

Linking Invasive Eradication with Native Plantings in a Changing Climate

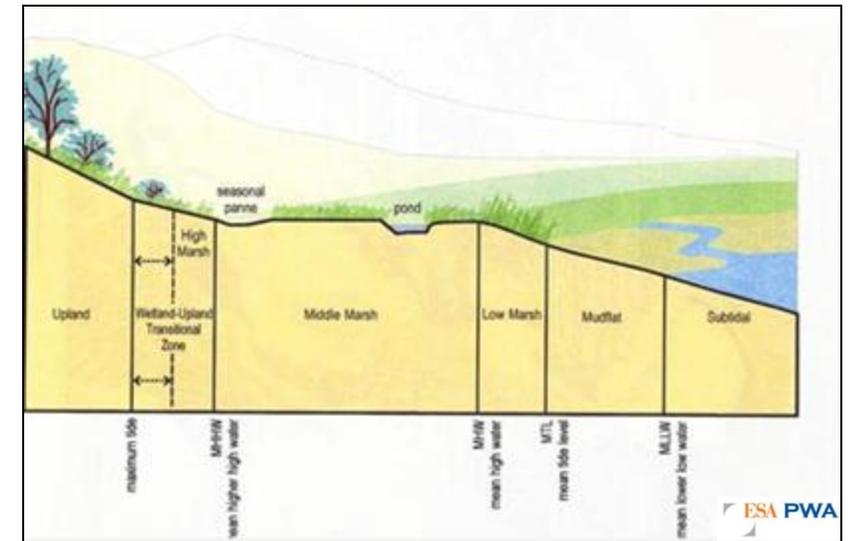


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Olofson Environmental Inc.



State of the Estuary
May 29, 2024

Outline



- Why talk about ISP in Regionally Advancing Living Shorelines session?
 - Learn from our work enhancing tidal marshes and marsh-upland transition zones – SF Bay's existing "vegetated shorelines"
- Overview of ISP
- ISP Treatment Program – brief update on treatment progress
- ISP Restoration Program – habitat enhancements by marsh zone
- Lessons Learned and Recommendations

A Few Invasive Plant Species in San Francisco Bay Tidal Marshes

...and just some of the impacts:

- Outcompete native species
- Change species composition and **habitat structure**
- Decrease biodiversity
- Ecosystem engineer (hybrid Spartina)
- Spread could result in extinction of native species (hybrid Spartina)



Seaside alkaligrass
(*Puccinellia maritima*)



Algerian sea lavender
(*Limonium ramosissimum*)

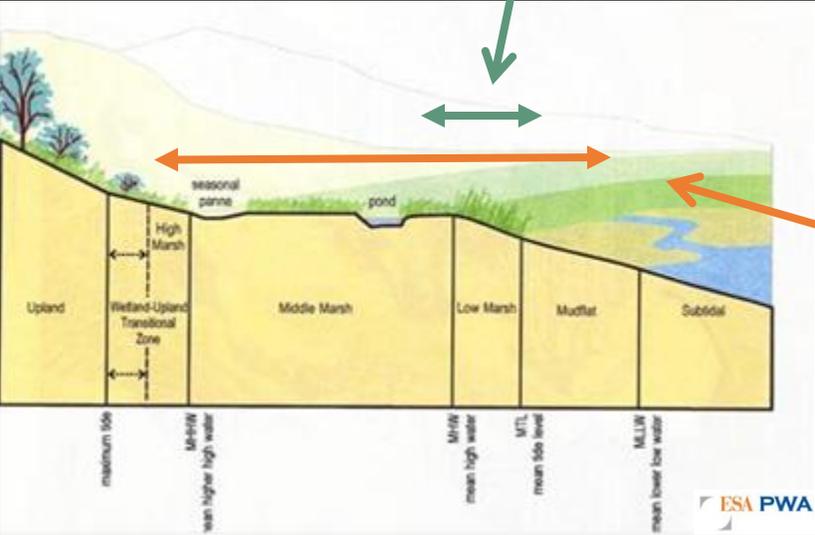


Hybrid Spartina
(*Spartina alterniflora* x *S. foliosa*)



Seashore paspalum
(*Paspalum vaginatum*)

Native Pacific Cordgrass (*Spartina foliosa*)



Hybrid *Spartina* (*S. alterniflora* × *foliosa*)



Why is hybrid *Spartina* a problem?

- Outcompetes other species > monoculture
- Spreads across mudflats > loss of shorebird foraging habitat (Point Blue Cons. Science)
- Changes mudflat invertebrate community (UC Davis)
- Endangers native Pacific cordgrass (UC Davis)
- Reduces flood control capacity
- Creates mosquito breeding areas

Undermines native tidal marsh restoration



SF Estuary Invasive *Spartina* Project

Regionally coordinated,
Estuary-wide *Spartina*
control efforts

Co-directed by:



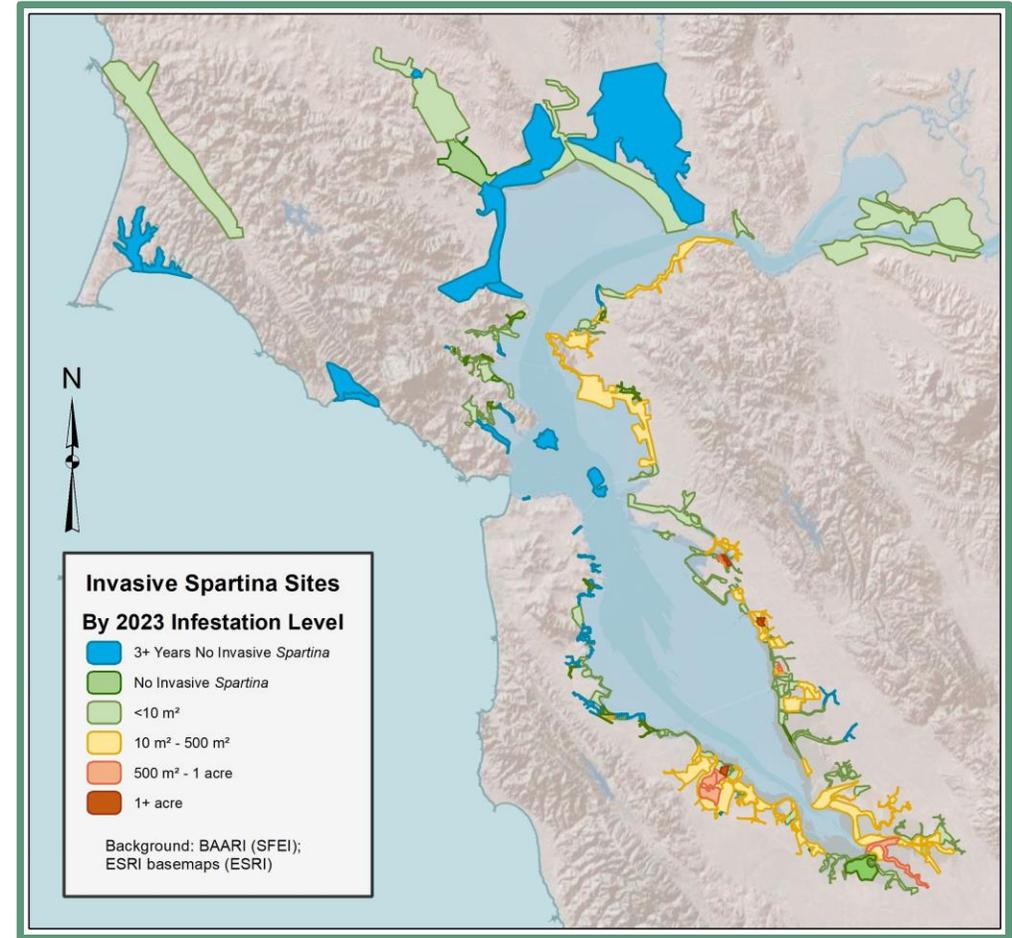
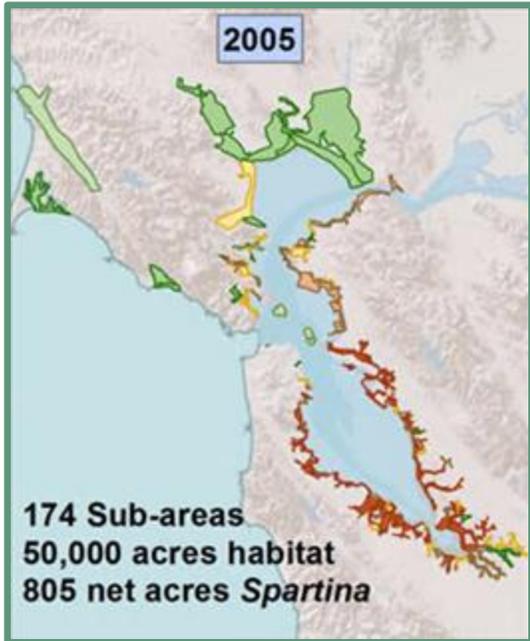
Began full-scale
implementation in 2005

Annual Baywide surveys
to map and treat



Update on Treatment Progress:

Invasive *Spartina* Cover Reduction 2005-2023



ISP Restoration Program

Supports inventory/treatment of invasive *Spartina*

13 years: 2011-ongoing

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

Rapid habitat enhancement to promote marsh resiliency



Habitat Enhancements

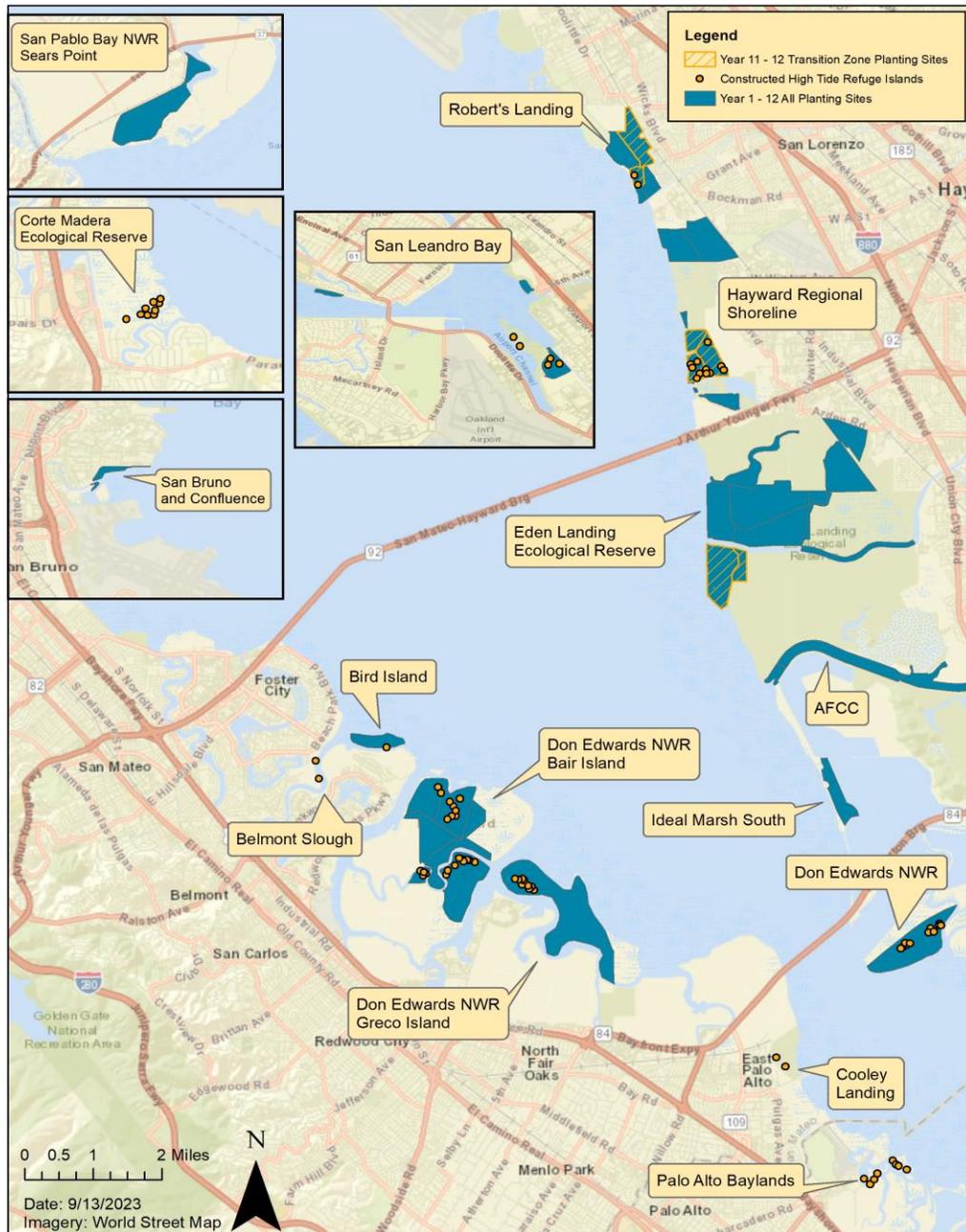
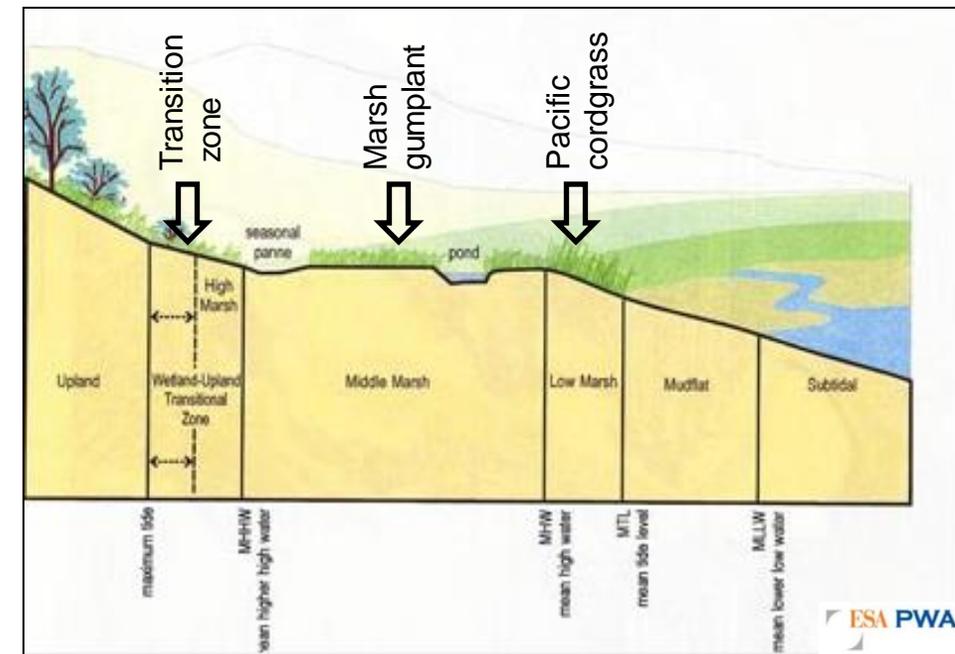
Program: 40+ sites, 580K+ plantings

Low marsh: Pacific cordgrass (*Spartina foliosa*)

Mid- to high marsh: marsh gumplant (*Grindelia stricta*)

Two types of high tide refuge:

- T-zone - focus on rhizomatous perennial plants
- Constructed 82 high tide refuge islands at 16 sites (with H.T. Harvey & Associates)



Site Selection

- Goal – **functional native habitat** for California Ridgway's rail and other wildlife
- Focus on critical components of rail habitat: cover from predators for foraging, nesting, high tide refuge
- Focus on sites with impacts from invasive Spartina removal – habitat loss
- **Older Restoration sites** – assess progress, lacking habitat cover?



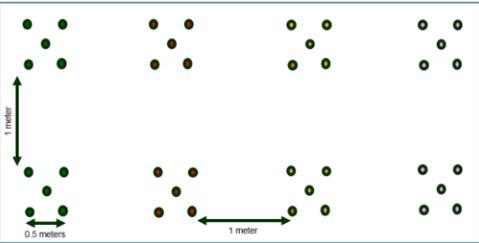
Planting Designs

Goal: rapid habitat enhancement

Design: plant dense, single species “clusters” of tall and/or “spreading” perennials



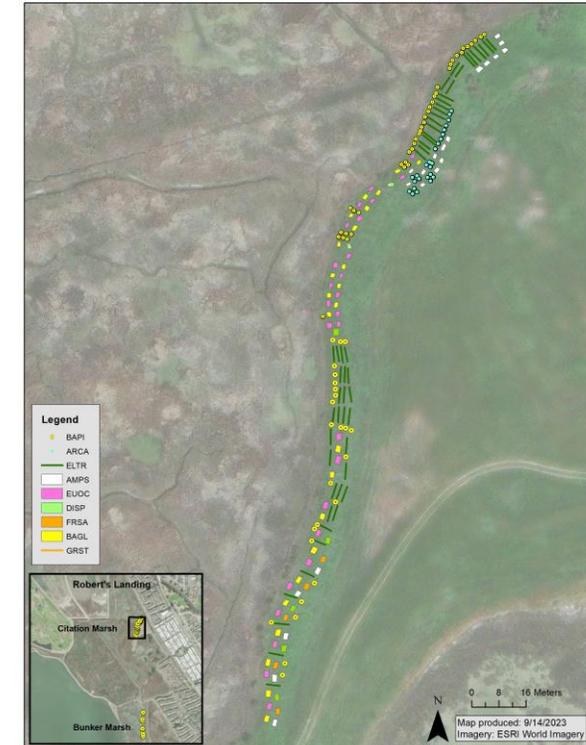
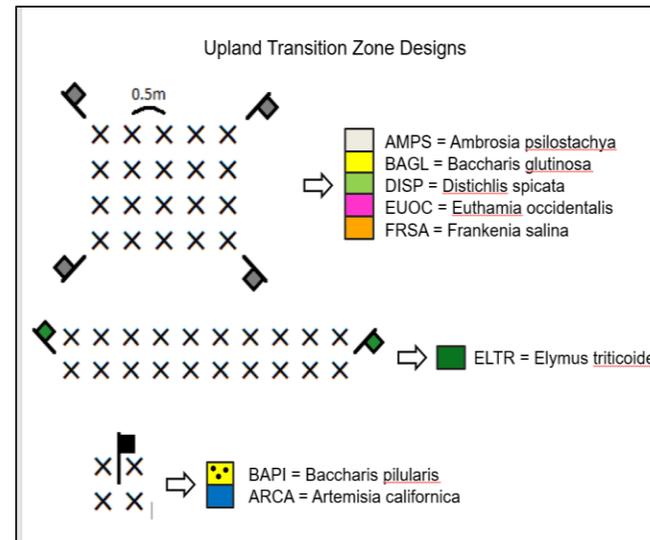
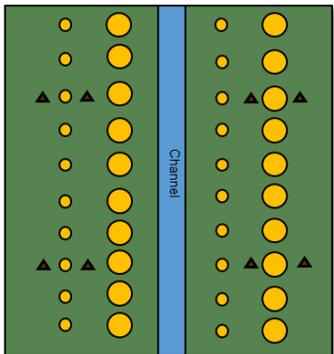
Low marsh: Pacific cordgrass



Marsh-upland T-zone:

- Western goldenrod – rhizomatous
- Western ragweed – rhizomatous
- Marsh baccharis – rhizomatous
- Alkali heath – rhizomatous
- Salt grass – rhizomatous
- Creeping wild rye grass – rhizomatous
- Coyote brush – shrub
- CA sagebrush - shrub

Mid- and high-marsh:
Marsh gumplant



Before/After Habitat Enhancement



2015



Pacific Cordgrass
(*Spartina foliosa*)

2023



2023



2013

Marsh Gumplant
(*Grindelia stricta*)



2015



2023



Ensuring a Resilient Tidal Marsh Ecosystem through Healthy Upland Transition Zones: Assessment and Recommendations

In Partnership with

SAVE THE BAY



SAN FRANCISCO BAY BIRD OBSERVATORY

Contact: Julian Wood jwood@pointblue.org

The following field-tested protocols, monitoring framework, restoration recommendations, and project reports will help restoration practitioners and scientists evaluate transition zone habitat and refine restoration practices that maximize the benefits of wetland-upland transition zone habitat to birds. Visit the links below to download the products. More information about the project, summary, background, and goals is provided below.

Why/How Enhance Older Restoration T-zones?



Existing T-zone vegetation = primarily annual WEEDS

T-zone Recommendations for Tidal Marsh Birds

- Dense vegetation: at least 15% of area covered in dense veg (>30cm from ground)
- Tall plants: 50-100cm, associated with increasing RIRA populations
- Wider transition zones: >25m wide good for tidal marsh bird population growth
- Steep levees have benefits: wide better but no negative effect of steep sloped T-zone
- Multiple species
- Grasses can be beneficial

Use competitive planting to help reduce weeds:

- Hardy, salt tolerant, “weedy” natives
- Rhizomatous perennial forbs and grasses
- Dense planting designs
- Container plants



Methods for Managing Weeds in Wetlands: Non-chemical Control

Competitive Planting

On This Page

- Overview
- How to Use
- Special Tax
- Optimal Conditions for Use
- Caveats
- Potential Hazards to Humans, Environment, and Cultural Resources
- Consider Combining with the Following Non-Chemical Methods
- Don't Use This Technique When/For
- References
- Supplementary Information
- Authors and Credits
- Efficacy

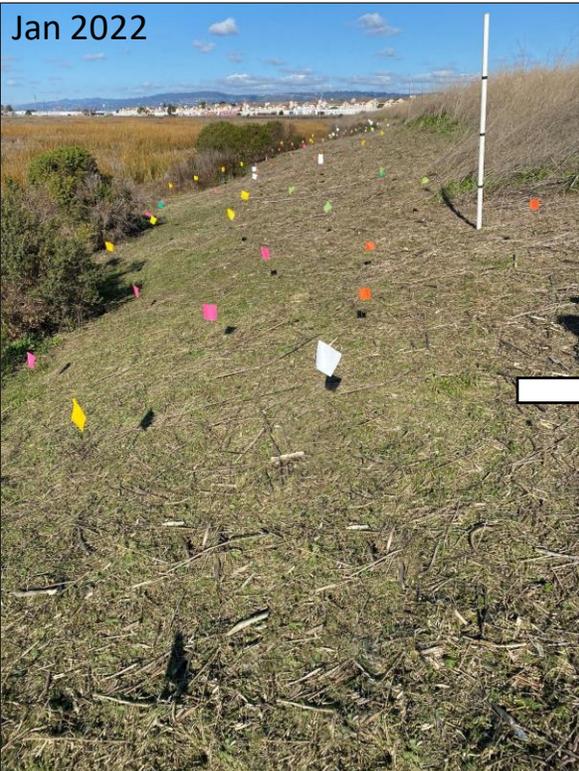
Overview

In competitive planting, native plants or otherwise desirable plant species are planted to prevent the spread of weeds or to directly compete against weeds and reduce their production. The effectiveness of this technique relies on the result, or comparison, of the treatment, or resource use (usually light) to water between the weed and desirable competitive plants. It also depends on the ability to initially reduce competitor from weeds enough for the replacement species to get established.

Success of this technique depends upon carefully choosing plant species that will compete with specific weeds of concern. For example, planted grasses will not readily replace or displace other weeds being used to keep shrubs at bay, but shrubs may replace grasses. Perennial plantings are likely to be more effective than annuals. If the target weed is a shrub, tree or vine that can outpace other planted species and if plantings are not dense enough to shade the neighbor, competitive planting will likely fail. Under these conditions, competitive plants can only rely on the suppression of seedlings and not growth of established plants.

Habitat restoration utilizes the same principles and focuses specifically on restoring ecological functions that have been lost through invasion or disturbance. Native species are planted in target sites or nearby to increase the abundance of native plants and subsequently reduce weed populations. Competitive plantings can be most effective when there are or were a few weed species present on the site. It becomes more difficult as the number of weed species and the diversity of local soil seed species increases. In some cases, this native species are used in competitive planting projects to gradually suppress species cover while native species are established in a managed competitive planting or restoration effort.

Before and After T-zone Habitat Enhancement



High Tide Refuge Islands

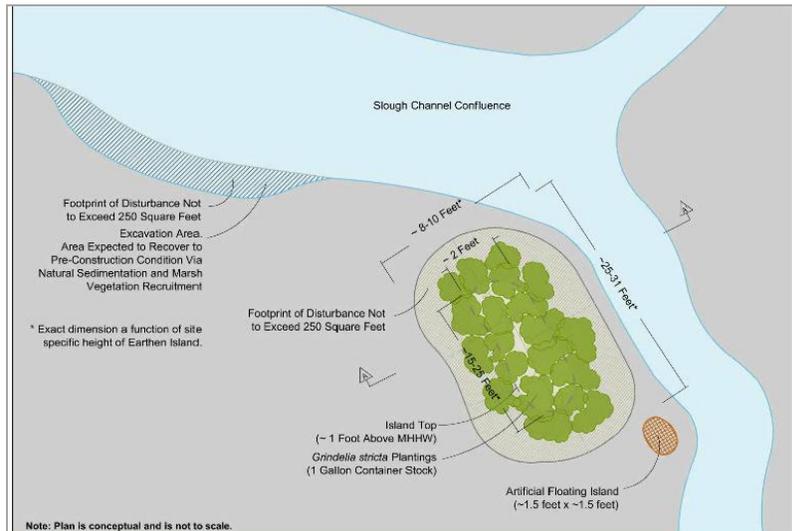
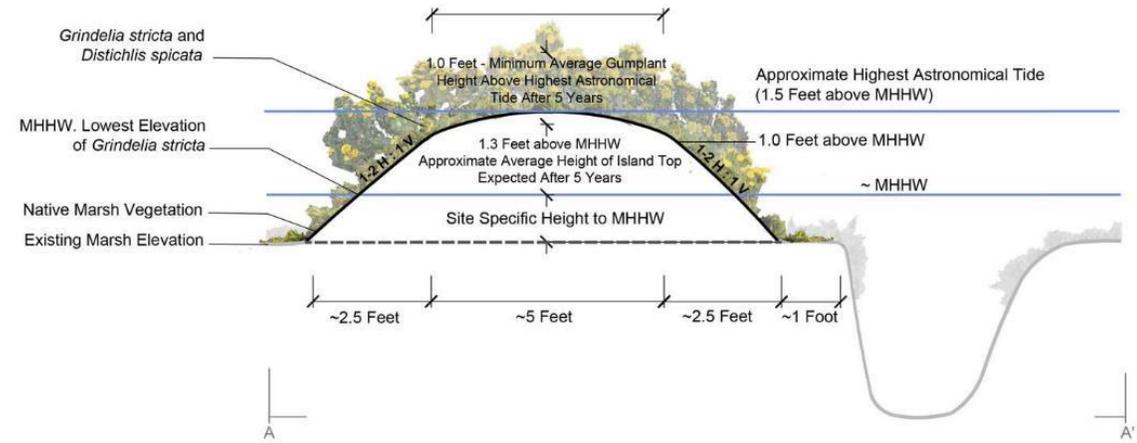
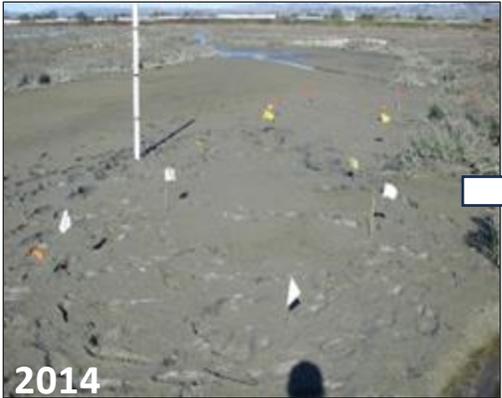


Figure 1: Typical Plan View Earthen Refugial Island Conceptual Plan

Eden Landing Ecological Reserve





Lessons Learned - Recommendations

Invasives species management – integral part of projects!

Rapid enhancement - plant high density, single species plots

T-zones – think competitive planting

- Plant “weedy” natives
- Plant rhizomatous “spreaders” – can survive dry years, bounce back wet years
- Ongoing maintenance - "Friends of" groups to promote native habitat

RAPID enhancement now to promote tidal marsh resiliency



Questions?

Thank you to all our partners and to the small but mighty crew at ISP!



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