Role of Epifaunal communities on Zostera marina Growth in the Gulf of Maine

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Introduction

The foundational species eelgrass (*Zostera marina*) creates vast seagrass beds throughout the Northern hemisphere, providing many marine species an essential nursery and habitat. Due to various factors such as climate change and poor water conditions, globally, seagrass beds have been observed to be shrinking and disappearing (Valdez et al. 2020). One driving factor in seagrass decline is the potential algal overgrowth of epiphytic algae, which grow on the surface of eelgrass. High growths of epiphytic algae can create inadequate light levels for seagrass to grow, leading to the progressive decline of seagrass meadows (Heck & Valentine 2006, Valdez et al. 2020).

Small invertebrates that live in seagrass meadows graze on epiphytic algae, which may positively impact seagrass growth. Though studied in smaller mesocosms and some field experiments, the relationship between eelgrass and its microfaunal inhabitants is still wildly unknown and inconclusive (Reed & Hovel 2006, Murphy et al. 2021). We know that microfaunal species composition varies throughout the season, though the exact relationships and abundance of specific species are unknown at certain points in time. Therefore, this summer my advisor Dr. Katie DuBois and I investigated the seasonal variation of microfaunal found on eelgrass beds and see how it differs between northern and southern sites.

Methods

To survey the biological diversity of microfauna found in *Zostera marina* beds, we sampled previously established transect lines in 6 field sites in Maine ranging from Machias, Maine (44°41′ N) to Portland, Maine (43°40′ N). At each transect line, we measured the overall health of each seagrass bed by quantifying shoot density and canopy height. We then survived the community of each site by using a mesh bag to collect seagrass and with it any microfauna on or near the seagrass. Furthermore, we deployed temperature loggers at each site to record the variation in water temperature. I then identifed and counted the microorganisms in the lab..

Results

Over the course of the summer, I conducted three samplings at each of my 6 different sites. In terms of seagrass health, I was able to capture the summer growing period observing rapid growth of seagrass from June to August. Furthermore, we observed a catastrophic seagrass die off in southern eelgrass meadows, which we hypothesize to be caused by the heatwave this summer. In the community composition portion of my research, I conducted 180 samplings where I identified the organisms found on seagrass. We have observed that there is a geographic difference between the community composition of northern and southern eelgrass meadows. I will be continuing the research I conducted in this fellowship this semester during the Bowdoin Marine Science Semester. My advisor and I hope to correlate our community composition and eelgrass health data together to find if there are certain keystone grazers associated with healthy eelgrass meadows.

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References

1. Valdez et al. *Front. Mar. Sci.* 7, (2020). 2. Heck & Valentine *J. Exp. Mar. Biol. Ecol.* 330, 420–436 (2006). 3. Reed & Hovel *Mar. Ecol.-Prog. Ser.* 326, 133–143 (2006). 4. Murphy et al. *Estuaries Coasts* 44, 442–452 (2021).