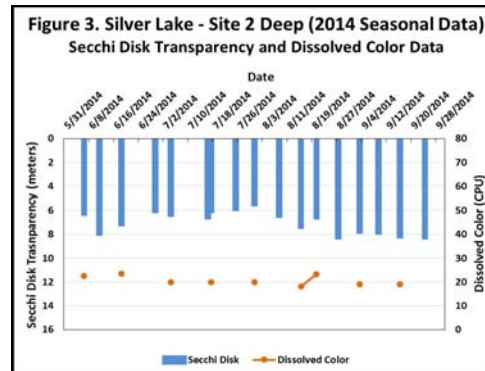
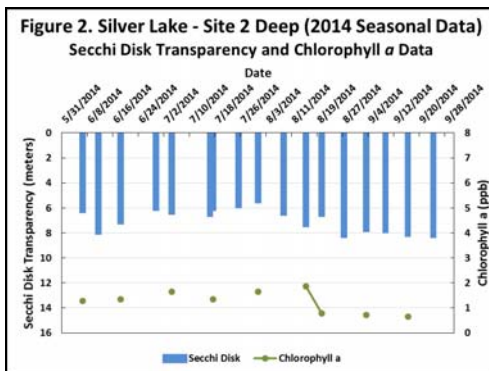


Figure 2 and 3. Seasonal Secchi Disk transparency, chlorophyll a changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll a and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll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

LONG-TERM TRENDS

WATER CLARITY: The Silver Lake water clarity measurements, measured as Secchi Disk transparency, display a trend of decreasing water clarity over thirty-two years of water quality monitoring conducted between 1983 and 2014 (Figure 4).

CHLOROPHYLL: The Silver Lake chlorophyll *a* concentrations, a measure of microscopic plant life within the lake, display a trend of increasing concentrations over thirty-two years of water quality monitoring conducted between 1983 and 2014 (Figure 4).

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The Silver Lake total phosphorus concentrations display a relatively stable trend over the thirty years of water quality monitoring conducted between 1983 and 2014 (Figure 5).

COLOR: The Silver Lake color data, the result of naturally occurring “tea” color substances from the breakdown of soils and plant materials, display a relatively stable trend over the thirty years of water quality monitoring conducted between 1985 and 2014 (Figure 5).

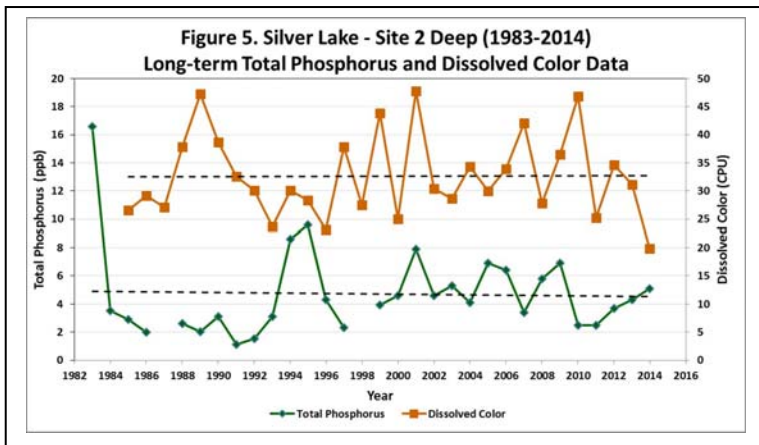
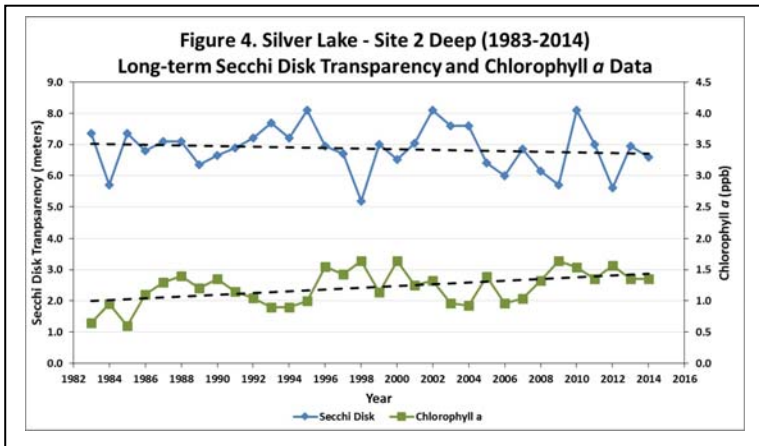


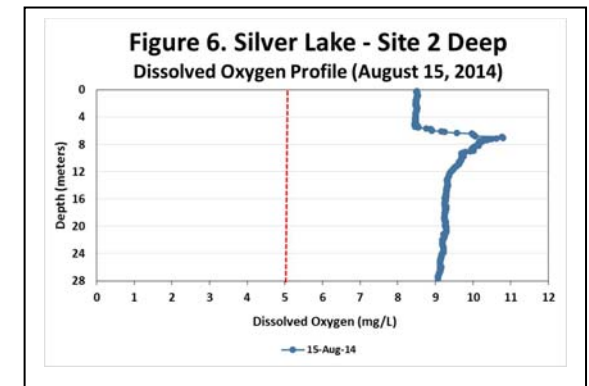
Table 3. Silver Lake Seasonal Average Water Quality Inter-Site Comparison (2014)

Sampling Station	Average (range) Water Clarity (meters)	Average (range) Total Phosphorus (ppb)	Average (range) Chlorophyll <i>a</i> (ppb)	Average (range) Dissolved Oxygen (mg/L)
1 South	7.0 m (range: 5.7 - 8.8)	3.8 ppb (range: 3.8 - 3.8)	1.3 ppb (range: 0.6 - 1.8)	-----
2 Deep	7.0 m (range: 5.5 - 8.3)	5.1 ppb (range: 5.1 - 5.1)	1.3 ppb (range: 0.6 - 1.9)	9.4 mg/L (range: 9.1 - 10.2)
3 Center	6.8 m (range: 5.7 - 8.3)	4.9 ppb (range: 4.9 - 4.9)	1.5 ppb (range: 0.7 - 2.1)	9.5 mg/L (range: 9.1 - 10.4)
4 East	5.2 m (range: 3.0 - 5.9)	4.3 ppb (range: 4.3 - 4.3)	1.6 ppb (range: 0.9 - 1.9)	-----
5 North	6.4 m (range: 4.9 - 7.7)	4.7 ppb (range: 4.7 - 4.7)	1.4 ppb (range: 0.9 - 2.2)	9.0 mg/L (range: 8.0 - 9.8)
7 North Island	6.1 m (range: 4.8 - 7.8)	4.9 ppb (range: 4.9 - 4.9)	1.5 ppb (range: 0.9 - 2.3)	1.2 mg/L (range: 0.9 - 1.6)

- Dissolved oxygen concentrations measured in the bottom waters (hypolimnion)
- Dashed line indicates there was not a bottom water (hypolimnion) layer

Figures 4 and 5. Changes in the Silver 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. Silver Lake dissolved oxygen profiles collected on August 15, 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 high dissolved oxygen concentrations near the lake bottom.*



Recommendations

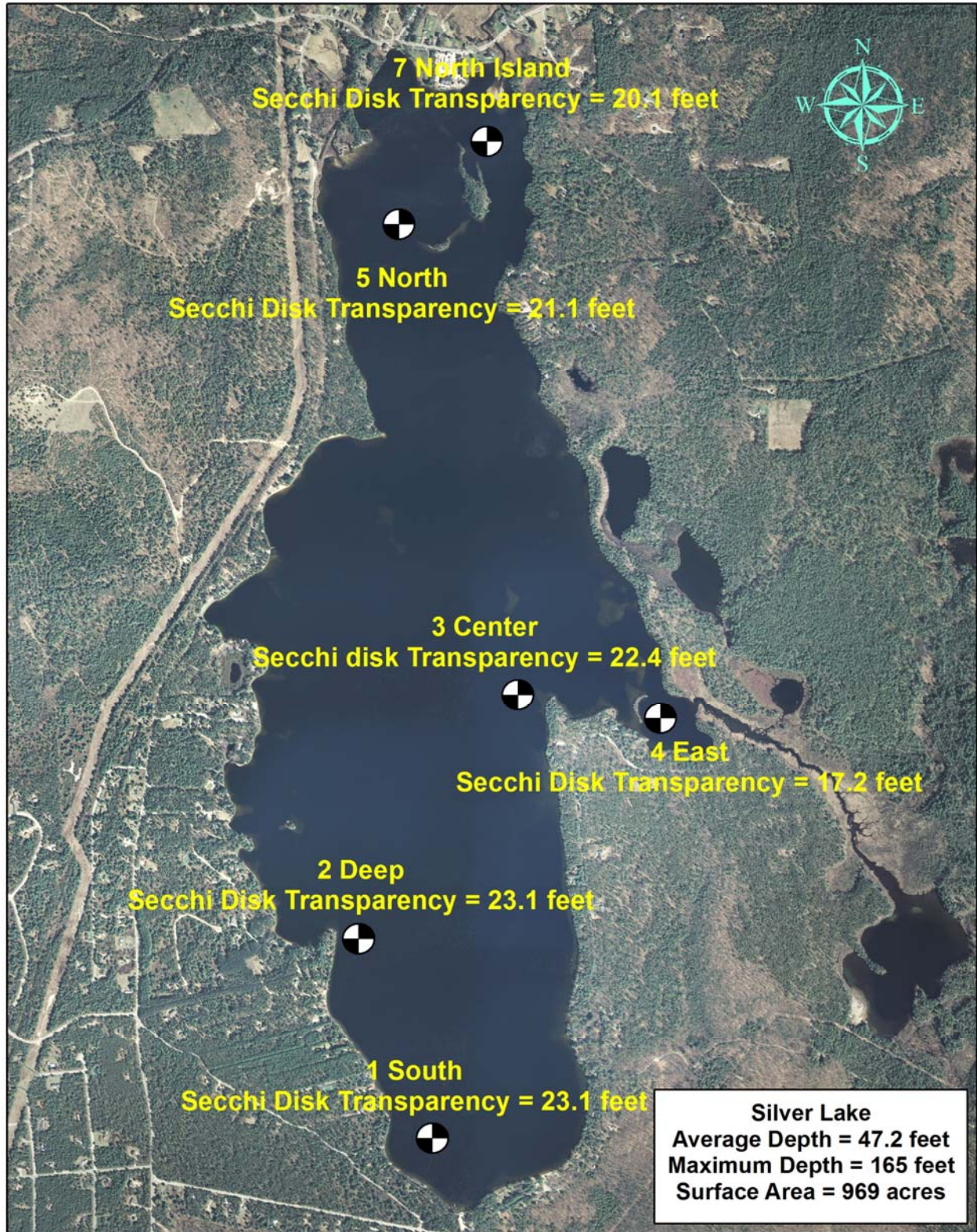
Implement Best Management Practices within the Silver Lake watershed to minimize the adverse impacts of polluted runoff and erosion into Silver Lake. Refer to “Landscaping at the Water’s Edge: An Ecological Approach” and “New Hampshire Homeowner’s Guide to Stormwater Management: Do-It-Yourself Stormwater 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 7. Silver Lake

Madison, NH

2014 Deep water sampling sites with seasonal average water clarity



0 0.2 0.4 0.6 0.8 Miles

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

 **University of New Hampshire**
Cooperative Extension

