

# Hackert Lake Water Sampling and Results 2015

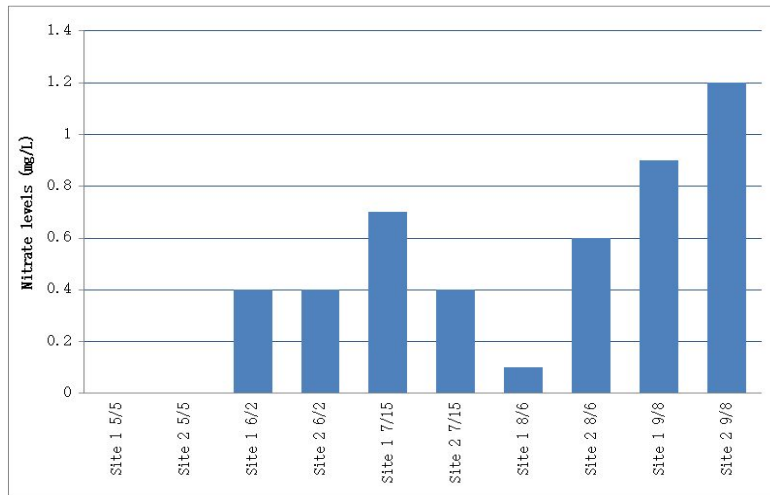
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## Abstract

Water samples were collected and tested one day per month between the months of June and September at two different sites on the lake. The water tests include ammonia, nitrate, phosphate, hardness and coliform. Temperature, Dissolved oxygen, pH and chlorophyll were taken with a multi-parameter sonde. The gathering of this information is to show how healthy the lake is. Throughout the report the actual results will be in **bold** lettering.

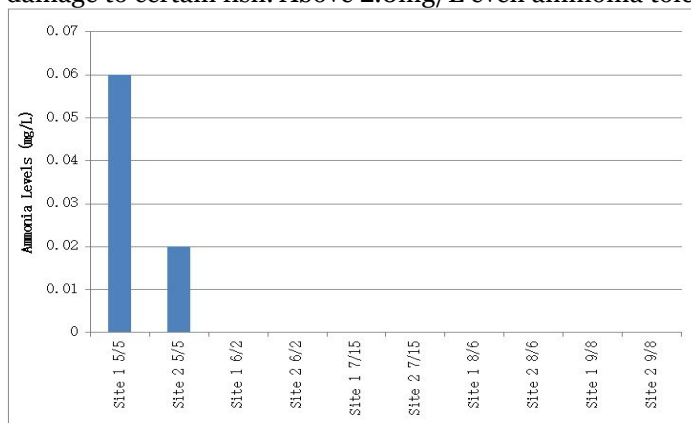
The compounds ammonia, nitrate, and phosphate are fundamental in maintaining the health and balance of Hackert Lake ecosystem. Too much or too little of one or more compounds may lead to fish die offs, algae blooms, excess turbidity and poor water quality.

**Nitrate (NO<sub>3</sub><sup>-</sup>)** – Nitrate is an oxidized form of dissolved nitrogen that is converted to ammonia by algae under anoxic (low or no oxygen) conditions. It is found in streams and runoff when dissolved oxygen is present, usually in the surface waters. **During the month of May at Hackert site 1 and 2 the lowest level was recorded at 0.0mg/L. The highest level was recorded at 1.2mg/L which occurred at Hackert site 2 during the month of September.** The MDEQ states that levels of non-detected levels to 0.3mg/L as excellent, 0.4 to 1.0mg/L as satisfactory, over 1mg/L as objectionable and above 10mg/L as hazardous.

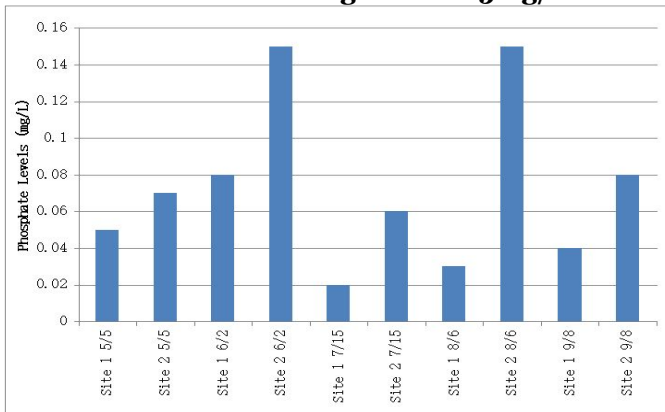


**Ammonia (NH<sub>4</sub><sup>+</sup>)** – Ammonia is a form of dissolved nitrogen that is readily used by algae. It is the reduced form of nitrogen and is found in water where dissolved oxygen is lacking such as in a eutrophic hypolimnion. Important sources of ammonia include fertilizers

and animal manure. In addition, ammonia is produced as a by-product by bacteria as dead plant and animal matter are decomposed. **During the months of June-September at Hackert site 1 and 2 the lowest levels were recorded at 0.0mg/L. The highest level occurred at Hackert site 1 during the month of May at 0.06mg/L.** Toxic levels range from 0.06mg/L where you could see gill damage to certain fish. Above 2.0mg/L even ammonia tolerant type fish like carp would begin to die.



**Phosphate** is a limiting factor for fish yield, meaning that it is a nutrient that is in the shortest supply relative to the needs of aquatic plants. A minimum of phosphate must exist to sustain plant life, and in turn, the species' that thrive on the plants from the zooplankton to the macro invertebrates to the fish species. However, overabundance of phosphate results in hypereutrophication-when plant life and algae life exceeds sustainable levels for other species. **The lowest level recorded was during the month of July at 0.02mg/L which occurred at Hackert site 1. The highest level recorded occurred at Hackert site 2 in August at 0.15mg/L.**



**Temperature** is one of the most important habitat variables for fish. Temperature strongly influences species composition of water bodies, fish growth rates, and the timing of reproduction. **Hackert Lake site 1's temperature was taken every meter starting at 0 to 15m. The warmest at the surface was 25.39°C in the month of August. The coldest at the surface was recorded at 15.11°C in the month of May. Hackert Lake site 2's temperature was taken between 0 to 10m every meter. The warmest at 10m was recorded in September at 12.14°C. The coldest was in May at 5.74°C.**

**Coliform bacteria** are not harmful to humans, but it's an indicator species to other microbes that are harmful. Lakes that receive the effects of sewage effluent are evaluated for their coliform presence to determine their safety for recreational purposes. Coliforms are measured by the number of colonies grown per 100mL of water. The number of colonies should not exceed 200 colonies/100mL. **All of the samples were taken by the Hackert site number 2 every month and never exceeded 36 colonies/100mL.**

**Dissolved oxygen (D.O.)** is the dissolved gaseous form of oxygen. It is essential for respiration of fish and other aquatic organisms. D.O. enters water by diffusion from the atmosphere and as a by-product of photosynthesis by algae and plants. Epilimnetic waters continually equilibrate with the concentration of atmospheric oxygen. Excessive algae growth can over-saturate (greater than 100% saturation) the water with D.O. when rate of photosynthesis production is greater than the rate of oxygen diffusion to the atmosphere. Hypolimnetic D.O. concentration is typically low as there is no mechanism to replace oxygen that is consumed by respiration and decomposition. Fish need at least 3-5 mg/L of D.O. to survive. **At Hackert site 1 the D.O. ranged from 8.94mg/L at 1m and 0.83mg/L at 15m during July. At Hackert site number 2 the D.O. ranged from 8.51mg/L at 3m and 2.61mg/L at 10m during the month of September. The rest of the data collected fell within normal ranges.**

**Alkalinity (pH)** measures the acid neutralizing capacity of lake water. Alkalinity refers to the quantity and kinds of compounds that shift pH to the alkaline side of neutrality (Wetzel 1975). In most freshwater lakes and streams the hydroxyl, bicarbonate, and carbonate ions represent the major buffering system. Only lakes with low alkalinity have pH substantially below 7.0. Fish species vary in their tolerance of low pH. Minnows are very intolerant, whereas yellow perch are more tolerant. The water's should be between 6.5 to 9.0 pH. **At Hackert site 1 the pH ranged from 8.39 at the surface to 7.39 at 5m in May. Hackert site 2's pH ranged from 8.55 at the surface to 7.06 at 10m in August. All of the other data collected also fell into normal range.**

**Water hardness** pertains to naturally occurring calcium and magnesium ions, mostly from rocks, which are an alkaline buffer against acidic rain. The MDEQ list that hardness values, in mg/L or ppm, from 50-125 as moderately hard, 125-250 as hard, and over 250 as very hard. **The values measured**

**fell within the hard range during May through August. During September the range fell within the moderately hard.**

**Chlorophyll** measuring is an algae production indicator since many algae produce chlorophyll pigments. Specifically, chlorophyll *a* is measured because it is the most abundant pigment in green plants and algae. High chlorophyll *a* indicates that algae levels are too high, ultimately depleting dissolved oxygen. The levels vary so comparing them to last years is the best way to determine if the algae levels are too high. **The chlorophyll at both sites has around the same levels as years past.**

The **Secchi disk** is a device that is used for measuring water clarity vs. turbidity. The disk consist of 4 alternating black and white colors and is lowered into the water until you can no longer see the white parts. The reading is done 2 or more times and is averaged. It is an easy tool to determine how much sunlight reaches certain depths of the lake. **The deepest recorded depth was 7m in May at site 1. The closest reading to the surface was 3.5m at site 2 in June. All the other readings fell between 3.5m-7m.**

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