Understanding Lakes

LAKE ZONES

A typical lake has distinct zones of biological communities linked to the physical structure of th (Figure 10). The littoral zone is the near shore area where sunlight penetrates all the way to th sediment and allows aquatic plants (macrophytes) to grow. Light levels of about 1% or less of s values usually define this depth. The 1% light level also defines the euphotic zone of the lake, w the layer from the surface down to the depth where light levels become too low for photosynthesizers. In most lakes, the sunlit euphotic zone occurs within the epilimnion.

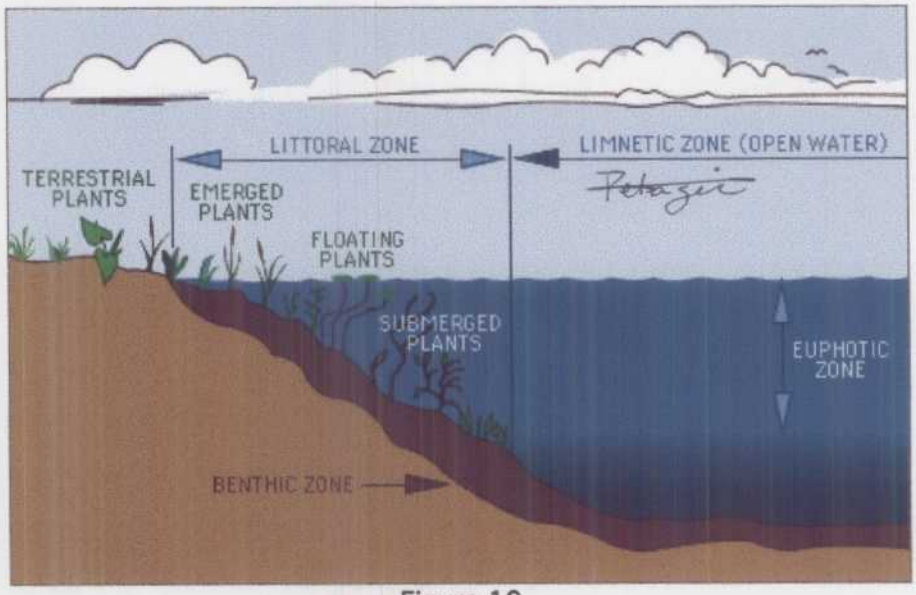

Figure 10

However, in unusually transparent lakes, photosynthesis may occur well below the thermocline i perennially cold hypolimnion. For example, in western Lake Superior near Duluth, MN, summertin photosynthesis and growth can persist to depths of at least 25 meters, while the mixed layer, c epilimnion, only extends down to about 10 meters. Ultra-oligotrophic Lake Tahoe, CA/NV, is so transparent that algal growth historically extended to over 100 meters, though its mixed layer extends to about 10 meters in summer. Unfortunately, inadequate management of the Lake Ta basin since about 1960 has led to a significant loss of transparency due to increased algal grow increased sediment inputs from stream and shoreline erosion.

The higher plants in the littoral zone, in addition to being a food source and a substrate for alga invertebrates, provide a habitat for fish and other organisms that is very different from the ope water environment.

The limnetic zone is the open water area where light does not generally penetrate all the way t bottom. The bottom sediment, known as the benthic zone, has a surface layer abundant with organisms. This upper layer of sediments may be mixed by the activity of the benthic organism live there, often to a depth of 2-5 cm (several inches) in rich organic sediments. Most of the organisms in the benthic zone are invertebrates, such as Dipteran insect larvae (midges, mosqu black flies, etc.) or small crustaceans. The productivity of this zone largely depends upon the o content of the sediment, the amount of physical structure, and in some cases upon the rate of predation. Sandy substrates contain relatively little organic matter (food) for organisms and po protection from predatory fish. Higher plant growth is typically sparse in sandy sediment, becau sand is unstable and nutrient deficient. A rocky bottom has a high diversity of potential habitat offering protection (refuge) from predators, substrate for attached algae (periphyton on rocks) pockets of organic "ooze" (food). A flat mucky bottom offers abundant food for benthic organi but is less protected and may have a lower diversity of structural habitats, unless it is colonize higher plants.

LAKE ORGANISMS

THOSE THAT GO WHERE THEY CHOOSE

FISH	AMPHIBIANS TURTLES	LARGER ZOOPLANKTON AND INSECTS

THOSE THAT GO WHERE THE WATER TAKES THEM

LIVING THINGS = PLANKTON	DEAD STUFF = DETRITUS
animals - zooplankton algae - phytoplankton bacteria - bacterioplankton	internal - produced within lake external - washed in from watershed

THOSE THAT LIVE ON THE LAKE BOTTOM

BENTHOS = ANIMALS	PLANTS higher plants -	BACTERIA & FUNGI

aquatic insects	macrophytes	sewage sludge
molluscs - clams, snails	attached algae - periphyton	aufwuchs - mixture of algae, fungi and bacteria
other invertebrates - worms, crayfish		

Figure 11

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