

Fate of endangered species in San Francisco Bay tidal marshes with sea-level rise: applying results from a pilot study of the NCCWSC

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Summary: The San Francisco Bay estuary, though severely fragmented and modified, represents the largest extent of tidal marsh in the western United States. Projected sea-level rise of 0.3-1.5m poses further threat to several endemic tidal marsh species such as the salt marsh harvest mouse, California clapper rail, and California black rail that are listed as federally endangered or state threatened species. Resource and land managers charged with the protection of endangered species and their habitats are in need of site-specific predictions of anticipated climate change impacts through the synthesis of downscaled regional climate change models and available data on species' ecological constraints. Changing sediment loads, extreme tide and storm events, salinities, and sea level rise will affect tidal marshes by altering the plant community composition and structure that provide the critical habitat for these endemic species. The objectives of this interdisciplinary study are to: (1) develop high resolution elevation models of San Francisco Bay tidal salt marshes and predict effects of sea level rise; (2) determine and quantify the likely effect of sea level rise on vertebrate endemic species and their salt marsh habitats at local and regional landscape levels; (3) evaluate whether remnant marshes develop and grow at rates that will be sustainable through time or whether some will be "drowned"; and (4) downscale tidal cycles to assess site-specific inundation patterns in estuary tidal marshes.

This interdisciplinary research includes individuals and research groups from government and academic institutions. Our collaborators and partners include Dr. John Calloway at the University of California San Francisco and Dr. Deborah Elliott-Fisk at the University of California Davis. In addition we are partnering with the California fish & game and the U.S. Fish & Wildlife Service.



San Pablo Bay National Wildlife Refuge elevation model developed using Real Time Kinetics Global Positioning System (RTK GPS, cm accuracy) ground points. Elevation Ranges from 4.8m to 1.2m.



A technician using a RTK GPS to collect elevation points in the salt marshes of San Francisco Bay.



California black rail (*Laterallus jamaicensis corturniculus*) is a California state threatened bird that lives in the salt marsh estuary of San Francisco Bay.