ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

6 Hazen Drive, Concord, New Hampshire 03301 · (603) 271-3503 · www.state.nh.us/des

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Lake Eutrophication

What is lake aging?

Lake aging is the natural process by which a lake fills in over geologic time with erosional materials carried in by the tributary streams, with materials deposited directly through the air, and with materials produced in the lake itself. From the time that a lake is created (by glacial action), the aging or filling in process begins. Although New Hampshire's lakes have the same chronological age, they age (i.e., fill in) at different rates because of differences in runoff and watershed characteristics. The natural succession is from lake to pond, pond to marsh, marsh to meadow, and meadow to dry land. Examples of each can be seen today including areas of dry land where past lake basins can still be identified.

What is eutrophication?

Eutrophication is the process of increased nutrient input to a lake over the natural supply. This increased lake fertilization usually results in an increase in the biological production that occurs in the lake. Although the increased production may increase the rate of lake filling, it is incorrect to define eutrophication as lake aging. A lake dies not when it reaches a high state of productivity, but when it no longer exists (i.e., is filled in). Lake filling results both from production that occurs in the lake, which may increase with eutrophication, and from organic and inorganic material deposited from outside the lake, which has no relationship with lake eutrophication.

What activities cause eutrophication?

Since eutrophication is increased nutrient input, any activity in the watershed of a lake that increases nutrient input causes eutrophication. Land use changes can result in significant changes in nutrient runoff. Studies in New Hampshire have shown that phosphorus export from agricultural lands is at least 5 times greater than from forested lands, and urban areas may be more than 10 times greater. Other activities that contribute to eutrophication are lawn and garden fertilizers, faulty septic systems, washing in or near the lake, erosion into the lake, dumping or burning leaves in or near a lake, and feeding ducks.

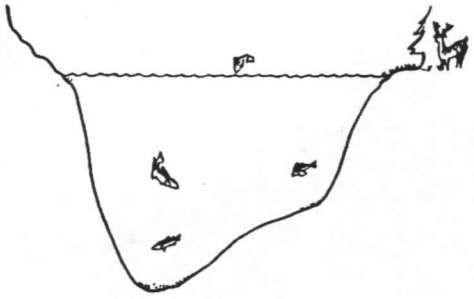
What is meant by trophic state?

The trophic state of a lake is a hybrid concept with no precise definition. Originally, trophic referred to nutrient status. Eutrophic water was water high in nutrients and, by extension, a eutrophic lake was a lake that contained eutrophic water. Later the concept of trophic state was applied to lakes rather than water, and its precise definition was lost. Now trophic state not only refers to the nutrient status of the water, but also to the biological production that occurs in the water and to the morphological characteristics of the lake basin itself. Now a eutrophic lake may not only be a lake with high levels of nutrients, but also a very shallow pond, full of rooted aquatic plants, that may or may not have high nutrient levels.

Lakes are divided into three trophic categories: oligotrophic, mesotrophic, and eutrophic. An oligotrophic lake is typically a large deep lake with crystal clear waters and a rocky or sandy shoreline. Both planktonic and rooted plant growth are sparse, and the lake can support a coldwater fishery. A eutrophic lake, on the other hand, is typically shallow with a soft, mucky bottom. Rooted plant growth is abundant along the shores and out into the lake, and algal blooms are not unusual. Water clarity is not good and the water often has a tea color. If deep enough to thermally stratify, the bottom waters are devoid of oxygen. Mesotrophic is an intermediate trophic state with characteristics between the other two.

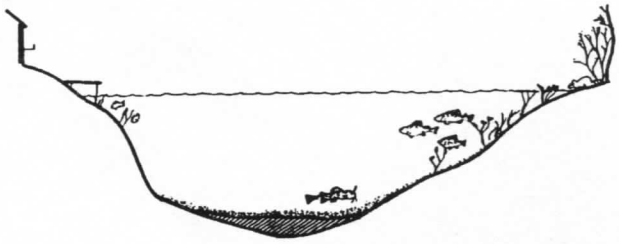
Oligotrophic

a. Steep Sided, Clear Water
b. Low Nutrient Enrichment
c. Little Planktonic Growth, Low Productivity
d. Few Aquatic Plants
e. Sand or Rock Along Most of Shoreline
f. Coldwater Fishery
g. High Dissolved Oxygen Content



Mesotrophic

a. Moderate Nutrient Enrichment
b. Moderate Planktonic Growth
c. Some Sediment Accumulation Over Most of Lake Bottom
d. Usually Supports Warmwater Fish Species



Eutrophic

a. High Nutrient Enrichment
b. Much Planktonic Growth (High Productivity)
c. Extensive Aquatic Plant Beds
d. Much Sediment Accumulation on Lake Bottom
e. Low Bottom Dissolved Oxygen
f. Only Warmwater Fish Species