Blue Carbon in Succotash Salt Marsh

Mentor(s)

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Location

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Abstract

Rhode Island salt marshes provide valuable ecosystem services but are threatened by climate and landuse change. To combat losses, state and federal agencies as well as non-profit organizations are using restoration to buy time for these important ecosystems. Succotash salt marsh in East Matunuck, RI is one such ecosystem that will undergo restoration efforts in the next ~2 years. Pre-restoration monitoring, especially of salt marsh sediment characteristics including accumulation rates are needed to inform restoration goals and decision making. Through analysis of sediment cores, the SURF undergraduate student will measure sediment and carbon accumulation rates, as well as identify potential stressors (such as sediment limitation) on salt marsh health. Their findings will be presented to state and federal partners.

Project Objectives

Succotash salt marsh, 182-acres located in the Village of East Matunuck, RI, is considered highly degraded and in danger of total loss due to rising sea levels. Restoration through sediment addition across the marsh surface is planned at Succotash in the next 1-2 years. Currently the salt marsh is being monitored by a number of state and federal agencies; however, additional data are needed. Specifically, Succotash salt marsh is currently being monitored for sediment accumulation rates using Sediment Elevation Tables (SETs); however, longer term accretion rates over the last century would provide insight into historic patterns of marsh growth and resilience to sea level rise. These rates of vertical salt marsh growth could help set a target for post-restoration accumulation rates. Further, identification of the primary contributor to elevation – the accumulation of mineral or organic matter – would improve understanding of past vulnerabilities to sea level rise (e.g., the degree of sediment limitation) and predictions for how the salt marsh will adjust with artificially added sediment during restoration. Three sediment cores (6.4-in diameter, ~0.3-m long) were collected in December 2024 by the PIs from Succotash salt marsh co-located with existing SETs. Two of these cores are within regions that will be restored and one is in a salt marsh that will serve as a control site. During summer 2025, the undergraduate student will section the cores at 1-cm increments and measure a number of sediment characteristics to determine rates of sediment and carbon accumulation and sources of sediment.

Salt marshes provide important ecosystem services, including flood protection for vulnerable coastal communities, habitat and nursery grounds for economically and culturally valuable fauna, and biogeochemical filtration of pollutants. Salt marshes are especially efficient sinks of carbon, thereby buffering climate change. Despite their economic and cultural value to Rhode Island, ~50% of the state's salt marshes have been lost over the last two centuries, and those that remain are threatened by rising sea level, encroaching invasives, and direct anthropogenic alteration. The proposed work would help support the ongoing pre-restoration monitoring efforts in Succotash salt marsh, thereby improving goal setting and decision making for restoration efforts.