# Lake Winnisquam

## 2014 SAMPLING HIGHLIGHTS

## Station – 10 Waldron

**Belmont, Laconia, Meredith, Sanbornton and Tilton, NH**

University of New Hampshire Cooperative Extension

Station 10 Waldron was used as a reference point to represent the Lake Winnisquam water quality along the northerly section of Black Brook Road.

**Blue** = Excellent = Oligotrophic

**Yellow** = Fair = Mesotrophic

**Red** = Poor = Eutrophic

**Gray** = No Data

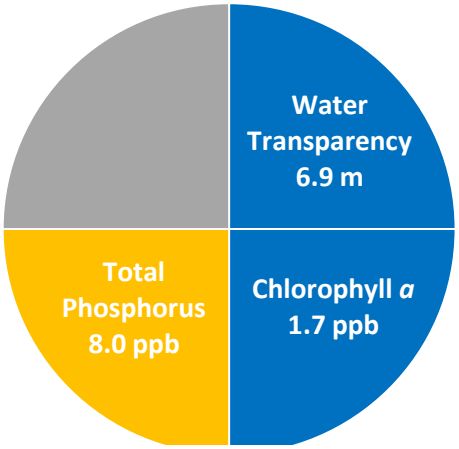


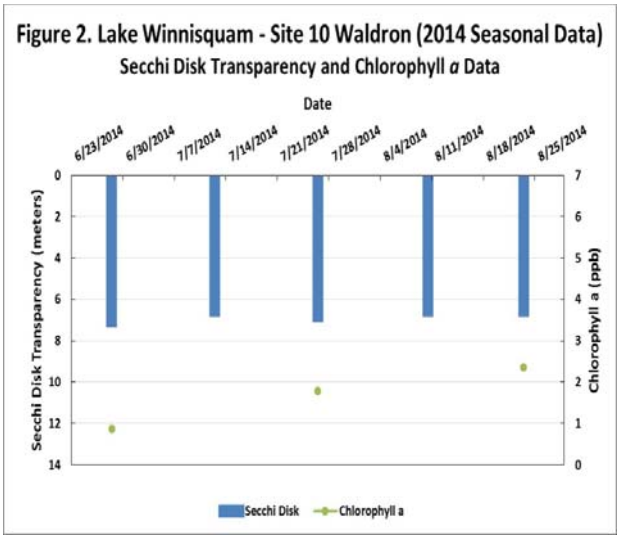

**Figure 1. Lake Winnisquam – 10 Waldron Water Quality (2014)**

**Table 1. 2014 Lake Winnisquam Seasonal Averages and NH DES Trophic Level Classification Criteria**

| Parameter | Oligotrophic "Excellent" | Mesotrophic "Fair" | Eutrophic "Poor" | 10 Waldron Average (range) | Lake Winnisquam Classification |
|---|---|---|---|---|---|
| Water Clarity (meters) | > 4.0 | 2.5 - 4.0 | < 2.5 | **6.9** meters (6.8 – 7.3) | **Oligotrophic** |
| Chlorophyll *a* (ppb) | < 3.3 | > 3.3 – 5.0 | > 5.0 – 11.0 | **1.7** ppb (0.9 – 2.4) | **Oligotrophic** |
| Total Phosphorus (ppb) | < 8.0 | > 8.0 – 12.0 | > 12.0 – 28.0 | **8.0** ppb (6.6 – 10.0) | **Mesotrophic** |

**Table 2. 2014 Lake Winnisquam Seasonal Average Accessory Water Quality Measurements**

| Parameter | Assessment Criteria | | | | | Lake Winnisquam Average (range) | Lake Winnisquam Classification |
|---|---|---|---|---|---|---|---|
| Color (color units) | < 10 uncolored | 10 – 20 slightly colored | 20 - 40 Lightly Tea colored | 40 – 80 tea colored | > 80 highly colored | **9.7** color units (8.8 – 11.5) | **Uncolored** |
| Alkalinity (mg/L) | < 0.0 acidified | 0.1 – 2.0 Extremely vulnerable | 2.1 – 10.0 moderately vulnerable | 10.1 – 25.0 low vulnerability | > 25.0 not vulnerable | **8.1** ppm (7.3 – 9.3) | **Moderately vulnerable** |



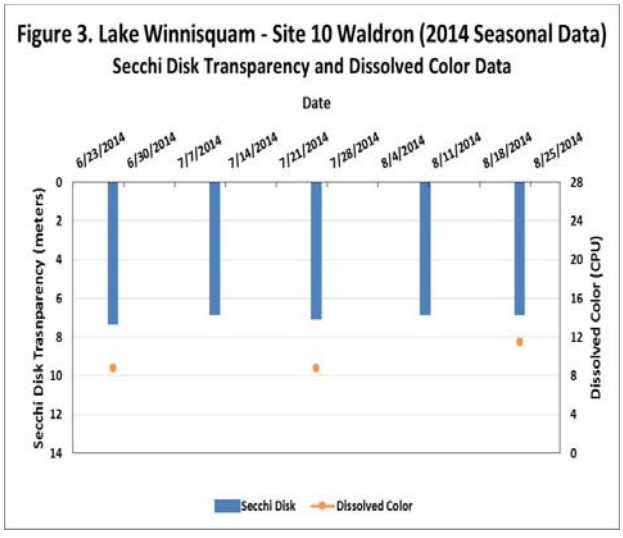




Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in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

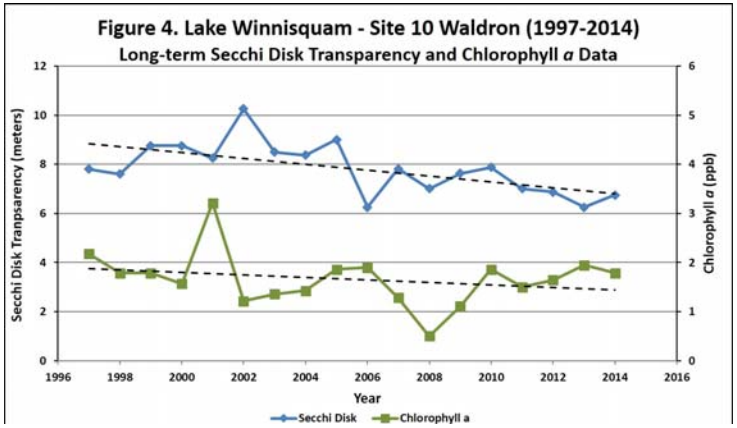
## LONG-TERM TRENDS

**WATER CLARITY:** The Lake Winnisquam water clarity measurements, measured as Secchi Disk transparency, display a trend of decreasing water clarity (Figure 4).

**CHLOROPHYLL:** The Lake Winnisquam 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 Lake Winnisquam total phosphorus concentrations display a trend of decreasing concentrations (Figure 5).

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



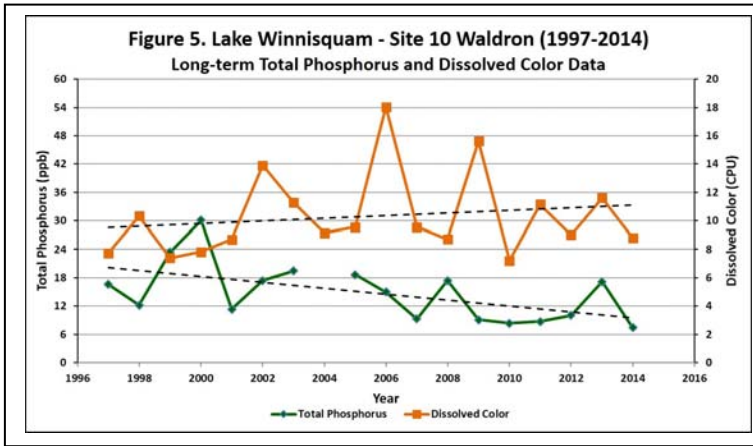
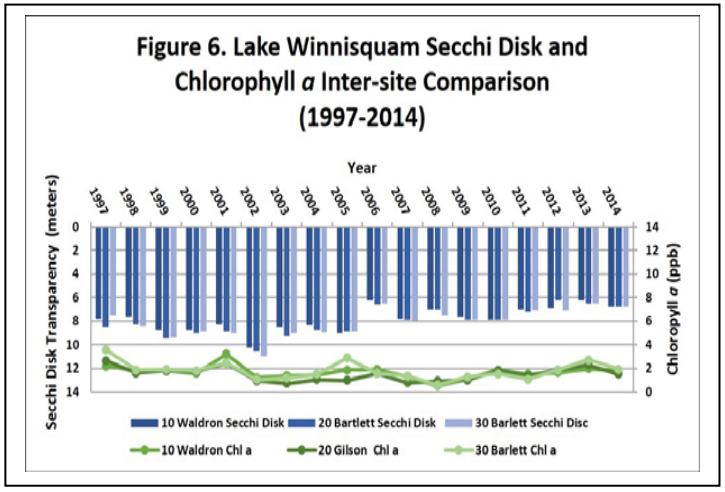




**Table 3. Lake Winnisquam Seasonal Average Water Quality Inter-Site Comparison (2014)**

| Sampling Station | Average (range) Secchi Disk (meters) | Average (range) Total Phosphorus (ppb) | Average (range) Chlorophyll *a* (ppb) |
|---|---|---|---|
| 10 Waldron | **6.9** m (range: 6.8 – 7.3) | **8.0** ppb (range: 6.6 – 10.0) | **1.7** ppb (range: 0.9 – 2.4) |
| 20 Gilson | **6.9** m (range: 6.8 – 7.3) | **5.9** ppb (range: 4.2 – 7.9) | **1.3** ppb (range: 0.9 – 1.6) |
| 30 Bartlett | **7.0** m (range: 6.8 – 7.5) | **5.6** ppb (range: 3.8 –7.0) | **1.5** ppb (range: 0.7 – 2.0) |

Figures 4 and 5. Changes in the Lake Winnisquam water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1997 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 microscopic plant growth.**

Figure 6. Inter-site comparison of the annual Lake Winnisquam 10 Waldron, 20 Gilson and 30 Bartlett water clarity and chlorophyll *a* concentrations. The inter-site comparison data provide a general sense of the variability among the three Lake Winnisquam sampling locations located along Black Brook Road.




## Recommendations

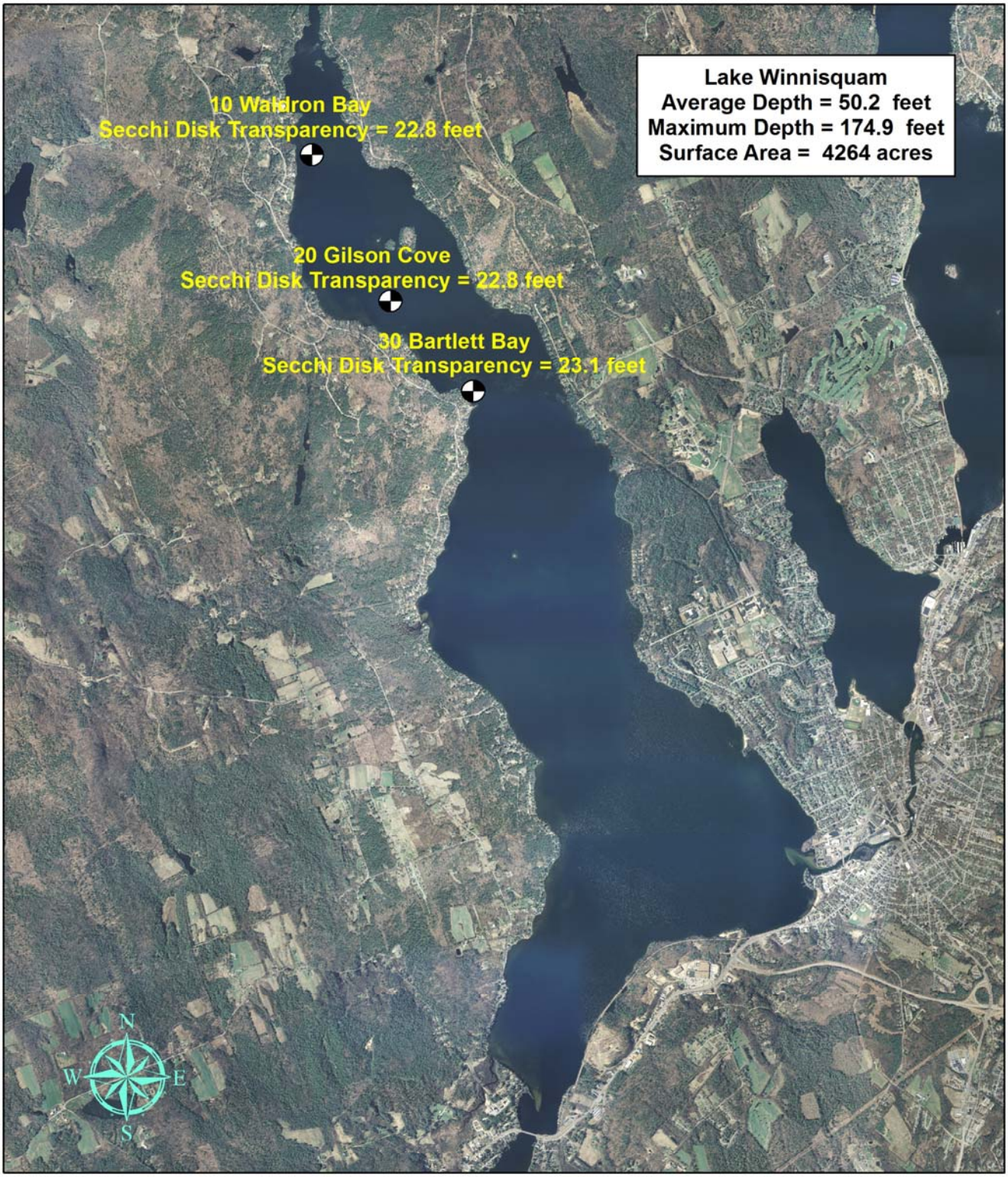
Implement Best Management Practices within the Lake Winnisquam watershed to minimize the adverse impacts of polluted runoff and erosion into Lake Winnisquam. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself 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 8. Lake Winnisquam

## Belmont, Laconia, Meredith, Sanbornton & Tilton, NH

## 2014 Deep water sampling site locations with seasonal average water clarity

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Aerial Orthophoto Source: NH GRANIT
Site location GPS coordiniates collected by theUNH Center of Freshwater Biology