San Francisco Estuary Wetlands Regional Monitoring Program Interactive Session

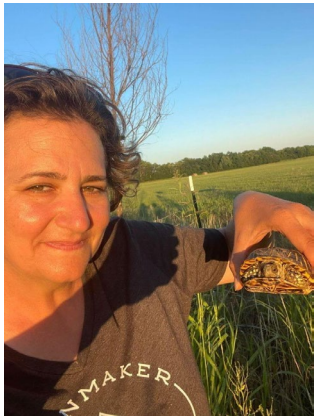
Moderator: Donna Ball, San Francisco Estuary Institute
State of the Estuary Conference
October 29, 2025

Photo: Shira Bezalel

Introduction

Lisa (Schile) Beers, PhD

Co-Lead Scientist



Aviva Rossi, PhD

Co-Lead Scientist

Lightning Talks

Interactive Session

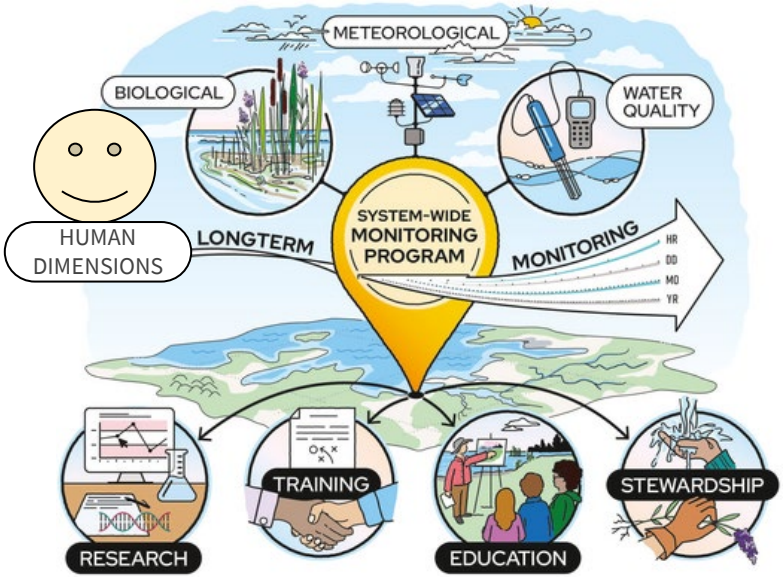
Wetlands Regional Monitoring Program Overview

Aviva Rossi & Lisa Beers
San Francisco Estuary Institute

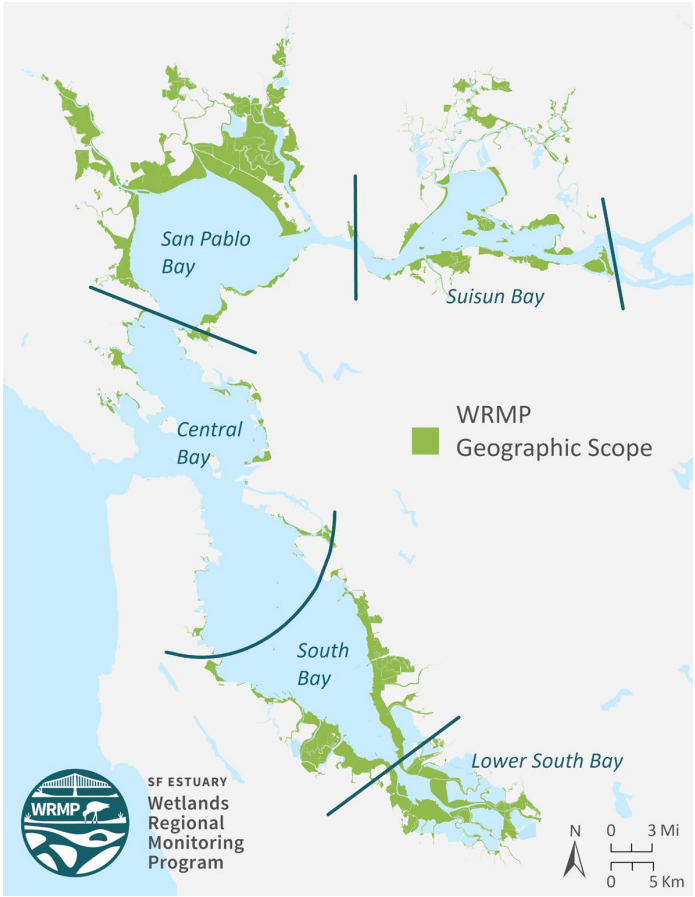
SF ESTUARY
Wetlands
Regional
Monitoring
Program

Why Regional Monitoring?

- This large estuary is an **interconnected system**
- Provides answers as to **how tidal wetlands are faring regionally,** especially in light of **sea-level rise**
- Advance tidal wetland science and ensure the continued **success of restoration projects**
- Create and store shareable **regional data that use consistent methods**



Modified from Reinl et. al (2025)



WRMP Mission

The WRMP delivers coordinated regional monitoring of the San Francisco Estuary's wetlands to:

- inform **science-based decision-making** for wetland restoration and adaptive management and
- increase the **cost-effectiveness** of **permit-driven monitoring** associated with wetland restoration projects.

Implementing Partners

SAN FRANCISCO ESTUARY PARTNERSHIP

SFEI San Francisco Estuary Institute

WRMP Development

25 Year Visioning and Strategy

Concept sharing, championing, team building

2016-2022

Program Development

Program Administration
Governance
Science Framework
Outreach

Funding USEPA and in-kind

2022-Current

Program Implementation

Operationalize Monitoring Site Network
Align Metrics and Indicators
Regulatory Coordination
Outreach
Ongoing Program Administration

Funding USEPA, SFBRA, in-kind

2024-Ongoing

Data Collection

Workgroups, SOPs, and Monitoring Plan

Established WG and SOPs:

- Fish and Fish Habitat
- Vegetation
- Hydrogeomorphic
- Geospatial
- People and Wetlands
- Bird (WG only)

Next:

- Bird SOP (2026)
- Mammal WG (2026)

WRMP Science Framework

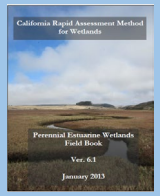
- Guiding Questions
- Management Questions
- Monitoring Questions/Priority Actions
- Metrics
- Protocols

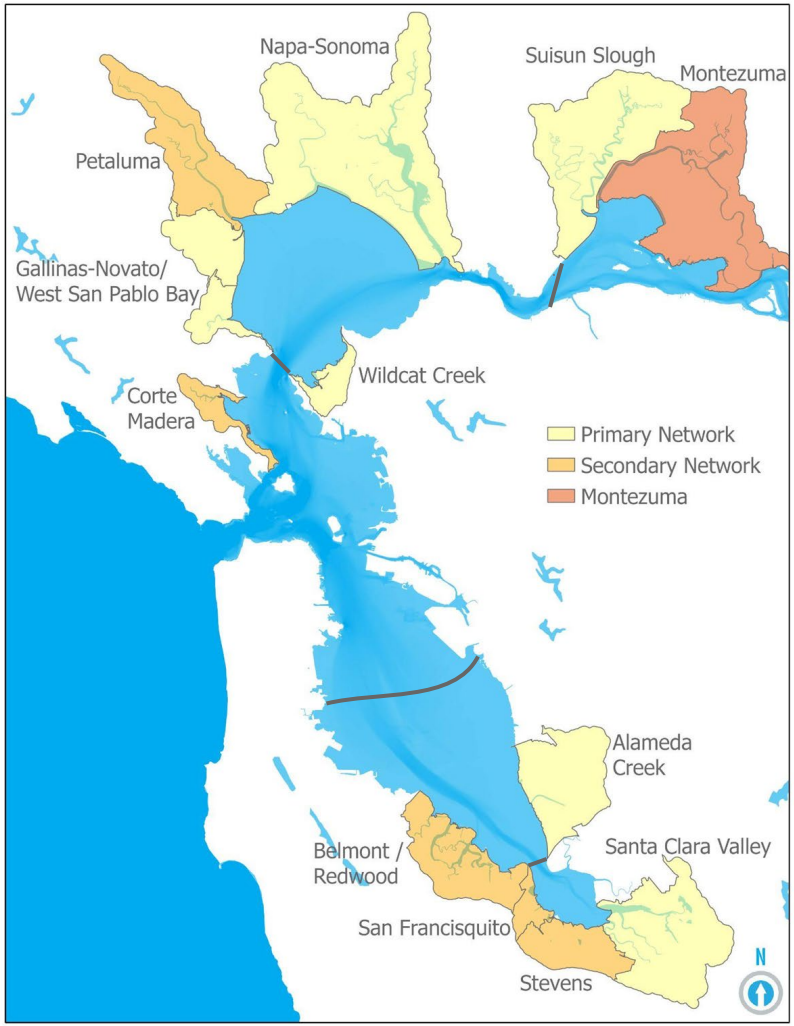
How do policies, programs, & projects to protect & restore tidal marshes affect the distribution, abundance, & health of plants & animals?

How are fish & wildlife **habitats** changing?

What is the distribution & abundance of tidal wetlands?

- Maps of bayland habitats
- Special-status species habitats





Priority Monitoring Site Networks

- Geographic coverage across the estuary
- Address WRMP Guiding Questions & near-term science priorities
- Build upon historical & existing wetland monitoring & projects
- Inform existing and planned tidal wetland restoration projects
- Contribute to climate change planning for underserved communities

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

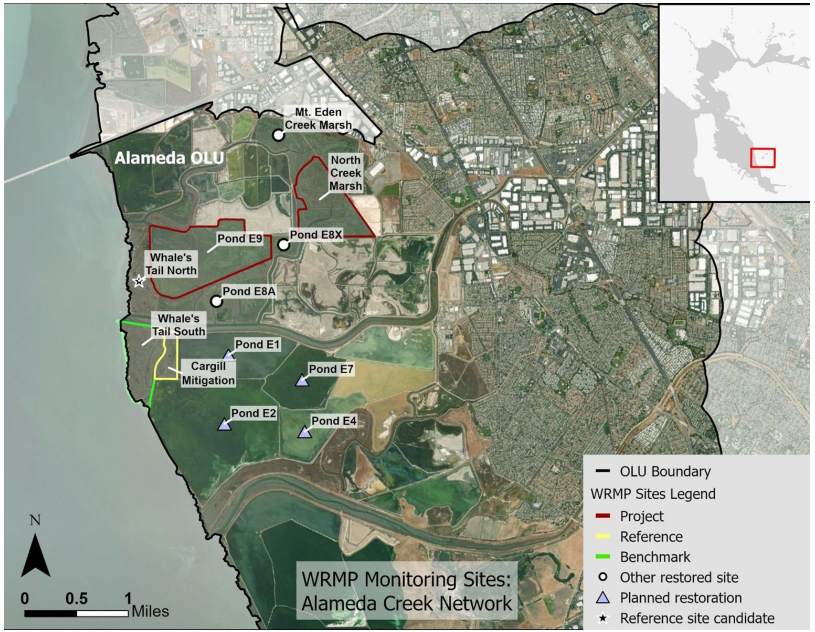
SAN FRANCISCO BAY
RESTORATION AUTHORITY

Regional Monitoring Networks

Benchmark Sites
Represent long-term restoration outcomes

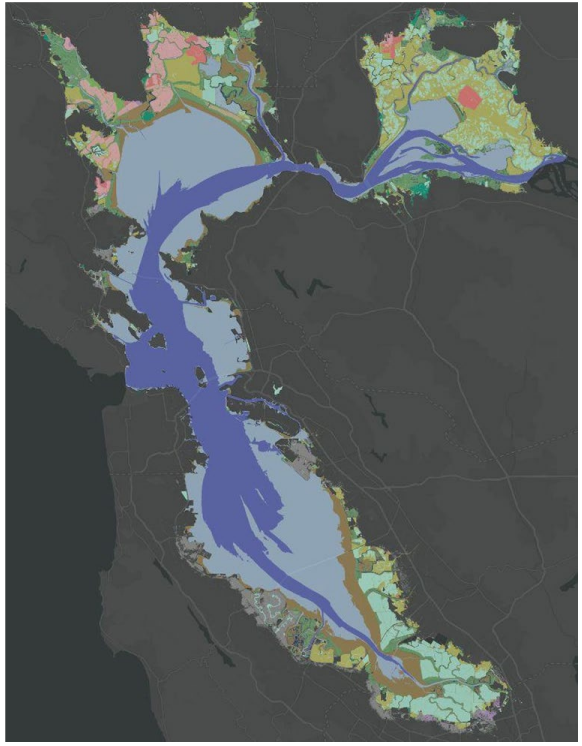
Reference Sites
Represent mid-term restoration progress

Project Sites
Represent recent restoration projects

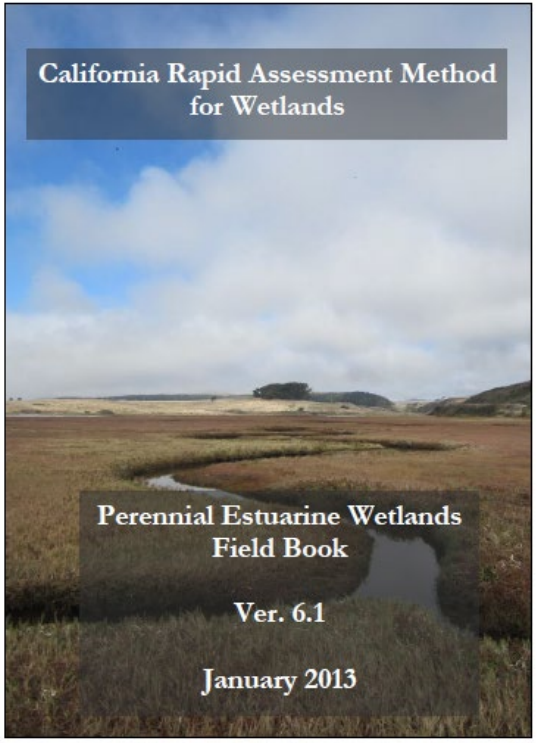


South Bay:
Alameda Creek Network

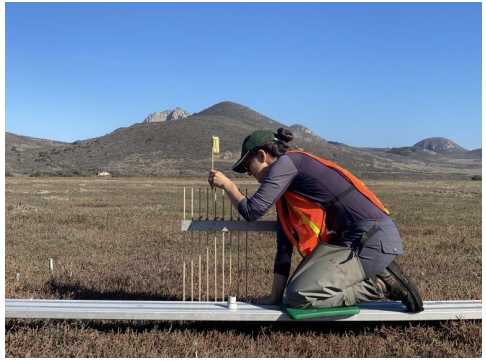
LEVEL 1 LANDSCAPE ASSESSMENT

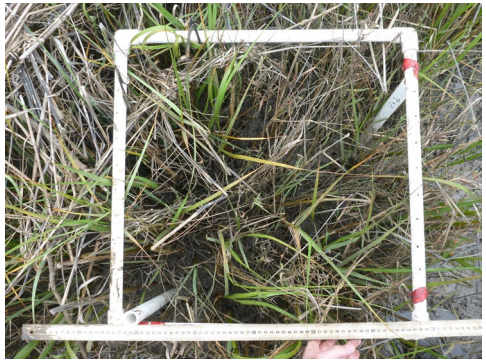


LEVEL 2 RAPID ASSESSMENT



LEVEL 3 INTENSIVE ASSESSMENT





Intensive Monitoring

- High-accuracy marsh surface elevations
- Surface Elevation Tables (SETs)
- Vegetation
- Fish and fish habitat
- Tidal inundation & groundwater levels
- Salinity in channels & porewater
- Ecotone vegetation monitoring

Photos by: Chris Janousek, Aviva Rossi, USGS, SF Bay NERR, UCD OGFE Lab

People & Wetlands

Developing indicators for monitoring human interactions with wetlands:

- Decision-making about restoration projects
- Visitation/recreation
- Stewardship and education events/programs

Developing educational products and interactive maps on:

- Shoreline access
- Restoration projects and their benefits
- Wetlands and flood risk reduction
- Wetlands and legacy contaminants

Near Term Priorities

Regional

- 2025 low tide LiDAR collection across the **entire Estuary**

Sub-Regional

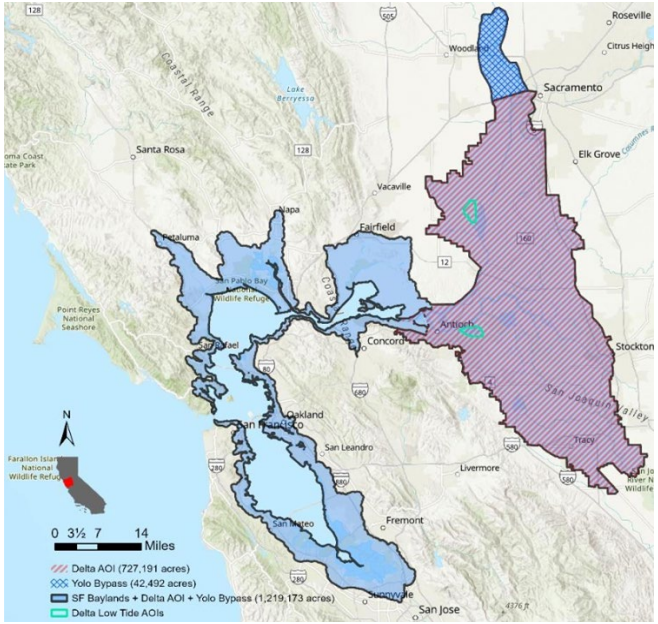
- Horizontal / vertical control
- CRAM
- Water surface elevations / water quality

Site Scale

- SET - marker horizons
- Vegetation & elevation transects, groundwater levels & salinity
- Ecotone transects
- Fish and fish habitat

Programmatic

- Bird Workgroup and SOP



Introduction

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Co-Lead Scientist

Aviva Rossi, PhD

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Lightning Talks

Interactive Session

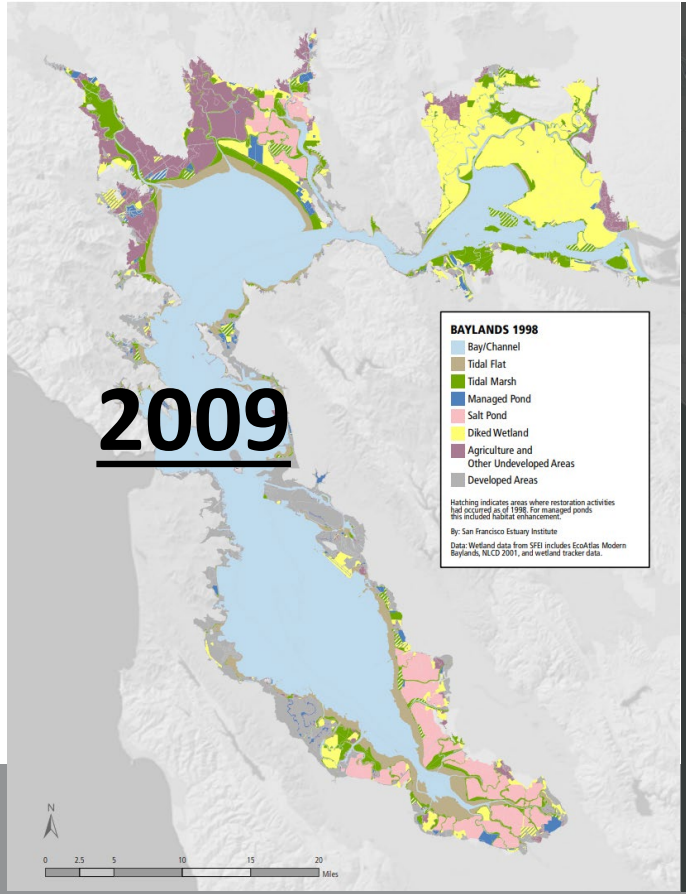
Baylands Habitat Map & LiDAR

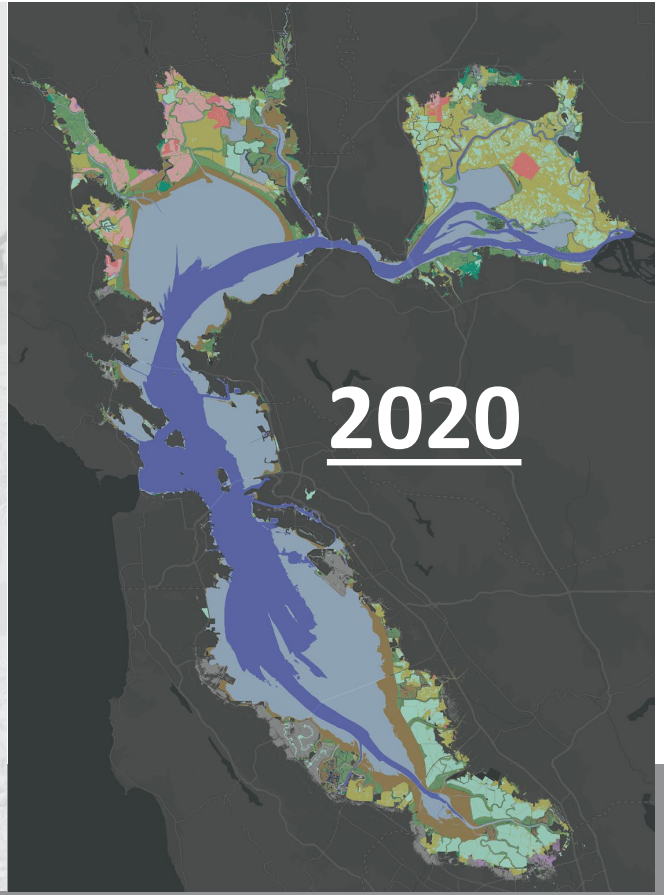
Alex Braud
San Francisco Estuary Institute

Baylands Habitat Map - Consistent & Repeatable

Management Question:

What is the distribution, abundance, diversity, and condition of tidal marsh ecosystems, and how are they changing over time?

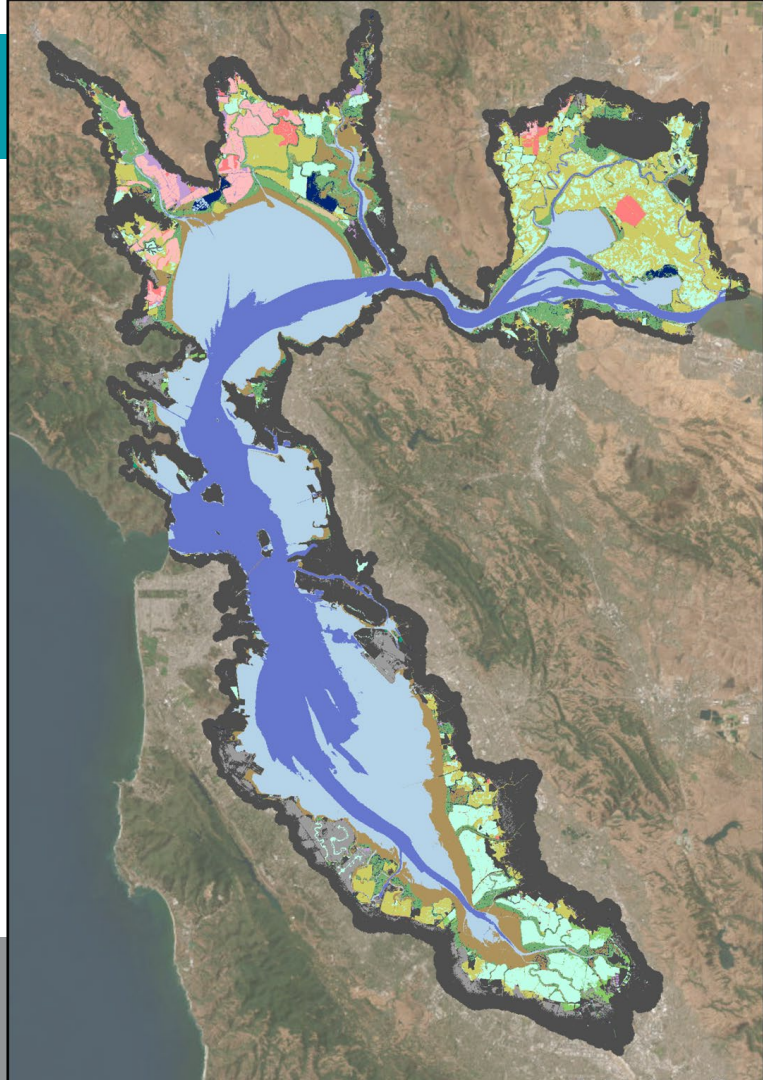




SF ESTUARY Wetlands Regional Monitoring Program

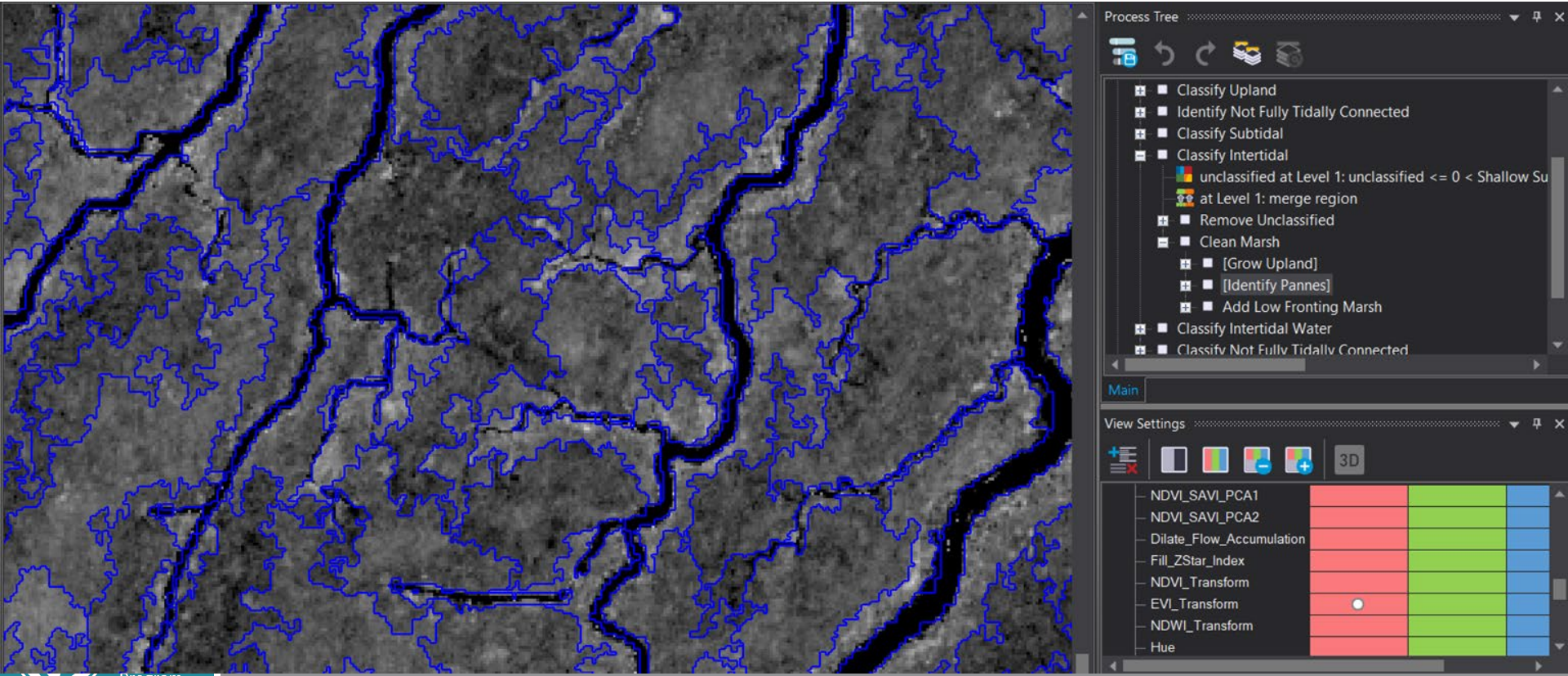
Baylands Habitat Map 2020

- 23 Classes
- Sub-Meter Resolution (60 cm)
- Aim to Re-Map every 3-5 years
- **Built via Computer Algorithm**



SF ESTUARY Wetlands Regional Monitoring Program

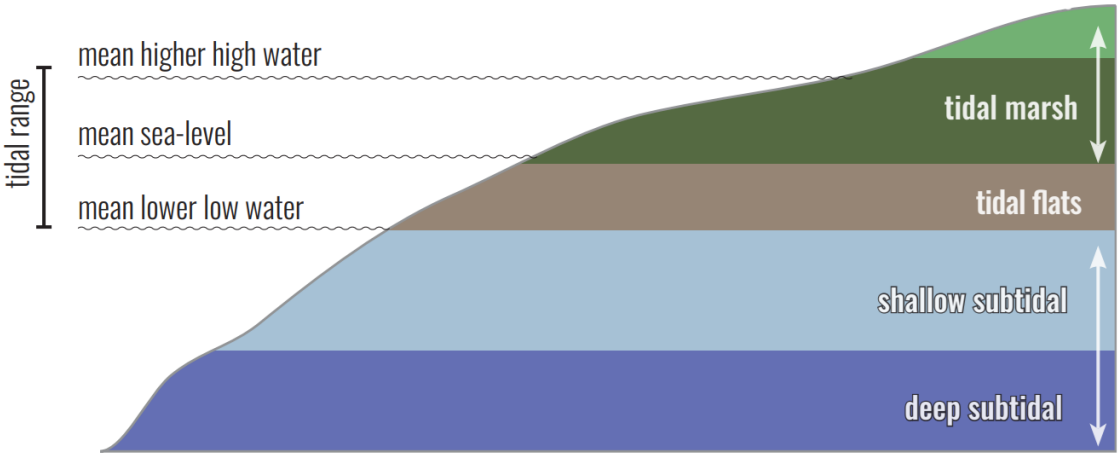
Trimble eCognition Developer - OBIA



What is relative tidal elevation? A Modeled Functional Extent

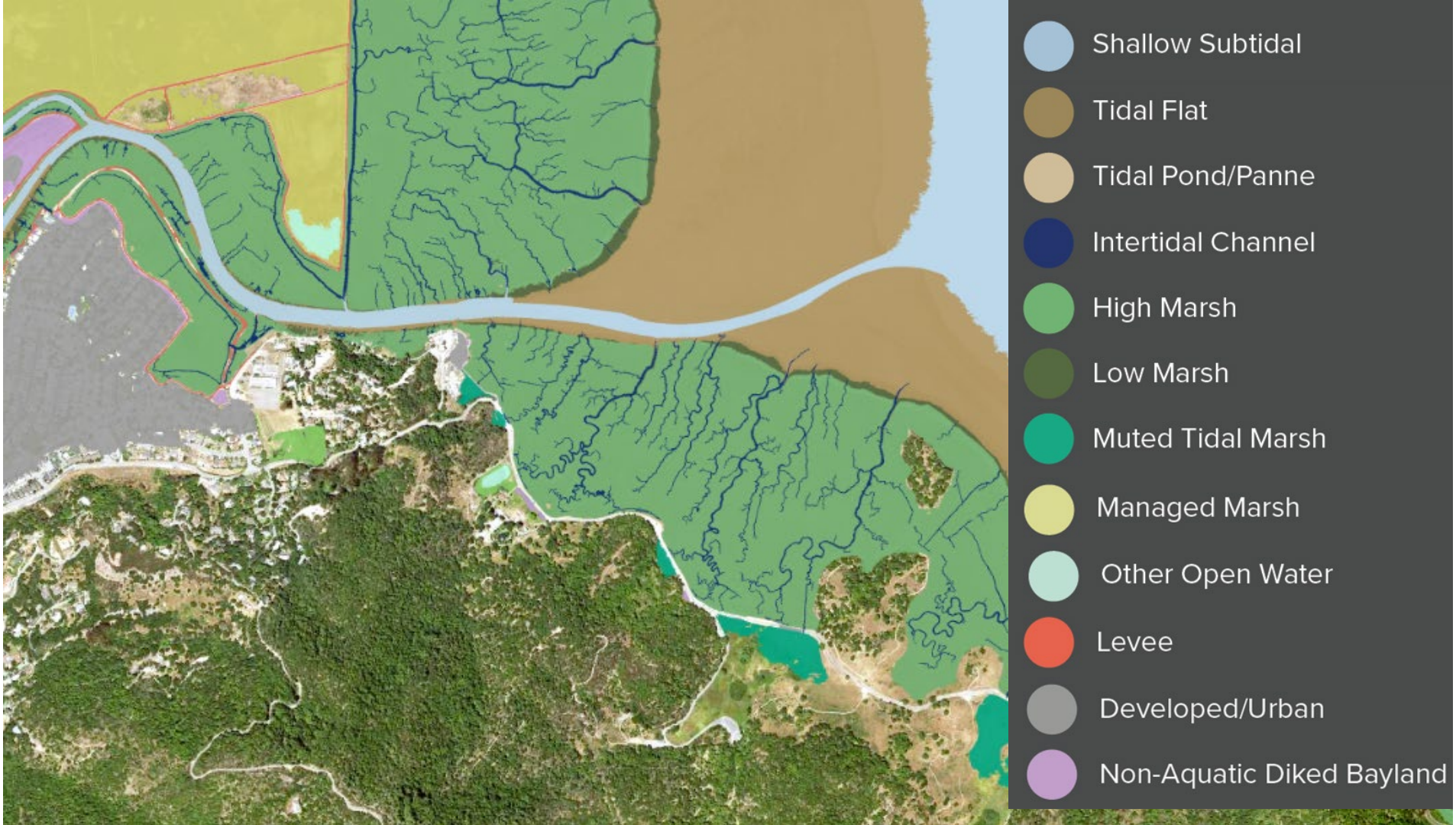
Channel at Hoffman Marsh, Sarah Pearce, SFEI

Schematic illustrating how different relative elevation ranges are suitable for different habitat types, and can be used to support mapping.

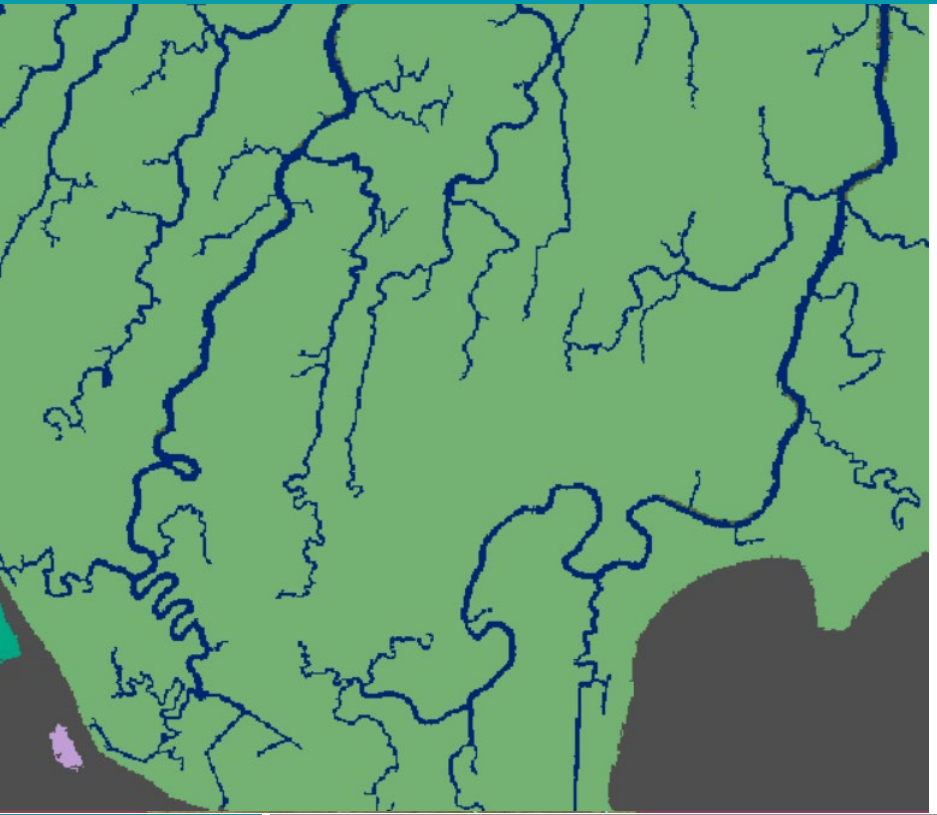


$$z^* = \frac{\text{[Land surface elevation]} - \text{MSL}}{\text{MHHW} - \text{MSL}}$$


Shallow Subtidal
Tidal Flat
Tidal Pond/Panne
Intertidal Channel
High Marsh
Low Marsh
Managed Marsh
Other Open Water
Levee


Shallow Subtidal
Tidal Flat
Tidal Pond/Panne
Intertidal Channel
High Marsh
Low Marsh
Muted Tidal Marsh
Managed Marsh
Other Open Water
Levee
Developed/Urban
Non-Aquatic Diked Bayland

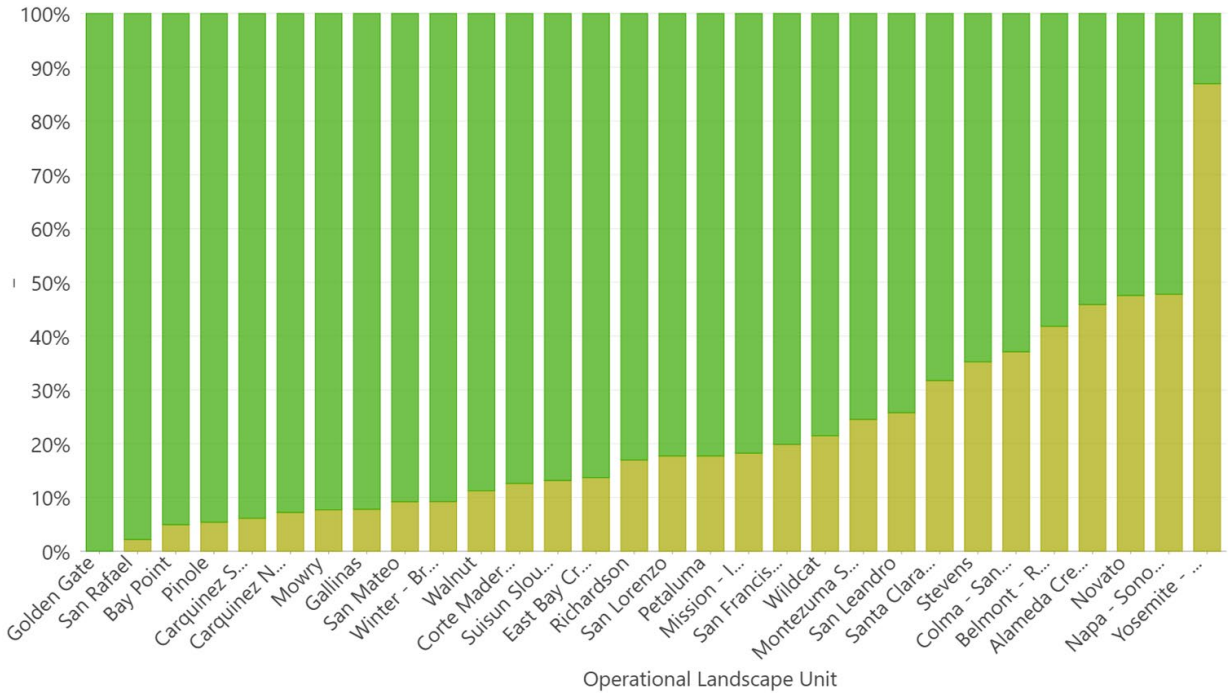
Level of Detail



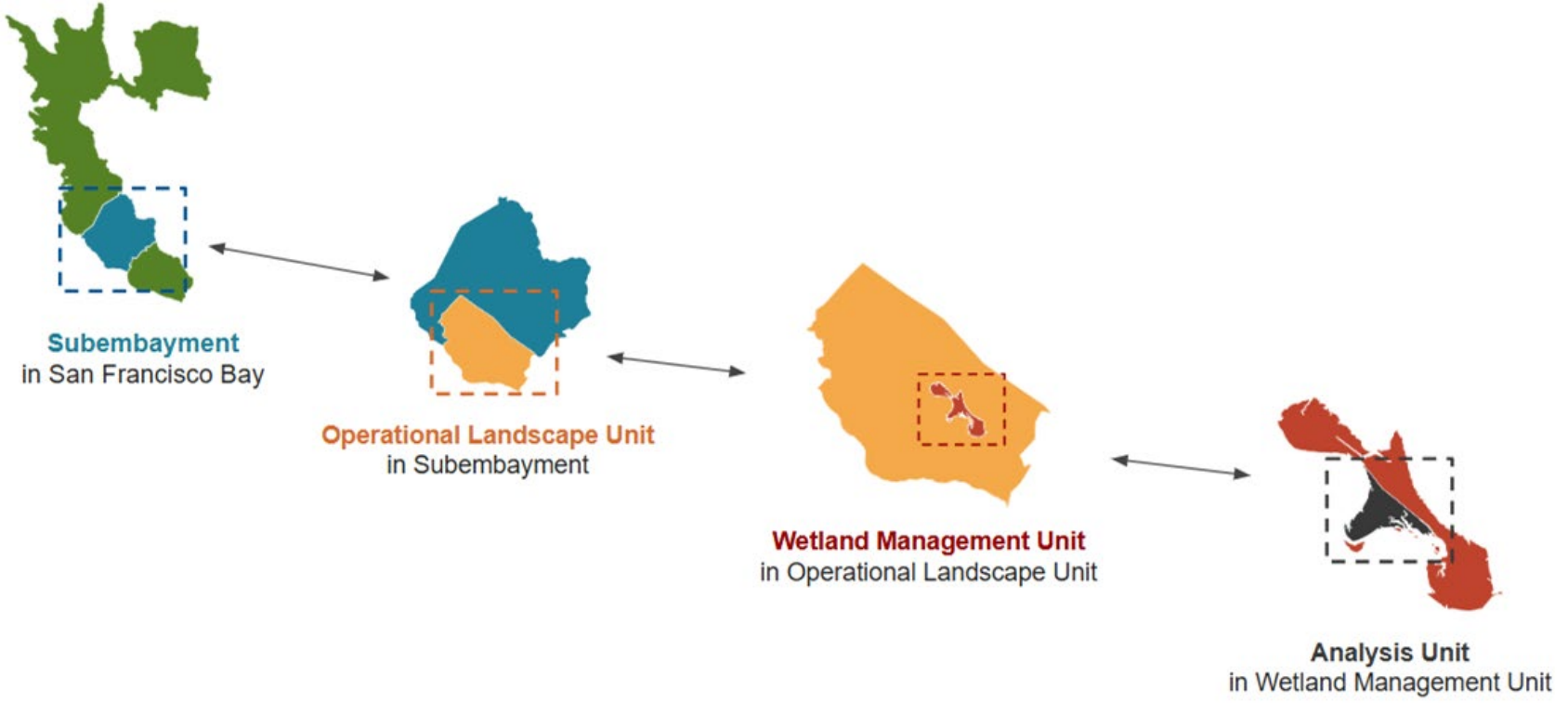
Habitat Metrics

- Tidal Wetland Extent
- UVVR
- Elevation Capital
- Drainage Density

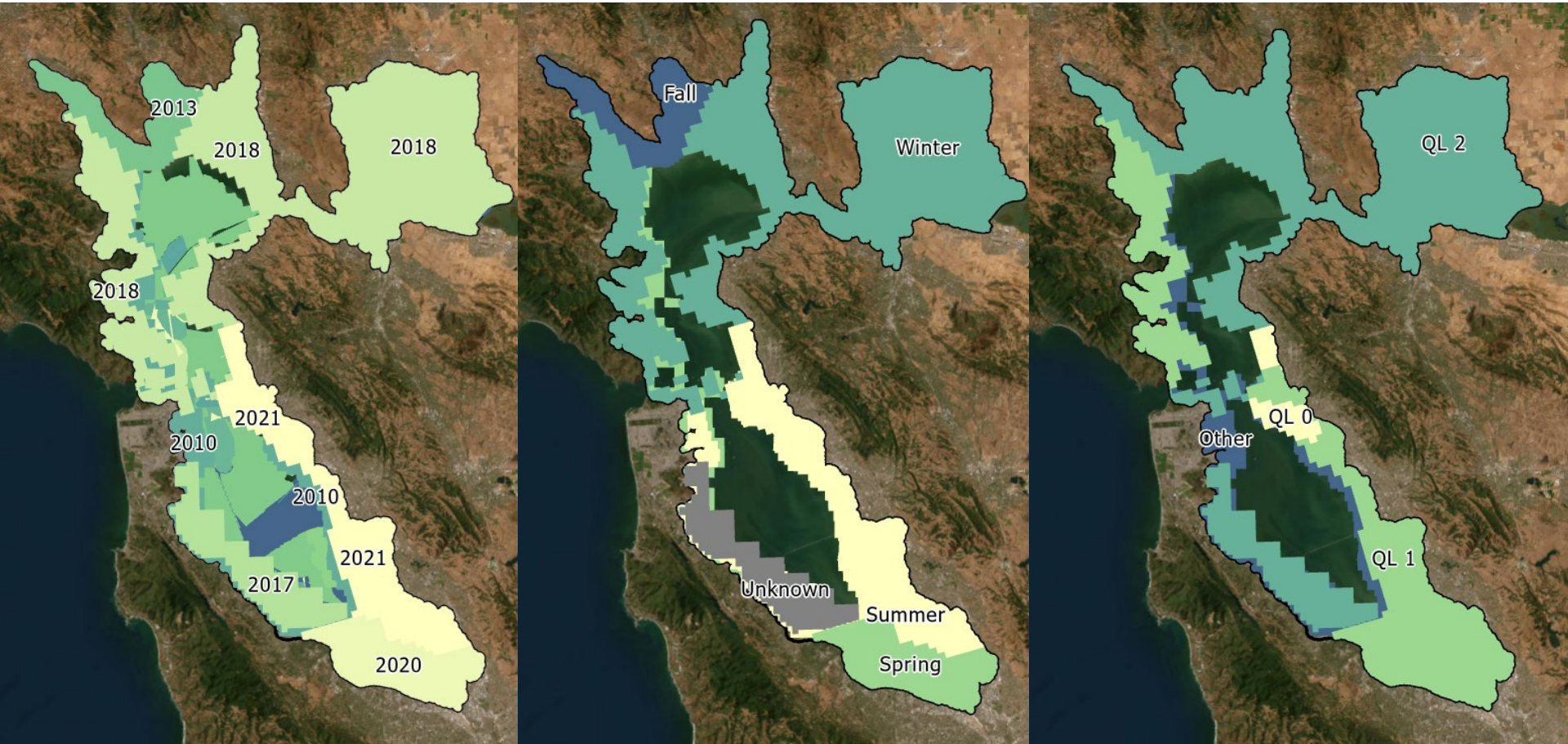
Unvegetated : Vegetated



Indicator Structure



BHM 2020 DEM Coverage (Year/Season/Quality)



San Francisco Bay-Delta Estuary Lidar

Collection Complete

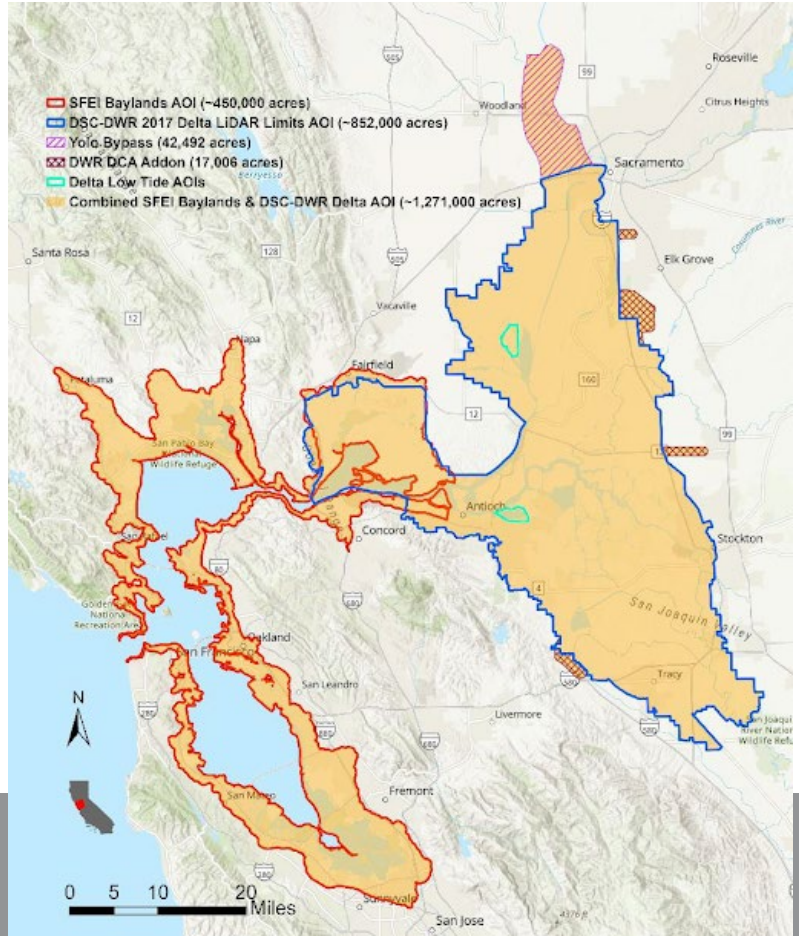
- Final Deliverables by January 30, 2026

Collection Info

- Collaboration: **SFBRA, DSC, DWR, SBSPRP, VW**
- Below Mean Sea Level
- 12 pulses/m2 (QL1)

Deliverables

- Lidar Point Cloud
- Surface Models
  - 1 ft Hydro-flattened DEM
  - 1 ft Lidar Intensity
  - 1 ft DSM, nDSM
  - 2 ft Slope, Aspect, nDSM Slope
  - 2 ft TPI and TPO



Wetland Education & Workforce Development

Cris Criollo
Multicultural Center of Marin

SF ESTUARY
Wetlands
Regional
Monitoring
Program

Knowledge Sharing for

Wetlands Education and Workforce Development

comienza aquí

keep reading

Description

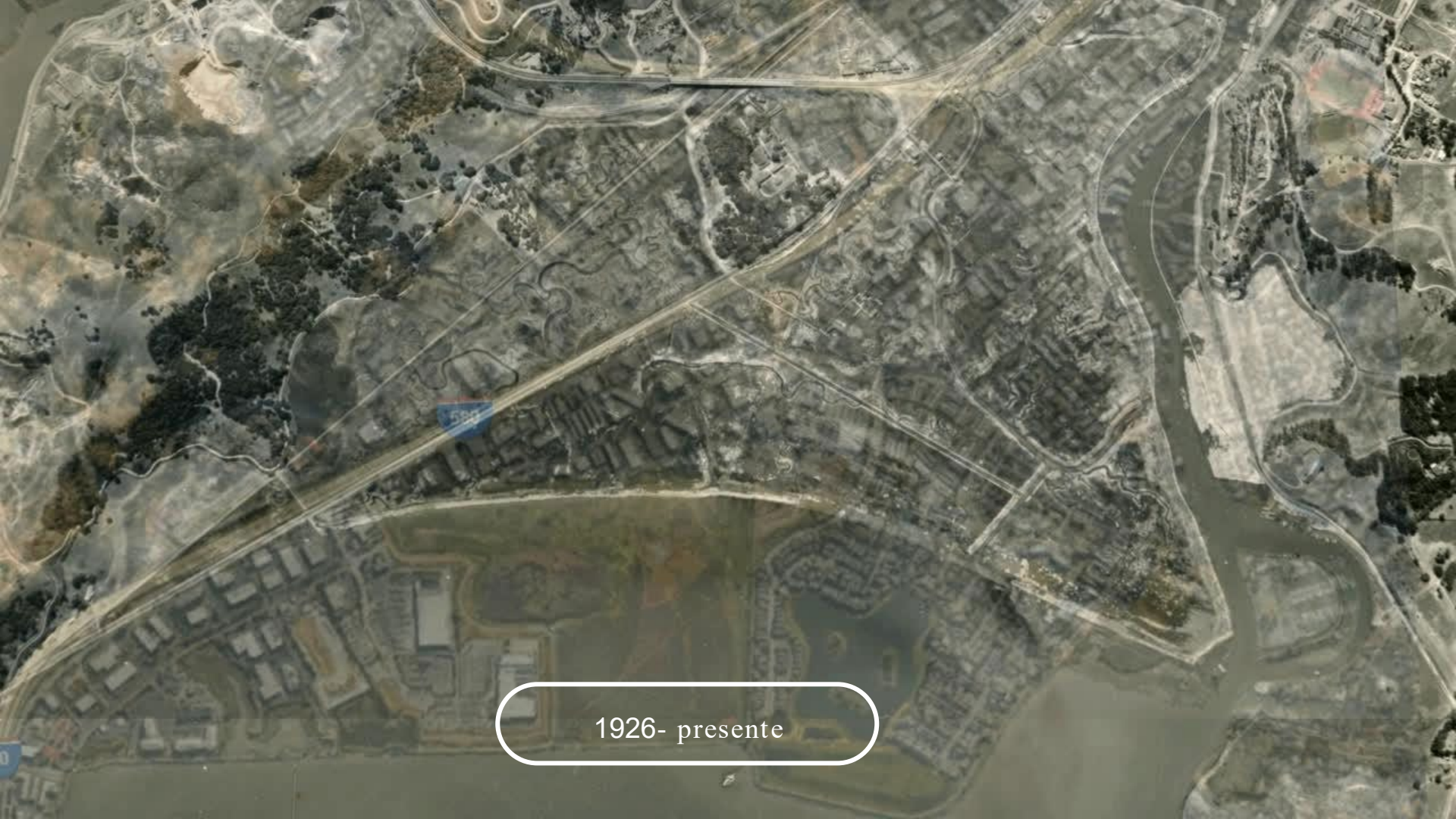
Every person holds a piece of the puzzle

Scientists, planners, and policymakers bring technical expertise, while community members share lived experience, history, and practical knowledge.

When these voices come together to build shared understanding, solutions become smarter, fairer, and more lasting—because nature belongs to everyone, and our future depends on all voices being heard.


Keep reading
EXPLORING
THE CANAL WETLAND


Third Street
Point San Pedro Road
Canal Street
Francisco Boulevard West
Francisco Boulevard East
John T. Knox Freeway
Andersen Drive
Irwin Street
Grand Avenue
Hatherton Street
Kerner Boulevard
Redwood Boulevard



1926- presente

KNOWLEDGE

SHARING METHODOLOGY

Keep reading

1.Combines community, scientific and technical knowledge for inclusive learning.

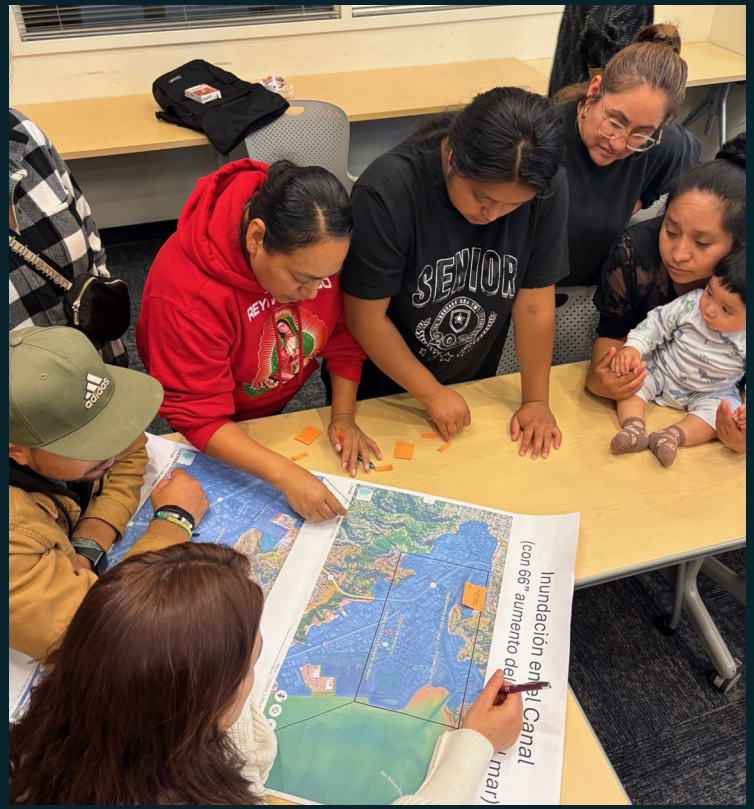
FIND THEM

PANTANOS/WETLANDS

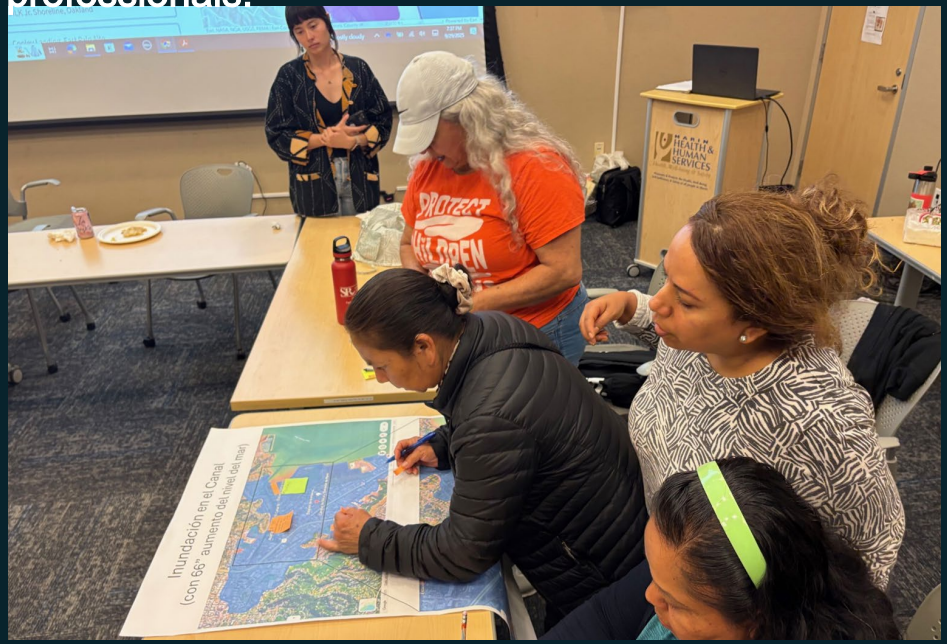
BINGO

Vamos a jugar!

Keep learning



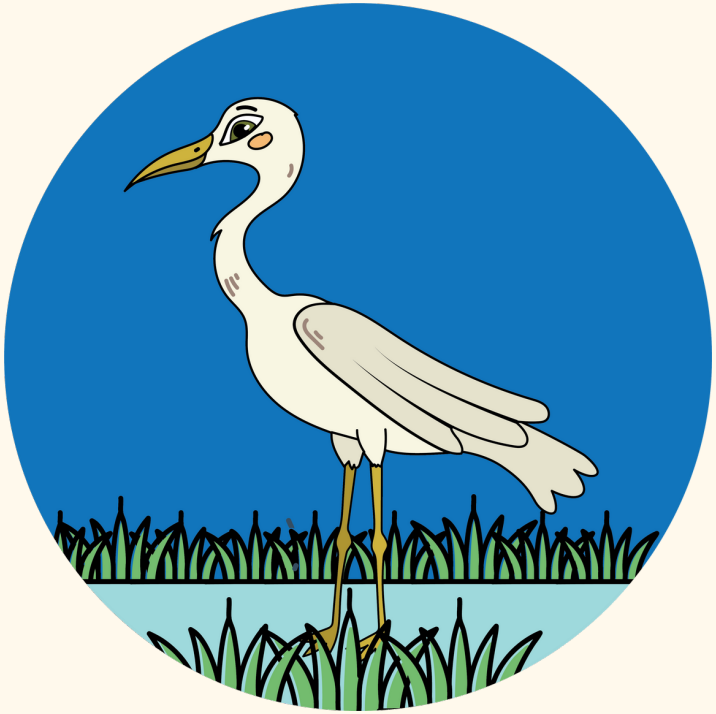
2. Promotes co - learning and hands - on experience across communities and professionals.



Keep learning

3. Links ecological education for climate resilience.

4. Builds lasting community stewardship and shared responsibility for wetland health.

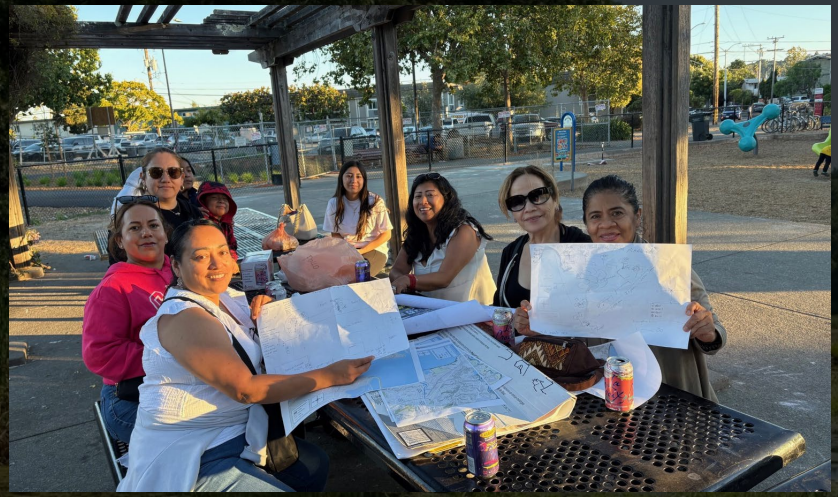


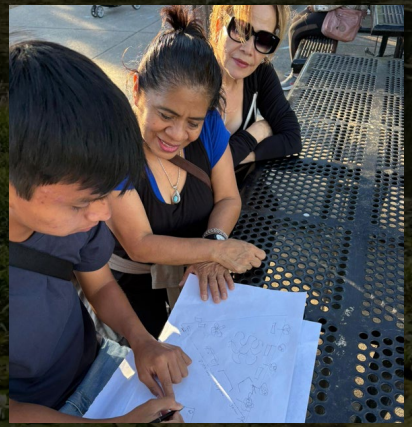
Friends of the Canal Wetland

Amigos de los Pantanos del Canal

Friends of the Canal Wetlands Goals
Objetivos de los Amigos de los Pantanos de El Canal

1. Compartir nuestros conocimientos desde y con la comunidad
2. Crear grupos de trabajo para abogar por el cuidado de los pantanos (restauración)
3. Asegurarnos de que la comunidad sepa los beneficios de los pantanos
4. Asegurarnos de que no se contaminen los pantanos, organizando limpiezas de las orillas y solicitando colaboración de organizaciones publicas y privadas para mantener limpio el borde de la bahía.





5. Workforce development

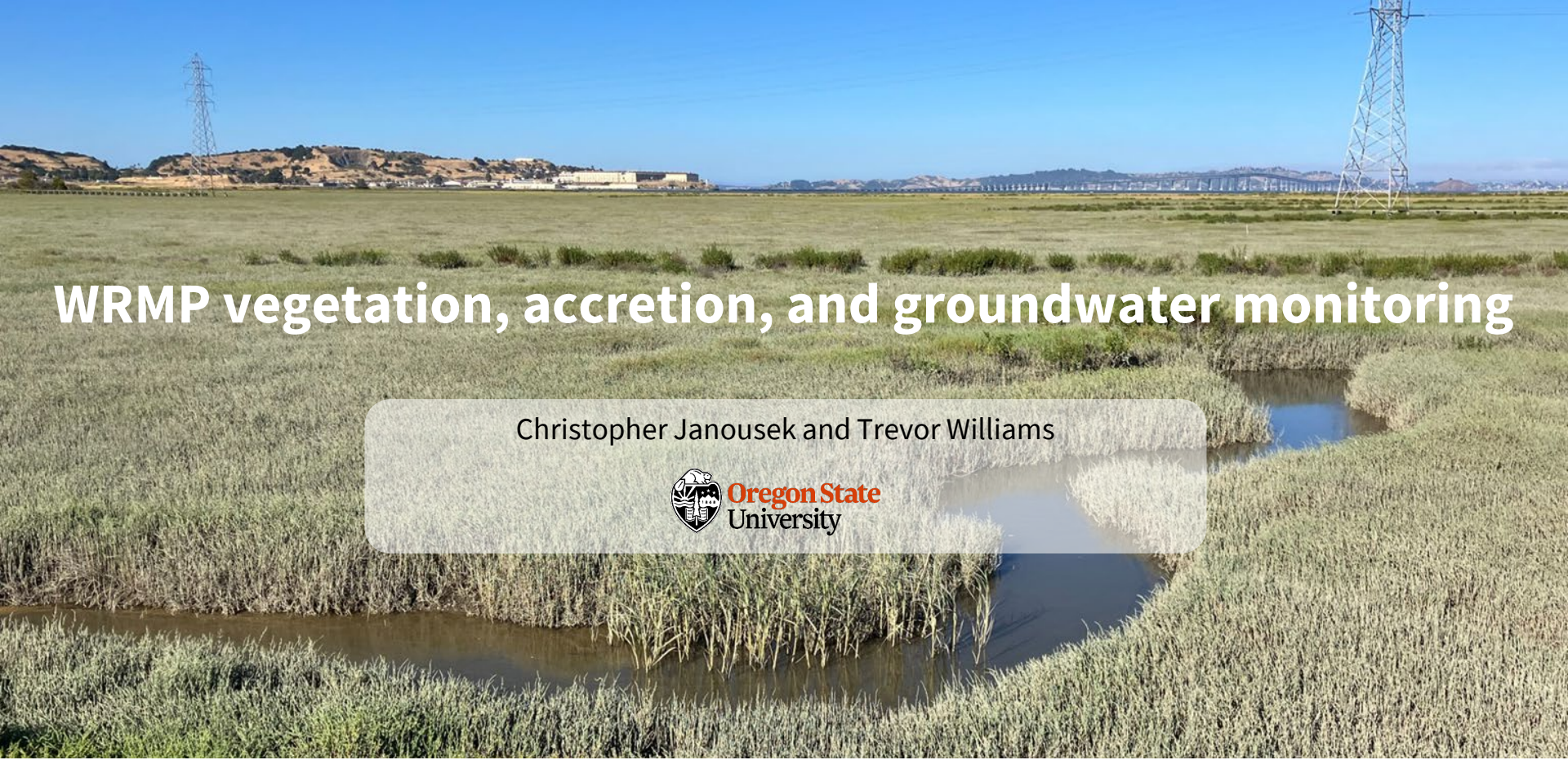
- Create Opportunities to Learn and Earn
- Grow Future Leaders
- Break Down Barriers
- Value Every Kind of Knowledge
- Inspire community members, specially youth to persue STEM careers


Thank You!
¡uoʏʞuɐɥʇ

WRMP vegetation, accretion, and groundwater monitoring

Presented by Lisa Beers
San Francisco Estuary Institute

Prepared by Chris Janousek & Trevor Wilson
Oregon State University



WRMP vegetation, accretion, and groundwater monitoring

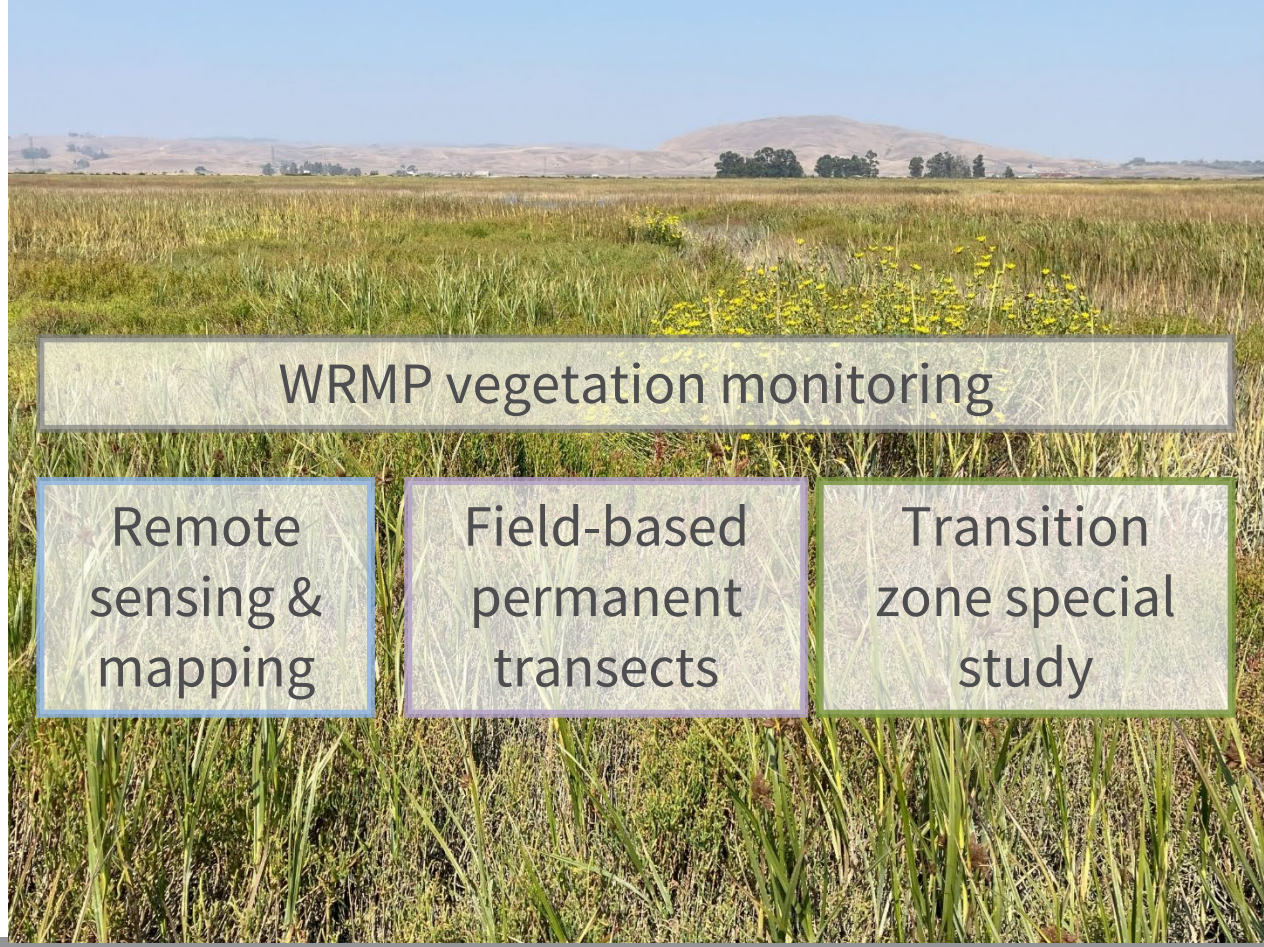
Christopher Janousek and Trevor Williams

Oregon State University

SF ESTUARY Wetlands Regional Monitoring Program

Management Questions

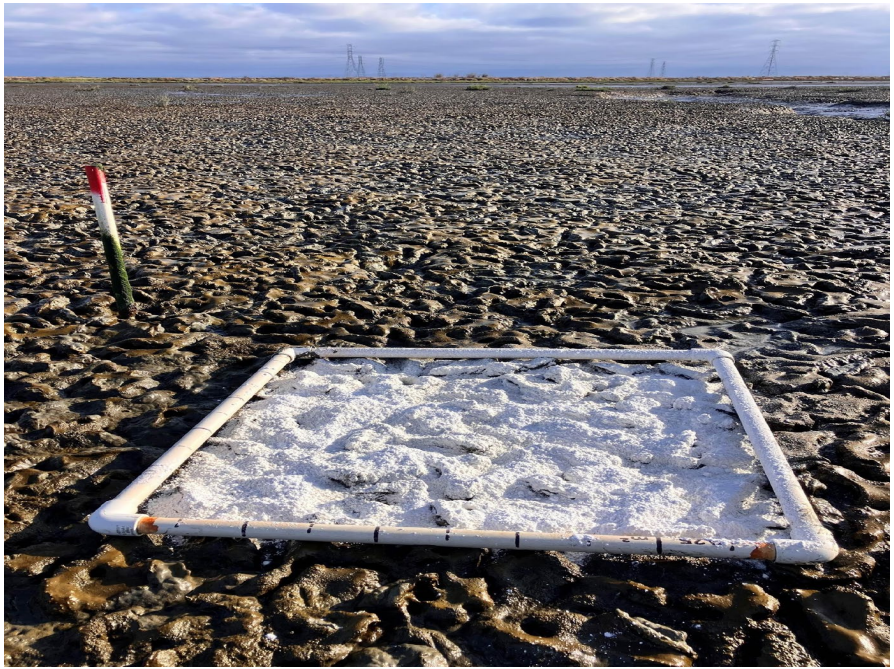
What is the distribution, abundance, diversity, and condition of tidal marsh ecosystems, and how are they changing over time?



Methods

- Vegetation cover, composition, diversity, height (plots)
- Wetland surface elevation (RTK-GNSS)
- Soil pore water salinity (refractometer)
- Short-term sediment accretion (feldspar marker horizons)
- Groundwater level (data loggers)

Methods

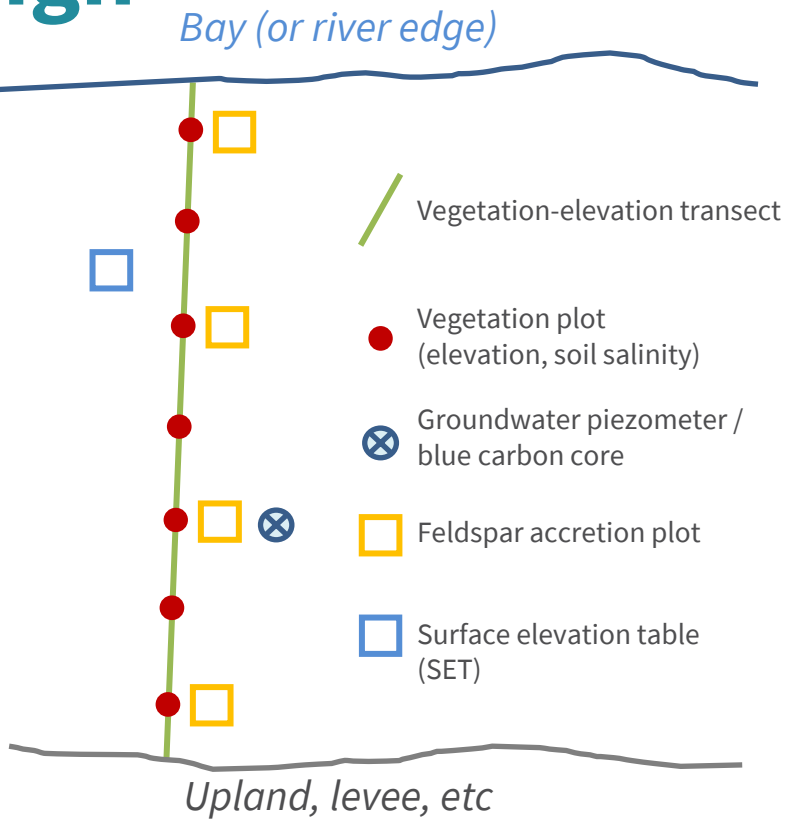


- Accretion measured annually
- Data logging every 30 min

Permanent Transect Design

- 3-4 transects per site, oriented from upland to bay (or river) edge
- Co-locate elevation points, vegetation plots, soil salinity, groundwater, accretion plots, SETs

Parameter	Sample size per site
Vegetation plots	30
Accretion plots	8
Groundwater piezometers	2
Blue carbon cores	2



Example Transect - Point Pinole

2025 Field Season

- 17 tidal wetlands surveyed
- ~518 vegetation plots surveyed (June – Sept)
- 127 feldspar accretion plots established
- 22 piezometers installed (data collection starting as early as March)
- Photopoints collected at five restoration sites (Aug-Sept)
- Several dozen species recorded
  - Suisun Bay sites are most diverse
- Populations of several rare, threatened or endangered species encountered in or near plots
  - *Chloropyron molle* ssp. *molle*
  - *Lathyrus jepsonii* var. *jepsonii*
  - *Cirsium hydophilum* var. *hydrophilum*

Monitoring Tidal Wetland Elevation Change

Presented by Donna Ball
San Francisco Estuary Institute

Prepared by Karen Thorne
US Geological Survey

Using Surface Elevation Tables to monitor tidal wetland elevation building processes

Presented on behalf of:
Karen M. Thorne, Lyndsay L. Rankin, McKenna L. Bristow

U.S. Geological Survey, Western Ecological Research Center, Davis, CA

SF ESTUARY Wetlands Regional Monitoring Program

USGS science for a changing world

Monitoring Questions

What are the accretion rates in the San Francisco Bay-Delta?

Are they keeping pace with SLR?

How does accretion vary across time and a marsh surface?

How does sediment deposition vary across the estuary?

SF ESTUARY Wetlands Regional Monitoring Program

USGS science for a changing world

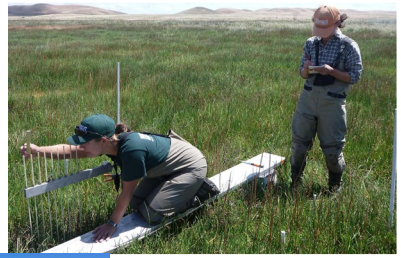
Wetland Soil Processes

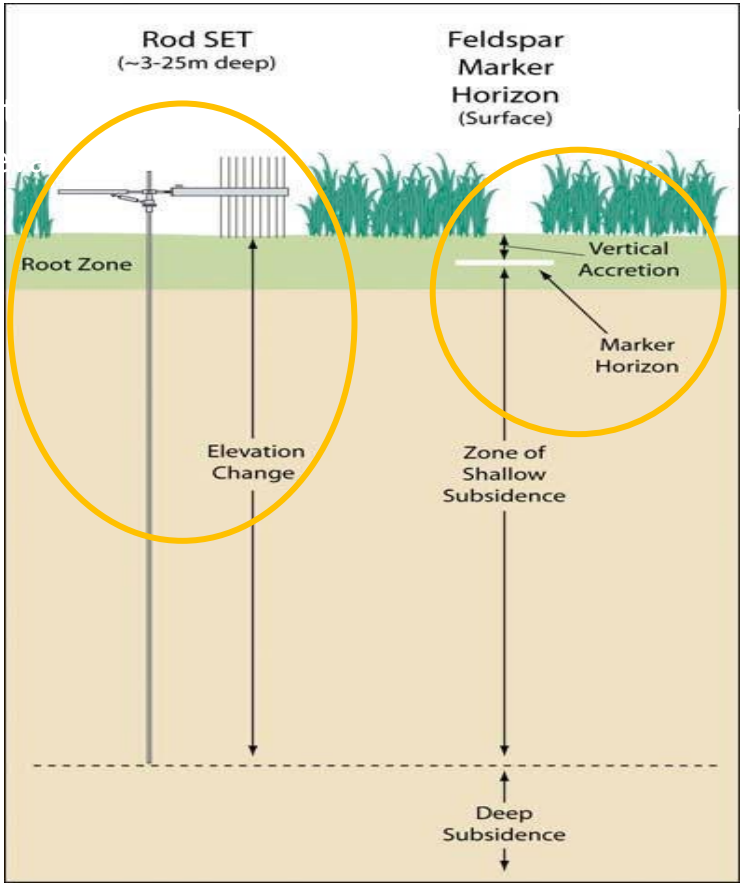
Wetlands can build their elevations through accretion processes:

- Organic matter input (+)
- Mineral deposition (+)
- Sediment compaction (-)
- Decomposition rate (-)

- Marshes can be sinks for sediment
- Accretion depends on sediment availability and how much makes it into a site
- Sediment can allow marshes to maintain elevations relative to local sea levels.

Surface Elevation Tables – Marker Horizons (SET-MH)





Soil profile measured by Surface Elevation Table and marker horizon techniques (Cahoon et al., 2002)

Measuring marsh accretion

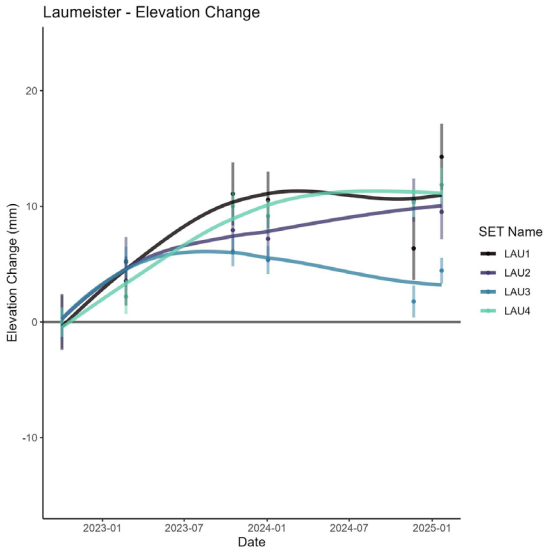
- *Surface elevation tables (SETs)-marker horizon (MH)*
    - Point measurements
    - Captures below and above ground processes
    - Expensive installation, but easy to maintain and read
    - Can be installed with feldspar to tease out deposition vs below ground processes

18 marsh sites
(n= 80 SET-MHs)

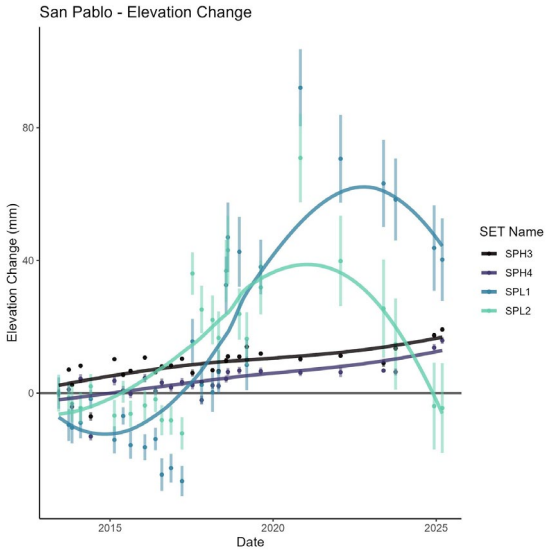
2 new sites
(8 SET-MHs) coming in Fall 2025

Marsh elevation changes differ by region, site, and history

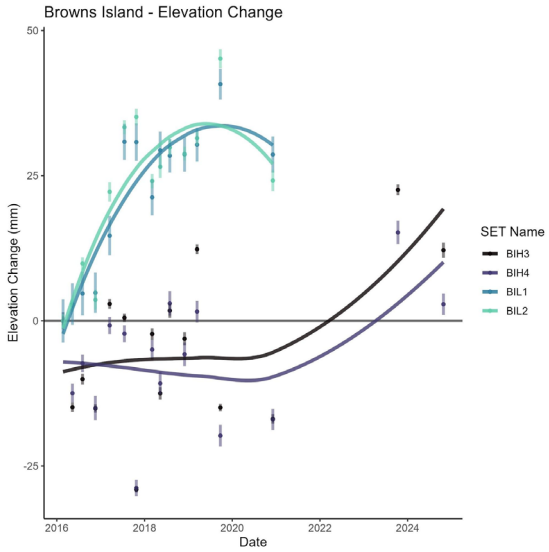
South SF Bay - Laumeister



San Pablo Bay – San Pablo NWR

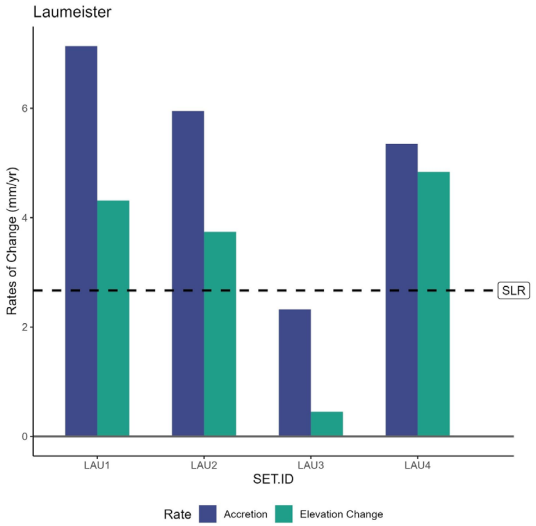


SF Delta – Browns Island

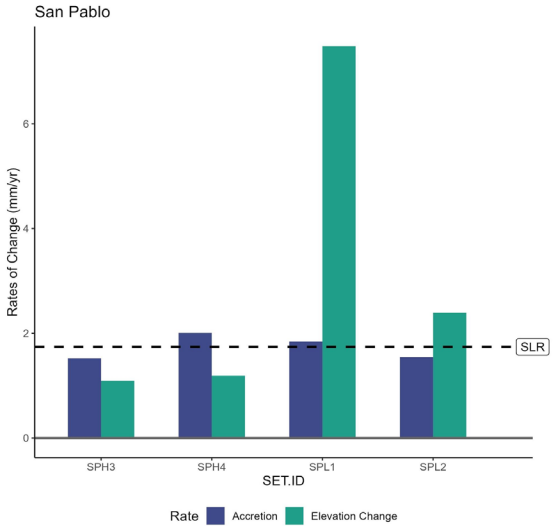


Most marshes in the San Francisco Bay - Delta are keeping pace with SLR

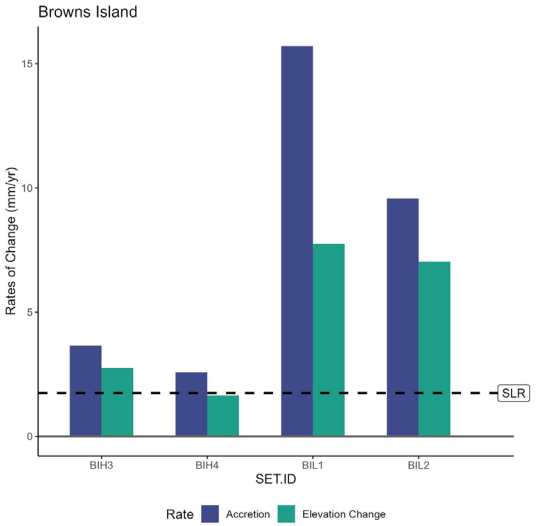
South SF Bay - Laumeister



San Pablo Bay – San Pablo NWR

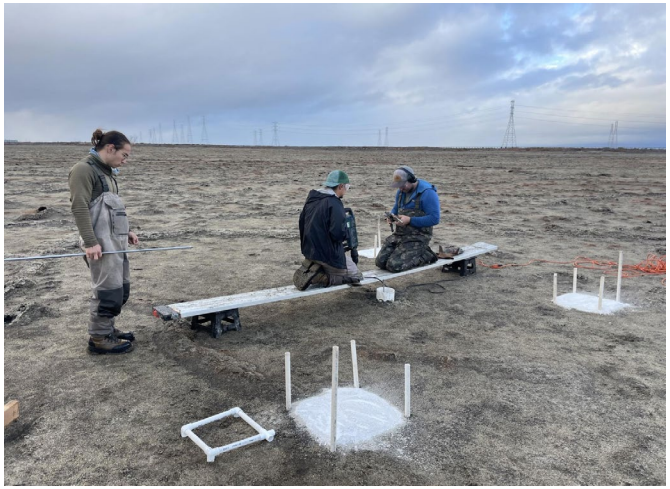


SF Delta – Browns Island



Take Homes

- San Francisco Bay marshes are keeping pace with current SLR rates, but future remains uncertain
- Continued monitoring is critical to track trends
- Accretion and elevation rates vary between region, sites, and marsh history – maintaining a network of diverse sites is key to understanding the factors that affect these processes

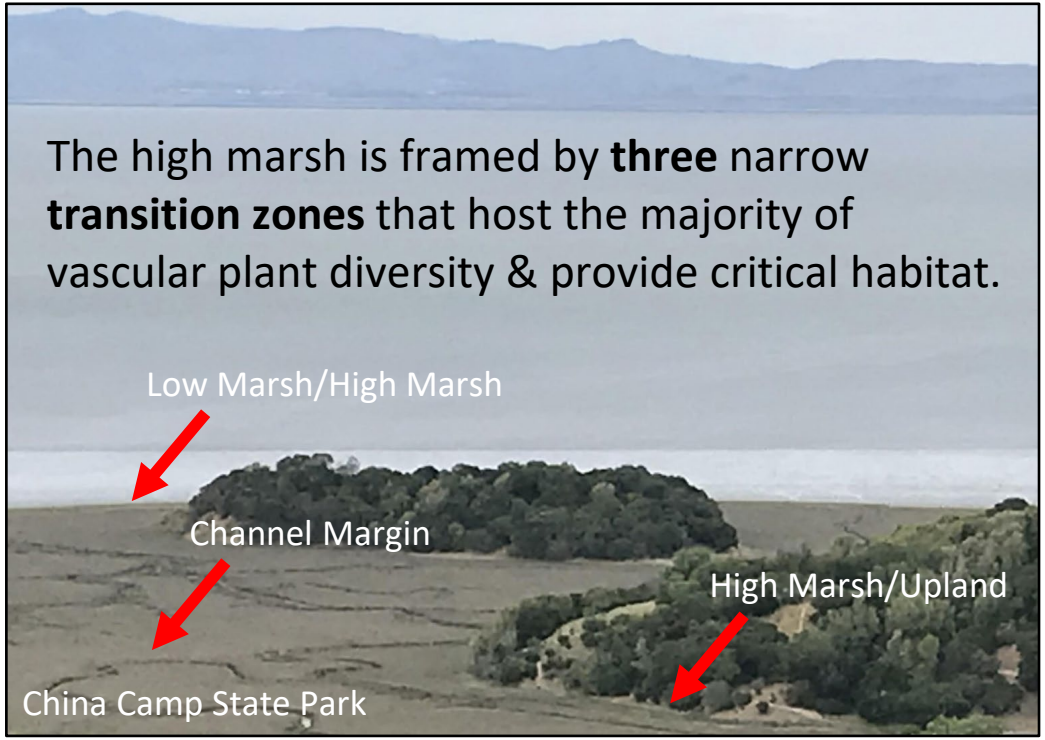


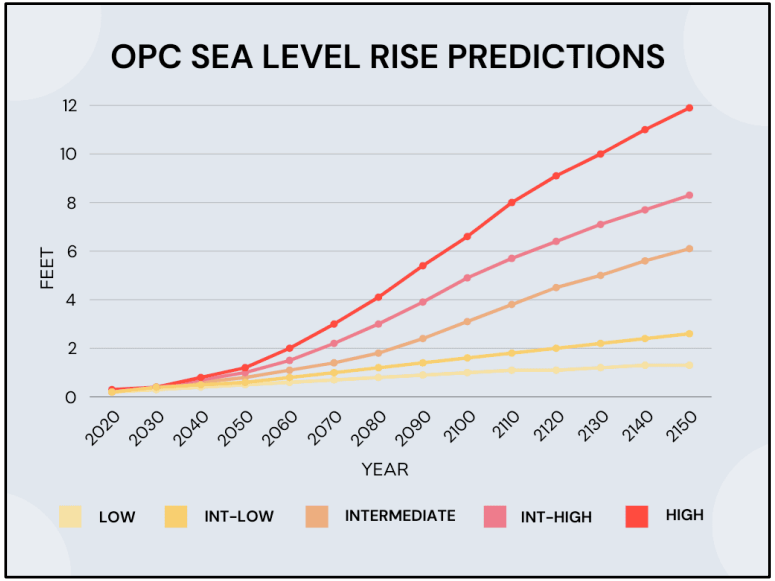
Transition Zone Monitoring

Mike Vasey
SF Bay National Estuarine Research Reserve

Transition Zone Monitoring

Michael Vasey (WRMP) and Anna Deck (SF Bay NERR)

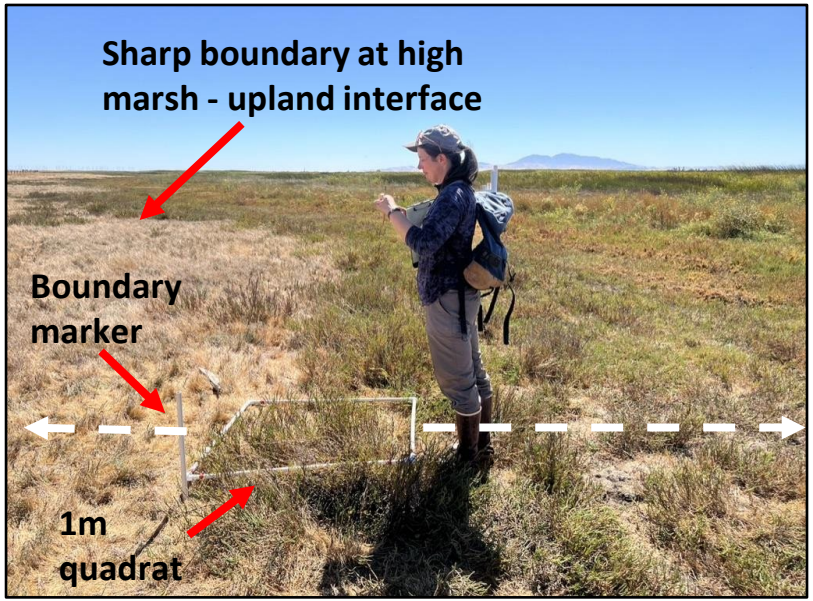


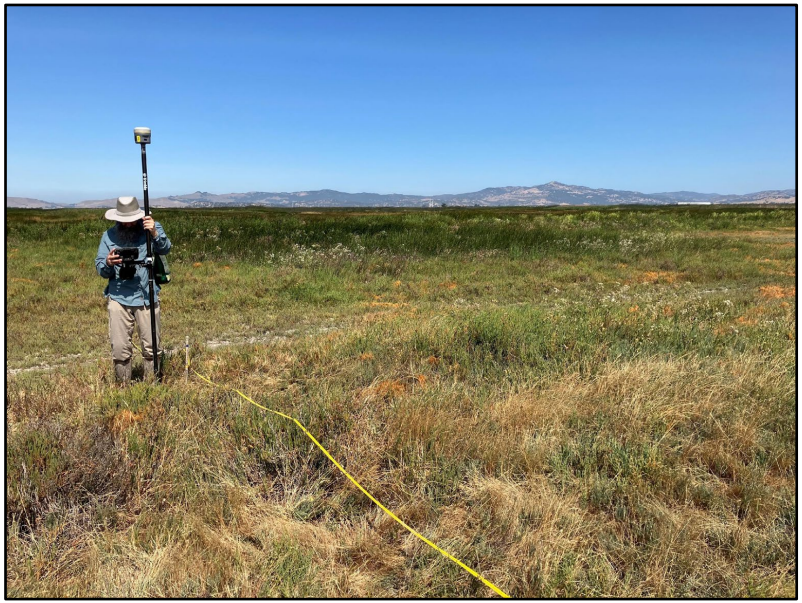


As the climate warms, we expect the rate of SLR to increase in the SF Bay beyond the 3 mm/yr average over past century –

But we don't know *how much* or *how fast!*

WRMP Transition Zone Pilot Project

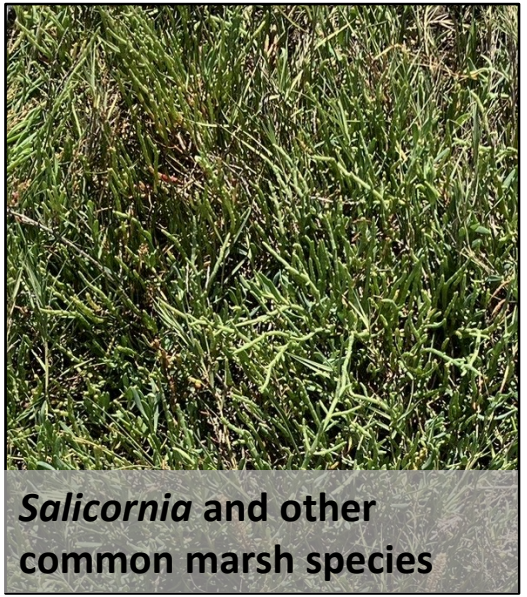




- **Rush Ranch Open Space Preserve** in the **Suisun Marsh** and **China Camp State Park** in **San Pablo Bay: NERR Components** and **WRMP Benchmark Sites**
- Marker at **boundary between the upper edge of the marsh and lower edge of the distinct salt tolerant grassland** grading into the marsh
- Quadrats sampled sequentially in both directions for species cover; i.e. **“belt transects”** or “**gradsects”**; elevation collected using RTK GPS

WRMP Transition Zone Pilot Project

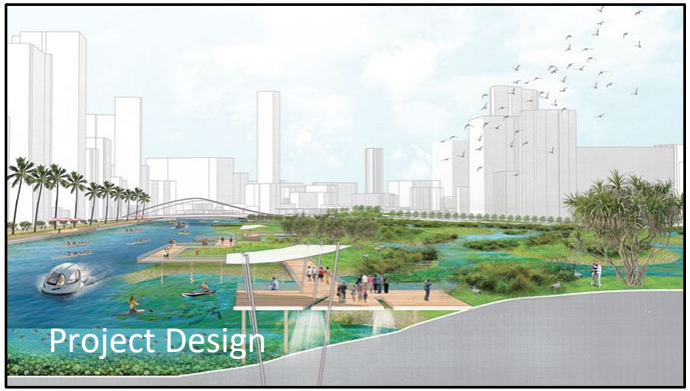
***Cressa truxillensis* and salt-tolerant annual grasses**



***Salicornia* and other common marsh species**

- It doesn't take much imagination to envision **subtle shifts in this vegetation over time** if and when the rate of SLR increases.
- The goal of this project is to **provide early warning of SLR rise** in the SFE.
- By establishing these transects now, as time passes, we can use these **baseline data** to assess **how much and how fast** SLR will likely impact the SFE.

Why does it matter to get early warning about SLR?



The sooner we can confidently move forward with this process, the sooner mitigation projects will be completed and the better our chances will be at successfully addressing SLR impacts.

Summary

- WRMP funded this pilot project to assess the possibility that subtle change of tidal marsh T-Zone vegetation over time can provide early warning of SLR.

- SF Bay NERR benchmark sites in the upper and lower estuary have long-term vegetation monitoring programs already established and well-trained, experienced staff to carry out this pilot project.

- Early warning concerning SLR should provide our region with opportunities to address expected landscape trends in advance and expedite appropriate mitigation measures that are both timely and more cost-effective.

Thanks to the WRMP, and particularly Veg Team participants including Tom Parker and John Callaway, for their support and conceptual design of this pilot project.

Fish & Fish Habitat Monitoring

Levi Lewis
University of California, Davis

SF ESTUARY
Wetlands
Regional
Monitoring
Program

Wetlands Regional Monitoring Program

Fish and Fish Habitat Survey

Levi S. Lewis & Jim Hobbs

Otolith Geochemistry & Fish Ecology Laboratory

University of California, Davis

lslewis@ucdavis.edu , www.ogfishlab.com

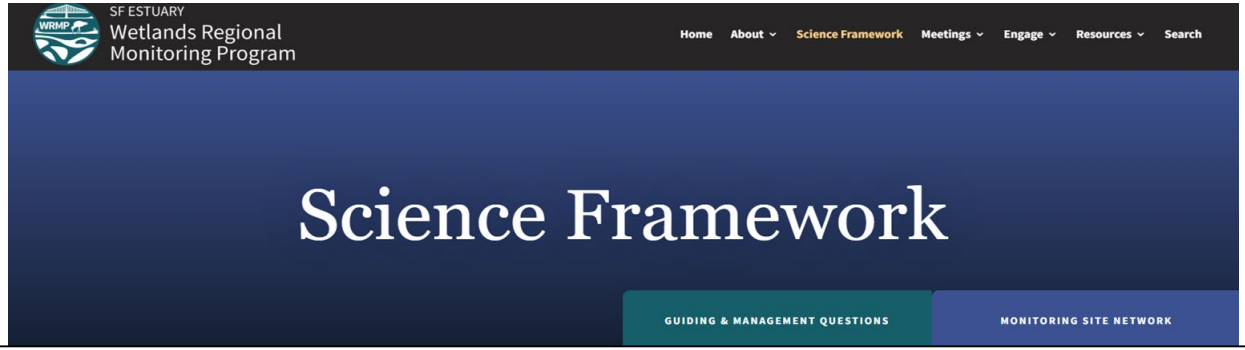
SF ESTUARY Wetlands Regional Monitoring Program

UC DAVIS DEPARTMENT OF WILDLIFE, FISH AND CONSERVATION BIOLOGY

OGFL UCD Otolith Geochemistry & Fish Ecology Laboratory

South Bay Salt Pond Restoration Project

WRMP FFH Survey Development & Implementation



GUIDING QUESTION 4:
How do policies, programs, and projects to protect and restore tidal marshes affect **distribution, abundance, and health of plants and animals?**

MANAGEMENT QUESTION 4b:
How are the **distribution and abundance of key resident species of fish** and wildlife of tidal marsh ecosystems changing over time?

MANAGEMENT QUESTION 4a:
How are **habitats for assemblages of resident species of fish** and wildlife in tidal marsh ecosystems changing over time?

PRIORITY RECOMMENDED ACTION:
Repeat surveys (detect change) of living organisms and their habitats (indicators), and standardize the metrics and reporting for indicators that are common to projects and baseline/subsequent ambient monitoring across the range of project designs and restoration practices.

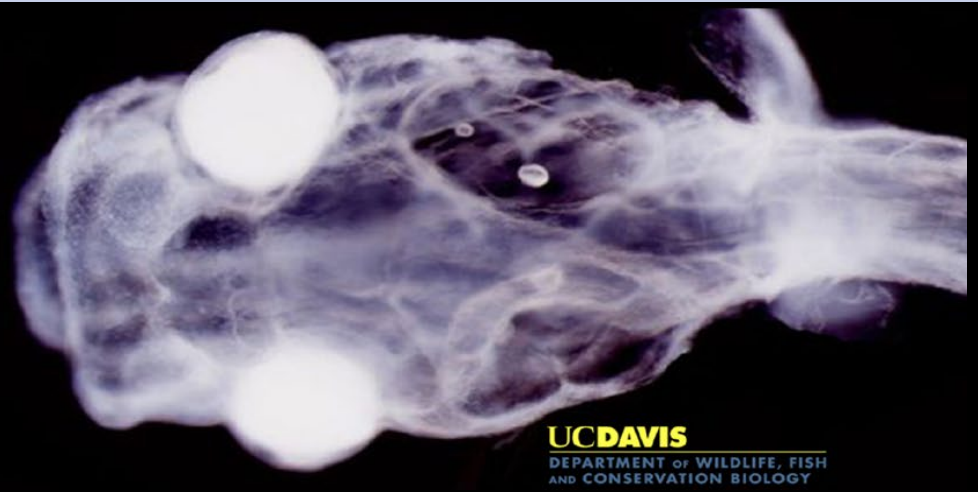
(abundance, diversity, biomass, sensitive spp., habitat/water quality)

WRMP FFH Survey Development & Implementation

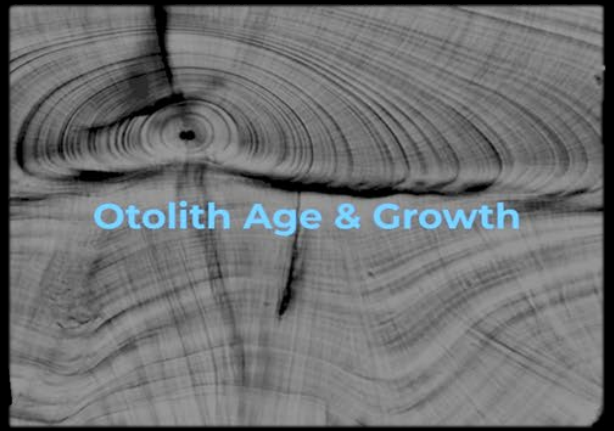
OGFL

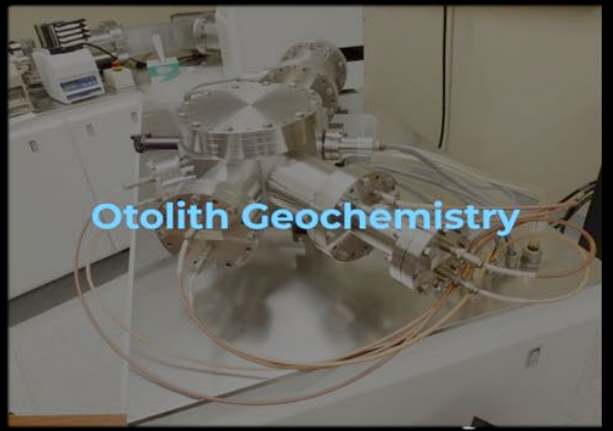
Otolith Geochemistry &
Fish Ecology Laboratory

www.ogfishlab.com



UCDAVIS
DEPARTMENT OF WILDLIFE, FISH AND CONSERVATION BIOLOGY





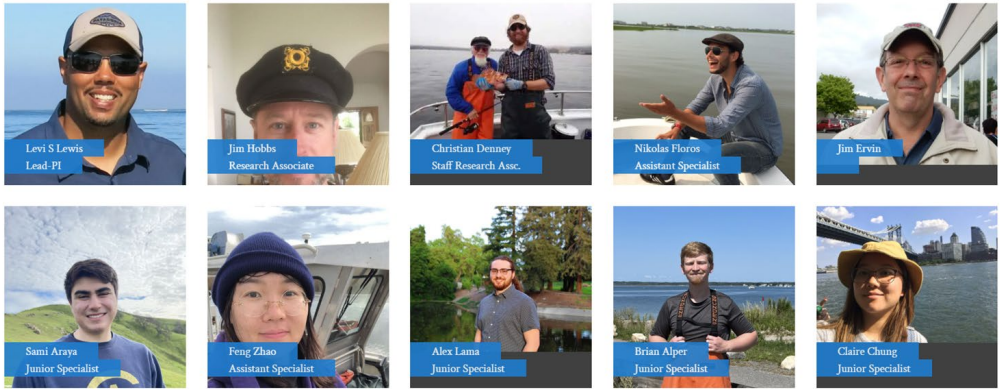
WRMP FFH Survey Development & Implementation

Otolith Geochemistry & Fish Ecology Laboratory

www.ogfishlab.com

UC DAVIS
UNIVERSITY OF CALIFORNIA

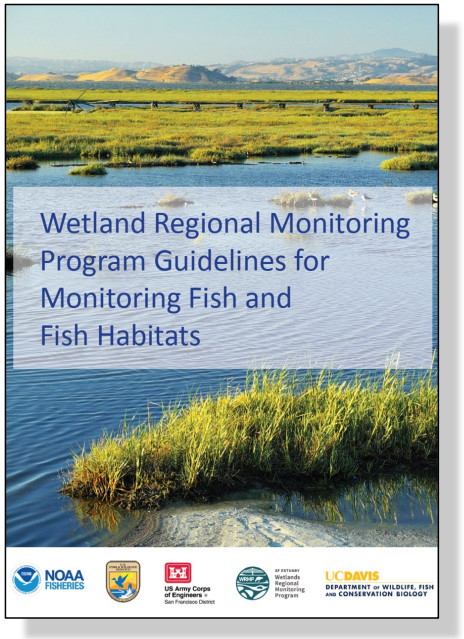
Current Members



Current Interns

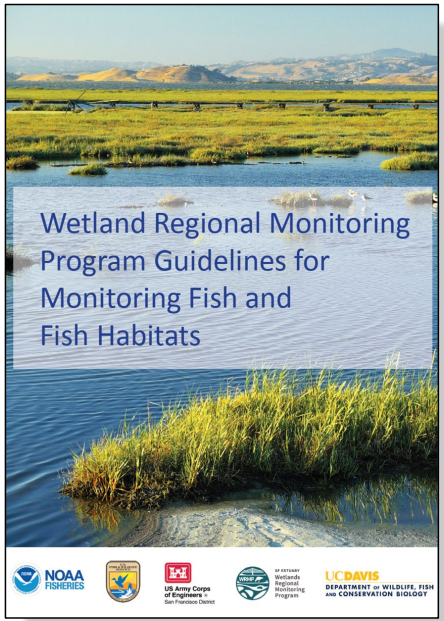
SF ESTUARY Wetlands Regional Monitoring Program

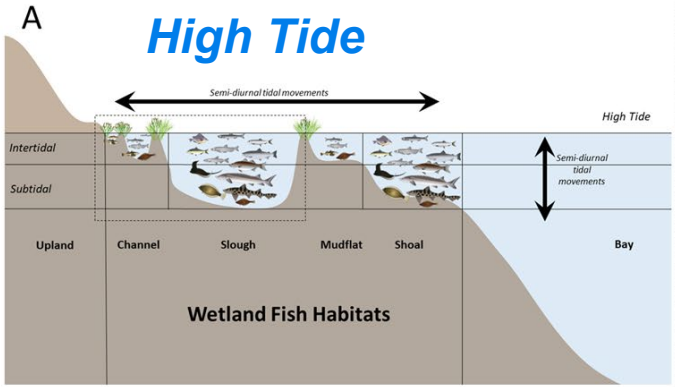
Monitoring Guidelines

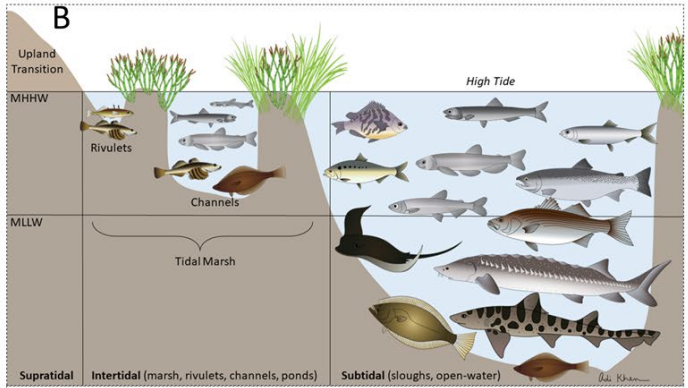


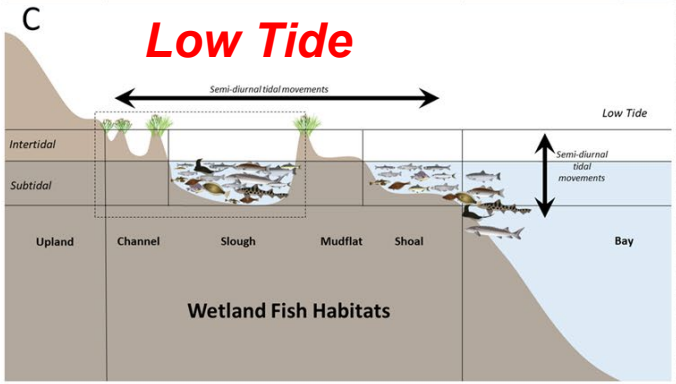
WRMP FFH Survey Development & Implementation

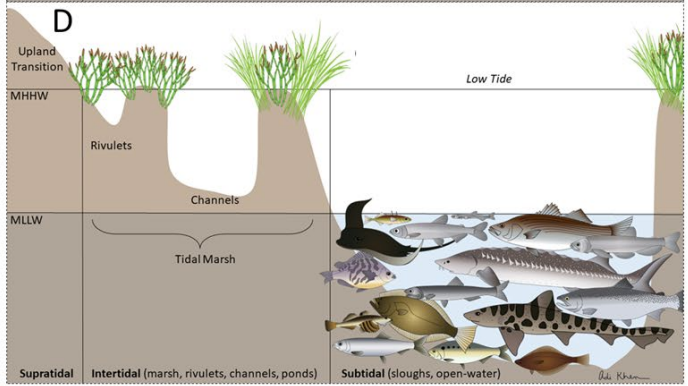
Monitoring Guidelines (habitats)





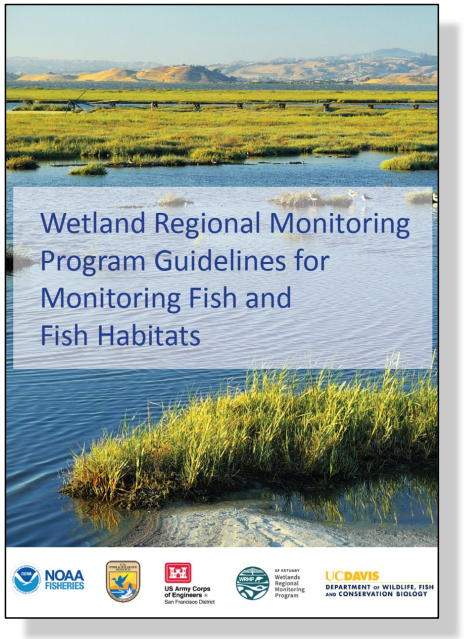






WRMP FFH Survey Development & Implementation

Monitoring Guidelines (habitats)



A

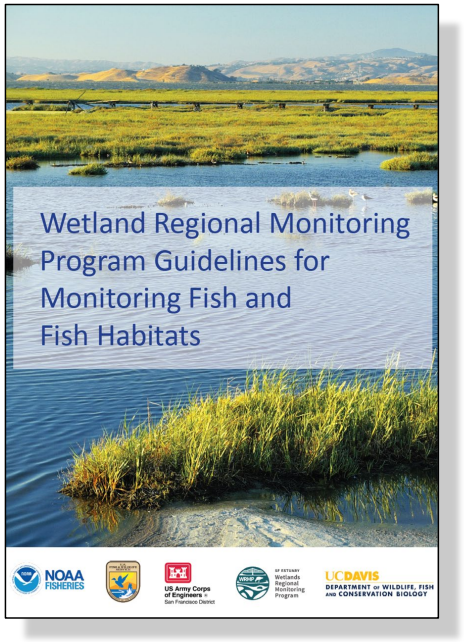
B

C

D

WRMP FFH Survey Development & Implementation

Monitoring Guidelines (gears)



A

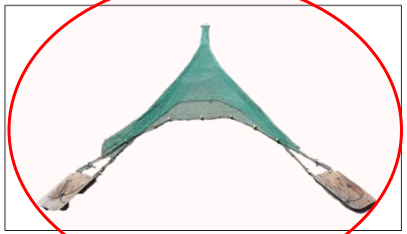
B

C

D

E

F



WRMP FFH Survey Development & Implementation

OGFL Monitoring Capacity (vessels)

WRMP FFH Survey Development & Implementation

OGFL Monitoring Capacity (permitting)

Current CDFW Permits (general sampling, Longfin Smelt, White Sturgeon):

CDFW Scientific Collecting Permit (SCP): S-191990002-19199-001-01 (Lewis, OGFL)
CDFW 2081(a) MOU for Longfin Smelt & Sturgeon: 2021-0005-R3_Lewis (Lewis, OGFL)

Current NOAA Permits (Winter/Spring Run Chinook Salmon, Green Sturgeon, CCC Steelhead):

10(a)(1)(A) Research Permit: 19820-3R (Lewis, OGFL)

Current USFW/IEP Permits (**Delta Smelt**:

IEP PEN# 296 for Delta Smelt (Lewis, OGFL)
USFWS Agent of the Service Letter received for temporary USFWS coverage for Longfin Smelt
USFWS Section 10(a)1(A) permit for Longfin Smelt currently in review (Lewis, OGFL)
USFWS Don Edwards NWR Special Use Permit: 2023-20 (Lewis, OGFL)

Current UCD IACUC Protocols:

IACUC Protocol #23068: South Bay Salt Pond Monitoring (Lewis, OGFL)
IACUC Protocol #23389: SFE Wetland Ecology and Mercury Study (Lewis, OGFL)
IACUC Protocol #23425: Monitoring Longfin Smelt and other fishes (Lewis, OGFL)

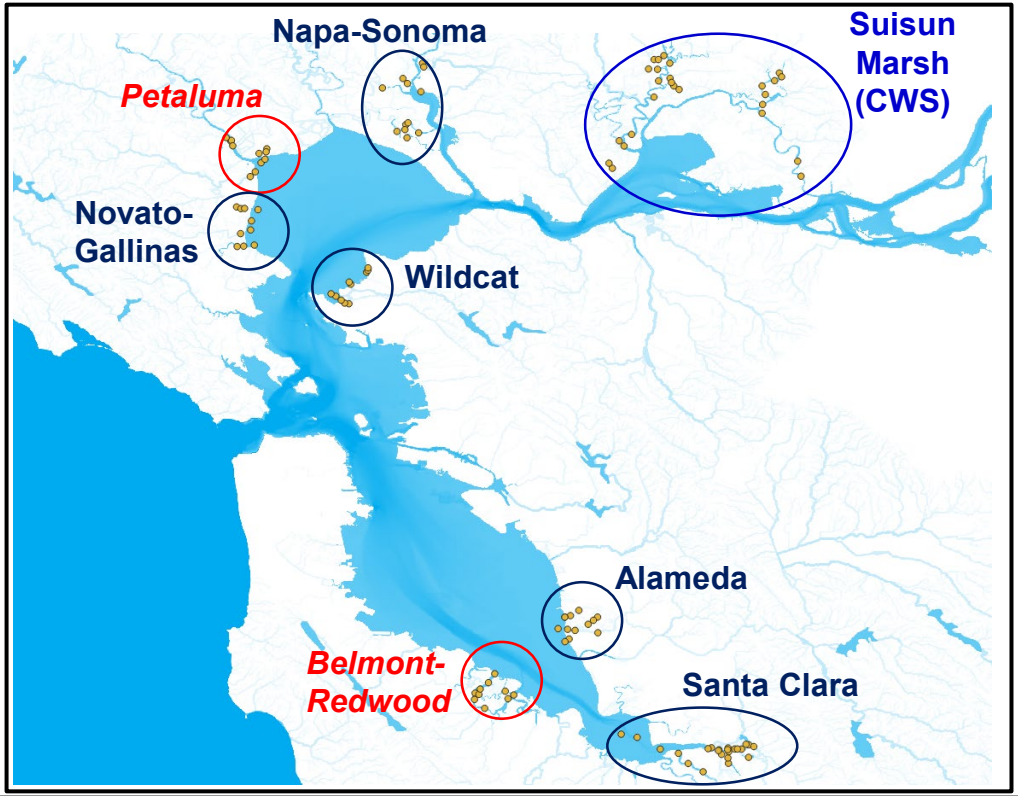
WRMP FFH Survey **Update** (Years 1 and 2)

(Primary, Secondary)

WRMP FFH Survey (OLUs)

(semi-seasonal, monthly)

- **Suisun Bay**
  - Suisun Slough network (cws,mo.)
- **San Pablo Bay**
  - Novato-Gallinas
  - Napa-Sonoma
  - Wildcat
  - Petaluma
- **South Bay**
  - Alameda Creek
  - Belmont-Redwood
- **Lower South Bay**
  - Santa Clara Valley (mo.)



SF ESTUARY Wetlands Regional Monitoring Program

BIOTA

Longfin smelt, *Spirinchus thaleichthys*

Starry Flounder, *Platichthys stellatus*

Yellowfin Goby, *Acanthogobius flavimanus*

Pacific Herring, *Clupea pallasii*

California Halibut, *Paralichthys californicus*

Sacramento Splittail, *Pogonichthys macrolepidotus*

Striped Bass, *Morone saxatilis*

Tule perch, *Hysterocarpus traskii*

Northern Anchovy, *Engraulis mordax*

Leopard Shark, *Triakis semifasciata*

Sacramento Pikeminnow, *Ptychocheil grandis*

Bat ray, *Myliobatis californica*

Shiner Perch, *Cymatogaster aggregata*

Pacific Staghorn Sculpin, *Leptocottus armatus*

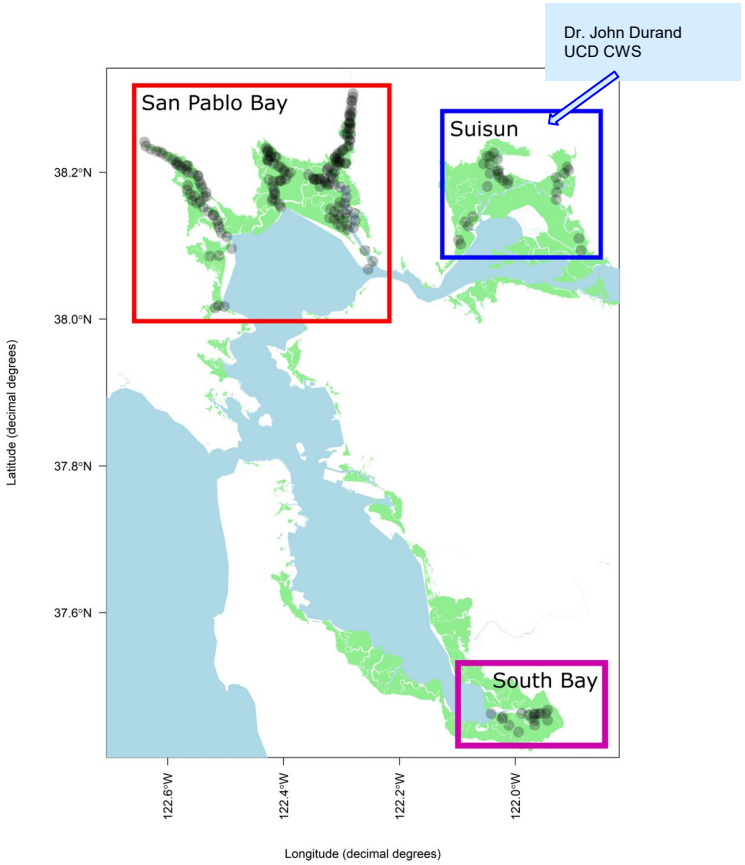
Prickly Sculpin, *Cottus asper*

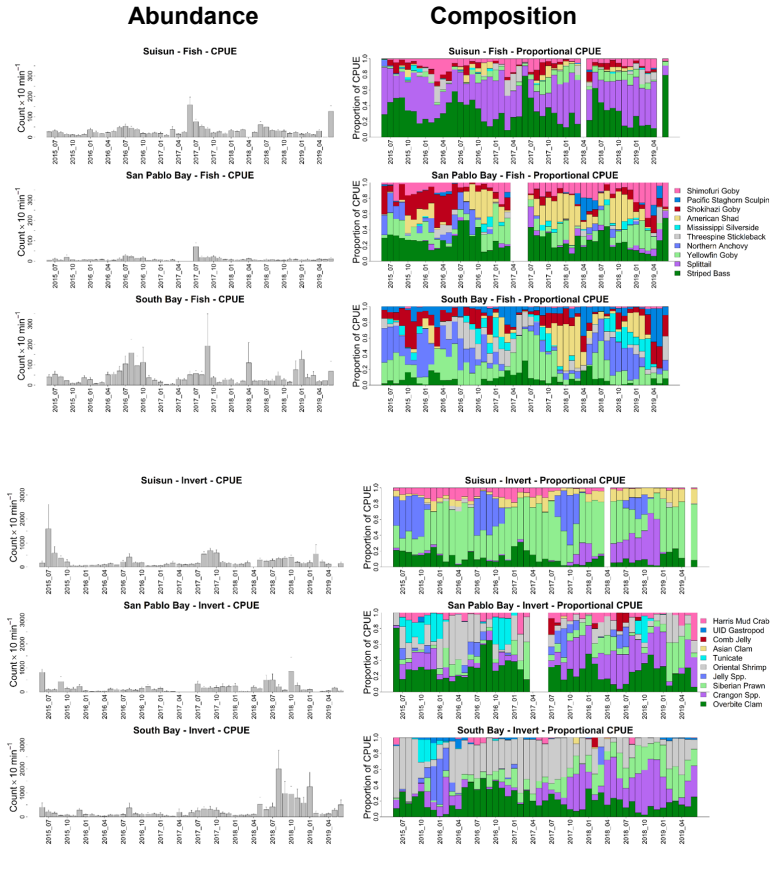
Dungeness Crab, *Metacarcinus magister*

Caridean Shrimps

Preliminary Data (“Bay Tribs” Study, 2015-2019)

Dr. John Durand
UCD CWS





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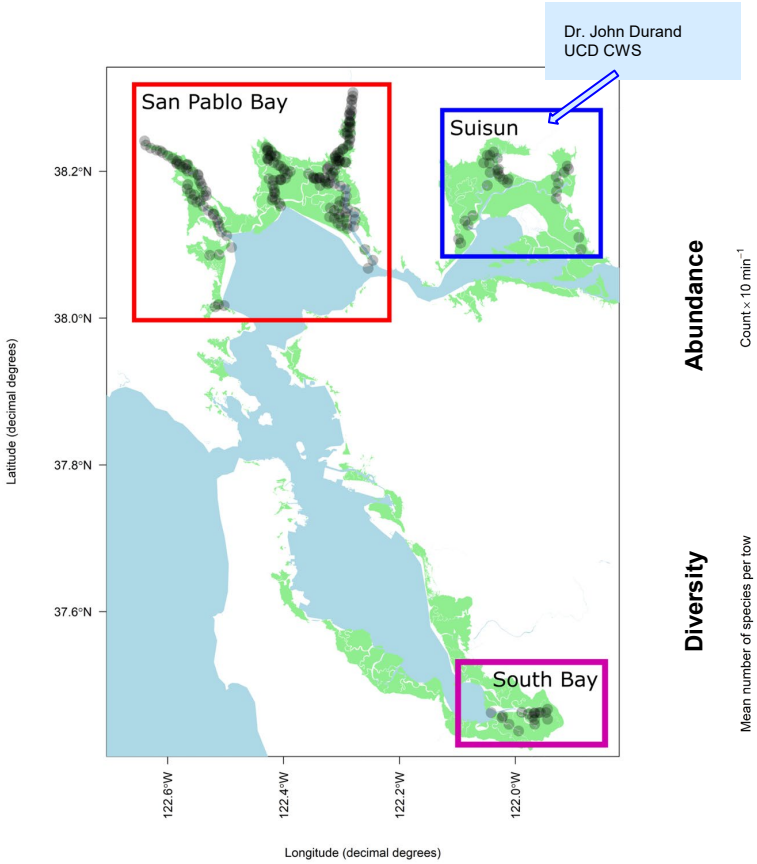

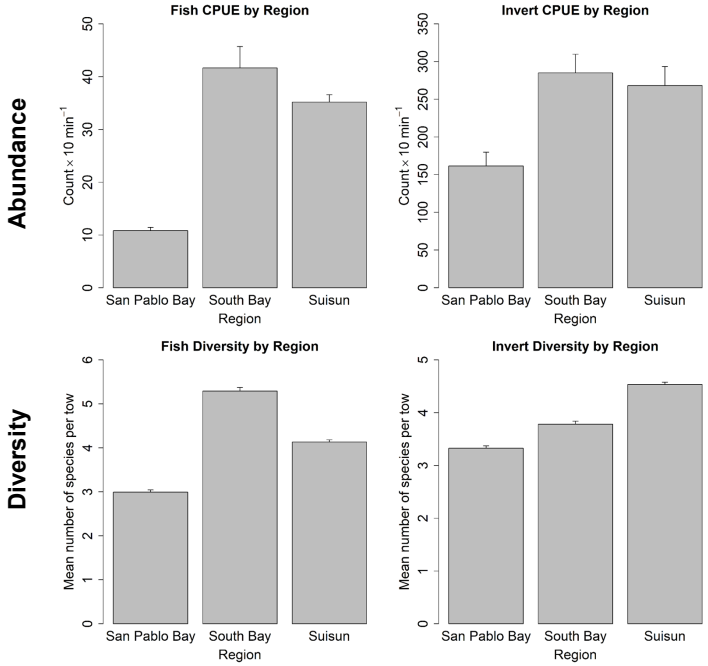

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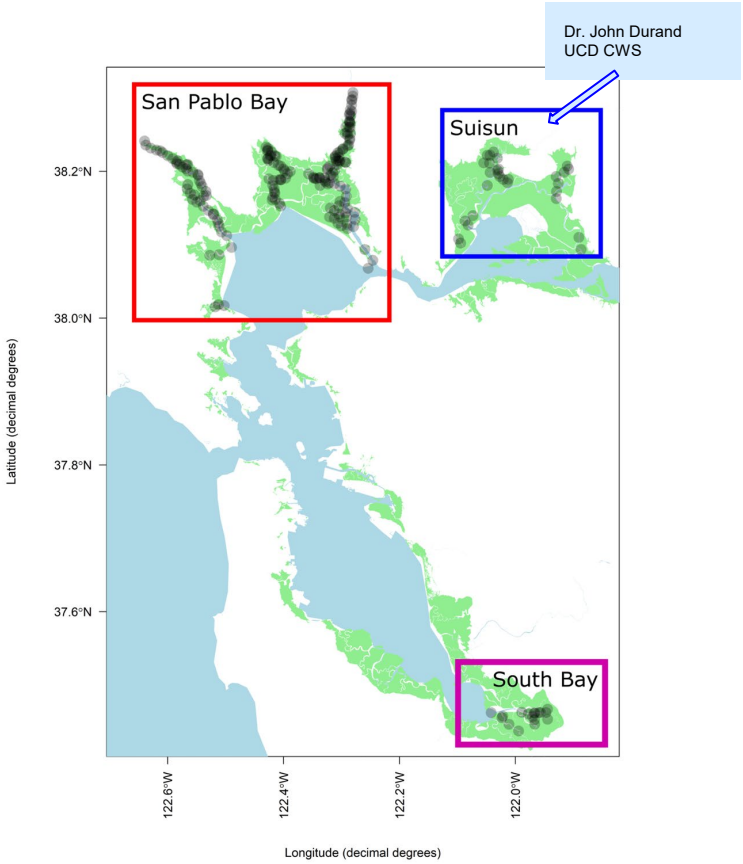
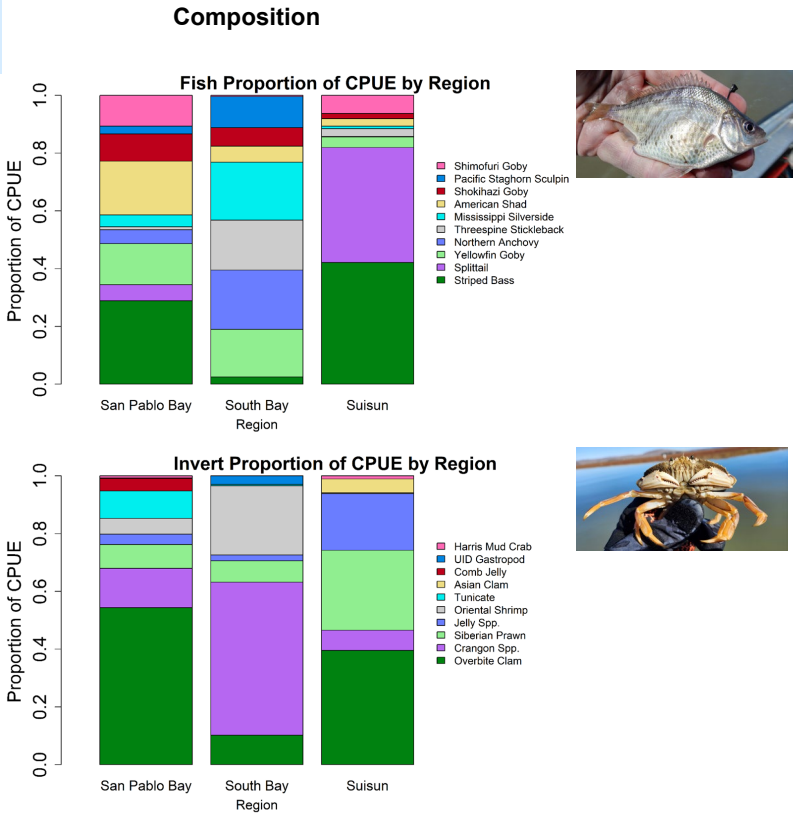
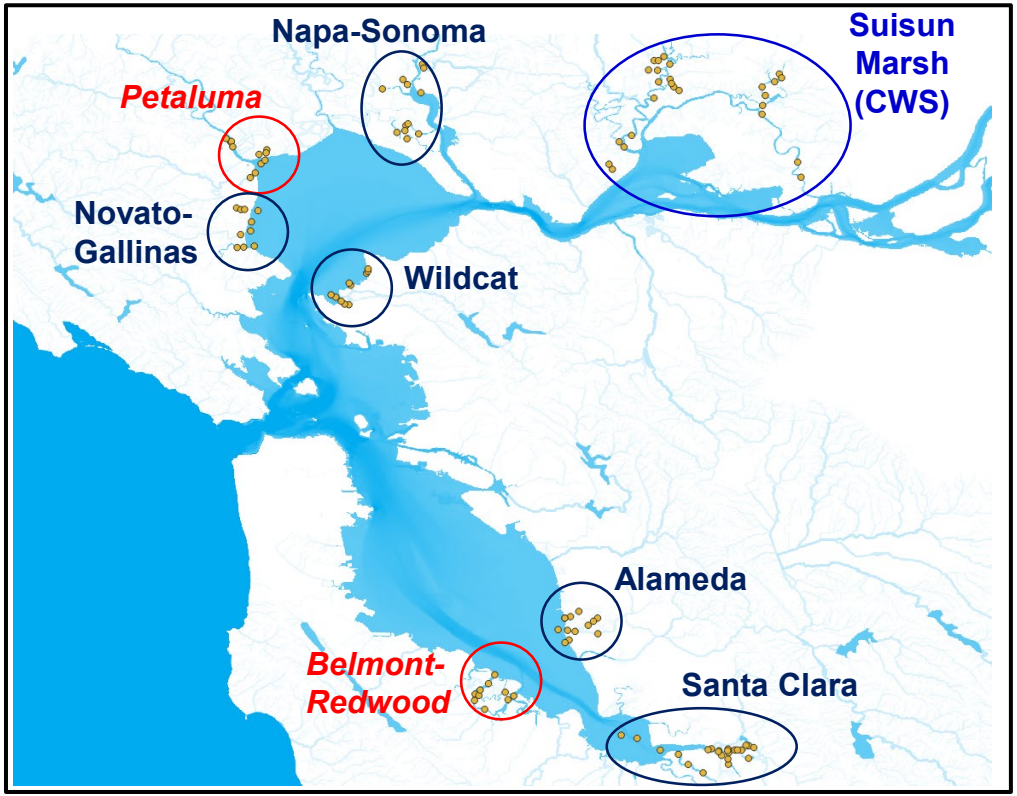




WRMP FFH Survey **Update** (Years 1 and 2)

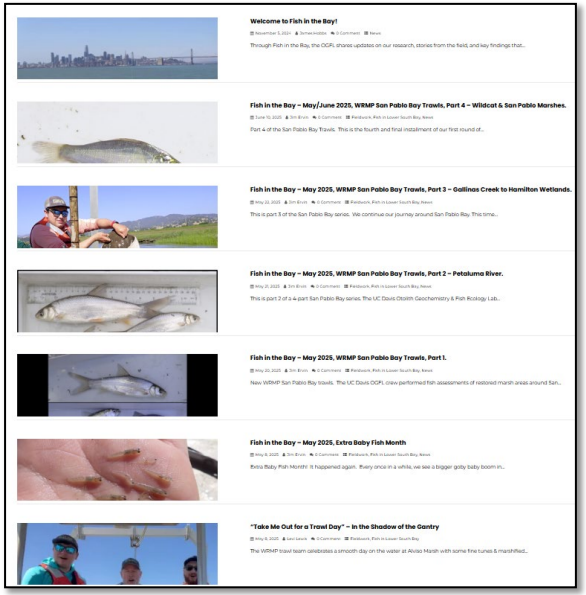


?

(coming soon)

WRMP FFH Updates on “**Fish in the Bay**”

https://www.ogfishlab.com/news/



SF ESTUARY Wetlands Regional Monitoring Program

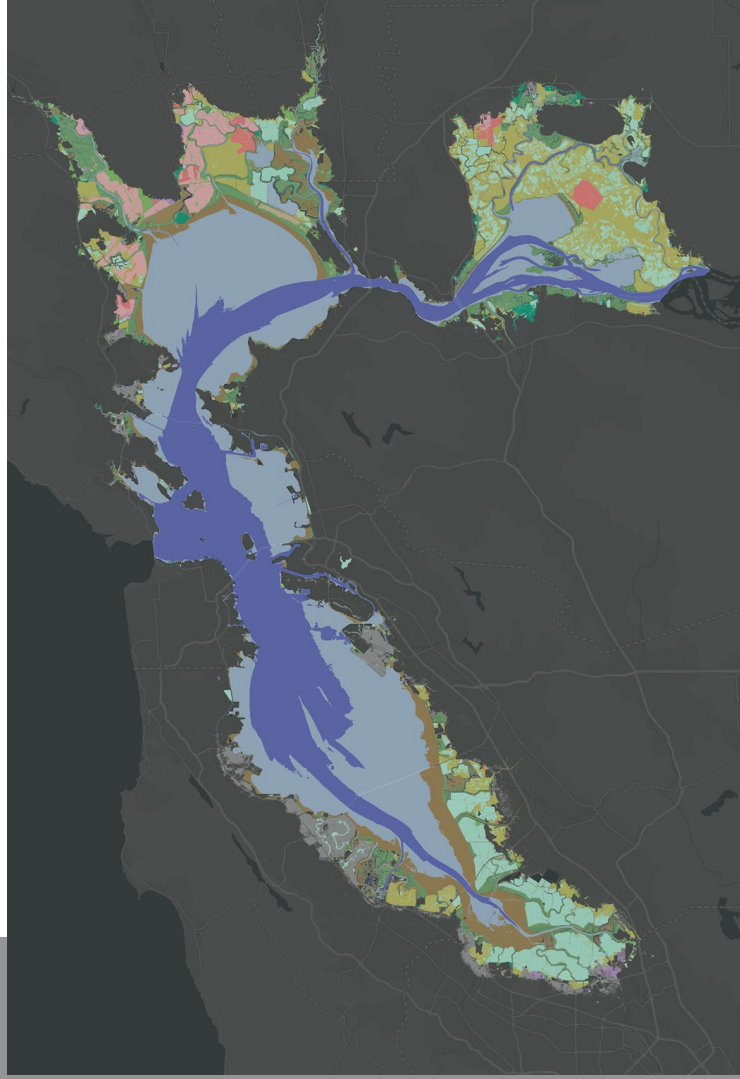
WRMP EcoAtlas Landscape Profile Tool

Presented by Aviva Rossi
San Francisco Estuary Institute

Prepared by Cristina Grosso
San Francisco Estuary Institute

WRMP Management Question:

What is the **distribution, abundance, diversity**, and condition of tidal marsh ecosystems, and how are they changing over time?



SF ESTUARY
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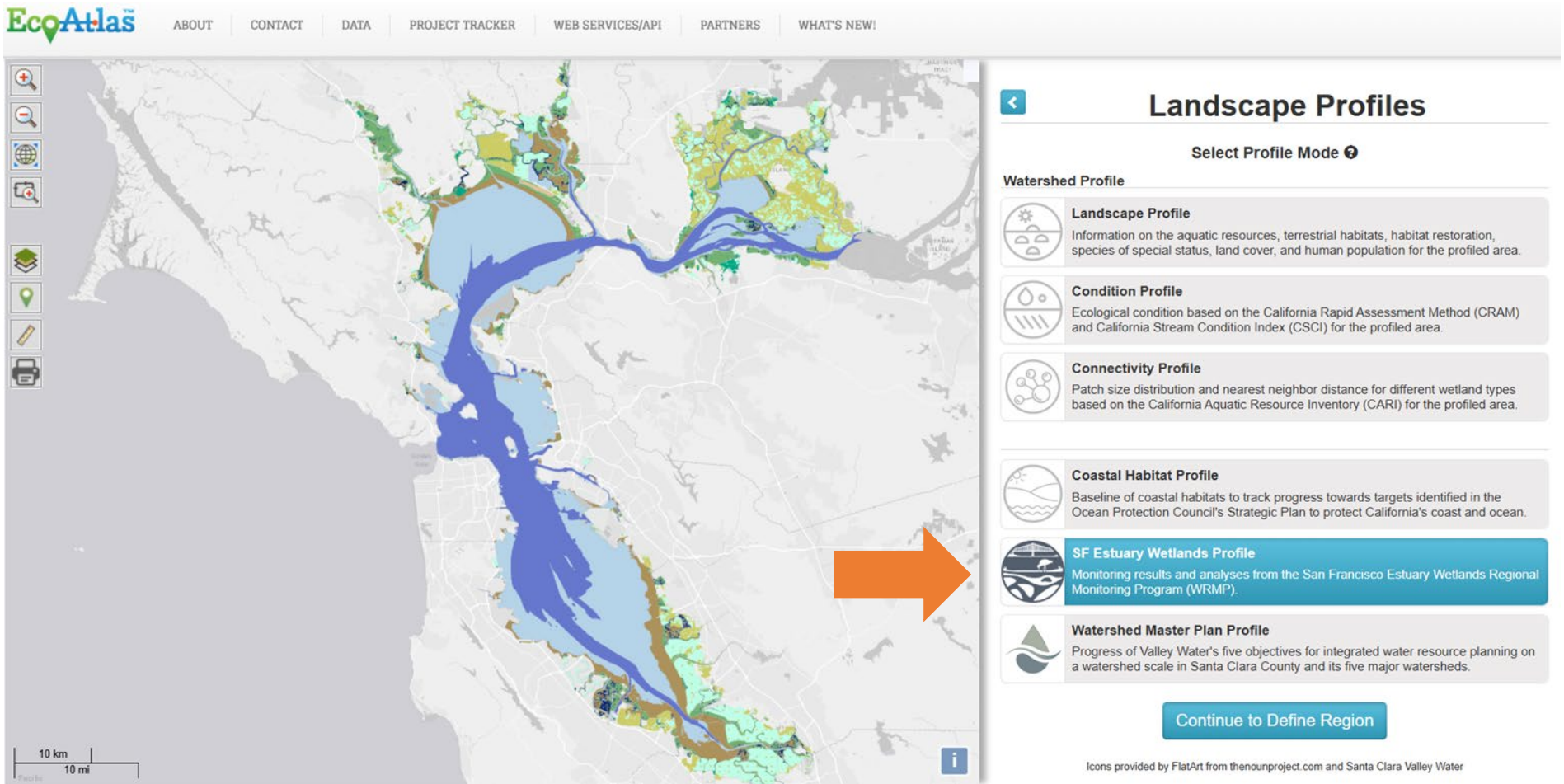
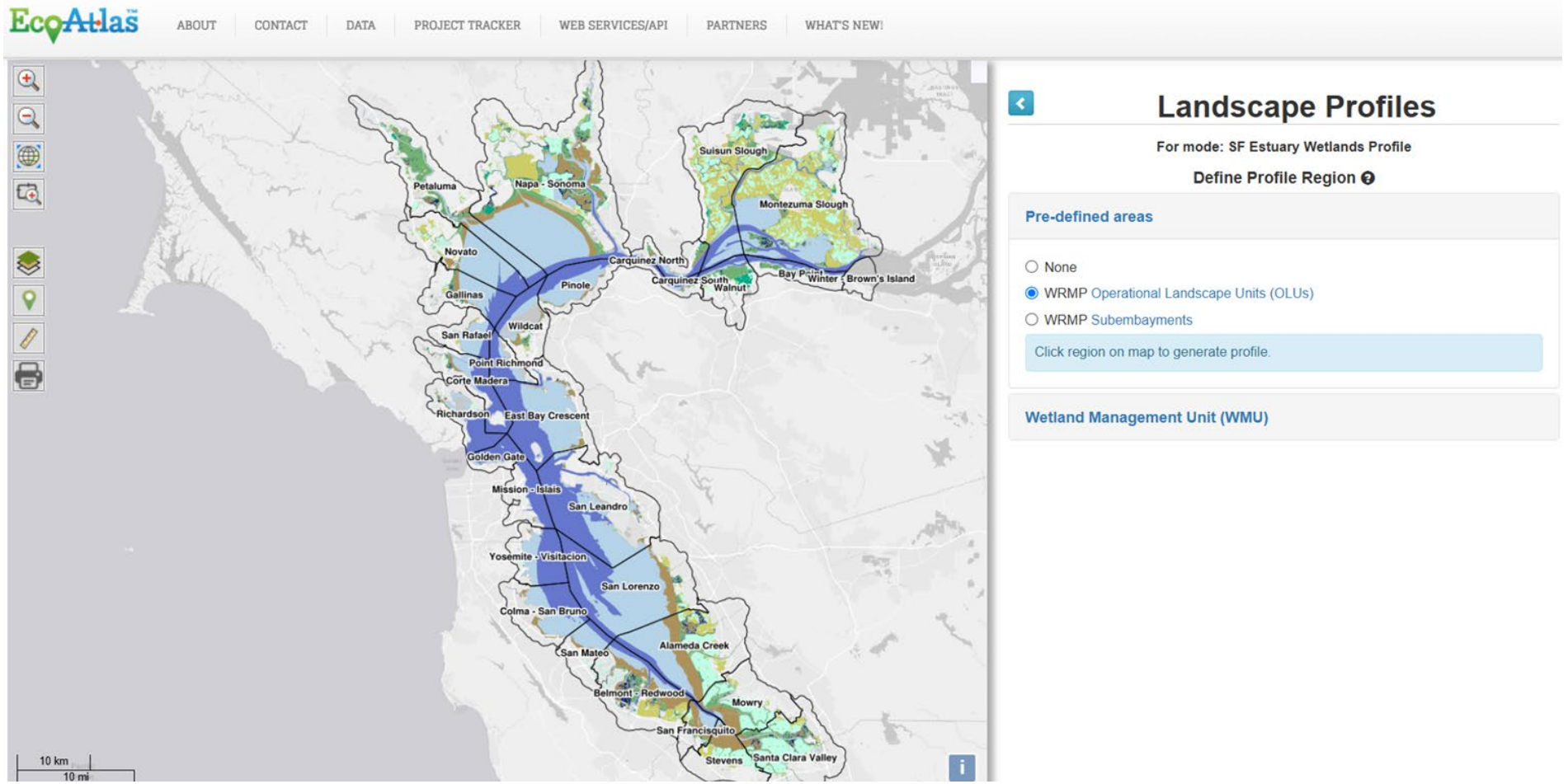
Regional
Monitoring
Program

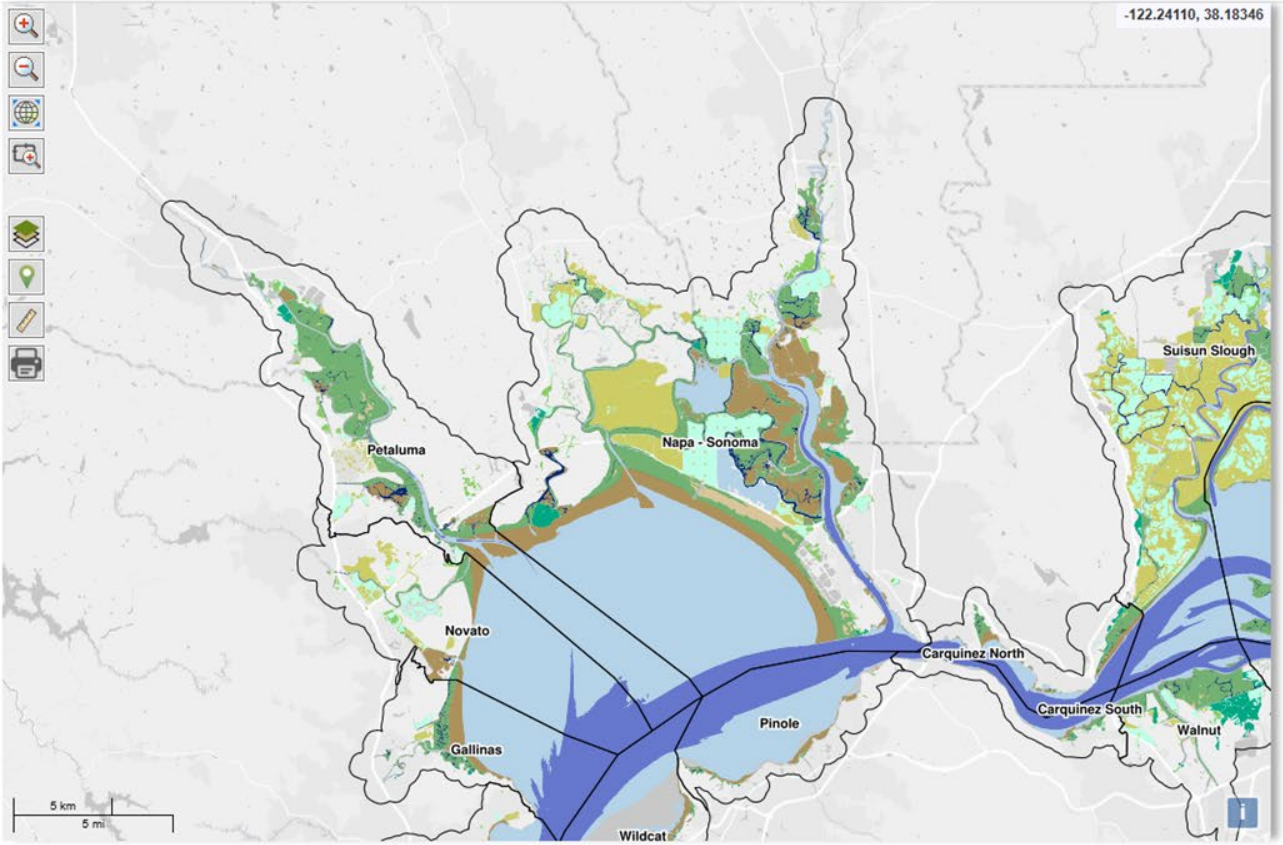
WRMP Profile | Customized summary of analyses



WRMP Profile | Pre-defined geographies



WRMP Profile | Tidal Wetland Metrics by OLU



Landscape Profile

WRMP Operational Landscape Unit (OLU): Napa - Sonoma

Total Profile Area: 93,566 acres or 146 miles^2

Print Report

The SF Estuary Wetlands Profile summarizes key metrics on indicators for tidal wetlands tracked by the SF Wetlands Regional Monitoring Program.

+ Tidal Wetland Extent

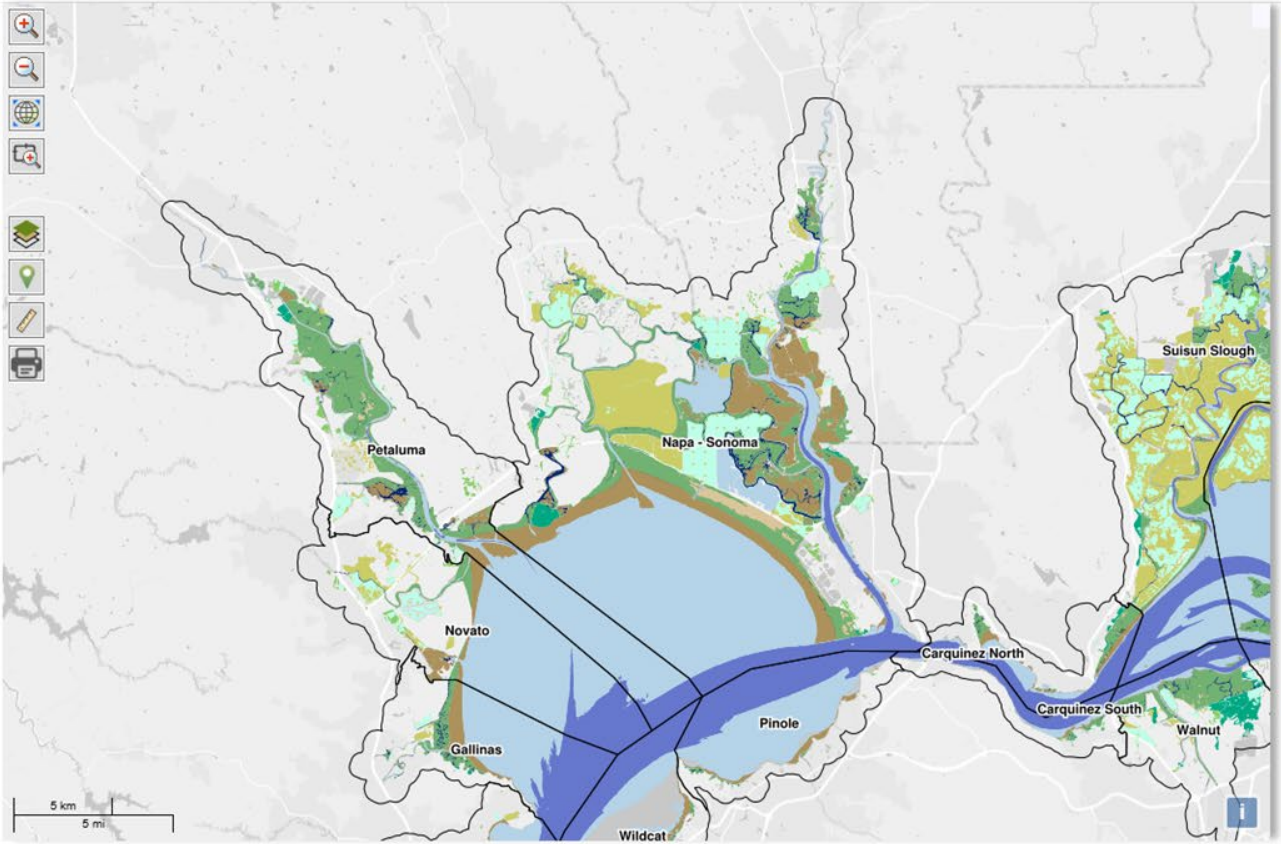
+ Restoration Status

+ Unvegetated to Vegetated Ratio (UVVR)

+ Elevation Capital

View data source details

WRMP Profile | Tidal Wetland Extent



Landscape Profile

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The SF Estuary Wetlands Profile summarizes key metrics on indicators for tidal wetlands tracked by the SF Wetlands Regional Monitoring Program.

− Tidal Wetland Extent

Tidal wetland extent in the San Francisco Bay based on the Baylands Habitat Map 2020. For more information, refer to this report.

Tidal Wetland Extent: 19,367 acres / 30.3 mi^2

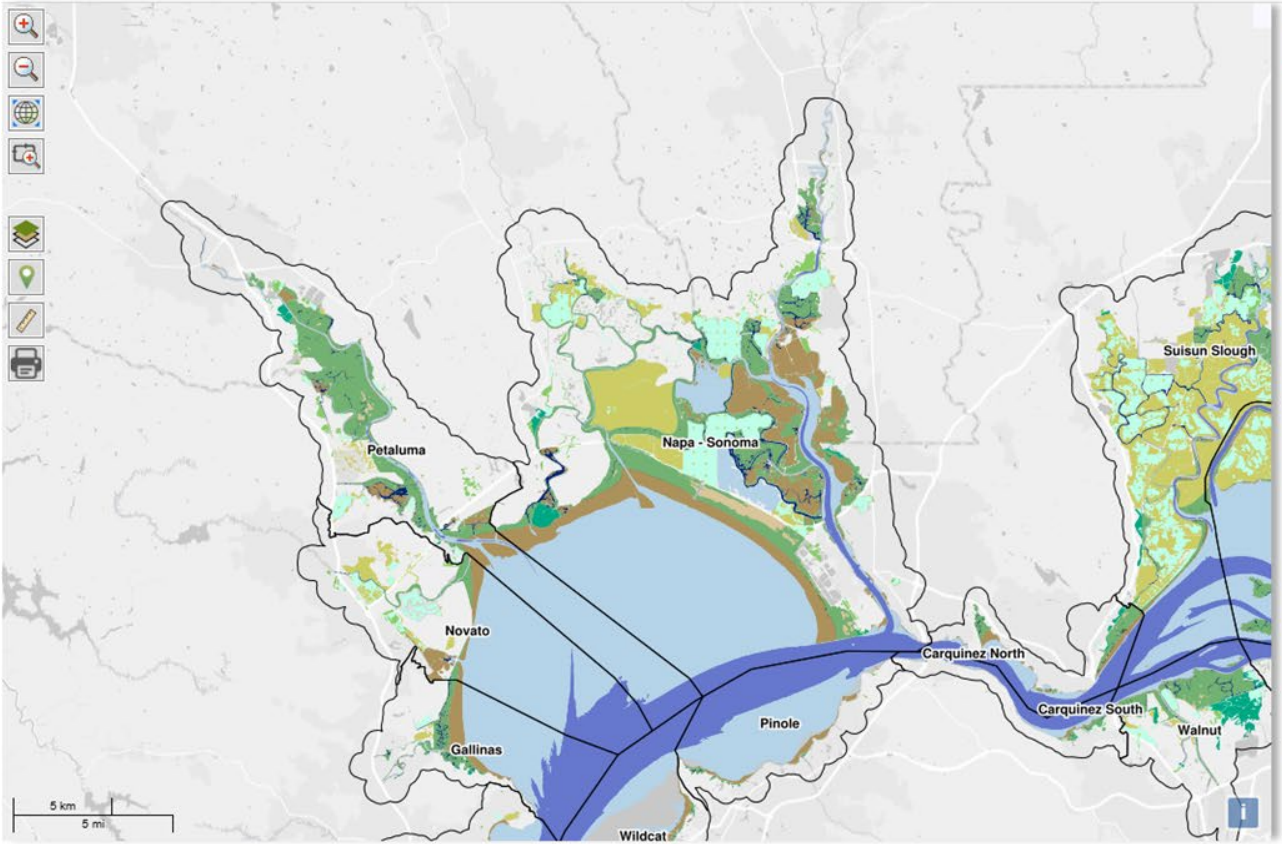
+ Restoration Status

+ Unvegetated to Vegetated Ratio (UVVR)

+ Elevation Capital

View data source details

WRMP Profile | Restoration Status



Landscape Profile

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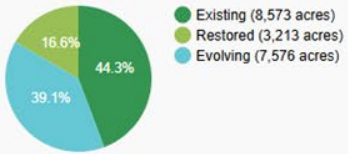
The SF Estuary Wetlands Profile summarizes key metrics on indicators for tidal wetlands tracked by the SF Wetlands Regional Monitoring Program.

+ Tidal Wetland Extent

− Restoration Status

Restoration status includes completed and future tidal wetland. *Existing* represents ancient or centennial tidal wetland occurring outside of restoration projects. *Restored* indicates tidal wetland that has been restored to tidal flow and now supports wetland vegetation and well-defined channels. *Evolving* is tidal wetland that has resulted from recent or ongoing restoration activities, but has not yet developed wetland vegetation and well-defined channels.

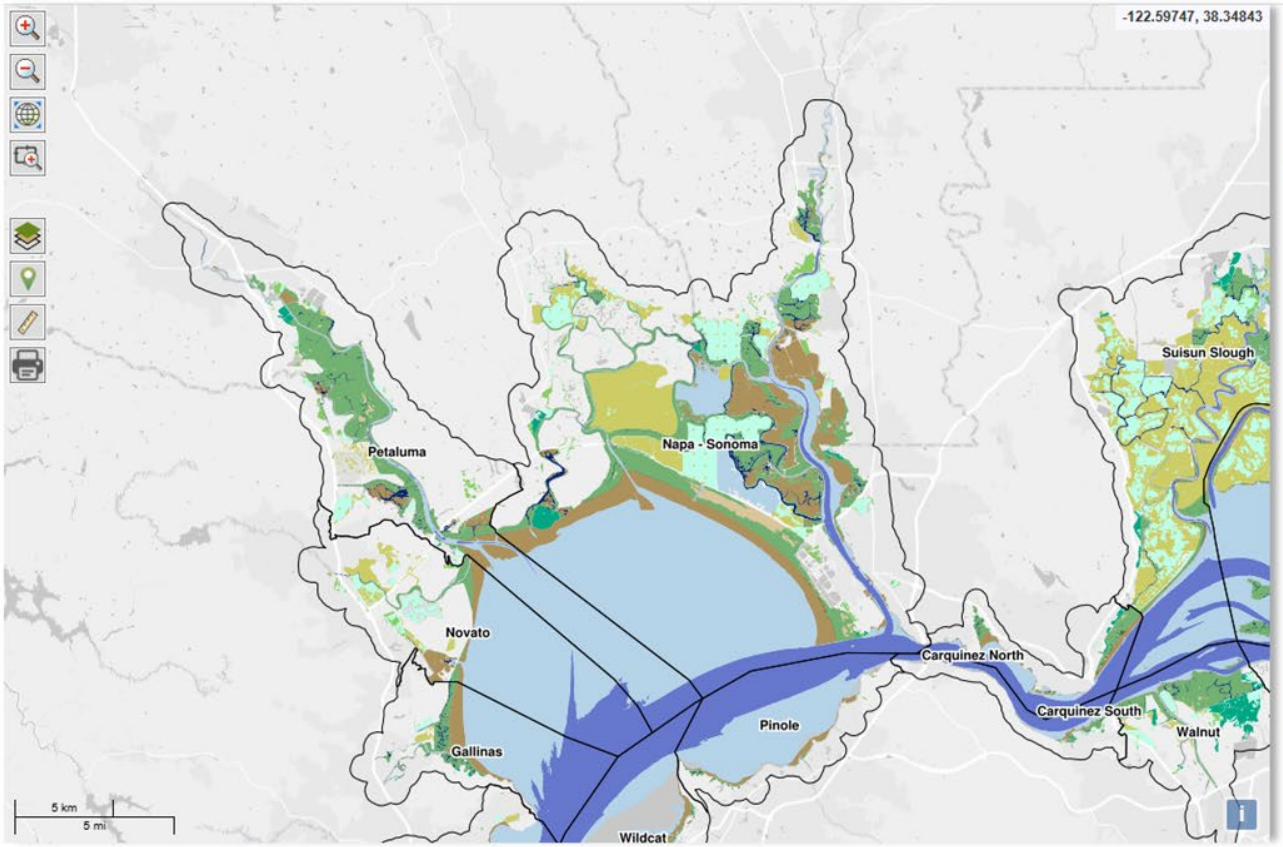


+ Unvegetated to Vegetated Ratio (UVVR)

+ Elevation Capital

View data source details

WRMP Profile | Unvegetated to Vegetated Ratio



Landscape Profile

WRMP Operational Landscape Unit (OLU): Napa - Sonoma

Print Report

Total Profile Area: 93,566 acres or 146 miles^2

The SF Estuary Wetlands Profile summarizes key metrics on indicators for tidal wetlands tracked by the SF Wetlands Regional Monitoring Program.

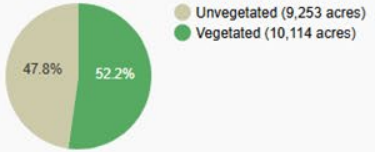
+ Tidal Wetland Extent

+ Restoration Status

− Unvegetated to Vegetated Ratio (UVVR)

UVVR is a ratio of unvegetated areas, including intertidal channels and marsh pannes, relative to the area of vegetated marsh. Lower values are positively associated with marsh resilience.

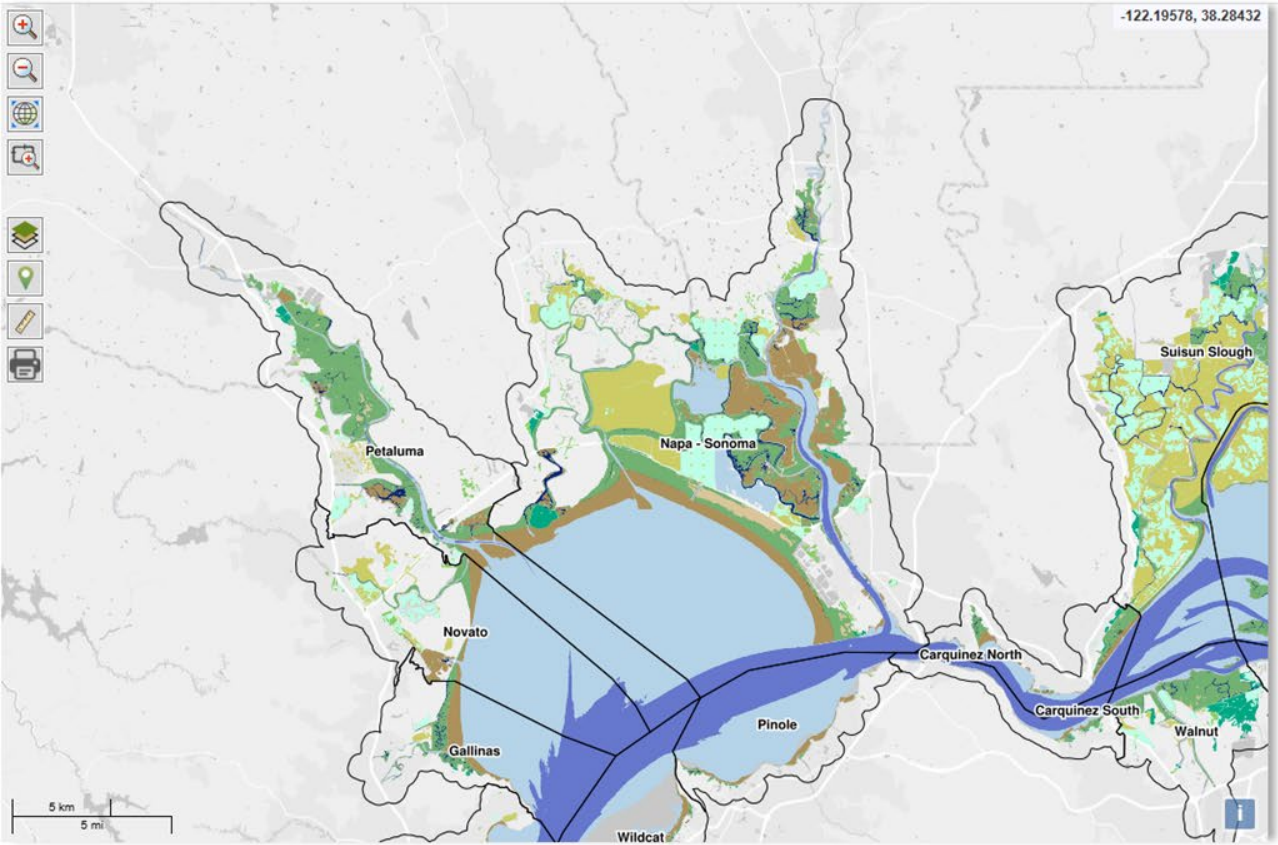
Unvegetated to Vegetated Ratio (UVVR): 0.91



+ Elevation Capital

View data source details

WRMP Profile | Elevation Capital



Landscape Profile

WRMP Operational Landscape Unit (OLU): Napa - Sonoma

Total Profile Area: 93,566 acres or 146 miles^2

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The SF Estuary Wetlands Profile summarizes key metrics on indicators for tidal wetlands tracked by the SF Wetlands Regional Monitoring Program.

+ Tidal Wetland Extent

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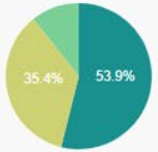
+ Unvegetated to Vegetated Ratio (UVVR)

− Elevation Capital

Elevation relative to the tides is a fundamental driver of plant distribution, abundance, and condition in tidal bayland habitats. Elevation capital is calculated as the wetland's elevation relative to the tidal range.



- Below Mean High Water (MHW) (10,462 acres)
- Between MHW and MHHW (2,076 acres)
- Above Mean Higher High Water (MHHW) (6,877 acres)

View data source details

WRMP Profile | Scalable to evolve with the Program

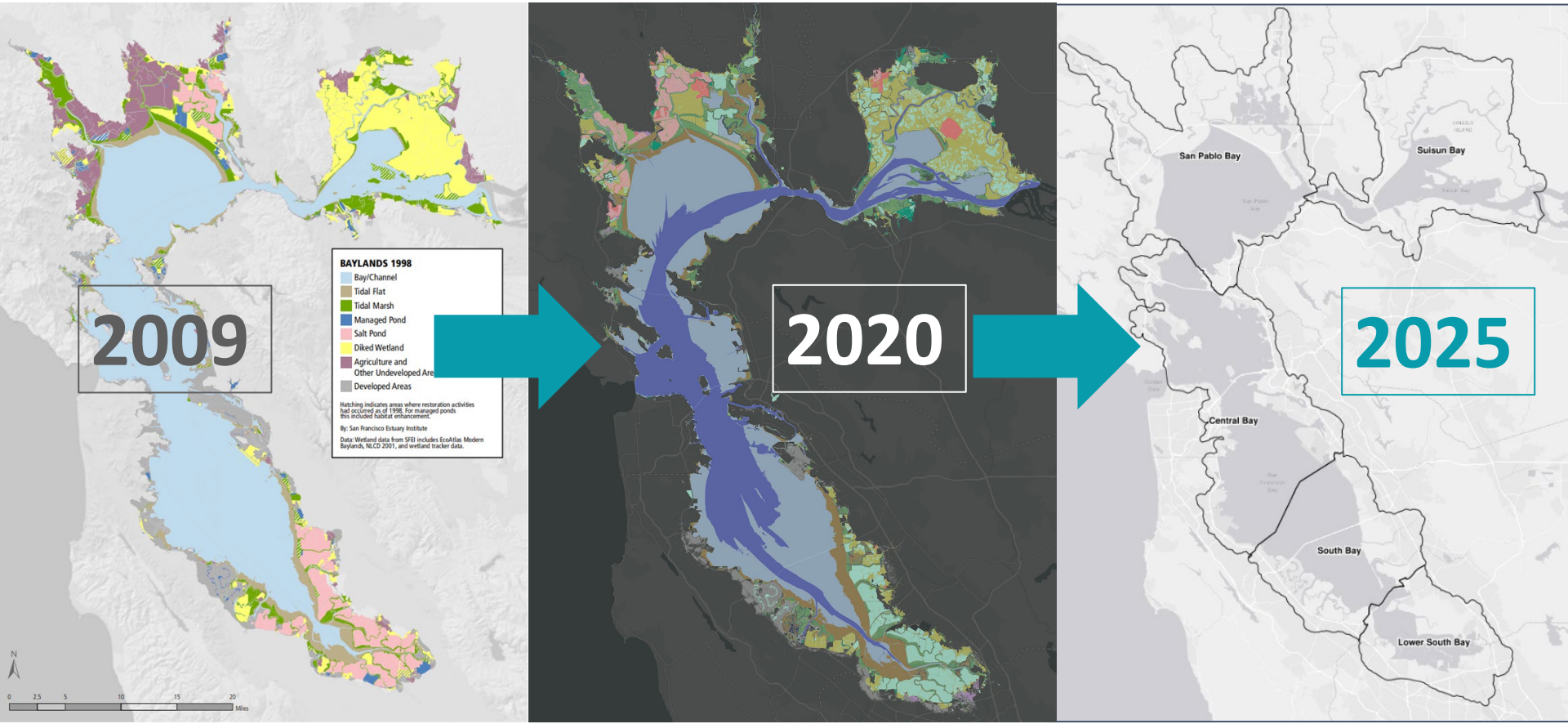
Metrics Summarized

- Tidal Wetland Extent
- Restoration Status
- Unvegetated to Vegetated Ratio
- Elevation Capital
- *Marsh Typology*
- *Patch Size/Shape*
- *Channel Length & Density*

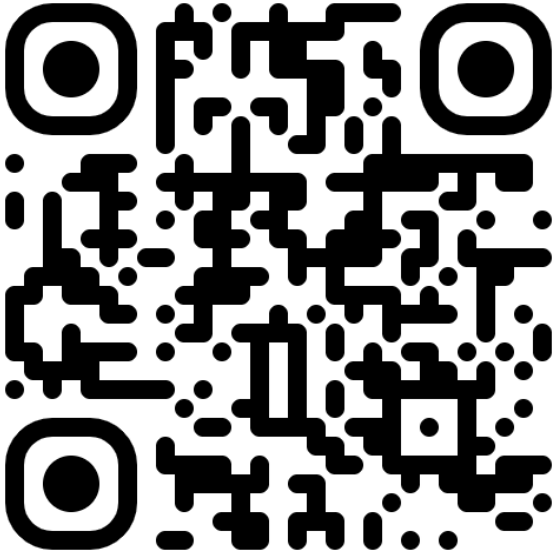
Filter/Selection

- Subembayments
- Operational Landscape Units
- Wetland Management Units
- *Analysis Unit*
- *Project Tracker Status*
- *WRMP Priority Site*
- *Patch*
- *Marsh Typology*

WRMP Profile | Visualize habitat change



EcoAtlas WRMP Profile Tool



WRMP Wetland Condition Monitoring

Sarah Pearce
San Francisco Estuary Institute

WRMP Management Question:

What is the distribution, abundance, diversity, and **condition** of tidal marsh ecosystems, and how are they changing over time?

How do we know when a marsh is healthy?

How can we track change in condition through time?

Raccoon Island

CRAM Index Score of 90

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Colma Creek Mouth

CRAM Index Score of 47

Rapid Assessment using CRAM

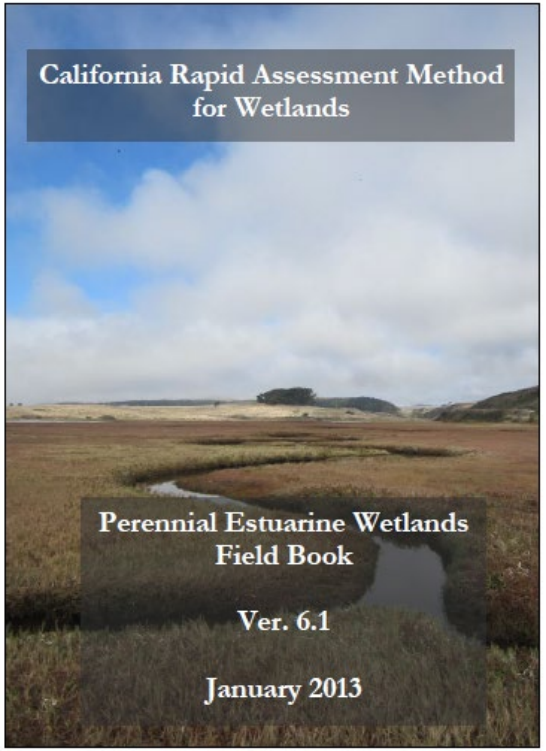
California Rapid Assessment Method

Rapid, repeatable, well-established and supported

Used statewide for 20+ years

Scores can be simplified into Good/Fair/Poor

CRAM
California Rapid Assessment Method



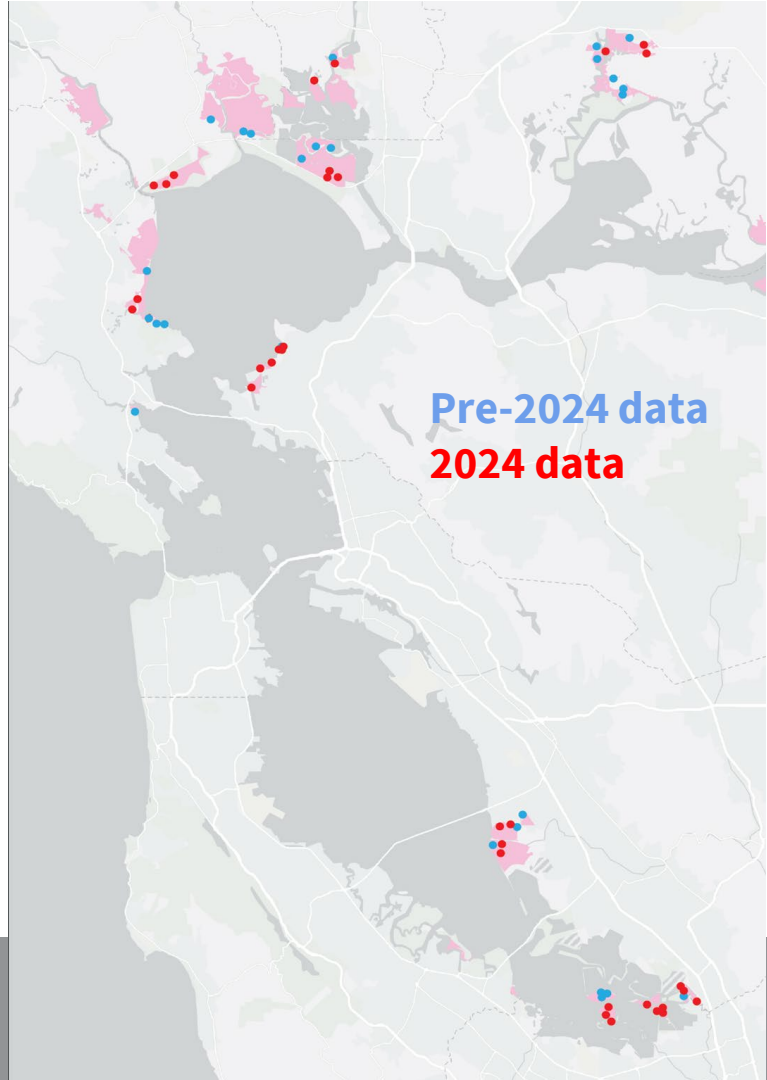
Two people about two hours
Numeric score of overall ecological health

2024 CRAM Results

Goal: Gain additional spatial coverage of CRAM assessments across the WRMP Priority Site Network

Completed 33 assessments at 18 WRMP sites

Outcome: A MUCH better understanding of condition at WRMP sites. All project sites were in Fair condition, while Reference sites were in Good condition.



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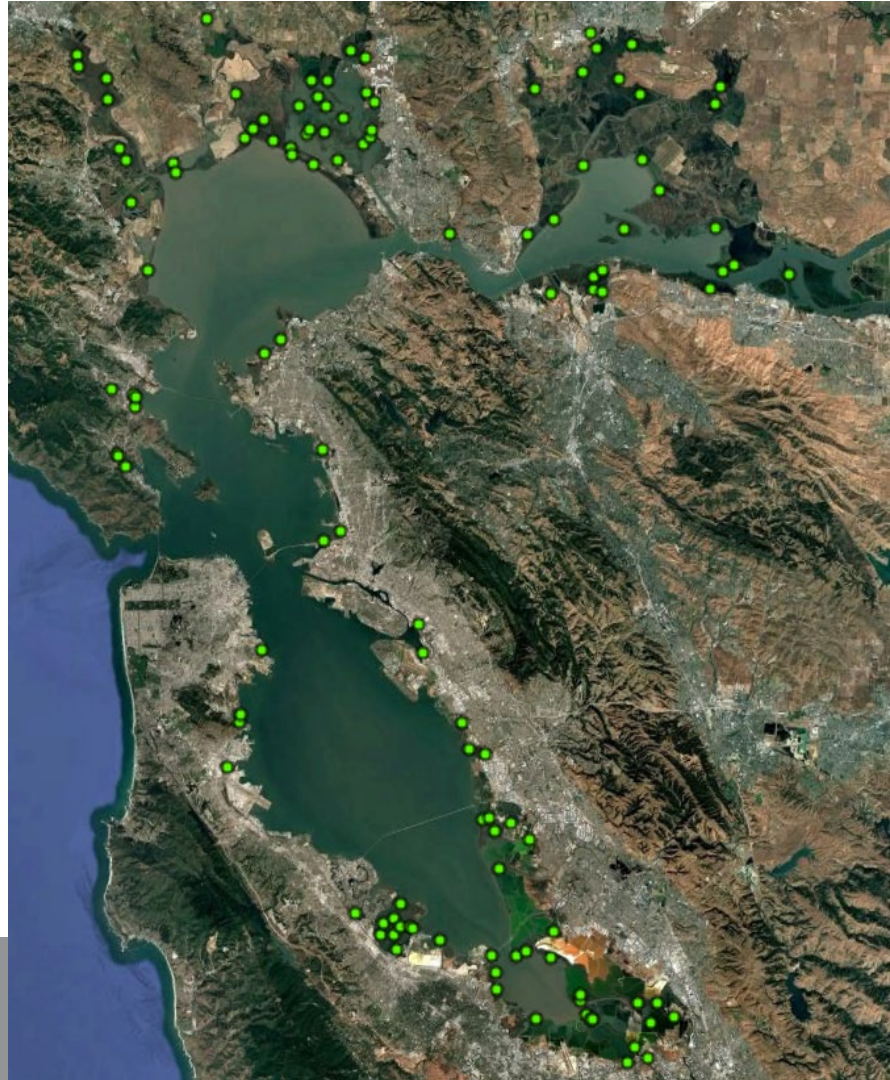
Condition across the SF Estuary?

2025-2027

- An ambient survey of the condition of all marshes
- Used the BHM
- 120 randomly selected sites
- Will result in a CDF of condition for the estuary



SF ESTUARY Wetlands Regional Monitoring Program

The power of CRAM

CRAM provides a **common language** that allows us to:

The power of CRAM

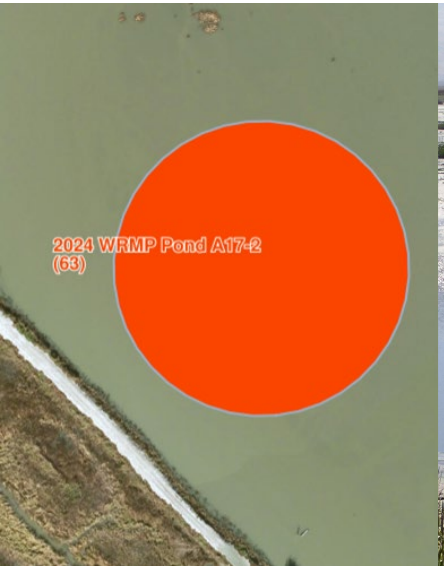
CRAM provides a **common language** that allows us to:

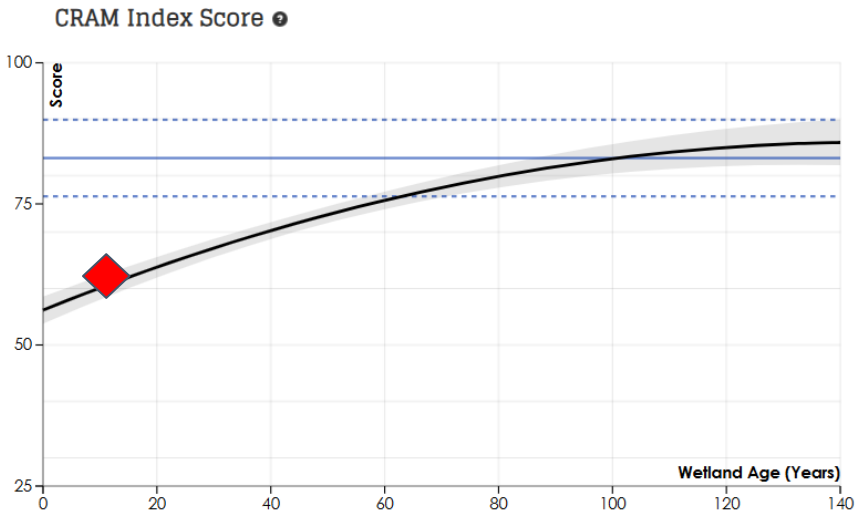
1) Compare WRMP sites to each other (and to others across the Estuary or the State)

The power of CRAM

CRAM provides a **common language** that allows us to:

2) Assess restoration project condition, track change through time, compare its condition to ambient condition, compare its condition to the expected rate of improvement

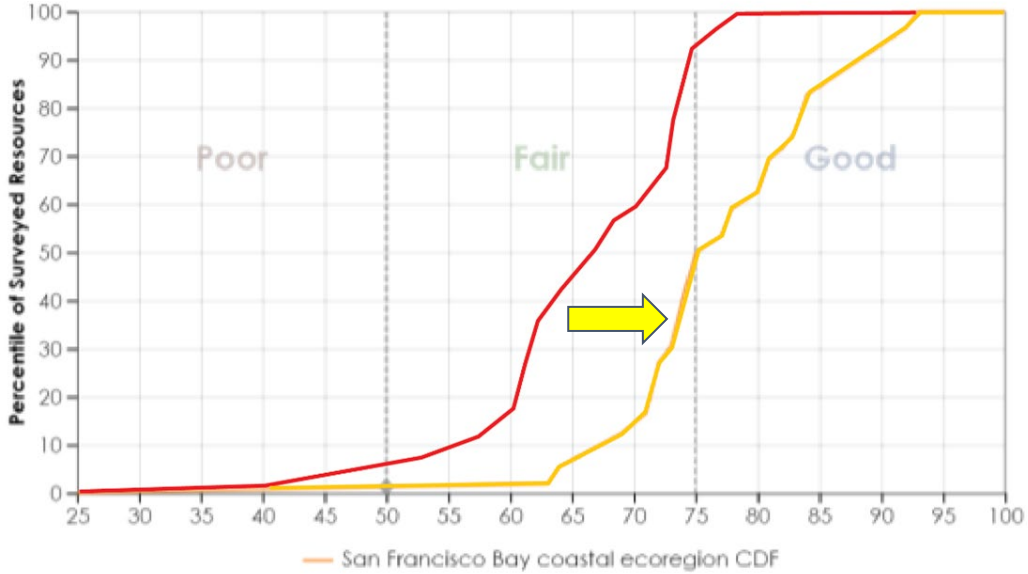


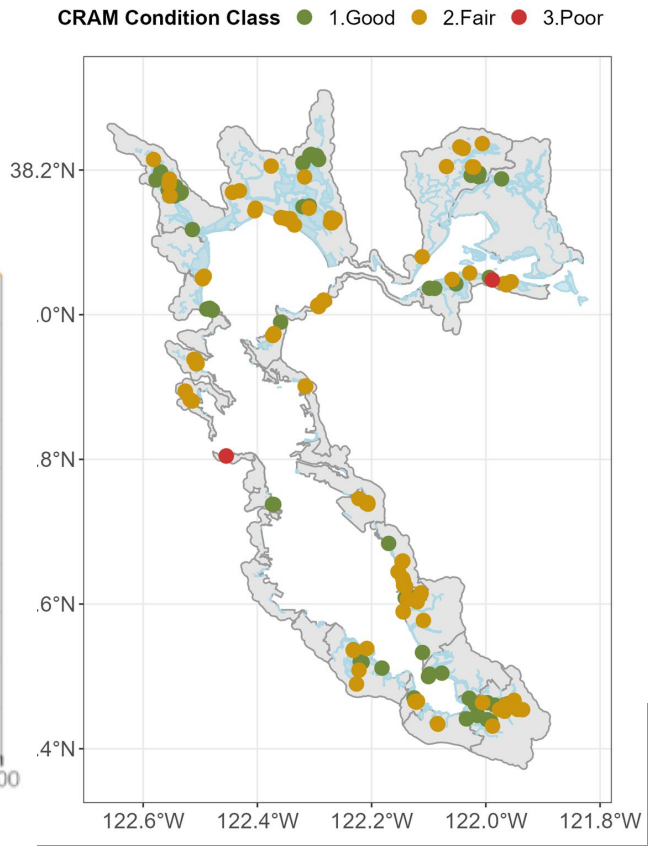


The power of CRAM

CRAM provides a **common language** that allows us to:

3) Understand the ambient condition of marshes across the SF Estuary, and track change in condition at the regional scale





SF ESTUARY Wetlands Regional Monitoring Program

Introduction

Lisa (Schile) Beers, PhD

Co-Lead Scientist

Aviva Rossi, PhD

Co-Lead Scientist

Lightning Talks

Interactive Session

Q&A

Thank you from the WRMP Team!

Photo: Shira Bezalel

SF ESTUARY Wetlands Regional Monitoring Program

Explore WRMP Tools & Resources!

Visit the tables to see the:

- WRMP website
- EcoAtlas Profile Tool
- Baylands Habitat Map
- People & Wetlands StoryMap(s)

Access all the tools: