

Linking current and future oyster aquaculture practices to eelgrass meadow health in Casco Bay, Maine

Fiona Ralph Class of 2023

This summer I was awarded a Rusack Coastal Studies Fellowship to continue my research on the interactions between eelgrass and farmed oysters. I began this work in the Summer of 2021 and continued it as an Honors Project during the 2021-2022 academic year. The central focus of my research is making the oyster aquaculture industry more resilient to ocean change through a facilitative relationship with eelgrass. This relationship could serve to support oyster farmers in Maine while also promoting the restoration of eelgrass, which is a highly important ecosystem builder. My past work shows that the oysters grown in the presence of eelgrass had significantly greater condition indices (a way of quantifying energy allocated to tissue growth) than those grown without the presence of eelgrass. Additionally, I found that oysters grown close to the ocean floor grew significantly more than those grown close to the surface.

This summer, I set out to investigate different methods of oyster aquaculture employed in Maine to determine if there is a system of best practice for farming oysters in the presence of eelgrass. I designed a system which consisted of a tray anchored to the ocean floor, a bag suspended halfway through the water column, and a bag floating on the surface of the ocean. I set up the three levels to be rigged together into one system. I placed 30 juvenile oysters in each of 12 aquaculture grow-out bags. I placed two systems in an eelgrass meadow, and two in an adjacent mudflat, all in Ash Cove for 35 days. I then began the process of condition indexing, which involves taking measurements of shell dimension as well as shell and tissue wet and dry weights. I am currently in the process of data analysis. Initially the data are showing that increasing depth corresponds to increased shell length, tissue weight, and condition index. Ash Cove has many different physical characteristics from the sites used during summer 2021 and will help us weigh the importance of these characteristics in determining eelgrass and farmed oyster interactions.

I paired this experimental project with a survey that I designed with my advisor Katie DuBois that was disseminated to oyster farmers in Maine. The survey was ultimately sent to 44 oyster farms in Maine and was also included in a memo to aquaculturists in Maine. We received responses from 24 farmers in the state, which amounts to about 16% of the 150 independent farms in Maine. The questions in the survey ask oyster farmers about the way they choose to farm oysters and the experiences they have had with eelgrass, and their perspectives on how issues such as conservation, climate change, and microplastics will affect their businesses. For example, we saw that 55% of respondents believe they will have to change the way they farm due to climate change. I plan to create an informational document with the survey data which can be given to legislators and conservationists to give them more perspective into the opinions and experiences of oyster farmers, an important stakeholder in conservation in the state.

The two aspects of this project bridge my two interests, scientific research and the stakeholders affected by that research. I have gained many skills from programming to plumbing during my fellowships at Bowdoin and am so grateful to have had these opportunities.

Faculty Mentor: Katie DuBois

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