Examining the Impact of *Littorina littorea* on Microalgal Productivity in the Gulf of Maine
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The common periwinkle snail (Littorina littorea) was introduced to New England from Europe in the 1800s. Periwinkles are generalist grazers that eat all palatable algae, therefore modifying the number of algae in their environment. For example, periwinkles prefer green algae over red algae, which have different levels of chemical defenses, and it has been shown that the presence of the snails can alter the algal species composition. The composition of the algal community can have a significant impact on the surrounding ecosystem by acting as the base of the food web (primary producers) and providing habitat. I explored the impact of *L. littorea* on microalgal species (microscopic algae). We know little about how intertidal grazers impact this community and how microalgae in turn provide food and other functions for their ecosystem. It is critical to understand the interactions between *L. littorea*, an introduced species, and the surrounding algae. These interactions can help predict how the ecology of the Gulf of Maine might change due to warming oceans and shifting species distributions.

To look at how this introduced snail impacts microalgal productivity, our experiment was designed to manipulate snail densities at 15 sites from Massachusetts to New Brunswick. Snail densities were manipulated using copper-topped fences. Copper is toxic to snails and is able to keep the snails out (or in) a designated area. We built these fences using a PVC coated stainless steel lobster mesh for structure and a stainless steel mesh which had holes small enough to keep out *L. littorea*. At each of the sites, we deployed six different treatments: a control plot without a fence, a control plot with fences that allow for snail movement, and four fenced plots with natural or manipulated snail abundances (0, natural levels, and double natural levels, and 200 snails × meters^2). All plots are 90 × 90 cm (0.81 meters^2). Within each area, we also set up a way to quantify microalgal productivity. Tiles of natural stone (5 × 5 in) were affixed to the inside of each fence. The microalgae will be able to grow on these tiles and are able to be scrubbed off during each visit to the site and analyzed in the laboratory. There, the samples can be soaked in ethanol to extract chlorophyll a (the main photosynthetic pigment in plants and algae) and analyzed using a fluorometer.

Throughout the summer, we handmade all 75 cages, which included cutting the raw material. After ensuring they successfully eliminated snail movement, we began the deployment process in Maine and New Hampshire. We recorded the initial set of data at each location, including the macroalgal biomass and animal identification per plot. To determine natural abundance at each site, we counted all snail types in 12 meter squared plots along a transect at each location. The project will continue to run for the next two years with seasonal data collection. This future data will be compared to our initial recordings, leading to a better understanding of *L. littorea's* impact on the environment.

Image:

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