

The environmental drivers of habitat use by Silicon Valley's estuarine fishes

Wetlands provide numerous important ecological functions, yet are also the most impacted habitats in California with 90% being drained, dredged, or developed over the past century. For this reason, major marsh restoration projects throughout San Francisco Bay, California have been the central focus of habitat and species conservation plans; however, many of these projects lack data on baselines for, and restoration impacts to, associated native and non-native fish communities. We conducted a 7-year study of fish abundance and community structure in the Alviso Marsh Complex in South San Francisco Bay, near Silicon Valley. We sampled fishes using a standard otter trawl and modeled abundances as functions of trawl-specific environmental conditions (dissolved oxygen, salinity, and temperature) using negative binomial Generalized Additive Mixed-effects Models (GAMMs). Over 50 resident and transient fishes used these habitats throughout the survey period, including: marsh residents (e.g., sticklebacks, mudsuckers); forage species (e.g., silversides, anchovies, herring, and shad); predators (sharks, rays, bass, and halibut); and a severely threatened osmerid (Longfin Smelt). The fish community showed remarkable diversity in responses to environmental conditions, corresponding with both temporal and spatial variation in habitat use. Habitat use by estuarine species remains a focal metric for assessing human impacts (e.g., eutrophication, pollution, fishing, marsh restoration); therefore, our results provide valuable information with direct relevance to ongoing management efforts and policy decisions for Silicon Valley's impacted marshlands.