SCCWRP's Wetland Research

ERIC STEIN, BIOLOGY DEPT.

Why Wetlands?

- Wetland provide a broad suite of important functions and beneficial uses
- Wetlands are affected by many stressors in complex ways
- Most aquatic resource management programs affect or are affected by wetlands

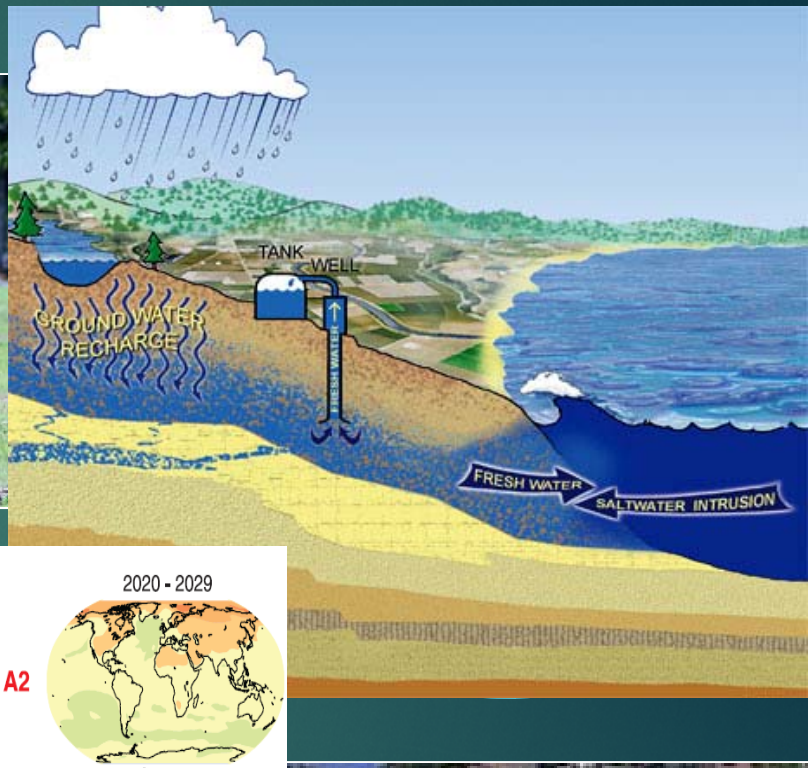
Most Ecologically Productive Habitat

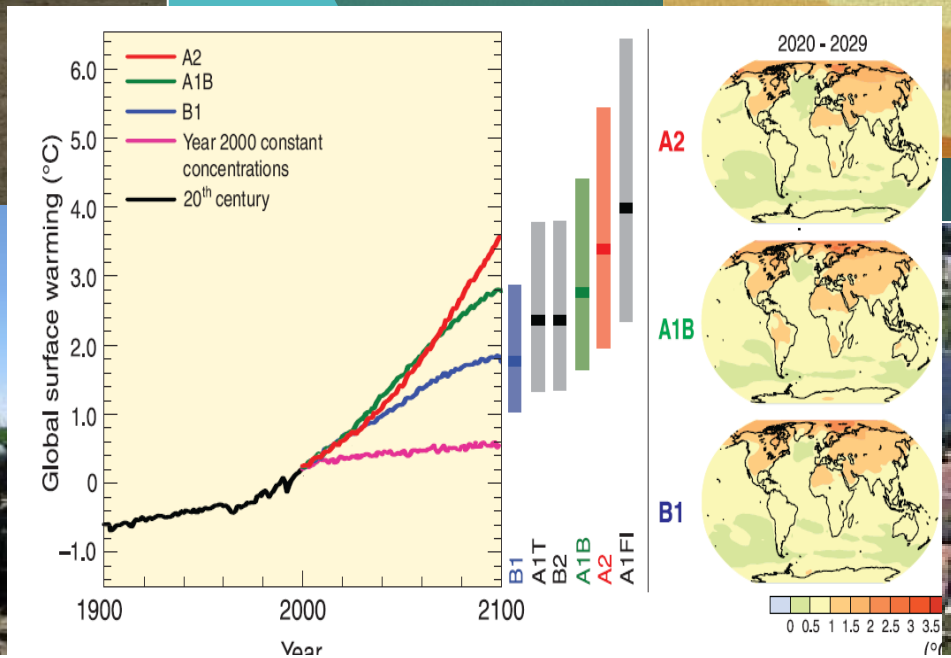
. . .in dry climates, such as southern California, approximately 75% of terrestrial (land based) animals rely on wetlands to fulfill at least part of their life cycle.

photo: Shana Dodd

Wetlands are Ubiquitous on the Landscape

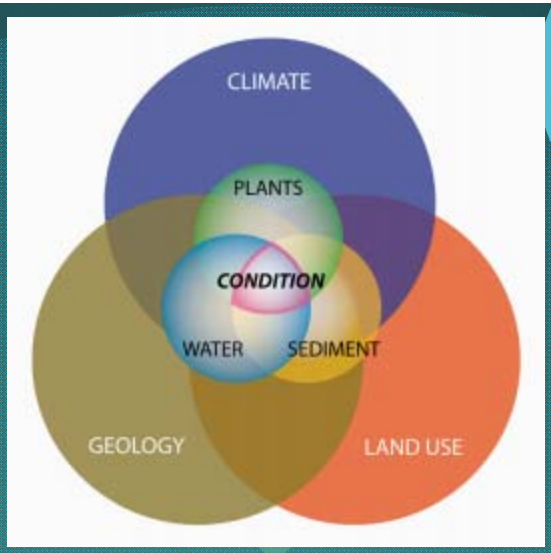
Many Stressors Can Affect Wetlands





Wetlands Touch Many Programs

- State and Federal Wetland Protection Programs
  - Regulate activities that fill or affect wetlands
- Stormwater Management Programs
  - Manage wetlands for water quality, flood control, or water supply endpoints
- Wastewater Programs
  - Discharge effects (pos. or neg.) on downstream wetlands
- Coastal Programs
  - Coastal wetland restoration
  - Coastal protection from erosion



Impacts

Management Actions

Assessment

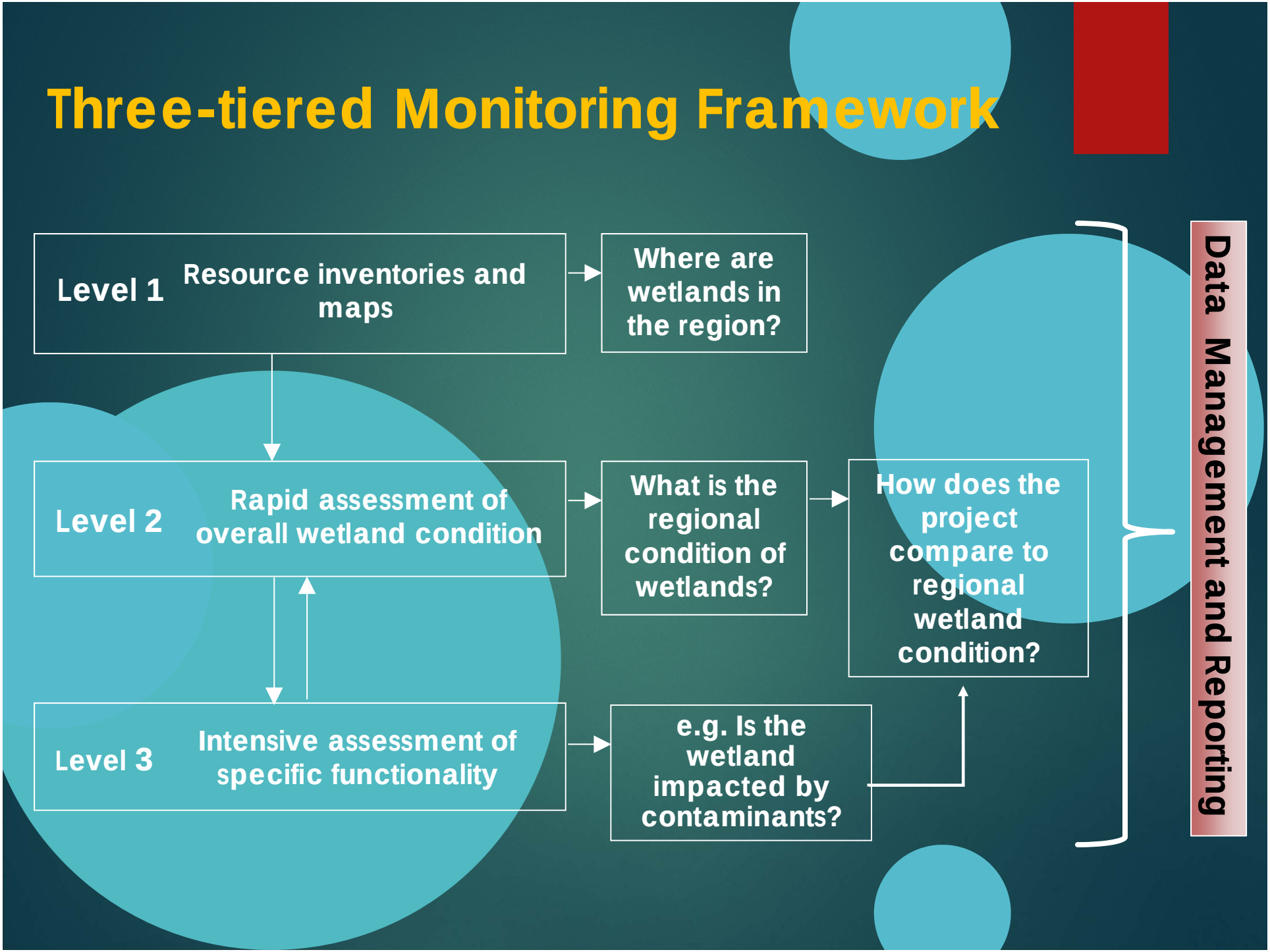
Uses/Values

Wetland Assessment

This has been the core of past SCCWRP research

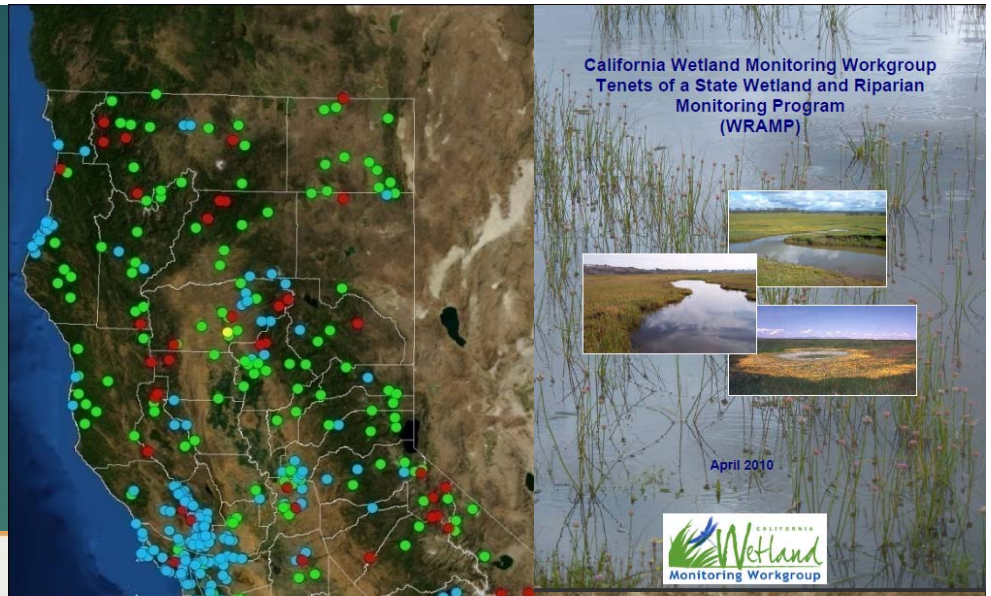
- Extent and distribution
  - Historical
  - Contemporary
- Ecological condition

Three-tiered Monitoring Framework

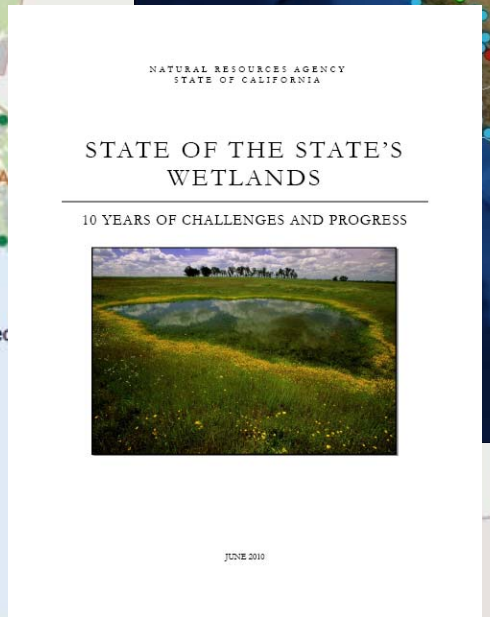


Past Successes

CALIFORNIA Wetland Monitoring Workgroup



SOUTHERN CALIFORNIA WETLANDS RECOVERY PROJECT



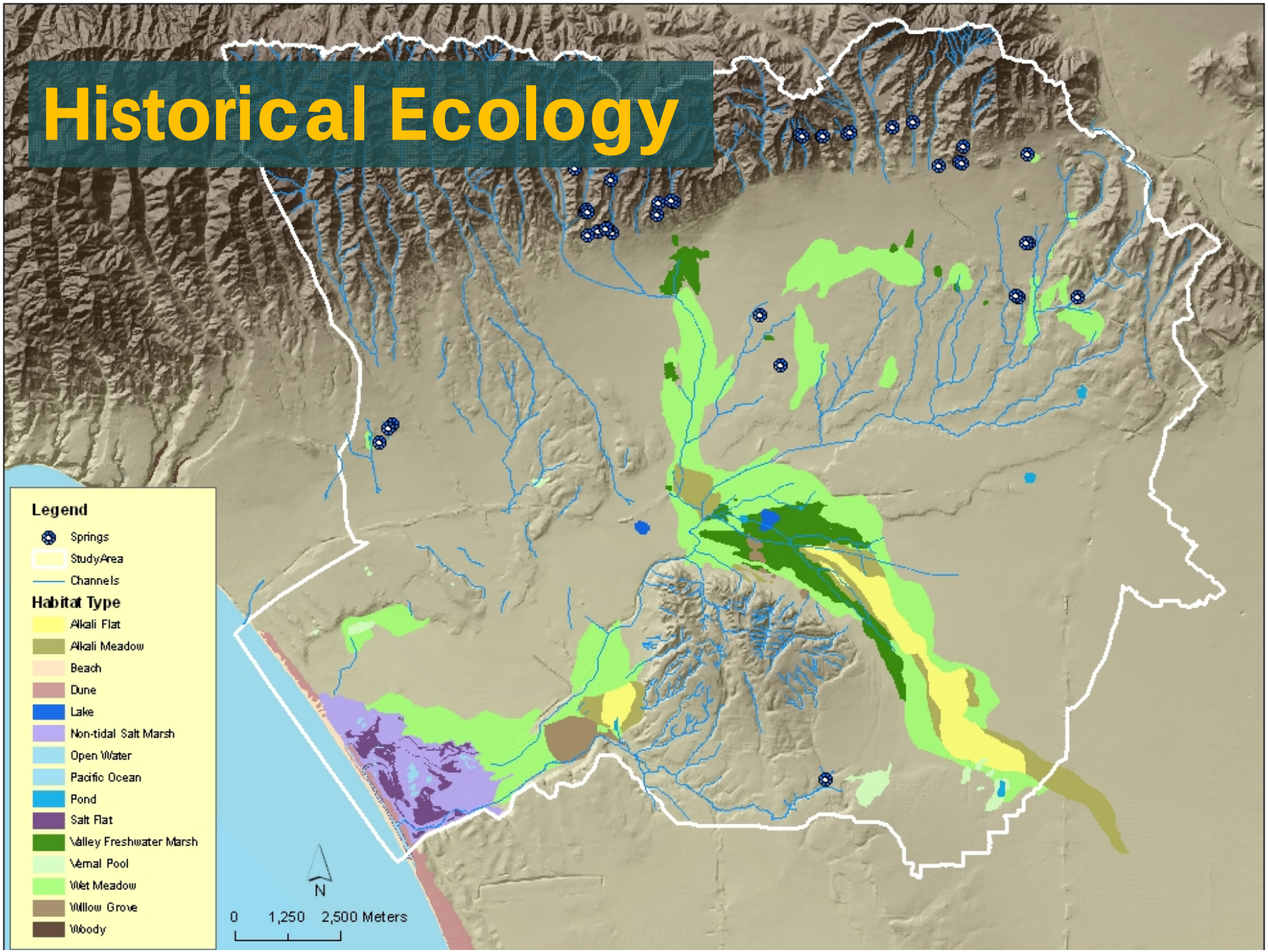
NATURAL RESOURCES AGENCY
STATE OF CALIFORNIA

STATE OF THE STATE'S WETLANDS

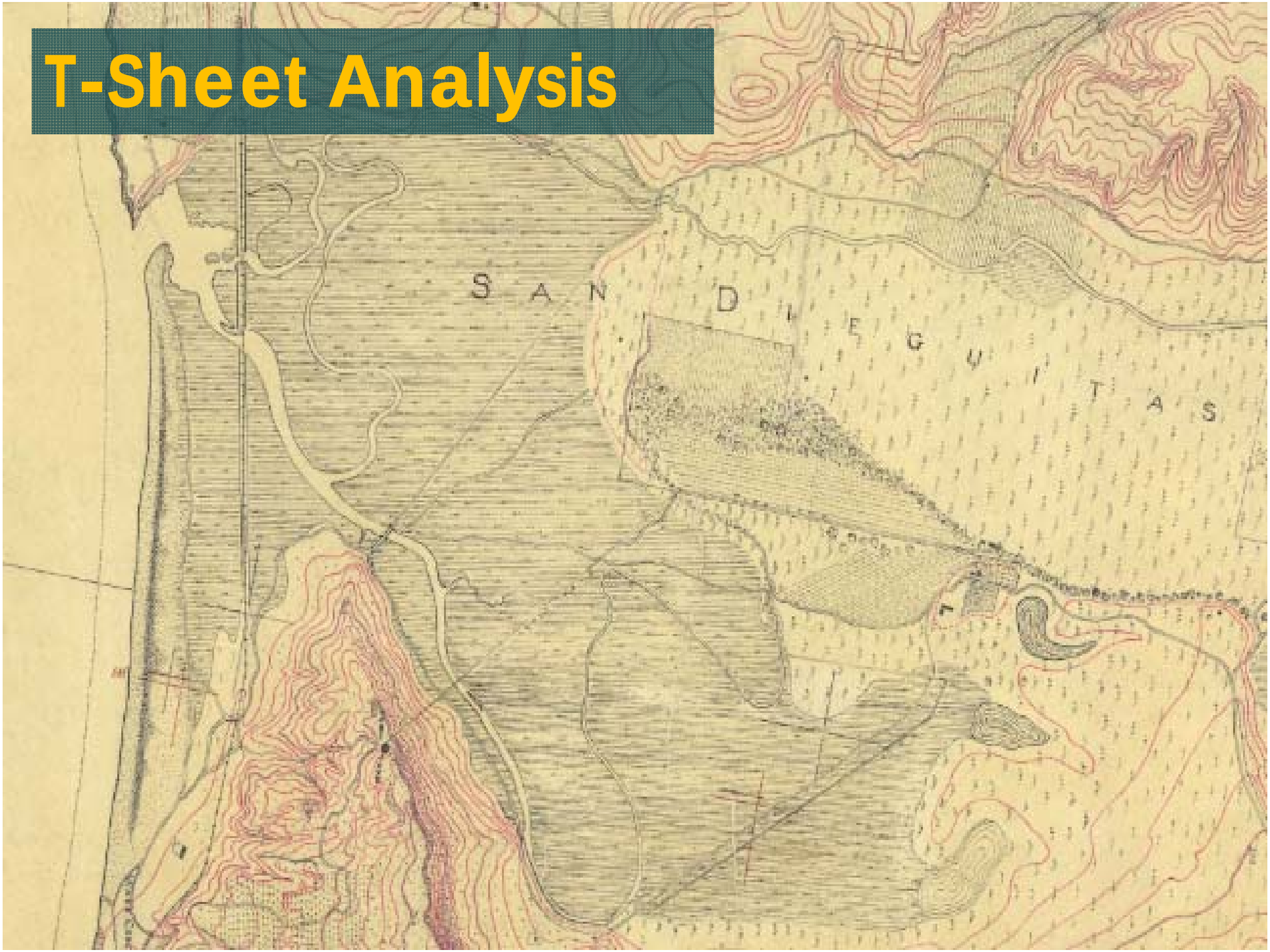
10 YEARS OF CHALLENGES AND PROGRESS

JUNE 2010

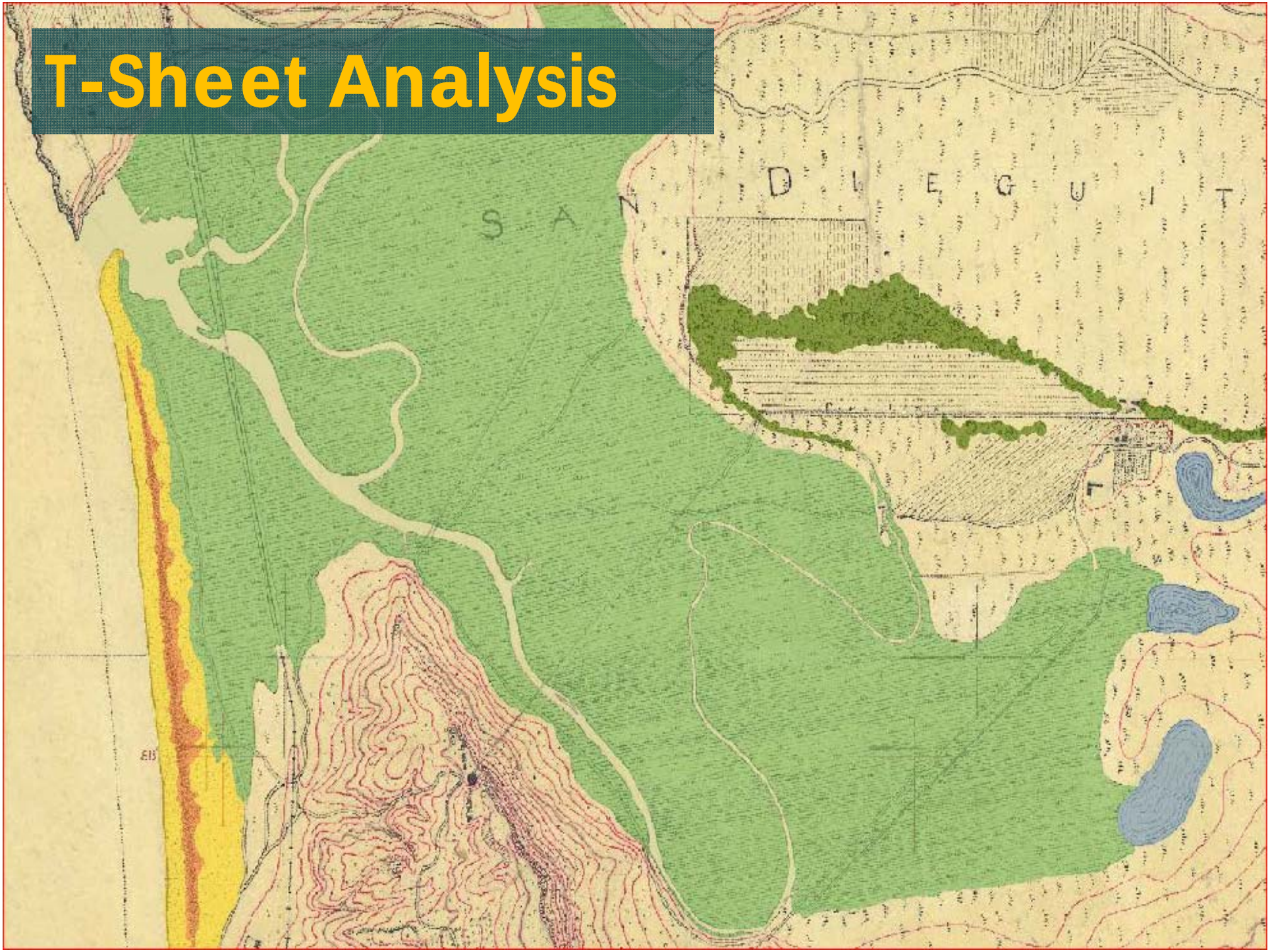
Historical Ecology

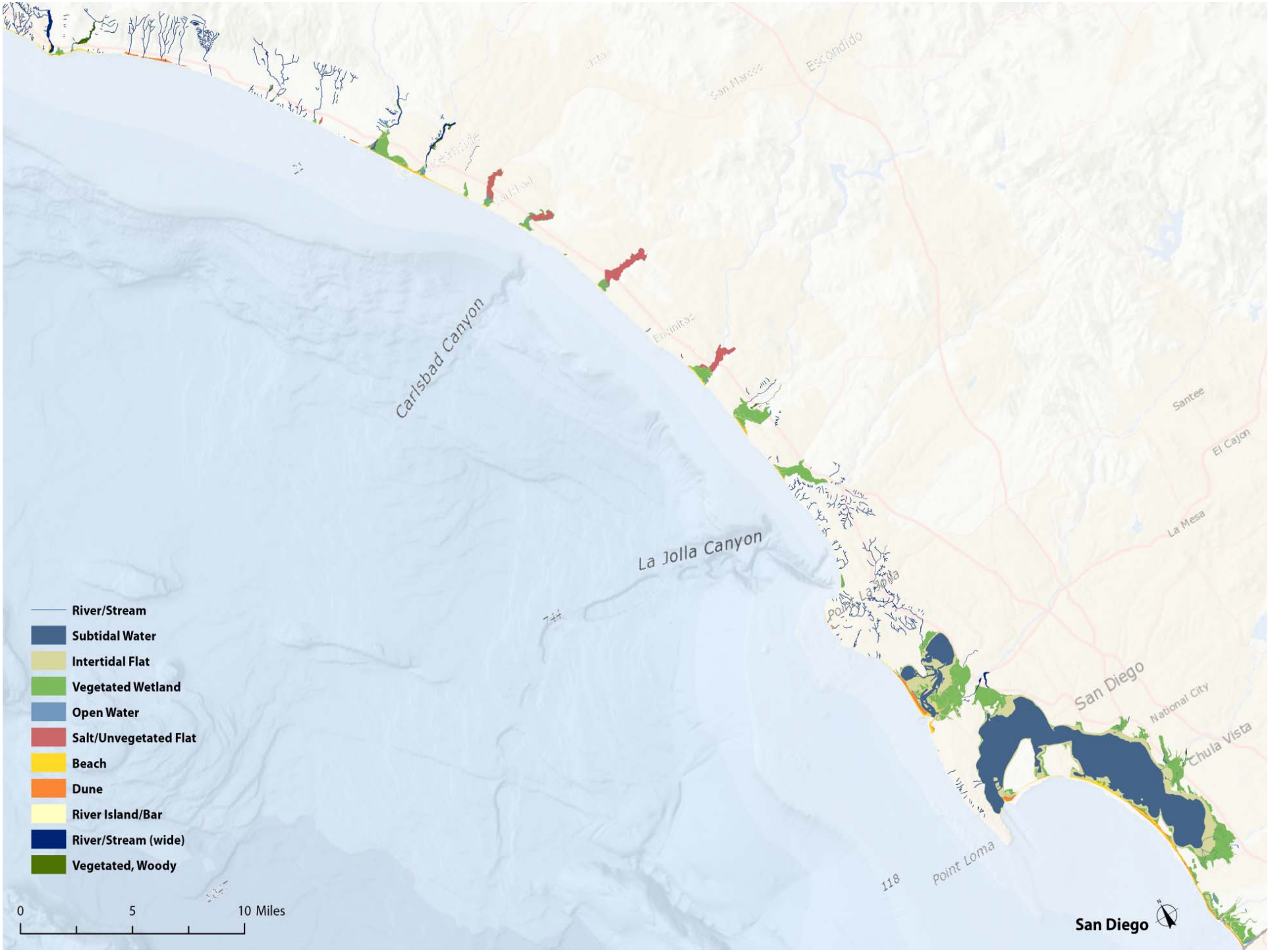


T-Sheet Analysis

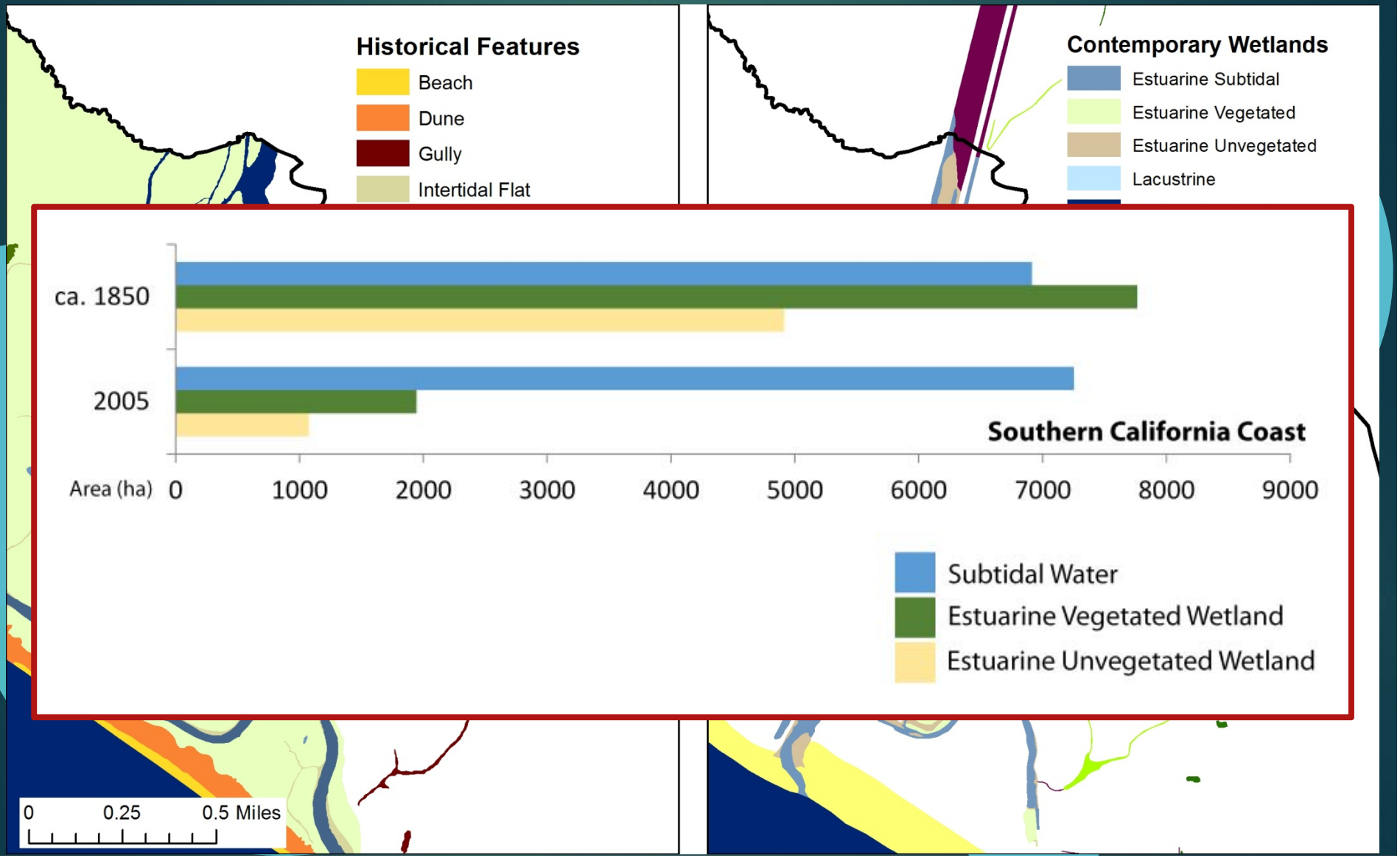


T-Sheet Analysis




Carlsbad Canyon
La Jolla Canyon
Escondido
Santee
El Cajon
La Mesa
San Diego
National City
Chula Vista
Point Loma
118
River/Stream
Subtidal Water
Intertidal Flat
Vegetated Wetland
Open Water
Salt/Unvegetated Flat
Beach
Dune
River Island/Bar
River/Stream (wide)
Vegetated, Woody
0
5
10 Miles
San Diego

Comparison of Historical and Contemporary Wetlands



U.S. COAST SURVEY MAPS OF CALIFORNIA

Southern California Coast T-Sheets (1851-1889)

Outlines
Labels

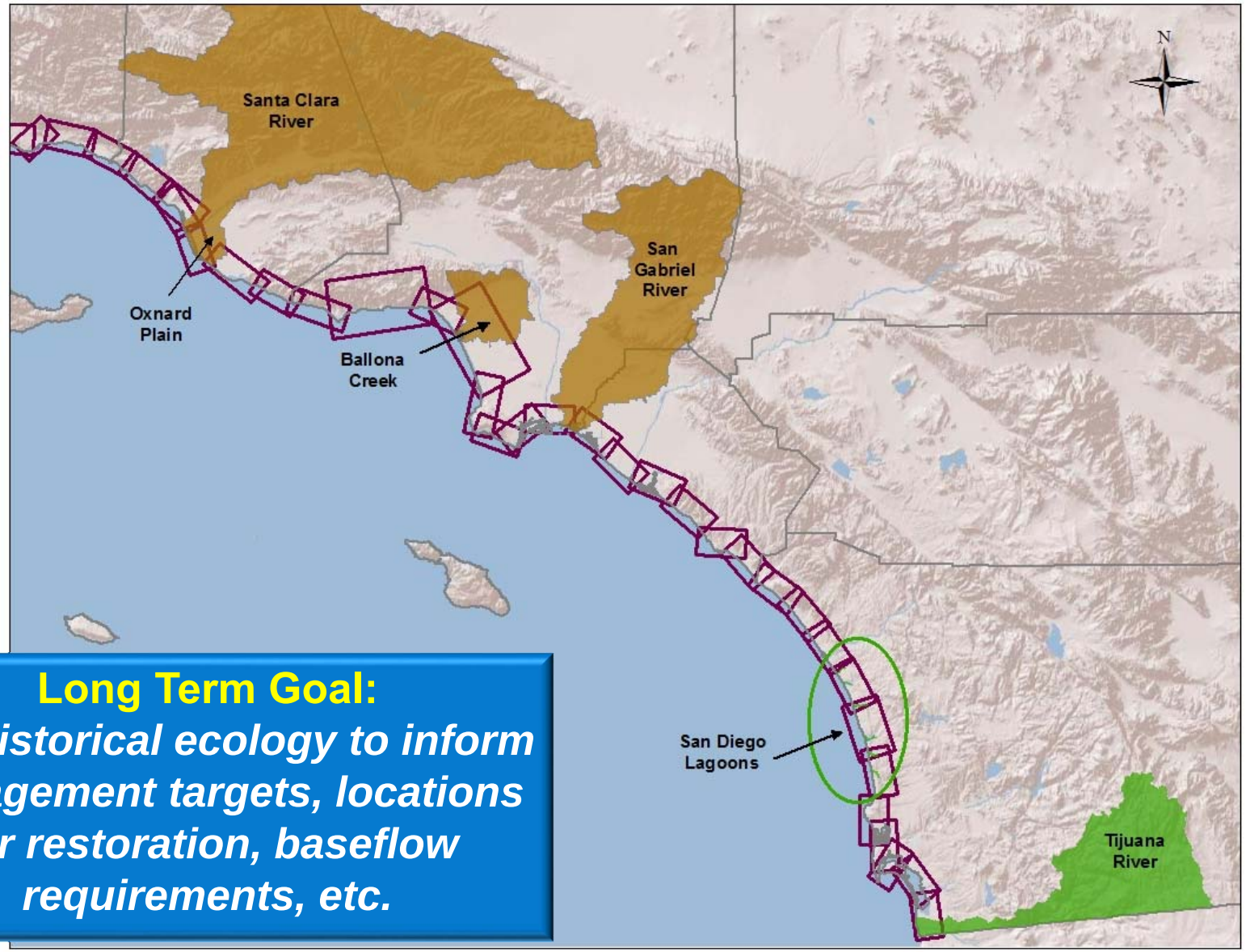
Estuarine Habitats
Opacity

Features
Ocean
Beach
Dune
Gully
Intertidal Flat
Open Water
River/Stream
River Island/Bar
Salt/Unvegetated Flat
Subtidal Water
Vegetated Wetland
Vegetated, Upland
Vegetated, Woody

Download Data and Reports

http://www.caltsheets.org/

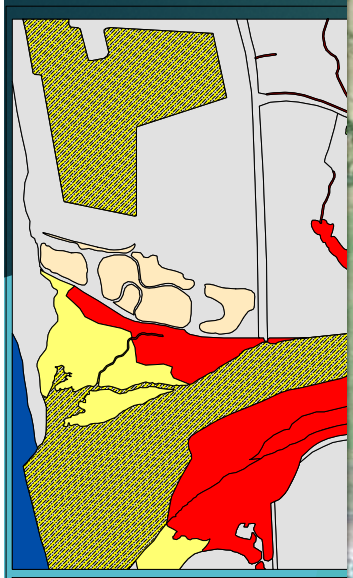
Future Research: Watershed Historical Ecology

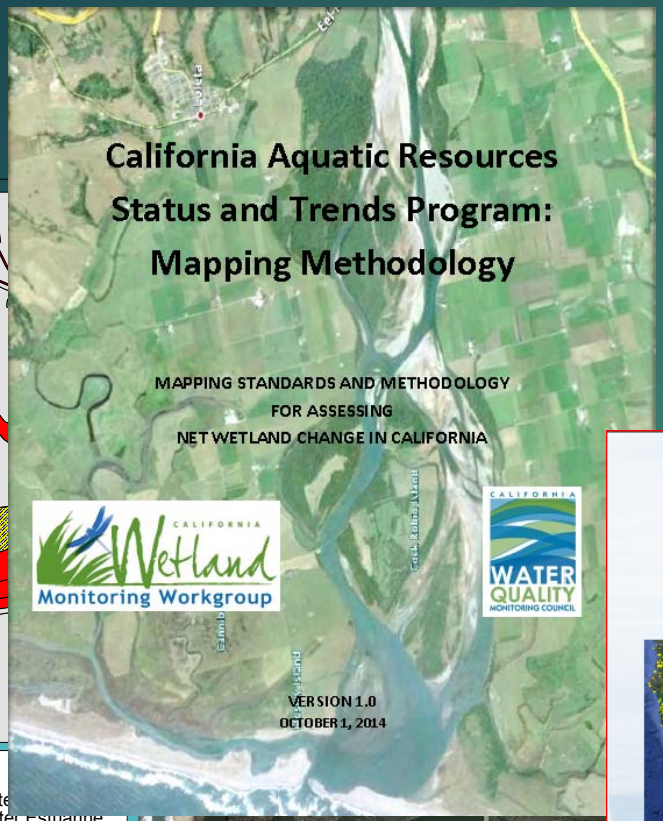


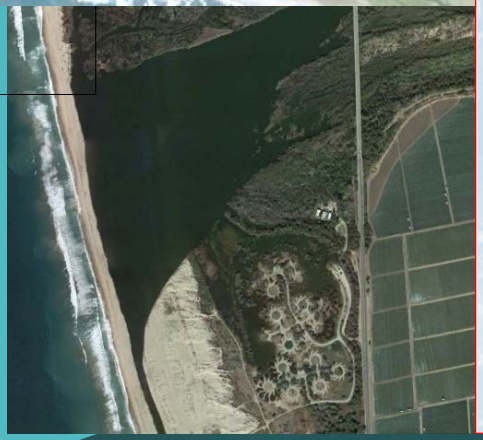
Long Term Goal:

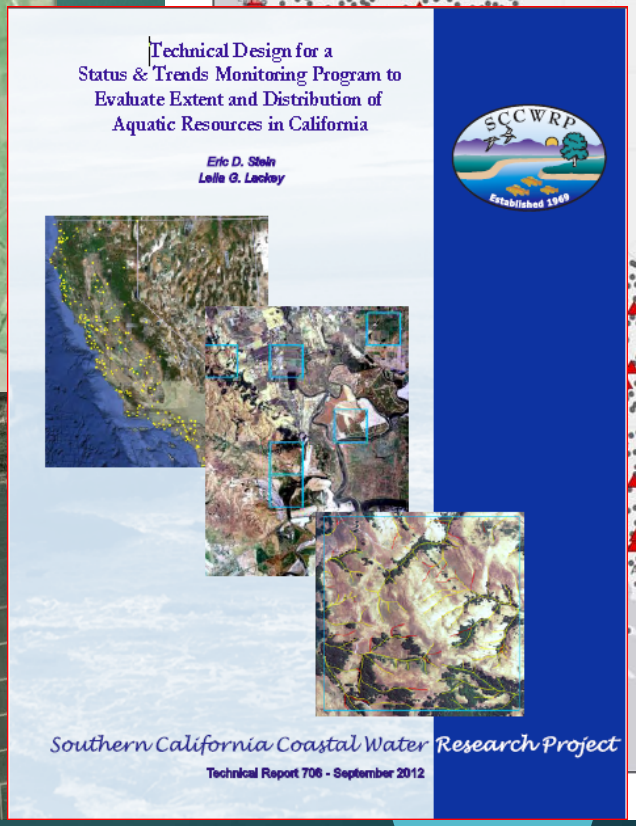
Use historical ecology to inform management targets, locations for restoration, baseflow requirements, etc.

Wetland Status and Trends (S&T)



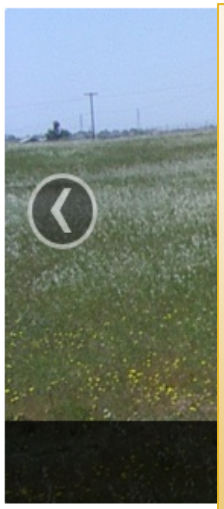




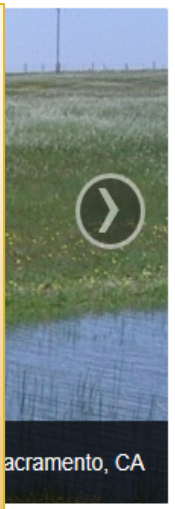


CRAM | CRAM DATA | DATA ENTRY | TRAINING | RESOURCES & DOCUMENTS | STEERING COMMITTEE | ABOUT | CONTACT US | Log In

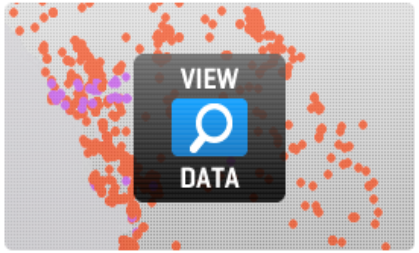
California Rapid Assessment Method

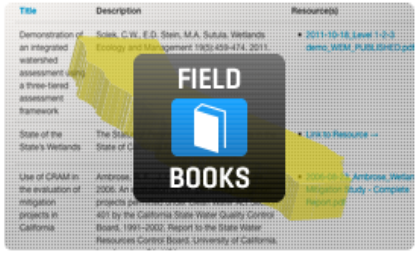


- **Released for broad use in 2006**
- **Over 3,000 assessments loaded to the eCRAM website**
- **More than 1,100 trained practitioners**
- **Routinely used in monitoring and assessment programs**
- **Incorporated into draft State Wetland Policy**
- **Ongoing, active training, QA, update and implementation workgroup**

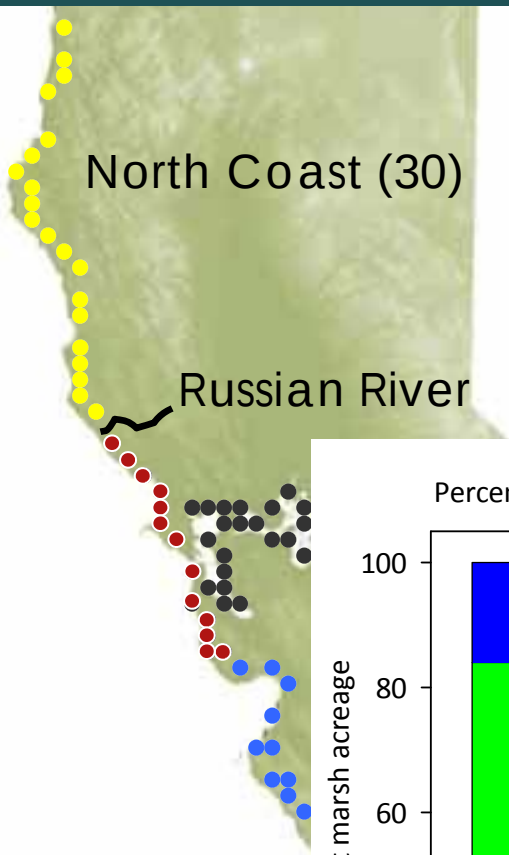


CRAM is a c itoring the conditions of wetlands throughout California. It is designed for assessing ambient conditions within watersheds, regions, and throughout the State. It can also be used to assess the performance of compensatory mitigation projects and restoration projects.

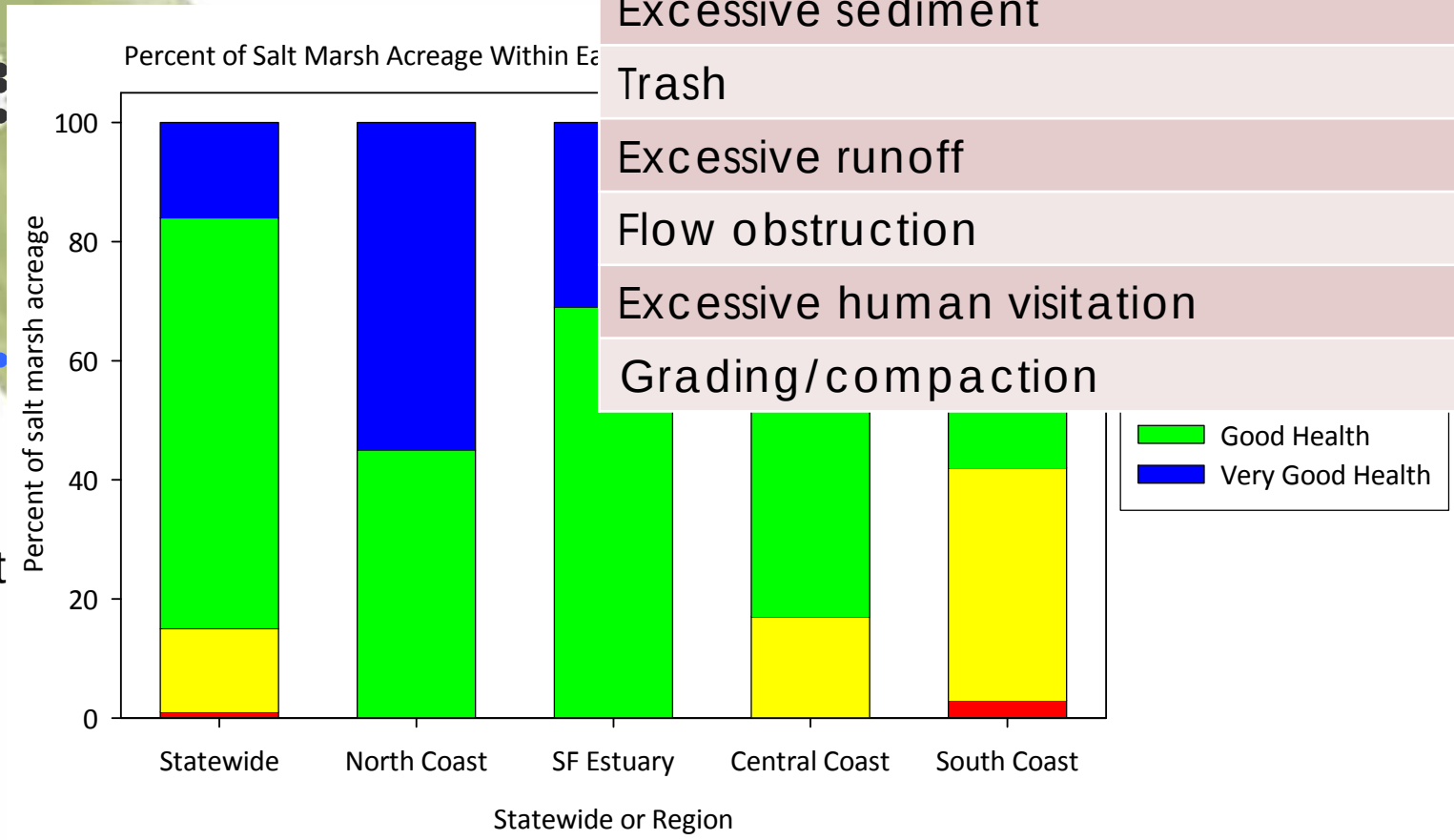




Statewide Assessment of Estuarine Wetlands



Primary Stressors
Dikes & Levees
Water quality/discharges
Invasive species
Predation/Habitat destruction
Excessive sediment
Trash
Excessive runoff
Flow obstruction
Excessive human visitation
Grading/compaction

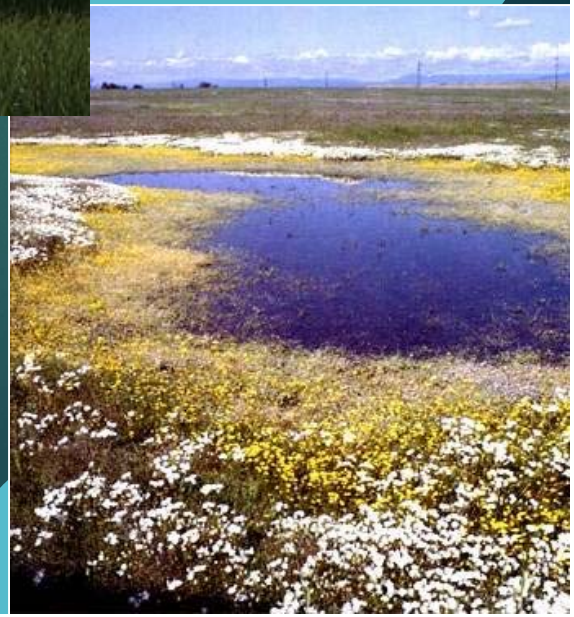


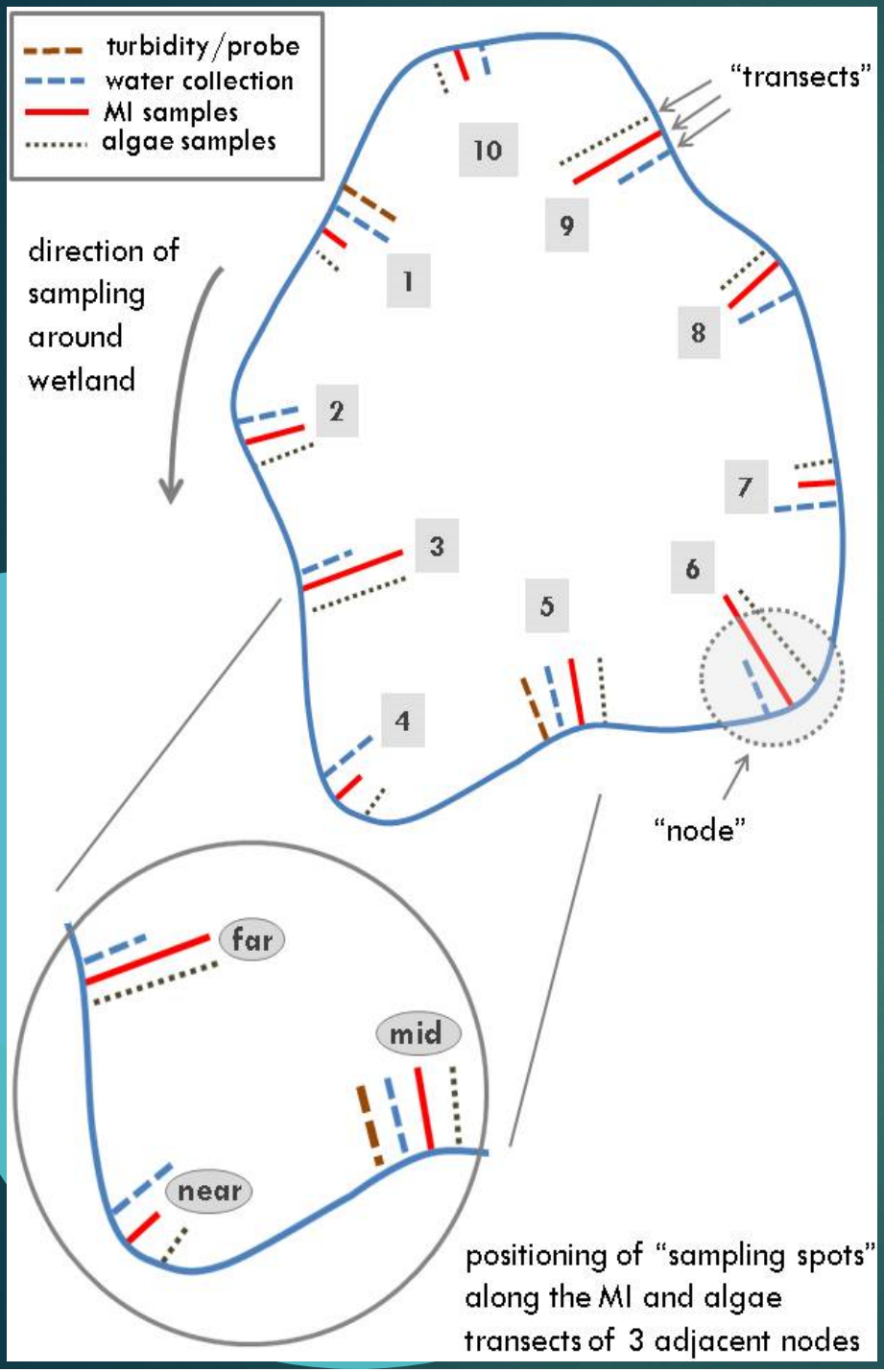
Future Research: Standardized Level 3 Tools

Next Generation of Assessment

- New wetland types
- New assessment tools
- New assessment endpoints
- Expanded ambient monitoring

Depressional Wetland Assessment





SWAMP
Surface Water Ambient Monitoring Program

Final Report November 2014

Standard Operating Procedures (SOP) for Collection of Macroinvertebrates, Benthic Algae, and Associated Physical Habitat Data in California Depressional Wetlands

A. Elizabeth Fetscher[1], Kevin Lunde[2], Eric D. Stein[1], and Jeffrey S. Brown[1]

[1]Southern California Coastal Water Research Project
3535 Harbor Blvd., Suite 110
Costa Mesa, CA 92626

[2]San Francisco Bay Regional Water Quality Control Board
1515 Clay St., Suite 1400
Oakland, CA 94612

Water Boards

www.waterboards.ca.gov/swamp

Bar-built/Seasonal Lagoons & Estuaries

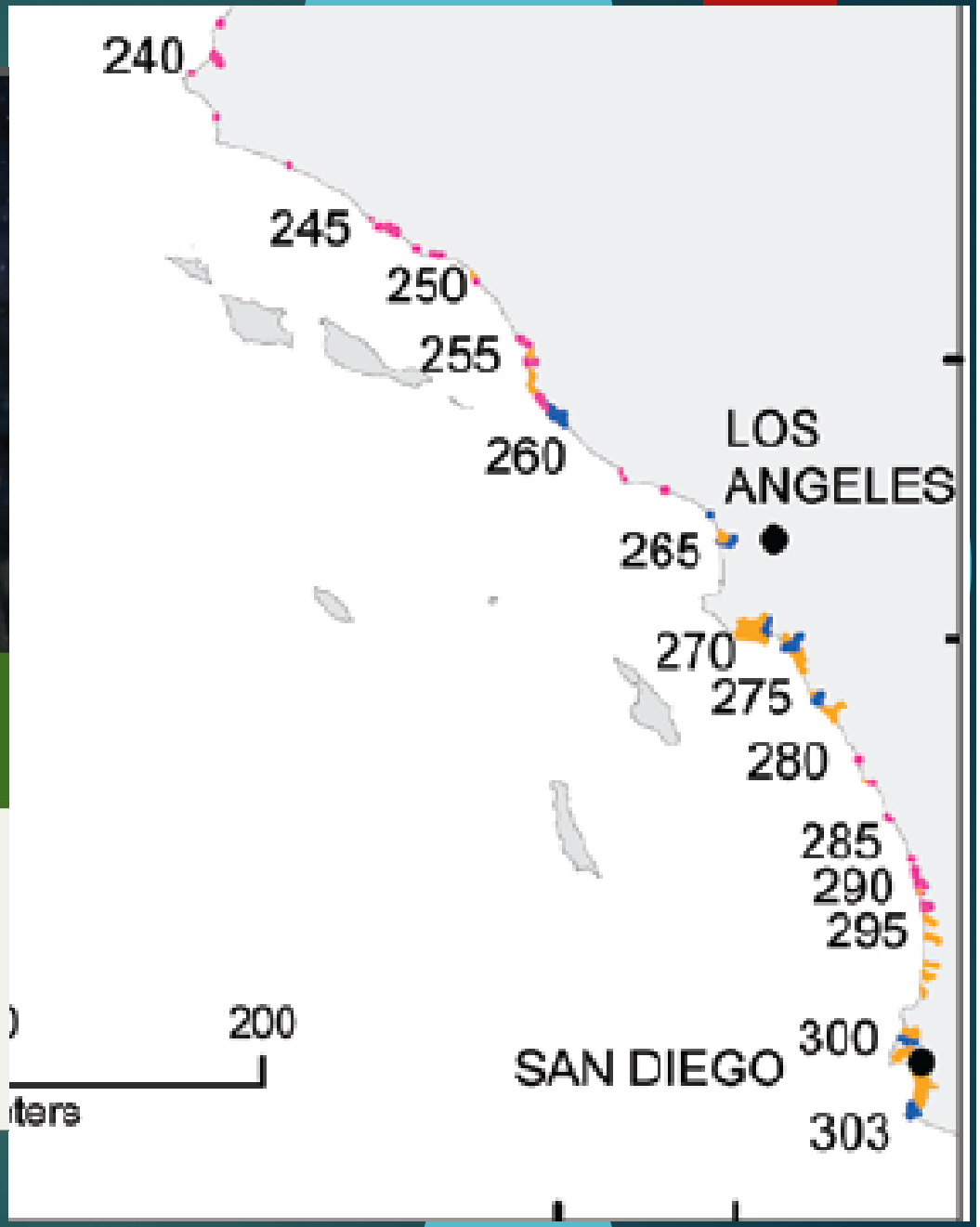
- Most common natural estuary type in CA
- Unique functions and values
- Management challenges associated with mouth management
- Lack of standard assessment tools

NURSERY FUNCTIONS OF U.S. WEST COAST ESTUARIES: THE STATE OF KNOWLEDGE FOR JUVENILES OF FOCAL INVERTEBRATE AND FISH SPECIES

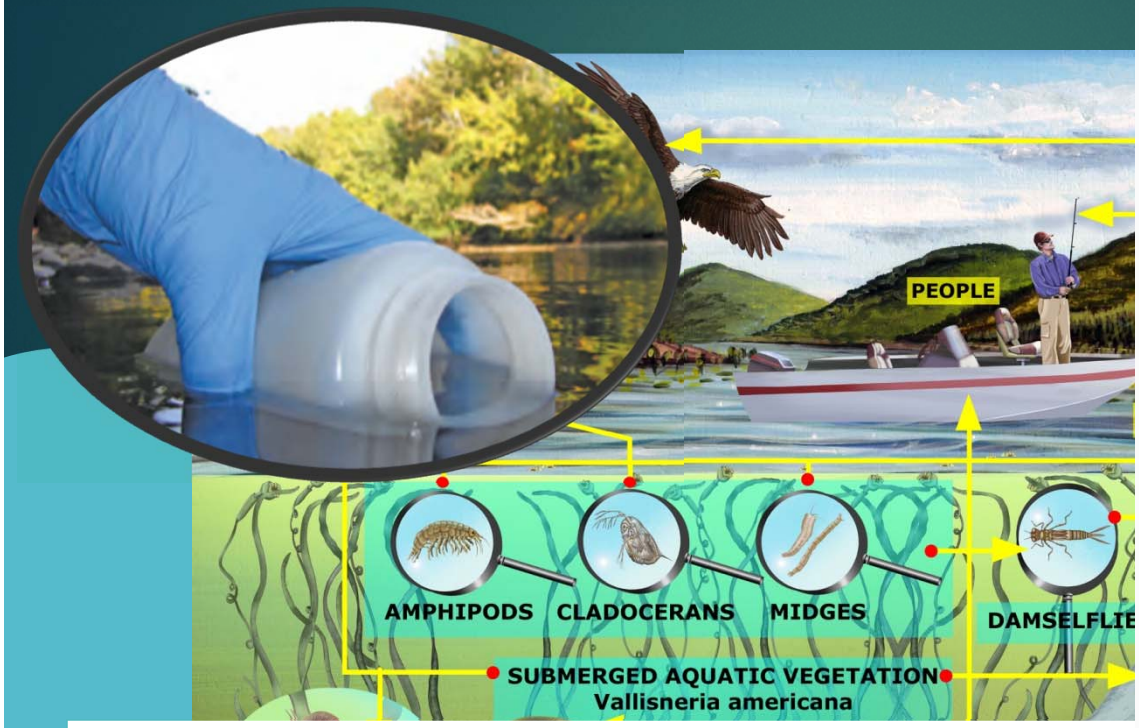
Brent B. Hughes[1], Matthew D. Levey[2], Jennifer A. Brown[3], Monique C. Fountain[4], Aaron B. Carlisle[5], Steven Y. Litvin[5], Correigh M. Greene[6], Walter N. Heady[7] and Mary G. Gleason[7]

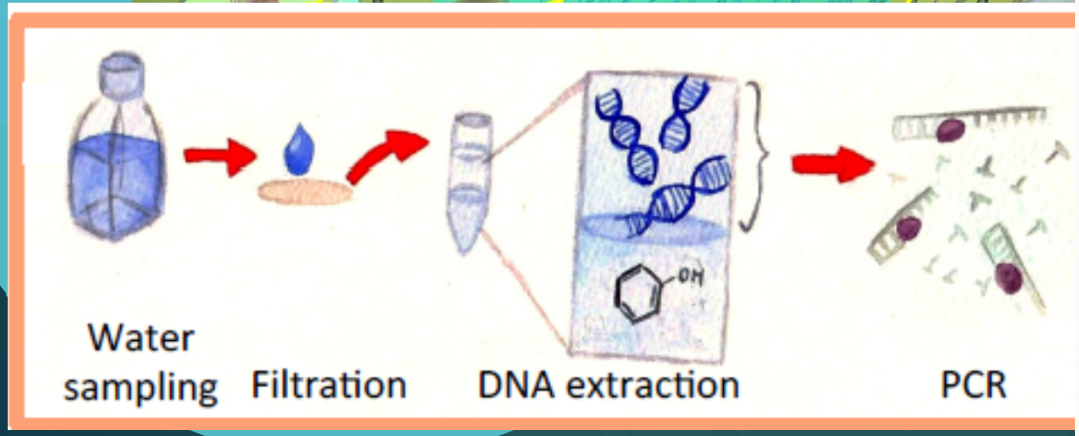
1 University of California Santa Cruz; 2 SeaSpatial Consulting; 3 Monterey Bay National Marine Sanctuary; 4 Elkhorn Slough National Estuarine Research Reserve; 5 Hopkins Marine Station, Stanford University; 6 NOAA Northwest Fisheries Science Center; 7 The Nature Conservancy

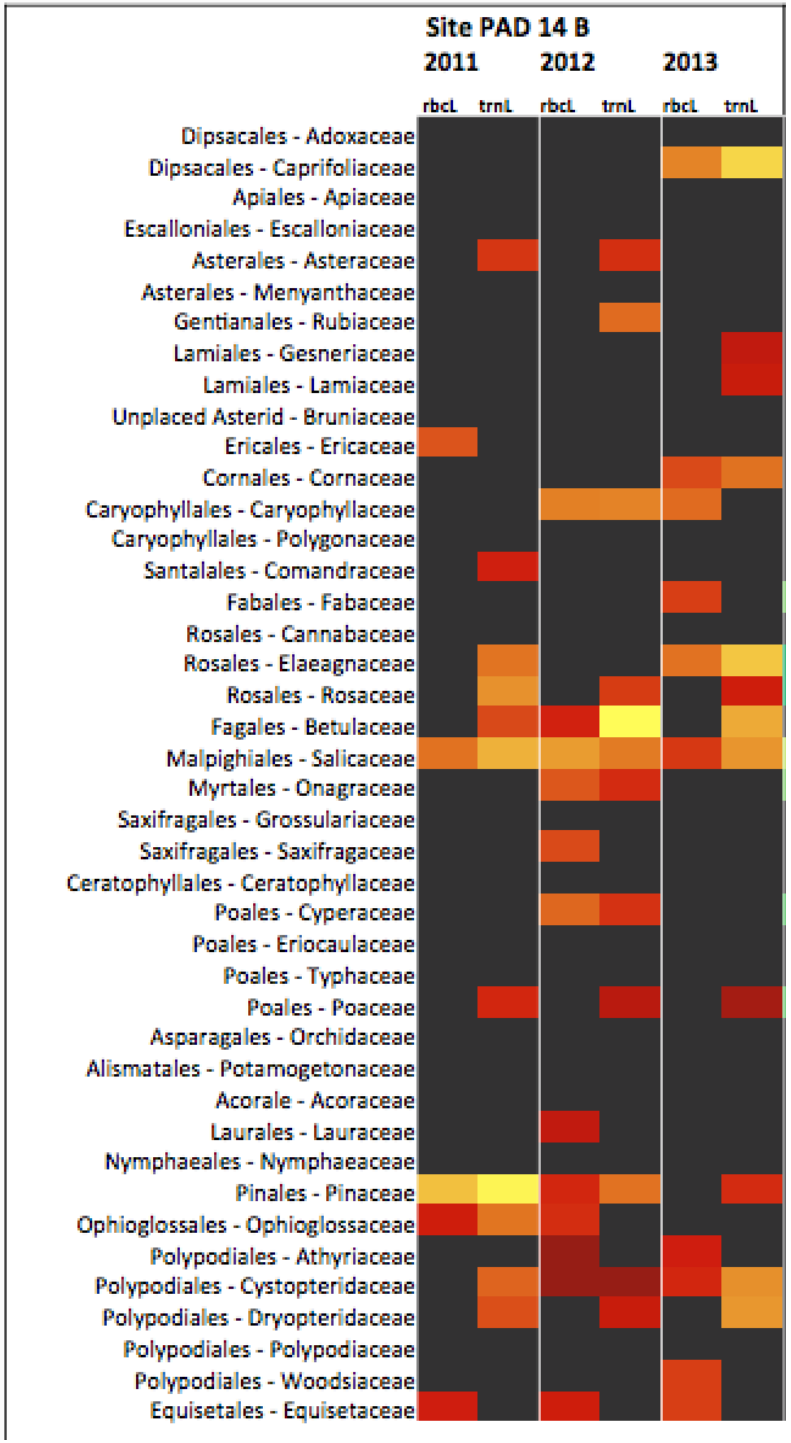
Prepared by SeaSpatial Consulting LLC: for The Nature Conservancy and the Pacific Marine and Estuarine Fish Habitat Partnership.



Future Assessments Us

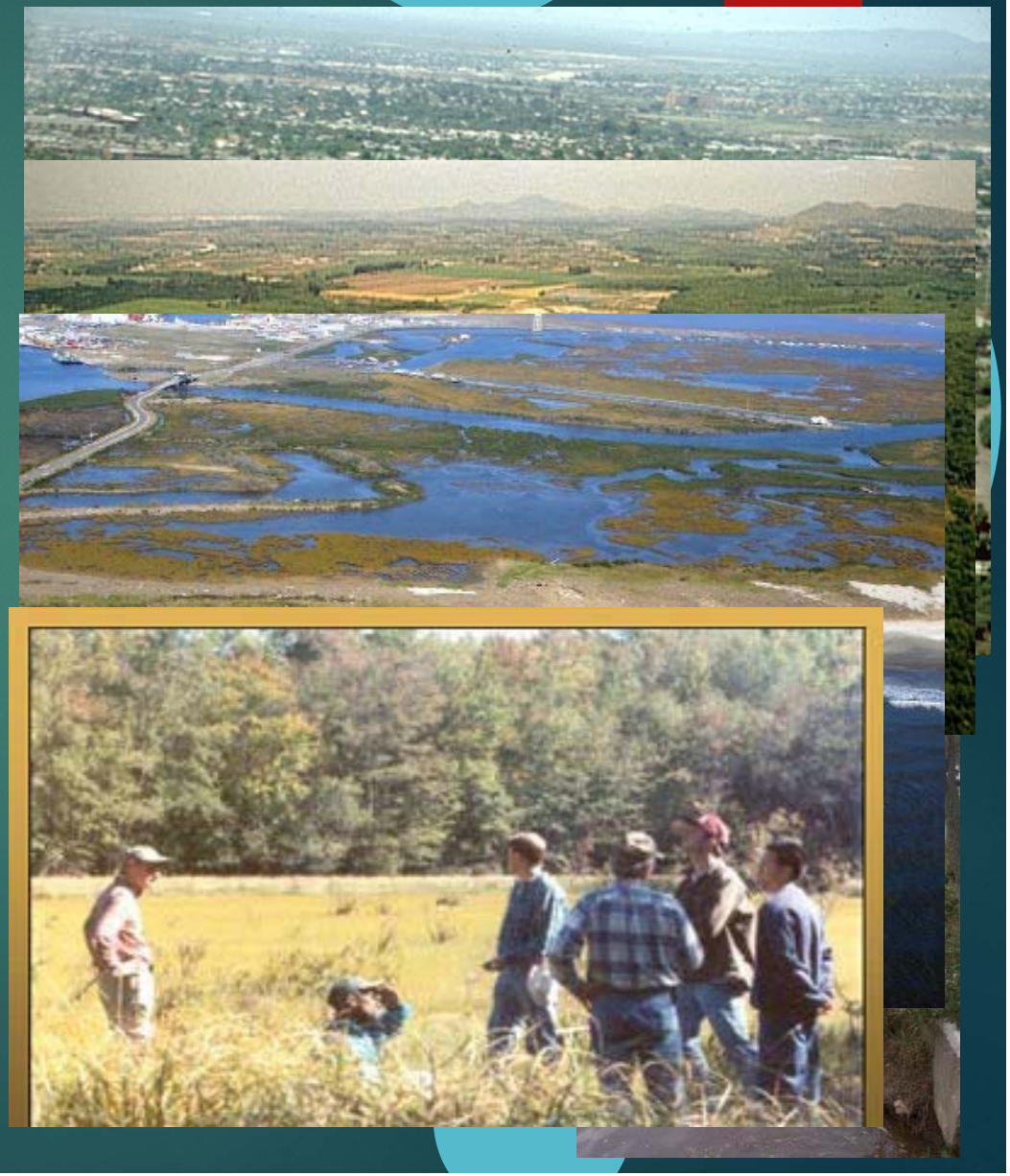




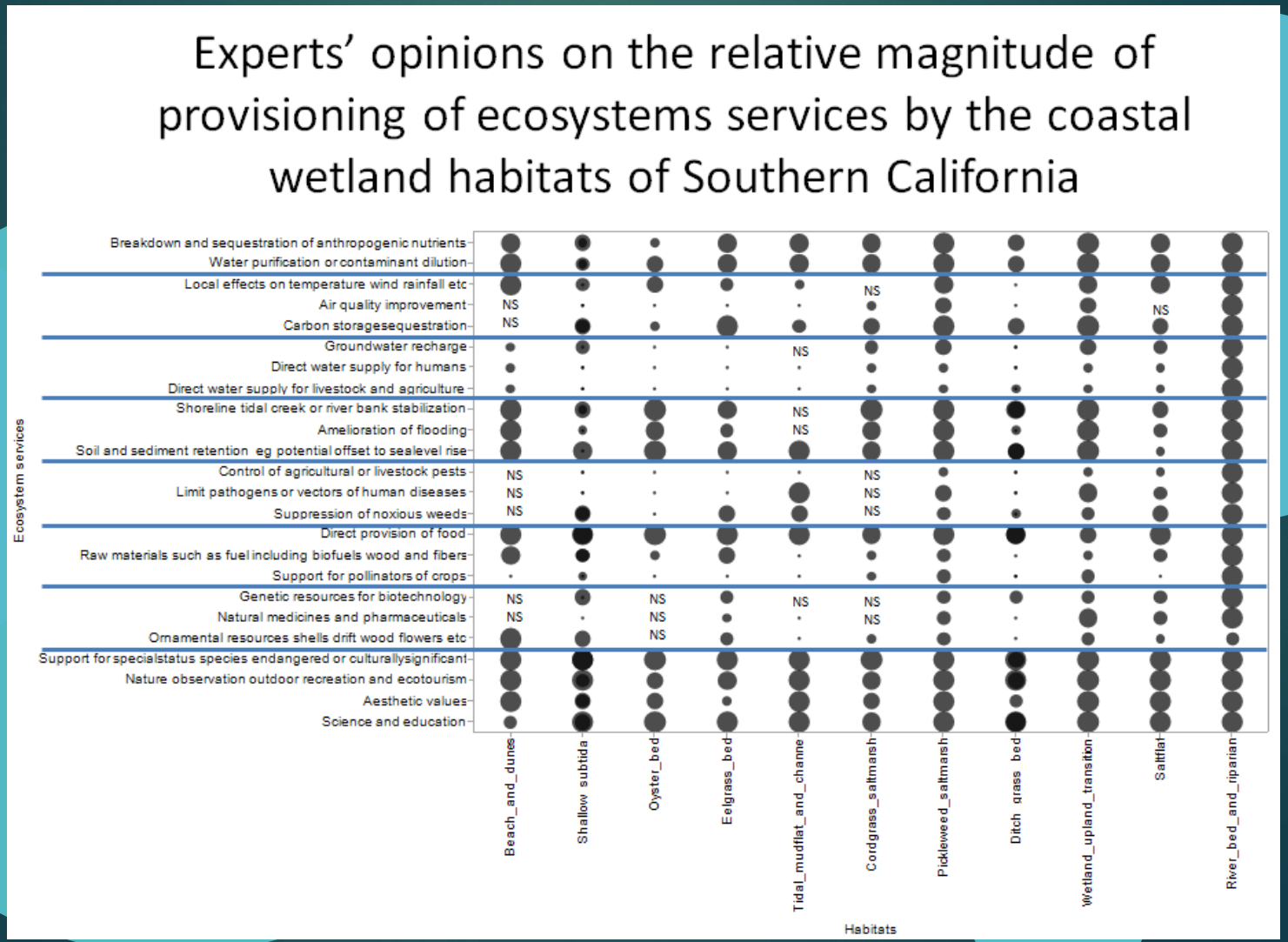


Wetland Uses and Values

- Flood Protection
- Water Quality
- Erosion Protection
- Recreation and Research

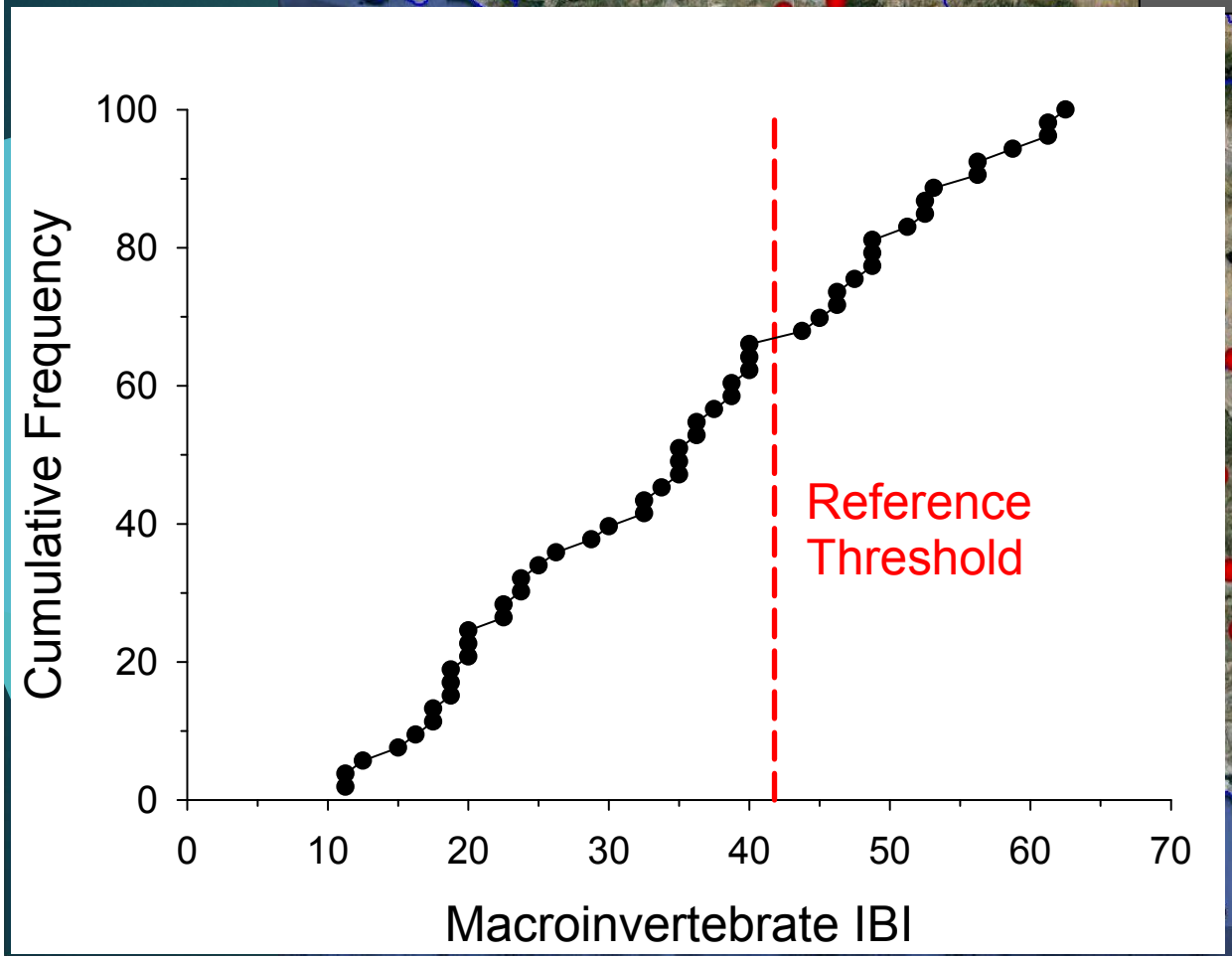


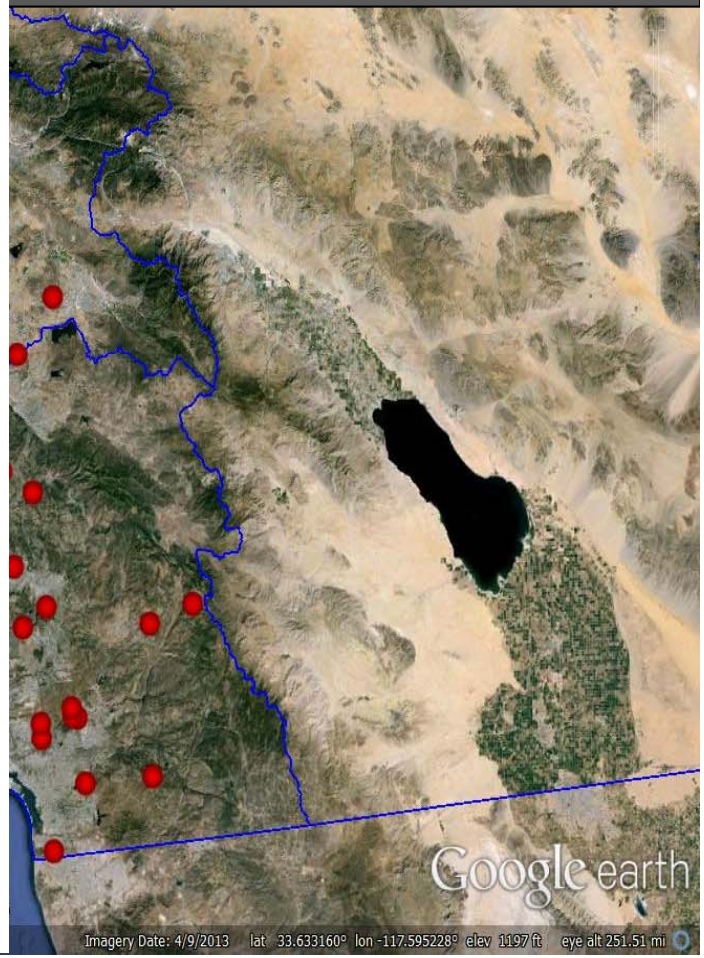
Current/Future Research: Assessment of Wetland Values



Wetland Ambient Monitoring

- Reference expectations
- Regional range of conditions
- Trends over time
- Major stressors

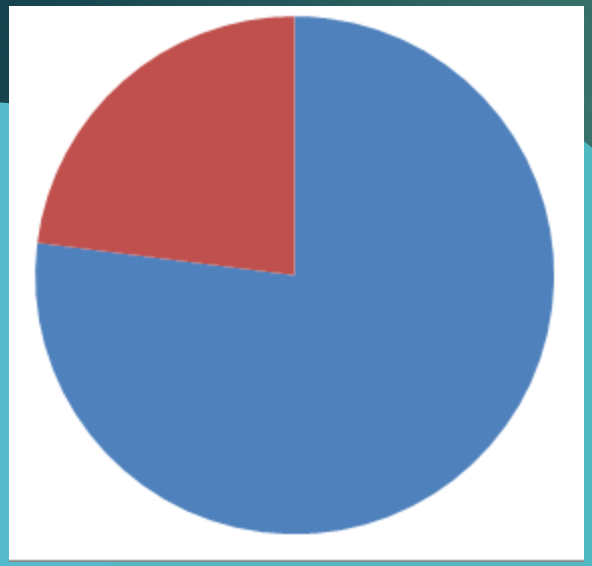


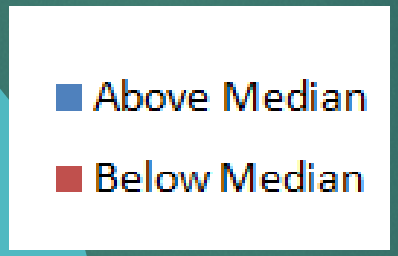


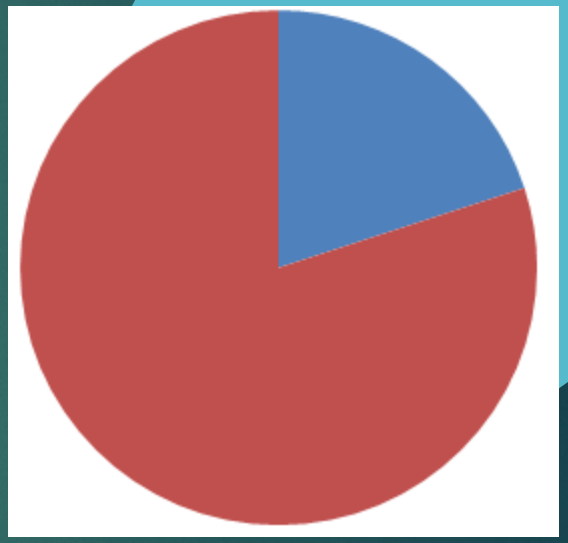
Informing Wetland Management and Uses

- Regional restoration planning
  - Improving restoration success
  - Habitat linkages and connections
- Water quality and water supply
- Adaptation and management for climate change
- Carbon sequestration

Past Research: Restoration Effectiveness based on CRAM







Riverine

Estuarine

Future Research: Regional Wetland Restoration Planning

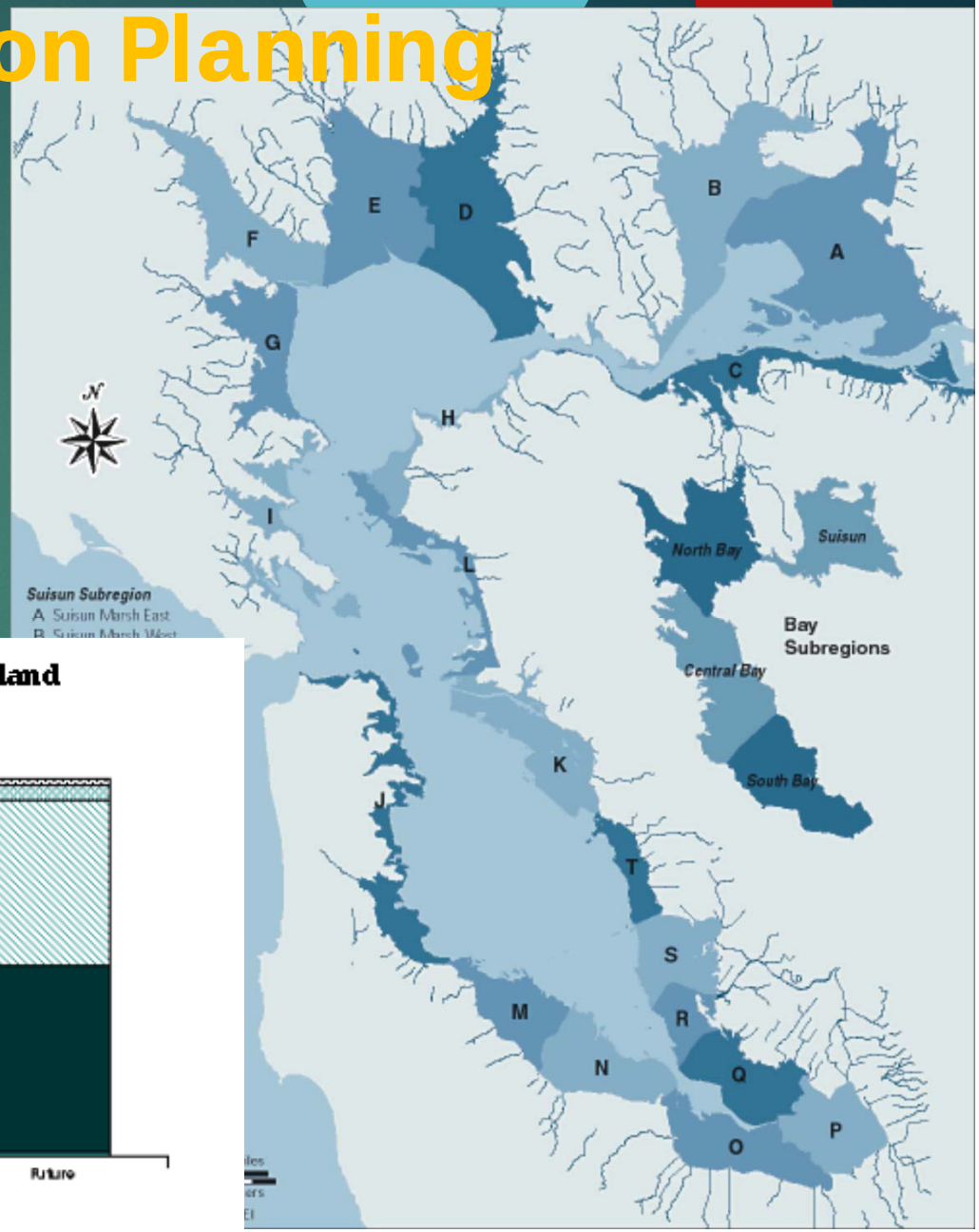
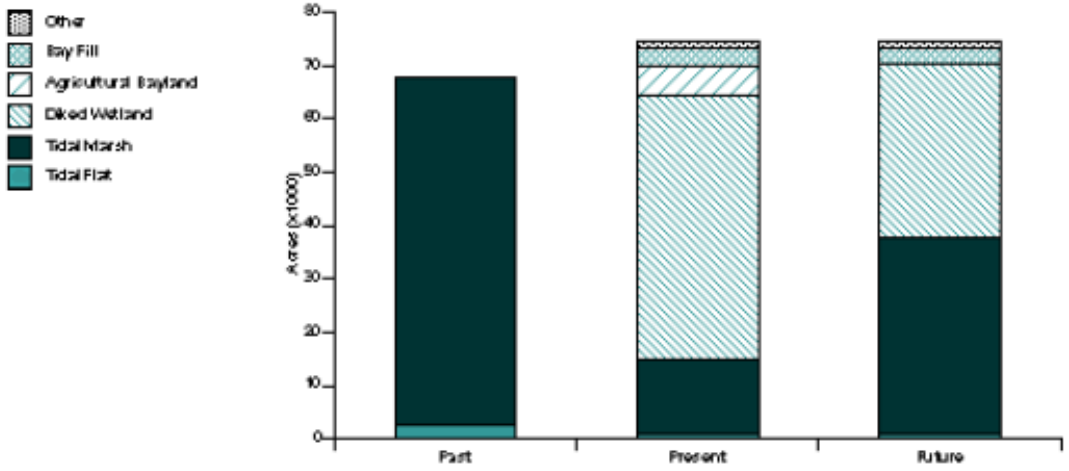


FIGURE 5.3 Past, Present, and Recommended Future Bayland Habitat Acreage for Suisun Subregion



The Regional Vision/Strategy

Regional quantifiable objectives

Project prioritization guidelines

Decision-making framework for stakeholders

Guidelines for implementing Monitoring

Past: Historical Ecology

Present: Monitoring & Research

Future: Climate Change Predictions

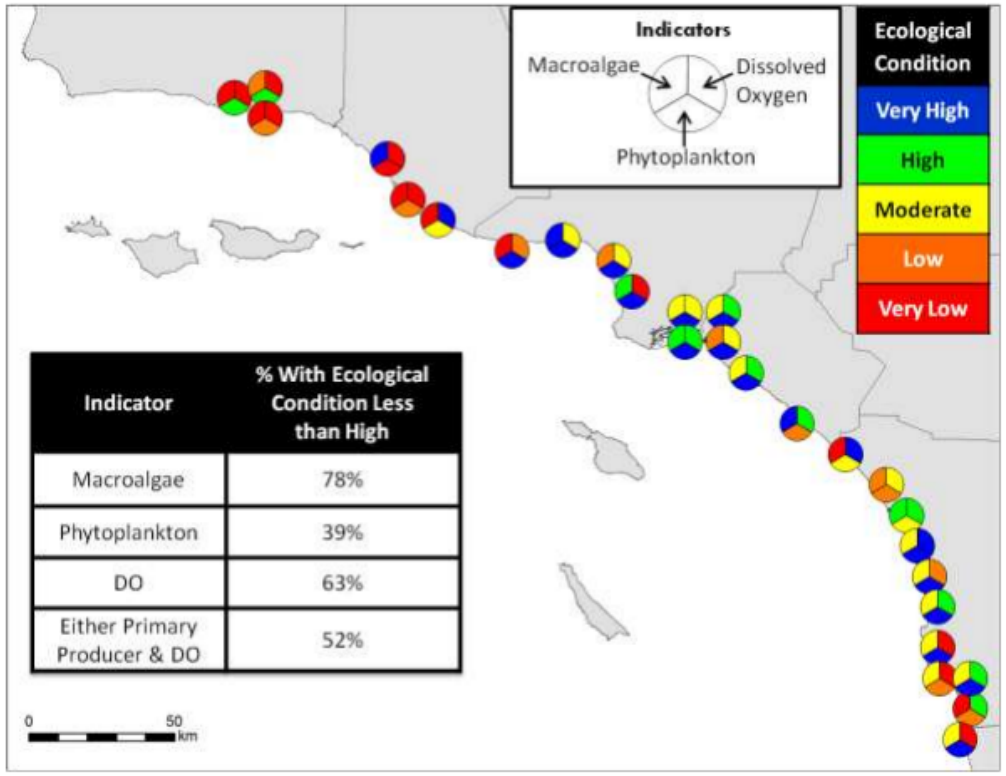
Ecosystem functions and services, resilient and dynamic landscapes, landscape trajectory goals, watershed context

Regional Strategy = Quantifiable Objectives + Regional Monitoring Program + Decision-support Tool

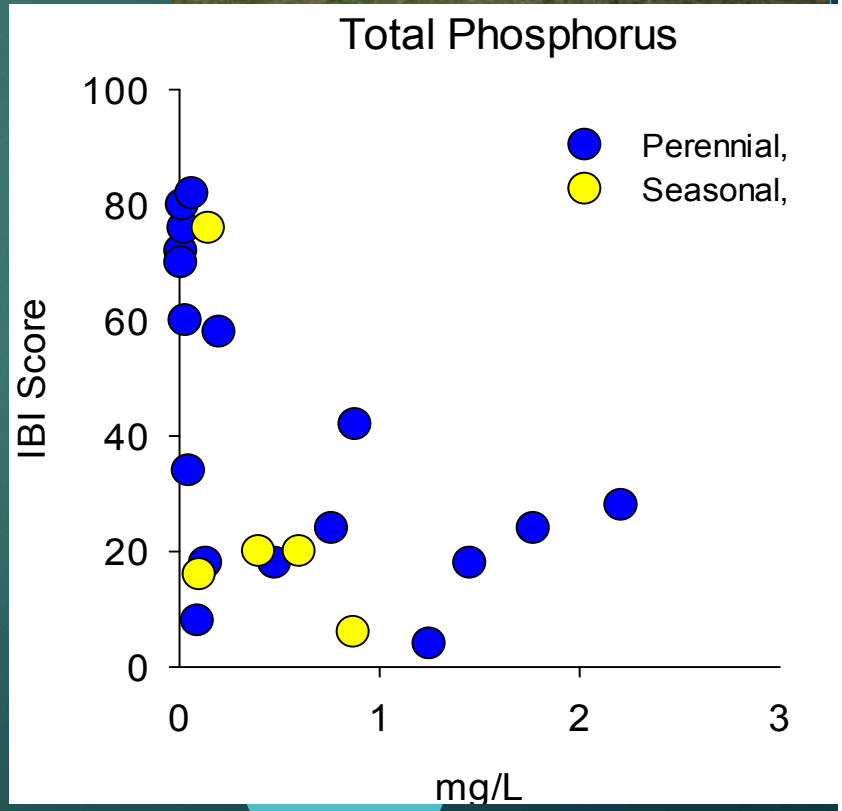
Site Specific Restoration Projects (Work Plan)

Regional Planning

Water Quality Effects on Wetlands



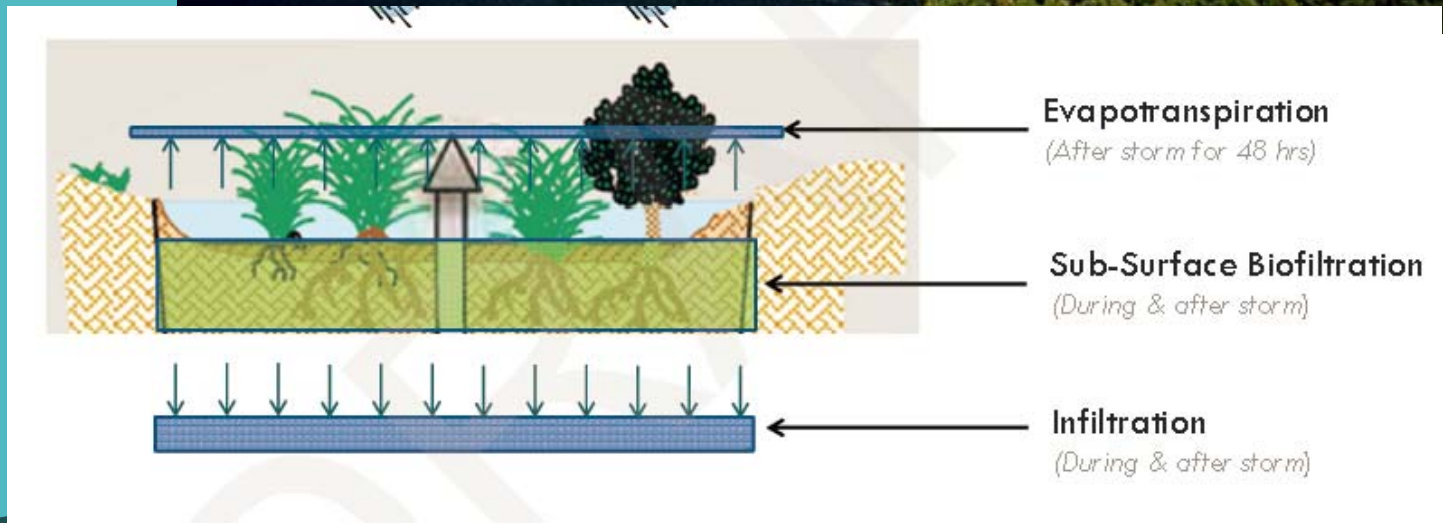
Indicator	% With Ecological Condition Less than High
Macroalgae	78%
Phytoplankton	39%
DO	63%
Either Primary Producer & DO	52%



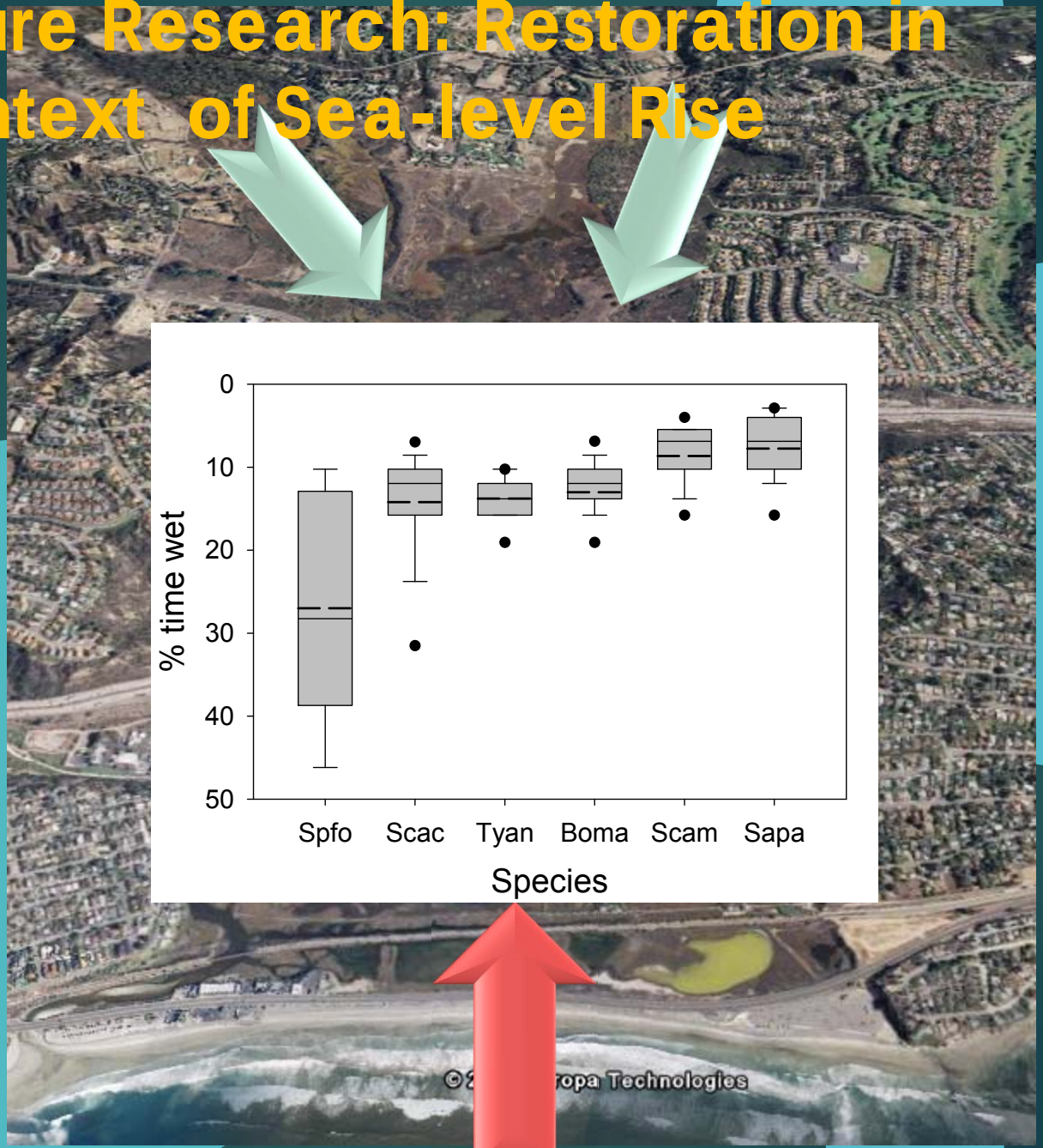
Improve our understanding of contaminant effects on freshwater and estuarine wetlands

Future Research: Role of Wetland for Water Quality/Supply

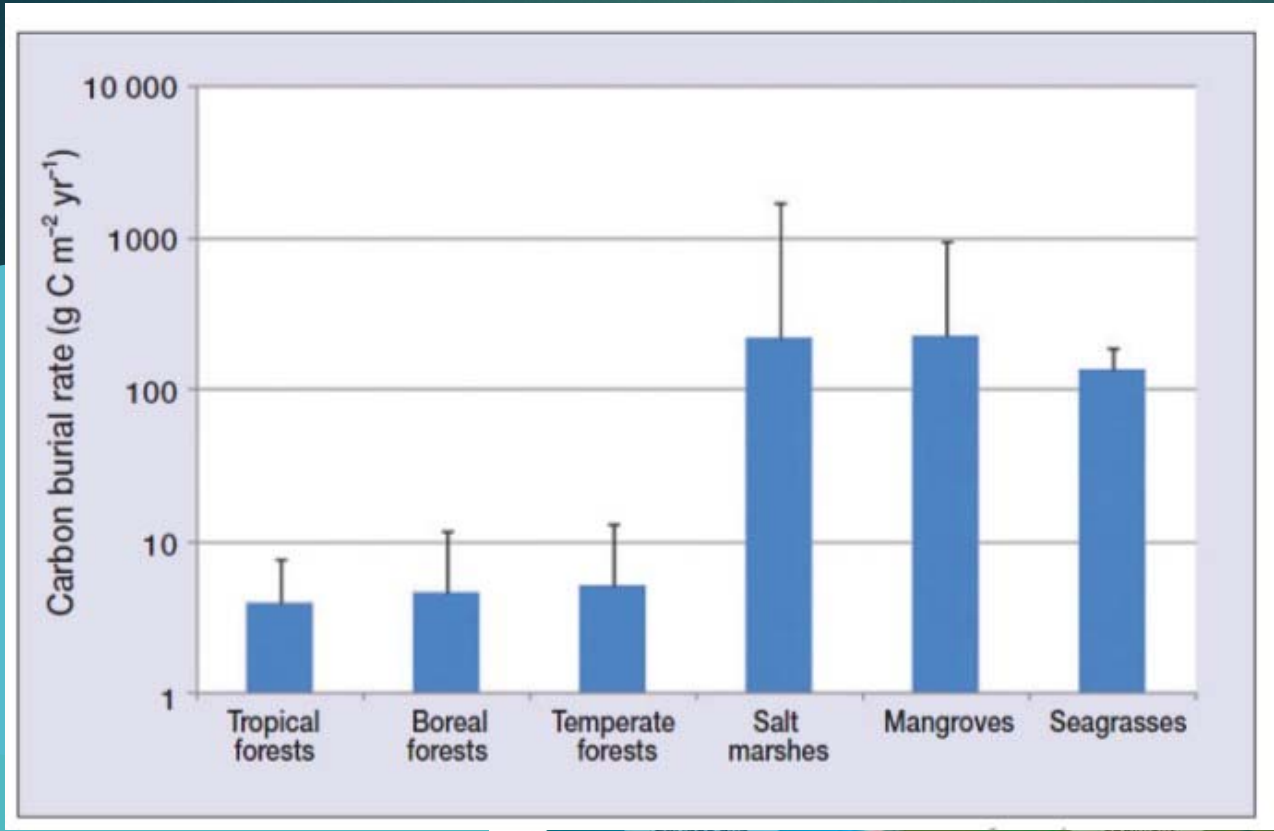
Factors affecting ability to use wetlands for water quality or infiltration offsets under stormwater permits



Future Research: Restoration in Context of Sea-level Rise



Future Research: Carbon Sequestration



Priority Next Steps?

- Fill regional gaps in mapping and assessment
  - New tools
  - Ambient monitoring programs
- Improve tools to assess overall biodiversity & function
  - Food chain energetics
  - Molecular methods
- Improved understanding of sea level rise effects
  - Quantification of carbon sequestration rates
- Discern water quality benefits of wetland restoration
- Improved data management and data sharing systems


Thank you!