

Limnology (lim·nol·o·gy)

Limnology is the scientific study of fresh water, especially lakes and ponds. It includes studying the physical, chemical and biological components of lakes, reservoirs, ponds, streams, rivers, wetlands, and estuaries.

WBIC = WaterBody Identification Codes

ug/l = micrograms per liter.

Impoundment = A body of water, such as a reservoir, made by impounding.

Trophic State Index

Scientists like to classify lakes and give names to the different lake types so they can be easily referred to. The root "trophy" means nutrients; therefore, lakes are classified based on the amount of available nutrients for organisms. The Trophic State Index ranges from 0-100.

Because it is difficult to count individual algae cells in lake water, these categories are most easily determined by measuring the chlorophyll content of the water. Chlorophyll is a plant pigment found in algae. Measuring chlorophyll indicates how much algae is present in the water, and so provides a clue as to the amount of nutrients present. Therefore, measuring chlorophyll lets us classify lakes according to their trophic status.

Trophic states are based on lake fertility. More fertile lakes have more nutrients and therefore more plants and algae. It is important to remember that lake trophic state is not necessarily interchangeable with water quality. Water quality is subjective and depends on how you intend to use the water body.

One drawback of defining trophic states as certain divisions in the trophic state index is that each lake is different. The trophic nature of a lake depends on many things including depth, area, watershed size, adjacent land use, and climate. A lake with a TSI of 49 falls on the borderline between mesotrophic and eutrophic, and there is some overlap. Trophic states should be considered a general definition of lake condition.

Chlorophyll

Chlorophyll is the pigment that makes plants and algae green. This pigment is what allows plants and algae to photosynthesize. In photosynthesis, plants use the sun's energy to convert carbon dioxide and water into oxygen and cellular material.

Chlorophyll is tested in lakes to determine how much algae is in the lake. Algae is important in lakes because it adds oxygen to the water as a by-product of photosynthesis. On the other hand, if there is too much algae in a lake it can produce a foul odor and be unpleasant for swimming. Chlorophyll concentration can tell you a lot about the lake's water quality and trophic state

Dissolved Oxygen

Dissolved Oxygen (DO) is the amount of oxygen dissolved in lake water. Oxygen is necessary for all living organisms to survive except for some bacteria. Living organisms breathe in oxygen that is dissolved in the water. The amount of oxygen lake water can hold is directly related to temperature. The colder the water, the more dissolved oxygen it can hold.

Secchi

Secchi Depth is a measure of water clarity that can indicate the overall health of a lake. A black and white metal disc is lowered into the water on a rope until it can't be seen anymore and raised to the point it can be seen. The depth of the disk to the surface of the water is the Secchi Depth.

Oligotrophic

"Oligo" means very little; therefore, oligotrophic means very little nutrients. Oligotrophic lakes have a Trophic State Index between 0 and 30. Oligotrophic lakes are very low in nutrients, so few algae grow and the water is very clear. Oligotrophic lakes are biologically less productive lakes (they have the lowest level of biological productivity), and support very few plants and fish. Oligotrophic lakes usually have deep clear water, rocky and sandy bottoms, and very little algae.

Mesotrophic

"Meso" means middle or mid; therefore, mesotrophic means a medium amount of nutrients. Mesotrophic lakes have a Trophic State Index between 30 and 50. Mesotrophic lakes usually have clear water with some algae blooms in late summer. Mesotrophic lakes are great fishing lakes and are home to many sport fish such as walleye, perch, smallmouth bass, muskellunge and northern pike. Mesotrophic lakes behave differently than oligotrophic lakes in that they stratify, meaning they separate into layers in the summer. The top layer of water becomes warm from the sun and contains algae. Since the by-product of photosynthesis is oxygen, oxygen concentration remains high at the surface of the lake. The bottom layer remains cooler and can become anoxic in mid-summer. This change occurs because as all the algae and other organisms die and are decomposed at the bottom of the lake, oxygen gets used up. Since this bottom layer of water does not mix with the top layer of water in the summer, oxygen cannot be replenished. The implications of anoxia are that no fish or other organisms can live where there is no oxygen; therefore, in late summer, fish move shallower where there is still oxygen available.

Eutrophic

"Eu" means true; therefore, eutrophic literally means true nutrients or truly nutrient rich. Eutrophic lakes have a Trophic State Index between 50 and 70. Eutrophic lakes are found where the soils are more fertile and where there is a lot of farmland. Eutrophic lakes are productive shallow lakes with murkier water and mucky, soft bottoms. They also have a lot of plants and algae

Hyperutrophic

Hyperutrophic lakes are very high in nutrients and their water is very clouded with algae. Hyperutrophic lakes have a Trophic State Index between 70 and 100. Hyperutrophic lakes are the most biologically productive lakes with noxious surface scums of algae, and support large amounts of plants, fish and other animals.