Tidal Marsh Sediment Accretion; October 2024

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Ride the Wave: Sediment Accretion Keeps in Line with Sea Level Rise Modeling Predictions in San Francisco, California

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Hyperlink to your Github repository: https://github.com/Smillersfsu/Biol708.git

Marsh lands, crucial transitional ecosystems between estuaries and adjacent terrestrial areas, face significant threats from sea level rise and urbanization. In this modern era, these threats can intensify the exposure and intensity of effects of tidal action and salinity exposure on marshland ecosystems, which can have downhill affects to vegetative species composition that acts as the basis of each ecotone (Taylor-Burns et al. (2023)). In order to retain enough space for the marshes to experience a wide range of conditions in salinity and tidal action across the ecotones, there are questions that remain on how to accrete sediment to keep pace with expected sea level rise. While previous studies have used numerical models to forecast sediment accretion patterns and assess species diversity effects, few have employed field measurements (Ganju, Schoellhamer, and Bergamaschi (2005), Belliard et al. (2016)).

This study investigates sediment accretion rates in relation to vegetative species transects and elevation across multiple marshland ecosystems within the San Francisco Bay estuary. Our aim is to determine potential relationships among these factors, informing management decisions regarding applied sediment deposition in marshland ecosystems. We examine how sediment accretes through different ecotones and its impact on species diversity.

By focusing on the interplay between sediment accretion, vegetation, and elevation, this research addresses a critical knowledge gap in understanding marsh ecosystem dynamics under changing environmental conditions that have the potential to disturb the foundation of an important and increasingly rare ecosystem.

Belliard, J.-P., N. Di Marco, L. Carniello, and M. Toffolon. 2016. “Sediment and Vegetation Spatial Dynamics Facing Sea-Level Rise in Microtidal Salt Marshes: Insights from an Ecogeomorphic Model.” *Advances in Water Resources* 93 (July): 249–64. https://doi.org/10.1016/j.advwatres.2015.11.020.

Ganju, Neil K., David H. Schoellhamer, and Brian A. Bergamaschi. 2005. “Suspended Sediment Fluxes in a Tidal Wetland: Measurement, Controlling Factors, and Error Analysis.” *Estuaries* 28 (6): 812–22. https://doi.org/10.1007/BF02696011.

Taylor-Burns, Rae, Kees Nederhoff, Jessica R. Lacy, and Patrick L. Barnard. 2023. “The Influence of Vegetated Marshes on Wave Transformation in Sheltered Estuaries.” *Coastal Engineering* 184 (September): 104346. https://doi.org/10.1016/j.coastaleng.2023.104346.