

# MEMBERS SUMMARY – 2020 LAKE SAMPLING EVENT #1 PERFORMED BY PRINCETON HYDRO, JUNE 1, 2020



**BACKGROUND:** The Water Quality Committee (WQC) recommended to the LLPOA Board retaining a professional lake advisor to guide the management of Lake Latonka to support the desired broad range of uses, including swimming, boating, water skiing, fishing, and aesthetics. After an extensive review of potential advisor firms and evaluation of proposals, the Board accepted the WQC's recommendation and retained Princeton Hydro (PH) to serve as our community's professional lake advisor. Their services will include 15 specific tasks focused on fully understanding the lake's water quality throughout the primary recreation season, culminating with a lake management plan. Over the course of the summer, PH is conducting five sampling events that also will include observations by the Project Manager/Senior Limnologist (fresh water pond/lake scientist).

The aerial image to the left shows the locations where PH is sampling during each of five sampling events (2 inlet stations, 3 lake stations + 1 beach station, and 1 outlet station).

## SUMMARY OF SAMPLING EVENT #1 - JUNE 1, 2020:

### In-Situ (In-place) Sampling

Clarity - On June 1, the lake had good clarity (transparency), with visibility to about 7 feet at the deeper lake stations (L-2 and L-3), based on Secchi disc transparency.

Thermal Stratification - The Lake exhibited thermal stratification (temperature variability with depth). At the deepest station, L-3, the surface water temperature was 71.6°F, while the temperature at 21' deep was 52.3°F. Temperature zones were defined as the top 3' of warm water (the epilimnion), the thermocline from 7 to 16' separating warmer surface water from coolest deep water, and the hypolimnion below 16' containing the coolest water. Thermal stratification prevents mixing and negatively impacts dissolved oxygen at depth.

Dissolved Oxygen (DO) – Aquatic organisms require oxygen dissolved in the water for survival. PH likes to see a minimum 4 mg/l for warm-water fish. At L-3, DO was high (>9 mg/l) within the upper 10'. However, at 16' the DO was less than 4 mg/l, was less than 2 mg/l at 20' deep (hypoxic) and was less than 1 mg/l (anoxic) at the sediment interface.

pH – Generally the lake was very slightly acidic, with pH's in the range of 6.6 to 6.9, consistent with low early-season rates of algal productivity (increasing photosynthesis generally leads to basic water conditions with pH > 7.0)

## Laboratory Water Quality Results

Chlorophyll a – Chlorophyll is the pigment plants use to convert sunlight to energy. Chlorophyll a is the primary photosynthetic pigment in algae and is an indicator of algal biomass. PH typically recommends that this value remain below 20 µg/L. Measured results ranged from a minimum of 6.8 µg/L to a maximum of 12.0 µg/L, within an acceptable range for Lake Latonka during the early-part of the growing season.

Total phosphorus (TP) – TP includes inorganic and organic, dissolved and particulate forms of phosphorus. TP is used to assess lake productivity as it is typically the limiting nutrient in freshwater ecosystems. PH recommends TP concentrations in natural lakes to remain below 0.03 mg/L to preclude nuisance algal growth. In impoundments and man-made lakes, such as Lake Latonka, an initial threshold value of 0.05 mg/L is typically appropriate given the larger tributary areas and agricultural runoff. Peak concentrations were 0.06 mg/L at the Cool Spring Creek inlet, decreasing to 0.03 mg/L at L-3. Data from this event did not indicate large-scale internal (from lake sediments) phosphorus loading at the time of sampling.

Soluble Reactive Phosphorus (SRP) – The dissolved, inorganic portion of phosphorus which is most readily assimilated by algae for growth. PH recommends that SRP concentrations remain below 0.005 mg/L; no samples exceeded this recommendation.

Nitrogen Compounds (Ammonia [NH<sub>3</sub>] and Nitrates [NO<sub>3</sub>]) – Nitrogen is a nutrient that can lead to eutrophication of water bodies. Ammonia can be converted to nitrate (NO<sub>3</sub>) by bacteria, and then used by plants. Nitrate and ammonia are the most common forms of nitrogen in aquatic systems. Nitrogen levels were found to be low to moderate at Lake Latonka during this June sampling event.

Total suspended solids (TSS) – TSS represents the inorganic and organic particulates in the water column. TSS measures in lakes should remain below 10 mg/L to preclude turbid conditions. TSS measures at Latonka ranged from non-detectable (ND < 2) to 7 mg/L; TSS was acceptable.

### **Plankton Data (Phytoplankton is aquatic plants, Zooplankton is small aquatic animals)**

Princeton Hydro collected three phytoplankton grab samples (two near the dam, one at the beach); these samples were subsequently identified and enumerated (cells/mL). Zooplankton also was collected near the dam for taxonomic analysis and enumeration (organisms/mL). Additionally, samples for cyanotoxins (toxins from cyanobacteria, a.k.a. blue-green algae), specifically, total microcystin, and cylindrospermopsin, were collected at the Beach.

Phytoplankton results - Phytoplankton grab samples showed low to moderate densities, comprised by the chlorophytes (green algae), cyanobacteria (blue-green algae), and diatoms with a relatively high diversity of the green algae which are preferential food source for zooplankton. However, zooplankton net tows also revealed densities of cyanobacteria, largely the nuisance *Aphanizomenon* and the colonial *Woronichinia*. PH reported a robust standing stock of these nuisance organisms in the lake that will likely proliferate in the coming weeks and may form nuisance conditions.

Zooplankton results - Samples showed a high prevalence of large-bodied *Daphnia*. These organisms graze heavily on phytoplankton, especially the green algae and diatoms, and can offer natural control of higher phytoplankton densities. PH noted that copper-based algaecides, which are frequently utilized in lake management, are toxic to many zooplankton. As such, applications should be conducted judiciously.

Cyanotoxins – Cyanobacteria (termed blue-green algae) can release natural toxins into water bodies. PH sampled at the Beach for the more common toxins from algae blooms; they analyzed for total microcystins and cylindrospermopsin (both are hepatotoxins that can impact the liver and kidneys). The sample results were negative for both toxins at the Beach.

### **Other Observations**

Fish Mortality - PH observed approximately 50-100 dead fish at the time of sampling. The majority of these fish were black crappie (*Pomoxis nigromaculatus*) in the 6-9" size cohort. The fish showed some ragged fin edges and fungal type growths near the mouth, operculum, and caudal fins. The disease affecting these fish was likely columnaris which is a bacterial disease caused by *Flexibacter columnaris*. The disease is usually associated with stressful conditions including rapid changes in water temperature, low dissolved oxygen, or high populations. Such conditions may have been present following post-spawn of these fish.

Stormwater Management/Erosion Controls – PH noted successful uses of silt traps by LLPOA but also noted streambank erosion at Cool Spring Creek needing mechanical stabilization or establishment of vegetation to prevent erosion.