

Looking below the surface at Narragansett Bay phytoplankton community respiration rates

The study of the phytoplankton is the base of all ecosystem research because these primary producers provide the vast majority of energy and nutrients that are propagated through marine food web. The study site of Narragansett Bay is a valuable research area due to increasing anthropogenic nutrient input that is leading to changing phytoplankton dynamics. Traditional studies de-emphasize respiration rates and focus on limited depths, usually on only surface and bottom. This study seeks to fill in the gap of understanding in terms of net primary production by studying the mid-depths that have previously been ignored. The Winkler method was used to determine oxygen concentrations in water samples before and after a 6 hour incubation period and to thus estimate community respiration occurring. Integrated respiration was calculated using all mid-depths in 1 meter increments and was found to vary from the integrated respiration rates that would be estimated using the old model of water column respiration, which was traditionally limited to information of just two depths. Significant relationships were found between integrated respiration rates and temperature at the less river-influenced site, Mount View ($p=0.016$). The relationship between respiration and chlorophyll at mid-depths varied from the traditional assumption (based on surface data) that that chlorophyll and respiration are directly and positively correlated. The study also shows that dissolved oxygen decreases across the summer months in at the more river-influenced site, Bullock's Reach, and that respiration rates could be high enough to cause the problem of hypoxia in the estuary.

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