

Active Revegetation to Benefit California Ridgway's Rail (*Rallus o. obsoletus*) in San Francisco Bay's Tidal Marshes - Is It Habitat Yet?

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The California Coastal Conservancy and U.S. Fish and Wildlife Service's San Francisco Estuary Invasive *Spartina* Project (ISP) has implemented four years of a five year program to rapidly enhance habitat for California Ridgway's rail (*Rallus o. obsoletus*) in areas affected by the invasion and subsequent removal of non-native *Spartina*. After successful removal of non-native *Spartina*, natural recruitment of some native species has been very successful (e.g., perennial pickleweed, *Salicornia pacifica*). Our program has focused on planting two key components of rail habitat still missing at some sites, marsh gumplant (*Grindelia stricta*) and the native Pacific cordgrass (*Spartina foliosa*). ISP and partners designed and installed plantings that aim to rapidly establish dense, strategically-located patches of vegetation that will benefit nesting, foraging and roosting rails as well as provide high tide refuge.

During the first four years of our program, over 300,000 plants have been installed at over 40 sites by ISP and partners. Overall first-year survivorship for marsh gumplant planted during the first three years of the program was 31% (Year 1), 54% (Year 2), and 33% (Year 3). First-year survivorship for cordgrass was 40% (Year 1), 36% (Year 2), and 31% (Year 3). Marsh gumplant flowering, seed production, and the presence of new seedlings has been recorded at all sites indicating that the plantings are self-sustaining. For marsh gumplant planted in Year 1 of the program, we also measured plant volume, an indicator of the amount of critical taller cover available to rails. Planted cordgrass patches are rapidly expanding laterally, where prior to our planting efforts, cordgrass was absent. In addition, we have recorded the presence of Pacific cordgrass seedling recruits in the vicinity of our plantings indicating successful seed production. Despite the ongoing drought, active revegetation has been successful in establishing critical cover for rails at restoration sites.

Keywords: Active revegetation, tidal marsh, marsh gumplant, Pacific cordgrass, Ridgway's Rail

Poster Topic: Restoration Enhancement work by the Invasive Spartina Project

Creating High-Tide Refuge Islands for the California Ridgway's Rail

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Recovery of the endangered California Ridgway's rail (*Rallus obsoletus obsoletus*) is threatened in part by a lack of high-tide refuge habitat in San Francisco Estuary marshes. To decrease predation on Ridgway's rail, the California Coastal Conservancy has constructed 43 "high-tide refuge islands" in 11 tidal marshes in the San Francisco Estuary. These islands were designed to mimic natural slough channel levees dominated by gumplant (*Grindelia stricta*). Island locations expected to have the greatest positive effect on Ridgway's rail survival were selected. Islands were constructed during the winters of 2012 (6 islands), 2013 (16 islands), and 2014 (21 islands). They were built primarily using pickleweed sod (*Salicornia pacifica*) harvested from a nearby slough channel edge and excavated sediment. In one marsh, imported clean terrestrial soil was used. Island tops were constructed to elevations of 1.0 foot above mean higher high water (MHHW) in 2012, 1.3 feet above MHHW in 2013, and 1.8 feet above MHHW in 2014. All islands were then covered with the pickleweed sod and planted with gumplant and saltgrass (*Distichlis spicata*). Topography and vegetation were monitored in May 2013 and September/October 2014. Gumplant survival in both monitoring years was positively correlated with the elevation of island tops above MHHW ($R^2 = 0.78$, $R^2 = 0.68$, respectively). Gumplant was most robust on the islands constructed using terrestrial soil; therefore, in 2014, terrestrial soil was added into gumplant planting wells on 13 of the 21 islands constructed. Pickleweed currently provides 70–100% cover on all the islands, and gumplant cover continues to develop. Additional monitoring is scheduled for September 2015. Information obtained from the monitoring results will be incorporated into the design of 19 additional islands that will be constructed in winter 2015.

Keywords: California Ridgway's rail, refuge, island, gumplant, elevation

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