BOW LAKE

2022 SAMPLING HIGHLIGHTS

Station 3 Bennett

Barrington and Northwood, NH

Extension

Water quality data displayed in Tables 1 and 2 are surface water measurements, with the exception of the dissolved oxygen data that are collected near the lake bottom. Summary statistics are provided for bi-weekly samples collected between June 22 and September 7, 2022.

Blue = Oligotrophic

Yellow = Mesotrophic

Red = Eutrophic

Gray = No Data

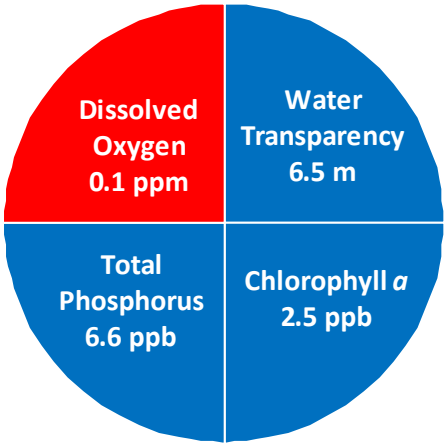


Figure 1. Bow Lake Water Quality (2022)

Table 1. 2022 Bow Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Bow Lake Site 3 Bennett Average (range)	Bow Lake Site 3 Bennett Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	**6.5** meters (5.4 – 7.7)	**Oligotrophic**
Chlorophyll *a* [1] (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	**2.5** ppb (1.5 – 3.4)	**Oligotrophic**
Total Phosphorus [1] (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	**6.6** ppb (5.8 – 8.4)	**Oligotrophic**
Dissolved Oxygen (ppm)	5.0 – 7.0	2.0 – 5.0	<2.0	*** 0.1 ppm (0.0 – 0.3)**	**Eutrophic**

* Dissolved oxygen was assessed based on the September 7, 2022, oxygen values measured between 10.5 and 15.0 meters, in the bottom water layer.

Table 2. 2022 Bow Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Bow Lake Site 3 Bennett Average (range)	Bow Lake Site 3 Bennett Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	**16.4** color units (range: 15.2 – 18.2)	**Slightly tea colored**
Alkalinity (ppm)	< 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** ppm (range: 4.4 – 5.0)	**Moderately vulnerable**
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			**Not Assessed**	**Not Assessed**
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		**Not Assessed**	**Not Assessed**

Strategies to stabilize and improve water quality

Implement Best Management Practices (BMPs) 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. NH Lakes also provides a series of resources aimed at educating residents and protecting our lakes and ponds.

- https://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/homeowner-guide-stormwater.pdf
- https://nhlakes.org/lakesmart-resource-library/

Figure 2. Bow Lake - 3 Bennett (2022 Seasonal Data)

Secchi Disk Transparency and Chlorophyll *a* Data

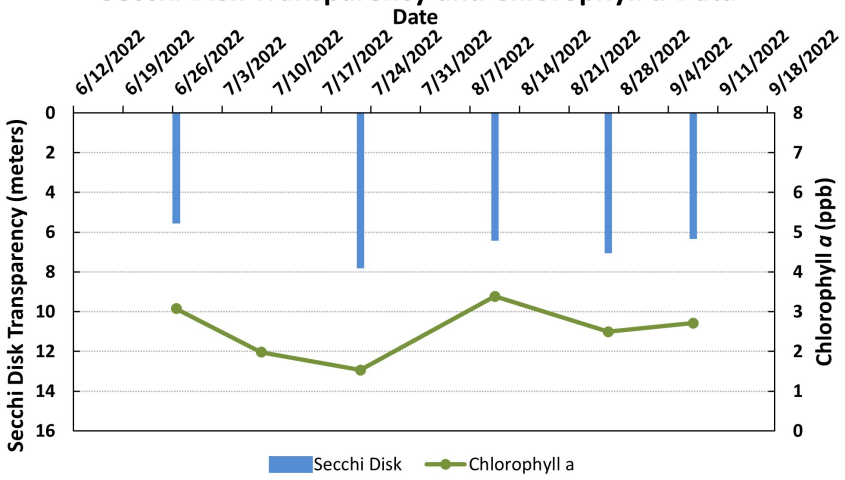


Figure 3. Bow Lake - 3 Bennett (2022 Seasonal Data)

Secchi Disk Transparency and Dissolved Color Data

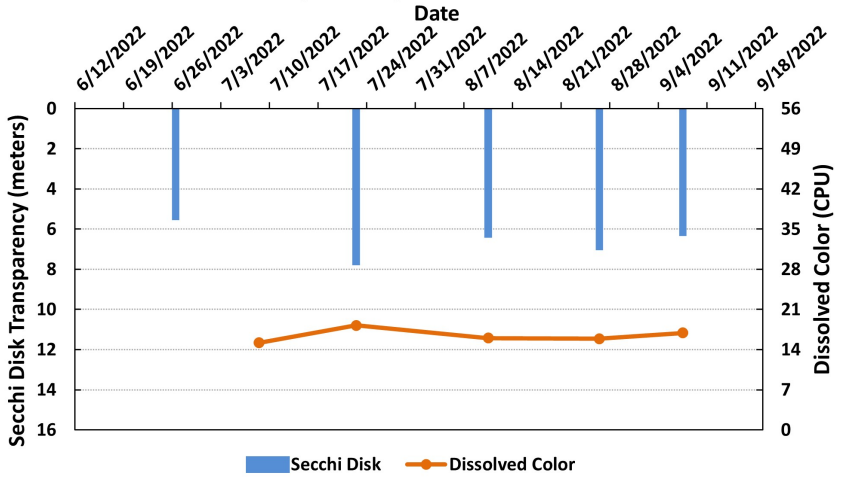


Figure 4. Bow Lake - Site 3 Bennett (1984-2022)

Long-term Secchi Disk Transparency and Chlorophyll *a* Data

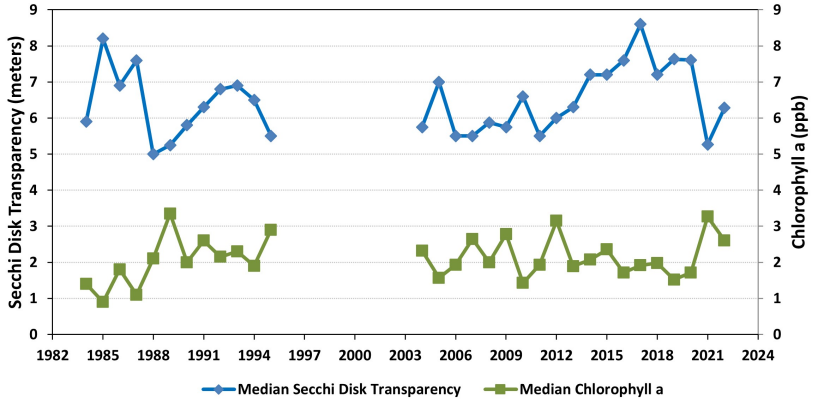
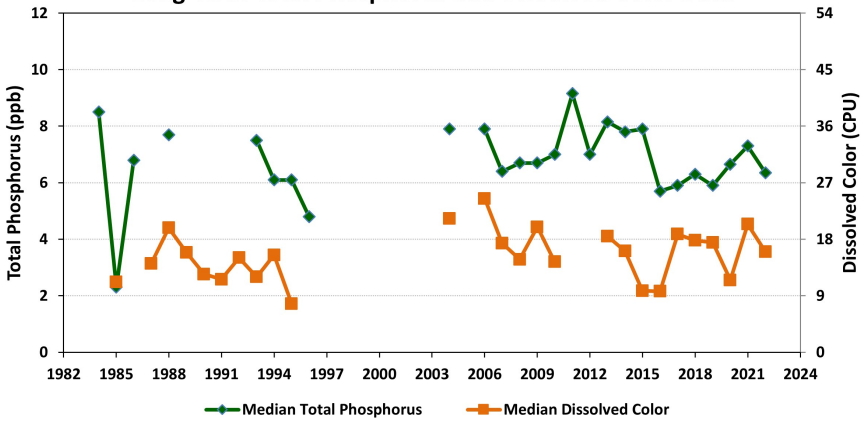


Figure 5. Bow Lake - Site 3 Bennett (1984-2022)

Long-term Total Phosphorus and Dissolved Color Data



Figures 2 and 3. Seasonal comparison of Bow Lake – Site 3 Bennett water transparency (Secchi Disk depth), chlorophyll *a* and dissolved color for 2022. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations.

Figures 4 and 5. Annual median Bow Lake – Site 3 Bennett water transparency, chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1984 and 2022, through the New Hampshire Lakes Lay Monitoring Program**.** The long-term data provide insight into the water quality fluctuations, among years, that have been documented in Bow Lake.

Figure 6. Bow Lake - Site 3 Bennett
Temperature Profiles (June 22 through September 7, 2022)

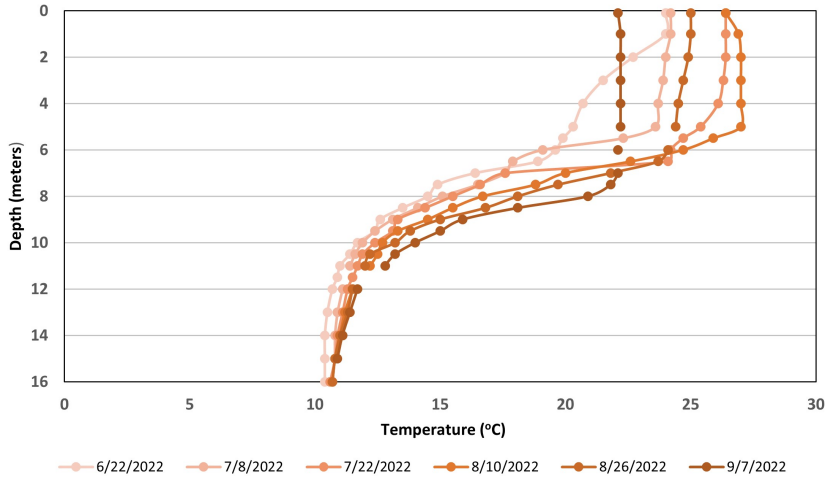


Figure 7. Bow Lake - Site 3 Bennett
Dissolved Oxygen Profiles (June 22 through September 7, 2022)

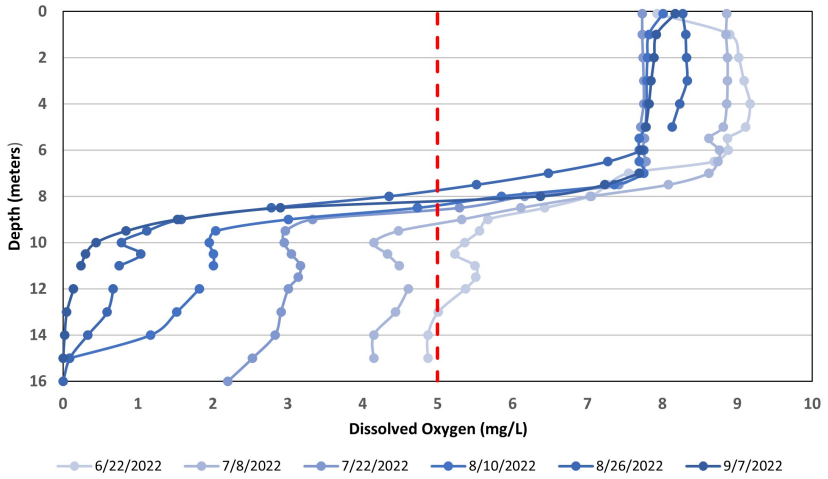
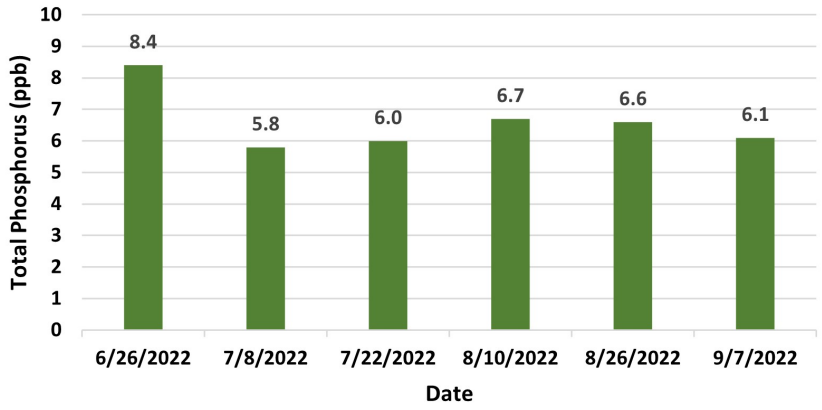


Figure 8. Bow Lake - Site 3 Bennett
Surface Water Total Phosphrus Results



Figures 6 and 7. Bow Lake – Site 3 Bennett temperature and dissolved oxygen profiles that display the water quality differences, through the water column, in 0.5-meter increments. Notice the decreasing dissolved oxygen concentrations near the lake bottom. The dashed vertical red line in Figure 7 displays the dissolved oxygen threshold for the successful growth and reproduction of cold-water fish such as trout and salmon.

Figures 8. 2022 surface water total phosphorus concentrations that display the seasonal variability at Bow Lake – Site 3 Bennett.

Data Interpretation: Overview of factors to consider when reviewing the Bow Lake data

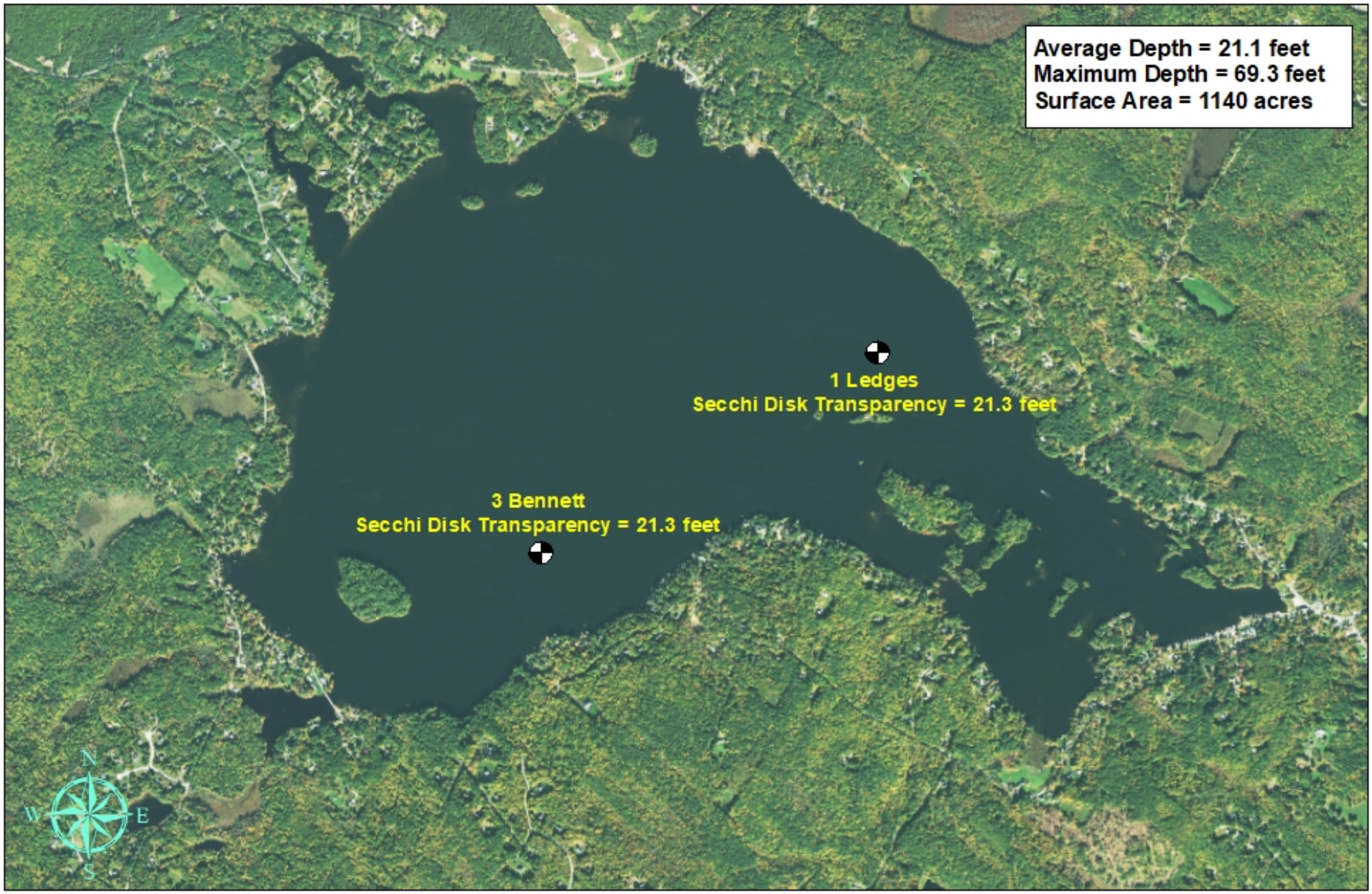
This highlight report provides a general overview of the current and historical conditions of Bow Lake. The report is intended to provide a simple assessment of the water quality trends. Should you have additional questions about interpreting your water quality results, we would be happy to discuss the data with you and/or any concerns you may have. In general, some factors that influence the current and long-term water quality results/trends for our New Hampshire lakes and ponds include:

- **Land-use Patterns** within the watershed (drainage basin) – Research indicates land use patterns have an impact on how much phosphorus (nutrient) is washing into our lakes. In general, more urbanized watersheds have a greater degree of phosphorus runoff than highly forested/vegetated drainage areas.
- **Weather Patterns** – Rainfall and temperature can influence water quality. Wet periods, and overland runoff, tend to be a time when elevated nutrients and other pollutants are transported into our lakes. Temperature can also influence water quality conditions since many aquatic plants and algae tend to respond to changing seasonal conditions. Unusually warm periods are sometimes tied to short-term algal and cyanobacteria blooms.
- **Best Management Practices (BMPs)** – The presence/absence of best management practices can have an interplay on water quality. BMPs are measures that are used to manage nutrients and other pollutants that could otherwise make their way into our lakes. Properties that employ BMPs, designed specifically to remove pollutants of concern (e.g. sediments and phosphorus), are less likely to contribute nutrients and other pollutants into our lakes.
- **Temperature (Thermal) Stratification** – Many lakes become thermally stratified during the summer months and may form three distinct thermal layers: upper water layer (epilimnion), middle lake layer (metalimnion) and bottom cold-water layer (hypolimnion). These thermal zones form a barrier to lake mixing, during the summer months, and can coincide with differences in dissolved oxygen and specific conductivity through the water column.
- **Internal Nutrient Loading** (nutrients that are introduced from the sediments along the lake bottom) – Some of our lakes experience significant internal nutrient loading. Such lakes generally tend to be well stratified and exhibit increasing deep water phosphorus concentrations, relative to surface levels.

Figure 9. Bow Lake

Strafford & Northwood, NH

2022 Deep water sampling locations and the seasonal average water clarity



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

NH Extension