

MIRROR LAKE

2015 SAMPLING HIGHLIGHTS

Station – 3 Deep Point

Tuftonboro and Wolfeboro, NH



Blue = Excellent =
Oligotrophic

Yellow = Fair =
Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

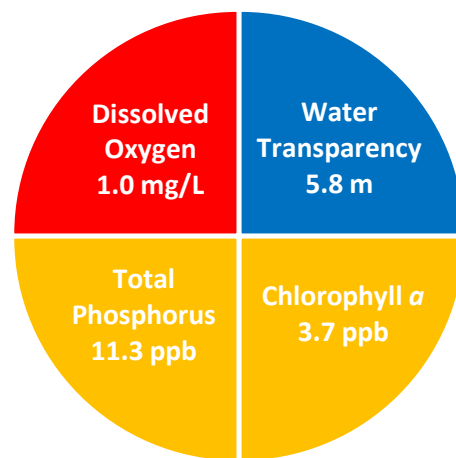


Figure 1. Mirror Lake Water Quality (2015)

Station 3 Deep Point (Figure 7) was used as a reference point to represent the overall Mirror 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. 2015 Mirror Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Mirror Lake Average (range)	Mirror Lake Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	5.8 meters (5.2 – 6.5)	Oligotrophic
Chlorophyll a (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	3.7 ppb (2.2 – 5.1)	Mesotrophic
Total Phosphorus (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	11.3 ppb (9.0 – 16.4)	Mesotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	1.0 mg/L (0.1 – 3.8)	Eutrophic

* Dissolved oxygen concentrations were measured on August 6, 2015 between 6.0 and 8.5 meters, in the layer of rapidly decreasing temperature.

Table 2. 2015 Mirror Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Mirror Lake Average (range)	Mirror Lake Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	24.7 color units (18.5 – 40.1)	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	9.7 mg/L (9.2 – 10.2)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			7.2 standard units (range: 6.9 – 7.6)	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		69.4 uS/cm (range: 67.5 – 70.9)	Lakes with some human influence

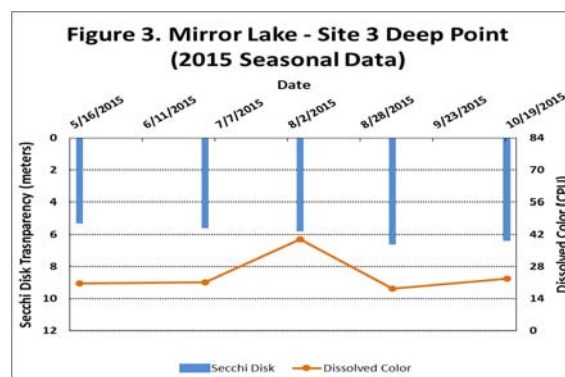
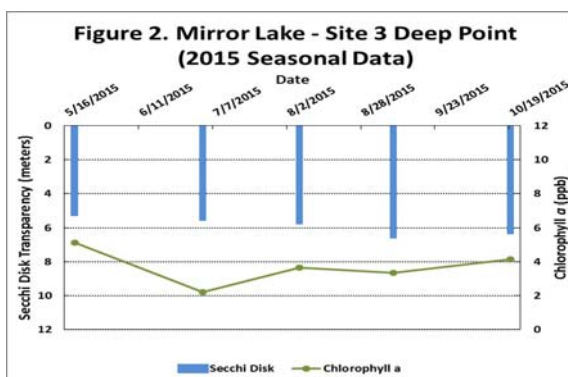


Figure 2 and 3. Seasonal Secchi Disk transparency, chlorophyll a changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll a and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll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

LONG-TERM TRENDS

WATER CLARITY: The Mirror Lake water clarity measurements, measured as Secchi Disk transparency, display a trend of increasing water clarity over a twenty-five year span (Figure 4).

CHLOROPHYLL: The Mirror Lake chlorophyll *a* concentrations, a measure of microscopic plant life within the lake, display a trend of increasing concentrations over a twenty-five year span (Figure 4).

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

COLOR: The Mirror 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 over a twenty-five year span (Figure 5).

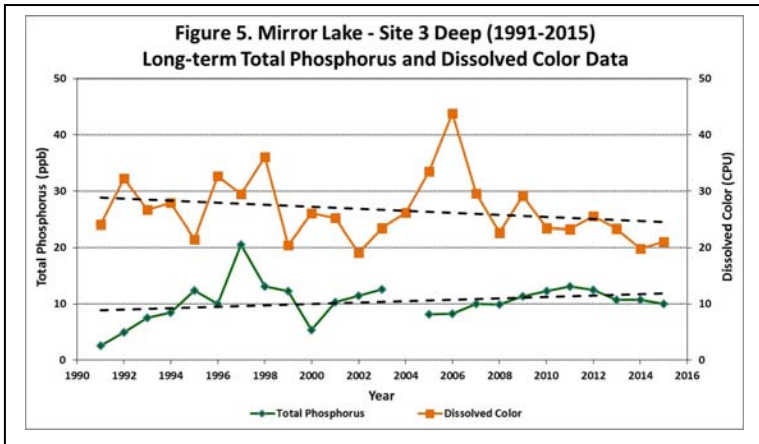
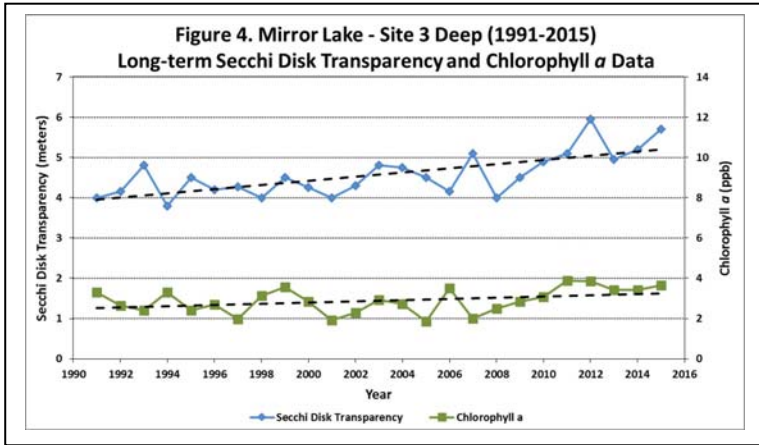
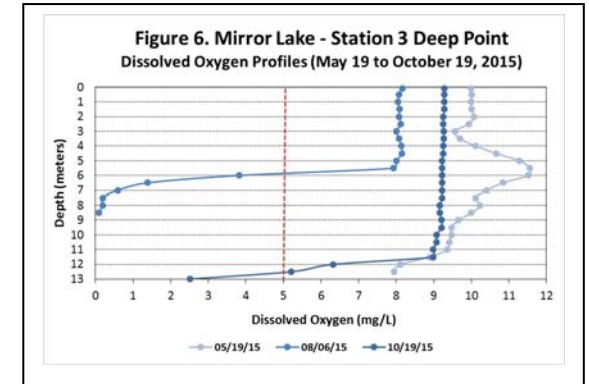


Table 3. Mirror Lake Near-shore Seasonal Average Water Quality Inter-Site Comparison (2015)

Near-shore Sampling Station	Average (range) Total Phosphorus (ppb)	Average (range) Chlorophyll <i>a</i> (ppb)	Average (range) Dissolved Color (CPU)
4 Hersey Cove	9.1 ppb (range: 7.1 – 11.1)	3.6 ppb (range: 2.2 – 6.1)	22.6 CPU (range: 15.8 – 29.8)
5 Bowles Inlet	9.8 ppb (range: 7.9 – 13.8)	3.6 ppb (range: 2.1 – 8.1)	19.8 CPU (range: 17.5 – 22.9)
7 Beach Inlet	10.9 ppb (range: 7.3 – 13.0)	2.6 ppb (range: 1.5 – 4.1)	20.9 CPU (range: 19.3 – 22.9)
8 Libby Cove	9.4 ppb (range: 7.1 – 12.2)	2.9 ppb (range: 2.3 – 3.5)	20.4 CPU (range: 16.7 – 24.4)
9 M.L. Drive	10.1 ppb (range: 8.0 – 13.8)	3.0 ppb (range: 1.6 – 5.2)	20.2 CPU (range: 18.4 – 22.0)
10 109 Launch	9.3 ppb (range: 7.3 – 11.9)	3.8 ppb (range: 1.5 – 8.2)	22.1 CPU (range: 16.7 – 30.8)

Figures 4 and 5. Changes in the Mirror Lake water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1991 and 2015. **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 Mirror Lake dissolved oxygen profiles collected between May 28 and October 19, 2015. 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 lake bottom.*

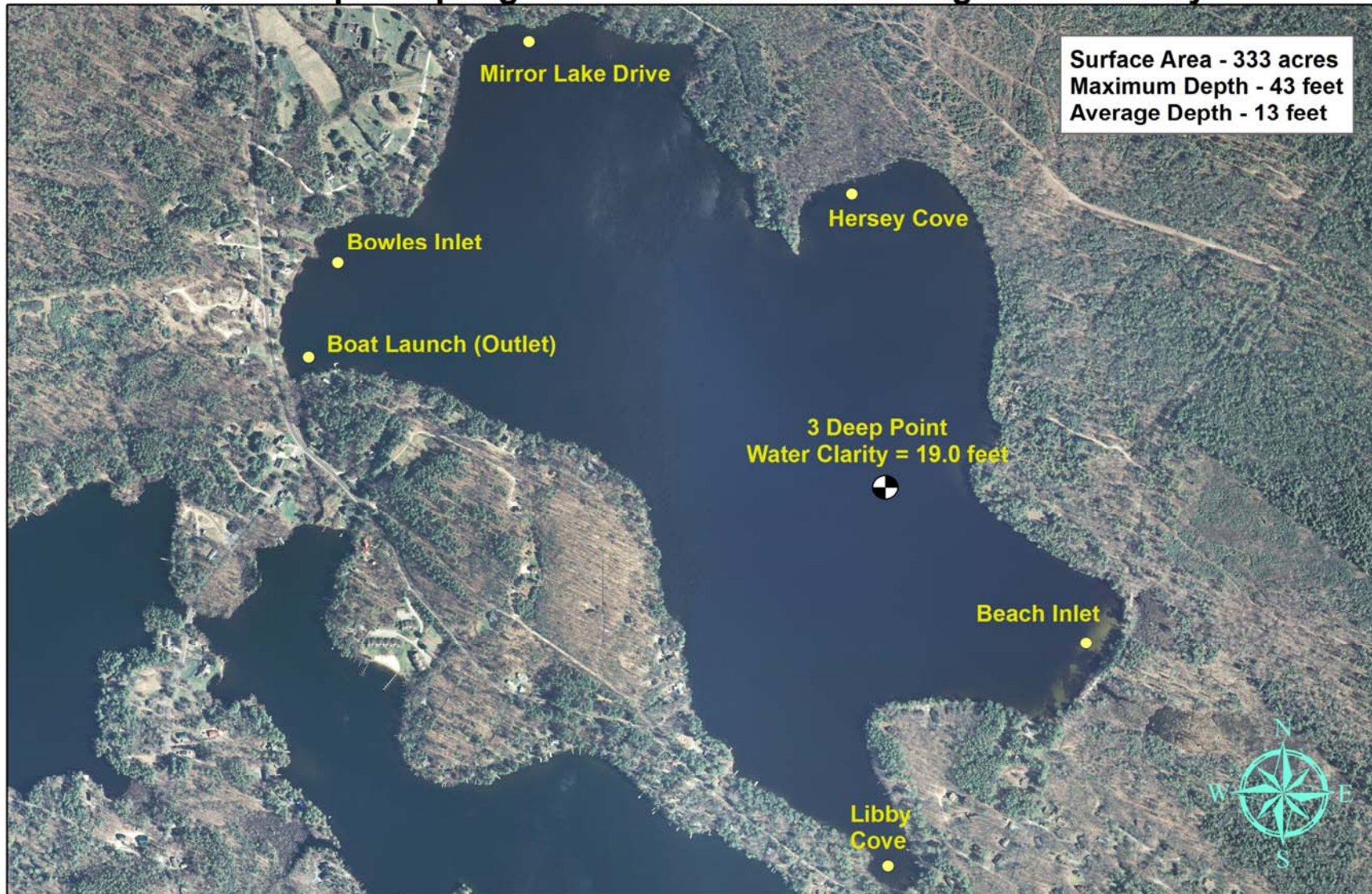


Recommendations

Implement Best Management Practices within the Mirror Lake watershed to minimize the adverse impacts of polluted runoff and erosion into Mirror 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 Mirror Lake Watershed Management Plan, prepared by Geosyntec Consultants, lists additional measures that can help reduce the phosphorus inputs into Mirror Lake.

- <http://des.nh.gov/organization/divisions/water/wmb/was/documents/mirror-lake-wmp-2012.pdf>
- 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. Mirror Lake
Tuftonboro and Wolfeboro, NH
2015 Deep sampling sites with seasonal average water clarity**



0 0.1 0.2 0.4 0.6 0.8 Miles

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