



## San Francisco Bay Subtidal Habitat Goals Update

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February 10, 2017  
Restoration Authority Board Mtg  
Oakland, CA

## Tidal Wetlands- food, filtering, flood control, habitat



## Subtidal Habitat Connections-

submerged areas always covered with water





Photo credits: www.bluewaterimages.com


## SF Bay Subtidal Habitat Goals

[www.sfbaysubtidal.org](http://www.sfbaysubtidal.org)

- Research
- Protection
- Restoration
- Integrated Habitats

## Objectives of Subtidal Goals Report

- Regional 50-year vision to improve subtidal habitats
- Non-regulatory, interagency, collaborative approach
- Science goals to address data gaps
- Protection goals to maintain quality and function
- Specific restoration targets based on phased approach
- Audience: Resource managers, academics, non-profits, etc.



### Project Vision

Achieve a net improvement of the San Francisco Bay's subtidal ecosystem over the next 50 years through restoration, science, and protection.

**To achieve this improvement, the project proposes:**

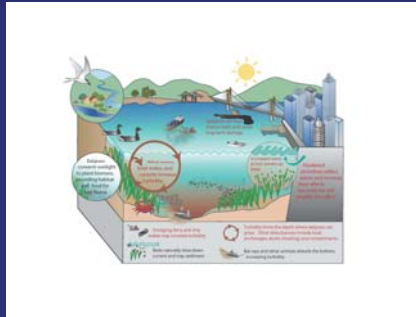
- Increasing the quantity of desired but currently limited habitats;
- Emphasizing support of native species;
- Increasing our understanding of the physical and biological processes that affect subtidal habitats and species.



### Subtidal Habitat Conceptual Models

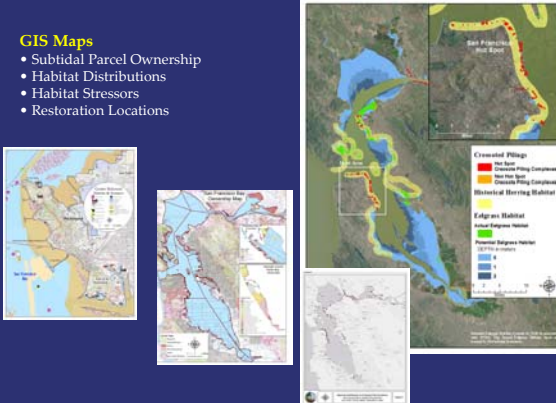
#### Science Goals and Research Questions

Wim Kimmerer



### GIS Maps

- Subtidal Parcel Ownership
- Habitat Distributions
- Habitat Stressors
- Restoration Locations



### Cross-Habitat Goals


- Climate Change
- Invasive Species
- Oil Spills
- Marine Debris
- Public Education

### Habitat Integration

- Subtidal-Wetland Design Integration
- Living Shorelines



### Restore COMPLETE SYSTEMS




### Hard Infrastructure Impacts to Shorelines and Wetlands

- Dredging, fill, structures
- Loss of habitat values and species
- Impacts, erosion, high cost
- SLR: seawalls, groins, levees





### Potential Benefits Nature-Based Infrastructure

- Biologically dynamic borders
- Species support and connectivity
- Shoreline protection
- Climate adaptation and habitat resilience
- Cost effective, sustainability

### Nature's Architects

**Native Olympia Oysters and Eelgrass**

- Heterogeneity = increased niche space
- 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
- Deformities to herring embryos

**Pacific cordgrass and Marsh gumplant**

- Builds habitat, traps sediments
- Food chain- seed and detrital food resources
- Foraging and breeding area for Ridgway's Rail

**Sites Selected for Tier 1 Screening Process**  
 San Francisco Bay Oyster Shellfish, San Francisco Bay Oyster Shellfish, and Pacific Herring Habitat Restoration Project

### SF Bay Living Shorelines Project

- Link to Subtidal Habitat Goals
- Pilot scale, experimental approach
- Monitor: invertebrates, fish, birds
- Evaluate physical benefits
- Pilot climate change adaptation
- Apply lessons learned

> 3 million oysters at height of recruitment!

Photos: S. Kiriakopoulos

### Increase in Species Use

15 cm sediment accretion along reefs

**Physical Benefits**

- most energy lost on broad mudflat
- but reef extracts 30-50% more at MSL water levels

24 cm in center

Photos: S. Kiriakopoulos, Damien Kunz, and Sally Rae Kimme

### Hidden Habitats Play a Key Role

Shoreline Protection with Biological and Physical Goals

Design to address Sea level rise and erosion

More Pilot Projects needed – BMP's & Design Criteria

Regulatory Challenges- bay fill, experimentation

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