EVALUATING THE EFFECT OF A CHANGING CLIMATE ON THERMOCLINE DEPTH IN MAINE’S GREAT PONDS

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Declining wind strength has been observed over the last few decades in terrestrial habitats in North America, with the strongest trends observed in the midwestern and eastern United States. Additionally the yearly spring ice-out date, which strongly correlates with air temperature, has become increasingly earlier since the mid-19th century in New England. Both decreased wind strength and earlier ice-out dates influence the thermal structure of a lake by decreasing the intensity of a lake’s mixing resulting in a shallower mixed layer of the water column, and warming surface waters faster possibly causing earlier stratification. Additionally, wind is the main driver influencing the mixing depth of larger lakes with a surface area greater than 500 ha. Therefore, these observed changes may significantly alter the thermal structure and subsequently the ecology of lakes.

The objective of this study is to evaluate how thermocline depths have changed over time in large lakes in Maine, and how wind strength and earlier ice out dates correlate with these changes. To do this, we will examine the changing relative abundances of Discostella stelligera and Aulacoseira species due to the differences in their preferred lake environments. The Discostella species prefer shallower mixing while the Aulacoseira species prefer deeper mixing.

Sediment cores have been taken from three lakes across Maine: Sebago, Tunk, and Lobster. The cores have been sectioned into 0.5 cm increments to evaluate changes in diatom species over time. Preliminary findings show an increase in the number of Discostella stelligera and a decrease in the number of Aulacoseira subarctica for both Tunk Lake and Sebago Lake within the diatom assemblage. This could indicate a transition from deeper to shallower mixing over time, possibly due to the observed declines in wind speed and earlier ice-out dates in the region.