

# BELLEAU LAKE

## 2019 SAMPLING HIGHLIGHTS

### Station – 1 Deep Wakefield, NH



Blue = Oligotrophic

Yellow = Mesotrophic

Red = Eutrophic

Gray = No Data

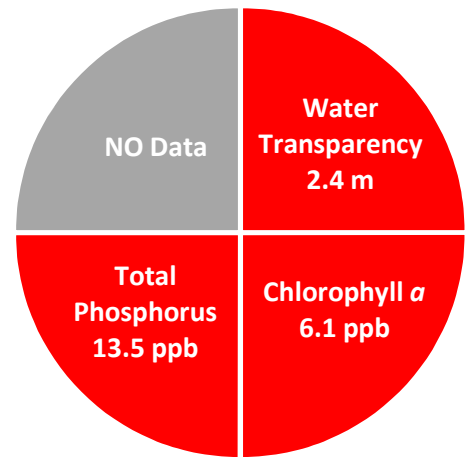


Figure 1. Belleau Lake Water Quality (2019)

Table 1. 2019 Belleau Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria<sup>1</sup>

Parameter	Oligotrophic	Mesotrophic	Eutrophic	Belleau Lake Average (range)	Belleau Lake Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	2.4 meters (1.9 – 2.9)	Eutrophic
Chlorophyll <i>a</i> <sup>1</sup> (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	6.1 ppb (4.5 – 8.7)	Eutrophic
Total Phosphorus <sup>1</sup> (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	13.5 ppb (12.7 – 14.7)	Eutrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	Not Assessed *	N/A

\* Belleau Lake did not develop a deep cold water layer needed to assess dissolved oxygen concentrations.

Table 2. 2019 Belleau Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Belleau Lake Average (range)	Belleau Lake Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	46.6 color units (range: 27.8 – 57.4)	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	7.1 mg/L (range: 5.7 – 8.0)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			7.0 standard units (range: 6.9 – 7.1)	Optimal range for fish growth and reproduction
Specific Conductivity (µS/cm)	< 50 µS/cm Characteristic of minimally impacted NH lakes		50-100 µS/cm Lakes with some human influence	> 100 µS/cm Characteristic of lakes experiencing human disturbances		66.1 µS/cm (range: 60.2 – 73.9)	Characteristic of lakes with some human influence

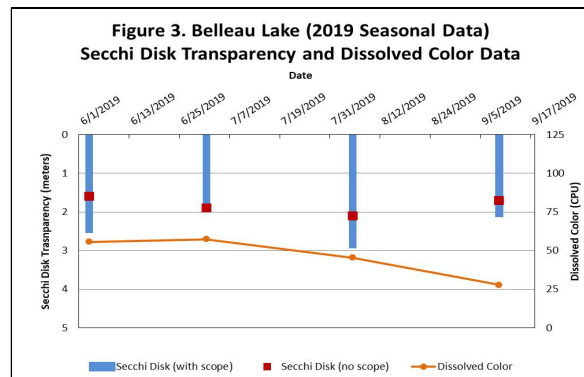
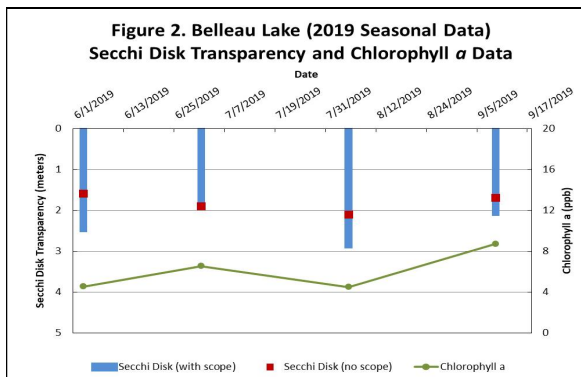


Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* concentrations and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases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

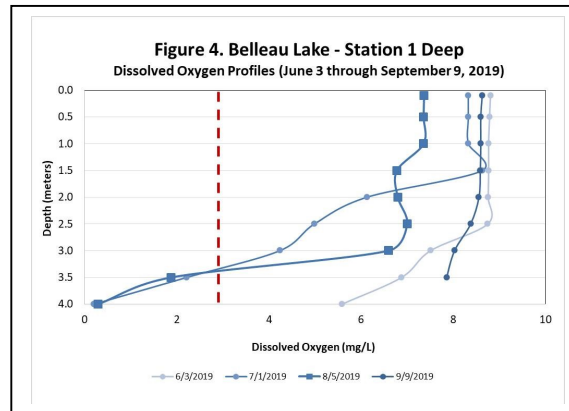
**Table 3. Acton Wakefield Watershed Alliance Inter-lake Water Quality Comparison (2019 Data)**

Lake	Average (range) Secchi Disk Transparency (meters)	Average (range) Chlorophyll <i>a</i> (ppb)	Average (range) Total Phosphorus (ppb)	Average (range) Dissolved Color (CPU)	Average (range) Dissolved Oxygen (mg/l)
Belleau Lake	2.4 meters (range: 1.9 – 2.9)	6.1 ppb (range: 4.5 – 8.7)	13.5 ppb (range: 12.7 – 14.7)	46.6 CPU (range: 27.8 – 57.4)	-----
Great East Lake	10.4 meters (range: 7.8 – 13.0)	1.3 ppb (range: 1.1 – 1.8)	4.2 ppb (range: 3.0 – 7.2)	8.6 CPU (range: 4.7 – 12.0)	6.6 mg/l (range: 5.3 – 8.5)
Horn Pond	No 2019 Data				
Lake Ivanhoe	5.0 meters (4.2 – 6.0)	3.7 ppb (range: 2.5 – 5.4)	8.8 ppb (range: 7.7 – 10.3)	6.1 CPU (range: 3.7 – 9.4)	-----
Lovell Lake	6.6 meters (range: 5.2 – 7.5)	2.7 ppb (range: 1.8 – 3.4)	6.9 ppb (range: 5.0 – 8.0)	10.6 CPU (range: 7.4 – 16.1)	0.5 mg/l (range: 0.0 – 3.1)
Pine River Pond	5.5 meters (range: 4.8 – 6.0)	3.0 ppb (range: 2.7 – 3.3)	5.9 ppb (range: 4.9 – 6.5)	15.8 CPU (range: 10.2 – 18.5)	0.3 mg/l (range: 0.0 – 1.6)
Province Lake	3.1 meters (range: 2.2 – 4.4)	3.7 ppb (range: 2.2 – 4.4)	15.6 ppb (range: 12.1 – 18.0)	27.5 CPU (range: 20.3 – 39.2)	-----
Wilson Lake	No 2019 Data				

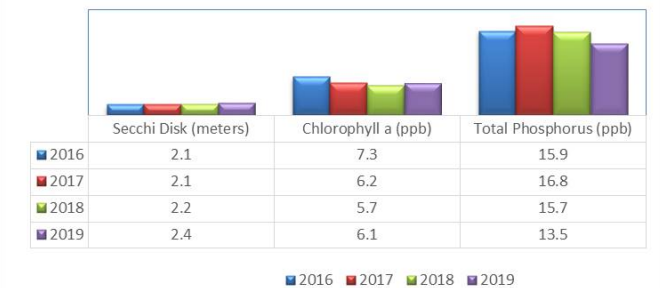
- Water quality data are reported for a deep reference sampling location in each water body
- Dissolved oxygen measurements were collected in the late summer (late August through early September) in the bottom water layer (hypolimnion or metalimnion).
- ----- Indicates the site is too shallow to form a deep water layer (hypolimnion or metalimnion) during the summer months.

Figure 4. Monthly Belleau Lake dissolved oxygen profiles collected between June 3 and September 9, 2019. The vertical red line indicates the oxygen concentration commonly considered the threshold for successful growth and reproduction of warm water fish such as bass and perch.

Figure 5. Belleau Lake annual 2016, 2017, 2018 and 2019 water quality averages. Secchi Disk transparency is reported as meters while the chlorophyll *a* and total phosphorus results are reported as parts per billion (ppb).



**Figure 5. Annual Belleau Lake Water Quality Inter-comparison (2016 - 2019)**

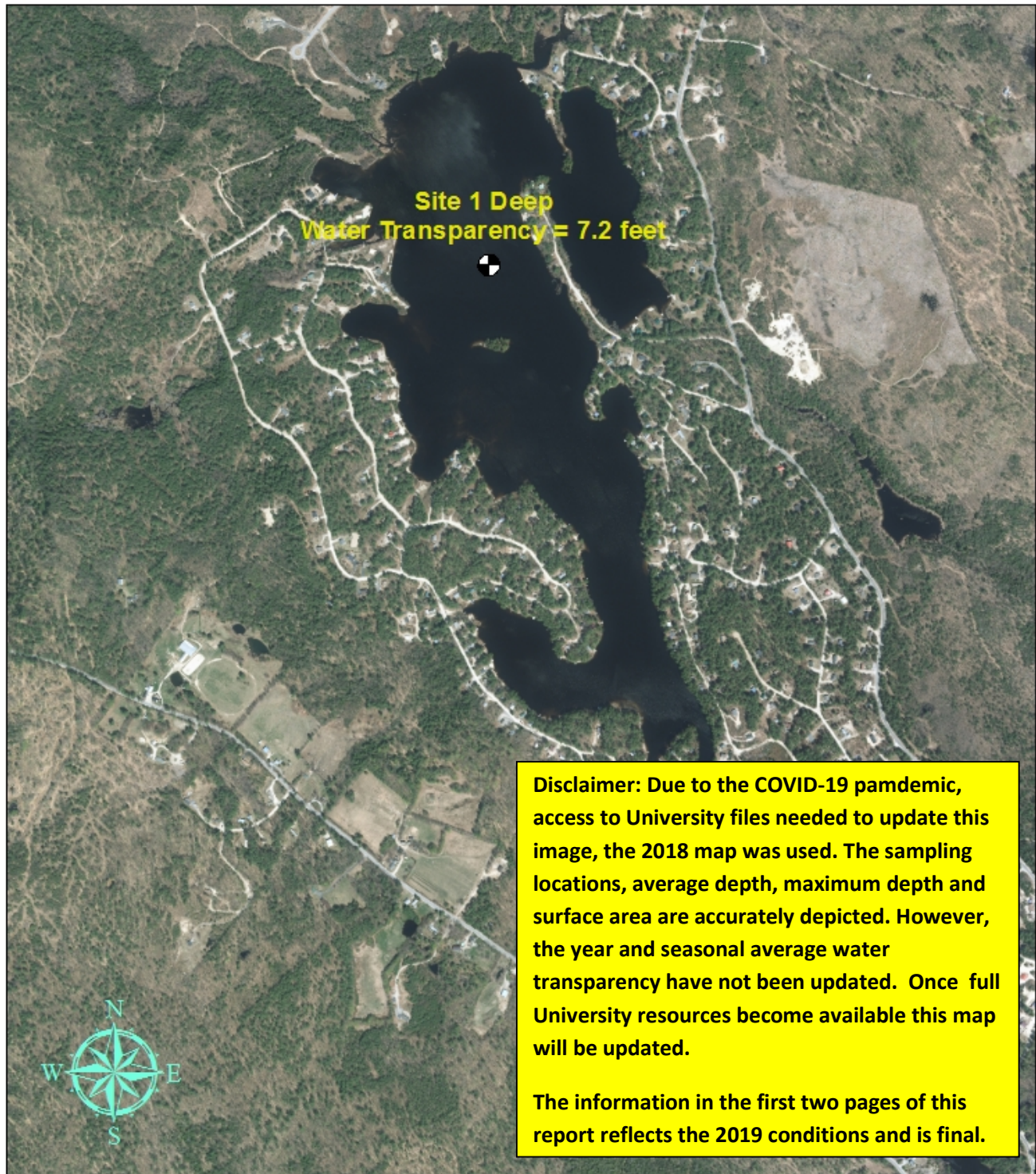


## Recommendations

Implement Best Management Practices within the Belleau Lake watershed to minimize the adverse impacts of polluted runoff and erosion on Belleau 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 Acton Wakefield Watersheds Alliance also offers technical assistance to help design and implement erosion control projects that protect and improve water quality.

- [https://extension.unh.edu/resources/files/Resource004159\\_Rep5940.pdf](https://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf)
- <https://www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf>
- <https://awwatersheds.org/healthy-lakes/conservation-practices-for-homeowners/>

**Figure 6. Belleau Lake  
Wakefield, NH  
Deep sampling site and 2018 seasonal average water clarity**



0 0.1 0.2 0.3 0.4 0.5  
Miles

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



**Extension**

