



2013 Lower Long Lake Water Quality Summary

The goal of this testing protocol was to monitor various water quality parameters of the lake, compare results to historical data, and identify any potential risks to the health of Lower Long Lake. Water samples were taken at four different locations and tested for 14 different parameters. Tests were conducted on a monthly basis from April through August. This report describes conditions at the times the samples were taken. The quality of the water was tested only to the parameters listed below. For more information, please see the full Water Quality Report.

Parameter	Change from 2012	2013 Season Average	Target Range	Status
Temperature	↓ Improvement	70.7 °F	Less Than 75 °F	● Healthy
Dissolved Oxygen	↓ Decline	7.6 mg/L	4.0 – 12.0 mg/L	● Healthy
Total Phosphorus	↓ Improvement	70 ppb	0 – 100 ppb	● Healthy
Phosphate	↓ Improvement	23 ppb	0 – 100 ppb	● Healthy
Nitrate	↓ Improvement	211 ppb	0 – 1,000 ppb	● Healthy
Chlorophyll-a	↑ Decline	2.3 ppb	0 – 7.3 ppb	● Healthy
Transparency	↓ Decline	18.3 feet	More than 6.5 feet	● Healthy
pH	↓ Improvement	8.17 S.U.	7.0 – 9.0 S.U.	● Healthy
Total Dissolved Solids	↓ Improvement	375 ppm	0 – 1,000 ppm	● Healthy
Conductivity	↓ Improvement	750 ppm	0 – 1,500 ppm	● Healthy
Alkalinity	↓ Decline	115 ppm	100 – 250 ppm	● Healthy
Sulfate	↓ Improvement	16 ppm	3 – 30 ppm	● Healthy
Fluoride	↓ Improvement	0.06 ppm	0.01 – 0.30 ppm	● Healthy
Chloride	↓ Improvement	192 ppm	0 – 230 ppm	● Acceptable
Trophic State Index – Transparency	↑ Decline	36		Oligotrophic
Trophic State Index – Total Phosphorus	↓ Improvement	64		Eutrophic
Trophic State Index – Chlorophyll-a	↔ No Change	38		Oligotrophic

Discussion:

The Temperature decreased from 2012. The lower temperature increased the oxygen solubility of the lake, but the dissolved oxygen decreased. The nutrients in the lake, Total Phosphorus, Phosphate, and Nitrate, all decreased. The Chlorophyll concentration increased, suggesting more plant production used up the nutrients. More Chlorophyll indicated more phytoplankton in the water and, correspondingly, the Transparency decreased. The water chemistry parameters all decreased from 2012, showing rainfall flushed excess molecules from the lake. The decreases were all positive trends for the lake except Alkalinity, which is getting close to the lower limit. As the rainwater infiltrates the ground, it will pick up carbonates from the bedrock and replenish the Alkalinity.

The Trophic State Indices generalize the most useful parameters for an easy comparison to other lakes and expected values. The TSI based on Transparency increased, showing a decrease in water quality due to less clarity. The TSI – Chlorophyll did not change because the increase in chlorophyll was very slight. Therefore, the decrease in transparency was only partially due to increased chlorophyll. With abundant rainfall throughout the summer, the lake underwent more mixing, which also clouded the water. Finally, the TSI – Total Phosphorus shows that this nutrient improved, decreasing the lake's potential to grow plants.

