

From Paleoceanography to Policy: applying historical coastal pH baselines from long lived shells and skeletons to contemporary shellfish aquaculture

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My summer project consisted of two parts: (1) constructing chronologies of crustose coralline algae (CCA) for a Sea Grant Research project and (2) running the spectrophotometer and processing chlorophyll for a biological experiment at the Schiller Coastal Studies Center (SCSC). The first portion of my project involved using a temperature proxy, Mg/Ca, to determine annual growth increments on CCA samples collected in the 1960s and early 2000s from the Gulf of Maine. CCA can record seawater conditions, such as seawater pH and temperature, due to their calcification process which takes in surrounding seawater to calcify. Thus, a marine environment's conditions can be recorded in the CCA skeleton. This is important because CCA can be used to potentially understand how climate change is impacting the Gulf of Maine seawater pH. After constructing the chronologies I applied boron isotope data from the CCA skeleton, which is a proxy for seawater pH. With coastal ecosystems at risk of ocean acidification due to rising atmospheric carbon dioxide concentrations, it's necessary to understand past seawater pH conditions in order to better predict and understand how rising carbon dioxide concentrations could impact the ecosystem.

The second portion of my project involved running the spectrophotometer at the SCSC and processing chlorophyll samples. The spectrophotometer with meta-cresol purple dye is used to determine seawater pH. I collected seawater samples from tanks of varying conditions (temperature, nutrients and pH), and ran the samples on the spectrophotometer. This helped verify tank seawater pH conditions and will help determine variability in tank seawater pH over the duration of the experiment.

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