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ADVANCED WATER QUALITY ASSESSMENT REPORT

Prepared For:

Pinnacle Lake Estates
102 Skyline Drive
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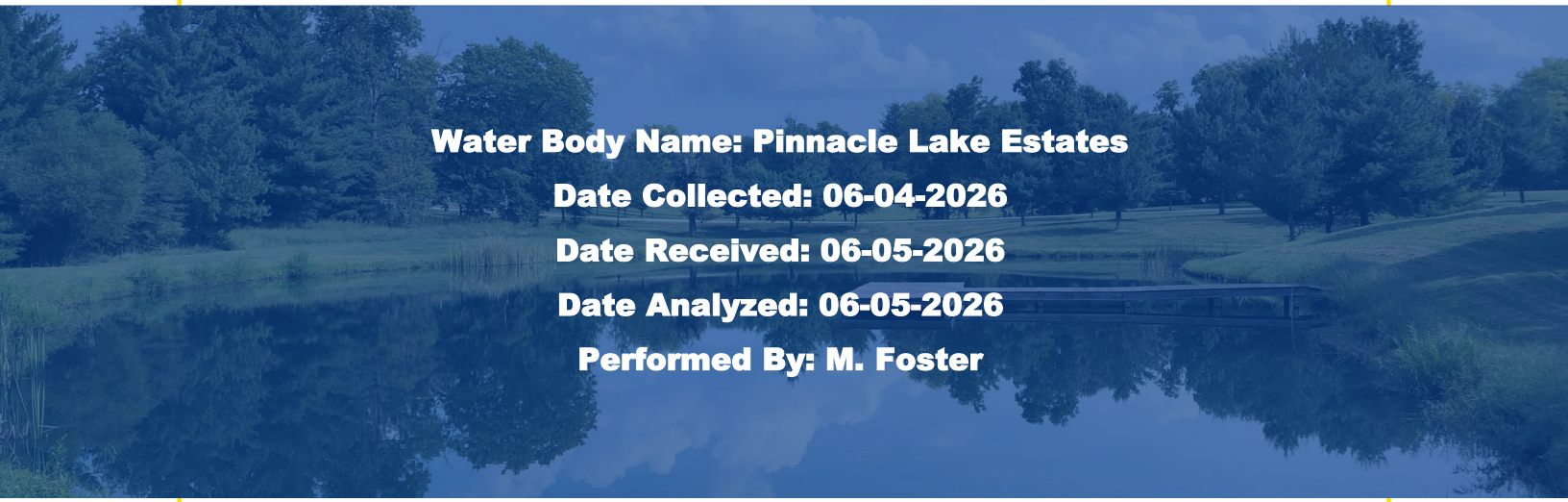
Report # 4819



Water Body Name: Pinnacle Lake Estates

Date Collected: 06-04-2026

Date Received: 06-05-2026

Date Analyzed: 06-05-2026

Performed By: M. Foster

Sample ID: Pinnacle Lake Estates **Sample Depth (feet): Surface**

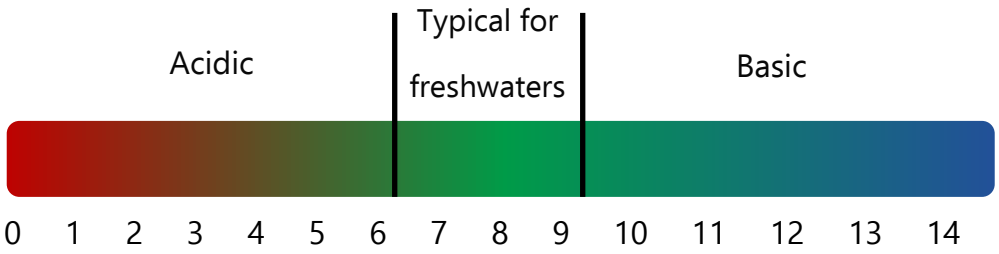
Sample Type: Grab **Preservative: Chilled/0.2% sulfuric**

Parameter	Value	Reference Page and Section Number for Interpretation of Value
pH (Standard Units [S.U.])	8.31	Page 2 Section 1.1
Alkalinity (mg/L as $CaCO_3$)	102	Page 2 Section 1.2
Hardness (mg/L as $CaCO_3$)	124	Page 2 Section 1.3
Conductivity (µS/cm)	264	Page 3 Section 1.4
Turbidity (NTUs)	0.61	Page 3 Section 1.5
Chlorophyll-a Concentration (ppb; µg/L)	1	Page 3 Section 1.6
Total Phosphorus Concentration (ppb; µg/L)	23	Page 4 Section 1.7
Total Nitrogen Concentration (ppm; mg/L)	1.13	Page 4 Section 1.8
Total Nitrogen: Total Phosphorus Ratio	49:1	Page 4 Section 1.9
Reactive Phosphorus Concentration (ppb; µg/L)	< 10*	Page 5 Section 2.0

* Indicates value is less than reporting limit

Section 1.1 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), while a range of 6.8-8.2 is preferable.



Section 1.2 Alkalinity

Alkalinity is a measure of the buffering capacity of water, reported in "mg/L as calcium carbonate" or parts per million (ppm). Buffering capacity of water describes the capacity of water to resist changes in pH. In other words, waters with lower alkalinity are more susceptible to pH shifts that can occur due to plant and algae growth. An alkalinity of 50-150 mg/L is desirable for fish health and growth.

Low	Moderate	Buffered	Highly Buffered
0-49 mg/L	50-100 mg/L	101-200 mg/L	> 200 mg/L

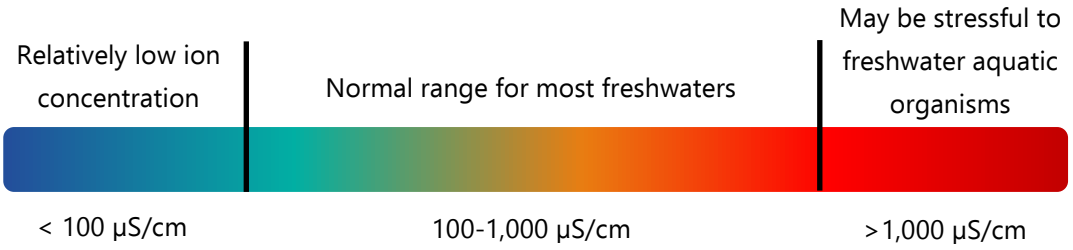
Section 1.3 Hardness

Hardness is a measure of dissolved calcium and magnesium in water, reported in "mg/L as calcium carbonate" or parts per million (ppm). Elevated calcium helps to improve survival of juvenile fish and is necessary for scale and bone formation as well as other metabolic functions. Hardness can also impact herbicide/algaecide efficacy. For fish health, a range of 50-150 mg/L hardness is desired.

Soft	Moderately	Hard	Very Hard
0-60 mg/L	61-120 mg/L	121-180 mg/L	> 180 mg/L

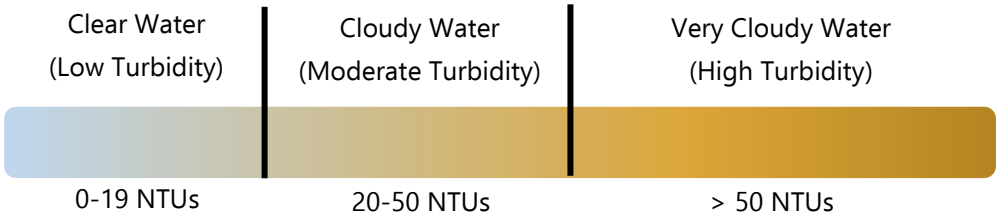
Section 1.4 Conductivity

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.



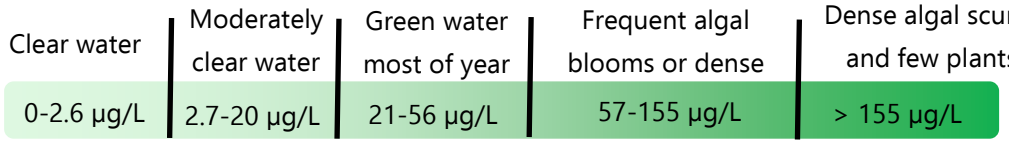
Section 1.5 Turbidity

Turbidity is the cloudiness or haziness of a liquid caused by suspended particles. Sunlight can penetrate deeper into clear water than turbid water. Clear waters will generally grow more submersed vegetation species and experience fewer algae blooms. More turbid waters transmit less light, will grow fewer submersed weeds, but may have problems with planktonic algae blooms and thermal stratification. Turbidity is quantified as NTUs (Nephelometric Turbidity Units) which are used to describe the clarity of water.



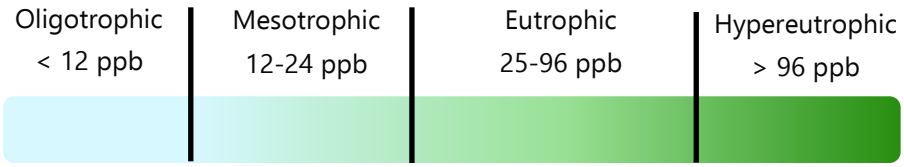
Section 1.6 Chlorophyll-*a*

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. For example, chlorophyll-a concentrations of 0-2.6 µg/L are generally correlated with oligotrophic status and clear water. Concentrations between 2.7 and 20 µg/L can correlate with mesotrophic status, which is characterized by moderately clear water for most of the year yet some periods of green color in the water in the summer. Concentrations between 21 and 56 µg/L can correlate with eutrophic status, which is characterized by green colored water for most of the year and potential issues with excessive plant and algae growth. Concentrations between 57 and 155 µg/L can correlate with hypereutrophic status, characterized by frequent dense algal blooms and macrophyte growth. Concentrations more than 155 µg/L are likely to correlate with frequent dense algal



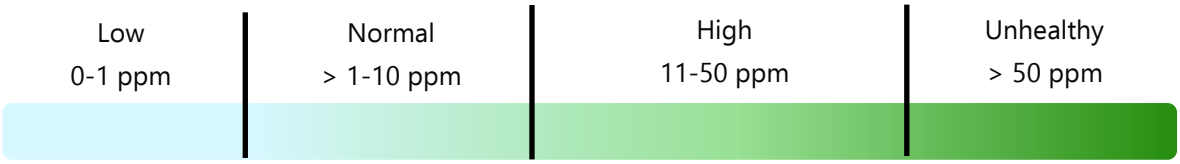
Section 1.7 Total Phosphorus

Phosphorus is an essential nutrient often correlating to 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.*



Section 1.8 Total Nitrogen

Nitrogen: 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). *For reference, < 1 ppm is considered relatively low, 1-10 ppm is considered normal but may support eutrophic to hypereutrophic lake status, >10 ppm is considered high for human consumption and may cause accelerated plant growth; > 50 ppm is unhealthy for lakes.* Nitrogen is usually not a limiting nutrient in aquatic systems, but is often compared to total phosphorus levels to establish a nutrient ratio (see section 1.9).



Section 1.9 Total Nitrogen to Total Phosphorus Ratio

The total nitrogen to total phosphorus ratio (N:P) of water can provide evidence of the potential for growth and types of cyanobacteria or algae that could dominate phytoplankton communities. In general, as N:P increases above 17:1, there will likely be a higher proportion of green algae than of cyanobacteria (i.e. blue-green algae). However, it is important to consider the actual concentrations of the nutrients as well and where they lie within the ranges found in aquatic systems. N:P ratios can be informative as to how nutrient levels could be altered to promote growth of a different type of algal community, as discussed in the table below.

N:P Ratio	Algal Community	Solutions
< 10:1	Blue-green algae may dominate if conditions persist	Phosphorus mitigation and/or aeration
< 17:1	Some green algae during cool seasons	Phosphorus mitigation or aeration
17:1	Balance of green and blue-green algae, favoring green algae	No action likely needed
> 17:1	Some blue-green algae present in warmer seasons, but mostly green algae present	Aeration to oxidize nitrogen more rapidly, bacteria may help. Some P fertilization only if oligotrophic or mesotrophic for fishery
> 29:1	Almost exclusively green algae	Aeration to increase N oxidation rate, bacteria may help reduce N, may need liming and P fertilizing if oligotrophic or mesotrophic for fishery improvement

Section 2.0 Reactive Phosphorus

Reactive phosphorus consists of mostly orthophosphate, which is an inorganic form of phosphorus that is readily utilized by plants and algae. As such, this form of phosphorus is most often the target for phosphorus management products. The goal of these treatments is to decrease the ratio of reactive phosphorus to total phosphorus in eutrophic and hypereutrophic systems, so that the minimal concentrations are available to promote growth of harmful algae or nuisance aquatic weeds. In general, healthy aquatic systems contain about 10% orthophosphate relative to the total phosphorus concentration. We recommend in situ phosphorus management treatments that target orthophosphate only when approximately 20% or more of total phosphorus is in the reactive form in eutrophic and hypereutrophic systems. Aluminum-based products can target all forms of phosphorus and can be used more broadly regardless of the fraction of orthophosphate.

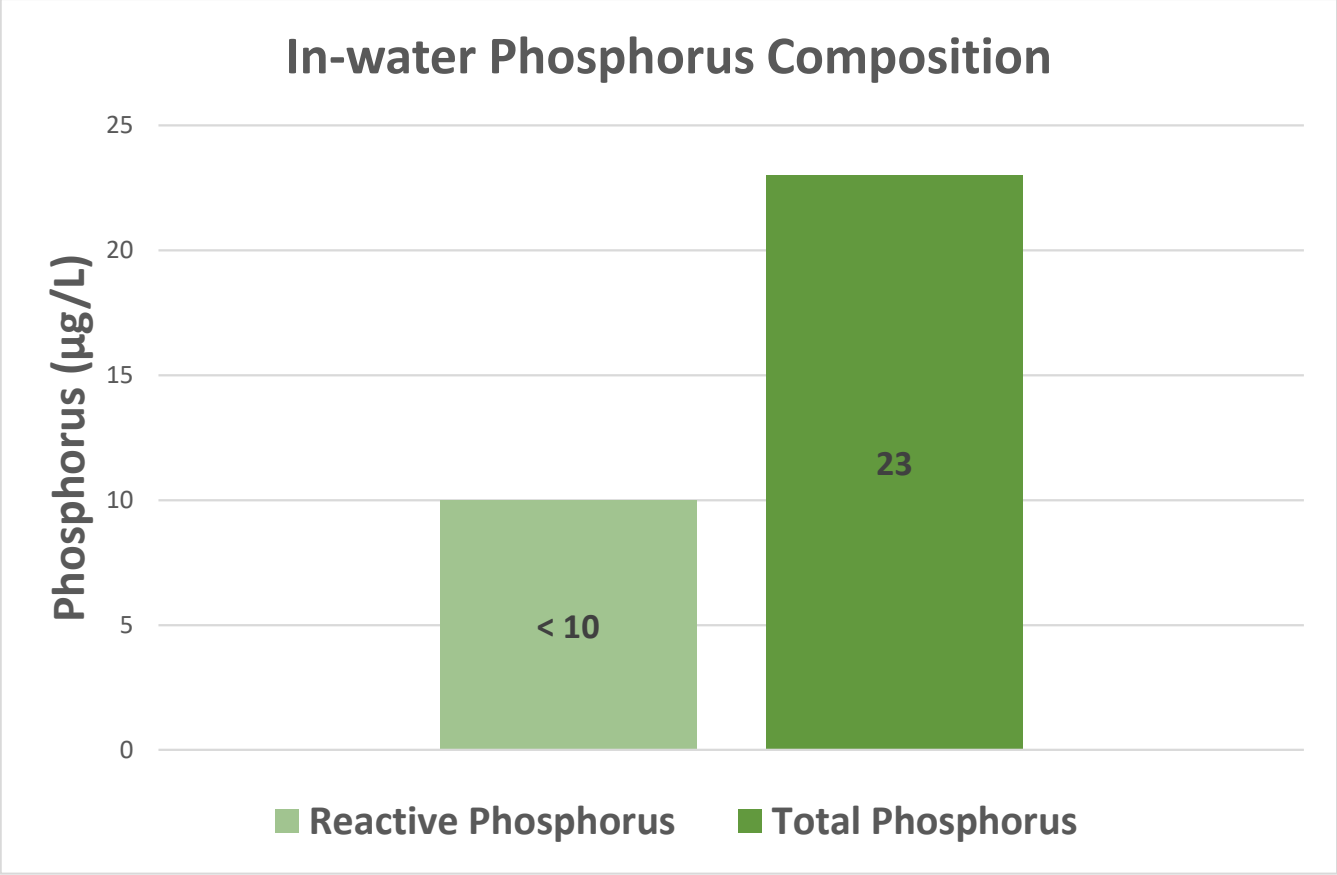


Figure 1a. Concentrations of reactive and total phosphorus measured in the submitted sample Pinnacle Lake Estates. Note: concentration of reactive phosphorus was below reporting limit of 10 micrograms/L and as such is reported here as the reporting limit.