

Evidence of a shift in the littoral fish community of the Sacramento-San Joaquin Delta

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Abstract:

Various estuarine and freshwater ecosystems worldwide have undergone substantial changes due to multiple stressors that are often anthropogenic in origin. Over the past two decades, the Sacramento-San Joaquin Delta (Delta) in California, USA, saw a severe decline in pelagic fishes, a shift in zooplankton species composition, and a rapid expansion of invasive aquatic vegetation. To evaluate whether major changes have also occurred in the littoral fish assemblage, we analyzed a beach seine survey dataset collected from 1995 to 2015 from 26 sites within the Delta. We examined changes in the littoral fish assemblage at three different ecological levels (species, community, and biomass), using clustering analysis, trend tests, and change-point analyses. We found that the annual catch for many introduced species and some native species have increased since 1995, while only a few seemed to have experienced a decline. As noted in previous studies, the amount of freshwater inflow to the Delta at a given year explains a substantial amount of the interannual variation in fish community composition over the study period. However, we observed a strong and consistent pattern of steady change over time in annual species community composition, defined primarily by a constant increase in non-native Centrarchid fish species. Lastly, we found that littoral fish biomass has essentially doubled over the 21-year study period, with Mississippi Silverside *Menidia audens* and fishes in the Centrarchidae family driving most of this increase. These shifts in the catch, community composition, and biomass indicate that a shift has occurred in the Delta littoral fish community, and that the factors causing the decline in the pelagic food web may have been beneficial to the littoral community productivity.