

Salinity, Nutrients, and Chlorophyll,
Vertical and Horizontal Profiles in Oyster
Pond

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Abstract

We are attempting to assess the water quality of Oyster Pond by following saltwater incursions, testing nutrient distributions, and finding patterns therein. The average salinity of the Pond is 2.4 ppt, only greatly changing in secluded coves where freshwater inputs are great and within 200 m of the culvert. We found a small increase in nitrate concentrations near TreeTops where there had been a higher population density through the summer. Because there is no relationship between N-load from groundwater and nutrients or chlorophyll in the water, we concluded that horizontal mixing has such a strong enough influence on the water that it masks the sources of the nutrients. When the actual concentrations of nutrients were compared with similar standard ranges (Smith *et al* 1999), Oyster Pond was determined to be mesotrophic. Almost all of the peripheral site N:P ratios were close to 5:1, much less than the Redfield ratio suggesting that these areas are nitrogen limited. Salt water was seen to sink to the southern basin as soon as it entered the Pond, pooling there where the salinity was consistently 14 ppt. Nitrate, ammonium and phosphate profiles all showed high concentrations in the lowest 2 m of the basins where decomposition and absorption would raise levels above the Pond mean. Chlorophyll levels are highest in the basins due to sinking plankton accumulating and slowly decomposing. Because of the effective horizontal mixing, any water sample with a salinity of 2.4 ppt would be representative of the entire Pond.

Introduction

Water quality in estuaries such as the Oyster Pond system depend to a large degree on the nutrients brought in from its watershed by flow from groundwater, and by tidal exchange (Emory 1997). To identify the parts of the watershed that contributed nutrients, we sampled near where water entered the periphery of the pond. To examine the effects of seawater incursions during high tide, we followed the salinity change during high tide and low tide conditions. Studies of nutrient and chlorophyll concentrations in Oyster Pond showed substantial variations over time (Burdick *et al* 2001) to determine the present water quality of the Pond, we measured concentrations of nutrients through the Pond, both horizontally and vertically.

The saltwater entering the system from the Sound is monitored and controlled by a weir system to maintain a constant salinity between 2 ppt and 5 ppt throughout the

