Utilization of San Francisco Bay Dredge Materials for Habitat Restoration: Reef Balls and Aramburu Island

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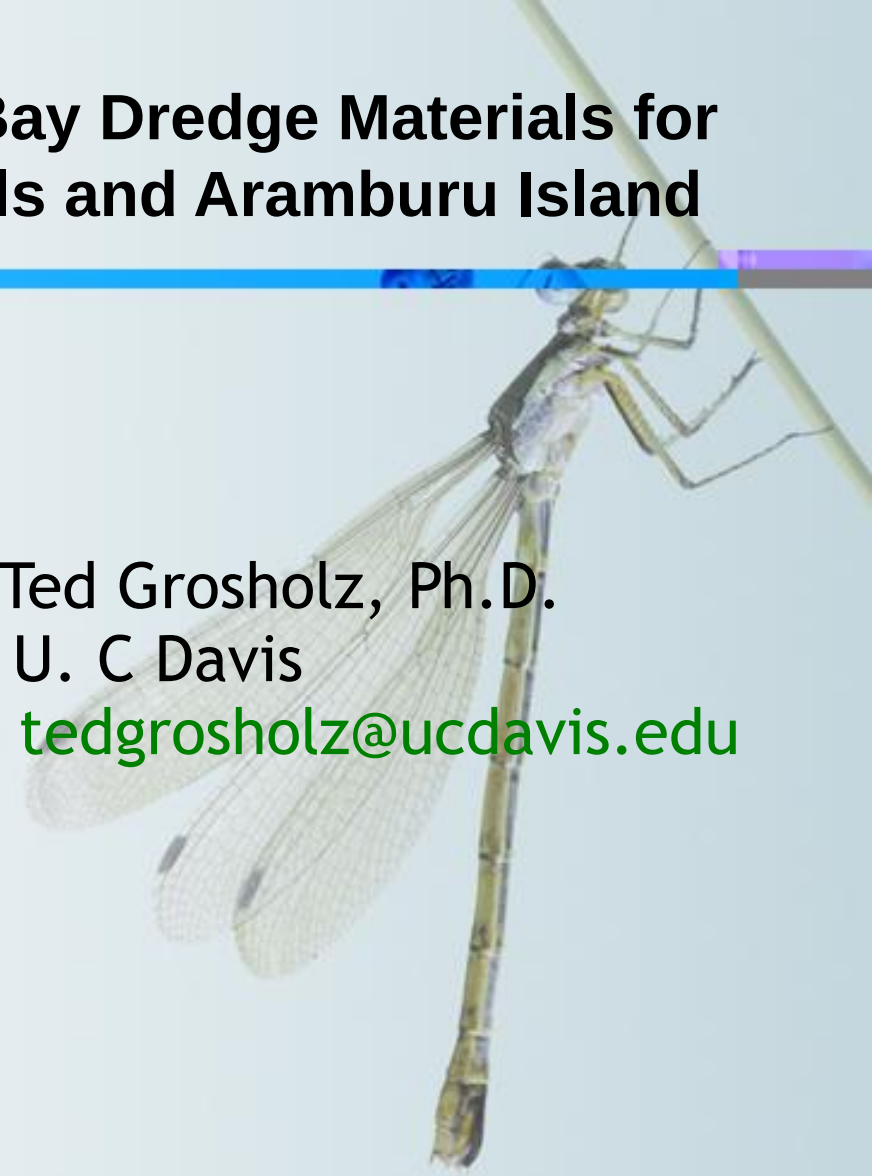
Prepared for
LTMS Science Symposium
Oakland, CA
May 19, 2010



ENVIRON

Reef Balls

1. Why Reef Balls in San Francisco Bay
2. Comparison to Bagged Oyster Cultch
3. Method
4. Effectiveness
5. Cost

Why Reef Balls?

- The Problem is Loss of Essential Habitat
  - Loss of vertical structure in water column
  - Loss of hard surfaces for sessile organisms
  - Loss of habitat complexity
  - Loss of edge

We used to have this

Now we have this….

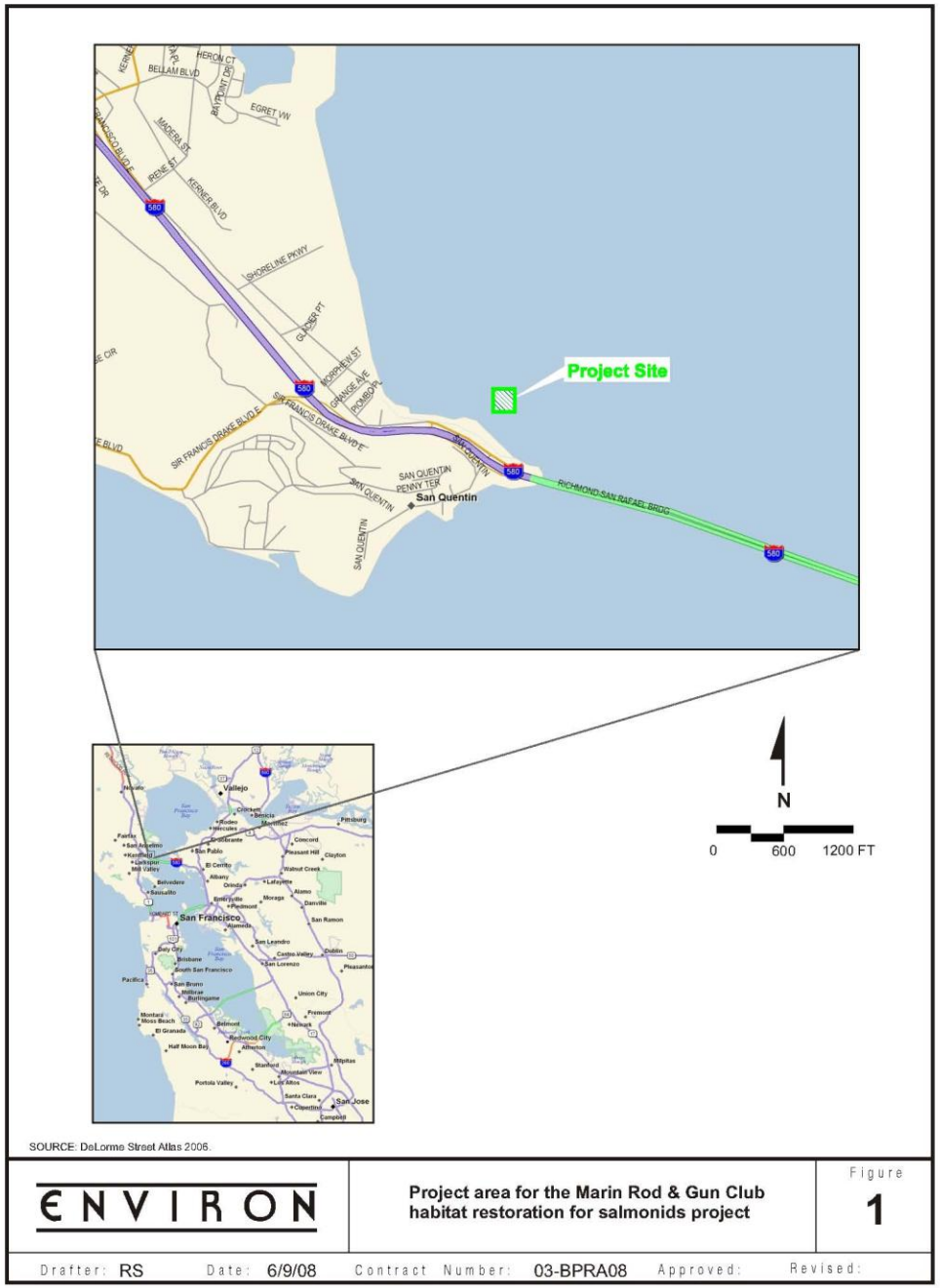
Marin Rod & Gun Club Project

- Approximately one acre of reefs
- Funding by NFWF & NOAA for two reefs
- Mounds of Pacific oyster shell
- Reef balls
- Monitoring of fish utilization
- Acoustic Monitoring for tagged:
  salmon, steelhead and sturgeon

Construction and Installation

- Mould from the Reef Ball Foundation
- Raw materials dredged from the Bay
- Formulation of materials
- Construction
- Installation
- Monitoring

MRGC is located near the Richmond-San Rafael Bridge



Marin Rod and Gun Club


BRONCO


gladiator


Best

Finished Product

They are heavy, but with a little help from my friends….


MARIN ROD &

Anybody home?

Native oysters

Sea Slugs

Community of Organisms

- Shrimp
- Crabs
- Many species of fish
- Birds
- Volunteers
- The media

Acoustic receiver & tag

Acoustically Tagged Fish

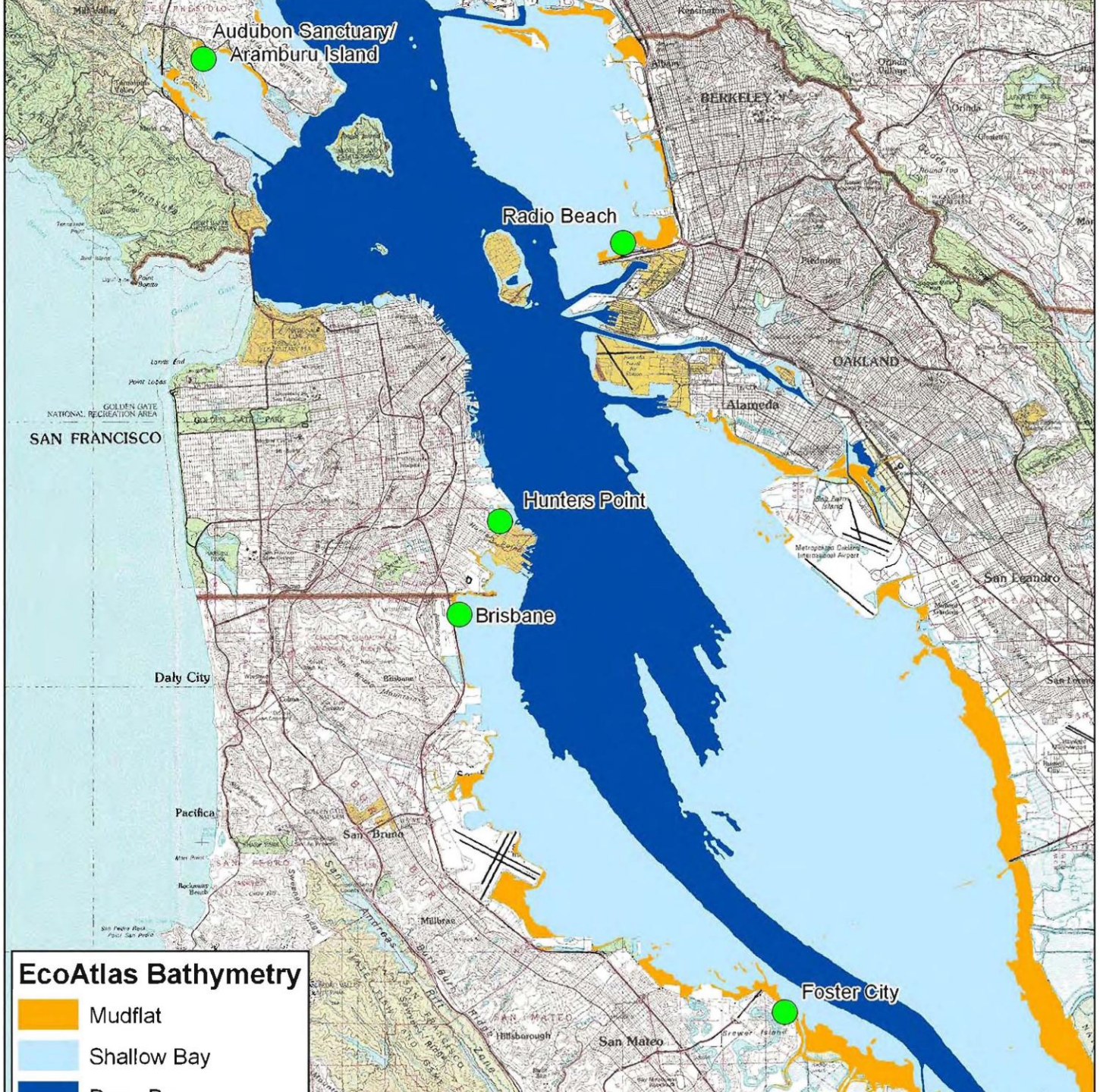
- Five late fall-run Chinook salmon
- Three Steelhead
- One green sturgeon

Cost $$$

- Fiberglass mould and parts $1,500
- Bag of Portland Cement ~$6.00
- Sand ($30/ton) ~$1.50
- Dredged oyster shell ($200/ton) ~$8.00
- Water Just a little…
- Ratio-Cement:sand:shell = 1:2:3
- Labor: Depends ~ 4 hrs/reef ball by hand

Aramburu Island Project

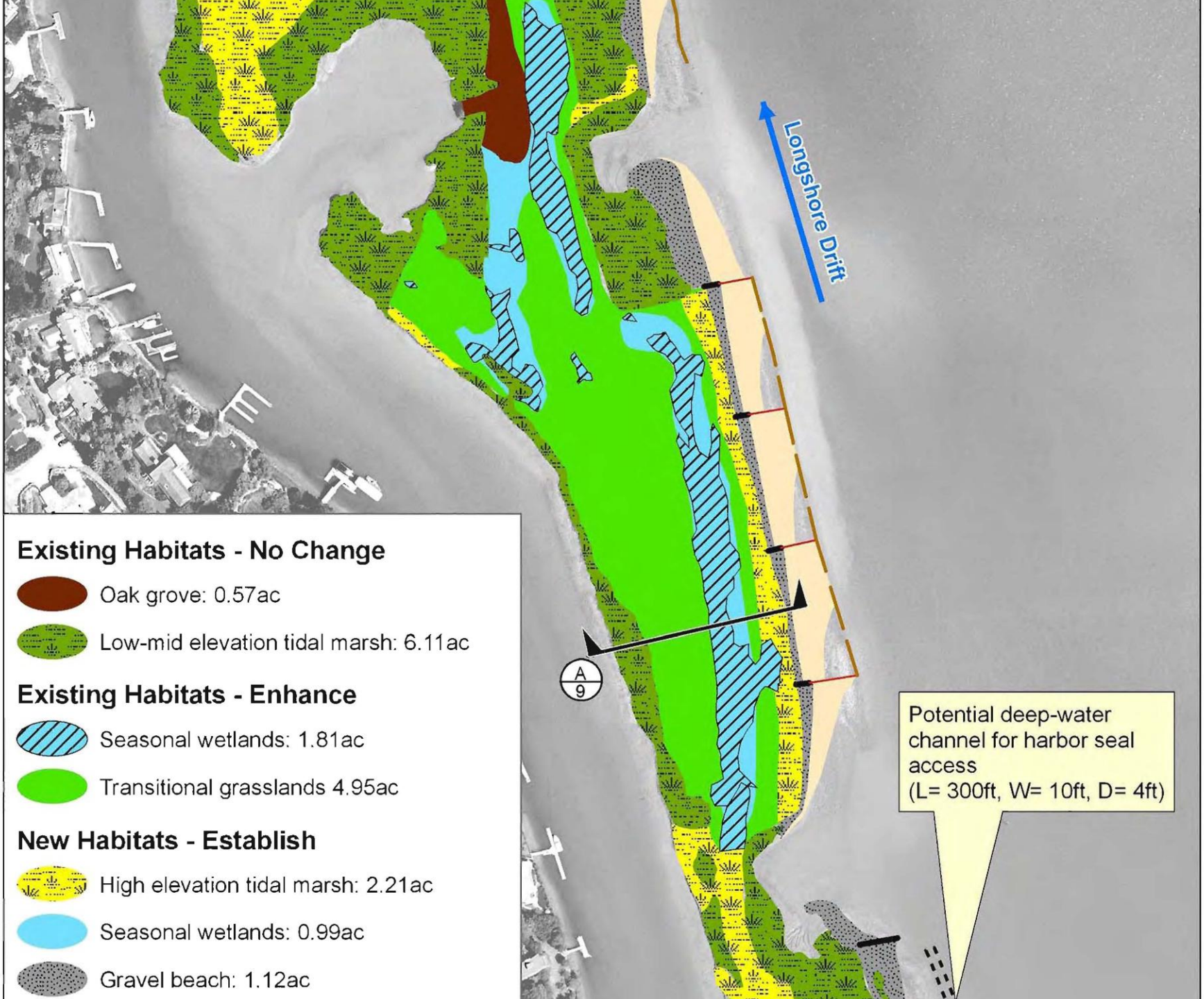
- Project of Richardson Bay Audubon
- Land owned by Marin County
- Potential Funding Regional Water Board
- Team including:
  - UC Davis
  - SFSU
  - Consultants
  - Community outreach


Audubon Sanctuary/
Aramburu Island
Radio Beach
Hunters Point
Brisbane
SAN FRANCISCO
GOLDEN GATE
NATIONAL RECREATION AREA
BERKELEY
OAKLAND
Alameda
San Leandro
Daly City
Pacifica
San Bruno
Millbrae
San Mateo
Foster City
EcoAtlas Bathymetry
Mudflat
Shallow Bay

Aramburu Is. Restoration Project

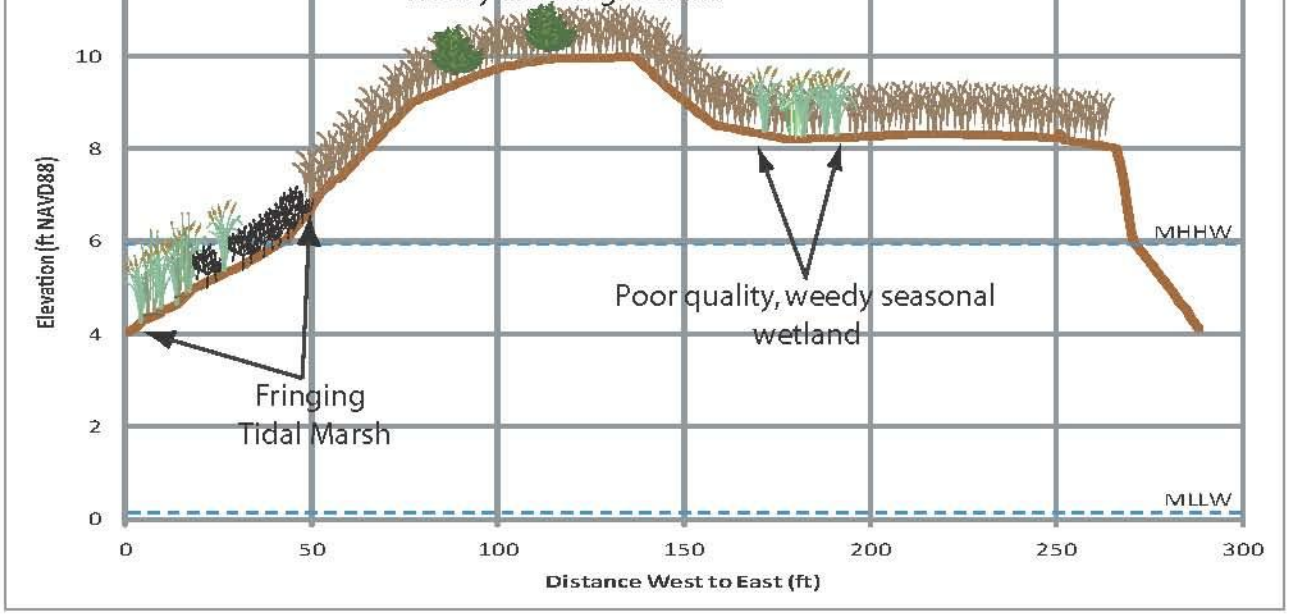

Aramburu Island
Strawberry Point
Strawberry Spit
101
Richardson Bay
Sausalito
Data sources: Photo (NAIP, 2005)


Constructed
harbor seal
haul out coves
Channel cut in 1987


Longshore Drift
A
9
Potential deep-water channel for harbor seal access
(L= 300ft, W= 10ft, D= 4ft)
Existing Habitats - No Change
Oak grove: 0.57ac
Low-mid elevation tidal marsh: 6.11ac
Existing Habitats - Enhance
Seasonal wetlands: 1.81ac
Transitional grasslands 4.95ac
New Habitats - Establish
High elevation tidal marsh: 2.21ac
Seasonal wetlands: 0.99ac
Gravel beach: 1.12ac

Dredge Material Usage

- Plan to use on the order of 30,000 cubic yards of dredge material for upland restoration to change soil constitution to benefit native plant species
- Subtidal work is still in the design stage but may include living shoreline elements



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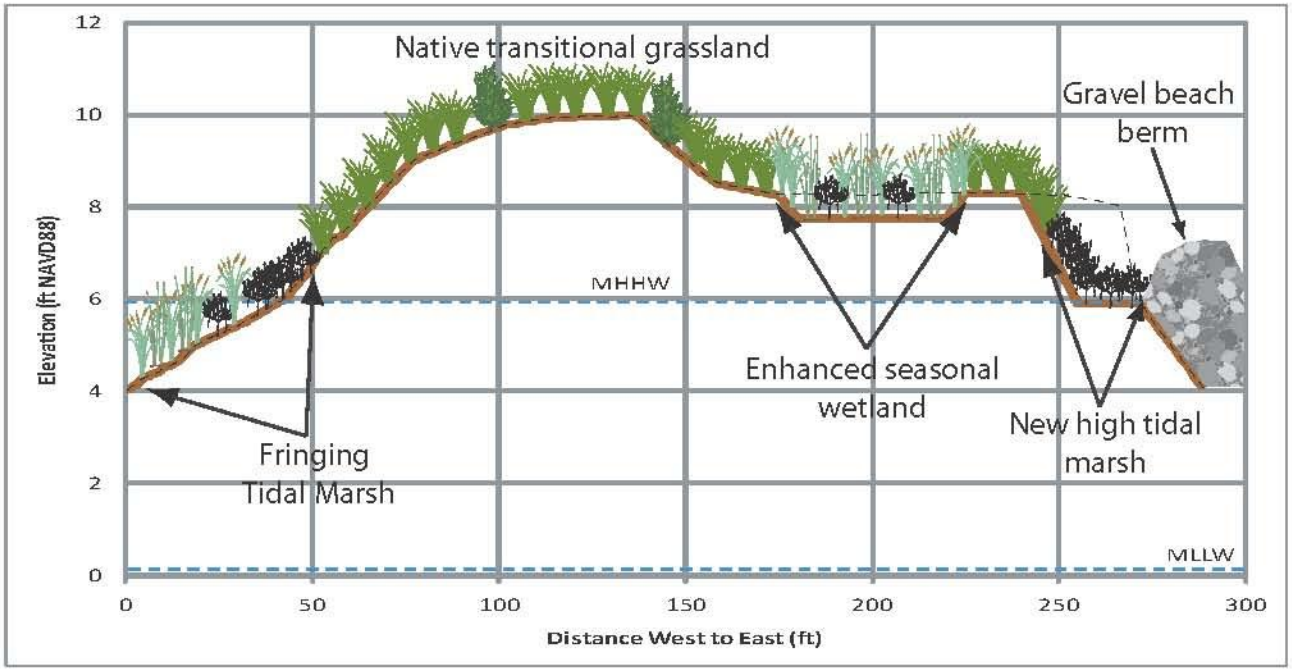
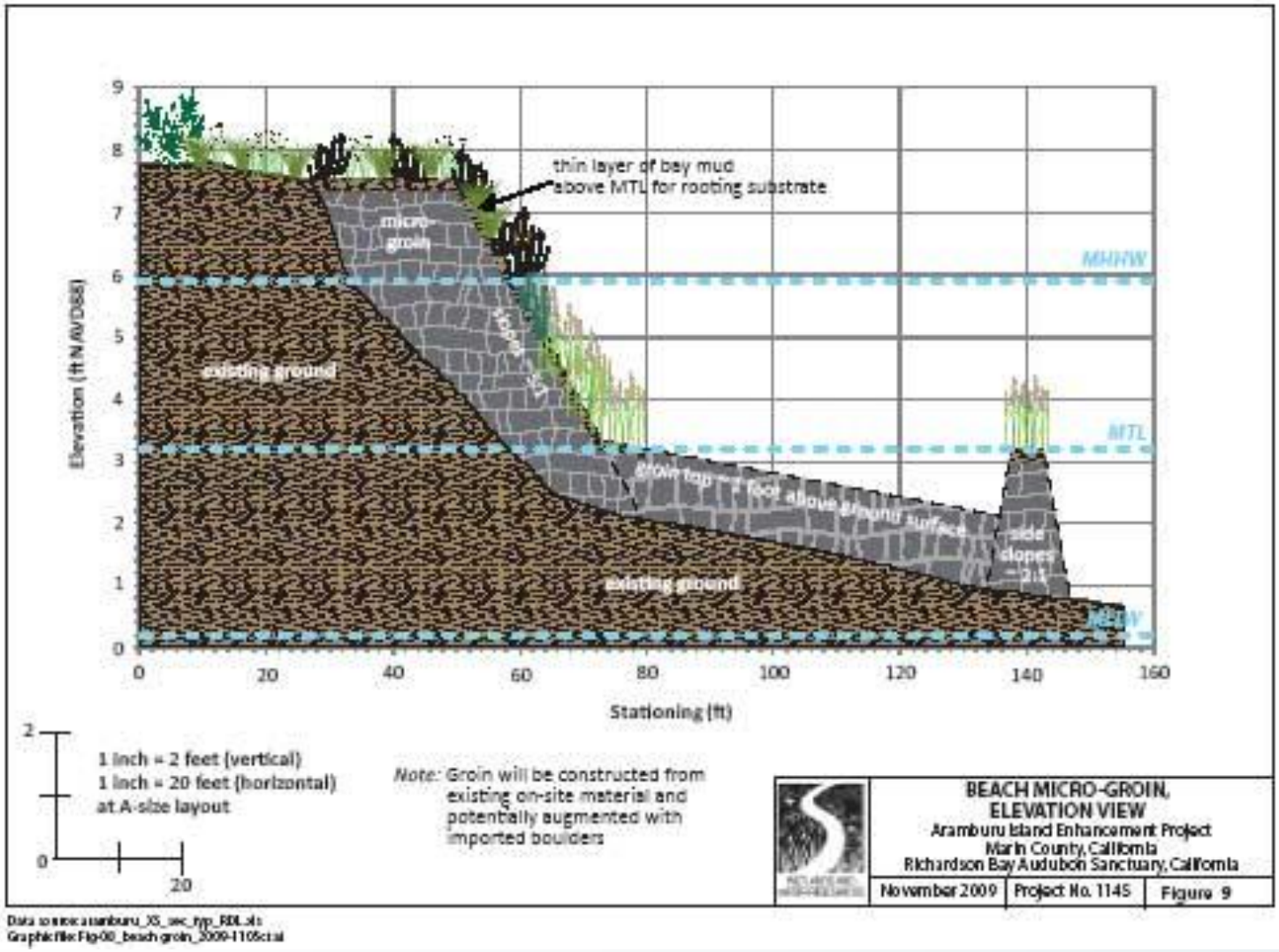
2. Proposed Conditions



Subtidal habitat Restoration

- Plan restore native Olympia oyster habitat
- Plan to restore eelgrass habitat
- Potential experiment in “Living Shoreline”



Data source: aramburu_XS_sec_typ_RDL.xls
Graphic file: Fig-00_beach groin_2009-1105c.ai

Thank your for your attention

- Many thanks to the following
  - National Fish and Wildlife Foundation
  - NOAA Restoration Center
  - San Francisco Bay Joint Venture
  - USFWS
  - Fish America Foundation
  - The Water Shed Project
  - 200 Volunteers
  - Richardson Bay Audubon
  - UC Davis