

Investigation of Facilitative Relationship Between *Zostera Marina* and *Crassostrea Virginica*
Fiona Ralph Class of 2023

This summer I was awarded a Henry L. and Grace Doherty Charitable Foundation Coastal Studies Research Fellowship. I spent the summer working at the Schiller Coastal Studies Center under the advisement of Justin Baumann, Katie DuBois, and Dave Carlon. Our group worked on a two-sided project that served to explore the interactions between *Zostera marina*, commonly known as Eelgrass, and *Crassostrea virginica*, the Eastern oyster. The goal of this ongoing project is to investigate the possibility of a mutually beneficial relationship between oysters and eelgrass in which the eelgrass can mitigate some of the effects of ocean acidification and global warming on oysters. Oysters and other shell-forming organisms need readily available stores of carbonate to grow and build their shells. Unfortunately, much of this carbonate combines with carbon dioxide, which can be found in increasing amounts in the ocean because of human industrialization, to form bicarbonate. As a photosynthesizing organism, eelgrass removes carbon dioxide from the water to perform its metabolic processes. Ideally, eelgrass meadows can be intentionally placed in the vicinity of oyster farms to remove excess carbon dioxide from the ocean and thus promote growth in oysters grown in aquaculture.

One half of the project was an outdoor mesocosm system that I constructed with my research partner. We spent the first two weeks of our fellowships designing and building the mesocosm. We learned basic plumbing and some carpentry, which was very useful and allowed us to be independent in the process of constructing the mesocosm. Our mesocosm system consisted of three conditions, oysters only, seagrass only, and oysters and seagrass together. These conditions were then exposed to one of four treatments. The conditions were set to mirror projected Gulf of Maine pH and temperature conditions in the year 2100. I spent most of my summer monitoring the conditions as well as correcting any issues as they arose.

The second half of the project was a field study. We partnered with Quahog Bay Conservancy, an oyster farm based in Harpswell, ME, to acquire expertise on oyster farming and Harpswell Sound. We constructed two types of apparatuses which we referred to as oyster arrays, one was designed to sit on the ocean floor and the other was meant to float just below the surface. We then adhered the oysters to the oyster arrays and deployed them into two sites in Harpswell Sound where they stayed for just under two months. I took weekly trips out to the field sites to check on the arrays and clean them while snorkeling. I became a boat operator and was able to drive Bowdoin's boats out into the sound to do this.

I have decided to engage in an Honors Project in the Biology Department to continue my work on this project. I plan on focusing my attention on the field portion of the project and how it directly relates to the oyster farming industry in Maine. I am in the process of communicating with local oyster farmers to discuss their experiences with eelgrass meadows that exist in areas adjacent to their farms. My summer research opportunity has allowed me to foster relationships with professionals in the field of ecology and climate change research, which is what I believe I will have a career in. I gained many practical skills this summer which will help me to be competitive in future hiring processes. I am very thankful to have had this opportunity and am very excited to see what my future holds.

Faculty Mentor: Justin Baumann

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