

Glossary of Terms Used in Lake Almanor Water Quality Reports

Algae. Algae (the plural form of alga) are one-celled plants that do not have a central vascular system for respiration and nutrient flow. Usually algae are very small, microscopic size. However, some are much larger, such a sea lettuce, but are still algae because each cell can survive on its own and there is no central vascular system. Various estimates indicate there are over 70,000 species of algae that inhabit fresh water.

“Blue green algae”. These are more correctly Cyanobacteria, and not algae. The chlorophyll in each cell is spread throughout the entire cell. This contrasts with a true algae cell which has a firmer wall, like a pea, and the chlorophyll is in sacks called chloroplasts. Most of the harmful algae bloom (HAB) problems in US lakes are caused by only about 30 species of cyanobacteria. Cyanobacteria are found in many lakes and can destroy a lake's utility by producing potent toxins (cyanotoxins), taste, and odor in the lake water. The toxins can kill or harm humans that contact the lake water.

Anoxic. Anoxic water has little or no measurable dissolved oxygen.

Bloom. A "bloom" usually refers to excessive algal growth.

Cladocera. Relatively large members of the zooplankton, such as Daphnia (water fleas), that are primarily filter feeders that eat algae and other phytoplankton.

Coldwater Fishery. Waters in which the maximum mean monthly temperature generally does not exceed a certain value and, when other ecological factors are favorable, are capable of supporting year-round populations of cold water aquatic life, such as trout.

Concentration. Concentrations of a substance in water are usually given as ppm in the English system or mg/l in the Metric system. Below is conversion information to go from the English to the Metric system:

1 part per thousand = 1 ppt is the same as 1 gram per liter = 1 g/l

1 part per million = 1 ppm is the same as 1 milligram per liter = 1 mg/l

1 part per billion = 1 ppb is the same as 1 microgram per liter = 1 ug/l

The above are weight ratios, not molar ratios. For example, 1 ppm means 1 lb.of solute per 1,000,000 lbs.of water.

Conductivity. A simple way to determine the salinity, or total dissolved solids (TDS), in water is to measure the electrical conductivity of the water using an electric meter compensated for water temperature. This works because water conductivity is affected by the amount of salts dissolved in water.

Copepods. Members of the zooplankton that can be predaceous on other organisms.

Cyanobacteria. See Blue-green algae.

Diatoms. Diatoms are a beneficial microscopic cold water algae with a hard exoskeleton. These algae are typically brown, and impart a brown tint to lake water in the spring and fall.

Dissolved oxygen (DO). The amount of oxygen dissolved in water, and available for biological use and chemical reactions. Saturation refers to the maximum amount of DO water can hold in solution. Both lower temperature and higher pressure result in higher DO saturation concentrations in water. Examples of the approximate saturation of DO in water at standard atmospheric conditions are: 50°F (10°C) >> 11 mg/l of DO, 68°F (20°C) >> 9.5 mg/l of DO, 86°F (30°C) >> 8 mg/l of DO.

Epilimnion. The epilimnion is the upper portion of the lake above the metalimnion (See definition below.) In most US lakes and other fresh water bodies the epilimnion extends from the surface to 2-3 meters deep, but in some large lakes, such as Almanor, it can extend much deeper (down to 10 meters in late summer). Usually the epilimnion is mixed well enough by wind so that the water temperature, dissolved oxygen (DO), pH, and conductivity, from the surface down to the metalimnion, are nearly the same at every test point in the lake.

Eutrophic. See trophic status.

Filter feeder. an animal that feeds by sieving or straining small food items from water.

Hypolimnion. The hypolimnion is the lower portion of the lake, from the metalimnion to the lake bottom. The temperature is constant and dissolved oxygen may be low or depleted.

Mesotrophic. See trophic status.

Metalimnion. The transitional layer in a thermally stratified lake between the upper warm epilimnion and the deep cold hypolimnion. Generally, temperature and dissolved oxygen decrease with depth. The thermocline is part of the metalimnion., where temperature declines at least 1 °C for every drop of 1 meter in depth.

Oligotrophic. See trophic status.

Photosynthesis. Photosynthesis involves the use of energy from sunlight, water and carbon dioxide to produce glucose and oxygen.

Phytoplankton. Microscopic algae or bacteria that live free floating in the water column.

Plankton. Organisms that live free-floating in the water column of a lake with little or no power of locomotion.

Respiration. Aerobic respiration breaks down organic molecules in the presence of oxygen to produce carbon dioxide and water.

Rotifers. Relatively small members of the zooplankton that can be filter feeders, but some are also predaceous.

Secchi Depth. Secchi depth is a measurement of water clarity using a Secchi disc. The Secchi disc was invented by Pietro Angelo Secchi (science advisor to the Pope in the late 1800s). It is usually an 8-inch (20 cm) flat round plate, with alternating black and white quadrants, and a rope at the center to lower it into the water, usually from the shady side of a boat. The Secchi depth is the water depth at which the disc is no longer visible.

Thermal stratification: This usually refers to late spring and summer-time conditions when water near the surface is warmed up by the sun, and the wind can only mix the "less-dense" epilimnetic water that extends from the surface of the lake down to the metalimnion. The deeper regions of the reservoir are not circulating because they are denser than the warmer overlying epilimnion.

Thermocline. The traditional definition of a thermocline is the range of depths, in stratified summer conditions, where the water has a 1°C decline in temperature within a 1 meter change of depth. Photosynthesis

Trophic Status. The trophic status usually refers to the level of algal nutrients, primarily nitrogen (N) and phosphorus (P), and organic production in an aquatic system. Lake water quality can be described by its trophic status:

Oligotrophic (low food availability) lakes are more often found in mountain areas or lakes with very little nutrient inputs. These lakes are clear and blue with low algal productivity, and with Secchi depth visibility > 8 m (25 ft). Since there is little algae, there is not much of a food chain and so fish need to be stocked in these lakes.

Mesotrophic (moderate food availability) lakes have sufficient algal productivity to support lake fisheries, and have Secchi depths 2-4 m (6-12 ft)

Eutrophic (high food availability) lakes have large external nutrient inputs, and are characterized by excessive algae (primarily cyanobacteria) and aquatic weed growth. Fisheries are not as good, as cyanobacteria are not edible and their decomposition can deplete bottom waters of dissolved oxygen. Secchi depths in eutrophic lakes range 1-2 m (3-6 ft) and less than 1 m (3 ft) in hypereutrophic lakes. These lakes often have noxious odors associated with the presence and decomposition of cyanobacteria blooms.

Turbidity. Cloudiness in water caused by particulate matter suspended in the water that decreases water clarity and can affect beneficial uses. Turbidity is either inorganic, such as clay particles, or organic, such as algal cells.

Warmwater Fishery. Warm-water fish streams and lakes support fish species such as smallmouth bass, largemouth bass, and other species with less stringent temperature requirements than trout. Warm-water streams and lakes can also contain stocked trout or salmon, but these fish may not survive year-round.

Water column. A conceptual column of water from the surface of a lake to the bottom sediment.

Watershed. An area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel.

Zooplankton. Tiny animals that have some motility, but are also carried passively in a body of water.

Some definitions modified from "Lakes A to Z Help Guide", Medora Corporation (www.medoraco.com)