

## **Plant responses to increased inundation and salt exposure: Potential sea-level rise effects on tidal marsh productivity**

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Sea-level rise (SLR) may increase submergence and salinity exposure for tidal marsh plants. We tested the effects of these two potential stressors on seedling survival and growth in a transplant experiment in a macrotidal estuary in the Pacific Northwest. Plants of seven species were grown at mean higher high water (MHHW, a typical mid-marsh elevation), and at 25 and 50 cm below MHHW in oligohaline, mesohaline, and polyhaline marshes. Survival was high for most species, except when species typical of high marsh habitat were grown at lower elevations. Increased submergence reduced shoot and root growth in all species, including those typically found in the middle or lower marsh. For the more sensitive species, biomass declined by >50% with only a 25 cm drop in elevation at the oligohaline site. Shoot to root biomass ratios usually increased with greater tidal submergence. Plant growth was also strongly reduced at the most saline site relative to the mesohaline and oligohaline sites. By combining in situ water level and salinity measurements, we estimated a salt exposure index for each site by elevation treatment. Root and shoot biomass declined at higher values of this index for all species and the index was positively correlated with a shift to relatively more above-ground production in five of six species. Our results suggest that in addition to compositional changes in the wetland flora, SLR-associated changes will result in a reduction in total marsh productivity and a relative reduction in root biomass that may affect accretion potential.