STATUS, TRENDS, AND FUTURE OF EELGRASS IN CALIFORNIA

California Marine Affairs & Navigation Conference (CMANC)
San Pedro, California

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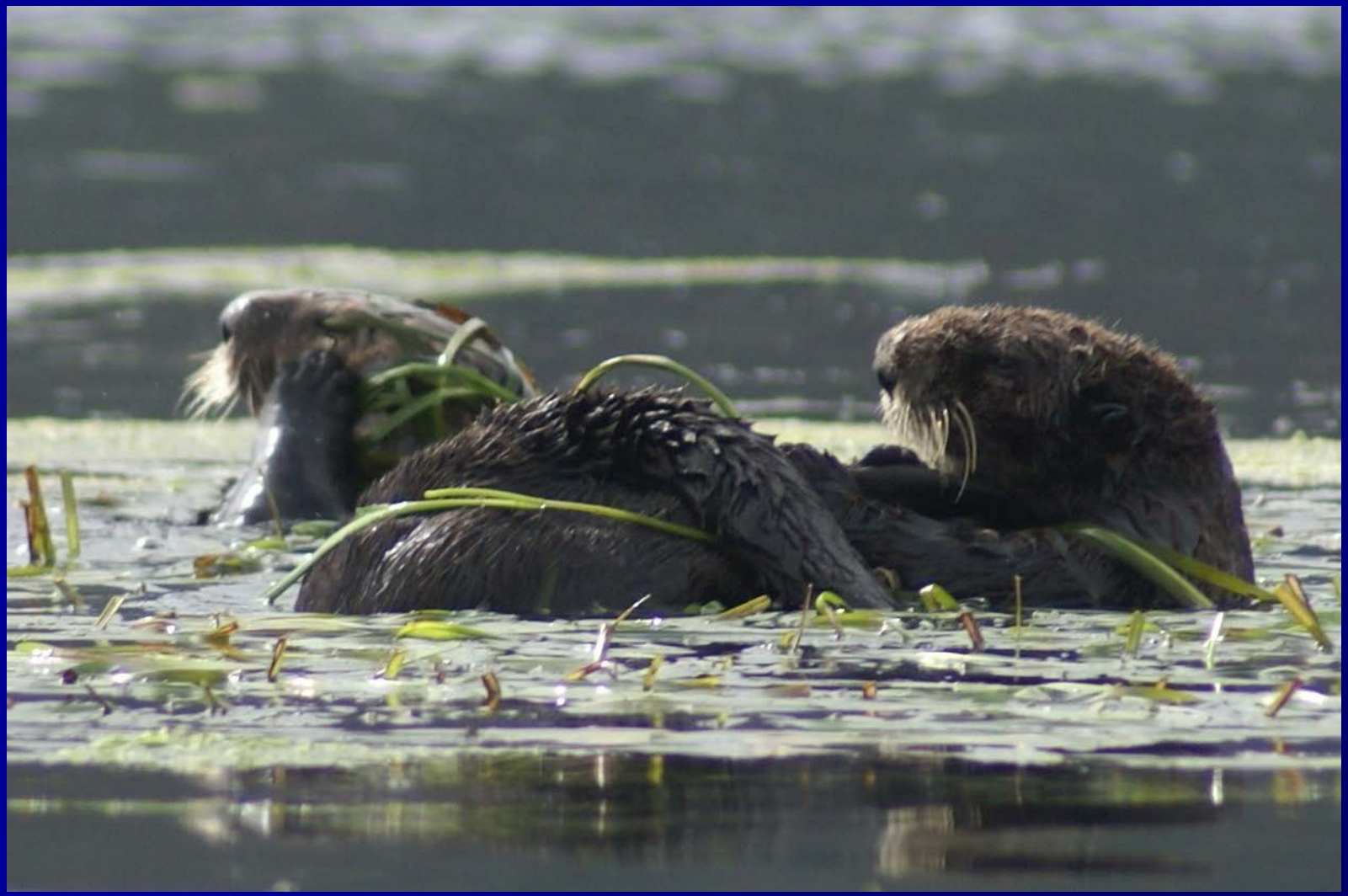
Merkel & Associates, Inc.

Overview

- Status of eelgrass in California
- Recent and future trends in eelgrass distribution
  - Development and Maintenance Activities
  - Wasting Disease
  - Climate Change
- Regulatory landscape relating to eelgrass
  - CEMP
  - Programmatic Planning
  - Eelgrass Mitigation and Mitigation Banking

Obligatory Eelgrass Relevance Slide



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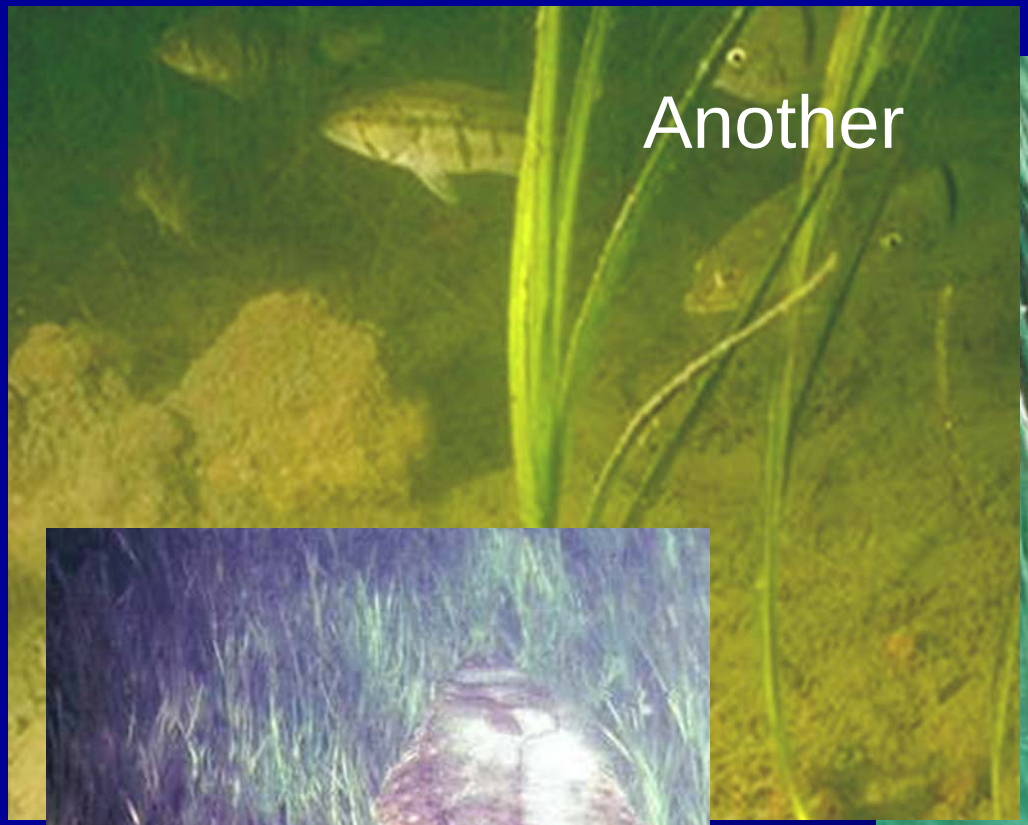

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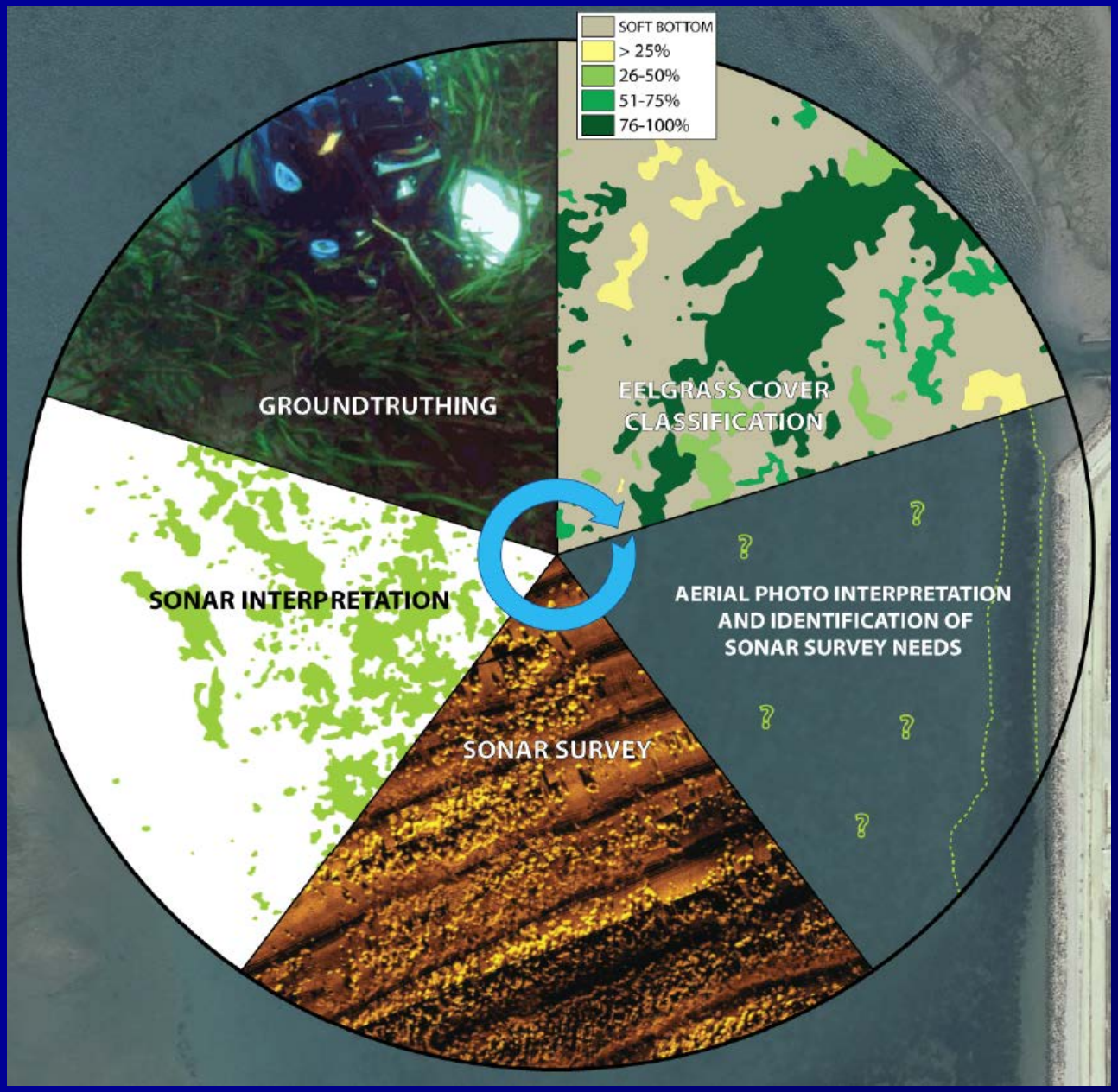
Status of Eelgrass in California

- Multiple surveys and data sources contribute to estimates of eelgrass statewide
- NMFS/CDFW, and others working to fill data gaps
- Approximately 80% of bays and estuaries have been surveyed and eelgrass mapped over 90% of the bays and estuaries by area having been examined
- Less than 20% of the open coastal habitat area suitable to support eelgrass has been examined
- Regional eelgrass inventory survey and mapping differs from project level surveys and mapping

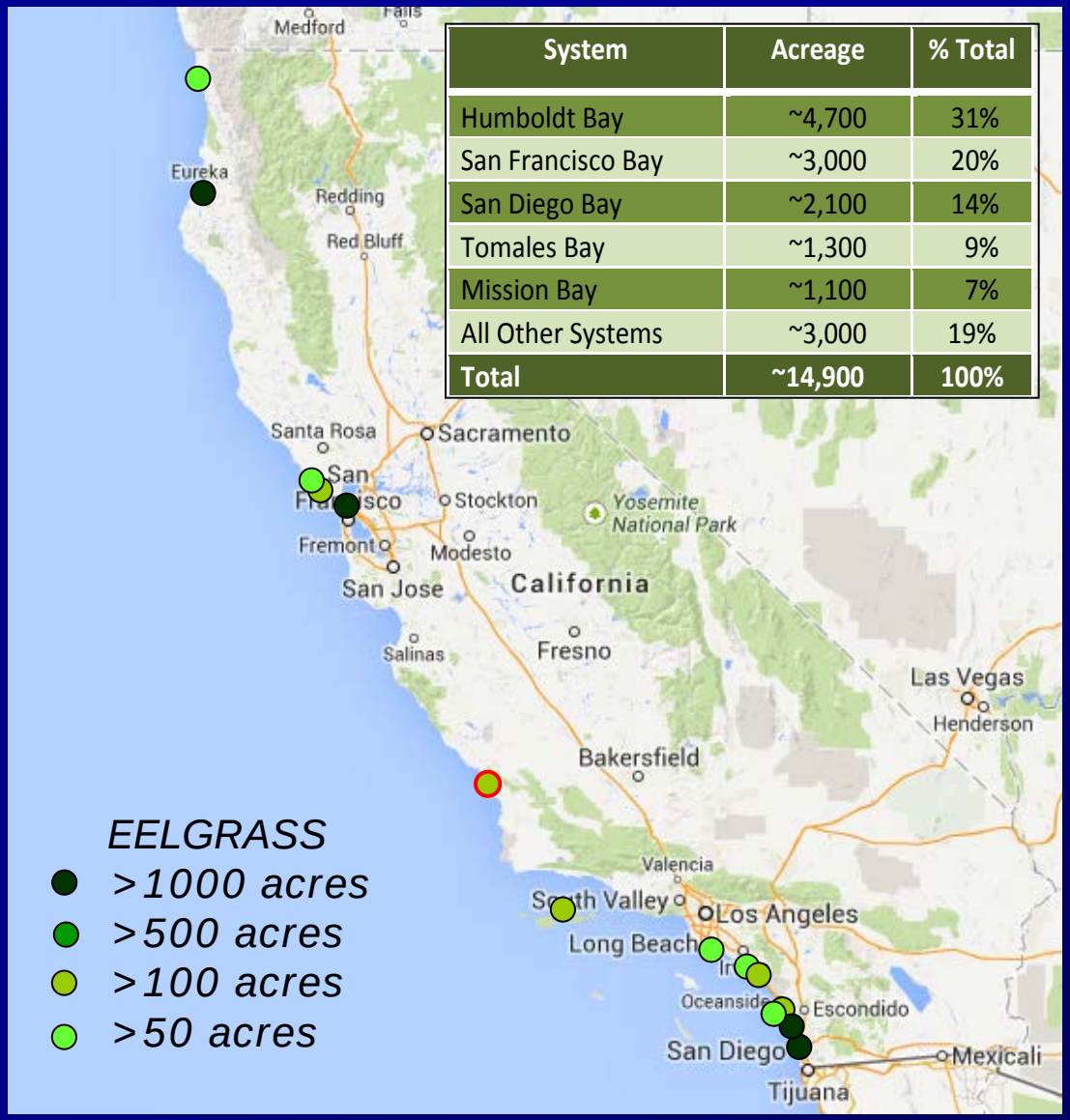
Diagrammatic Survey and Mapping for Regional Inventories



Distribution of Major Eelgrass Beds In California

- *Estimated 15,000 ac. of eelgrass statewide*
- *Five largest beds in California account for 80+% of all eelgrass*
  - *Humboldt Bay*
  - *San Francisco Bay*
  - *San Diego Bay*
  - *Tomales Bay*
  - *Mission Bay*
- *Status update is needed due to recent and significant losses of eelgrass at multiple locations*

System	Acreage	% Total
Humboldt Bay	~4,700	31%
San Francisco Bay	~3,000	20%
San Diego Bay	~2,100	14%
Tomales Bay	~1,300	9%
Mission Bay	~1,100	7%
All Other Systems	~3,000	19%
Total	**~14,900**	**100%**



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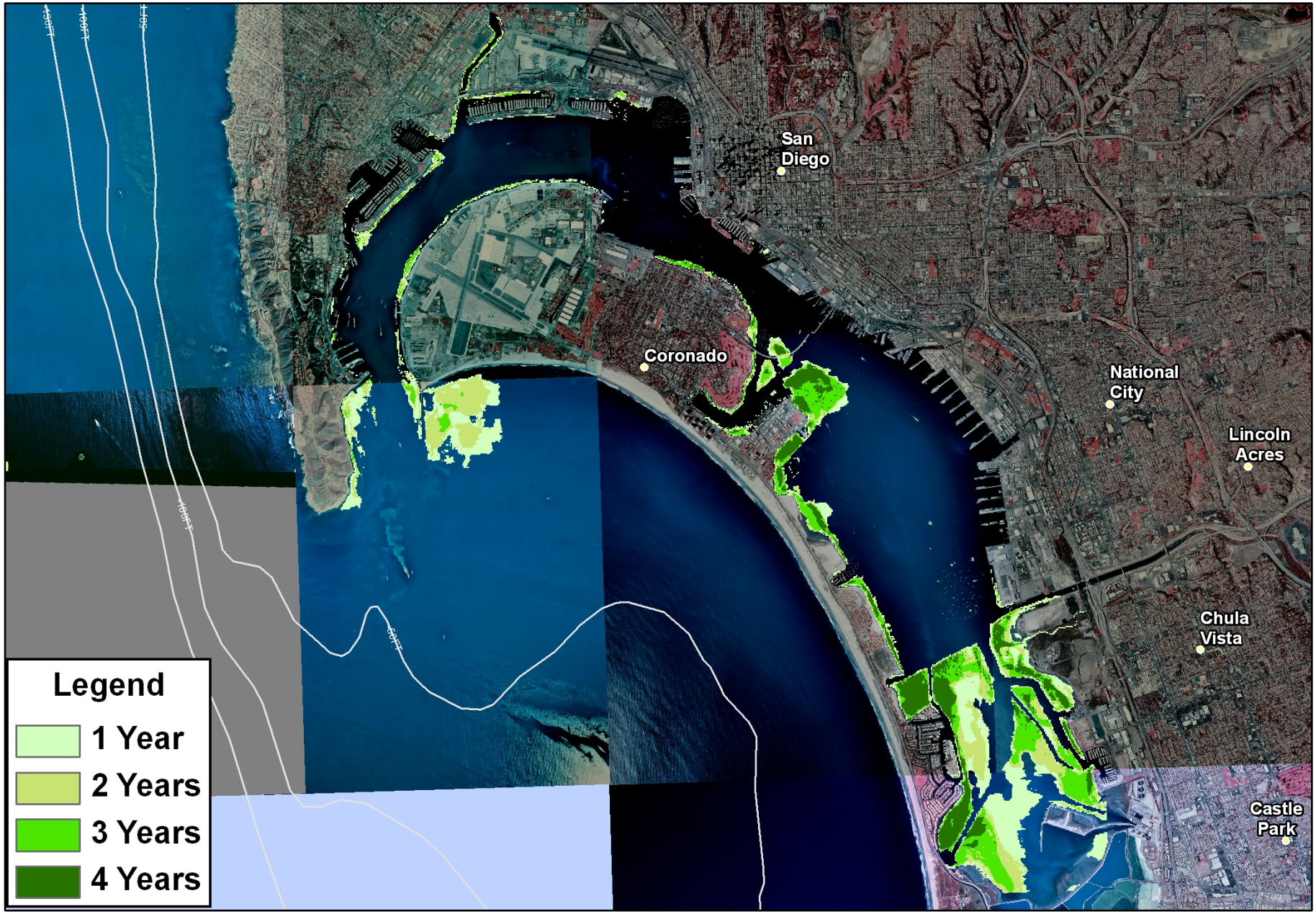
MONITORING PROGRAMS



San Diego Bay Eelgrass Persistence

Years - 1994, 2000, 2004 and 2008

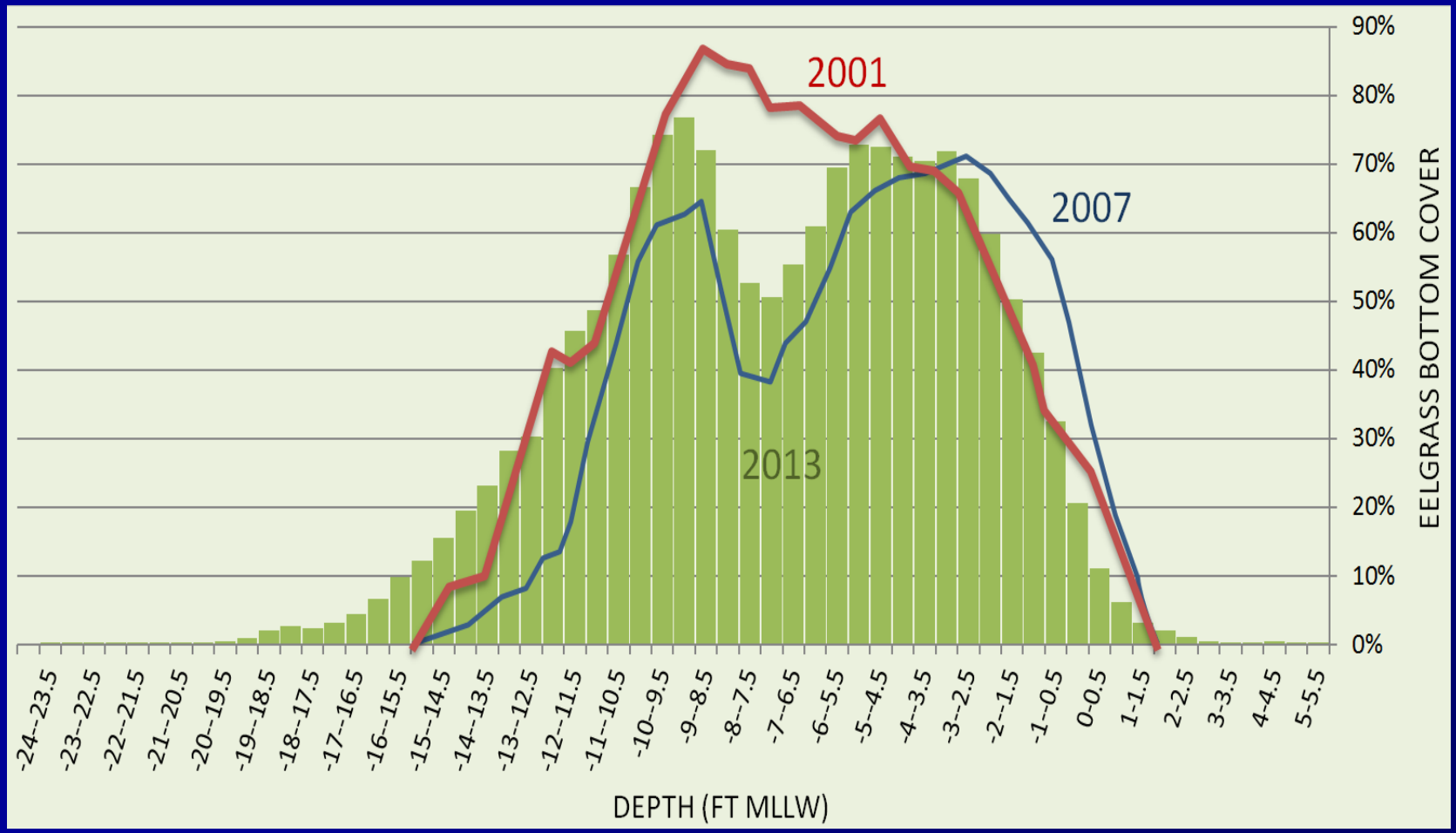
Trends in California Eelgrass 1970s – early 2000s

- Generally expanding trend in eelgrass from 1970s to early 2000s
  - Improved water quality in bays and estuaries
  - Reduced watershed sedimentation and nutrient pollution
  - Reduction of impact rates due to harbor build out being completed
  - Increased regulatory constraints and environmental planning
  - Better tracking and documentation

Trends in California Eelgrass mid-2000s - present

- Eelgrass instability and expanded variability
  - Erratic losses in historically stable beds
  - Scattered evidence of biological controls in beds from about 2007
  - 2005 El Nino losses without substantive recovery in some systems
  - Wasting disease outbreaks expanding south to north
  - Eelgrass collapse in Morro Bay

Mission Bay Depth Distribution



Changes in Morro Bay Eelgrass Beds

2009

2010

Courtesy of Annie Gillespie 2010
Morro Bay National Estuary Program

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2007 – Morro Bay Eelgrass Distribution

- 344 acres

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2010 – Morro Bay Eelgrass Distribution

- 179 acres

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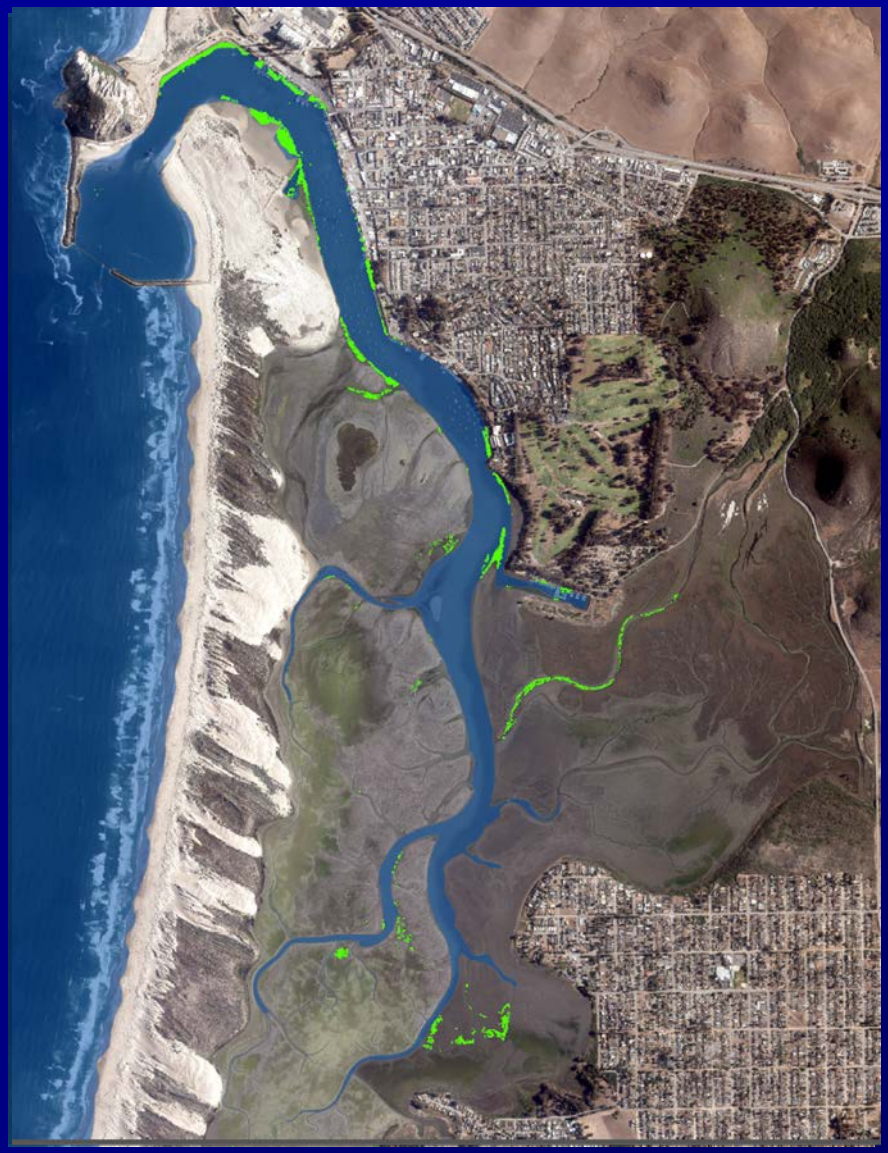
2013 – Morro Bay Eelgrass Distribution

- 17 acres



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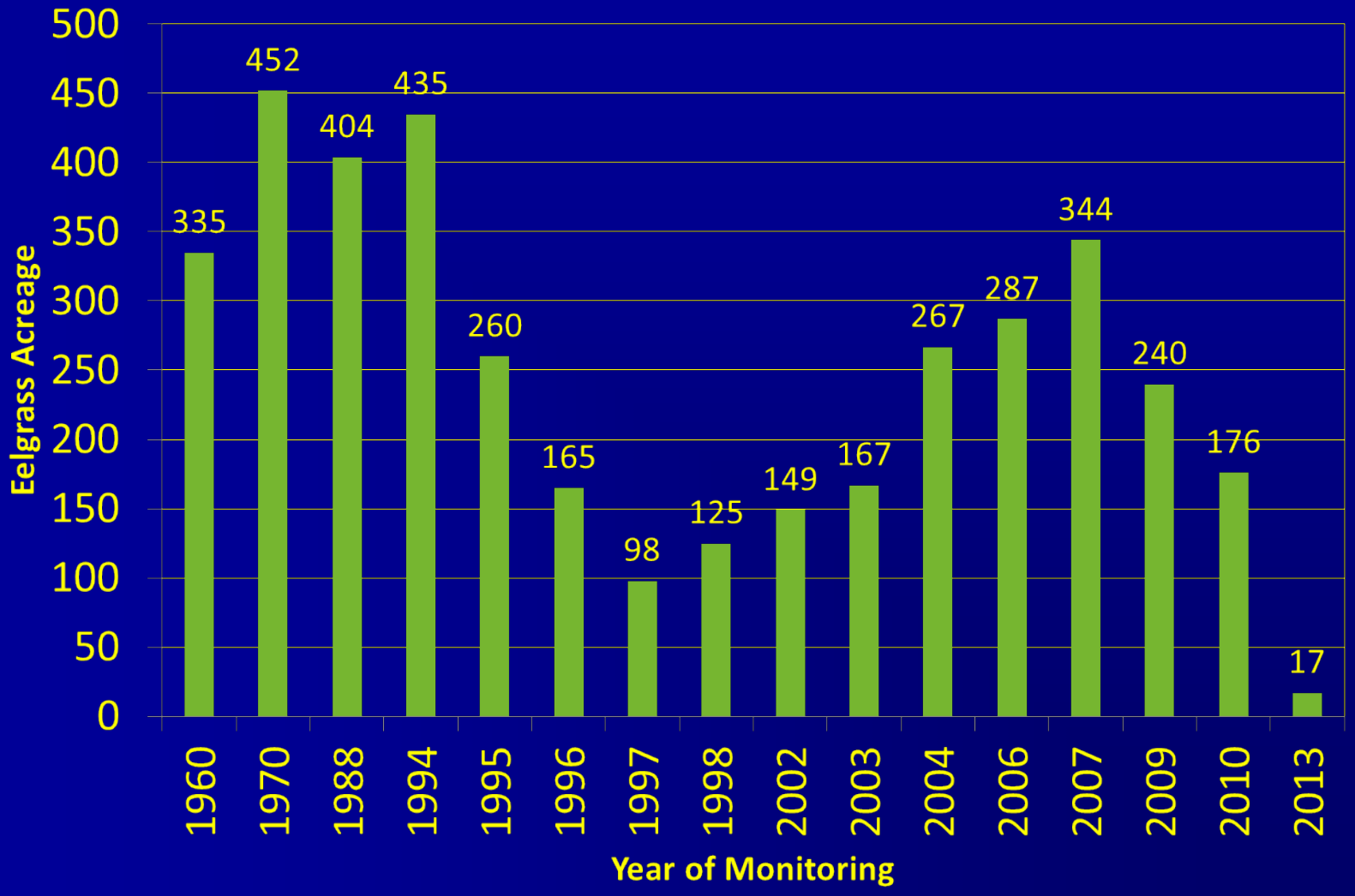
Morro Bay Eelgrass Abundance History



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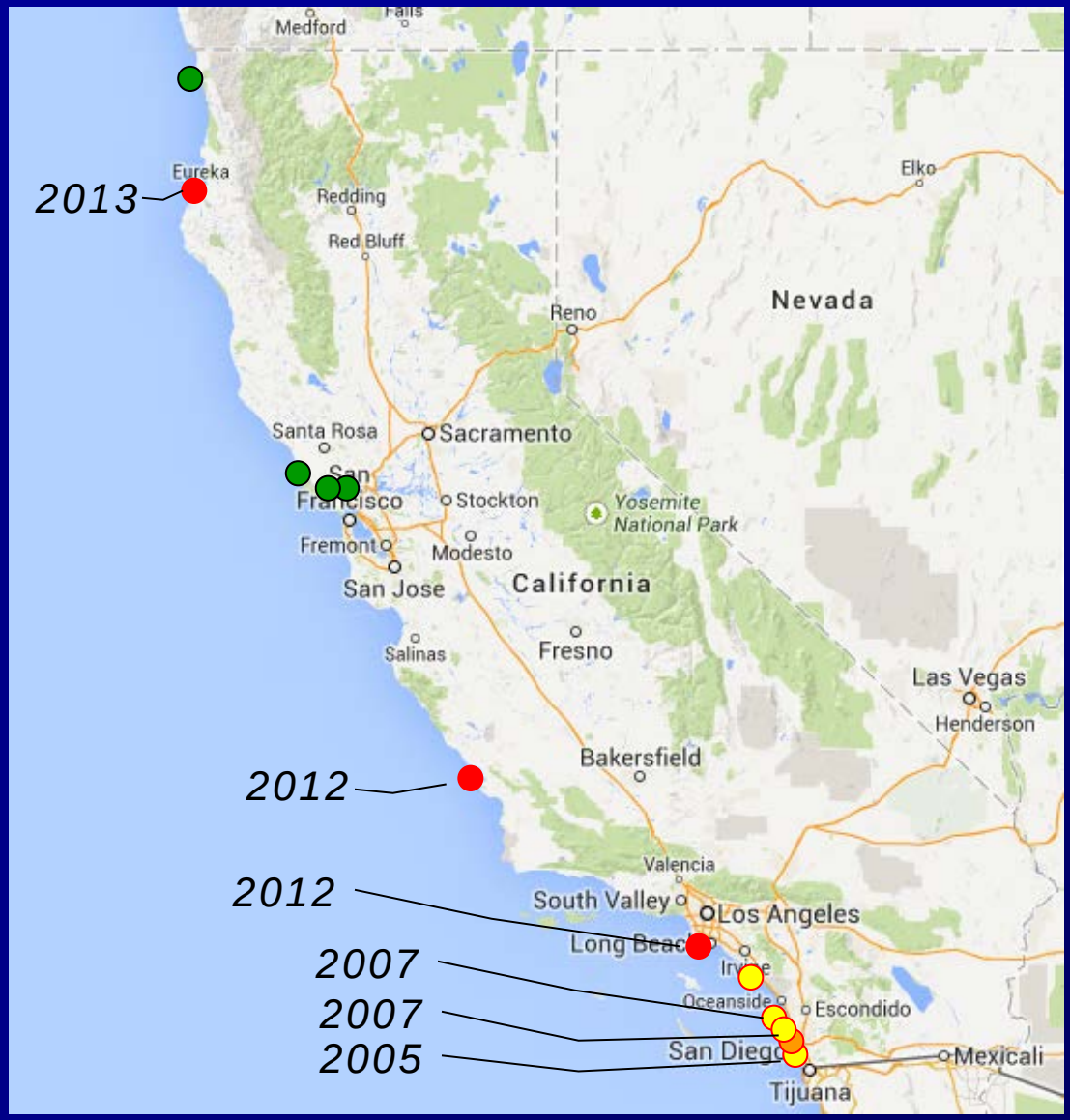
Evidence of Eelgrass Bed Disease In California

- *Anecdotal evidence*
- *Preliminary pathogen evidence*
- *Verified pathogen present*
- *No pathogen evidence*



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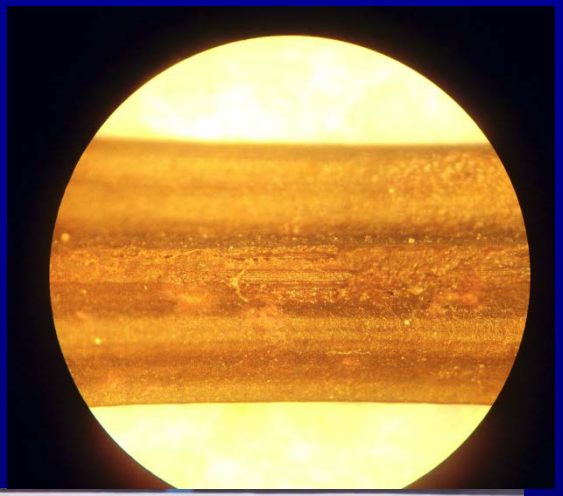
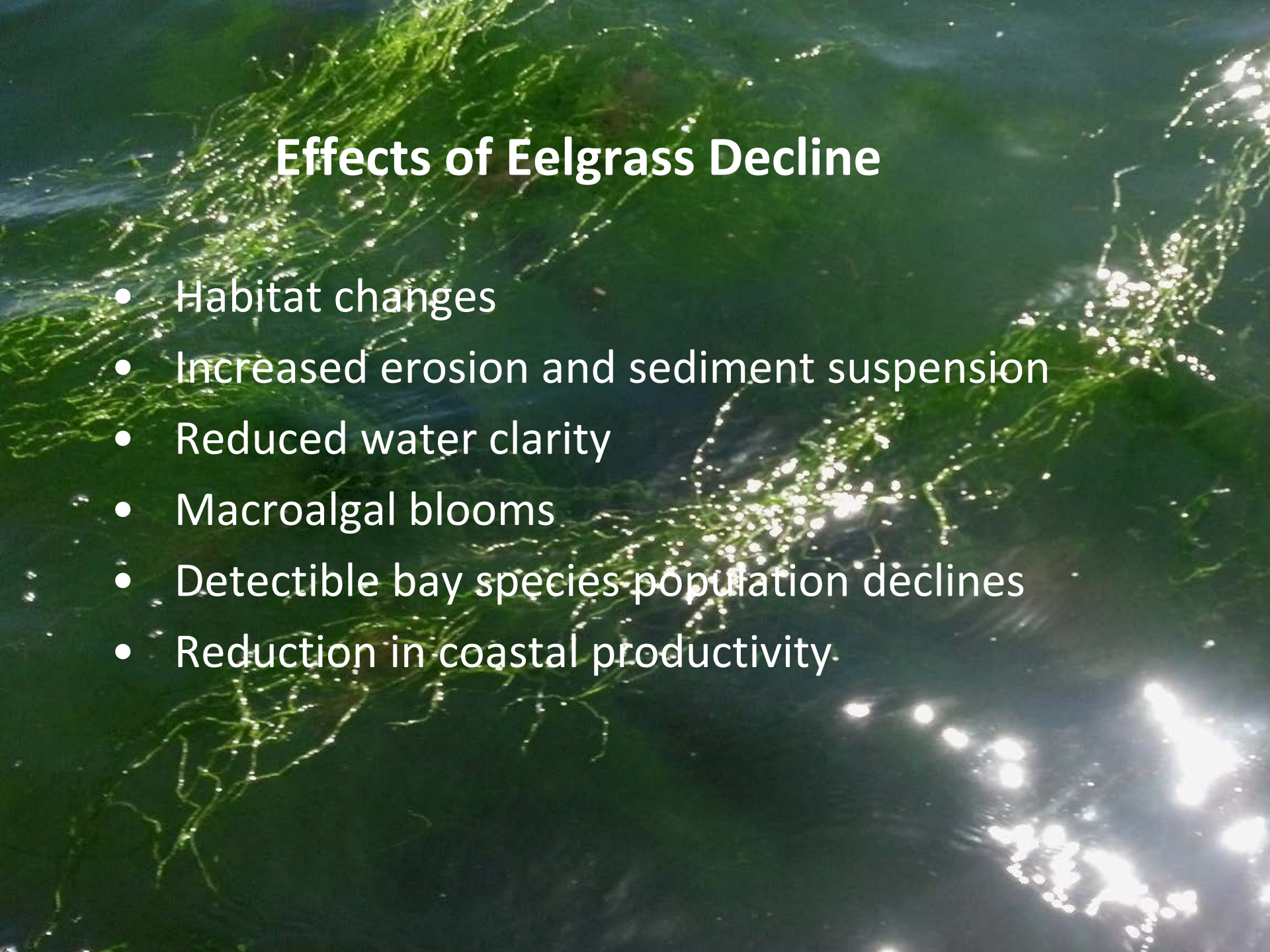
Morro Bay - Eelgrass Disease (Sept 2012)



Humboldt Bay – Eelgrass Disease (Aug 2013)

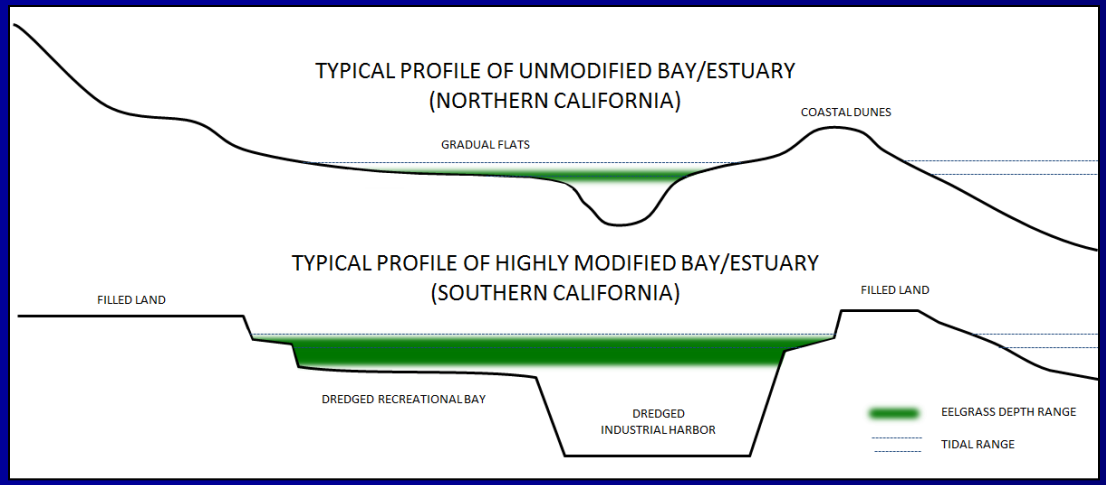


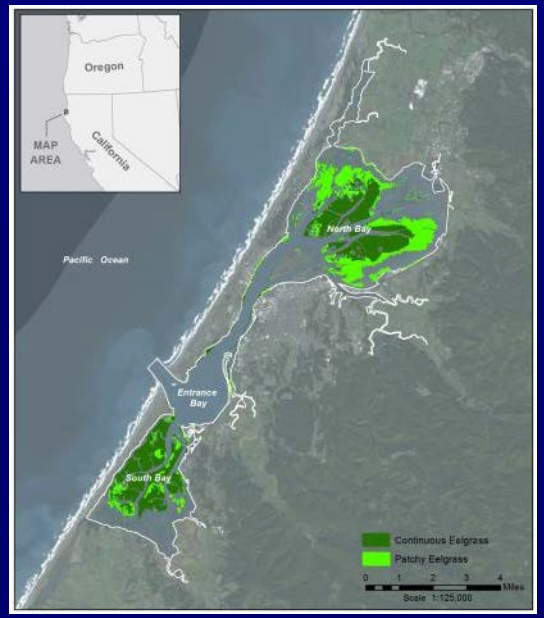
Effects of Eelgrass Decline

- Habitat changes
- Increased erosion and sediment suspension
- Reduced water clarity
- Macroalgal blooms
- Detectible bay species population declines
- Reduction in coastal productivity

Trends in California Eelgrass Future

- Dependent on climate patterns and location
  - SLR will be devastating to eelgrass in southern California
  - SLR may increase eelgrass in Humboldt Bay
  - Climate instability will result in eelgrass instability and most likely significant losses based on various scenario model predictions



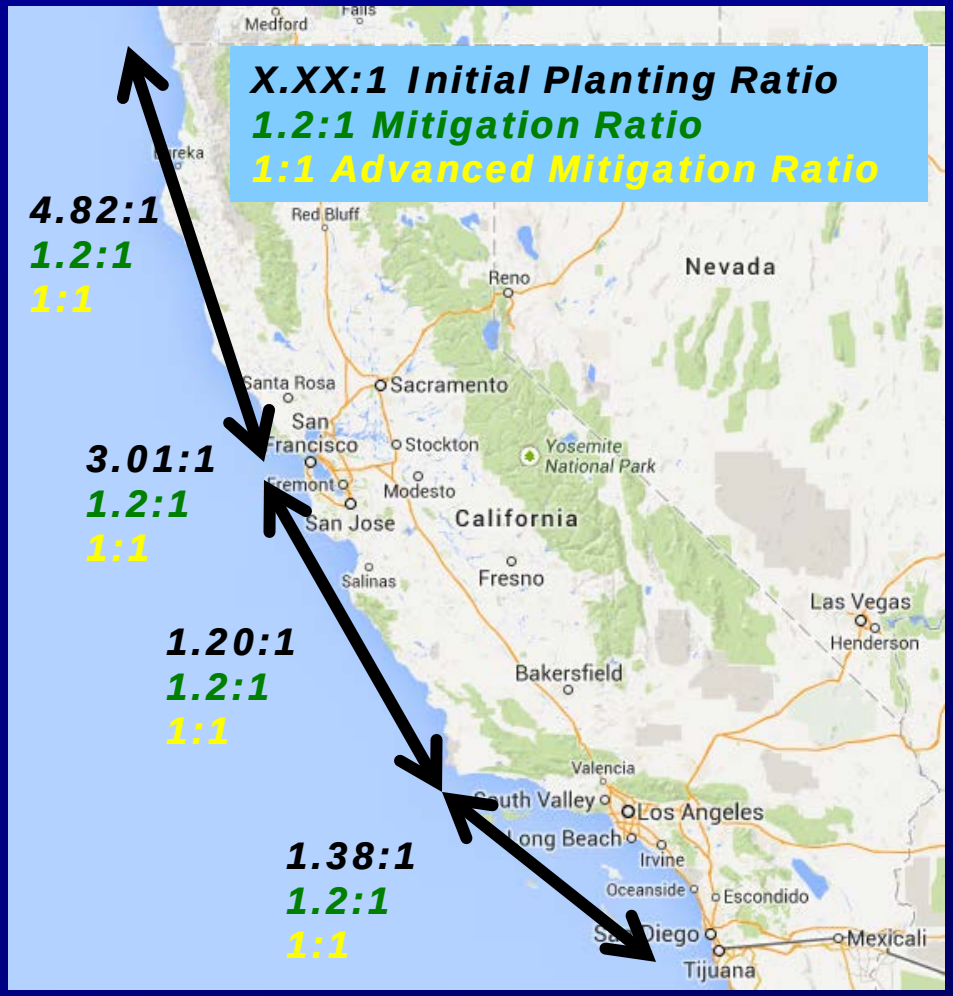


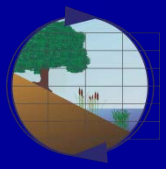
California Eelgrass Mitigation Policy (CEMP)

- Adopted NMFS (October 2014)
- Builds on SCEMP (1991)
- Establishes policy on agency handling of eelgrass impacts through regulatory framework
- Established mitigation standards statewide at 1.2:1 (replacement to impact)
- Establishes restoration target standards based on regional restoration success history
- Articulates agency support for comprehensive eelgrass planning

CEMP Ratios

- Ratios vary by region





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Monitoring and Management Planning

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Eelgrass Restoration Programs


The Black Brant Group.org
Morro Bay, CA
MORRO COAST
AUDUBON
SOCIETY
U.S. FISH & WILDLIFE SERVICE
MORRO BAY
NATIONAL
ESTUARY
PROGRAM
HIND
FOUNDATION
Preserving our Cultural Heritage
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GUERRILLA GARDENING
CLUB
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
Partners in
Eelgrass
Recovery
JOHN MUIR
CHARTER SCHOOL
PIZZA PORT
Surf First
Eat Later
Depth
Perceptions
Diving
Services
MORRO BAY
CALIFORNIA
CAL POLY
Center for Coastal
Marine Sciences
CALIFORNIA CONSERVATION CORPS
CCC
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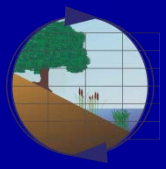
Eelgrass Restoration



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Eelgrass Restoration

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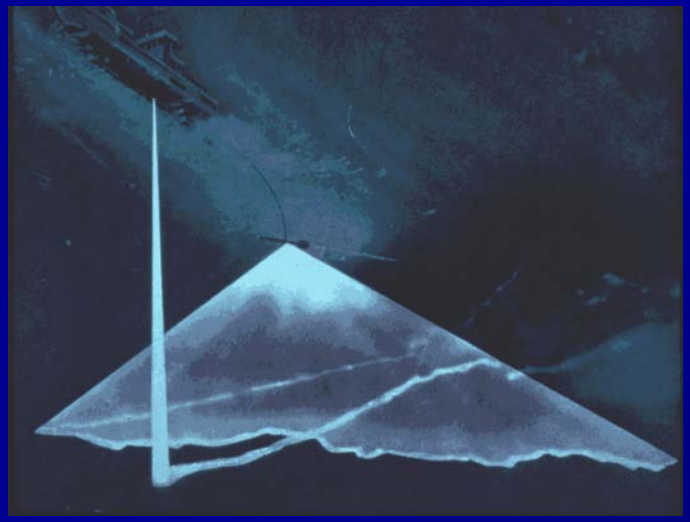
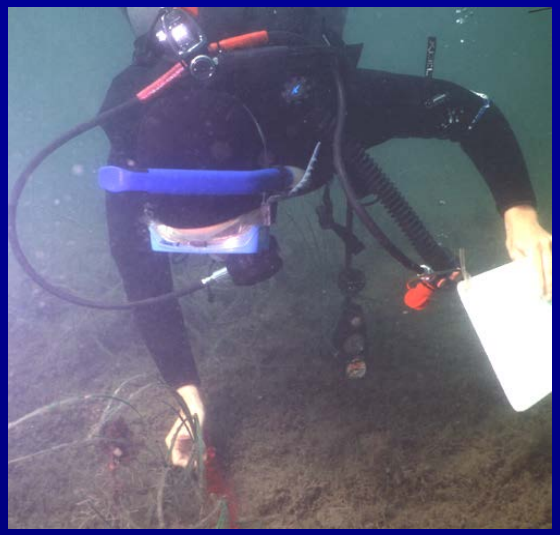
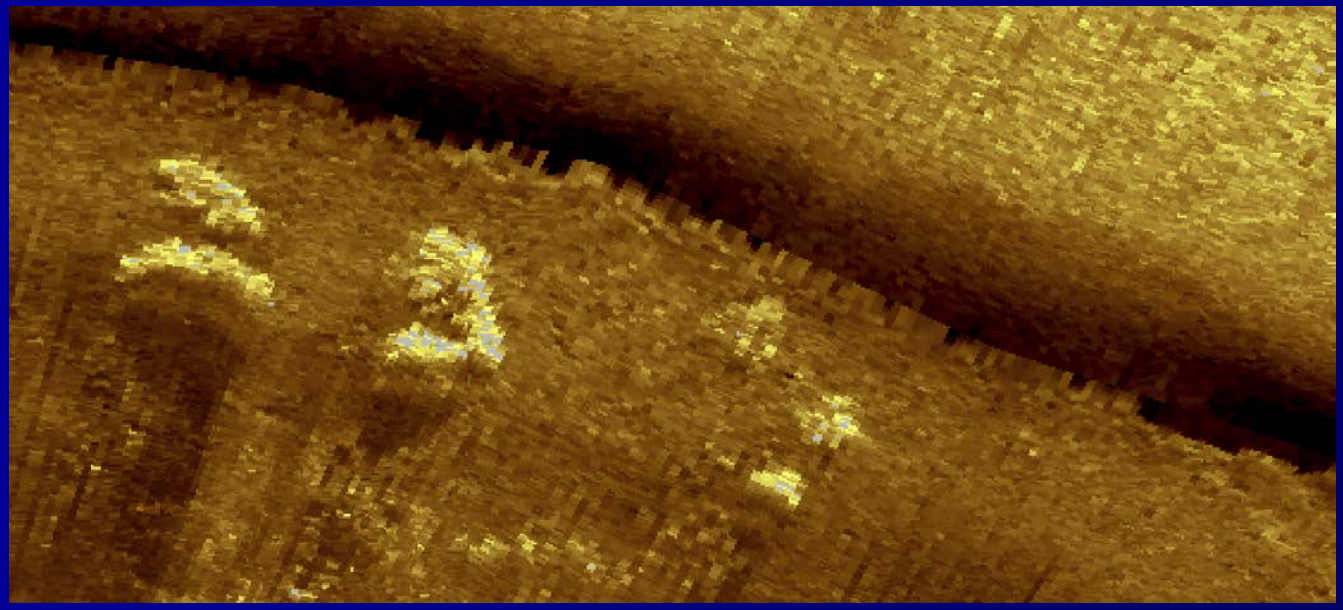
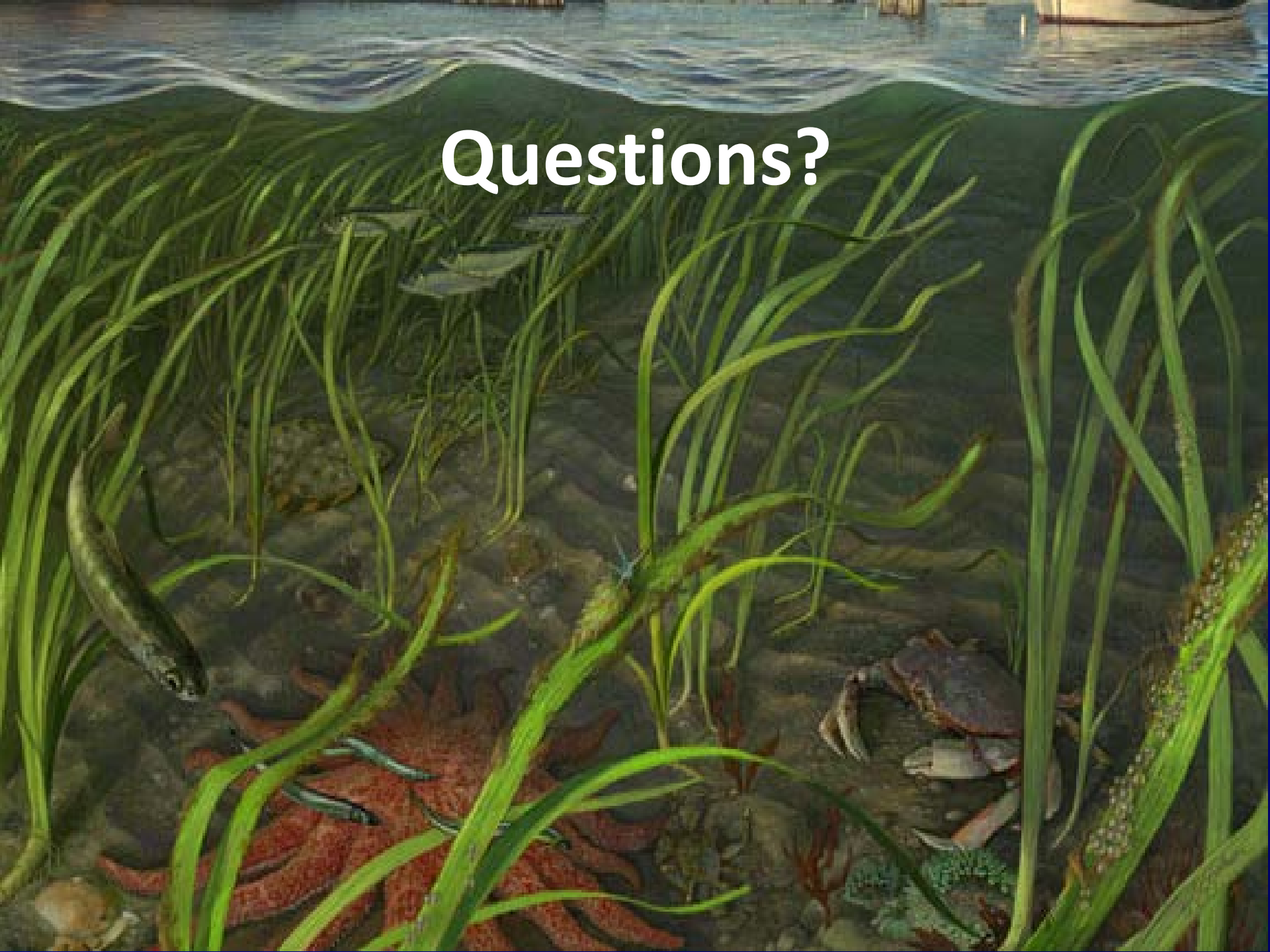






Eelgrass Restoration in the State

- Over 80 eelgrass restoration projects since 1976
- Over 150 acres transplanted and over 450 acres of new eelgrass from restoration
- Major gains
  - USN/Port/San Diego Banks (20+ ac.)
  - Mission Bay Sail Bay/ South Shores (36 ac.)
  - Batiquitos Lagoon (123 ac.)
  - Bolsa Chica (166 ac.)
  - San Dieguito Lagoon (32 ac.)


Questions?