BOW LAKE

2014 SAMPLING HIGHLIGHTS

Station 1 Ledges

Barrington and Northwood, NH

University of New Hampshire Cooperative Extension

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. Refer to the 2014 Bow Lake Annual Report for additional information.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

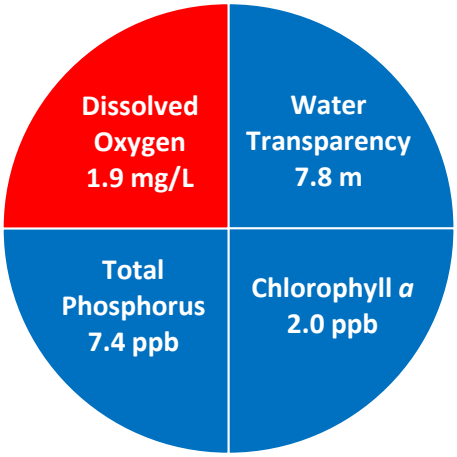


Figure 1. Bow Lake Water Quality (2014)

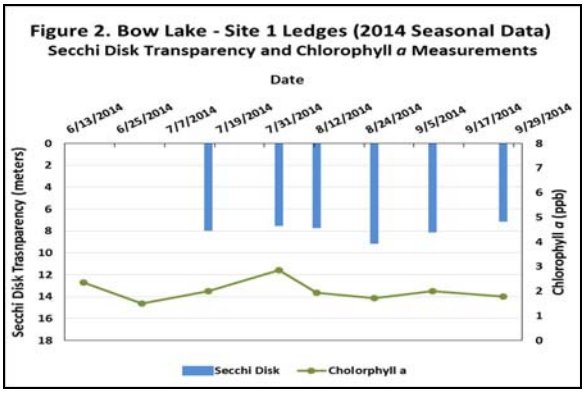
Table 1. 2014 Bow Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Bow Lake – 1 Ledges Average (range)	Bow Lake – 1 Ledges Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	**7.8** meters (7.0 – 9.1)	Oligotrophic
Chlorophyll *a* (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	**2.0** ppb (1.5 – 2.9)	Oligotrophic
Total Phosphorus (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	**7.4** ppb (5.2 – 10.8)	Oligotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	**1.9** mg/L (1.0 – 2.6)	Eutrophic

* Dissolved oxygen concentrations were measured on August 26, 2014 between 10.5 and 18.5 meters, in the bottom water layer.

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

Parameter	Assessment Criteria					Bow Lake – 1 Ledges Average (range)	Bow Lake – 1 Ledges Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	**16.3** color units (14.3 – 18.4)	Slightly 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	**4.3** mg/L (4.1 – 4.6)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			**6.9** standard units (6.7 – 7.0)	Tolerable 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		**52.0** *u*S/cm (52.0– 52.0)	Lakes with some human influences



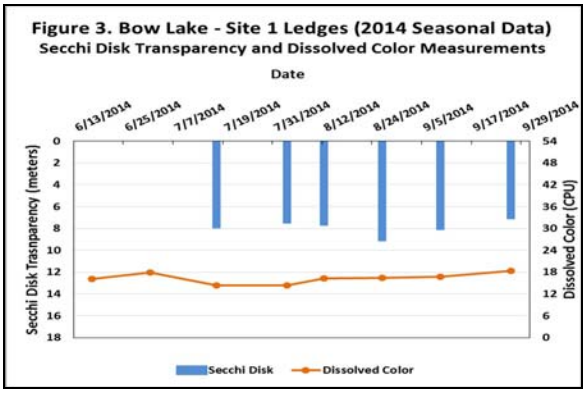


Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in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

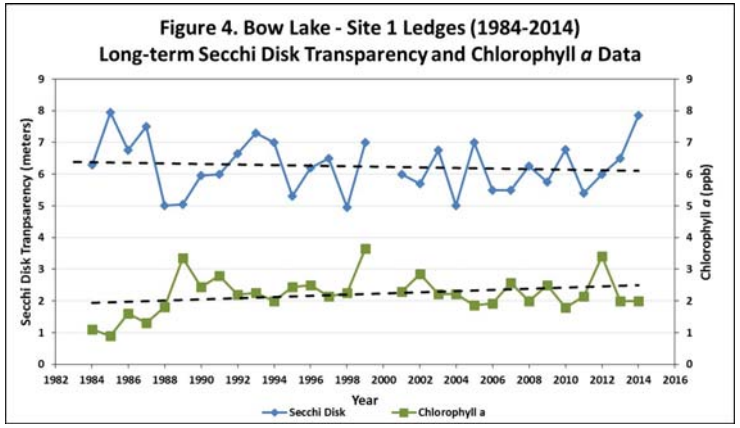
LONG-TERM TRENDS

WATER CLARITY: The Bow Lake water clarity measurements, measured as Secchi Disk transparency, display a trend of decreasing water clarity over thirty years of water quality monitoring conducted between 1984 and 2014 (Figure 4).

CHLOROPHYLL: The Bow Lake chlorophyll *a* concentrations, a measure of microscopic plant life within the lake, display a trend of increasing concentrations over thirty years of water quality monitoring conducted between 1984 and 2014 (Figure 4).

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The Bow Lake total phosphorus concentrations display a trend of decreasing concentrations over twenty-five years of water quality monitoring conducted between 1984 and 2014 (Figure 5).

COLOR: The Bow Lake color data, the result of naturally occurring "tea" color substances from the breakdown of soils and plant materials, display a trend of increasing concentrations over twenty-six years of water quality monitoring conducted between 1984 and 2014 (Figure 5).



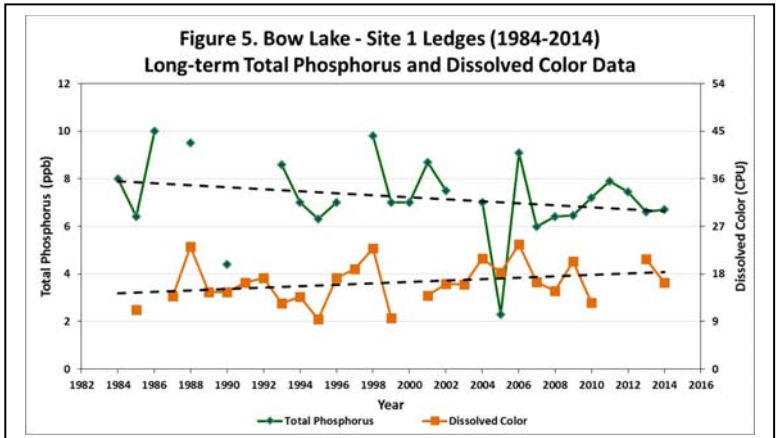


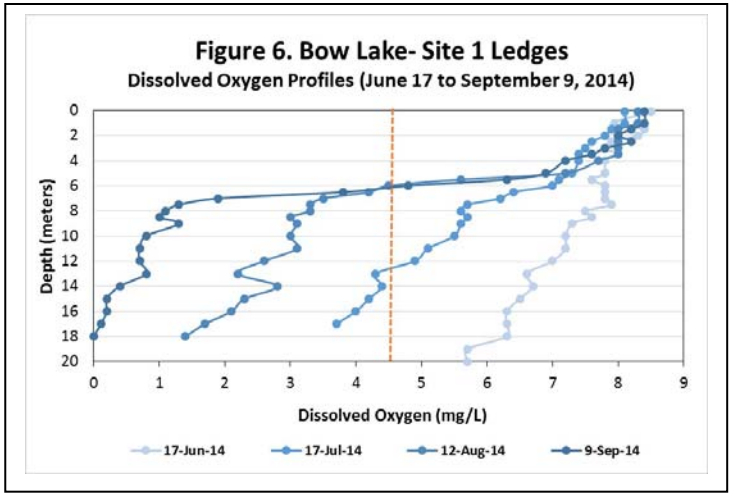
Table 3. Bow Lake Seasonal Average Water Quality Inter-site Comparison (2014)

Site	Average Secchi Disk Transparency (meters)	Average Chlorophyll *a* (ppb)	Average Total Phosphorus (ppb)	Average Dissolved Oxygen (ppm)
1 Ledges	7.8	2.0	7.4	1.9
3 Bennett	7.4	2.2	8.0	1.6

- Dissolved oxygen data were measured on August 26, 2014 in the bottom water layer (hypolimnion).

Figures 4 and 5. Changes in the Bow Lake water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1984 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.**

Figure 6. Bow Lake dissolved oxygen concentrations collected between June 17 through September 9, 2014. The vertical red line indicates the oxygen concentration commonly considered the threshold for successful growth and reproduction of cold water fish. *Notice the decreasing dissolved oxygen concentations near the lake bottom between June and September.*



Recommendations

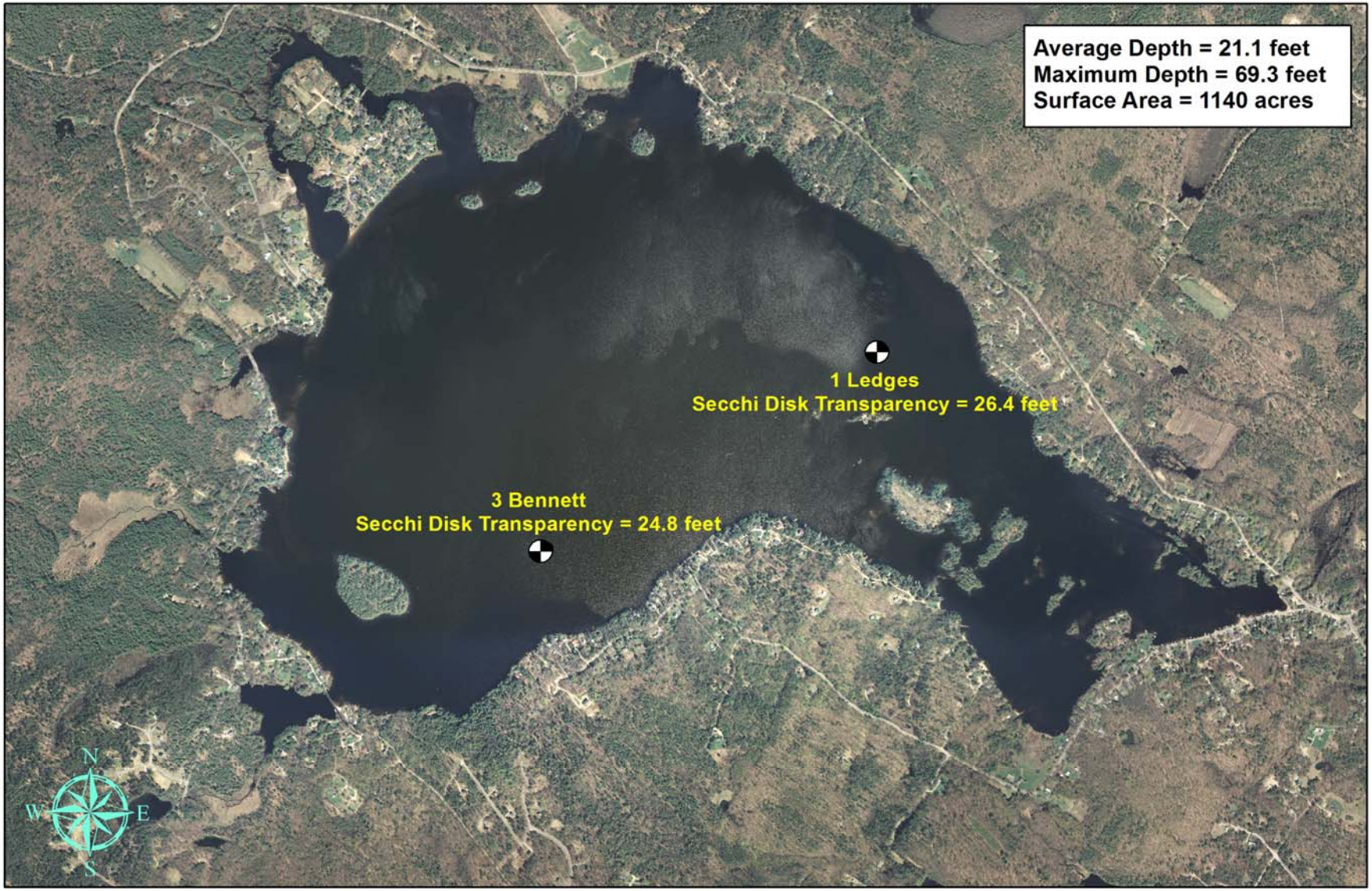
Implement Best Management Practices within the Bow Lake watershed to minimize the adverse impacts of polluted runoff and erosion into Bow Lake. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions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

Strafford & Northwood, NH

2014 Deep water sampling site locations with seasonal average water clarity



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

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