Report:
Water quality data from monthly sampling at Lake LeAnn

Photo credit: LakeLeAnn.org

Prepared for:
Lake LeAnn Property Owners Association
Jerome, MI

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Summary

Aquatic Control completed data and sample collection at Lake LeAnn between May 13 and May 14, 2026 to support water quality monitoring objectives for the year in alignment with data needed by Barr Engineering to complete modeling and nutrient budget. Within each of the North and South Basins, in situ data and water samples were collected at two predetermined locations. A YSI ProDSS Multi-parameter water quality meter and ProDSS 4-port sensor cable were used to measure vertical profiles of pH, dissolved oxygen (DO), temperature, conductivity, phycocyanin, and chlorophyll-*a* at 1-meter intervals through the water column at each site. Secchi depth was also measured in each basin. Water samples were collected at the surface and bottom of each site and overnight shipped to Aquatic Control's laboratory. Surface water samples were analyzed for total phosphorus, total nitrogen, total Kjeldahl nitrogen, and chlorophyll-a (via extraction and fluorescence). Bottom water samples were analyzed for total phosphorus and soluble reactive phosphorus. At the time of sample and data collection, the North Basin water visually appeared relatively clear with minor observations of planktonic algae in shallow areas. The South Basin had visibly worse clarity. Data and sample collection will continue monthly through September at Lake LeAnn.

Sample Site Coordinates

Sample Site	Latitude	Longitude
North Site 1	42.067315	-84.437952
North Site 2	42.067451	-84.432497
South Site 1	42.058371	-84.436547
South Site 2	42.057161	-84.426343

Results

Table 1. pH measurements (reported in standard units) collected with depth on May 14, 2026

Depth (m)	North Basin Site 1	North Basin Site 2	South Basin Site 1	South Basin Site 2
1	8.39	8.52	8.32	8.33
2	8.31	8.52	8.32	8.33
3	8.30	8.52	8.32	8.33
4	8.30		8.31	8.32
5	8.28		8.30	8.31
6	8.21		8.28	8.31
7				8.31
8				8.32

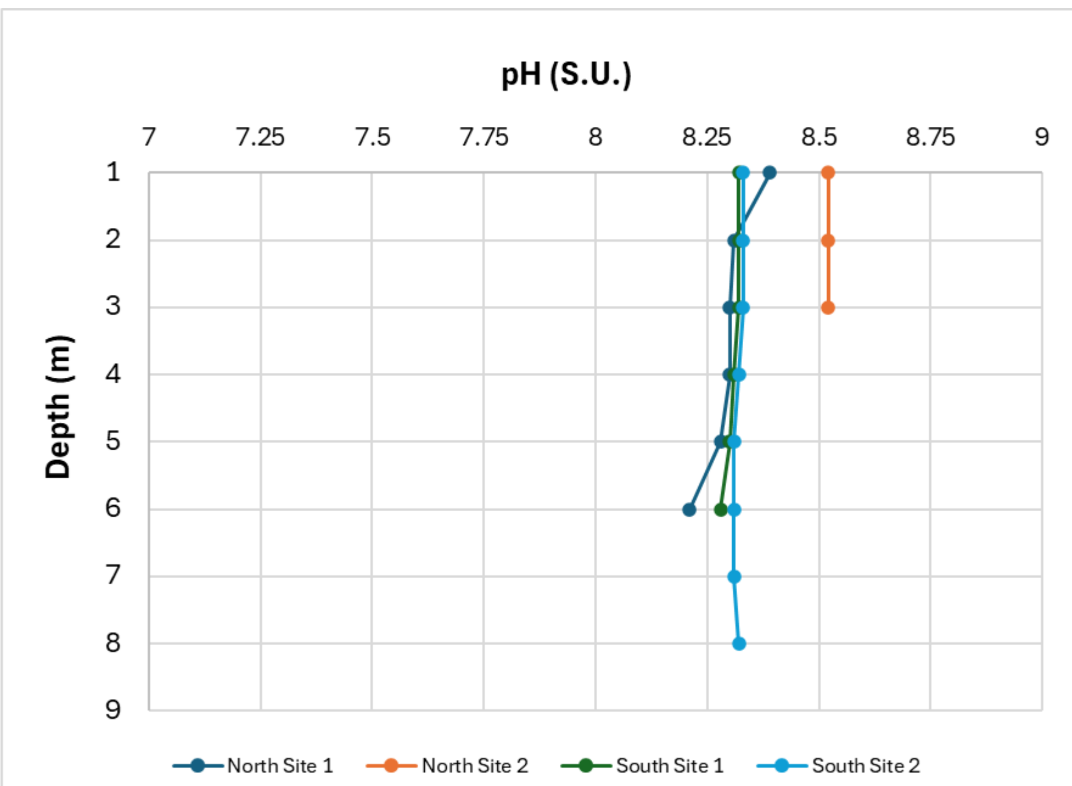


Figure 1. Graph of pH measurements (reported in standard units) collected with depth on May 14, 2026

Table 2. Temperature measurements (reported in degrees Celsius) collected with depth on May 14, 2026

Depth (m)	North Basin Site 1	North Basin Site 2	South Basin Site 1	South Basin Site 2
1	15.1	14.9	14.9	14.7
2	14.9	14.8	14.8	14.7
3	14.9	14.6	14.7	14.6
4	14.7		14.4	14.4
5	14.6		14.2	14.3
6	14.5		14.0	14.3
7				14.3
8				14.3

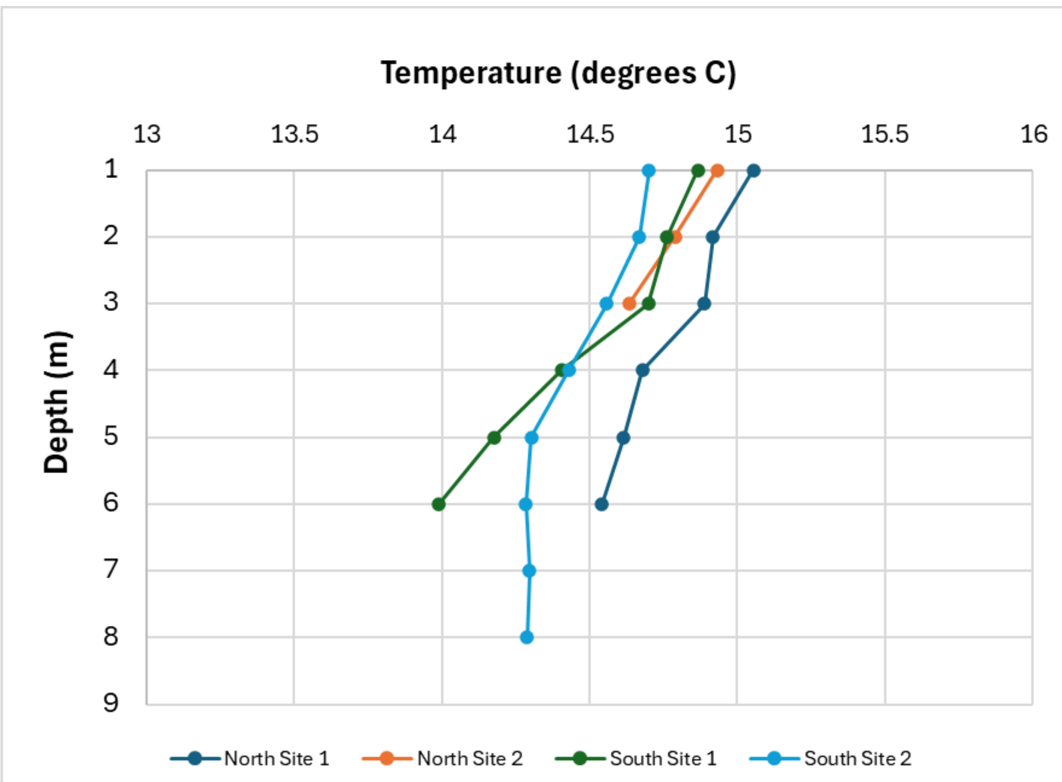


Figure 2. Graph of temperature measurements (reported in degrees Celsius) collected with depth on May 14, 2026

Table 3. Dissolved oxygen measurements (reported in mg/L) collected with depth on May 14, 2026

Depth (m)	North Basin Site 1	North Basin Site 2	South Basin Site 1	South Basin Site 2
1	10.07	9.99	8.94	9.29
2	10.05	10.06	8.92	9.07
3	10.04	10.05	8.91	8.98
4	10.00		8.86	8.90
5	9.82		8.77	8.80
6	9.43		8.60	8.76
7				8.75
8				8.76

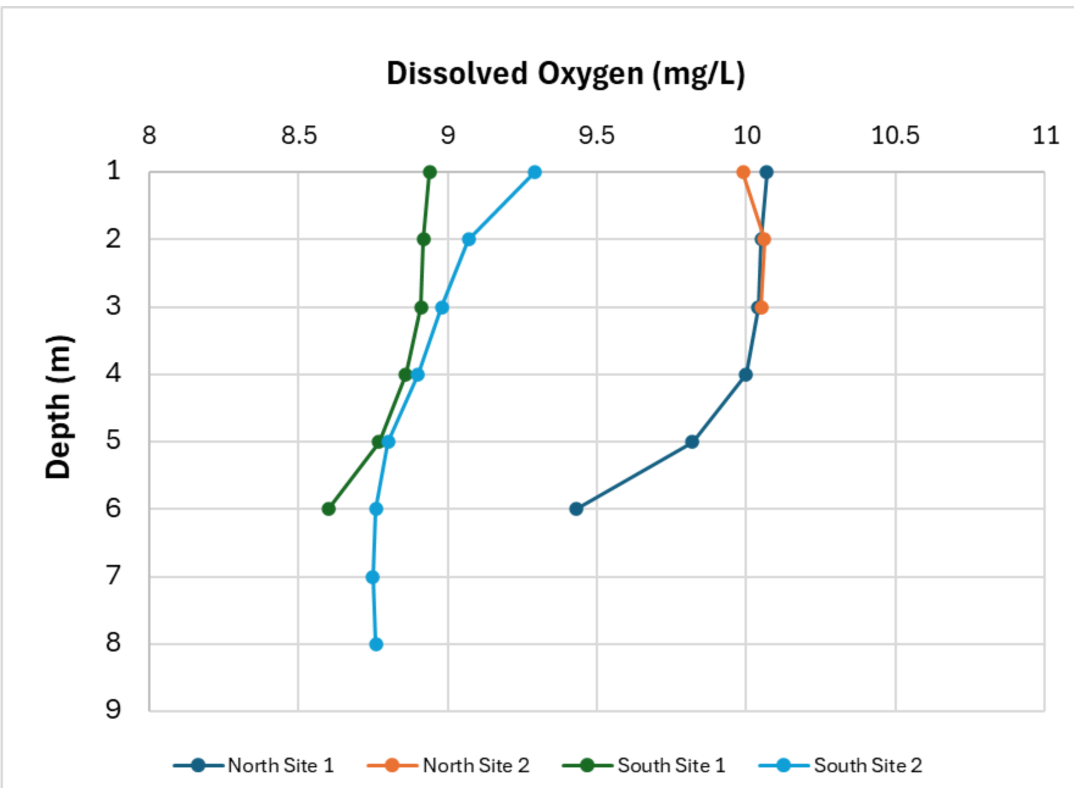


Figure 3. Graph of dissolved oxygen measurements (reported in mg/L) collected with depth on May 14, 2026

Table 4. Conductivity measurements (reported in µS/cm) collected with depth on May 14, 2026

Depth (m)	North Basin Site 1	North Basin Site 2	South Basin Site 1	South Basin Site 2
1	392.9	391.9	426.0	424.2
2	391.6	390.6	424.9	423.9
3	391.3	389.1	424.3	422.9
4	389.5		421.7	421.6
5	389.2		419.6	420.5
6	388.8		418.0	420.4
7				420.6
8				420.7

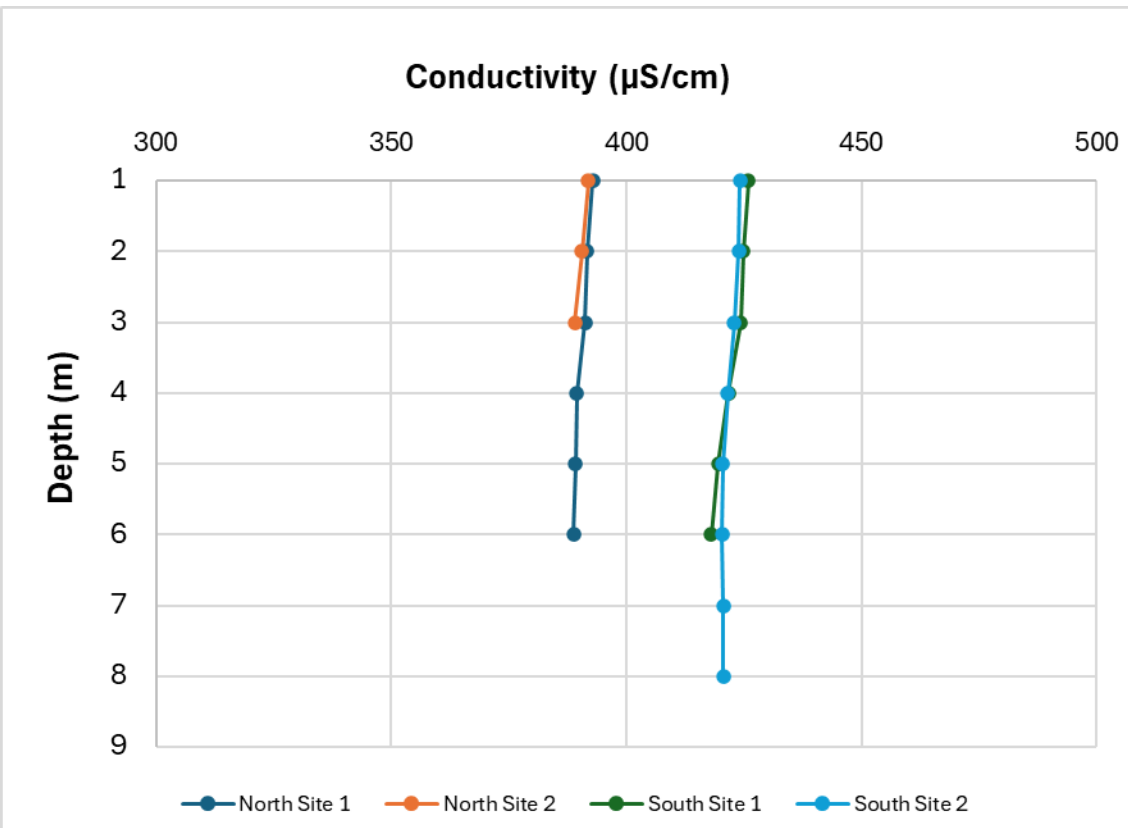


Figure 4. Graph of conductivity measurements (reported in µS/cm) collected with depth on May 14, 2026

Table 5. Phycocyanin measurements (reported in relative fluorescence units; RFUs) collected with depth on May 14, 2026

Depth (m)	North Basin Site 1	North Basin Site 2	South Basin Site 1	South Basin Site 2
1	0.14	0.14	0.18	0.32
2	0.12	0.17	0.21	0.23
3	0.15	0.19	0.25	0.26
4	0.19		0.25	0.26
5	0.17		0.25	0.25
6	0.24		0.27	0.26
7				0.26
8				0.26

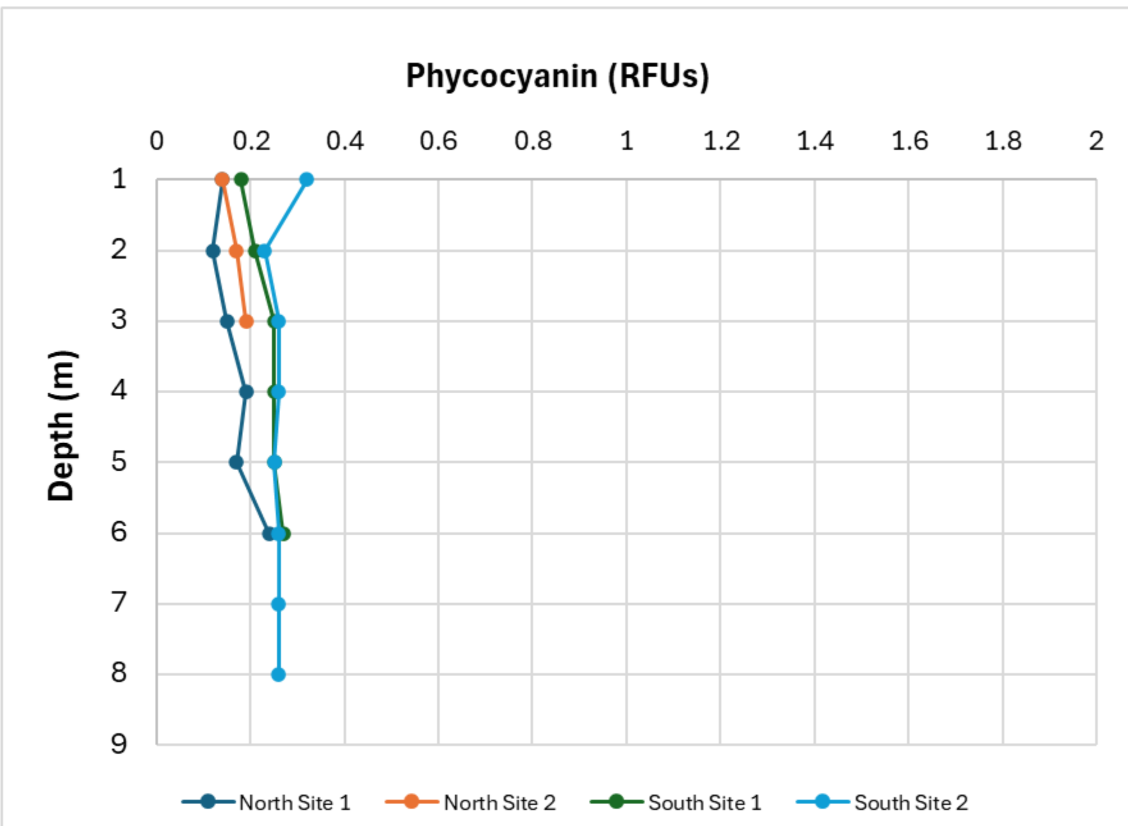


Figure 5. Graph of phycocyanin measurements (reported in relative fluorescence units; RFUs) collected with depth on May 14, 2026

Table 6. Chlorophyll-a measurements (reported in relative fluorescence units; RFUs) collected with depth on May 14, 2026

Depth (m)	North Basin Site 1	North Basin Site 2	South Basin Site 1	South Basin Site 2
1	0.08	0.08	0.26	0.20
2	0.09	0.13	0.38	0.43
3	00.1	0.18	0.45	0.48
4	0.17		0.47	0.5
5	0.18		0.55	0.52
6	0.38		0.55	0.51
7				0.53
8				0.51

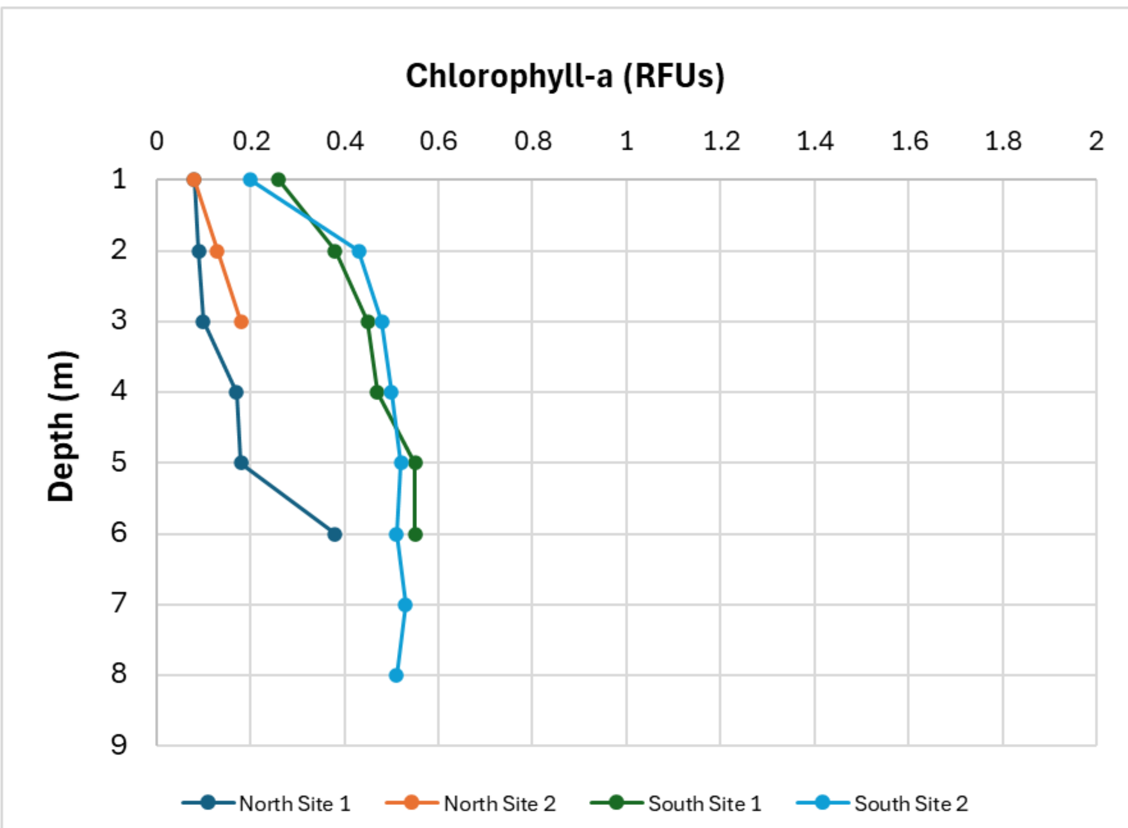


Figure 6. Graph of chlorophyll-a measurements (reported in relative fluorescence units; RFUs) collected with depth on May 14, 2026

Table 7. Water quality data from <u>surface samples</u> collected at Lake LeAnn on May 13, 2026

Sample ID	Total Phosphorus (µg/L)	Total Nitrogen (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Chlorophyll-a (µg/L)
North Site 1	< 10 (9)*	1.25	1.010	< 8 (0)*
North Site 2	11	1.04	0.817	< 8 (0)*
South Site 1	12	1.09	0.832	< 8 (3.8)*
South Site 2	20	1.12	0.909	< 8 (0)*

* Result was below reporting limit. Estimated concentration in parentheses.

Table 8. Water quality data from <u>bottom samples</u> collected at Lake LeAnn on May 13, 2026

Sample ID	Total Phosphorus (µg/L)	Soluble Reactive Phosphorus (µg/L)
North Site 1	11	< 10 (0)*
North Site 2	< 10 (0)*	< 10 (0)*
South Site 1	< 10 (3)*	< 10 (0)*
South Site 2	< 10 (0)*	< 10 (0)*

* Result was below reporting limit. Estimated concentration in parentheses.

Table 9. Secchi depth measurements collected at Lake LeAnn on May 14, 2026

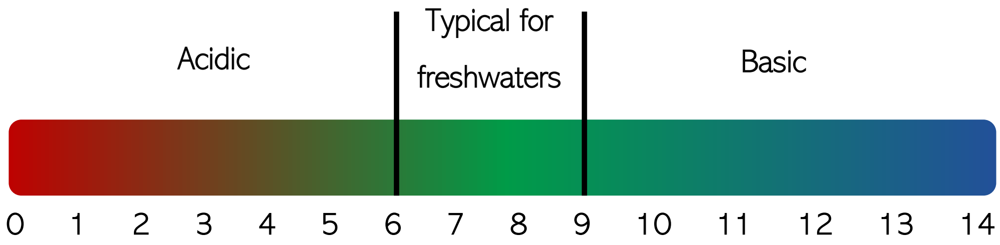
Sample Site	Secchi Depth (feet, inches)
North Site 1	9’10”
South Site 1	3’3”

All data presented in this report met QA/QC criteria unless otherwise specified here.

Explanations of Water Quality Parameters

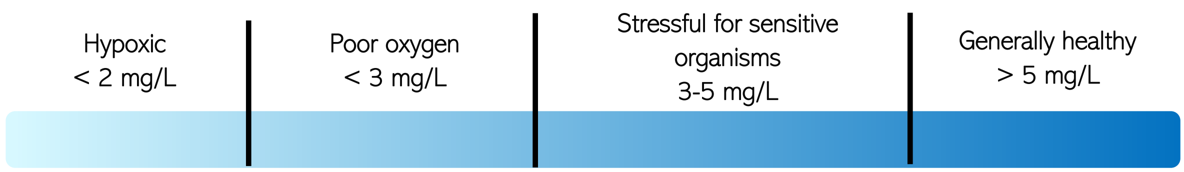
pH

pH is the measure of how acidic or basic water is, reported in standard units (S.U.). A pH of 7 is neutral, and a range of 6-9 is typical for freshwaters. A pH range of 6.5-9 is required for health and protection of aquatic organisms (i.e. survival, growth, and reproduction).



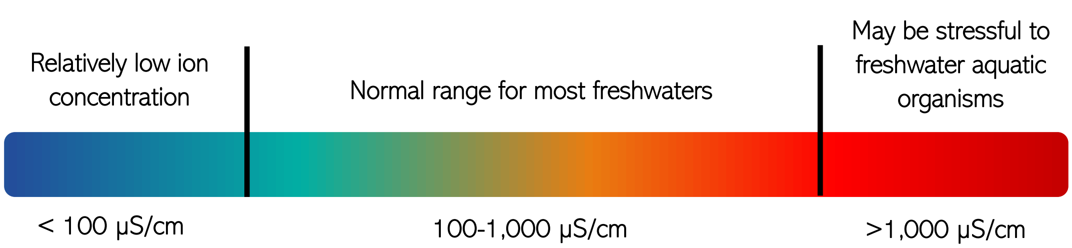
Dissolved Oxygen

Dissolved oxygen (DO) is the amount of oxygen gas that is mixed into water and available for aquatic organisms to breathe. DO is considered an important metric for water quality since it is essential for survival of aquatic life. Changes in DO can occur for a number of reasons including changes in water temperature, wind action, and biomass of plants and algae in a lake. When plants and algae respire overnight, this process consumes oxygen. When these organisms are conducting photosynthesis during the daytime, this process produces oxygen. Thus, heavier growth of plants or algae will have a proportionally higher influence on DO swings each day. Warmer water can hold less oxygen, so summer months tend to see lower DO levels, while colder months will see higher DO levels. Bacterial decay of detritus and other organic matter in sediments consumes oxygen, so DO levels are often lowest at the bottom of the water column, especially when a lake stratifies.



Conductivity

Conductivity is a measure of water's ability to pass an electrical charge. This is directly related to the concentration of ions in the water. Conductivity is measured in µS/cm. In freshwater bodies, a conductivity greater than 1,000 µS/cm may not be tolerable for fish and aquatic invertebrates.



Phycocyanin

Phycocyanin is a blue-colored pigment produced in cyanobacteria for photosynthesis. This pigment is mostly unique to cyanobacteria, so it can often be used as a screening-level measurement for detection of these organisms in water. While chlorophyll-a (pigment discussed below) is a more standardized metric for algal productivity in water, phycocyanin measurements are useful to discern the relative proportion of cyanobacteria within an algal assemblage. These data can be used to prompt further investigation with manual water sampling, algal identification and enumeration, and toxin testing where appropriate.

Chlorophyll-a

Chlorophyll-*a* is a pigment produced by plants and algae that is used to conduct photosynthesis. Measurements in water provide an estimate of the amount of planktonic (i.e. free-floating) algae and cyanobacteria present and can serve as a metric of productivity in water at that point in time. Chlorophyll-a measurements are used as a core metric in determining trophic state of lakes, along with nutrient levels. For example, oligotrophic (low productivity systems) lakes generally have chlorophyll-a levels of less than 3 µg/L, while hypereutrophic systems may routinely experience chlorophyll-a levels of greater than 40 µg/L. It is important to note that these designations should not be derived from one-time measurements, but rather trends over time. For example, a lake may experience a temporary algal bloom and experience high chlorophyll-a levels, but does not technically fall under the definition of a hypereutrophic lake. Thus, it is important to use this measurement as a line of evidence in tandem with other water quality parameters.

Clear water, low productivity	Usually clear water, slightly more productivity	Lessened clarity, nutrient rich water	Dense algal scums and few plants
0-3 µg/L	3-7 µg/L	7-30 µg/L	> 30 µg/L

Total Phosphorus

Phosphorus is an essential nutrient often correlating with algae growth. Total phosphorus (TP) is the measure of all phosphorus in a sample, reported in µg/L (or parts per billion; ppb). Includes phosphorus that is readily available for algae and plant growth and phosphorus that has potential to become available. The total phosphorus concentration in an aquatic system is often correlated with the trophic state of water. *For example*, *<12 ppb is considered oligotrophic and is often characterized by clear water with little plant or algae growth; 12-24 ppb is considered mesotrophic and is characterized by moderately clear water with some algae; 25-96 ppb is considered eutrophic and is characterized by productive waters with algae and plants; >96 ppb is considered hypereutrophic (highly productive) and is characterized by frequent algal blooms.* Again, these ranges are generalized and site-specific data should be interpreted in context with other water quality data and lake assessments of productivity.

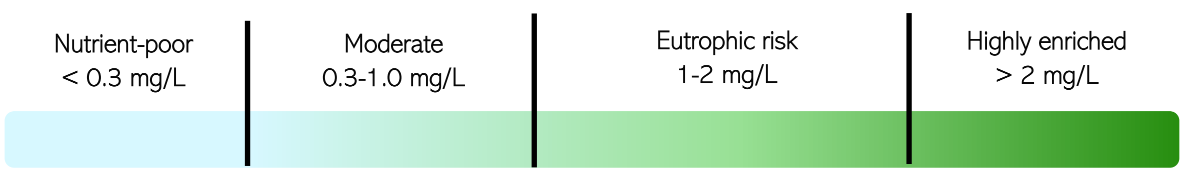
Oligotrophic	Mesotrophic	Eutrophic	Hypereutrophic
< 12 ppb	12-24 ppb	25-96 ppb	> 96 ppb

Soluble Reactive Phosphorus

Soluble reactive phosphorus (SRP) is the form of phosphorus in water that is dissolved in water and immediately available for uptake by plants and algae to use for growth. Most of SRP consists of orthophosphate, which is an inorganic form of phosphorus and is the simplest, most biologically available. Since SRP is readily usable, measurement of this parameter can help inform whether there is potential risk for rapid growth of cyanobacteria and algae, as well as reduced water clarity. While there are no universally adopted ranges of SRP that are considered normal/ healthy since this form fluctuates often, it is helpful when interpreted in context with total phosphorus concentrations and other water quality parameters.

Total Nitrogen

Nitrogen is an essential nutrient that can enhance growth of algae and plants., measured as total nitrogen (TN) in mg/L (or parts per million; ppm). Total nitrogen is the combined amount of all forms of inorganic nitrogen (ammonia, nitrite, nitrate) and organic nitrogen (forms found in animal and plant matter). Nitrogen is usually not a limiting nutrient in aquatic systems, but is often compared to total phosphorus levels to establish a nitrogen:phosphorus (N:P) ratio, which can inform whether a lake is more nitrogen-limited or phosphorus-limited.



Total Kjeldahl Nitrogen

Total Kjeldahl Nitrogen (TKN) is a measurement of the sum of organic-N and ammonia-N in water. TKN represents much of the nitrogen tied up in organic matter, which can include nitrogen in algae, plants, and organic debris, as well as in the ammonia form. High TKN levels may provide evidence of runoff containing manure or fertilizers, wastewater influence, decaying organic matter, or dense algae/aquatic vegetation. Organic-N and ammonia-N can both be transformed by bacteria over time into other forms of nitrogen, providing insight into the nitrogen cycle in a particular lake.