

MIRROR LAKE

2017 SAMPLING HIGHLIGHTS

Station – 3 Deep Point

Tuftonboro and Wolfeboro, NH



Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

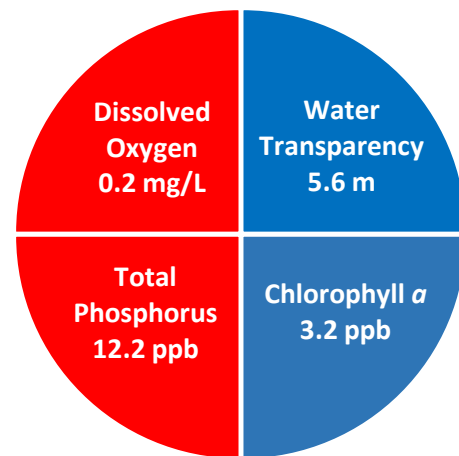


Figure 1. Mirror Lake Water Quality (2017)

Table 1. 2017 Mirror Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria¹

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	5.6 meters (4.5 – 6.5)	Oligotrophic
Chlorophyll <i>a</i> ¹ (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	3.2 ppb (2.2 – 4.6)	Oligotrophic
Total Phosphorus ¹ (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	12.2 ppb (10.1 – 16.1)	Eutrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	< 2.0	0.2 mg/L (0.1 – 0.4)*	Eutrophic

* Dissolved oxygen concentrations were measured on October 4, 2017 between 8.5 and 12.5 meters, in the bottom cold water layer.

Table 2. 2017 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	27.9 color units (range: 20.2 – 32.3)	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	9.3 mg/L (range: 9.1 – 9.5)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			7.0 standard units (range: 6.6 – 7.3)	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		74.5 uS/cm (range: 72.5 – 76.9)	Lakes with some human influence

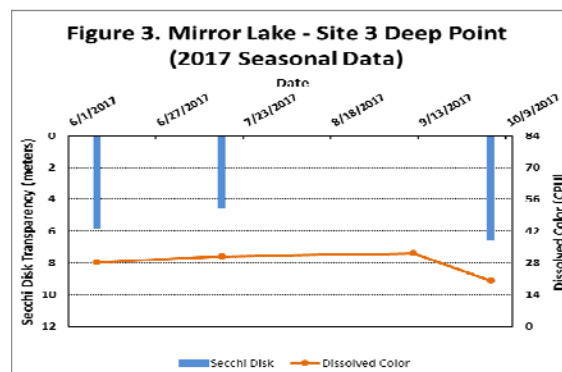
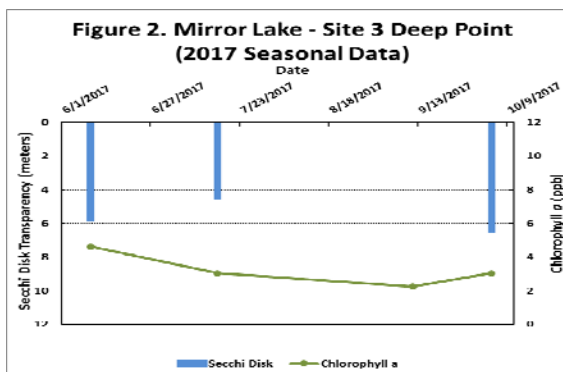


Figure 2 and 3. Seasonal Secchi Disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in 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-seven 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-seven 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 twenty-seven years of water quality monitoring (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-seven year span (Figure 5).

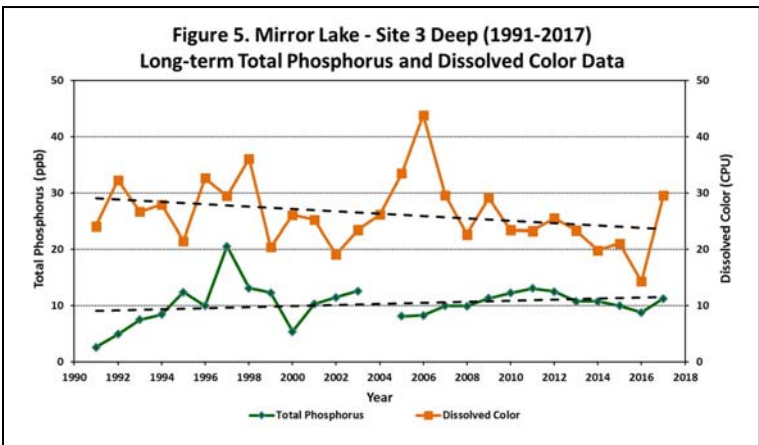
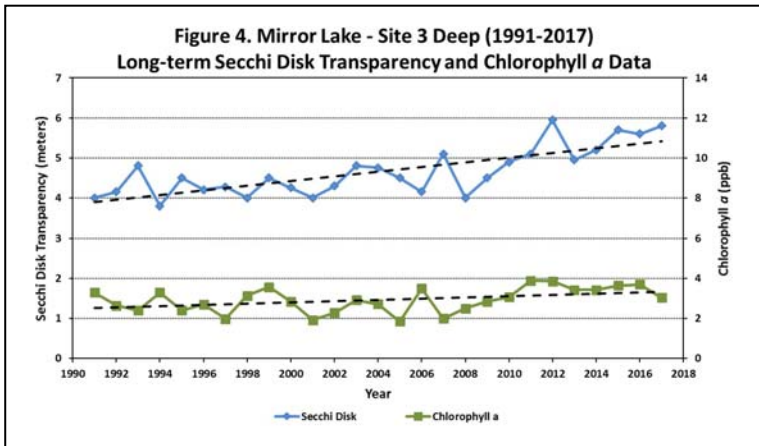
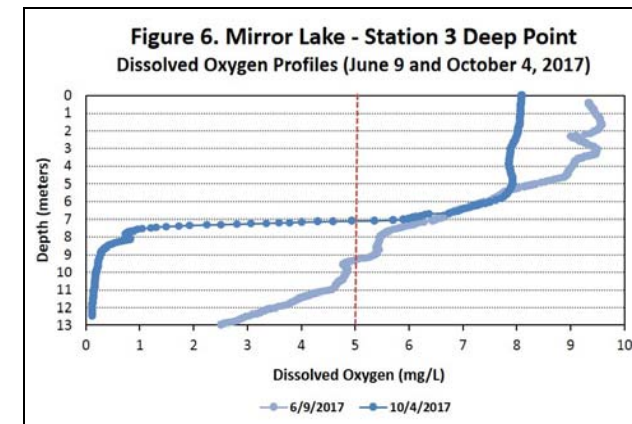


Table 3. Mirror Lake Near-shore Seasonal Average Water Quality Inter-Site Comparison (2017)

Near-shore Sampling Station	Average (range) Total Phosphorus (ppb)	Average (range) Chlorophyll <i>a</i> (ppb)	Average (range) Dissolved Color (CPU)
4 Hersey Cove	9.4 ppb (range: 7.8 – 11.5)	3.2 ppb (range: 1.9 – 5.8)	28.0 CPU (range: 20.2 – 37.2)
5 Bowles Inlet	9.3 ppb (range: 7.0 – 10.9)	2.1 ppb (range: 1.6 – 2.4)	25.1 CPU (range: 21.0 – 29.2)
7 Beach Inlet	10.1 ppb (range: 8.8 – 11.2)	2.6 ppb (range: 1.8 – 3.4)	24.4 CPU (range: 21.1 – 27.4)
8 Libby Cove	10.8 ppb (range: 8.6 – 14.3)	2.4 ppb (range: 2.2 – 2.5)	23.1 CPU (range: 20.2 – 25.7)
9 M.L. Drive	9.6 ppb (range: 6.1 – 13.8)	3.0 ppb (range: 1.6 – 5.2)	20.2 CPU (range: 18.4 – 22.0)
10 109 Launch	10.2 ppb (range: 9.9 – 10.8)	3.0 ppb (range: 1.8 – 4.2)	25.1 CPU (range: 20.2 – 27.4)

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 2017. **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 on June 9 and October 4, 2017. 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.*

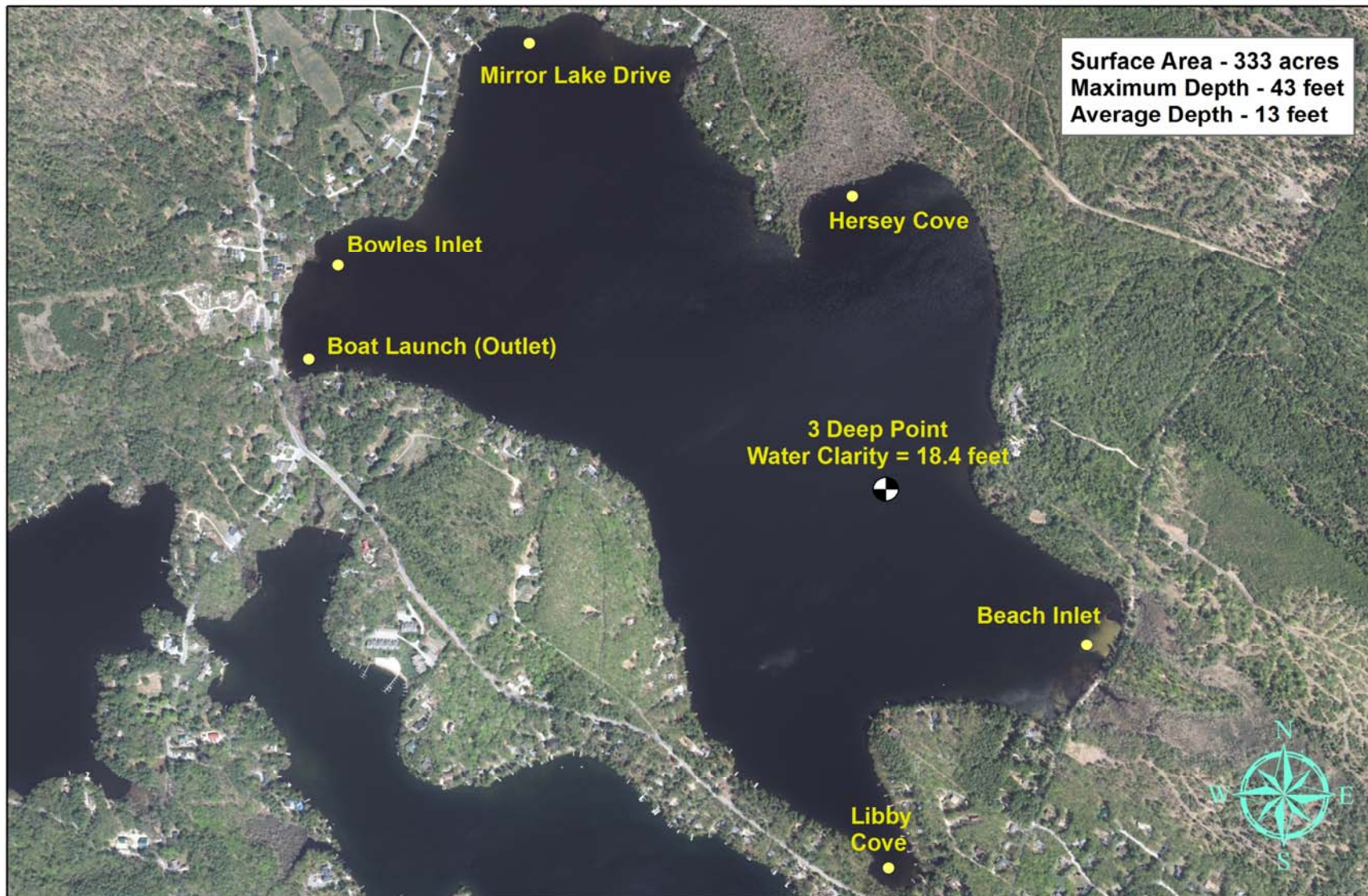


Recommendations

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://soaknh.org/wp-content/uploads/2016/04/NH-Homeowner-Guide-2016.pdf>

**Figure 7. Mirror Lake
Tuftonboro and Wolfeboro, NH
2017 Deep and nearshore sampling sites with seasonal average water clarity**



0 0.2 0.4 0.6 0.8 Miles

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



Extension

