



The San Francisco Estuary Invasive Spartina Project (ISP): Restoring tidal marsh and mudflat habitats in response to invasion



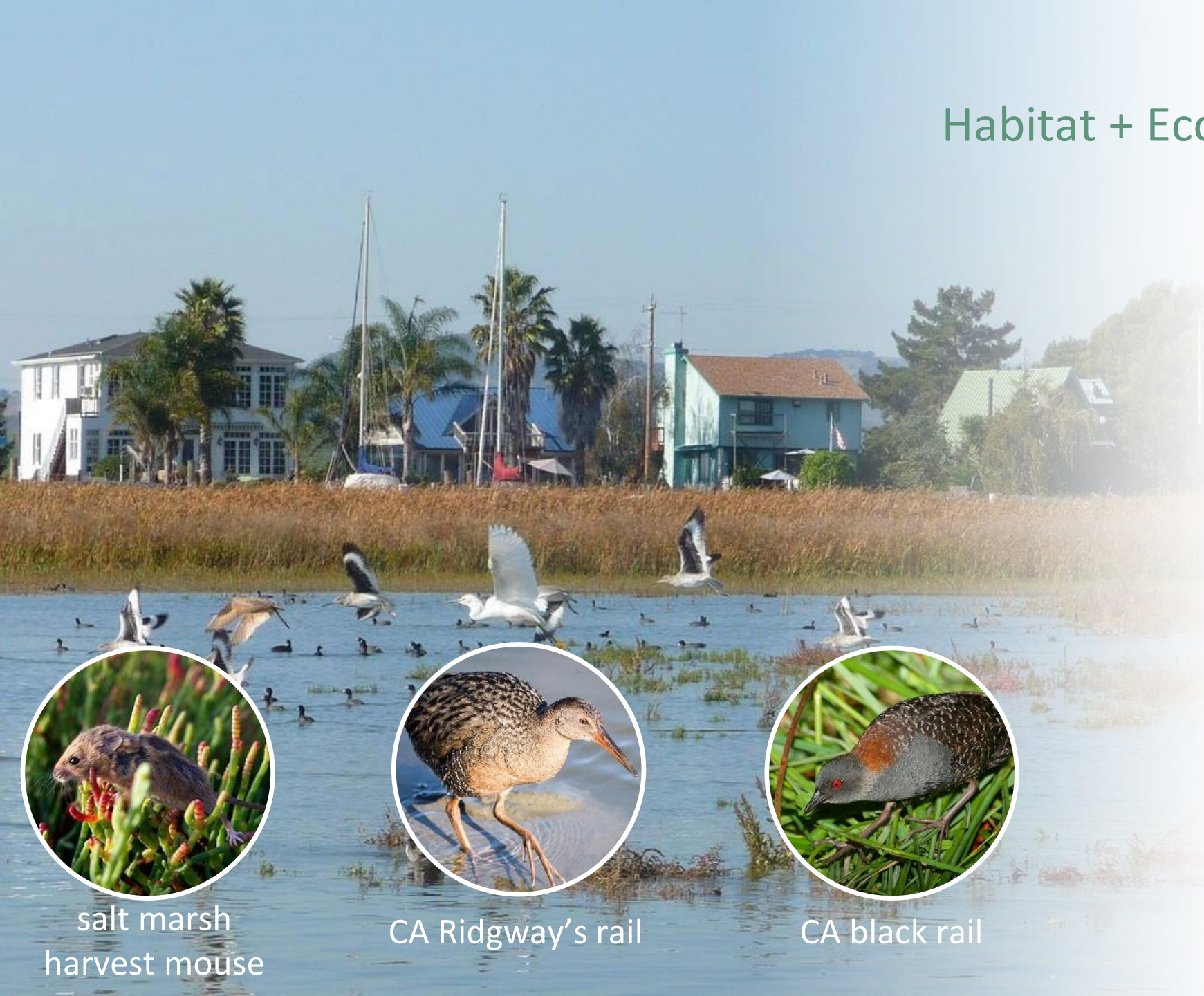
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Brian Ort
Olofson Environmental Inc.



October 20, 2022
California Native Plant Society
2022 Conference

Habitat + Ecosystem Services

- Protect urban areas from flooding & storm surge
- Reduce erosion
- Filter pollutants from water
- Sequester carbon
- Open space for recreation



salt marsh
harvest mouse



CA Ridgway's rail



CA black rail



Suaeda californica
(1B.1)



Chloropyron molle
ssp. *molle*
(1B.2)

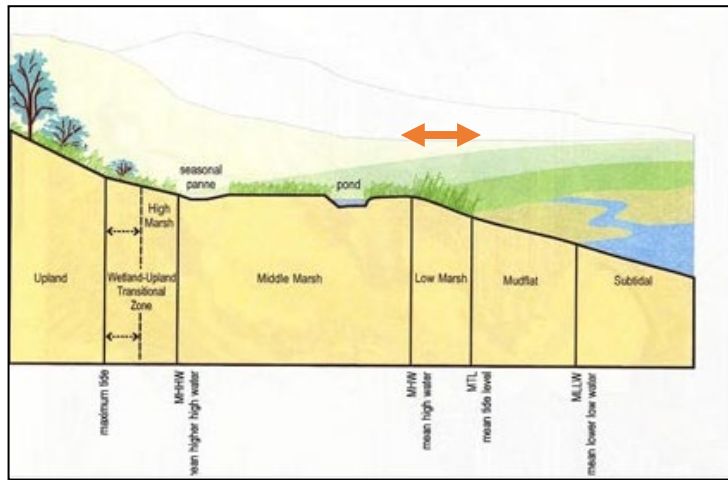


Threats to Tidal Wetlands

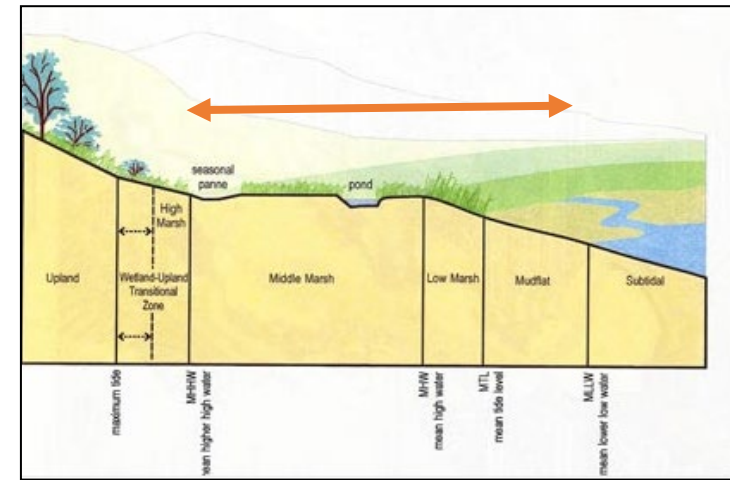
- 85% of SF Estuary marshland lost since 1800
 - Diked and filled for development
 - Agriculture, residential & commercial
 - Leveed for commercial salt production
- Ongoing threats to SF Bay tidal wetlands include:
 - Sea-level rise (drowning)
 - Other effects of changing climate

East coast smooth cordgrass,
Spartina alterniflora,
introduced in the 1970's

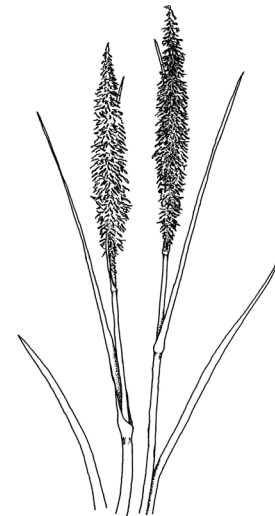




East Coast *Spartina alterniflora*
 hybridized with
 native Pacific cordgrass,
Spartina foliosa



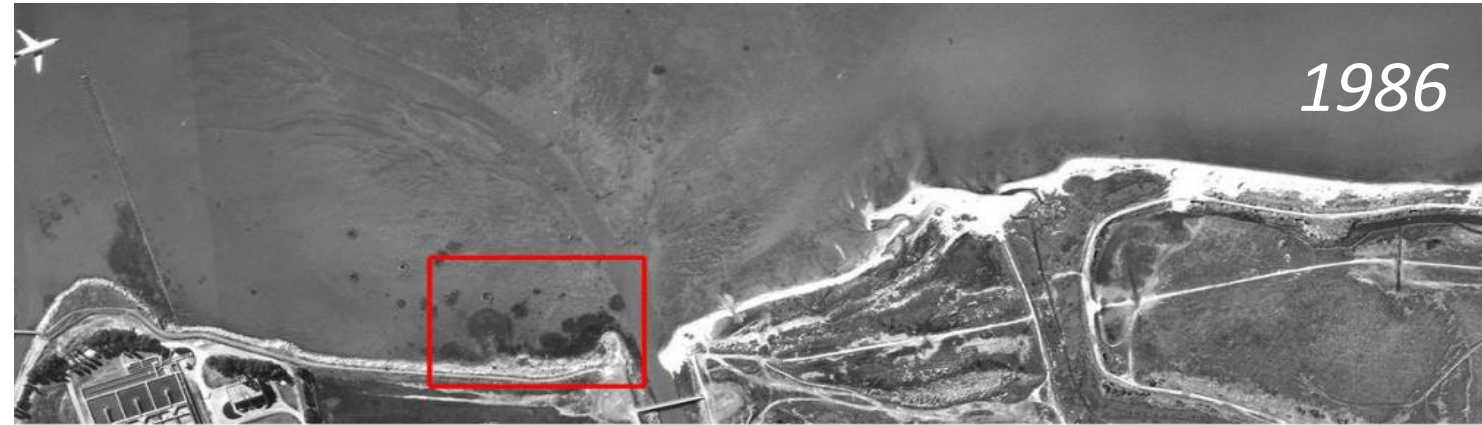
Spartina foliosa



Hybrid *Spartina* (*alterniflora* x *foliosa*)

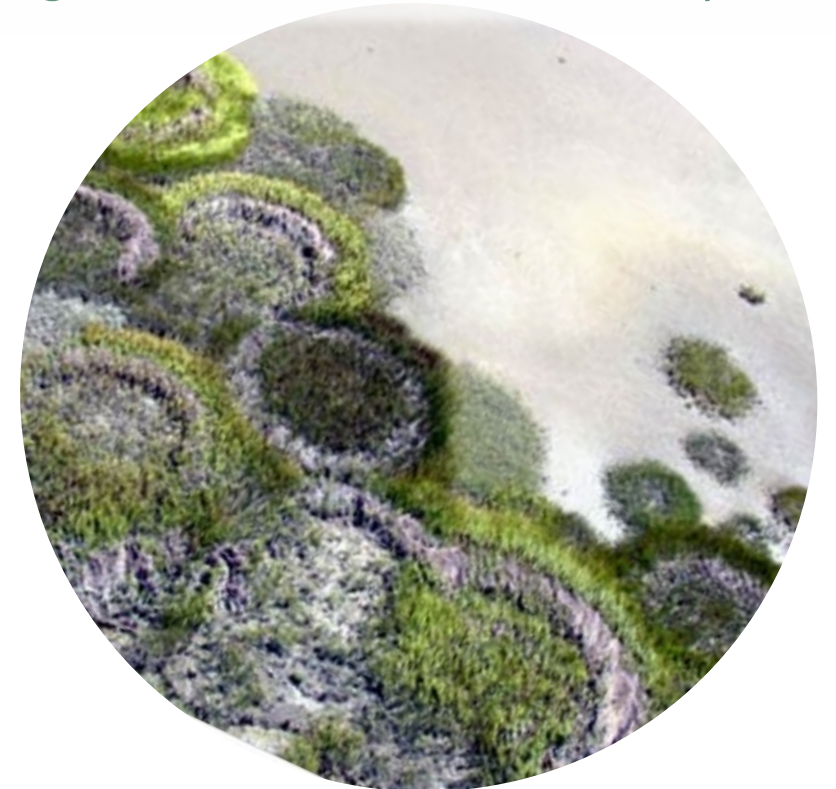
Why is hybrid *Spartina* a problem?

Mudflat converted to hybrid *Spartina* meadow in <20 years
by sediment accretion after hybrid *Spartina* colonization



Ecosystem Engineer

- Dominates mudflats, impacting shorebirds
- Changes invertebrate community
- Degrades native tidal marsh ecosystem



Why is hybrid *Spartina* a problem?

- Reduces flood control capacity
- Creates mosquito breeding areas
- **Causes failure of native tidal marsh restorations**



SF Estuary Invasive *Spartina* Project

Regionally coordinated,
Estuary-wide *Spartina*
control efforts

Co-directed by:



Began full-scale
implementation in 2005

Annual Baywide surveys
to map and treat



The Invasive *Spartina* Project: Programs

- **Inventory:** OEI biologists traverse tidal marshes & map invasive *Spartina*
- **Treatment:** OEI biologists lead treatment crews back to treat mapped invasive *Spartina*
- **Restoration:** Habitat enhancements to benefit Ridgway's rail & other tidal wetland species
- **Ridgway's rail monitoring:** Breeding season call-count surveys that inform other programs



Rallus obsoletus obsoletus
US & CA endangered

Inventory Monitoring

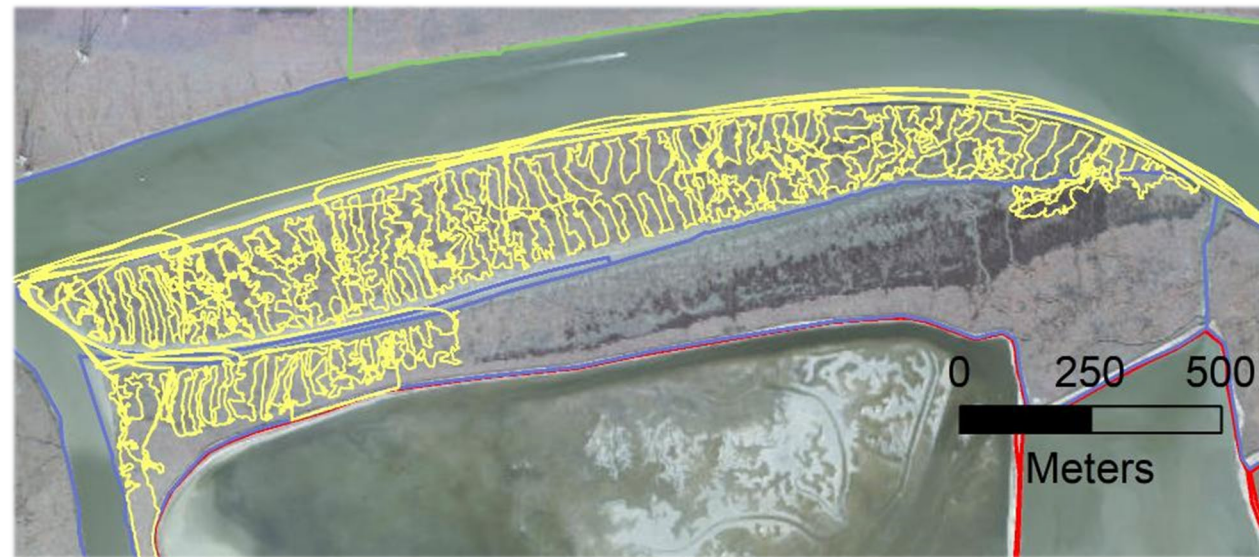
OEI biologists inventory up to 70,000 acres of San Francisco Bay marsh & shoreline
June – November each year to inform invasive *Spartina* treatment



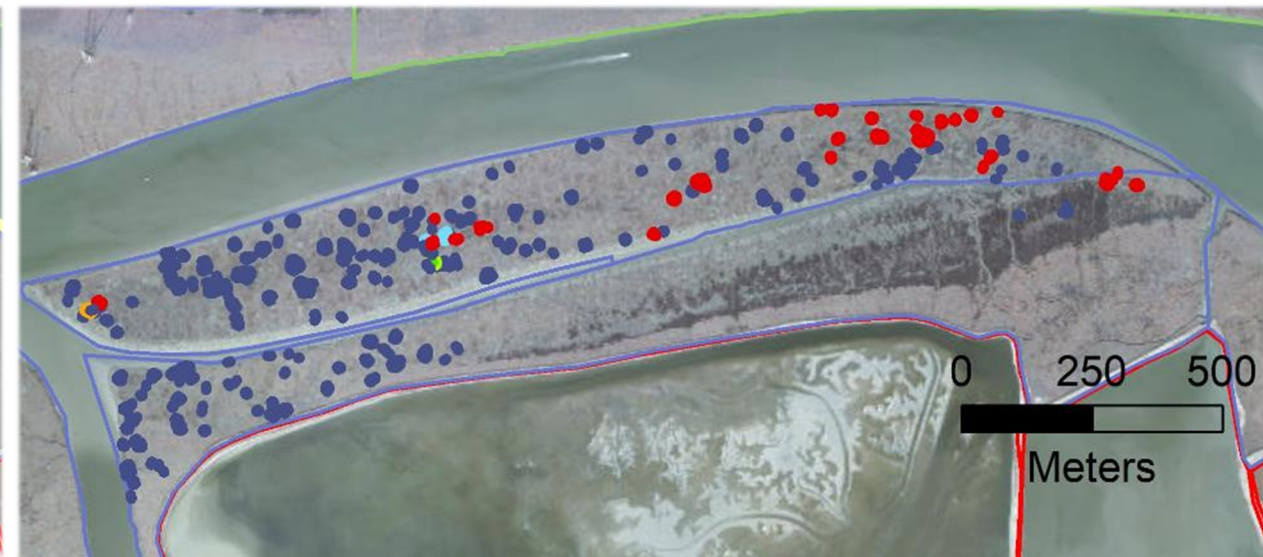
Inventory Monitoring

Ogilvie "Island" in Coyote Creek

12 Biologists Inventory 8/26/2022



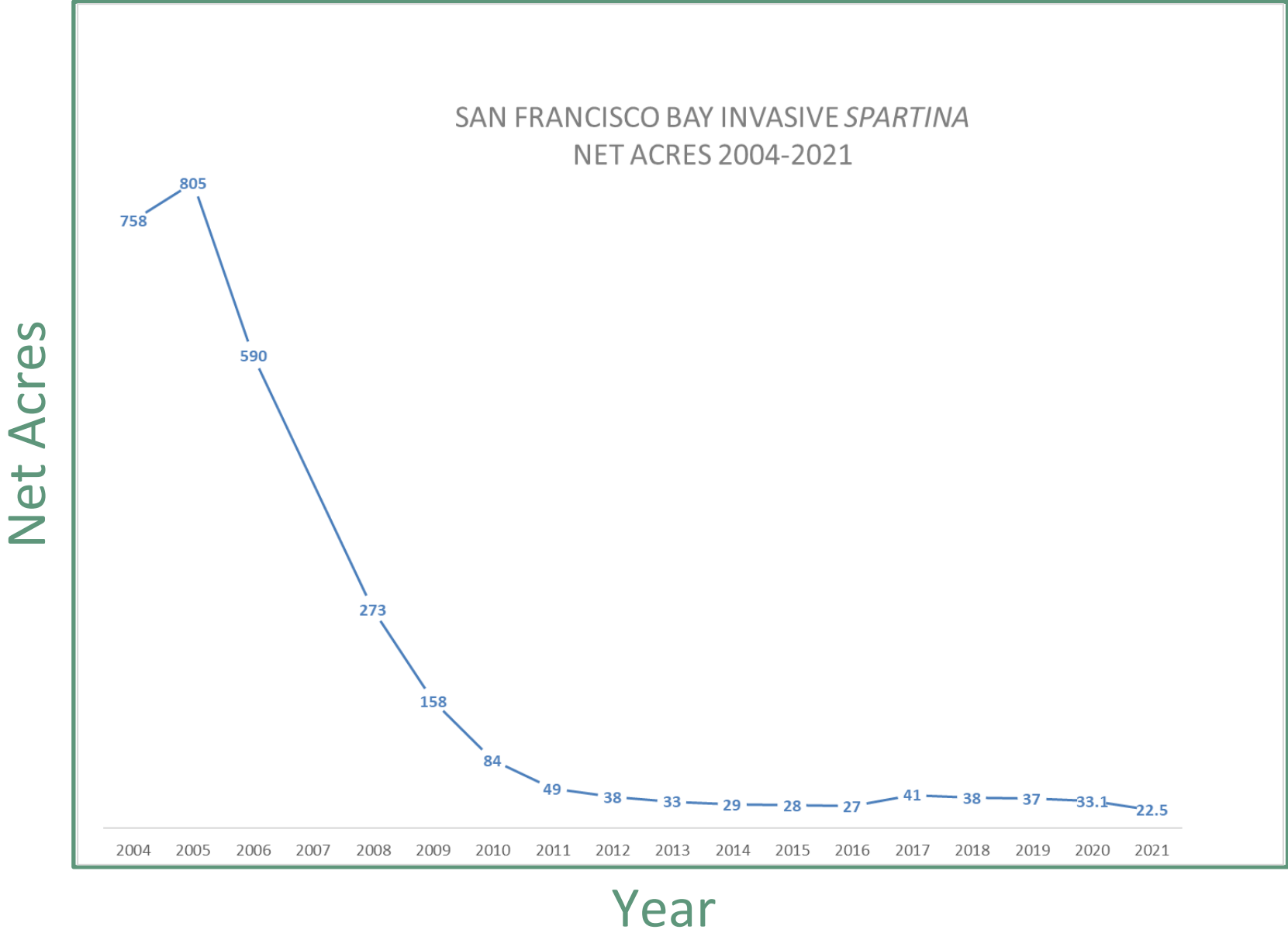
After Round 1 Treatment 9/15/2022



- Plan access for species/habitat protection:
 - Foot, boat, airboat, truck

- Tools in inventory & treatment toolbox:
 - Digging, tarping, herbicide
 - Genetic sampling to inform identification

Hybrid Spartina reduced by 97% Estuary-wide (2021)



- 805 net acres in 2005 down to 22.5 acres in 2021
- 97% reduction
- Critical to complete eradication to support regional native tidal marsh restoration

2021 Invasive *Spartina* Status

- 155 of 221 ISP sub-areas with historical infestations now contain less than 10 m² of invasive *Spartina*
- 195 m² net cover remaining
- These sites encompass tens of thousands of acres of marsh and mudflat

Spartina Status (net m ²)	# Sites	Collective Spartina (net m ²)
Zero Detect	54	0
0 - 1 m ²	53	14
1 - 10 m ²	48	181
TOTAL < 10 m²	155	195

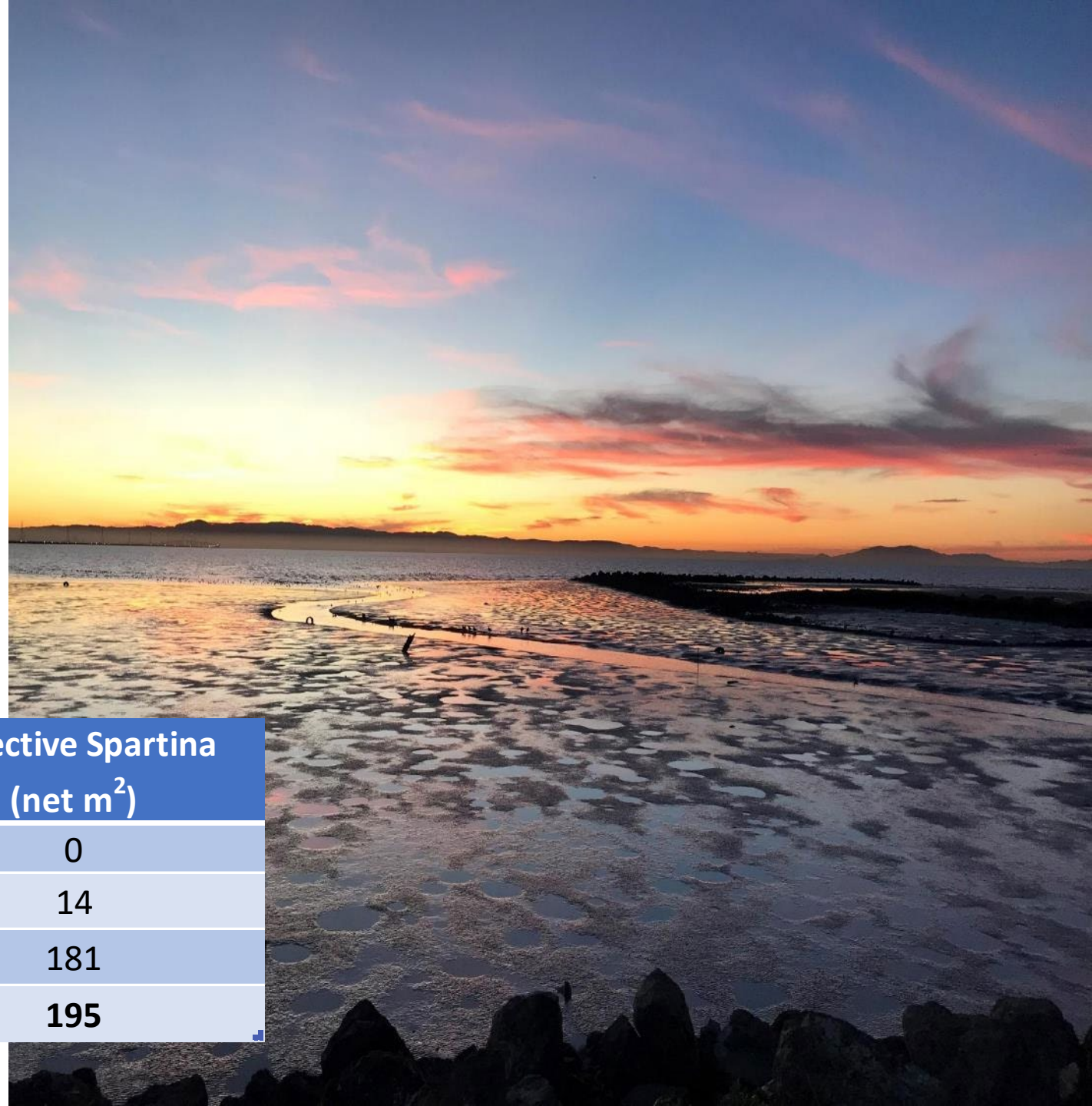




Photo courtesy of W. Kitundu

Restoration Program:
Habitat Enhancements focused on California Ridgway's rail

Hybrid Spartina – Novel Habitat for Ridgway's Rails

Created novel
habitat where there
was none

Provided cover
at high tide



But, after invasion
no native habitat
remained at some sites!

ISP Restoration Program

11 years: 2011-ongoing

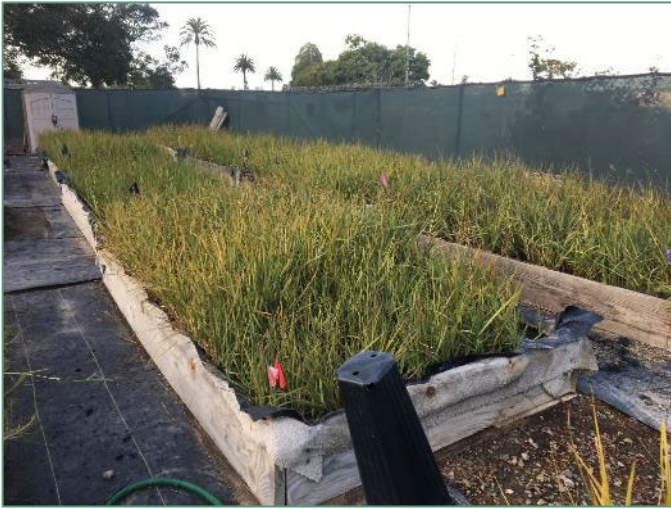
Guiding Plan - informed by TAC

Bay-wide scale

Focus on key components of rail habitat: cover from predators for foraging, nesting, high tide refuge

Rapid enhancement



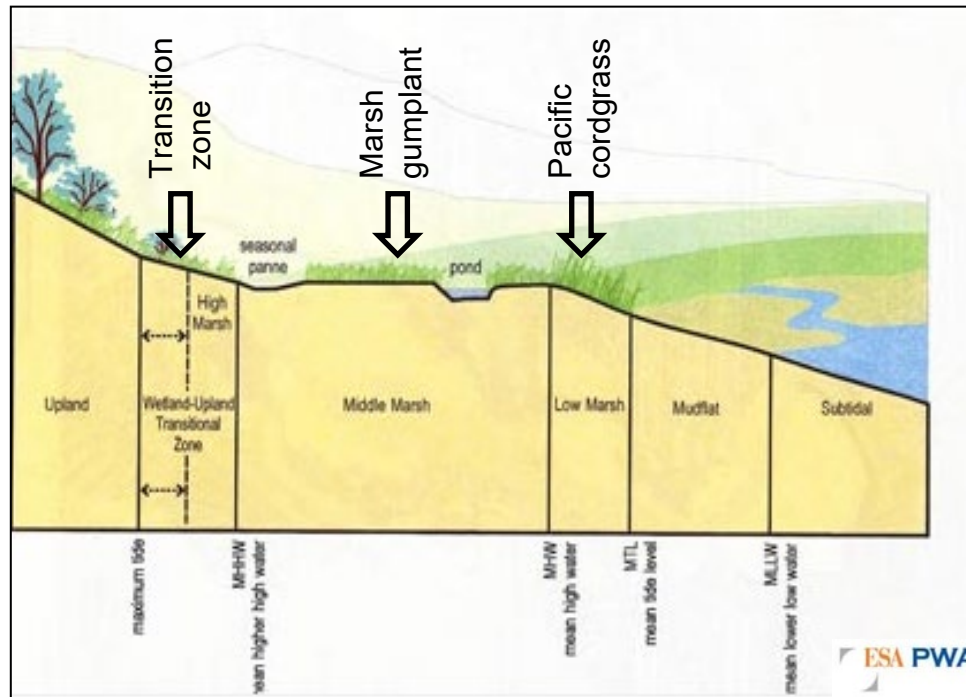
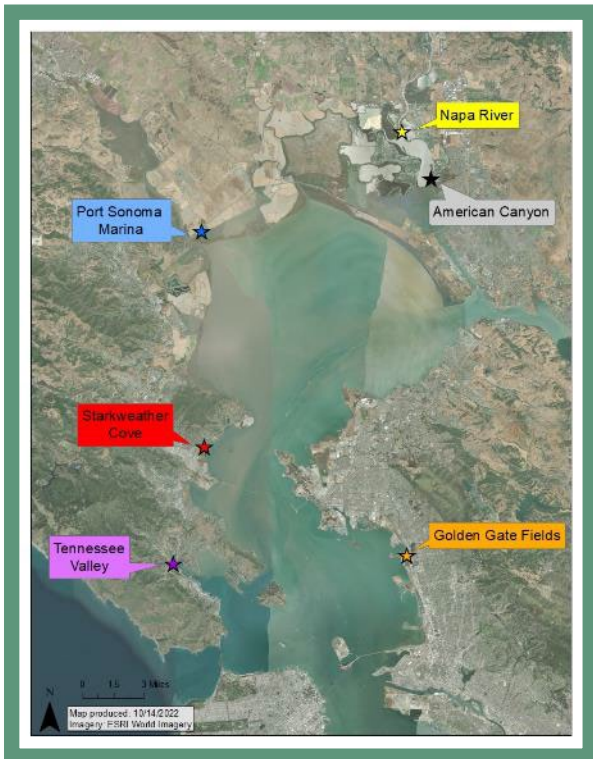


What Do We Plant?

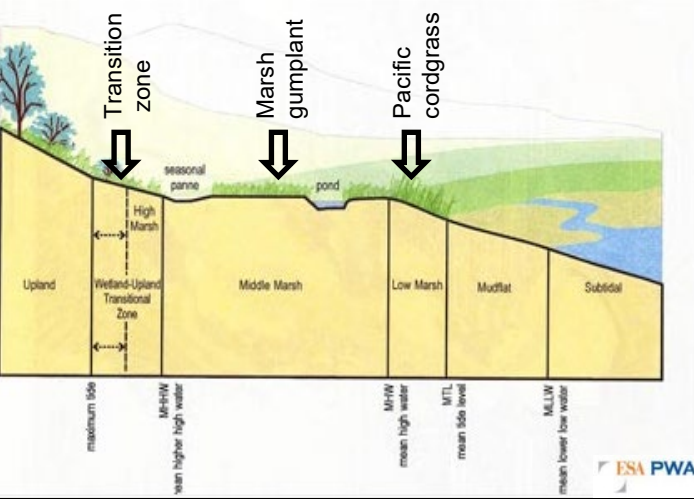
Pacific cordgrass

Marsh gumplant

Upland transition zone species



Pacific Cordgrass Source Populations



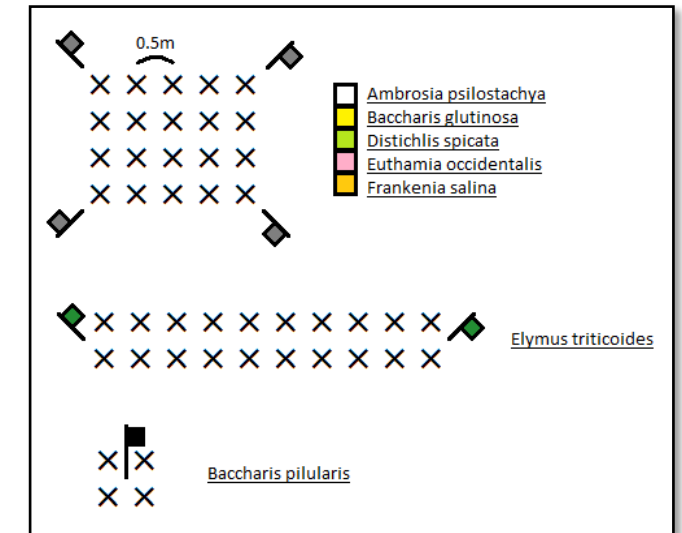
Planting Designs for Rapid Enhancement

Marsh-upland transition zone plots:

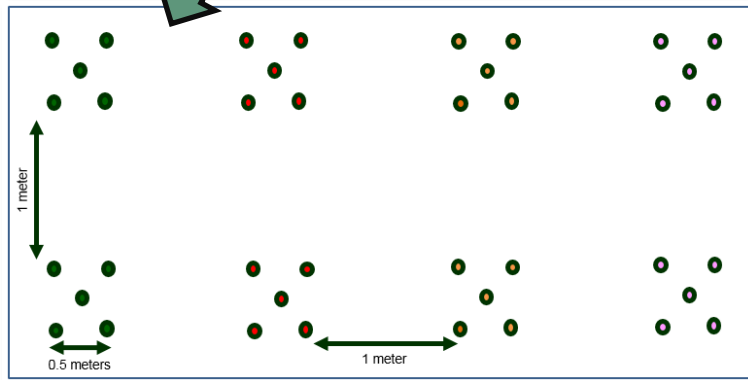
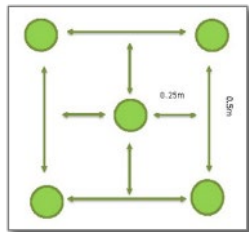
- 20 plants: D16s, TB4s, super cells
- various plot shapes

Marsh gumplant plots:

- 4.5 m in length, 0.5m between plants
- 20 plants: D16s, D40s, TB4s, or gallons

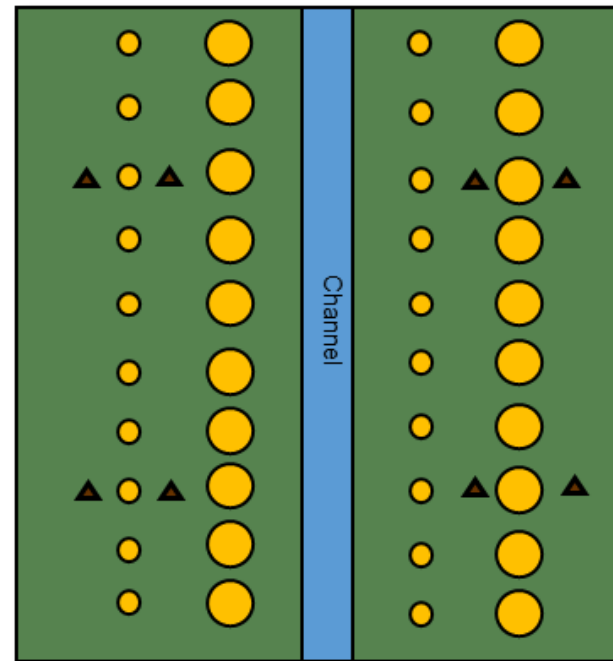


Pacific cordgrass plot



Example Pacific cordgrass block:

- 5 m in length, 1 m between plots
- 40 plugs, 4 sources



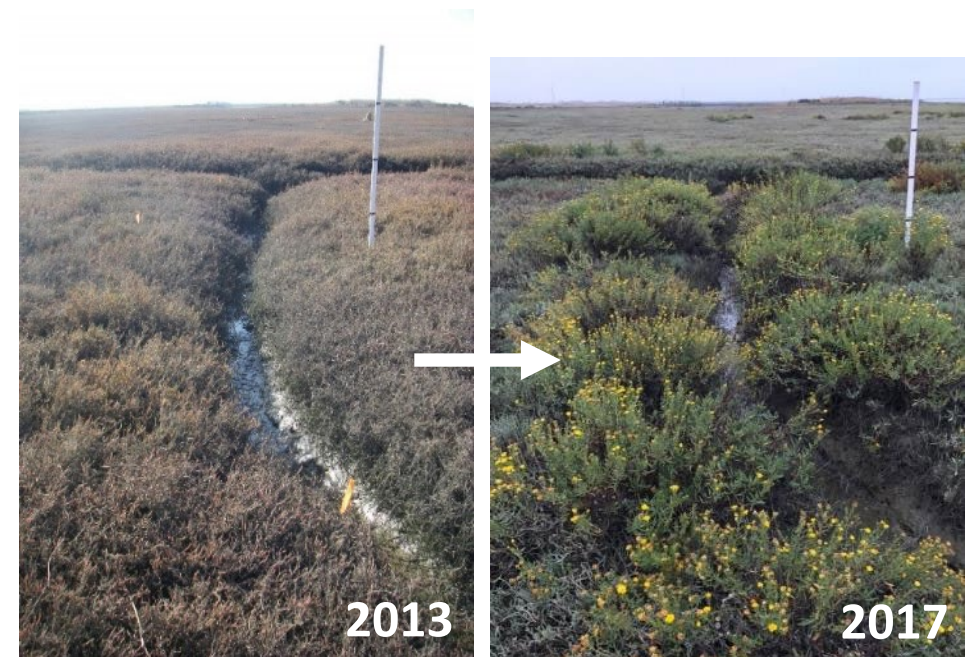
Pacific Cordgrass (*Spartina foliosa*)



Marsh Gumplant (*Grindelia stricta*)



Marsh-Upland Transition Zone





High Tide Refuge Islands

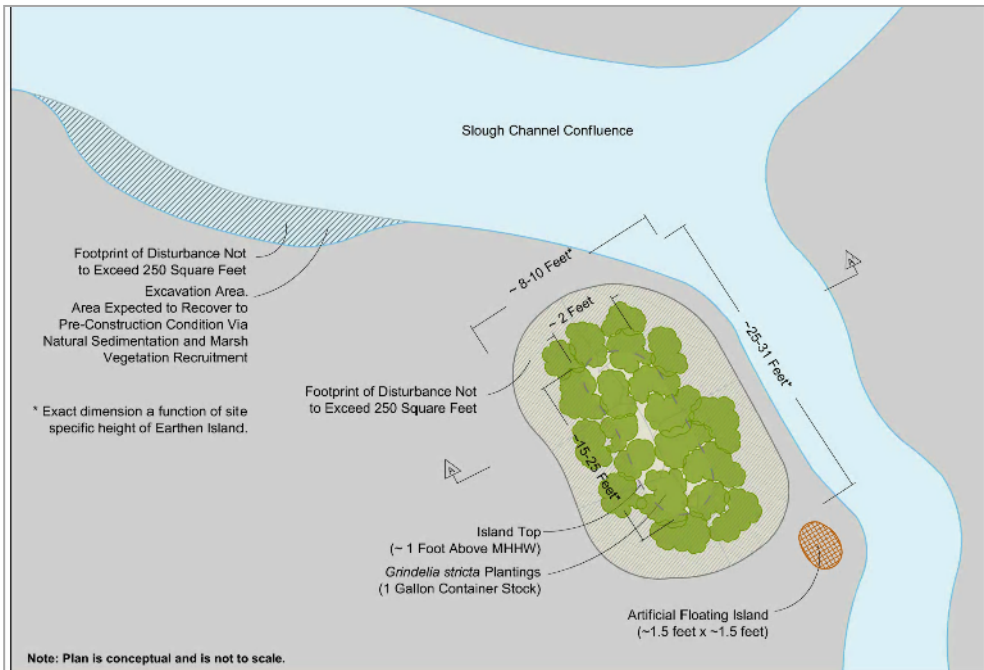
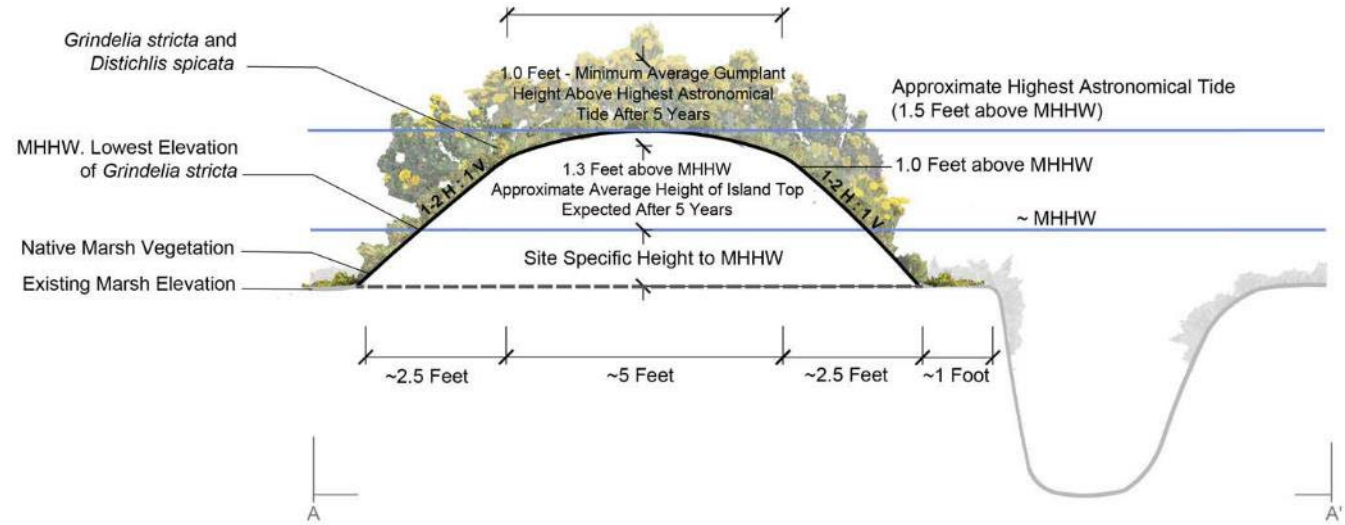
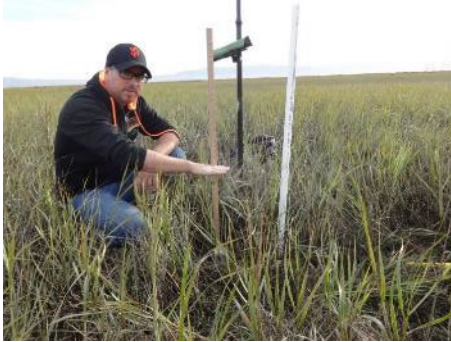


Figure 1: Typical Plan View Earthen Refugial Island Conceptual Plan





Corte Madera Ecological Reserve



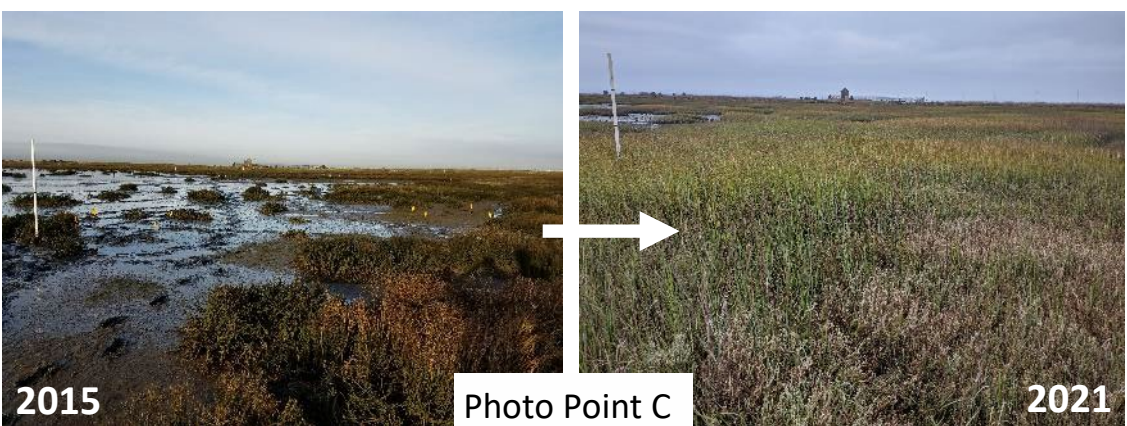
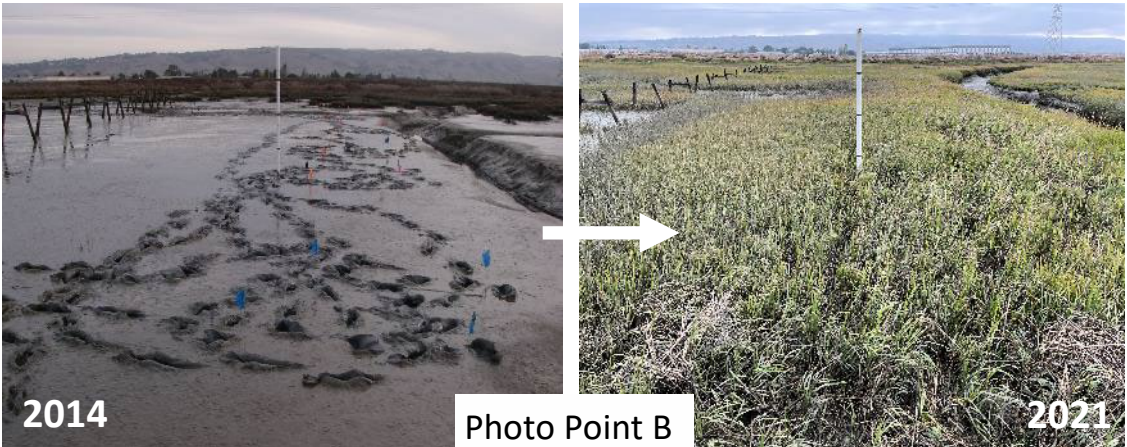
Palo Alto Baylands

Eden Landing Ecological Reserve

Early Restoration of Former Salt Pond: Unvegetated



Eden Landing Ecological Reserve



Successful Rapid Habitat Enhancement at Eden Landing

Spartina foliosa plantings helped convert former salt pond into a marsh that now supports Ridgway's Rail



Alameda Flood Control Channel

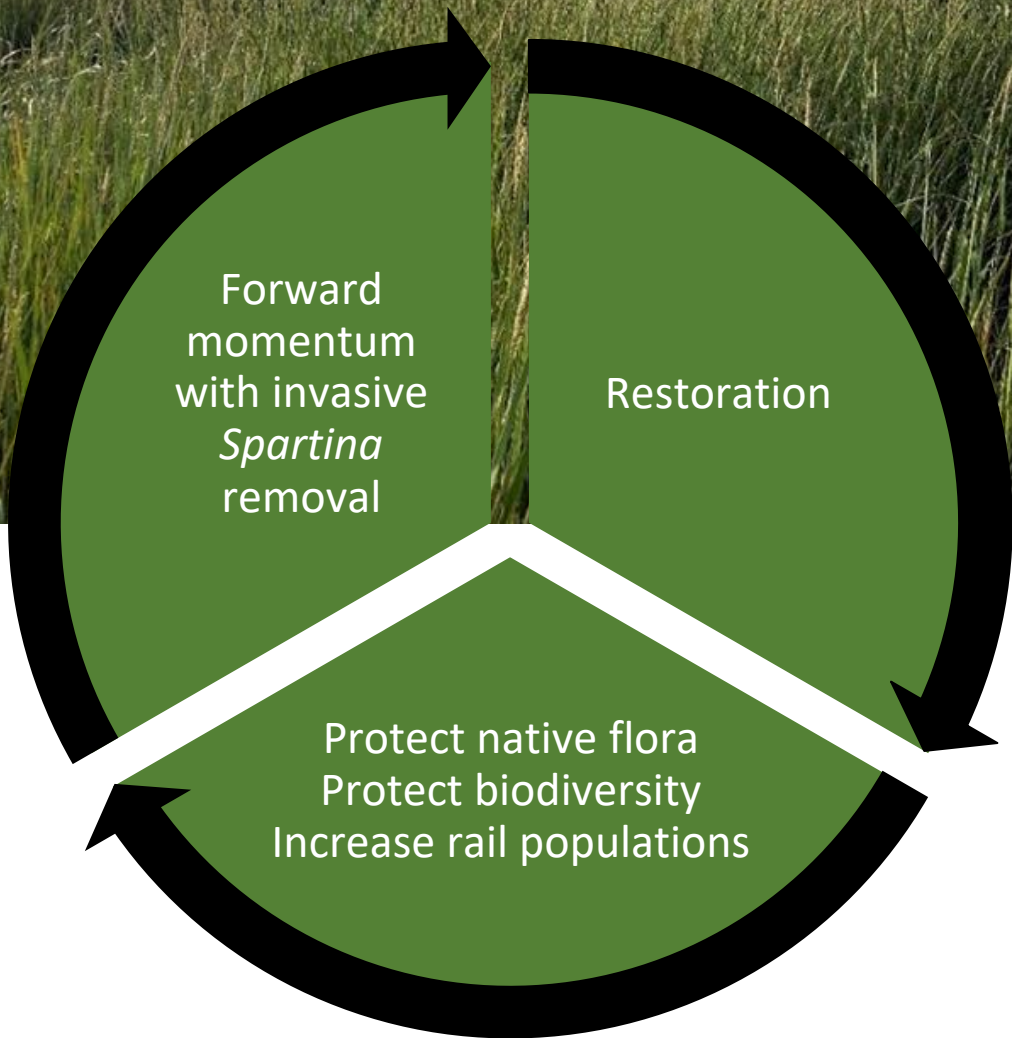
- Original East Coast *Spartina alterniflora* introduction site
- Site where subsequent hybridization occurred
- Shows rapid spread of hybrid *Spartina* - 2003 to 2005



Alameda Flood Control Channel

Original Introduction Site - after successful treatment and reintroduction of native *Spartina foliosa*, now forming a continuous band along the channel edge





Ultimate Goal:
healthy & diverse native tidal
wetlands

Thinking about planting Pacific cordgrass?

CAUTION

Consult with ISP

<https://www.cal-ipc.org/>

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- Invasive hybrid *Spartina* still present in SF Estuary
- Risk to project plantings



