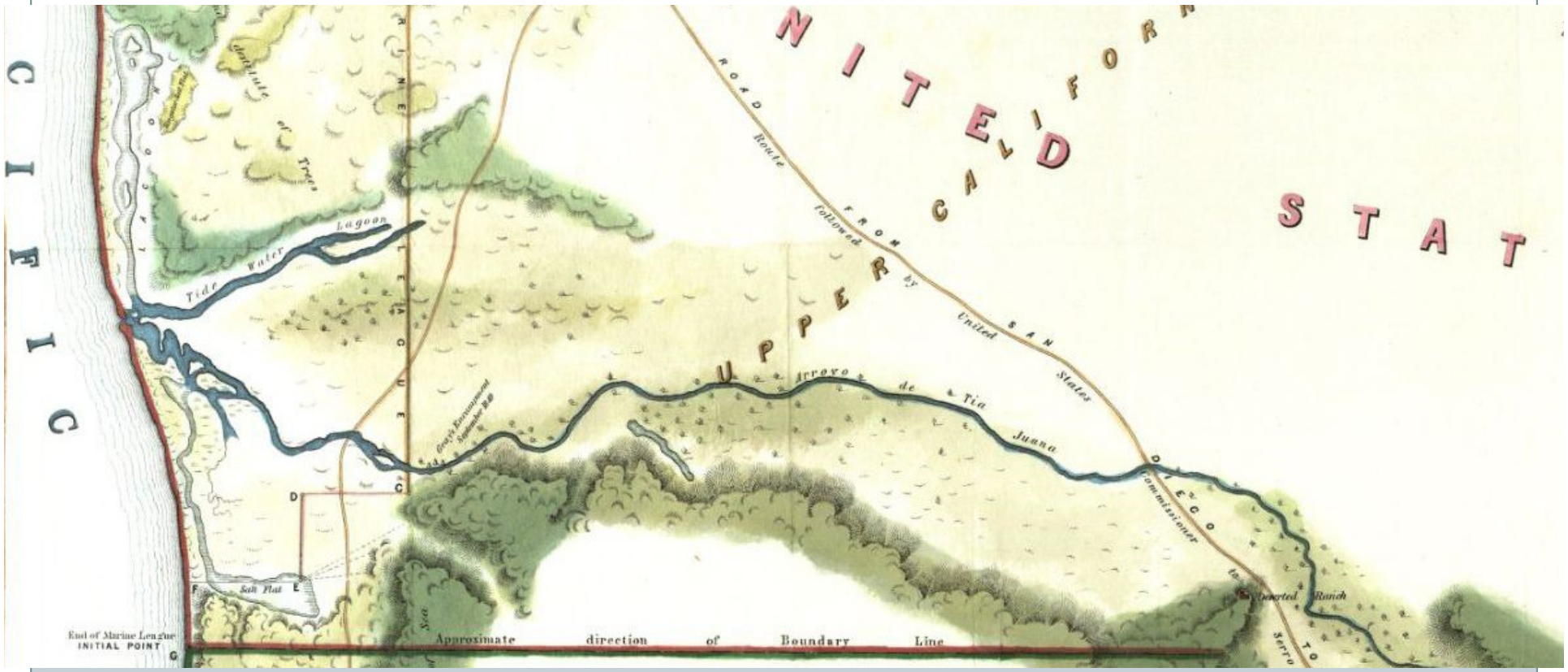
Wetland Typology and Historical Loss



ERIC D STEIN

SOUTHERN CALIFORNIA COASTAL WATER RESEARCH PROJECT

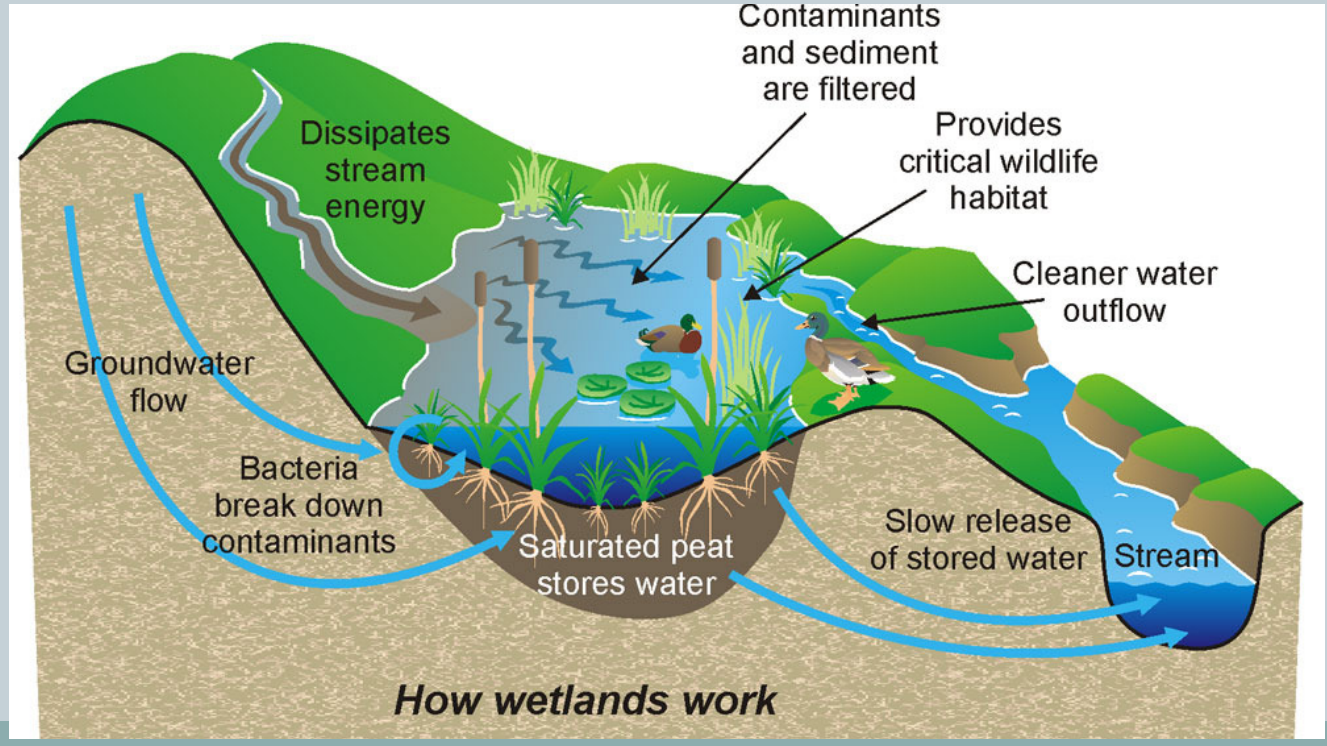
SEPT. 10, 2014

Main Messages

- There is a great diversity of wetlands
  - All perform similar functions
  - May need different tools to assess different types
- Historical ecology provides insight into past losses
  - Patterns vary throughout the region
- New programs are being developed to track future change
  - Ability to evaluate effectiveness of management actions

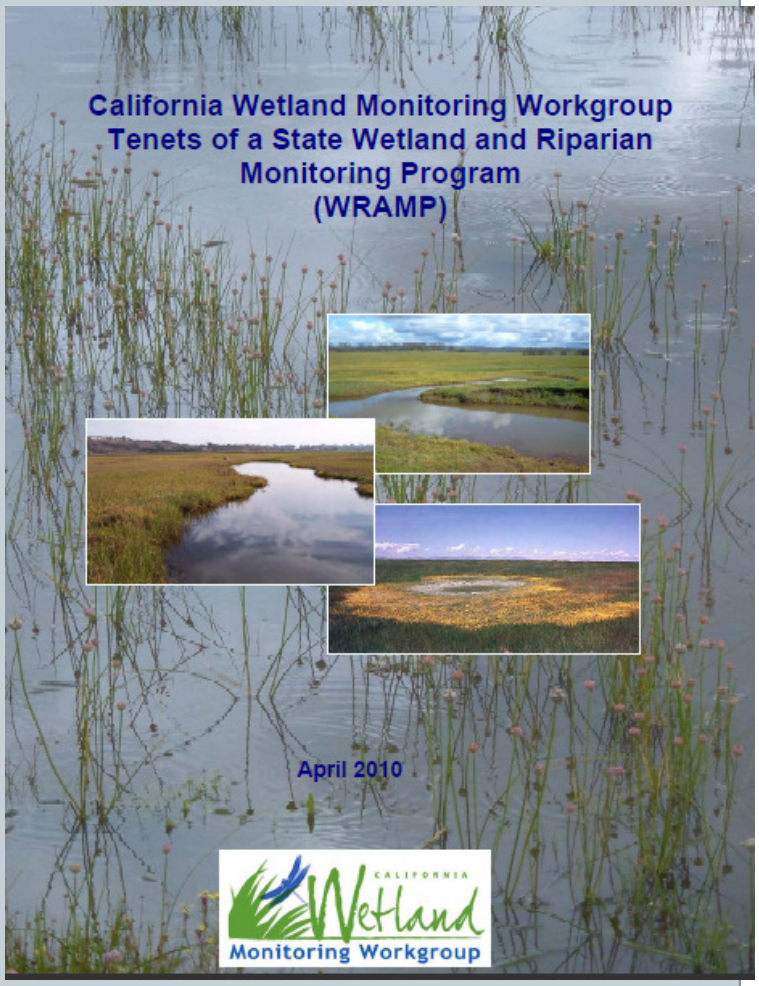
Overall Goal: Protect Wetland Functions

"Purpose of the State Wetlands and Riparian Area Protection Policy is to protect all waters of the State, including wetlands, from dredge and fill discharges"



Key Questions

- Where are our wetlands?
- What is the condition of our wetlands?
- What are the major stressors affecting wetlands?
- How are things changing over time?
  - Effectiveness of management programs



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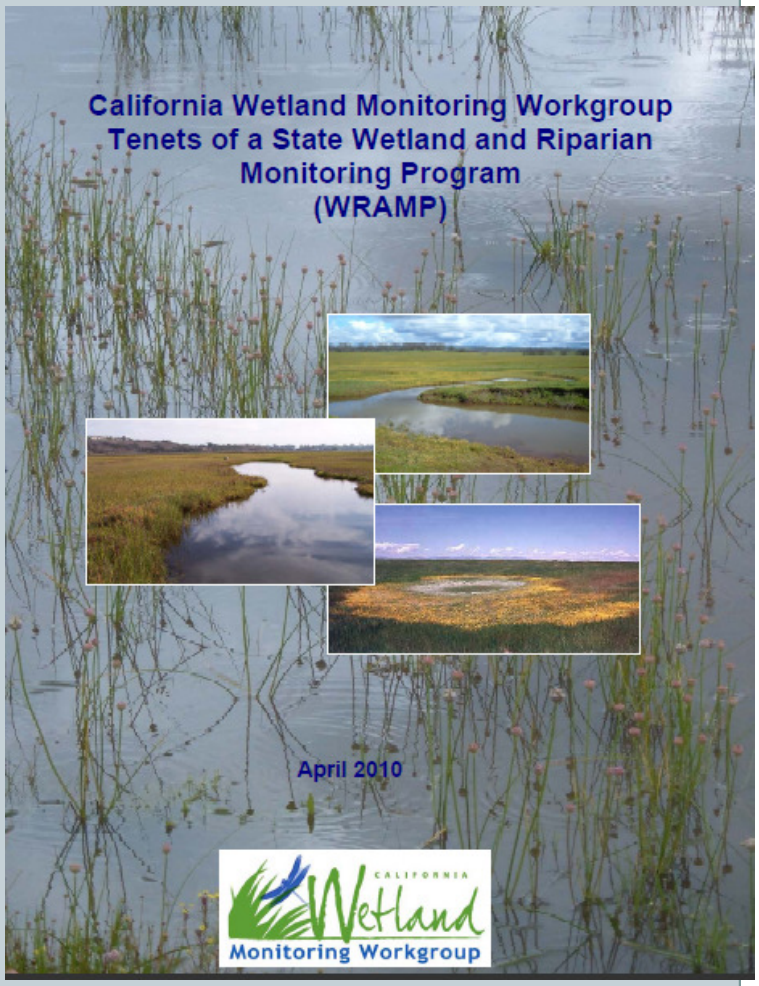
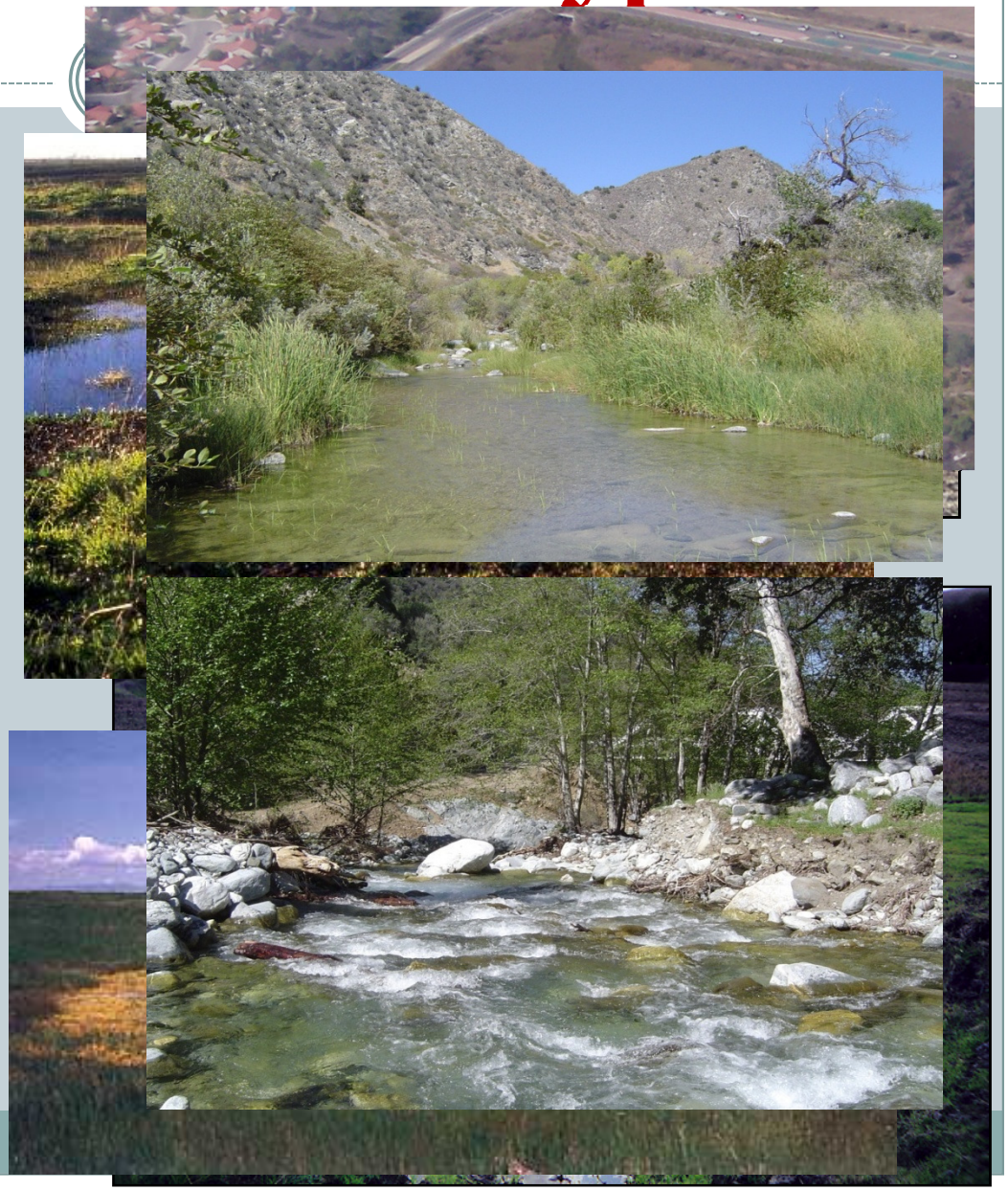


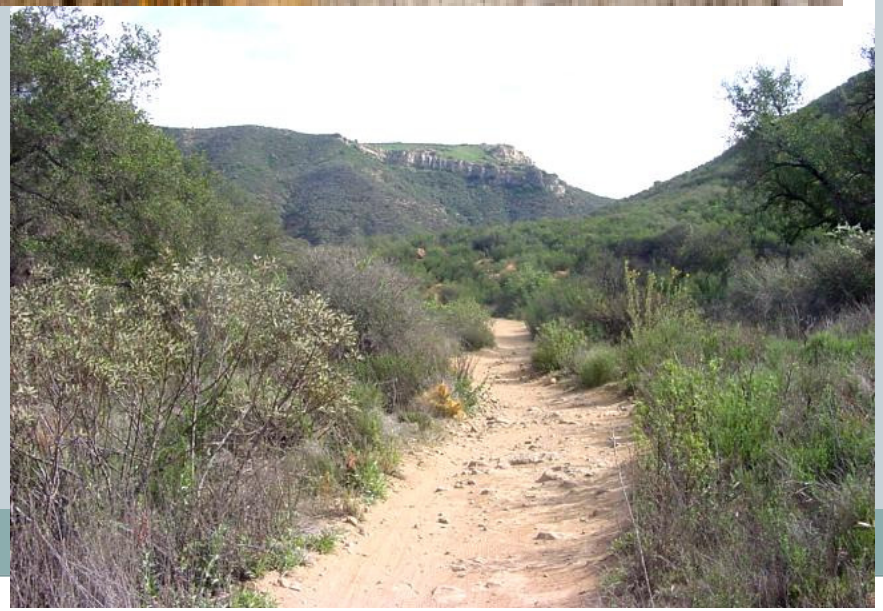
Traditional View of Wetlands

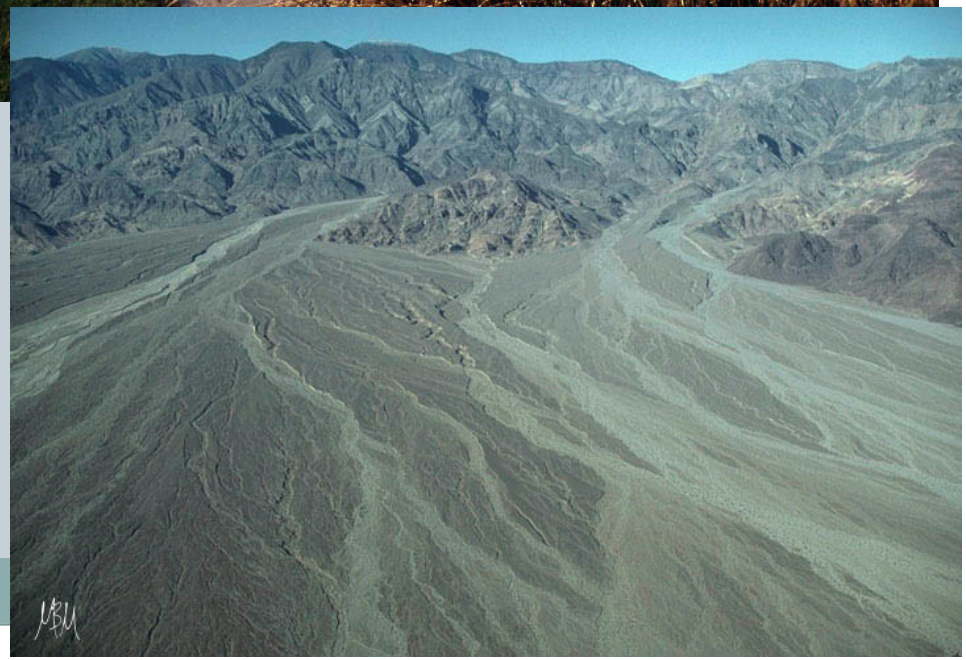
Additional Wetland Types

- Rivers & Streams
- Lake margins
- Depressions
- Slopes and seeps

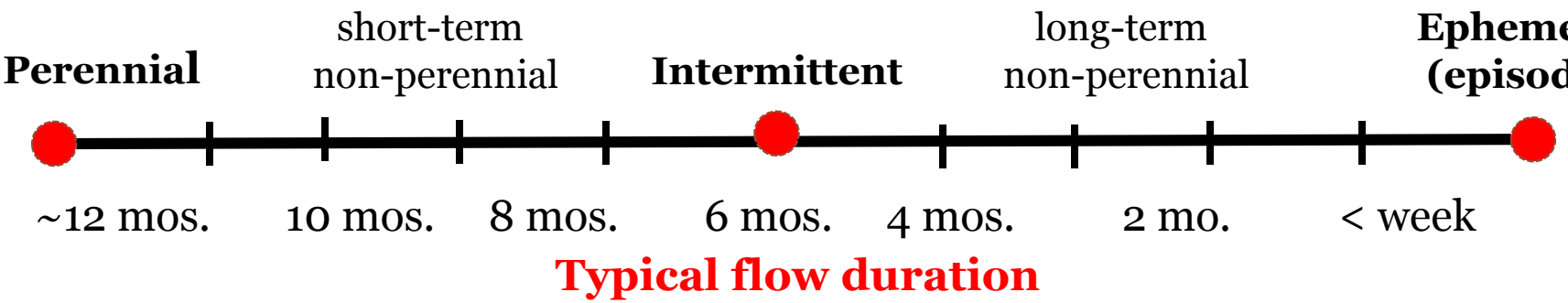


Dry (sometimes) is Normal





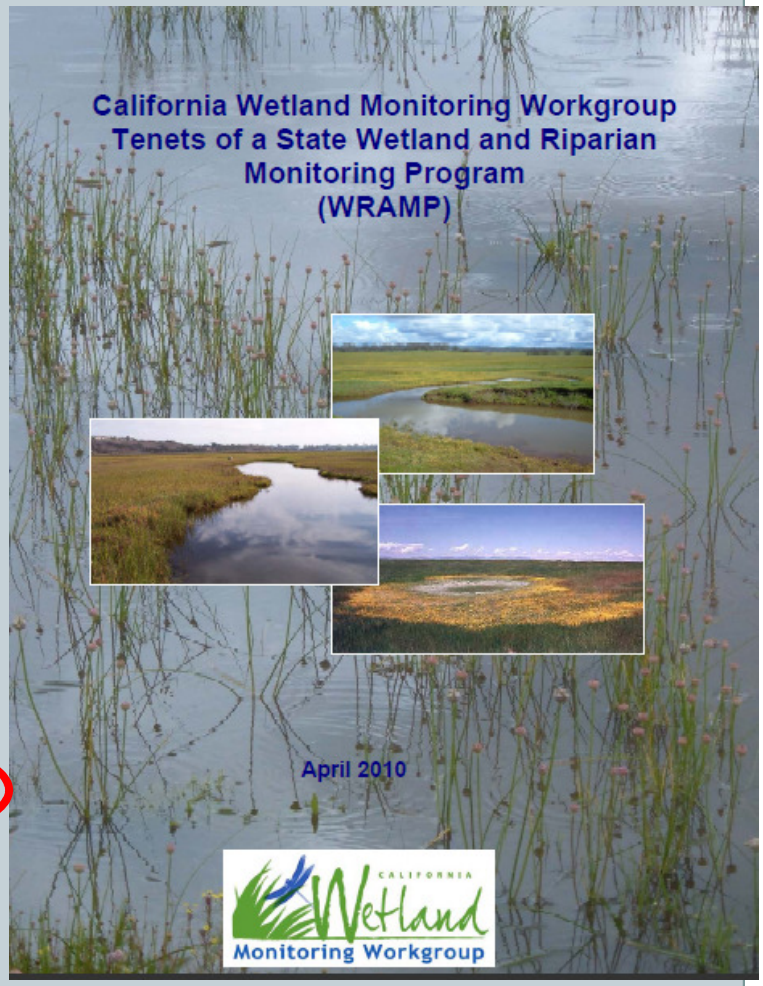
Programs Should Encompass All Conditions



Functions occur across entire hydrologic gradient to varying degrees

Key Questions

- ***What are wetlands?***
- Where are our wetlands?
- What is the condition of our wetlands?
- What are the major stressors affecting wetlands?
- How are things changing over time?
  - Effectiveness of management programs



Historical Ecology: Understanding Change Over Time

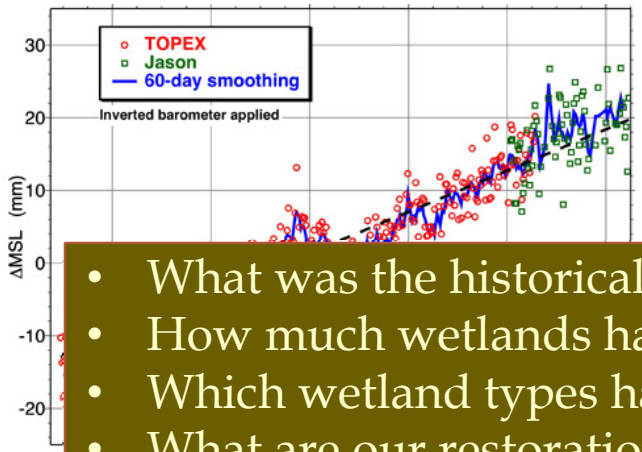
SCCWRP Established 1969

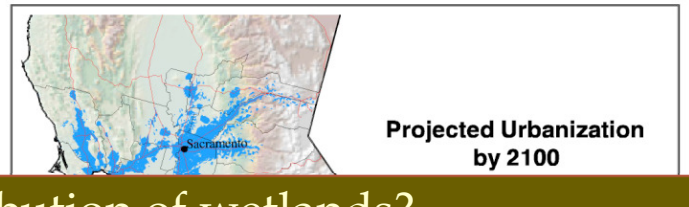
CSUN

USC University of Southern California

SFEI

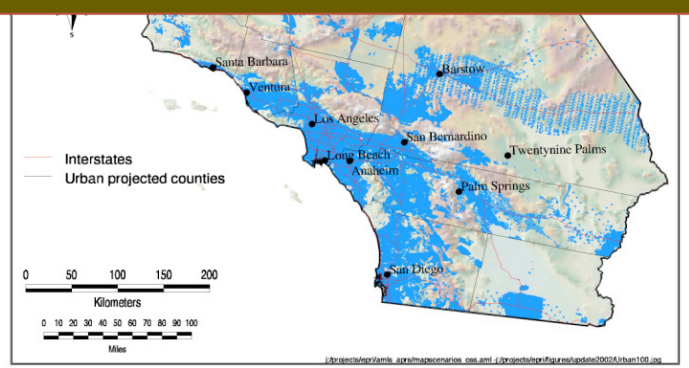
The Past Provides Insight into the Future



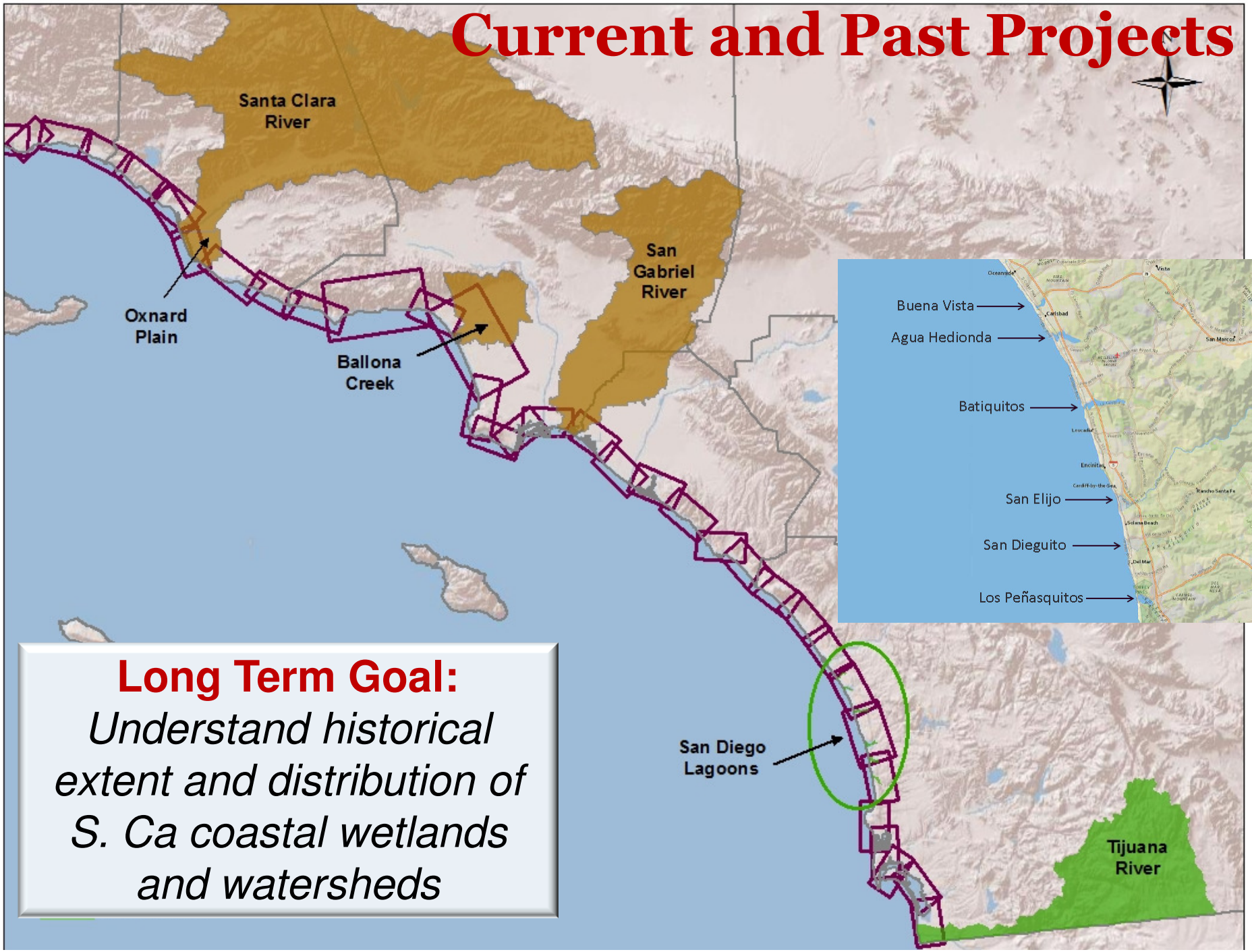


- What was the historical distribution of wetlands?
- How much wetlands have been lost?
- Which wetland types have been most impacted?
- What are our restoration priorities?

GOAL IS NOT TO TRY AND RECREATE THE PAST



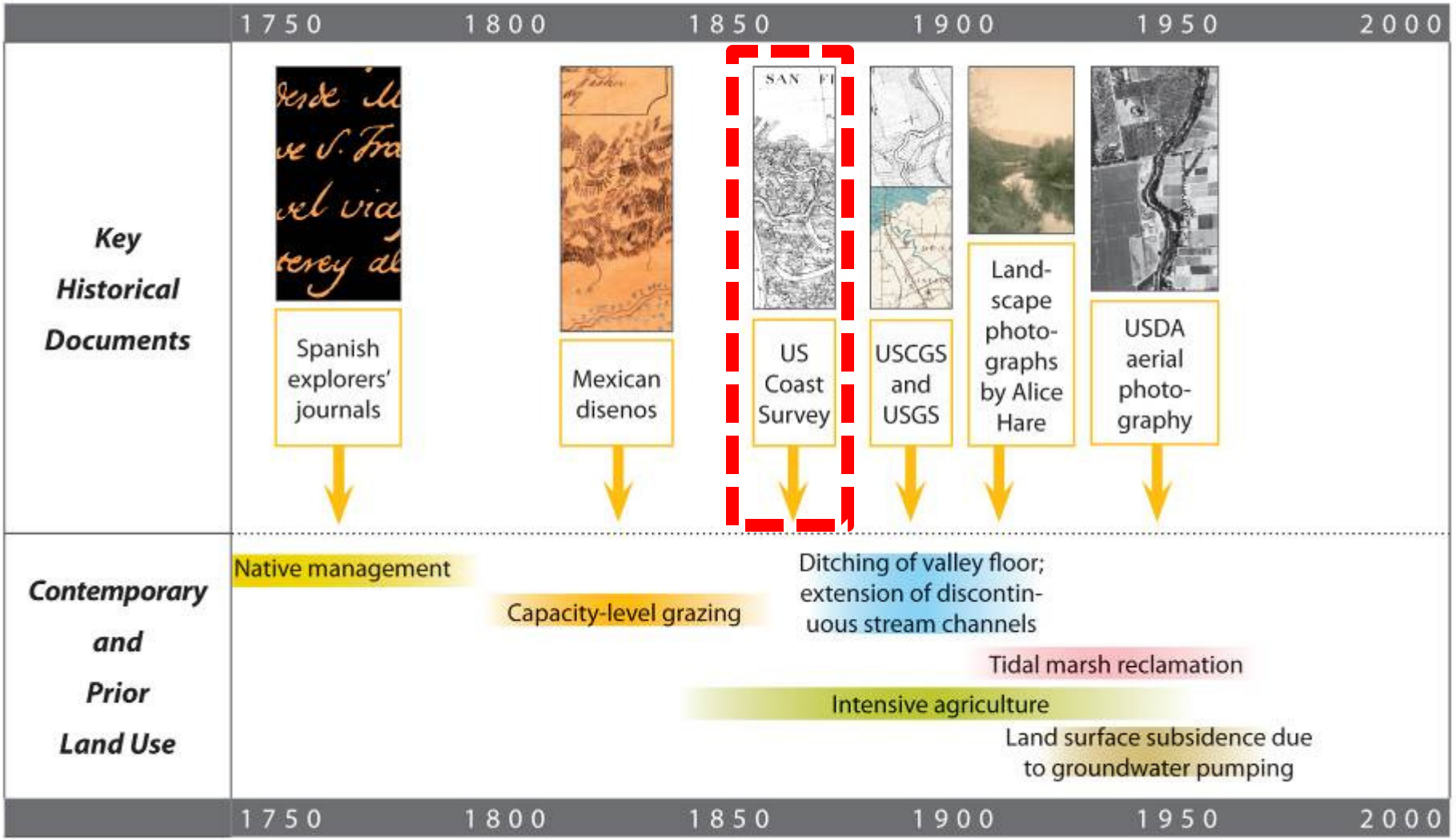
Current and Past Projects



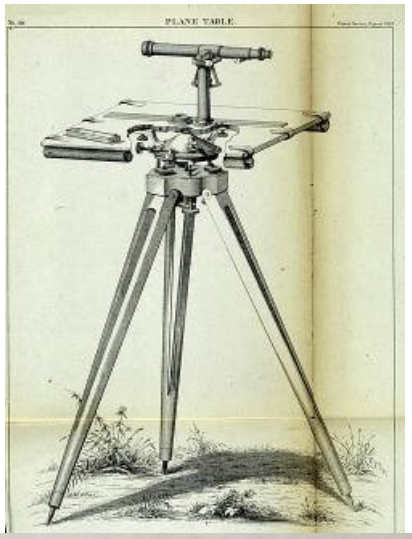
Long Term Goal:

Understand historical extent and distribution of S. Ca coastal wetlands and watersheds

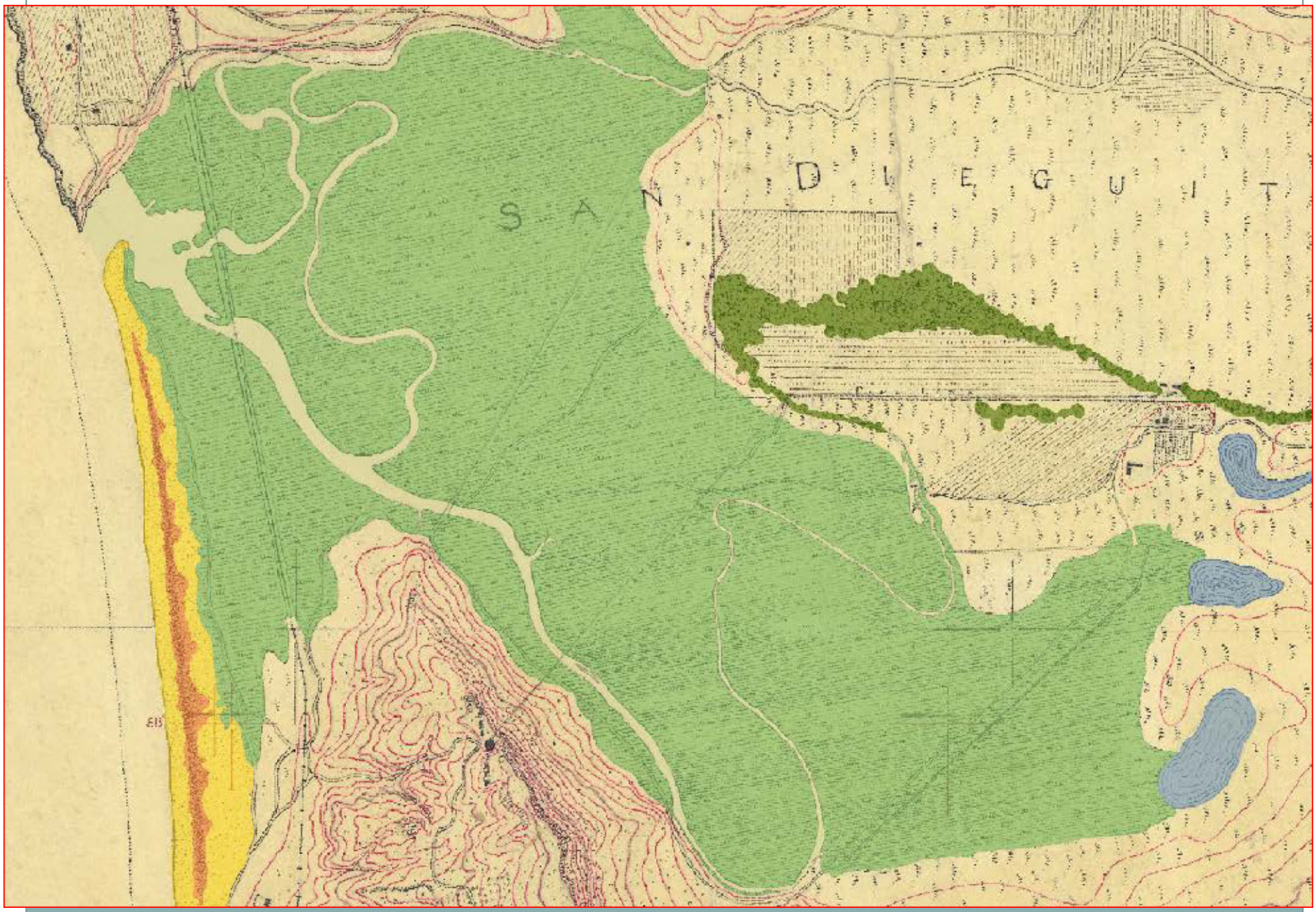
Historical Ecology=Weight of Evidence

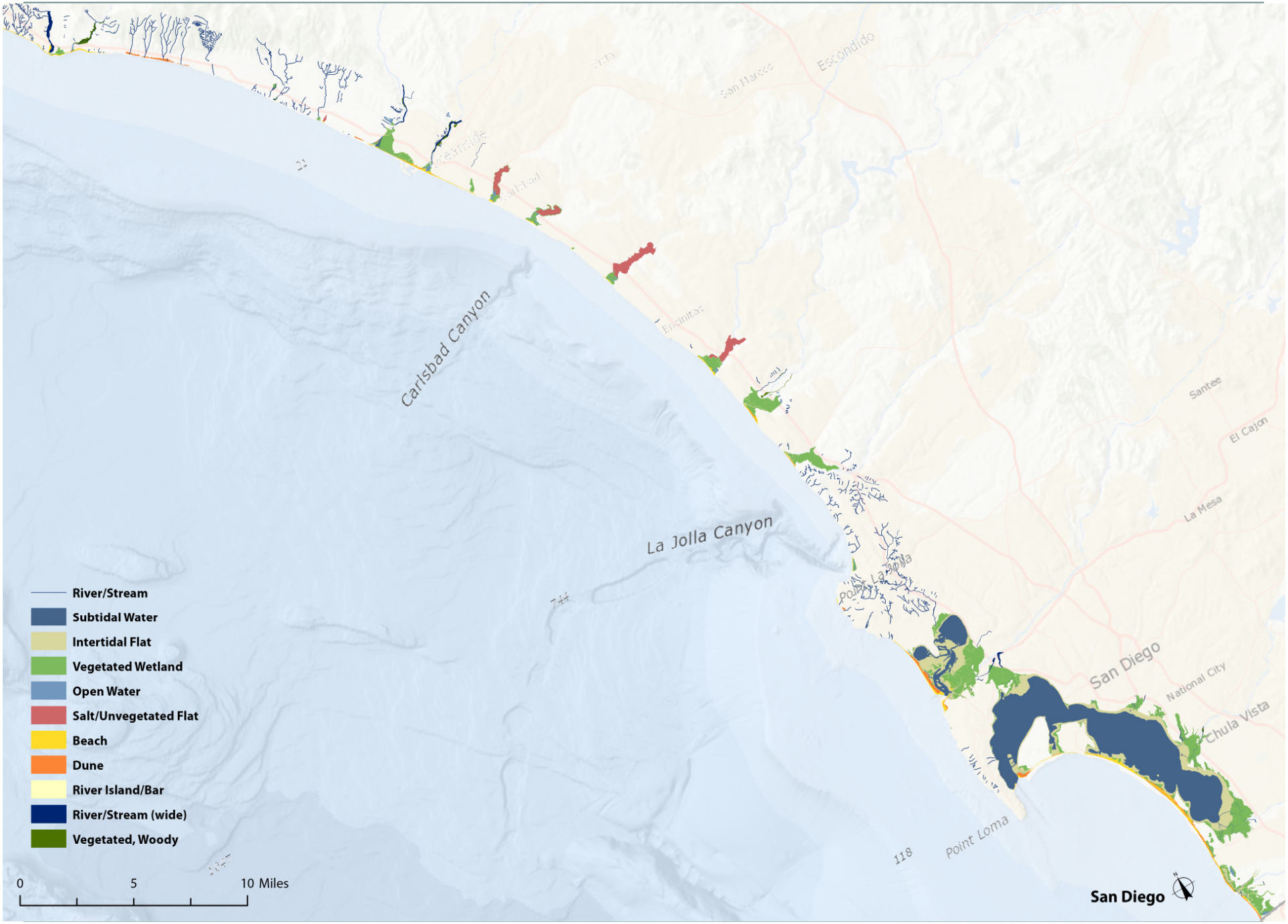


What is a T-Sheet?

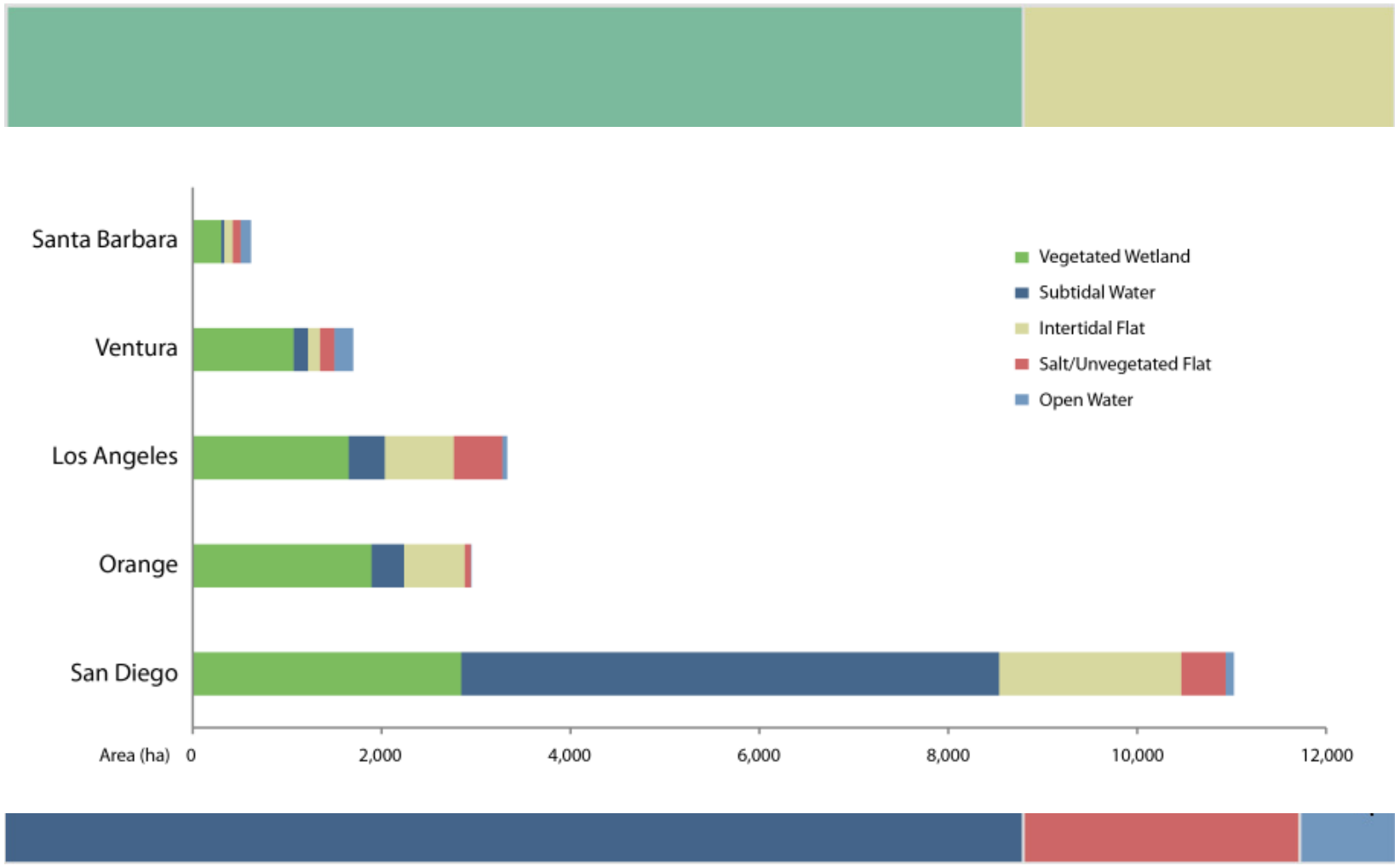



S A N D I E G U I T A S

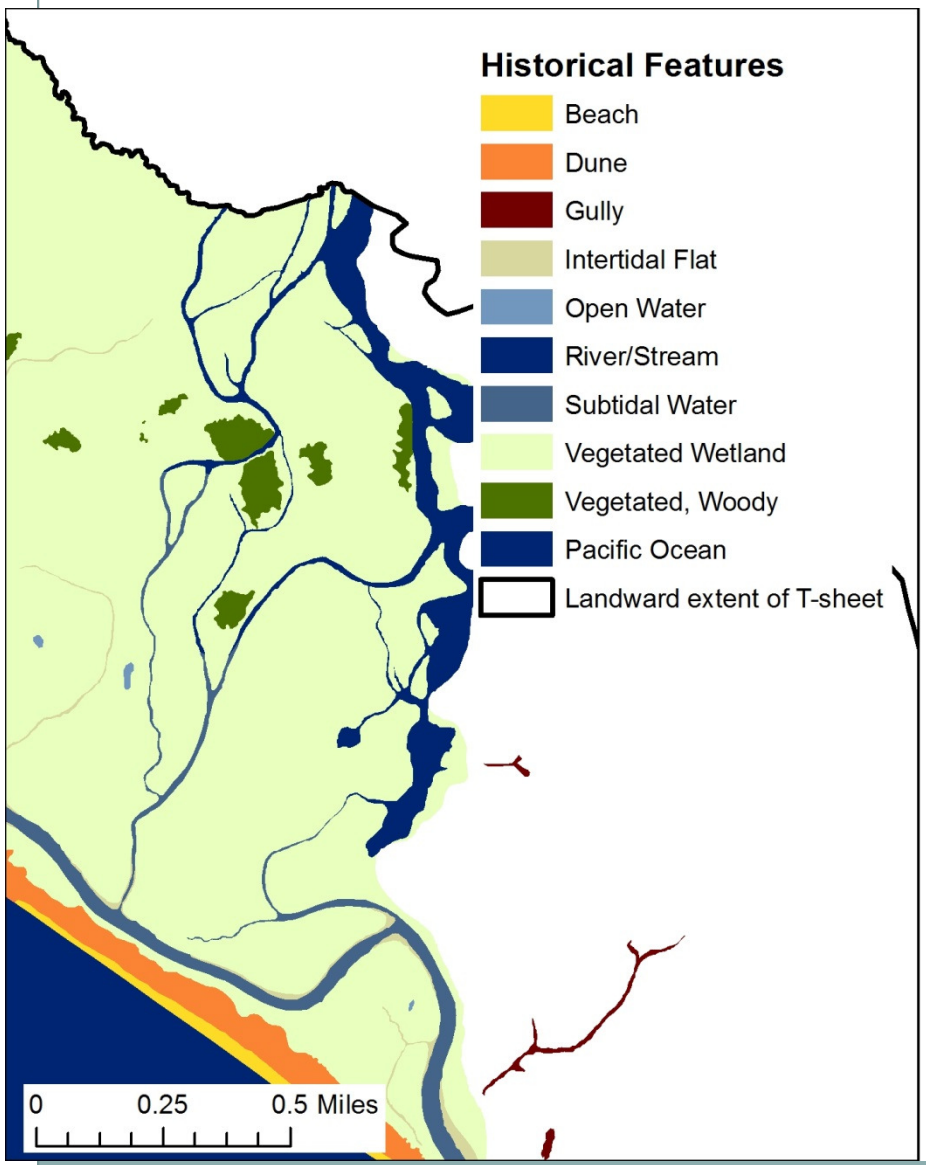

S A N
D I E G U I T

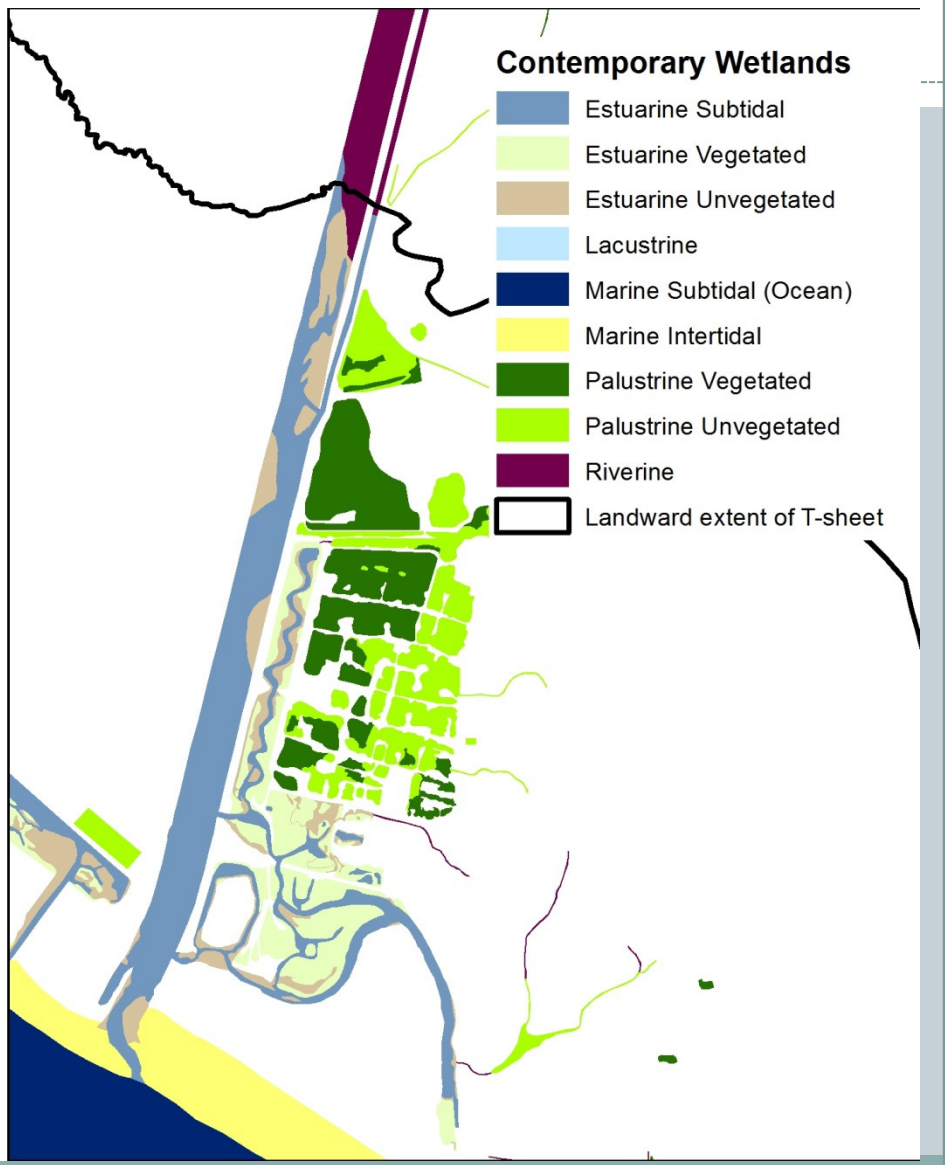

River/Stream
Subtidal Water
Intertidal Flat
Vegetated Wetland
Open Water
Salt/Unvegetated Flat
Beach
Dune
River Island/Bar
River/Stream (wide)
Vegetated, Woody
0
5
10 Miles
Carlsbad Canyon
La Jolla Canyon
Escondido
Santee
El Cajon
La Mesa
San Diego
National City
Chula Vista
Point Loma
San Diego

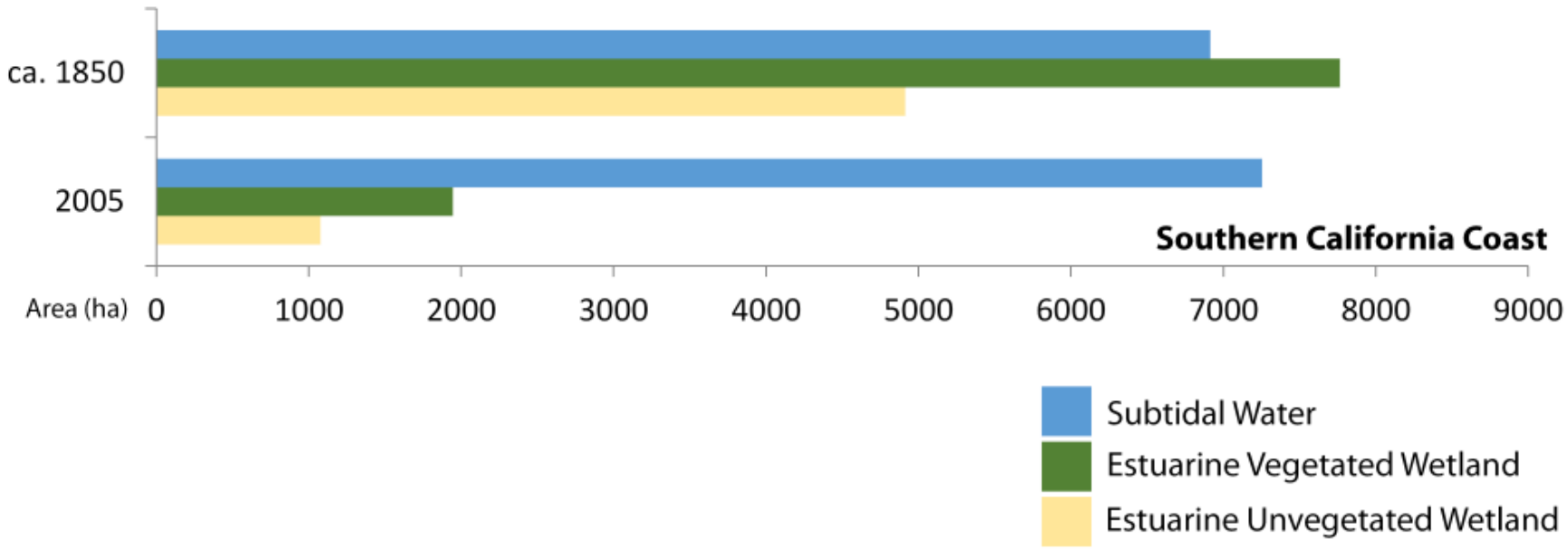

Palmdale
Victorville
Santa Clarita
Simi Valley
Oxnard
Thousand Oaks
Highland
Redlands
Los Angeles
West Covina
Santa Monica
Riverside
Corona
Redondo Beach
Long Beach
Santa Ana
Perris
Hemet
Rancho Santa Margarita
Lake Forest
Murrieta
Laguna Niguel
San Clemente
Oceanside
Escondido
Santee
San Diego
Tijuana
System Size
Large > 1000 ha
Medium 100 - 1000 ha
Small 1 - 100 ha
Very Small < 1 ha
Channel Only
0
50
100
150
200
250
Number of Systems
N
0
10
20 Miles


Santa Barbara
Ventura
Los Angeles
Orange
San Diego
Vegetated Wetland
Subtidal Water
Intertidal Flat
Salt/Unvegetated Flat
Open Water
Area (ha)
0
2,000
4,000
6,000
8,000
10,000
12,000

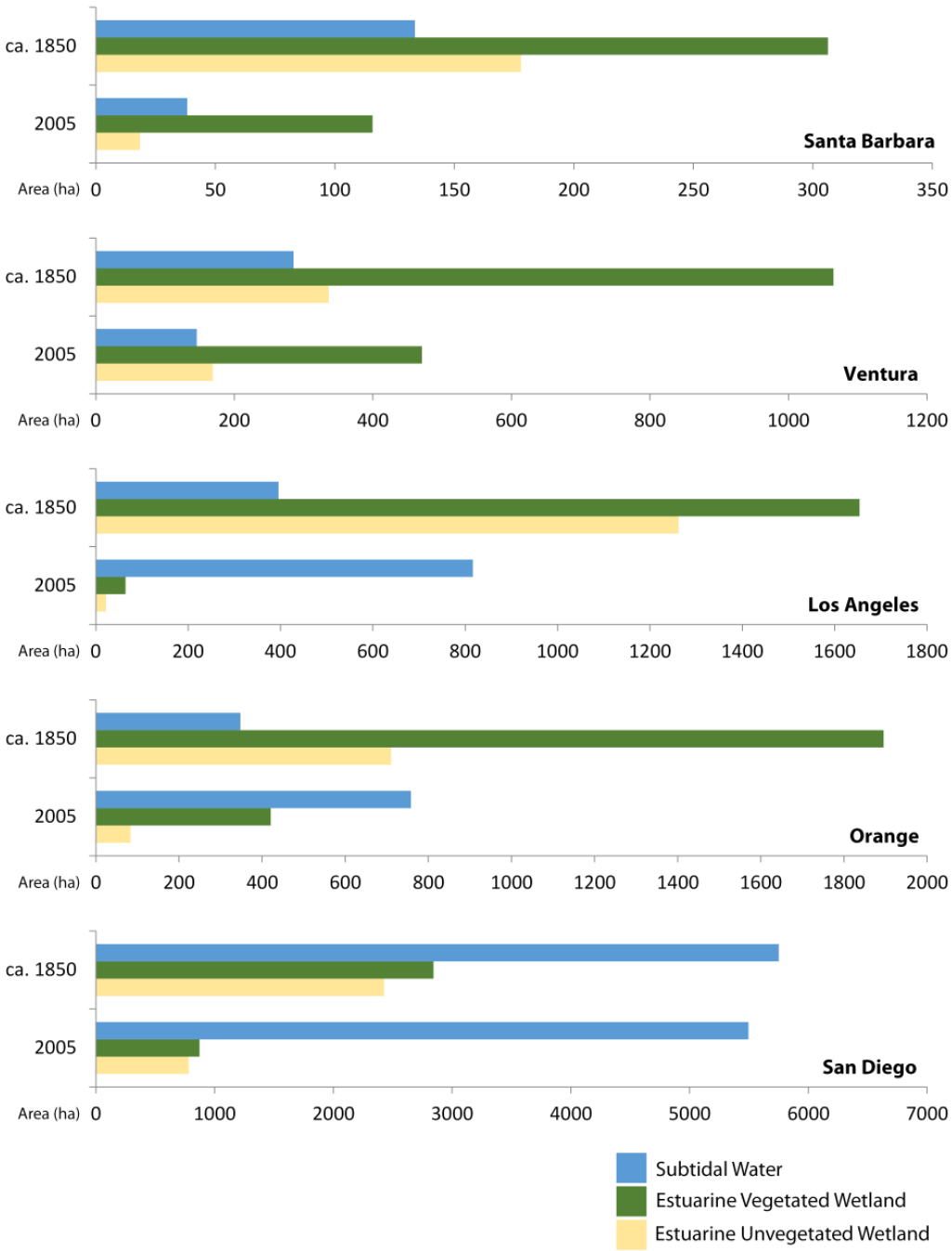
Comparison of Historical and Contemporary Wetlands Santa Ana River

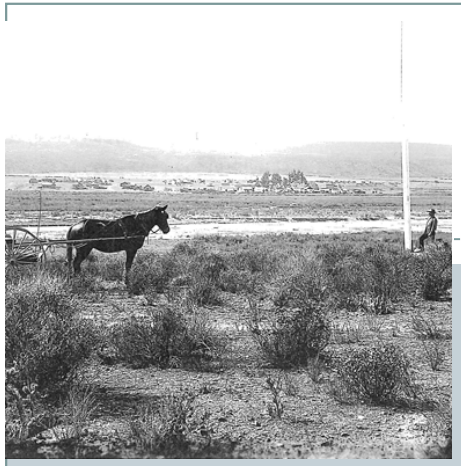






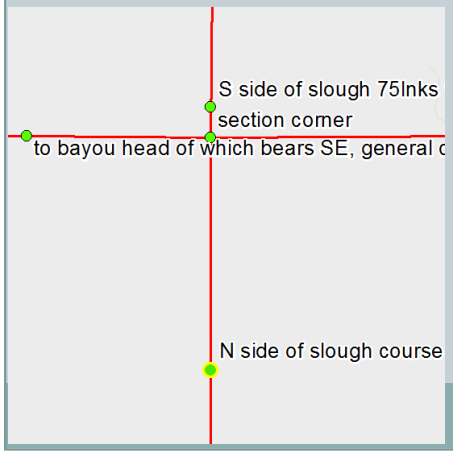
- Historically (19,560 ha)
  - 40% vegetated wetlands (e.g. salt marsh)
  - 25% was unvegetated wetlands (e.g. salt flat and mudflat)
  - 35% was subtidal water.
- Since ca. 1850, overall loss of 48% of historical estuarine habitat
  - Estuarine vegetated wetlands – 75% loss
  - Estuarine unvegetated – 78% loss
  - Subtidal water now is 71% of total area

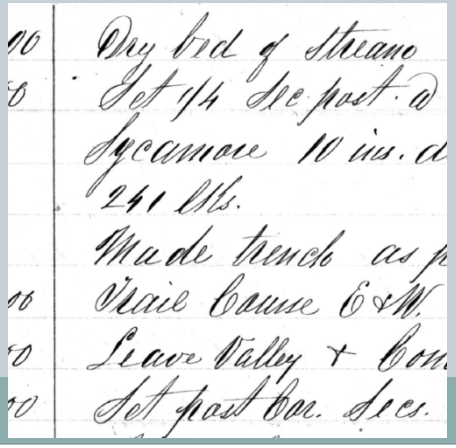

ca. 1850
2005
Santa Barbara
Area (ha) 0 50 100 150 200 250 300 350
ca. 1850
2005
Ventura
Area (ha) 0 200 400 600 800 1000 1200
ca. 1850
2005
Los Angeles
Area (ha) 0 200 400 600 800 1000 1200 1400 1600 1800
ca. 1850
2005
Orange
Area (ha) 0 200 400 600 800 1000 1200 1400 1600 1800 2000
ca. 1850
2005
San Diego
Area (ha) 0 1000 2000 3000 4000 5000 6000 7000
Subtidal Water
Estuarine Vegetated Wetland
Estuarine Unvegetated Wetland

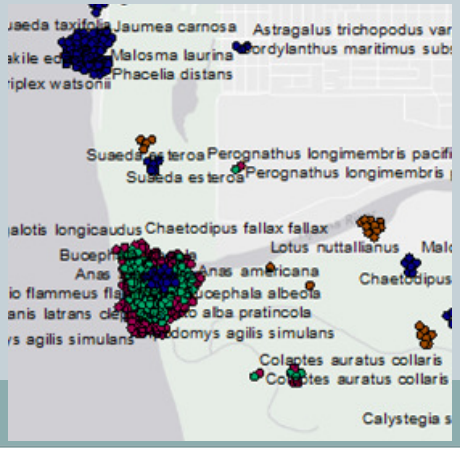


Photographs

Maps







Texts

"the bed is plainly over a hundred yards in width in spots" – Crespi 1769

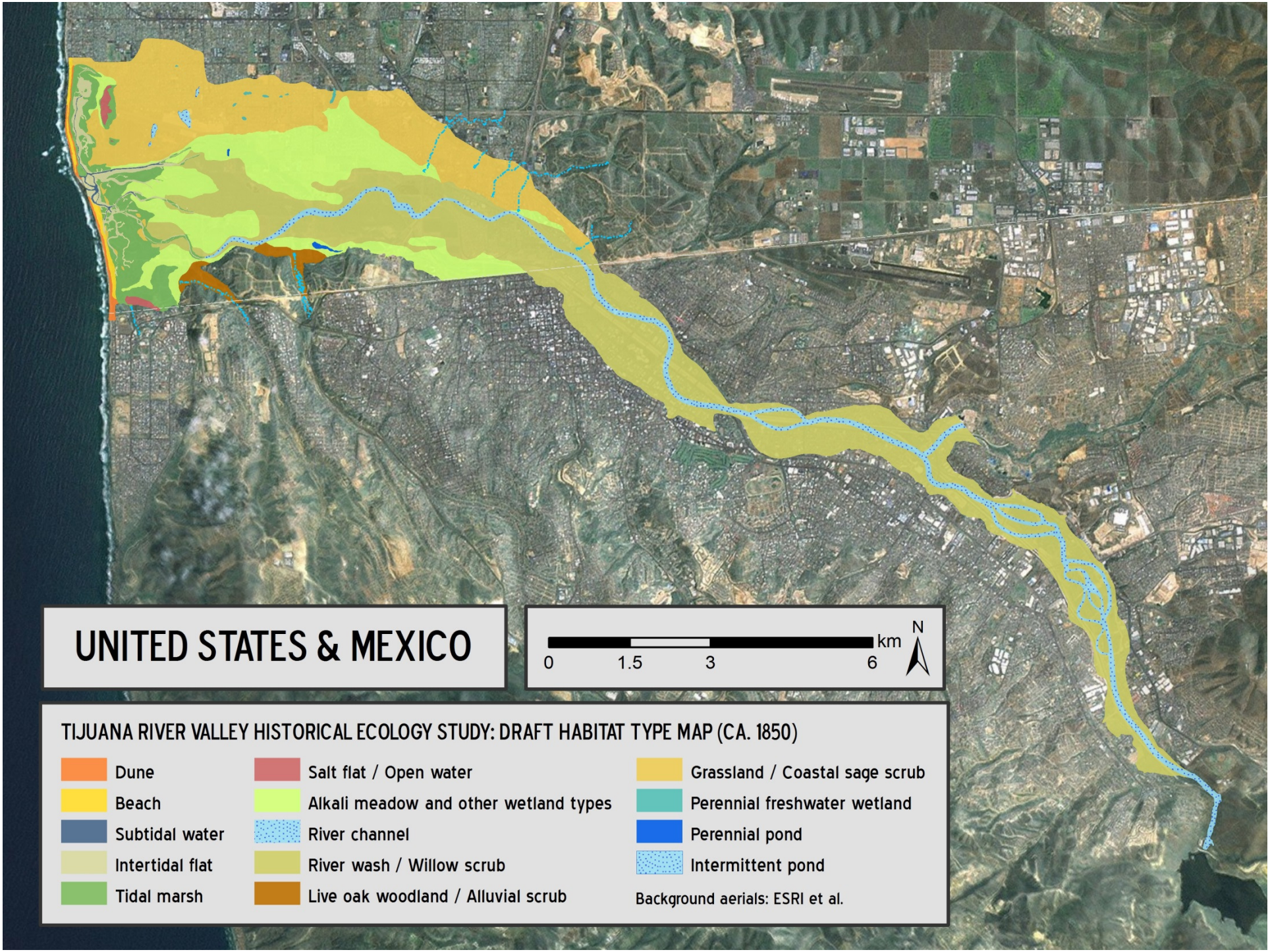
"The Saticoy springs furnished the only water in summer, and the only tree shelter for a circuit of three or four miles." – Cooper 1887

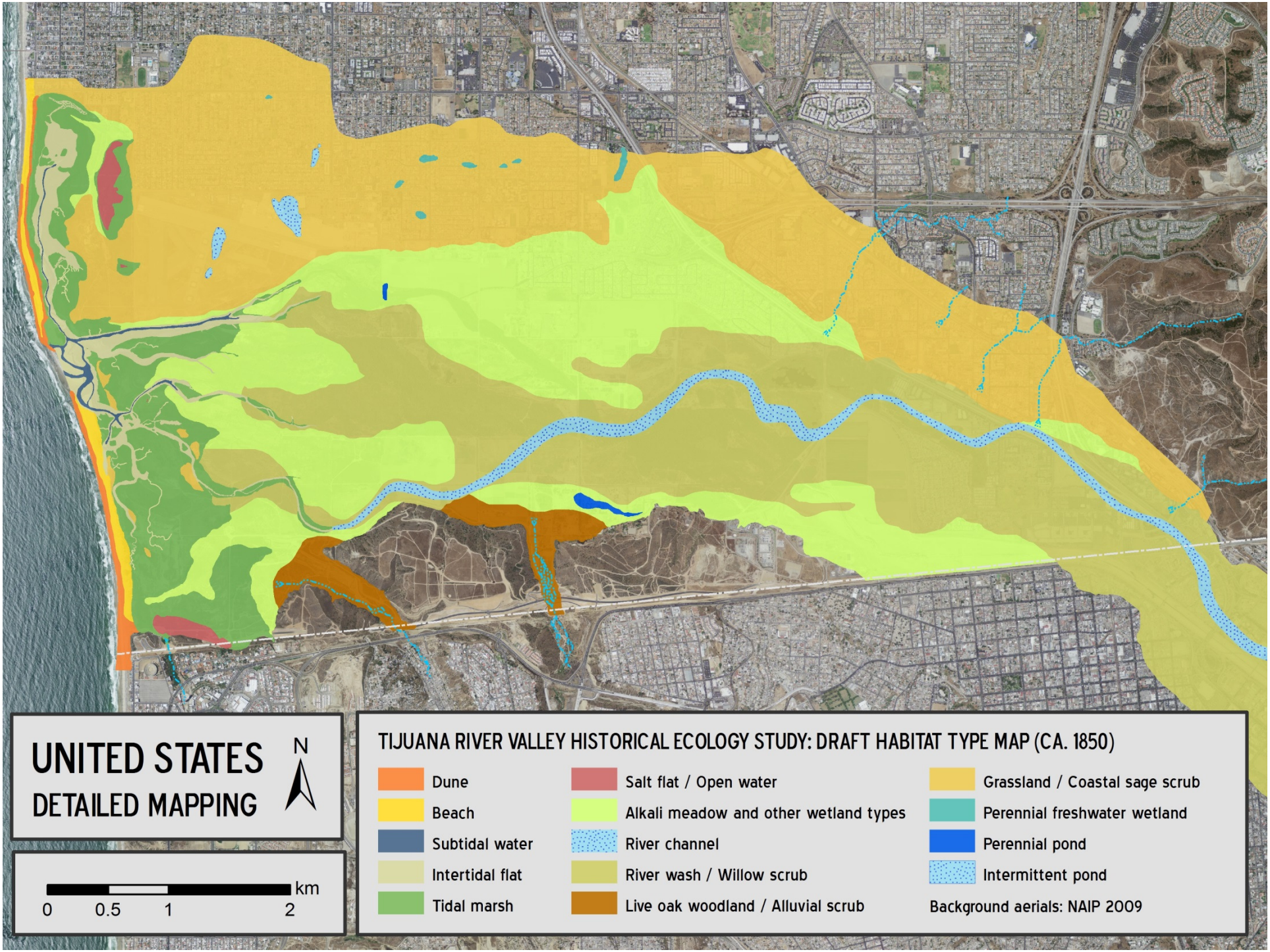
"...the shallow river that creeps lazily out from the grove of alders and willows" – Holder ca. 1893

"Along the river are small, isolat groves of cottonwoods and willo with here and there an occasion sycamore." – Evermann 1886

"It is a fine grassy plain...with a few dry creeks or alkaline ponds" – Brewer 1861

"There is not on the said place, any kind of timber, for the few (trees) it produces are only good for firewood, so that for the purposes of building houses and fences it will have to be brought from the river Santa Clara..." – Carrillo 1833


UNITED STATES & MEXICO
0
1.5
3
6
km
N
TIJUANA RIVER VALLEY HISTORICAL ECOLOGY STUDY: DRAFT HABITAT TYPE MAP (CA. 1850)
Dune
Beach
Subtidal water
Intertidal flat
Tidal marsh
Salt flat / Open water
Alkali meadow and other wetland types
River channel
River wash / Willow scrub
Live oak woodland / Alluvial scrub
Grassland / Coastal sage scrub
Perennial freshwater wetland
Perennial pond
Intermittent pond
Background aerials: ESRI et al.


UNITED STATES
DETAILED MAPPING
N
0
0.5
1
2
km
TIJUANA RIVER VALLEY HISTORICAL ECOLOGY STUDY: DRAFT HABITAT TYPE MAP (CA. 1850)
Dune
Beach
Subtidal water
Intertidal flat
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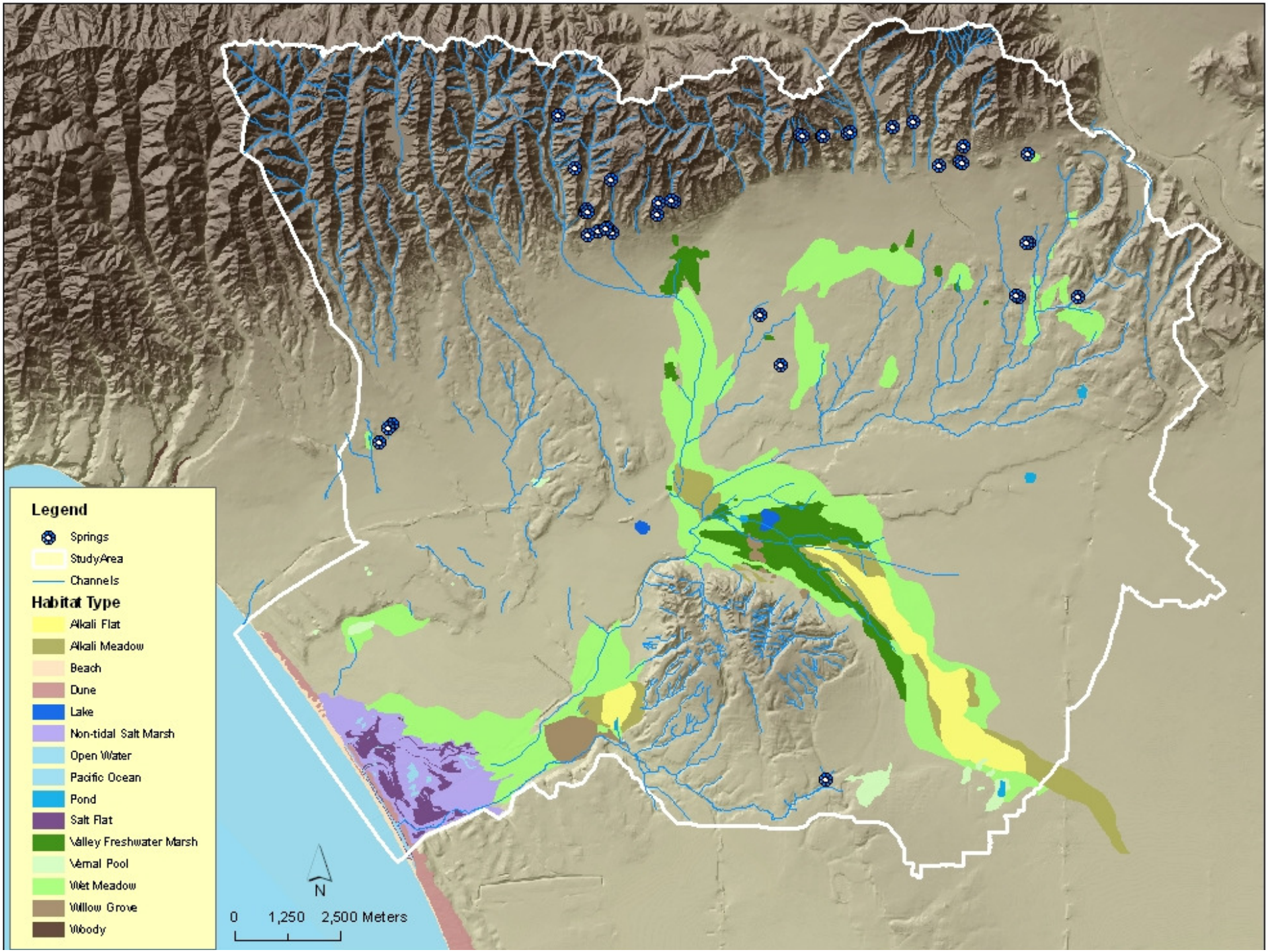
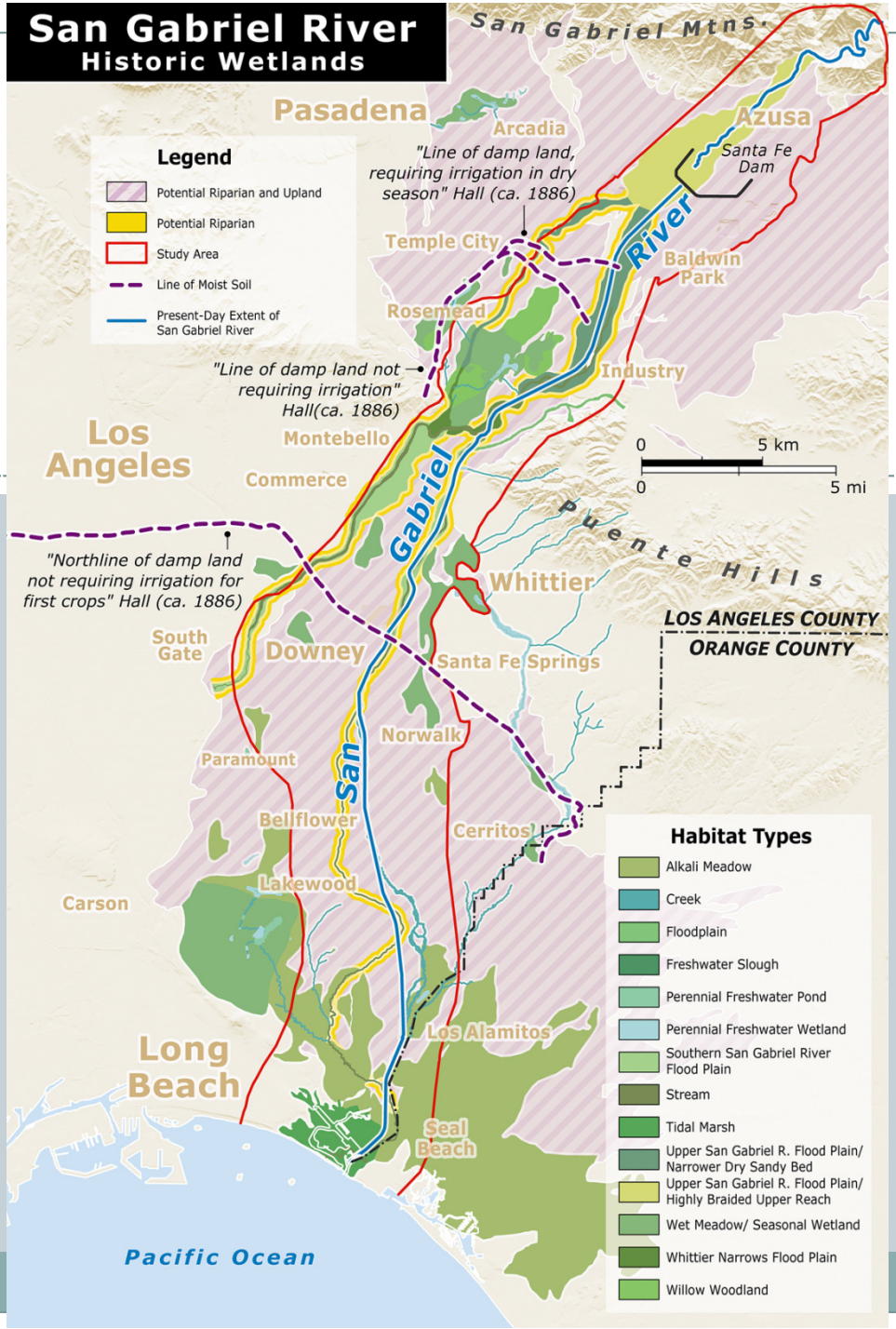
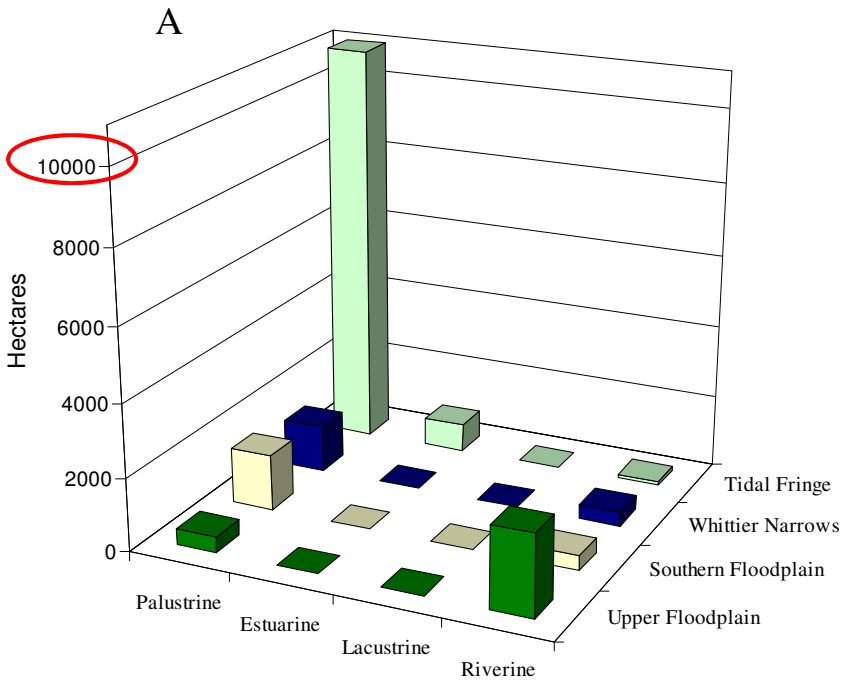
Live oak woodland / Alluvial scrub
Grassland / Coastal sage scrub
Perennial freshwater wetland
Perennial pond
Intermittent pond
Background aerials: NAIP 2009


Legend
Springs
StudyArea
Channels
Habitat Type
Alkali Flat
Alkali Meadow
Beach
Dune
Lake
Non-tidal Salt Marsh
Open Water
Pacific Ocean
Pond
Salt Flat
Valley Freshwater Marsh
Vernal Pool
Wet Meadow
Willow Grove
Woody
N
0 1,250 2,500 Meters

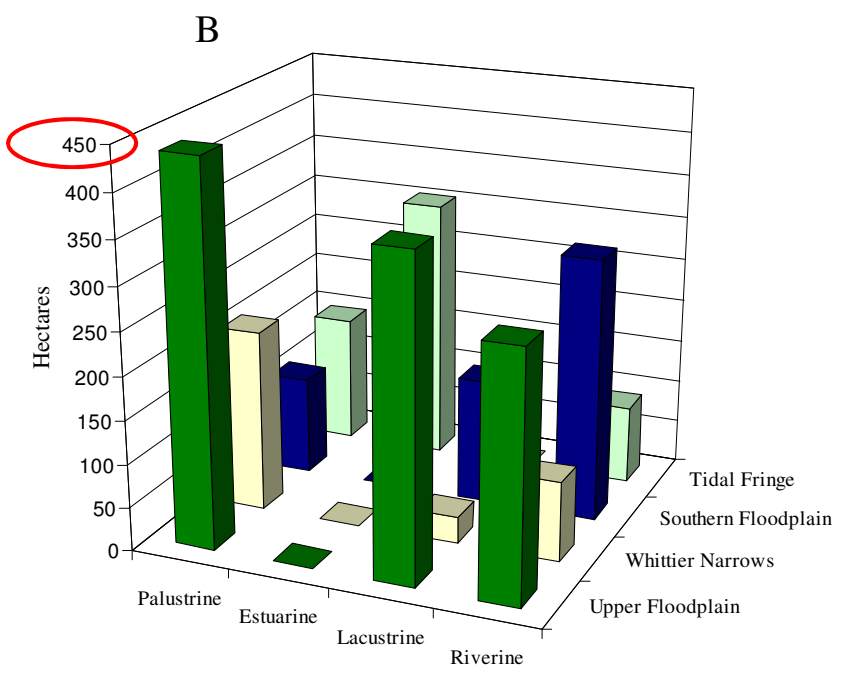

San Gabriel River
Historic Wetlands
San Gabriel Mtns.
Pasadena
Arcadia
Azusa
Santa Fe Dam
"Line of damp land, requiring irrigation in dry season" Hall (ca. 1886)
Temple City
Baldwin Park
Rosemead
"Line of damp land not requiring irrigation" Hall(ca. 1886)
Industry
Los Angeles
Montebello
Commerce
0 5 km
0 5 mi
"Northline of damp land not requiring irrigation for first crops" Hall (ca. 1886)
Puente Hills
Whittier
LOS ANGELES COUNTY
ORANGE COUNTY
South Gate
Downey
Santa Fe Springs
Norwalk
Paramount
Bellflower
Cerritos
Lakewood
Carson
Long Beach
Los Alamitos
Seal Beach
Pacific Ocean
Legend
Potential Riparian and Upland
Potential Riparian
Study Area
Line of Moist Soil
Present-Day Extent of San Gabriel River
Habitat Types
Alkali Meadow
Creek
Floodplain
Freshwater Slough
Perennial Freshwater Pond
Perennial Freshwater Wetland
Southern San Gabriel River Flood Plain
Stream
Tidal Marsh
Upper San Gabriel R. Flood Plain/ Narrower Dry Sandy Bed
Upper San Gabriel R. Flood Plain/ Highly Braided Upper Reach
Wet Meadow/ Seasonal Wetland
Whittier Narrows Flood Plain
Willow Woodland

Change Assessment

1870



2005



- ✓Loss of 38,500 acres (15,500 ha) - 86% of historical wetlands lost
- ✓Palustrine wetland most impacted - greatest losses in the tidal fringe area
- ✓Contemporary lacustrine wetlands mostly man-made - shift in wetland profile

Major Agents of Change

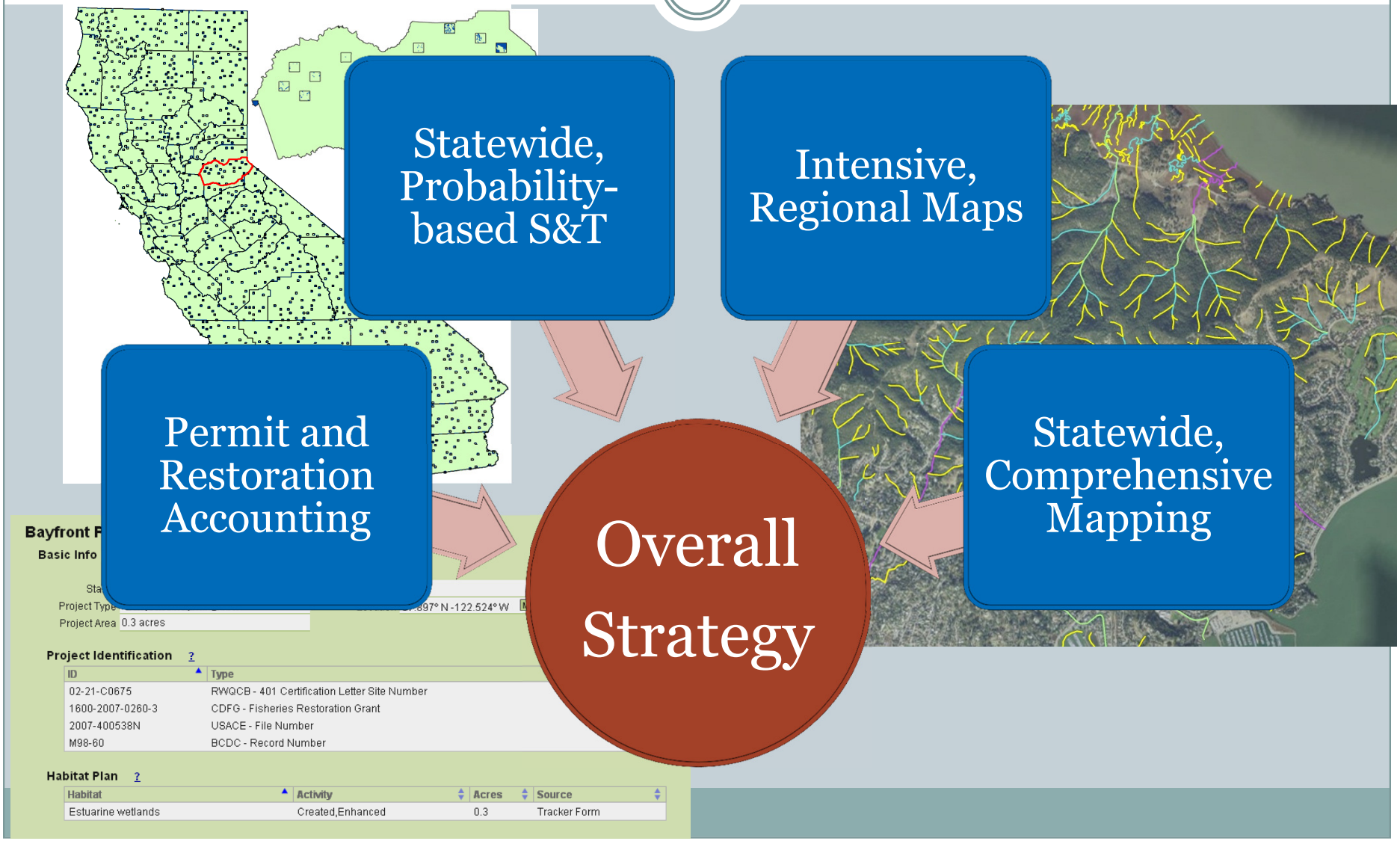
- *Railroads*
  - *1870s*
- *Groundwater Extraction*
  - *1890s*
- *Flood control*
  - *1915-1940s*

Current and Past Projects

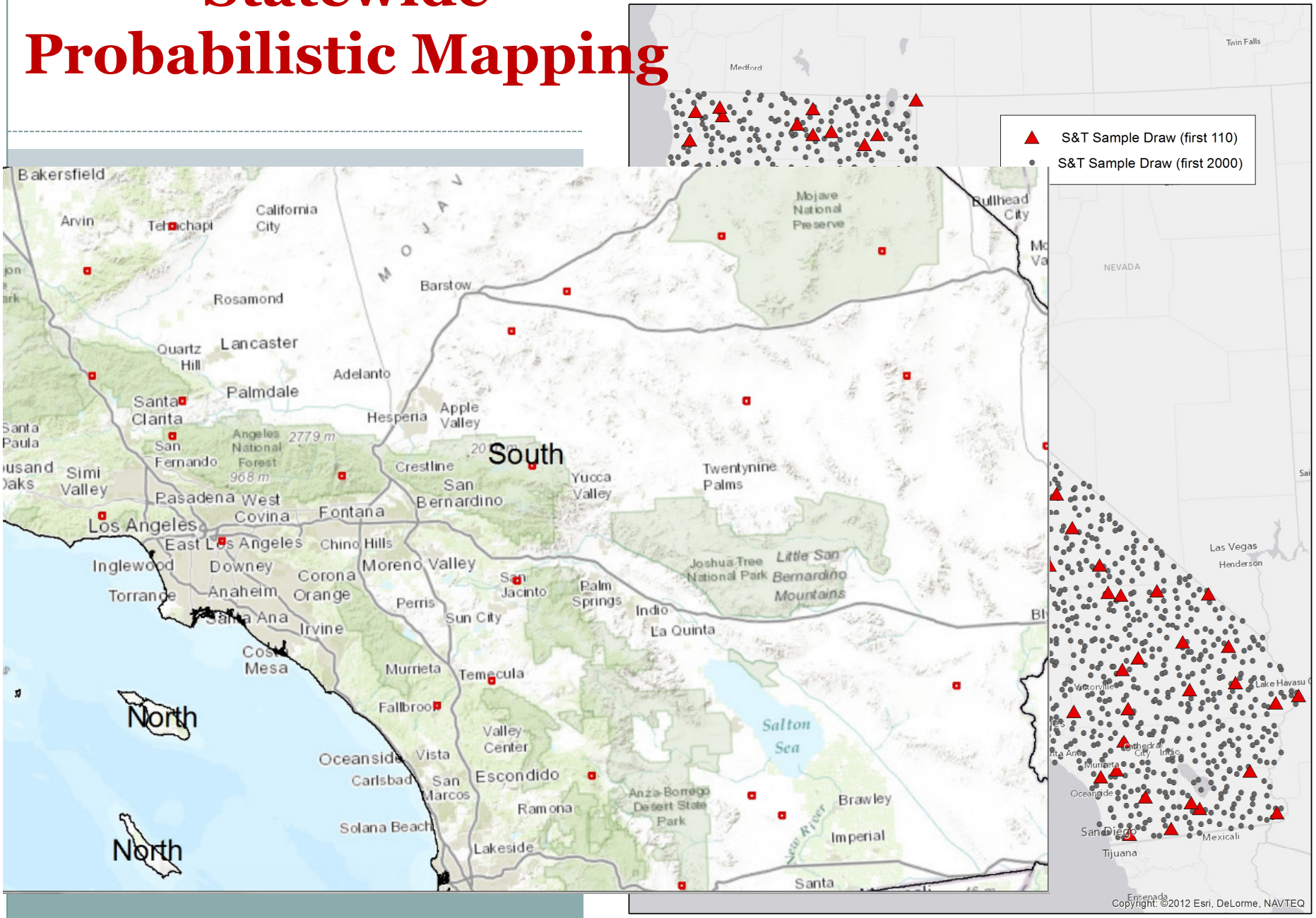
Long Term Goal:

Understand historical extent and distribution of S. Ca coastal wetlands and watersheds

California's Mapping Strategy



Statewide Probabilistic Mapping



Demonstrating Change Assessment

Change Assessment Products

- Report on overall changes:
  - Change in area by wetland type
  - Change in stream length by stream type
  - Change in stream area

- Report on specific change categories:
  - Wetland type to a different wetland type
  - Wetland/stream <--> open water
  - Wetland/stream <--> natural upland
  - Wetland/stream <--> developed
  - Wetland/stream <--> agriculture
  - Wetland/stream <--> structure

Conclusions

- California contains a diversity of wetlands
  - Wetlands span a broad range of hydrologic conditions
  - **Available tools vary by wetland type**
- Historical wetland losses vary from 50% - 90%
  - Varies by wetland type and location
- Many watersheds in S. CA. have not yet been assessed for historical losses
  - Historical ecology studies can inform planning
- New programs are being developed to track future change
  - Opportunities to support implementation through new wetland policies

Thank You

http://www.caltsheets.org/

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erics@sccwrp.org www.sccwrp.org