Cooperative Lakes Monitoring Program

Fact Sheet

Dissolved Oxygen and Temperature

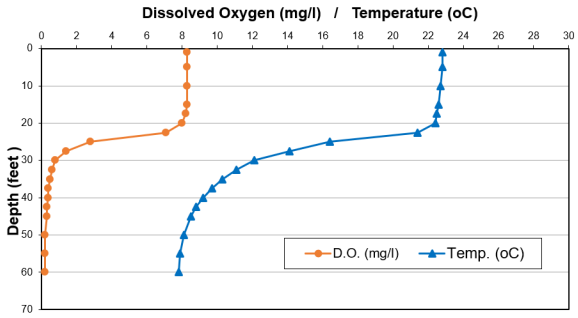
What do dissolved oxygen and water temperature tell us about a lake?

Why are dissolved oxygen and temperature important?

Measuring lake dissolved oxygen and temperature patterns are important to understand the physical, chemical, and biological properties of a lake. These patterns reflect and influence lake stratification, lake productivity, nutrient cycling, and aquatic habitat.

What is thermal stratification and why is it important?

Thermal stratification occurs when different layers of water form in a lake due to changes in temperature and density. In spring, as the sun warms the surface waters of a lake, a warm lighter layer of water forms on top of the colder, higher density water below. Stratification impacts where different aquatic organisms can live and where dissolved substances like oxygen and phosphorus can build up or become depleted.



This graph shows the distinct thermal and DO stratification typical for a late summer, mesotrophic lake.

What is dissolved oxygen, and how much does the lake's biology need?

Oxygen in the atmosphere naturally diffuses into water and becomes dissolved. The amount of dissolved oxygen in water is important because like humans and land animals, most organisms in aquatic environments need oxygen to power the life-sustaining respiration process. Different aquatic animals require different amounts of dissolved oxygen. For example, trout and stoneflies need dissolved oxygen levels as high as 6-8 mg/L. Smallmouth bass need dissolved oxygen between 5-6 mg/l. Some animals (like common carp) can thrive with very low oxygen (1-2 mg/L). When aquatic organisms cannot find water with the proper amount of dissolved oxygen, they will soon die.

What else does dissolved oxygen affect?

Dissolved oxygen also affects nutrient cycling in lakes. When algae and other organisms die and fall to the lake bottom, they begin to decompose. This decomposition process uses up oxygen. If oxygen reaches 0 mg/L then phosphorus can be released from the lake bottom.

The DO/ temp meter comes with a long cable attached to a probe. The probe is lowered from the lake surface to the lake bottom to get DO and temperature profiles (credit: YSI).

How are dissolved oxygen and temperature measured?

In the Cooperative Lakes Monitoring Program, dissolved oxygen and temperature are measured from the surface to within 3 feet of the bottom, as a profile, in the deepest basin of the lake. Measurements of dissolved oxygen and temperature are made every two to three weeks from mid-May to mid-September. CLMP volunteers use an oxygen/temperature meter connected to a cable with a sensor probe. The meter displays the dissolved oxygen readout based on the rate of diffusion of molecular oxygen across the probe's membrane. Using the dissolved oxygen/temp data, we can develop dissolved oxygen/temp profiles, which show the changes in dissolved oxygen and temperature through depth.

For more information about the MiCorps Cooperative Lakes Monitoring Program, visit www.MiCorps.net

Michigan Clean Water Corps

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