

## **Explanation of water quality testing parameters**

Upper South Long Lake is considered to be a part of the Northern Lakes and Forests Ecoregion. In terms of its trophic state, it is borderline between a mesotrophic lake and a eutrophic lake.

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The LID is currently doing water quality testing at the four main inlets to the lake. One is the Nokasippi River, the others are creeks located near the beginning of Silver Bay Road, near the end of Rognaldson Road, and to the south of Paradise Shores Resort. Explanations here are for most of the types of tests that are being conducted. For many years, testing has been occurring near the deepest point of the lake also. This testing will continue.

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### **pH:**

The pH of a lake is important for the survival and reproductive success of the fish and other aquatic life. If the pH is below 5.5, it will limit the growth and reproduction of fish.

The range of pH listed for our ecoregion is 7.2 - 8.3. Anything less than 6.5 may affect fish spawning and the solubility of metals.

### **Total suspended solids (TSS):**

Suspended solids include silt and clay particles, plankton, algae, other fine organic debris and other particles that will not pass through a 2-micron filter. Much of this material would enter the streams by erosion of soil from agricultural or construction sites.

An increase in the TSS can lower a lake's ability to support diverse aquatic life. Suspended solids absorb sunlight and can cause an increase in water temperature. This, in turn, decreases levels of dissolved oxygen being available to aquatic life. These solids also may settle to the bottom smothering some eggs of fish and aquatic insects. Gills (of fish and other aquatic larvae) may become clogged which may inhibit growth and lower resistance to disease.

The MPCA shows the ecoregion range through 2011 to be from less than 1 to 2 mg/L while another figure obtained was a range of 1.8 to 6 mg/L for the years 2007-2008. The recorded average TSS at the Nokasippi River inlet for that time was 3.7 mg/L.

## **Total Phosphorus:**

Although phosphorus is an essential nutrient for aquatic plants and algae, only small amounts are necessary. When too much phosphorus is present, it can lead to eutrophication of a lake. This is a condition that can result in an overabundance of plant and algae growth which, in turn, reduces the amount of dissolved oxygen available for aquatic organisms. Upper South Long is considered phosphorus limited. Available phosphorus will determine plant and algae growth.

Phosphorus is a naturally occurring substance in rocks, soils, and organic materials. Sources of phosphorus entering a lake may include: animal waste, lawn fertilizer, septic systems, road and construction erosion, industrial wastes, natural wetland runoff, and atmospheric deposition.

One would expect phosphorus levels in the streams entering the lake and the NOKASIPPI River to be higher at times of heavy run-off and also later in the season as plant and algae growth increases in the wetlands etc. surrounding the lake. The phosphorus testing done in the deeper part of the lake should be a truer test of the over-all health of the lake in regards to phosphorus. Sources show that the Environmental Protection Agency in the US has suggested a limit of .025 mg/L for a lake (at our deep spot) and .05 mg/L for streams entering the lake.

The MPCA has set the acceptable range for our ecoregion at .014 - .027 mg/L with .03 mg/L considered impaired. The average range for the Northern Lakes and Forest Ecosystem is .02 - .05 mg/L. (these also would be at the deep area of the lake)

## **Orthophosphates:**

Orthophosphate is a type of inorganic phosphate. These are the types of phosphates used by plants. It can be produced by natural processes, but can indicate other problems. They are used heavily in fertilizers so are frequently introduced by runoff. Poorly treated sewage or leaking septic systems can also elevate these levels.

Further investigation of the safe "numbers" will be necessary, but one source shows borderline healthy aquatic ecosystems with a range of 0.05 - 0.1 mg/L in a river environment. (haven't found anything yet on a lake)

## **Conductivity:**

Conductivity is a measure of the water's ability to carry an electrical current. It is a reflection of the number of ionic particles present. These can be inorganics such as chlorides, nitrates, iron, etc. Conductivity in streams has a high correlation to the geology of the area through which it flows. Acceptable range of numbers is difficult to establish for that reason. Once baselines are established, significant changes in conductivity could then be used to indicate that pollutants have entered the stream.

The MPCA has set 50-250 umhos/cm as the acceptable range for our ecoregion.

High conductivity may be a result of road salting, septic systems, or urban/agricultural runoff. Low conductivity could result from an oil spill.