

Title: Vulnerability of Northeastern U.S. salt marshes to climatic and anthropogenic stressors

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Abstract: In the Northeastern U.S., salt marsh area is in decline. Habitat change analysis has revealed fragmentation, displacement of high marsh by low marsh species, and ecological drowning, while development of adjacent uplands limits upslope migration. Using inundation experiments, field surveys, and LiDAR datasets, we developed an elevation-productivity relationship for *Spartina alterniflora* specific to the U.S. Northeast states of New York, Connecticut, Rhode Island, southern Massachusetts and located current salt marsh orthometric heights on this curve. We determined that 89% of salt marshes in these Northeastern states are located at elevations where growth is limited by inundation, suggesting links between current salt marsh loss patterns and sea level rise. By manipulating water column nutrients, precipitation, and elevation, we further found that altered precipitation receipt was associated with significant reductions in biomass, and that nutrient enrichment adversely impacts organic matter accumulation and peat formation. These results provide evidence that Northeastern U.S. marshes are vulnerable to the effects of accelerated sea level rise, and that neither precipitation changes, nor cultural eutrophication, will contribute positively to long-term salt marsh survival.