

# Effects of Increased Freshwater Inflow on the Emergent Vegetation of a South Texas Hypersaline Salt Marsh

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## Abstract

The coastal marshlands of the Nueces Estuary, Texas depend upon periodic freshwater inflow to preserve ecological functions. Extensive watershed modifications, however, have dramatically decreased freshwater discharge into the upper estuary resulting in hypersaline and dry conditions. In an attempt to partially restore freshwater inflow, two overflow channels were excavated to re-connect the river to the marshlands. Freshwater-mediated changes in tidal creek and pore water salinity and emergent marsh vegetation were examined over a 5-year period at three stations in the upper Nueces Marsh. Decreased tidal creek and pore water salinity were significantly correlated with increased freshwater inundation at all stations ( $R^2 = 0.37$  to  $0.56$ ), although soil salinities remained hypersaline during the study. Vegetation analyses utilizing a Geographical Information System indicated the most considerable vegetation change following freshwater inundation was increased cover of the annual succulent *Salicornia bigelovii*. Seed germination and expansion of this species into previously bare areas were seen the spring following fall inflow events. Cover increased at two stations, but the increase was greatest at the station affected by both inflow and precipitation than solely precipitation in both spring 1999 (58.7% compared to 27.9%) and 2000 (48.6% compared to 1.9%). Temporary increases were noted in the perennial *Batis maritima* following rainfall, but declines were seen after prolonged inundation. The results suggest that freshwater inundation produces variable effects. While freshwater increases soil moisture and allows seed germination, prolonged periods of soil saturation can inhibit both plant growth and expansion of species adapted to hypersaline conditions.