SEASONAL VERTICAL DISTRIBUTION OF PHYTOPLANKTON IN A SUBTROPICAL DYSTROPHIC LAKE

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Physical, chemical, and competitive processes can influence the vertical distribution of phytoplankton in freshwater lakes. While some phytoplankton control their buoyancy and motility with gas vesicles and flagella, others rely more heavily on the physical stratification of lake water to maintain their position in the photic zone. In DOC-rich waters, the photic zone may be limited to just a few meters, often above the thermocline where deep chlorophyll maxima typically occur. In these low-nutrient, high-OC environments, mixotrophs may be the dominant functional group. Mixotrophic algae, which combine heterotrophy and autotrophy, are able to sustain their metabolic functions under light, nutrient, or prey (bacteria, dissolved or particulate organic carbon) limitation, outcompeting strict auto and heterotrophs in stressful conditions. In subtropical dystrophic Lake Annie, mixotrophs may be serving as organizers of phytoplankton assemblages, including diatom distribution, spatially and temporally. The proposed study aims to determine the influence of changing DOC and bacteria concentrations on phytoplankton species diversity, richness, and mixotrophy across vertical depths and seasons. Patterns of seasonal vertical phytoplankton distribution will be used alongside physiochemical measurements and long-term data to elucidate the potential driving mechanism(s) of mixotrophy in this subtropical lake. Preliminary results suggest diversity is greatest in the hypolimnion during stratification, while an opposite trend is observed during lake turnover. Preliminary results also suggest that species richness and diversity are greatest with higher DOC concentrations, likely due to increased resource availability for mixotrophic species.