

Tidal Marsh Restoration Program in Support of California Clapper Rail in the San Francisco Estuary

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San Francisco Estuary Invasive Spartina Project – a project of the State Coastal Conservancy



Goals

- Rapidly establish habitat features to benefit California clapper rail at strategic locations where recent eradication of non-native *Spartina* has caused decreases in local populations
- Reintroduce *Spartina foliosa* where locally extirpated or radically reduced by spread of invasive *Spartina*

Objectives

- **Primary objective: Implement rapid intensive revegetation with *Grindelia stricta*, *S. foliosa* and other native vegetation**
- Deploy artificial floating islands (USGS)
- Evaluate opportunities for construction of habitat features at appropriate elevations to provide high tide refugia at or near *Spartina* eradication sites (H.T. Harvey)
- Coordinate or assist predator control actions
- Coordinate all of the above efforts with the continuing bay-wide eradication of hybrid *Spartina*

Background

In 2011, the California Coastal Conservancy's Invasive *Spartina* Project (ISP) established a 5-year program to meet the above objectives.

A novel approach of this programs is to intensively plant native marsh vegetation, primarily marsh gumplant (*G. stricta*) and Pacific cordgrass (*S. foliosa*), in strategic locations at or near invasive *Spartina* eradication sites, with the goal of rapidly enhancing cover, nesting, and high tide refuge habitat features for the rails.

While restoration practitioners have previously had success with planting *G. stricta*, there has been little success with *S. foliosa* in the San Francisco Estuary, and new methods had to be tested and developed.

Over the course of 2 planting seasons, the California Coastal Conservancy's ISP Revegetation Program and partners (Save The Bay and Friends of Corte Madera Creek) have installed over 165,000 native tidal marsh plants (counting *S. foliosa* as stems). The Program is preparing to install another 90,000 plants in 2013-2014 totaling ~255,000 plants in the Program's first three planting seasons.

Site Selection

- The majority of revegetation sites were selected because there were existing clapper rail populations that would benefit in the near term from habitat enhancement.
- Other sites were selected based on restoration work already underway by project partners or the opportunity to develop field-based propagation techniques and establish propagule sources for adjacent tidal areas.
- In addition, at some sites high tide refuge islands are being constructed and densely planted with *G. stricta*, perennial pickleweed (*Salicornia pacifica*), and saltgrass (*Distichlis spicata*).

2011-2012-2013

Bay-wide Restoration Sites



2011-2012
62,000 plants installed
(*S. foliosa* counted as stems)



2012-2013
103,000 plants



2013-2014
90,000 plants

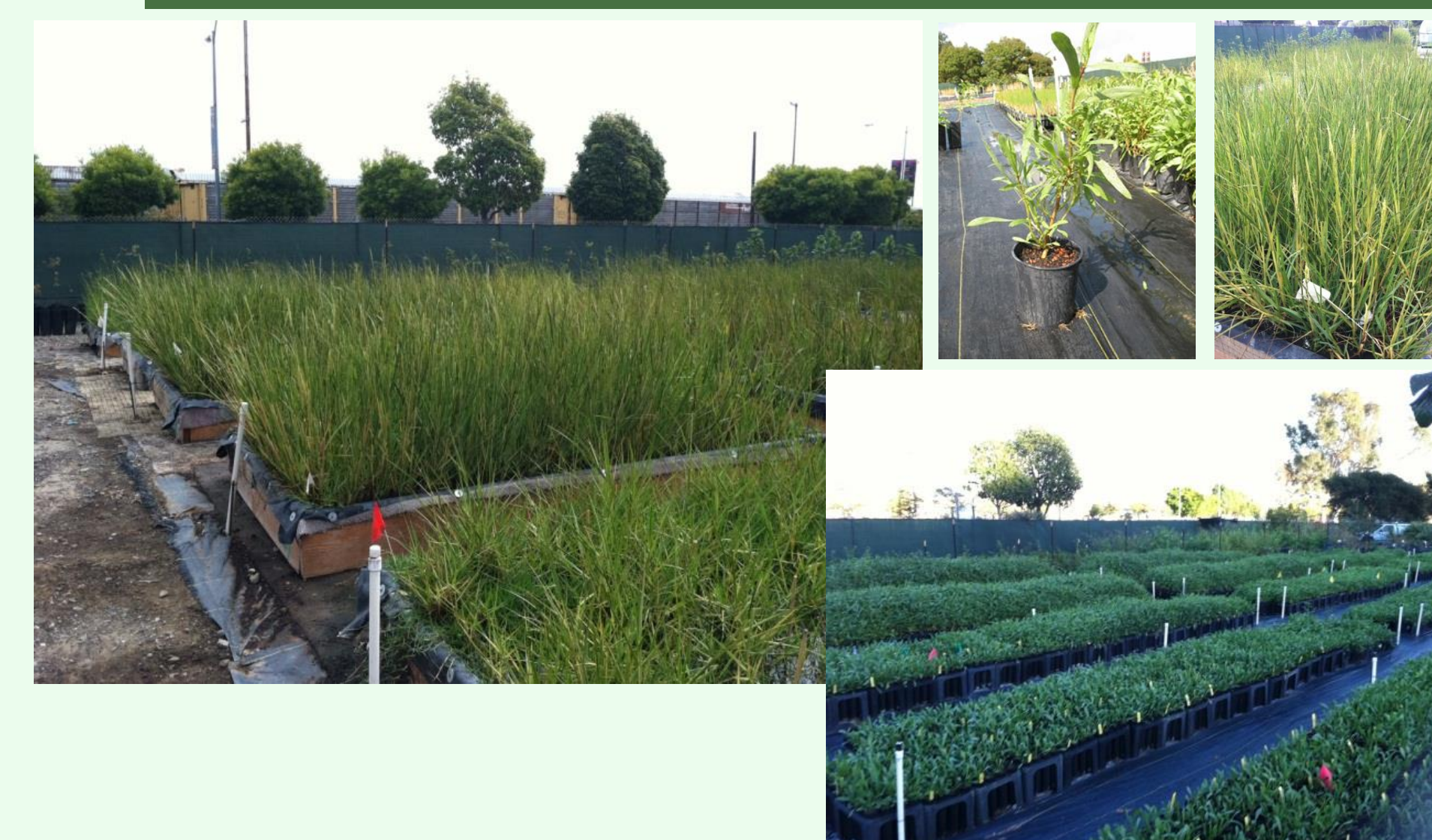
2011-2014
~ 225,000 plants

Note: Above totals for 2011-2013 include plants installed by partners Save The Bay and Friends of Corte Madera Creek funded by SCC.

Propagation

The Watershed Nursery

- *S. foliosa*: 8 sources, 33 beds
- *G. stricta*: 5 seed sources, 3 pots sizes
- *D. spicata*: 2 beds



High Tide Refuge Islands

(H.T. Harvey and Associates)



High tide refuge island paired with a floating island at Cooley Landing



G. stricta high tide refuge island plantings at MLK/New Marsh

Zones for Planting

The revegetation program targets planting *G. stricta* on the marsh plain and around the perimeter of islands and berms and *S. foliosa* along marsh interior channels and on the mud-flat transition zone.

- Low marsh: 2 to 10-meter wide *S. foliosa* fringe (varying length) along shoreline or wide channels for foraging/cover
- Channels: 2-meter wide *S. foliosa* zone (varying length) along channels (lower elevation) for foraging/cover
- Channels: 1 meter wide *G. stricta* "patches" (4m in length) along channel banks at higher elevation for nesting
- High marsh zone (berm/islands): 1-2 meter wide *G. stricta* "patches" (4m in length) at base of levees and island features for high tide refugia
- Marsh-upland transition zone: 1-3 meter wide "patches" to provide high tide refugia



G. stricta marsh plain channel plantings at Cogswell Marsh



Island berm G. stricta plantings at Mt. Eden Creek. G. stricta caged.



Upland transition zone plantings at Whales Tail-Cargill Mitigation Marsh Levee. G. stricta caged.



Basic 5-plug *S. foliosa* patch



Vexar caged *S. foliosa* plantings at Eden Landing Ecological Preserve's Whales Tail South



Rope caged *S. foliosa* plantings at Eden Landing Ecological Preserve's North Creek Marsh



Rope caged *S. foliosa* plantings at Alameda Flood Control Channel

Initial Survivorship

2011-2012 survivorship for varied across all sites, species, planting design and treatments (e.g., pot size, planting design, caging method). The target survivorship goal is 40%. (One year post planting survival reported.)

- *G. stricta* marsh plain survivorship was **35%**. Several sites had survivorship > **50%**.
- *S. foliosa* channel and mudflat transition zone survivorship > **40%**. As high as **94%**.
- Upland transition zone survivorship was **14-46%**

2012-2013 high tide refuge islands *G. stricta* survival after 5 months was **33-98%**

Future planting designs and treatments continue to be adapted to meet target survivorship goals.



S. foliosa patch at Alameda Flood Control Channel



G. stricta at Oro Loma and Alameda Flood Control Channel



Upland transition zone plantings at Bair Island