ABSTRACT

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Multi-species ocean farming involves the co-cultivation of shellfish and seaweed species throughout the water column. Currently in the northeast U.S., multi-species ocean farms only deploy macroalgae during the winter and spring, with only shellfish cages present in these farms in summer and fall. Aquaculture has the potential to increase local biodiversity by providing habitats for motile organisms, settlement substrates for sessile organisms, refuge from predators, and food sources. However, quantitative data of aquaculture impacts on local biodiversity, including on zooplankton, which are a critical part of the ocean's food chain, are limited. This project examined the impact of multi-species ocean farming on mesozooplankton abundance and group diversity during summer and fall when macroalgae is absent in such farms, in Martha's Vineyard, MA. Two 5-minute plankton tows were conducted monthly from July to November 2021; one tow was conducted in the ocean farm (Site A) while the other was conducted through a site without aquaculture 120 m away (Site NA). To quantify mesozooplankton abundance and determine group diversity, subsampled individuals were identified and counted using an Olympus SZX16 stereomicroscope fitted with an Olympus DP22 camera. The Shannon Weiner Diversity Index was calculated for all monthly samples from both sites to quantify group diversity. Overall, Site A had a higher group diversity than Site NA, however, Site NA had higher overall mesozooplankton abundance. The most common species observed were adult copepods, copepod and barnacle nauplii, polychaete worms, and bivalve larvae. Mesozooplankton abundance at both sites also mirrored seasonal primary productivity. The results from this study have provided preliminary data for a larger transdisciplinary research project at SCSU, in collaboration with WHOI and Cottage City Oysters, which investigates the environmental impacts of multi-species ocean farming. These findings will prove useful to existing and aspiring ocean farmers, as well as the general public.