

Regionally Advancing Living Shorelines in San Francisco Bay



Smart Coast CA
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Newport Beach, CA

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Project Manager



State of California
Coastal Conservancy

Threading the Needle

Innovation and Feasibility

Barriers to Innovation:

- **Science and data gaps**
- **Institutional Inertia**
- **Lack of broader context**
- **Lack of an advocate**



Importance of Feasibility:

- **Habitat and species**
- **Pilot projects – test**
- **Develop Best Management Practices**
- **Document success before scaling up**
- **Monitor long-term benefits and impacts**



Nature's Architects

Native Olympia Oysters and Eelgrass

- Food source for other invertebrates, birds, fish
- Reproductive and physical structure



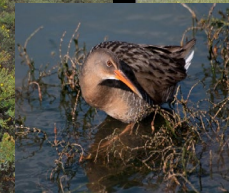
Creosote Pilings and Pacific herring

- More than 33,000 derelict pilings
- Toxic compounds and marine debris



Pacific cordgrass and Marsh gumplant

- Builds habitat, traps sediments
- Food chain- seed and detrital food resources



Site Specific Considerations

Existing Uses and Community Input

Parcel Ownership

Bathymetry

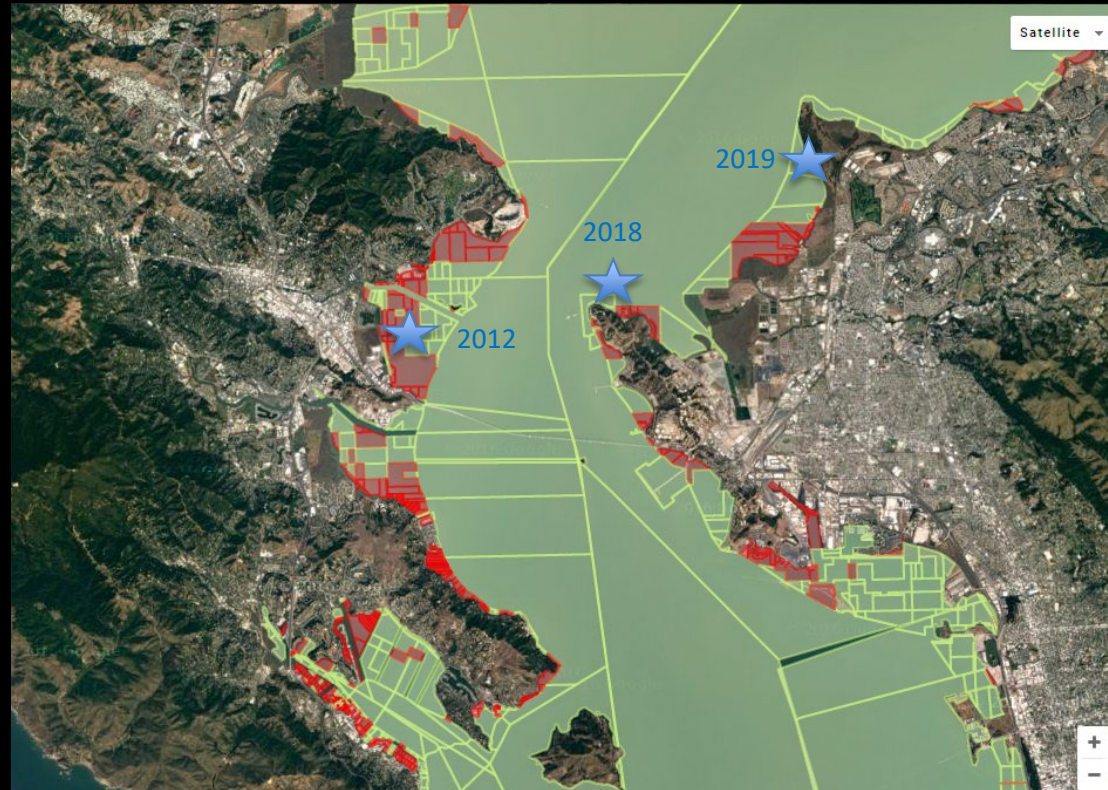
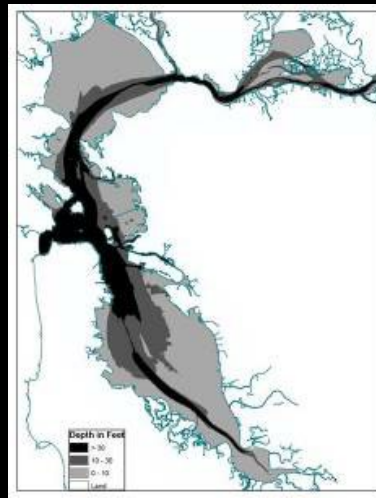
Depths for Habitat Restoration
Depths for Access

Orientation to Wind/Waves

Existing Species and Habitats

Sea Level Rise Modeling

Physical Space Required



Permitting Multi-Habitat Projects



USACE Nationwide Permit 54- Living Shorelines

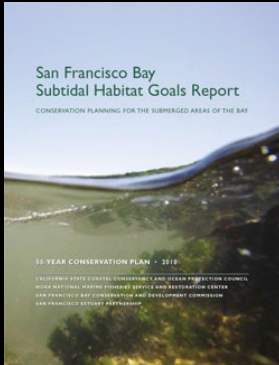
Policy Support in California

CA Natural Resources Agency *Increasing Biodiversity & Climate Resilience*

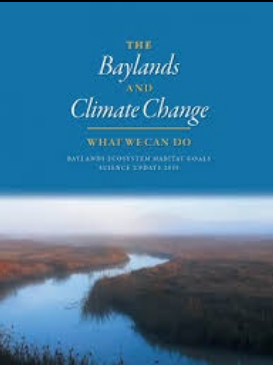
Exec Order B-30-15- *Prioritize natural infrastructure solutions*

SB 246: *Integrated Climate Adaptation and Resiliency Program*

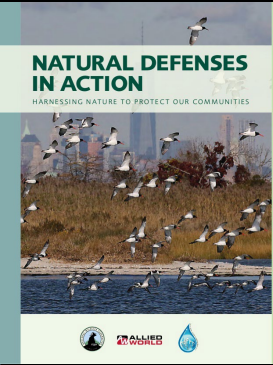
- NOAA Fisheries/Rest Center
- EPA and SF Estuary Partnership
- USFWS Coastal Programs
- CA Coastal Conservancy
- CA Coastal Commission
- SF Bay BCDC
- SF Bay Regional WQCB



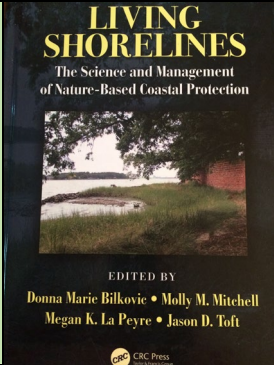
Subtidal Goals 2010
www.sfbaysubtidal.org



Baylands Goals 2015
www.baylandsgoals.org



NWF 2016
www.nwf.org



Bilkovic et al 2017
www.crcpress.com



Issues to Consider Thoughtfully

Beneficial Fill Justification

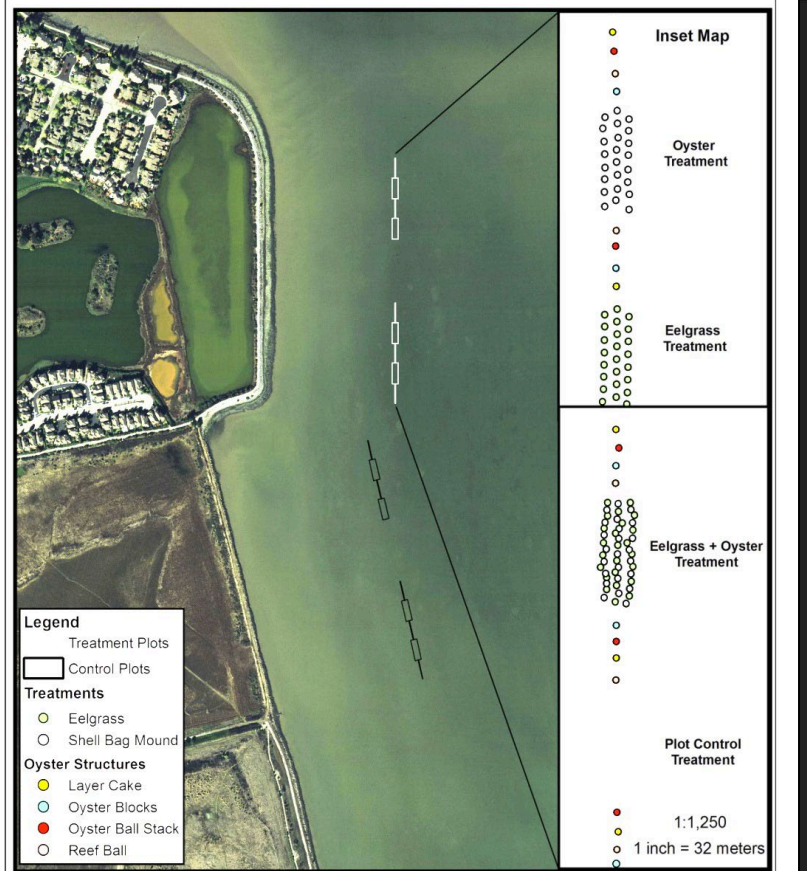
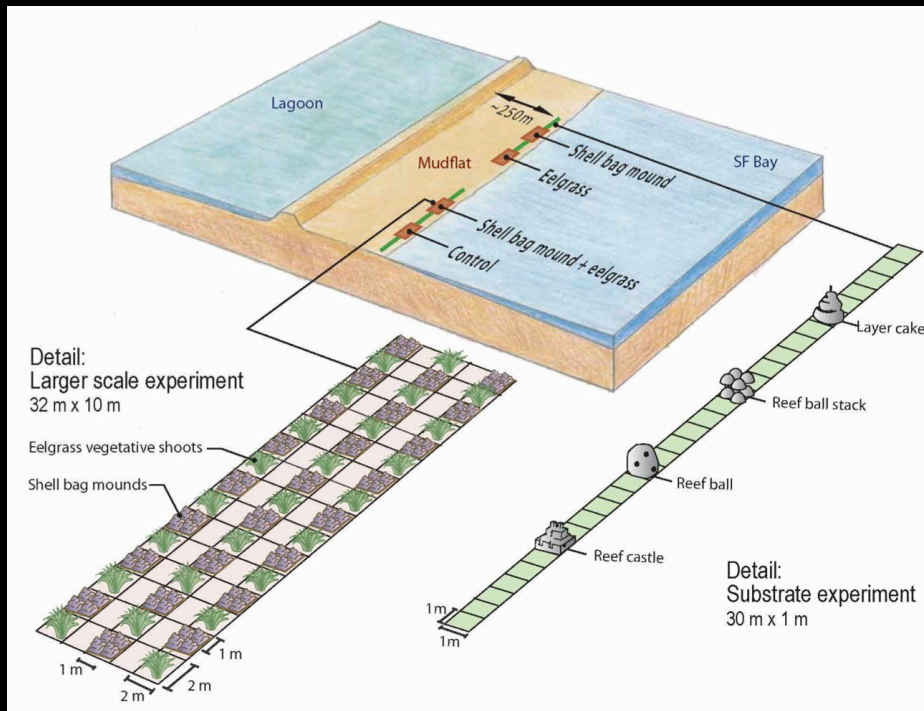
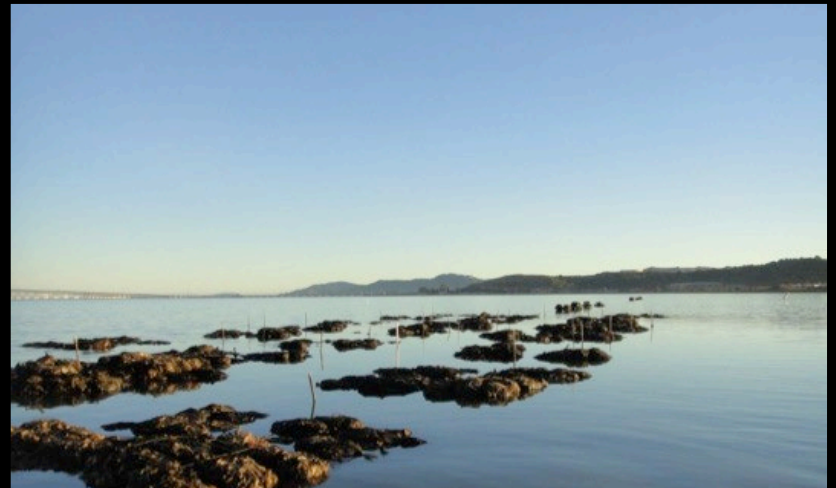
Materials

Construction Methods and Timing

Avoidance of Species Impacts



San Rafael Shoreline Constructed 2012



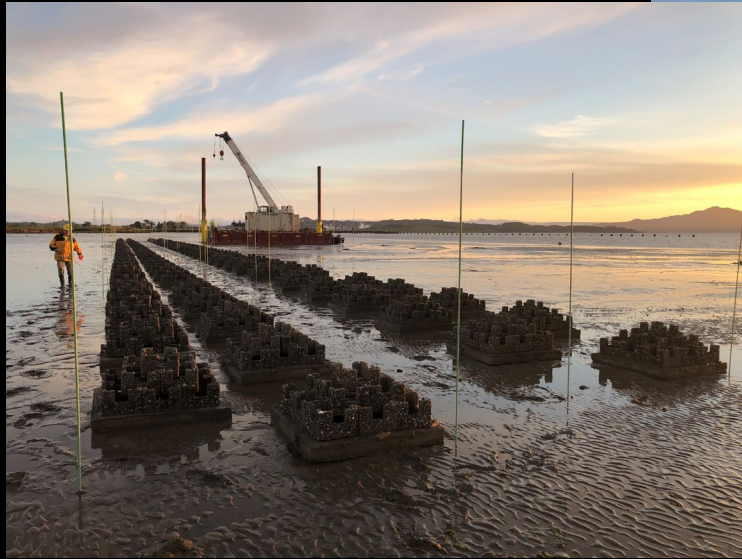
Construction Prep: Pacific Oyster Shell Bags



Construction Prep: "Baycrete" Reef Balls, Layer Cakes, Oyster Blocks



Local Contractors and Equipment

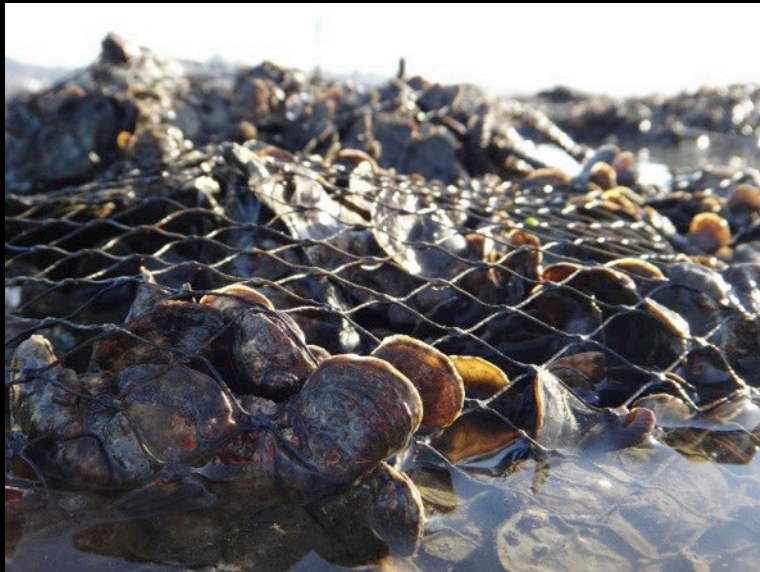


Monitoring is Critical to Building Proof of Concept

- Eelgrass, Oyster, Revegetation success
- Invertebrates- benthic and on reefs
- Fish- traps, seining, acoustic imaging
- Birds- shorebirds and waterfowl
- Physical-
 - bathymetry
 - sediment accretion and erosion
 - reef elements
 - water quality
 - wave attenuation



- < 3.8 million oysters at height of recruitment
- Fluctuations in numbers by year
 - Survival rates, annual recruitment fluctuations
 - Food resource for many species
 - Heavy rain years can impact oysters/eelgrass
 - Non-natives present, but not higher densities than native sp/control sites



Photos, S. Kiriakopoulos

Habitat and Benefits to Birds, Fish, Wildlife



Physical Shoreline Benefits
Reduce Wave Energy ~30%
Sedimentation, reductions in erosion



Regionally Advancing Living Shorelines

Goals:

COLLABORATE

DESIGN ACROSS REGIONS

SCALE UP AND BUILD ADAPTATION FASTER

TRANSFER AND SHARE KNOWLEDGE

Tasks:

Baseline Data Collection

Regional Design/Constructability Guidance

Living Shorelines Collaborative

Develop 30-60% Designs at 10 sites

Programmatic Permit Approach

Local Engagement/ Workforce Trainings

