

Lake LeAnn Water Quality Report Summary

Comprehensive Technical Summary for Residents and Board Members

Sampling Date: June 16, 2026

Executive Summary

The water quality sampling event conducted on June 16, 2026, reveals that Lake LeAnn is in a transitional, moderately productive summer state. Overall, the surface waters of both the North and South Basins exhibit good health, with comfortable temperatures, safe pH levels, and healthy oxygen concentrations capable of supporting aquatic life. However, a distinct vertical split has developed in the lake's water column—a natural seasonal process known as thermal stratification—where warm, oxygen-rich surface water sits on top of cold, heavy bottom water.

The most prominent area of concern is the severe lack of oxygen (hypoxia/anoxia) in the deeper parts of the lake. In the North Basin below 4 meters and the South Basin below 5 to 6 meters, oxygen levels drop to near zero. This completely cuts off the deep-water habitat for fish, forcing them into the warmer upper layers. Furthermore, the lack of oxygen at the lake bottom creates a chemical environment that allows phosphorus, which is normally trapped in the mud, to dissolve back into the water.

Nutrient levels at the surface show that the lake is managing well, though the North Basin is slightly more enriched than the South Basin. Total phosphorus at the surface remains low to moderate, keeping active algae growth in check for now. However, nitrogen concentrations across the entire lake are elevated, falling into a range that indicates potential eutrophic (nutrient-rich) risks over time.

Water clarity matches these findings perfectly. Field biologists noted a visible green hue in both basins, with the North Basin showing slightly lower clarity (around 4 feet) compared to the South Basin (nearly 6 to 7 feet). While no surface scums or active harmful algal blooms were seen during sampling, the lake contains the foundational ingredients—nutrients, warm surface water, and deep-water phosphorus release—that require careful monitoring as summer progresses.

Key Findings

- **Severe Deep-Water Oxygen Depletion:** Deep bottom waters in both basins have completely run out of oxygen (levels below 2.0 mg/L to near 0.0 mg/L), rendering the deep lake uninhabitable for fish.
- **Internal Phosphorus Release Underway:** At the deepest point in the South Basin (Site 2), total phosphorus jumps from an estimated 5 µg/L at the surface to 23 µg/L at the bottom, confirming that nutrients are dissolving out of the sediment due to zero-oxygen conditions.
- **North Basin Shows Lower Clarity:** The North Basin has less clarity (Secchi depth of 4'1") than the South Basin (5'9" to 6'7"), corresponding with its higher surface phosphorus levels.
- **Elevated Nitrogen Levels:** Total Nitrogen is high lake-wide (1.16 mg/L to 1.51 mg/L), signaling a steady supply of external nutrients from the watershed.
- **Low Current Algae Activity:** Actual chlorophyll-a (algae biomass) concentrations extracted in the lab are low (0.1 µg/L to 3.9 µg/L), confirming that a severe bloom has not yet materialized despite the green water tint.
- **Equipment Note:** The monitoring probe experienced a technical malfunction with its field chlorophyll sensor (reading negative values), which is being repaired. Rest assured, the laboratory analysis successfully captured accurate algae data.

Water Quality Scorecard

Parameter	June 2026 Result	Target / Typical Range	Status	What It Means
Water Temperature	Surface: 23.5°C – 23.7°C Bottom: 13.4°C – 16.1°C	Seasonal (Varies)	Good	Warm surface layers are ideal for recreation, but strong temperature layering isolates cold bottom water.
pH (Acidity)	7.07 to 8.42 S.U.	6.5 to 9.0 S.U.	Good	Perfectly balanced and safe for all swimming, recreation, and aquatic organism survival.
Dissolved Oxygen (DO)	Surface: 7.55 – 8.59 mg/L Bottom: 0.04 – 0.65 mg/L	Surface: > 5.0 mg/L Bottom: > 2.0 mg/L	Concern	Surface oxygen is excellent for fish, but deep water is entirely suffocated, stressing the ecosystem.
Secchi Depth (Clarity)	North: 4'1" South: 5'9" – 6'7"	Greater than 4 feet	Fair	Acceptable clarity, though a minor green hue indicates active suspended microscopic algae.
Total Phosphorus (TP)	Surface: <10 – 17 µg/L Bottom: <10 – 23 µg/L	Less than 24 µg/L (Mesotrophic)	Fair	Surface levels are under control, but bottom accumulation at South Site 2 is a warning sign.
Soluble Reactive Phosphorus (SRP)	All sites: <10 µg/L (Est. 0)	Near 0 µg/L	Good	Readily available dissolved phosphorus is very low, meaning algae cannot instantly explode.
Total Nitrogen (TN)	1.16 to 1.51 mg/L	Less than 1.0 mg/L	Concern	Elevated levels across the lake indicate a risk for long-term nutrient enrichment.
Total Kjeldahl Nitrogen (TKN)	1.06 to 1.49 mg/L	Less than 1.0 mg/L	Concern	Confirms that most of the nitrogen in the lake is bound up in organic material and organic debris.
Conductivity	North: ~464 µS/cm South: ~528 µS/cm	100 to 1,000 µS/cm	Good	Completely normal dissolved mineral/salt levels for a healthy inland freshwater lake.

Phycocyanin	0.04 to 0.81 RFUs	Low background levels	Good	Blue-green algae pigments are extremely low, showing no immediate toxic bloom signature.
Chlorophyll-a	Lab: Est. 0.1 – 3.9 µg/L (Field probe failed)	Less than 8.0 µg/L	Good	Lab results show low overall free-floating algae mass, supporting the lack of visible surface blooms.

Phosphorus Assessment

Phosphorus acts as a fertilizer for lakes. The current conditions show a stark contrast between the top and bottom of Lake LeAnn. At the surface, total phosphorus is low to moderate, hovering between 10 µg/L and 17 µg/L. This keeps the lake in a "mesotrophic" classification, meaning it has moderate nutrients and clear-to-partially-clear water.

However, internal loading—where the lake bottom feeds itself nutrients—appears to be starting. At South Basin Site 2, the bottom phosphorus spikes to 23 µg/L. Because the bottom water has completely lost its oxygen, the chemistry of the mud changes, forcing historical phosphorus deposits back up into the deep water.

What residents should understand: Right now, these bottom nutrients are trapped deep down by the cold temperature barrier. However, if late-summer storms mix the lake, or as the seasons change, this internal reservoir of fertilizer can be pushed to the warm surface, which could spark sudden algal blooms.

Algae Bloom Risk: Moderate Risk

While there are absolutely no major surface scums or highly concentrated toxic blue-green algae layers right now, the lake sits at a Moderate Risk for later this summer.

The reasoning is simple: the foundational ingredients for a bloom are assembling. The water column already displays a green hue, and phycocyanin (the blue-green algae marker) shows slight increases near the bottom where nutrients are accumulating. While the lab verified that the surface algae mass is currently low, the combo of high nitrogen lake-wide, warm surface temperatures (23.6°C), and a rising pool of phosphorus at the bottom means a sudden hot, calm stretch of weather could easily cause these dormant populations to multiply rapidly.

Oxygen Conditions & Fisheries Health

The oxygen profile of the lake represents a tale of two worlds, creating a squeezed environment for fish:

- **Surface Habitat:** The top 3 meters of water are well-oxygenated (> 7 mg/L), providing a healthy environment where fish can easily breathe and seek forage.
- **Deep Habitat:** Below 4 to 5 meters, bacterial decomposition of organic debris on the lake floor has consumed all available oxygen. Dissolved oxygen drops below the critical stress threshold of 3 mg/L, down into a hypoxic zone (< 2 mg/L), and ultimately hits a near-total zero at the bottom (0.04 mg/L).
- **Impact on Fish & Sediment:** Cold-water fish species that prefer deep, cool waters are completely forced out of their preferred depth and must crowd into the warm surface layers to breathe. Chemically,

this extensive low-oxygen footprint directly fuels internal loading, releasing trapped phosphorus into the lower depths of the lake.

Trend Analysis & Spatial Variations

- **Improving / Stable Indicators:** pH, conductivity, and soluble reactive phosphorus (SRP) are highly stable and well within pristine, healthy environmental ranges across all testing sites. Blue-green algae pigments (phycocyanin) remain at a very safe baseline level.
- **Worsening / Vulnerable Indicators:** Deep-water oxygen depletion has heavily set in for the summer season. The South Basin's deepest pocket is showing worsening accumulation of bottom total phosphorus.
- **Areas Requiring Additional Monitoring:** The North Basin requires close watch, as its water clarity is nearly 2.5 feet lower than parts of the South Basin, matching its higher surface nutrient concentrations. Close monitoring of the bottom water at South Site 2 is critical to track how much internal phosphorus continues to bleed out of the sediment.

Key Takeaways

- The surface water of Lake LeAnn is currently safe, healthy, and fully open for swimming, boating, and recreation.
- The lake water has a slight green tint due to tiny, free-floating microscopic algae, but no hazardous surface mats or scums are present.
- Water clarity is fair, allowing you to see down about 4 feet in the North Basin and up to 6.5 feet in the South Basin.
- Deep bottom water has run out of oxygen for the season, forcing fish to live primarily in the upper 10 to 12 feet of the lake.
- Phosphorus (algae fertilizer) is beginning to escape from the dark, oxygen-starved bottom mud into the deep water.
- Nitrogen levels are high across the lake, likely driven by runoff from lawns, fertilizers, or local watershed inflows.
- Property owners can help protect clarity by minimizing fertilizer use, inspecting septic systems, and maintaining natural shorelines to block nutrient runoff.