

Examining effects of sea level rise and marsh crabs on *Spartina patens* using mesocosms

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Coastal salt marshes provide essential ecosystem services but face increasing threats from habitat loss, eutrophication, changing precipitation patterns, and accelerating rates of sea level rise (SLR). Recent studies have suggested that herbivory and burrowing by native salt marsh crabs could further impact already degrading marsh conditions in southern New England, U.S. We conducted a greenhouse mesocosm experiment to examine the interactive effects of SLR and marsh crabs, *Uca pugnator* (sand fiddler crab) and *Sesarma reticulatum* (purple marsh crab) on the marsh plant *Spartina patens*. *Spartina patens* is a native salt marsh plant that resides in the high marsh, an area which is threatened by SLR and watershed development. In each mesocosm tank, we placed pots filled with local salt marsh soil and *S. patens* plugs at elevations representing the high and low marsh and filled tanks on semidiurnal tides with Narragansett Bay seawater. Each elevation consisted of three treatment pots: fiddler crabs, purple marsh crabs, and no crabs (control). Over the course of one summer we found significantly greater above- and belowground biomass at the high marsh elevation than the low marsh elevation. There were no differences in plant biomass between fiddler crab and control pots, indicating fiddler crabs may not pose a great threat of plant herbivory on southern New England, U.S. salt marshes. Pots with either fiddler or purple marsh crabs had significantly less macro- and filamentous algae, which in previous studies have been shown to contribute to dieback of marsh plants. This suggests that herbivory by the crabs may lessen the impacts to the marsh from algae. We also observed a nearly complete loss in above- and belowground plant material due to destruction from the purple marsh crab. Our results show similarities to recent studies demonstrating increased marsh degradation by the purple marsh crab linked to SLR and marsh loss.