

Wetland Remediation

Peyton Slough Martinez, CA

- Priya M. Ganguli -

www.PriyaGanguli.com
priya.ganguli@csun.edu



*Project Completed by Rhodia, Inc.
in response to RWQCB Cleanup & Abatement Order*

Big Picture Ideas

- Jobs in environmental remediation
- “Stake Holder” consensus
- Interdisciplinary, many links to hydrology:
 - hydraulic conductivity
 - groundwater-surface water interaction
 - Infiltration
- Terminology:
 - slough
 - marsh / wetland



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Slough

NOAA Definition
(abbreviated)

“Along the West Coast sloughs are the quiet, backwater parts of bays – they are part of the estuary, where freshwater (from creeks and runoff) mixes with salty ocean water that comes in with the tides.”



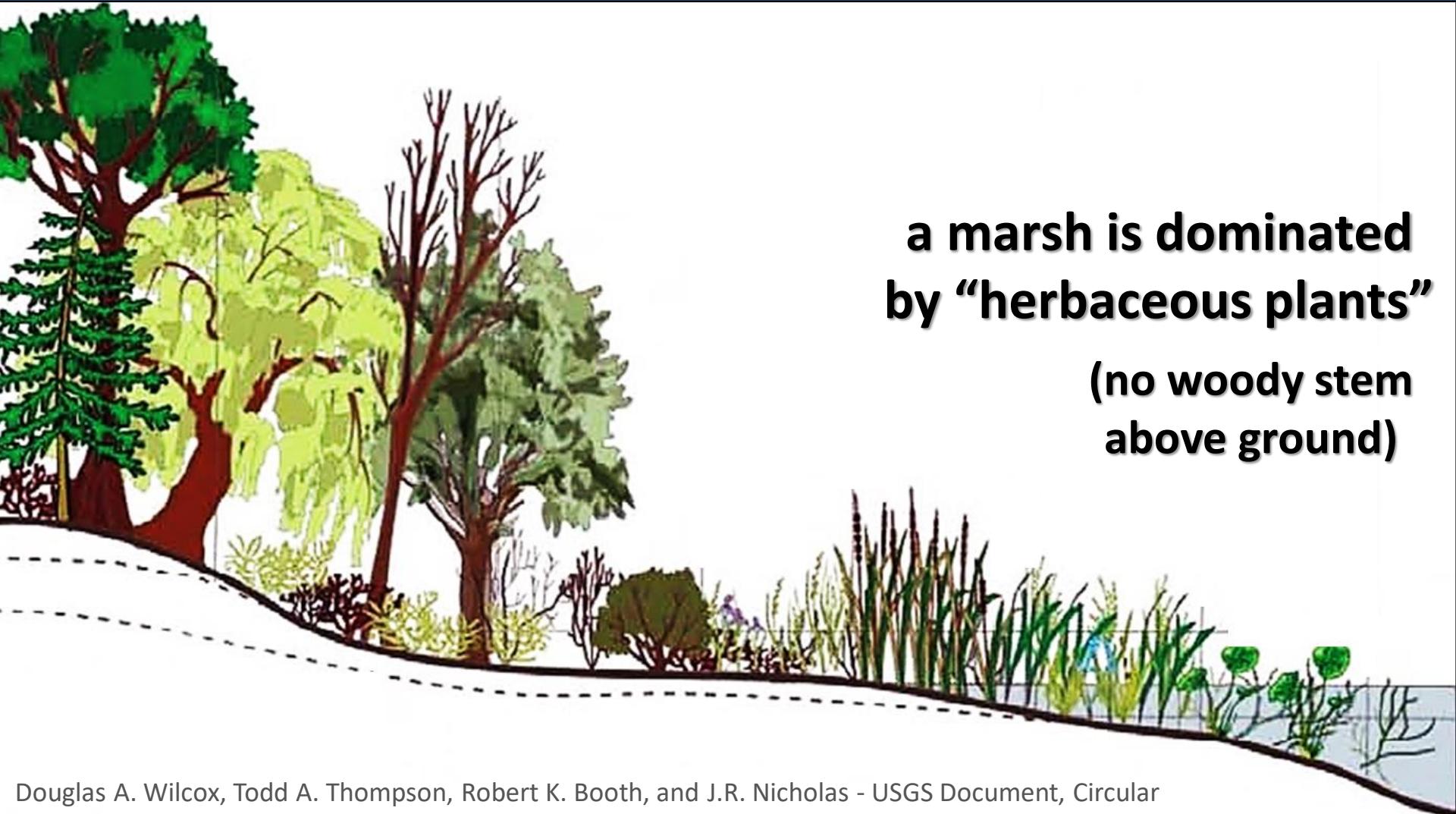
Slough & Marsh

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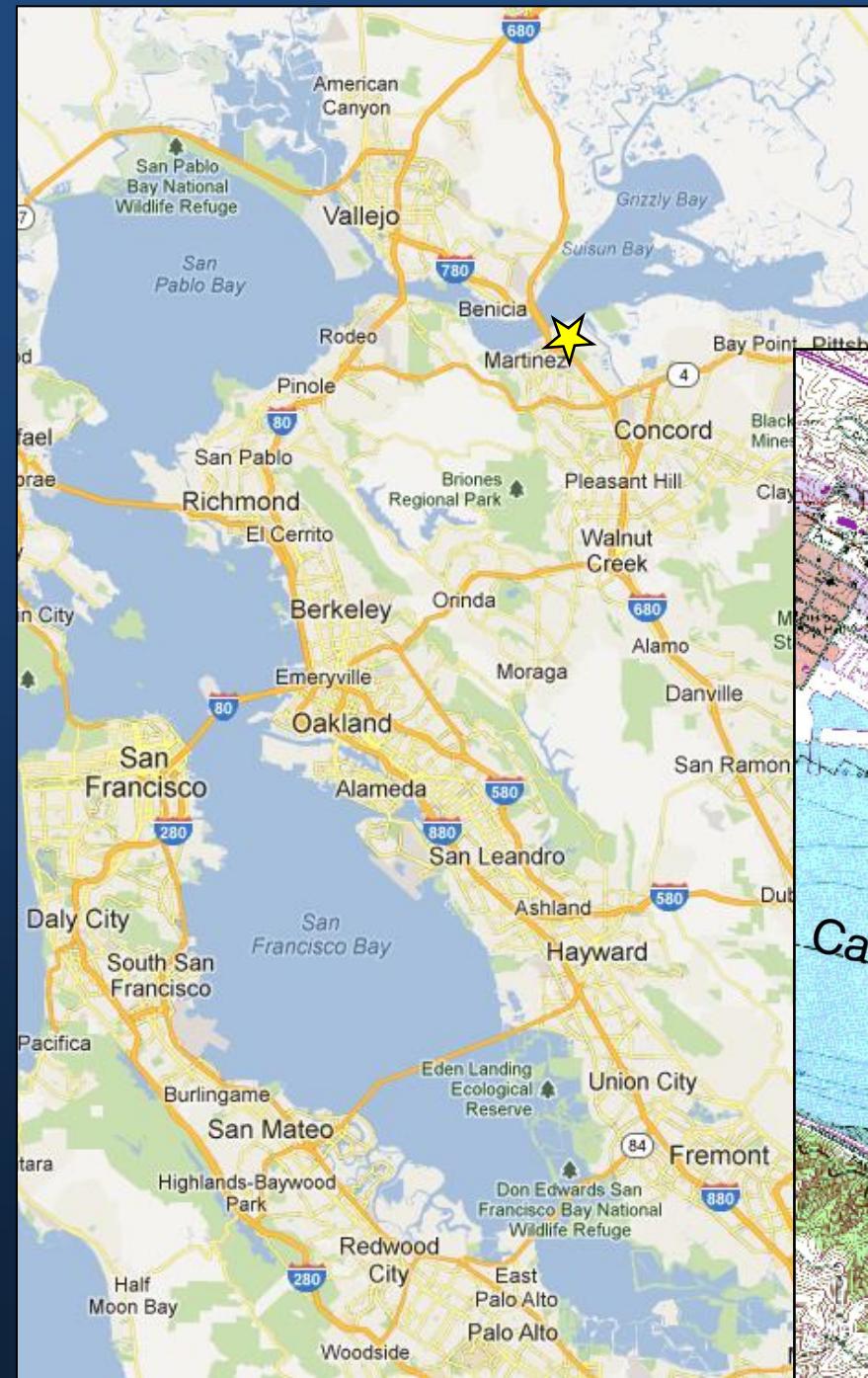


Marsh is a Type of Wetland



**a marsh is dominated
by “herbaceous plants”
(no woody stem
above ground)**

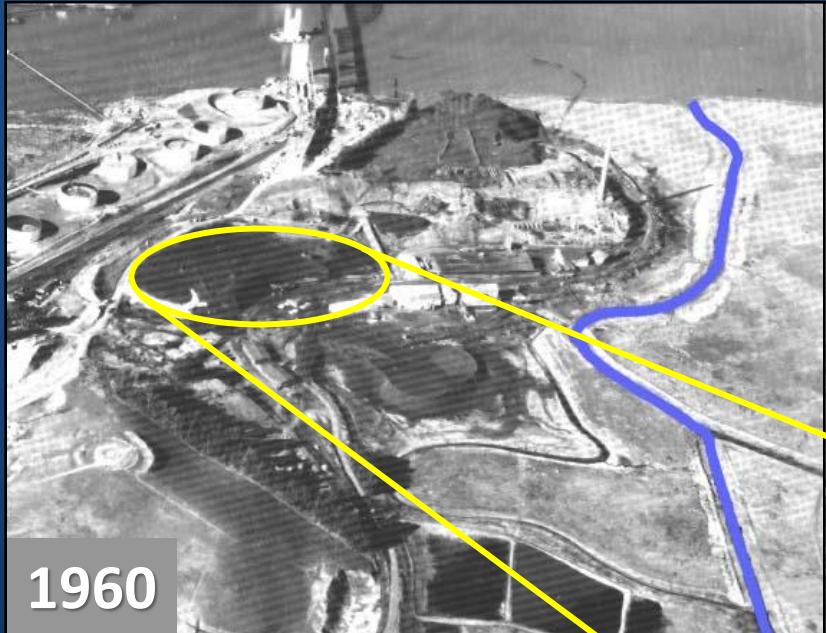
Site Location



Site History



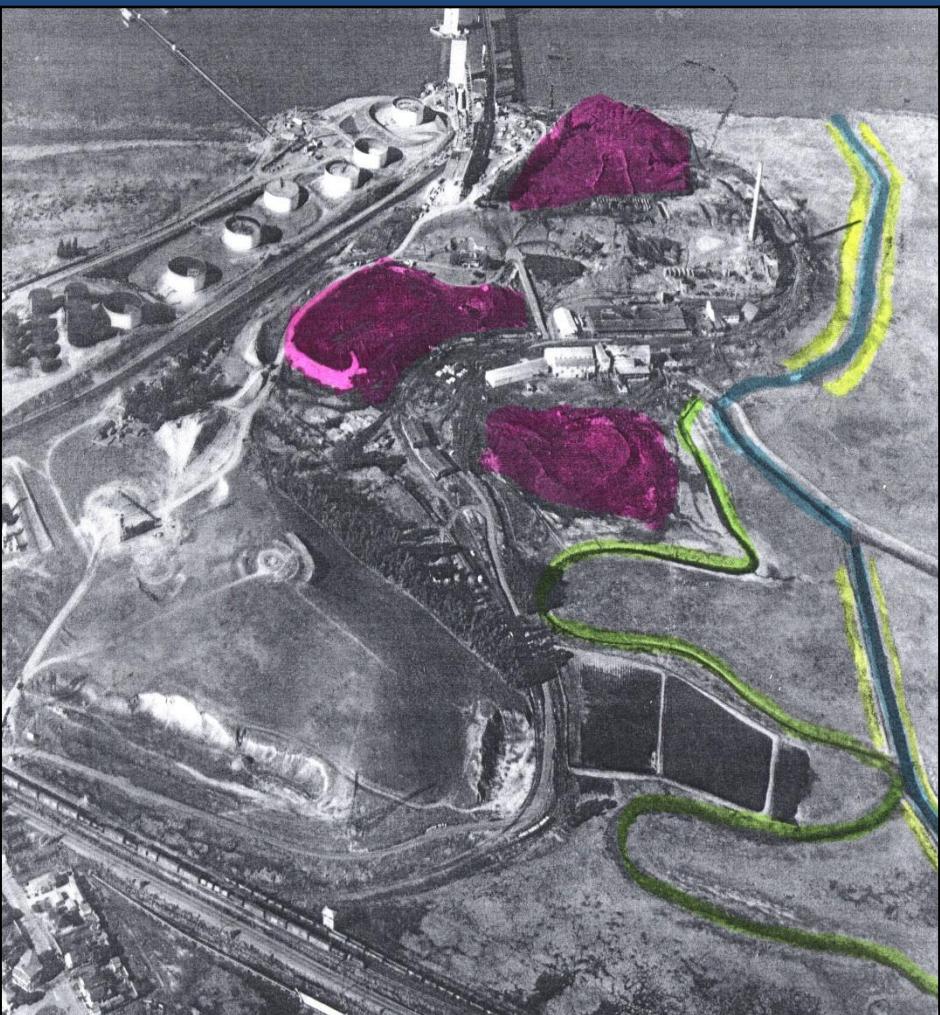
Magnitude of Ore Piles



Car next to building

Where Are They Now?

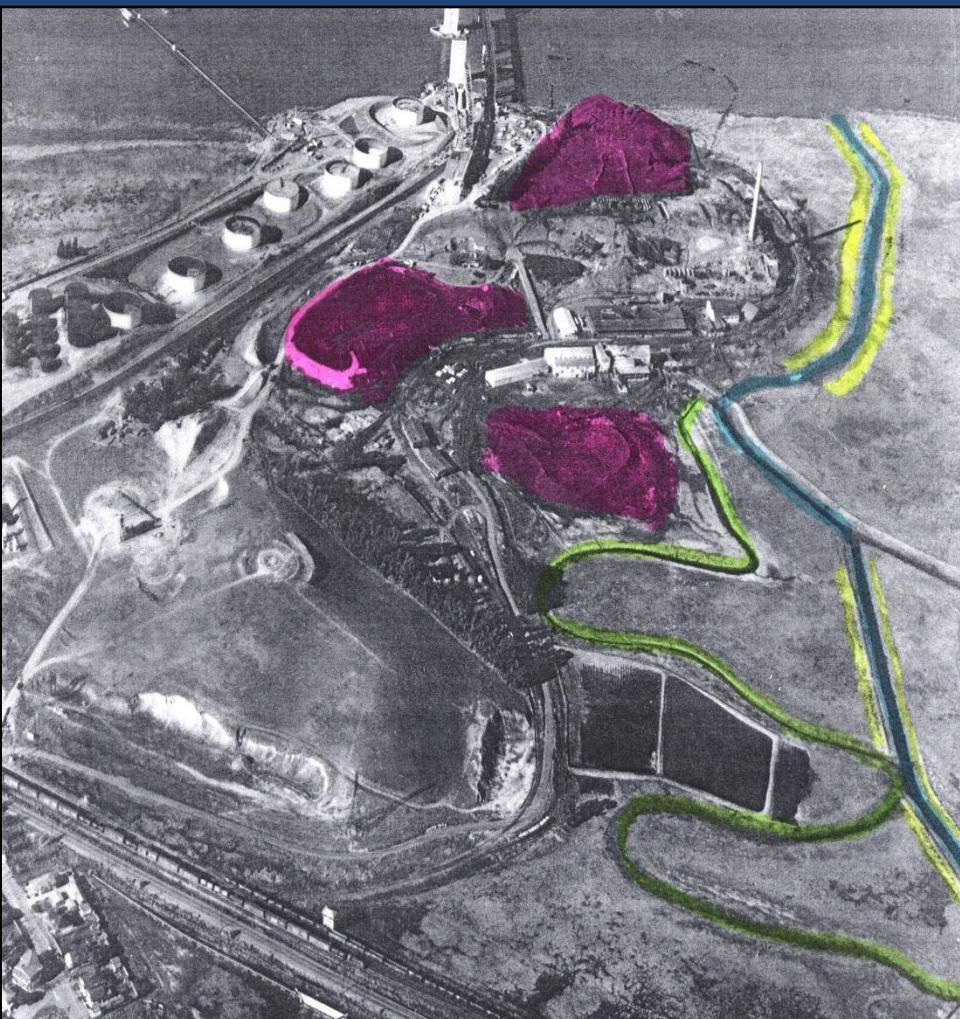
1960's

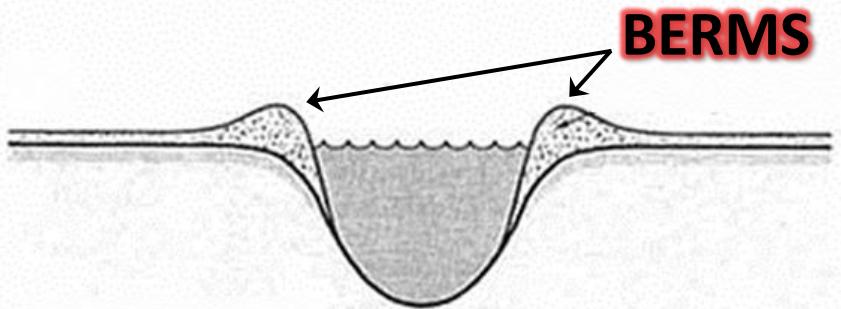


1989



Two Ore Piles Sunk!



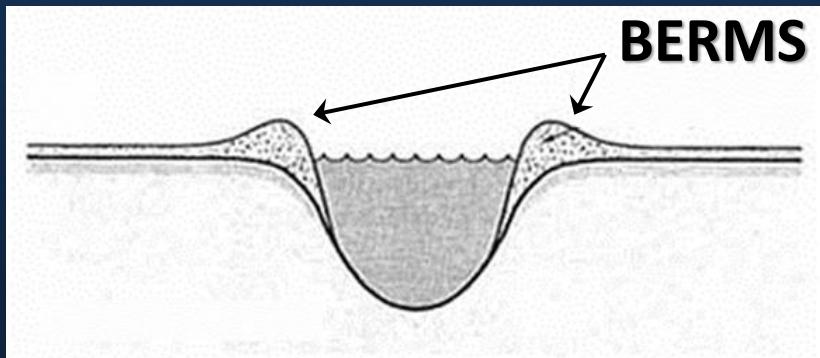


Contamination

Elevated copper and zinc in slough channel sediments

Sediment dredged to increase channel capacity

Dredge piles next to slough = BERM or LEVEE



An aerial photograph showing a coastal landscape. In the background, a long bridge spans a body of water. On the land, there are several industrial or construction sites with various buildings, roads, and parking areas. A prominent feature is a large, rounded, brown mound, likely a dredge spoil pile. In the foreground, there are more industrial structures, some green fields, and a road with several vehicles. The overall scene suggests a mix of natural and human-made environments.

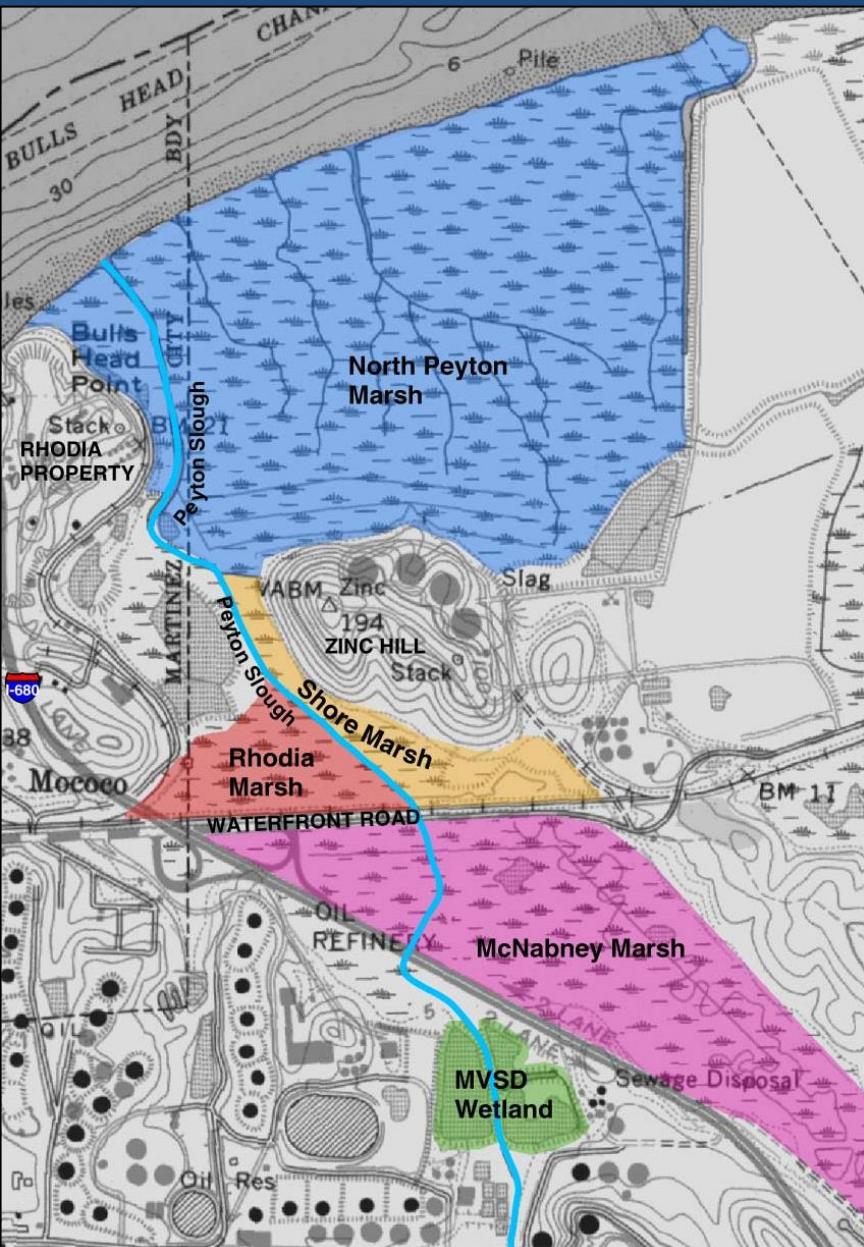
Challenges

- Responsible party(s)
- Contamination boundaries
- Slough and marsh functions
- Viable remediation plan
- Permits and stake holder consensus
- Construction
- Defining success

Primary Functions of Peyton Slough

Ecosystem

- Convey saline water to flood / drain marsh habitat
- Connect upstream “stranded” marsh systems
- Habitat / refuge for organisms



Lack of Tidal Exchange

- Berms – slough cannot flood and drain the marsh

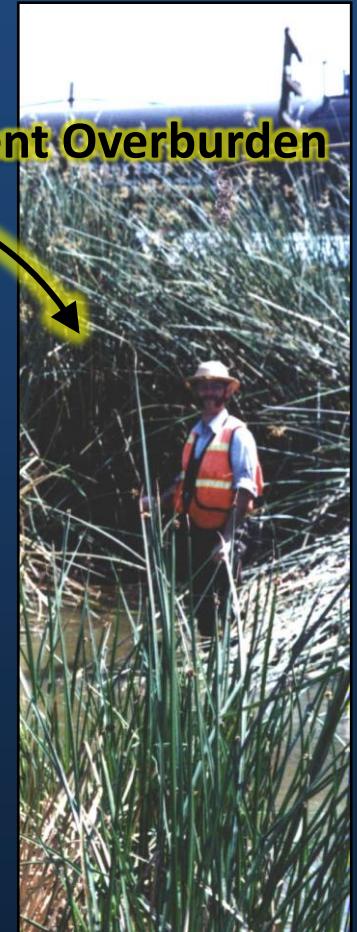


Lack of Tidal Exchange

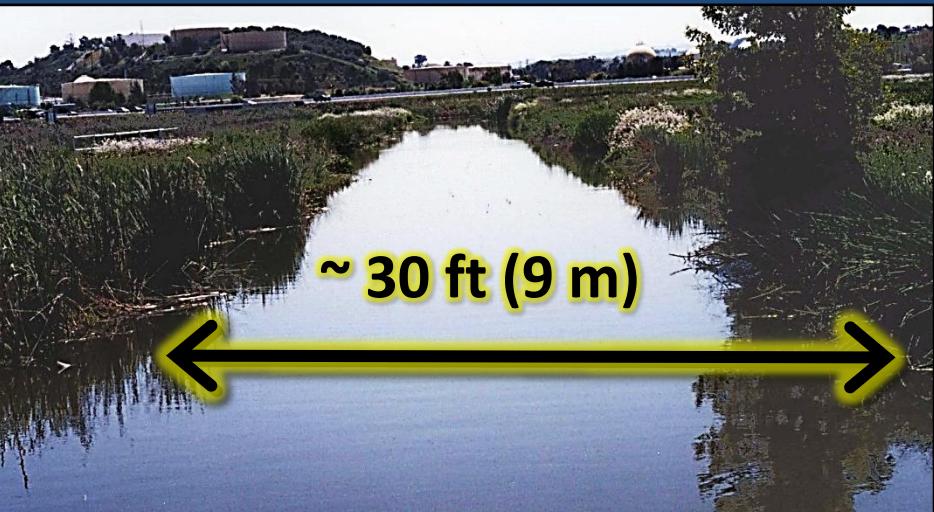
- Berms – slough cannot flood and drain the marsh
- Elevation & slope can limit slough-wetland connectivity



Shallow Petroleum Pipelines



Narrow Railroad Culvert



Lack of Tidal Exchange

- Berms – slough cannot flood and drain the marsh
- Elevation & slope can limit slough-wetland connectivity
- Shallow pipelines and narrow RR culvert reduce flow
 - Sedimentation
 - Vegetation overgrowth



Compounding Issues

- Reduced Flow
 - Sediment Deposition (smaller channel)
 - Vegetation in Channel
 - Reduced Flow...



The berms along the side of Peyton Slough:

- A) Contaminate the adjacent wetland
- B) Enhance the marsh by providing high elevation habitat
- C) Hydrologically disconnect the marsh and slough
- D) Both A and C
- E) Both B and C



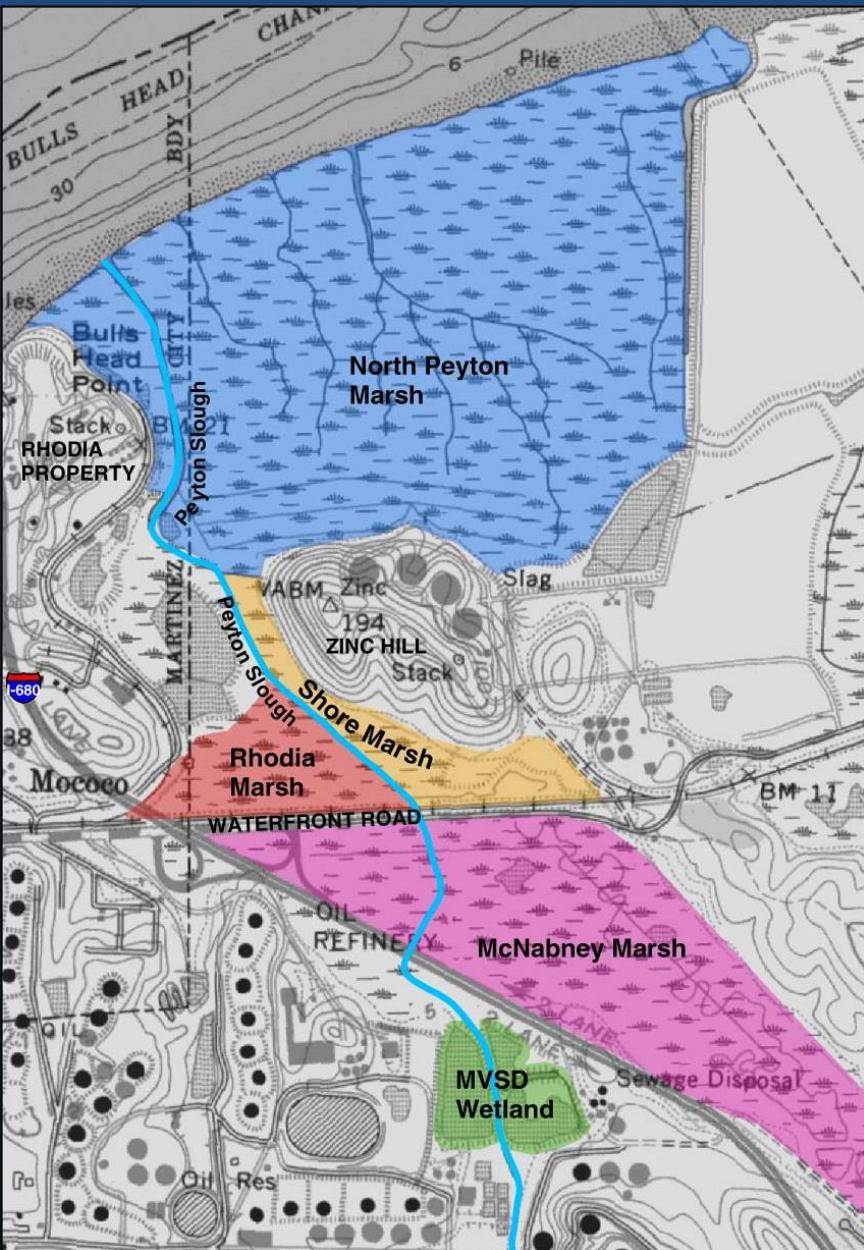
Primary Functions of Peyton Slough

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Urban Infrastructure

- Flood control during high tide and storm events (*tide gate*)
- Mosquito control





McNabney Marsh

Peyton Slough
connects to
McNabney Marsh

Remediation design
must allow salt water
tidal inundation

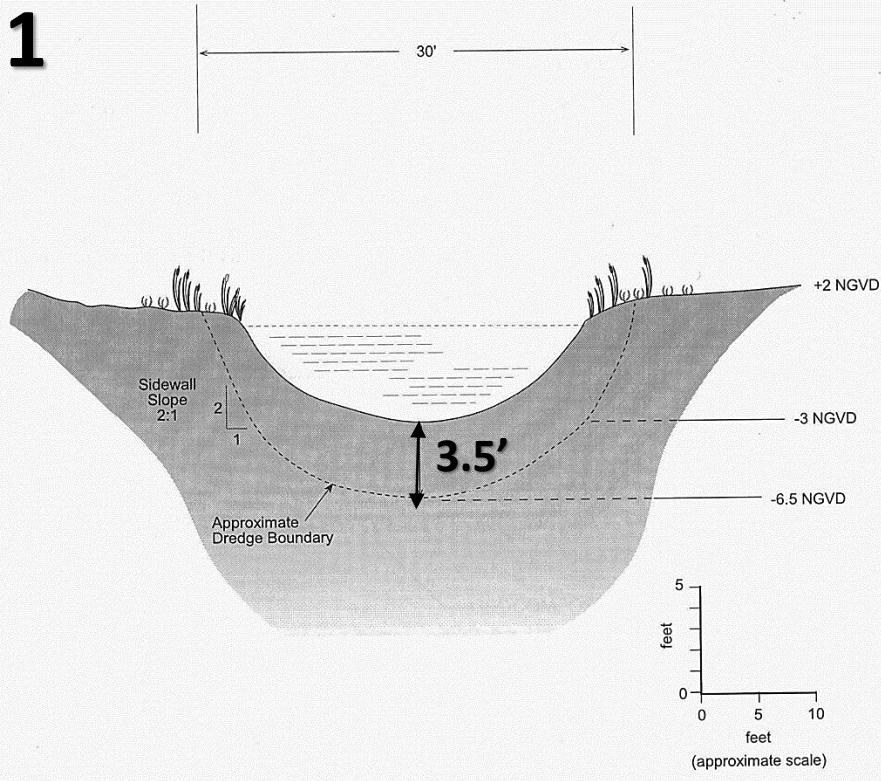
- maintain brackish
wetland ecosystem
- mosquito control

Two Proposed Remediation Designs

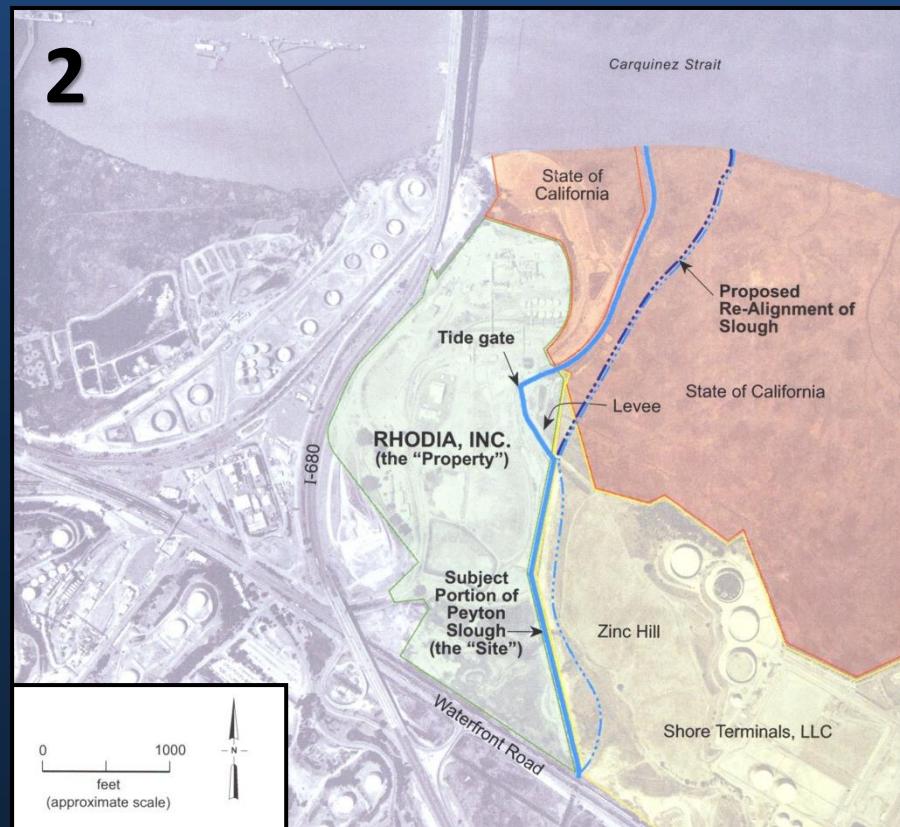
Dredge existing slough and line with an engineered cap

Excavate a new slough alignment and fill existing slough

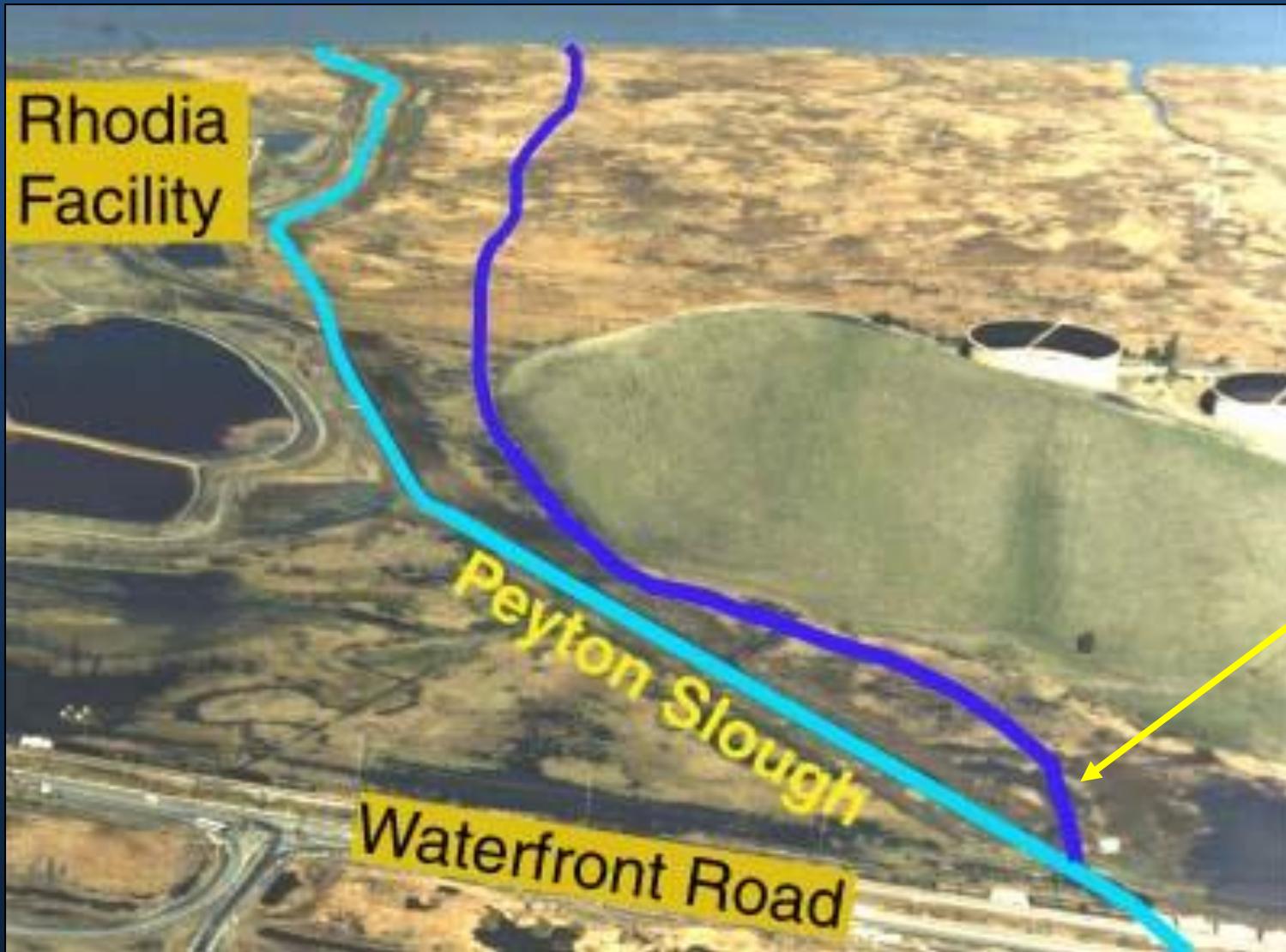
1



2



Selected Remediation Design



Permitting/Lease

- + Project Development

Federal Agencies

- + US Army Corps of Engineers
- + NOAA Fisheries (Nat'l Oceanic & Atmospheric Admin)
- + US Fish and Wildlife Service

State Agencies

- + SFB Water Board
- + CA Dept of Fish and Game
- + CA State Lands Commission

Local Agencies

- + BCDC (SFB Conservation and Development Commission)
- + City of Martinez
Contra Costa County

Involved Parties

- + Contra Costa Mosquito and Vector Control District
- + Mountain View Sanitation District
- + East Bay Regional Park District
- + Audubon
- + Caltrans (CA Dept of Transportation)
- + McNabney Marsh Management Advisory Committee

Private Sector

- + Shore Terminals (adjacent property owner)

Discharger

- + Rhodia, Inc. (international corporation based in France)

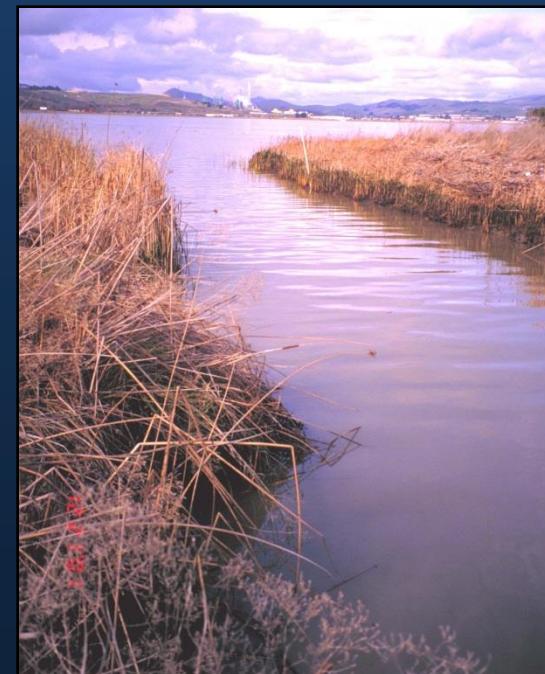
Consultant

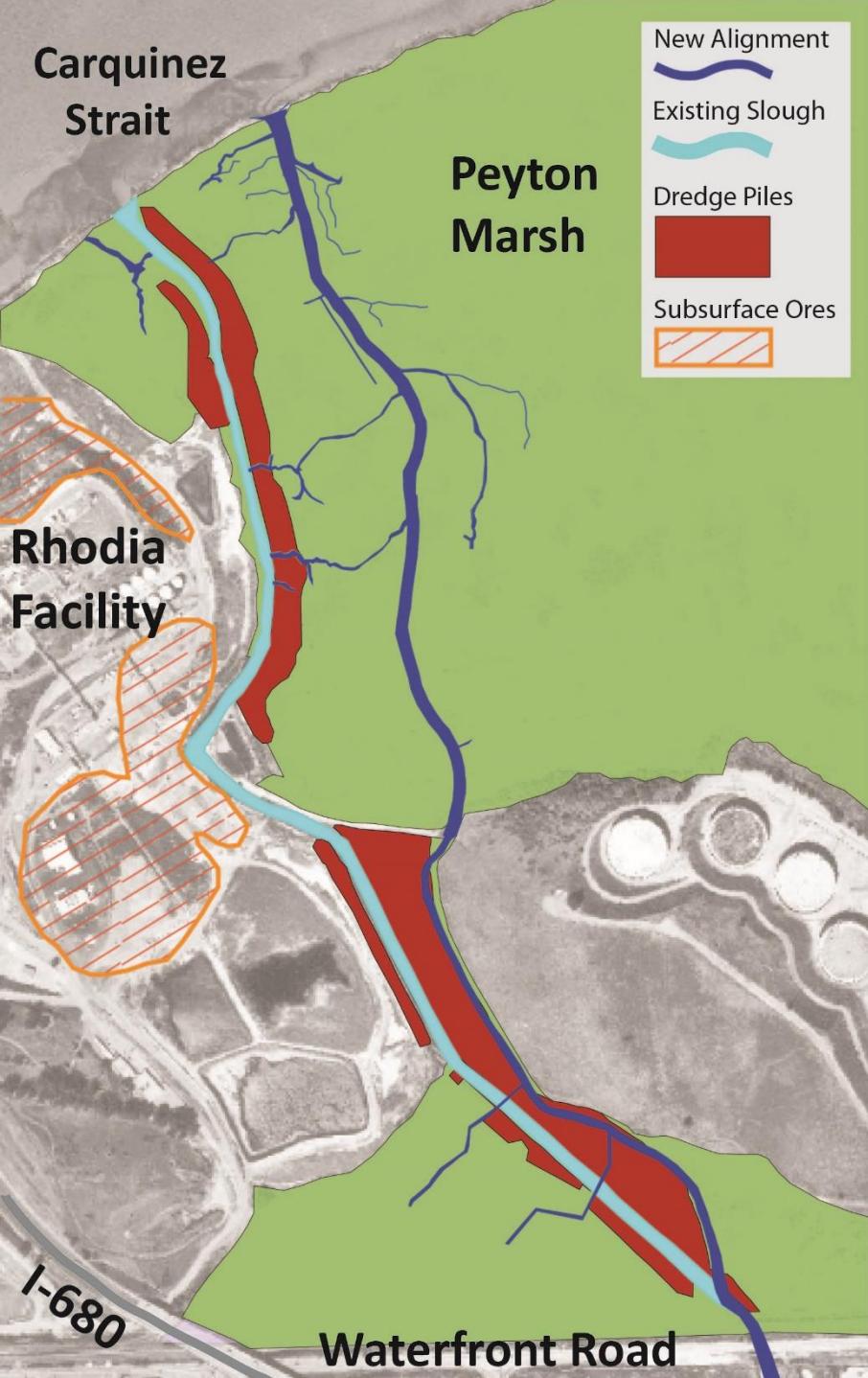
- + URS Corporation



Step-by-Step Summary of Remediation Plan

- 1) Using an already existing drainage...





Step-by-Step Summary of Remediation Plan

- 1) Using an already existing drainage, excavate a new channel

*How to minimize impacts to marsh?

Road Construction



Threatened Animal Species



Clapper Rail/Black Rail



Salt Marsh
Harvest Mouse

Threatened Plant Species



Mason's Lilaeopsis Relocation

Road Construction



In which direction should they excavate?

Excavating New Alignment



Tie-in Point



New Alignment

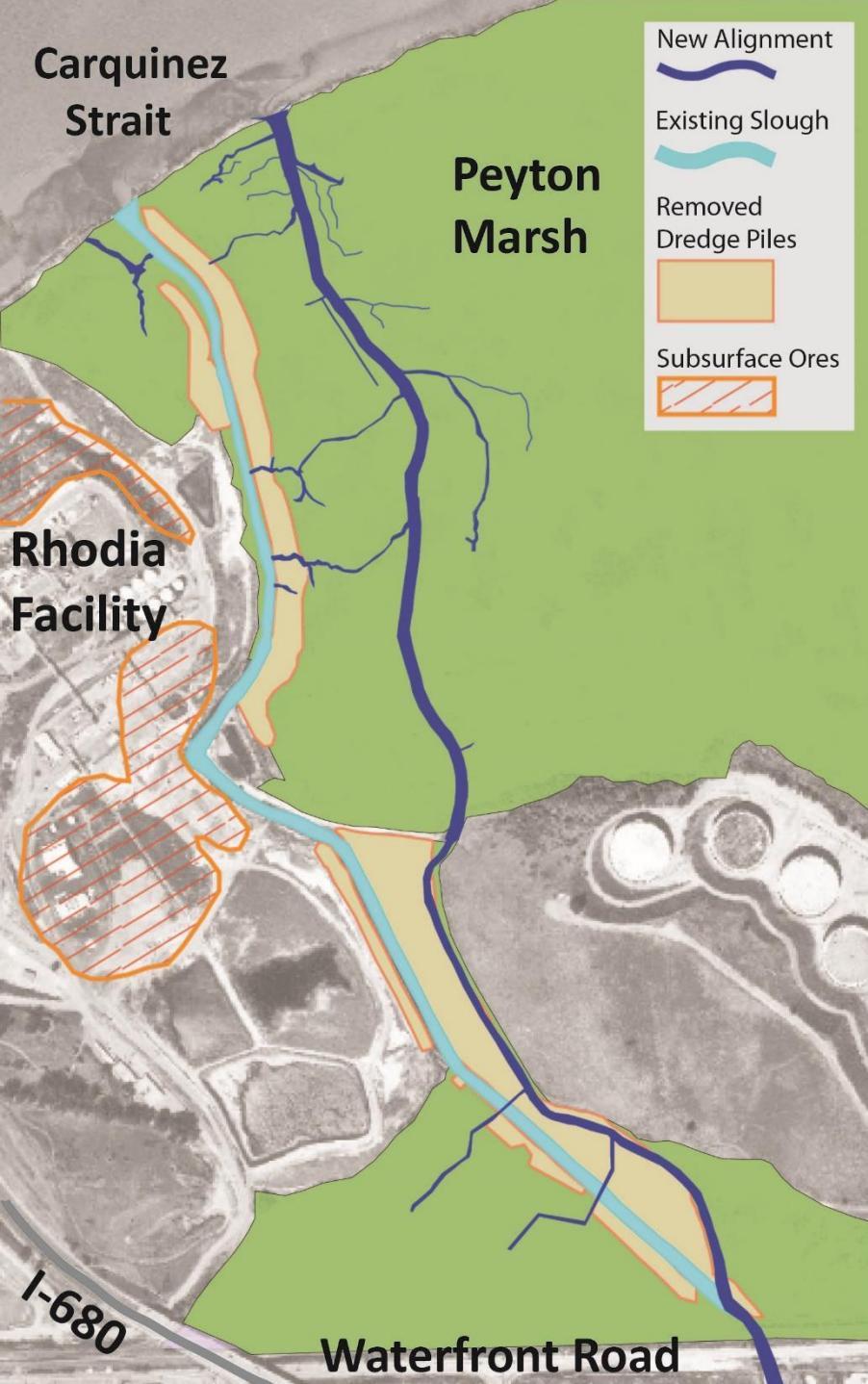


December 2004



What property of Bay Mud helps protect the new alignment from contamination?

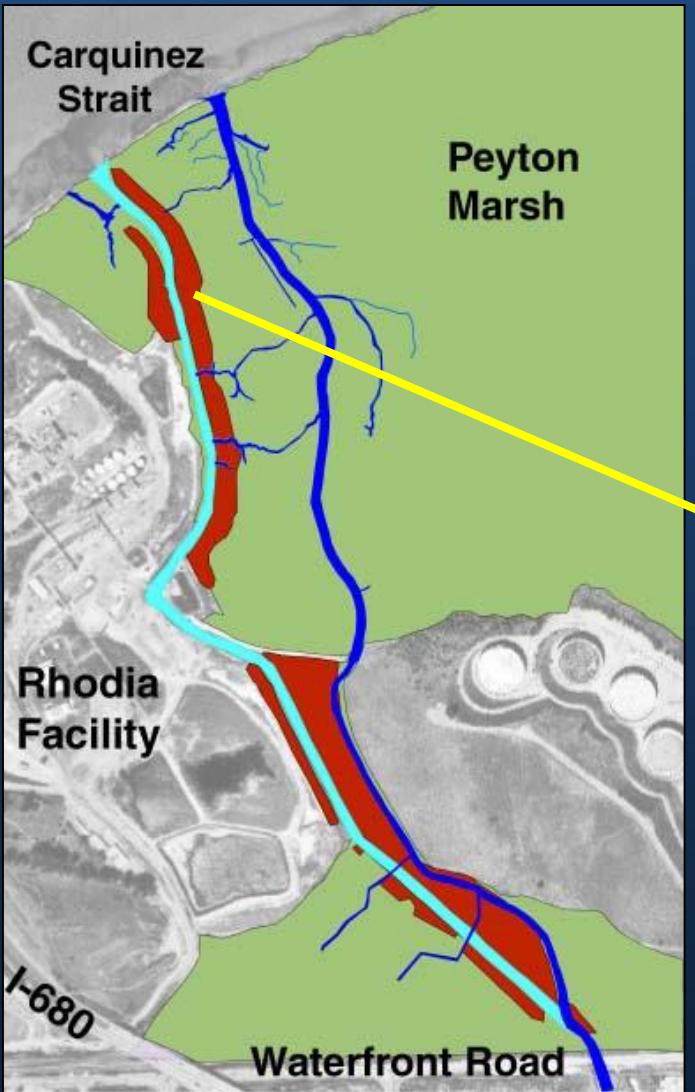
- A) high porosity
- B) large grain size
- C) low hydraulic conductivity
- D) lack of cohesion
- E) fast rate at which vegetation grows on it

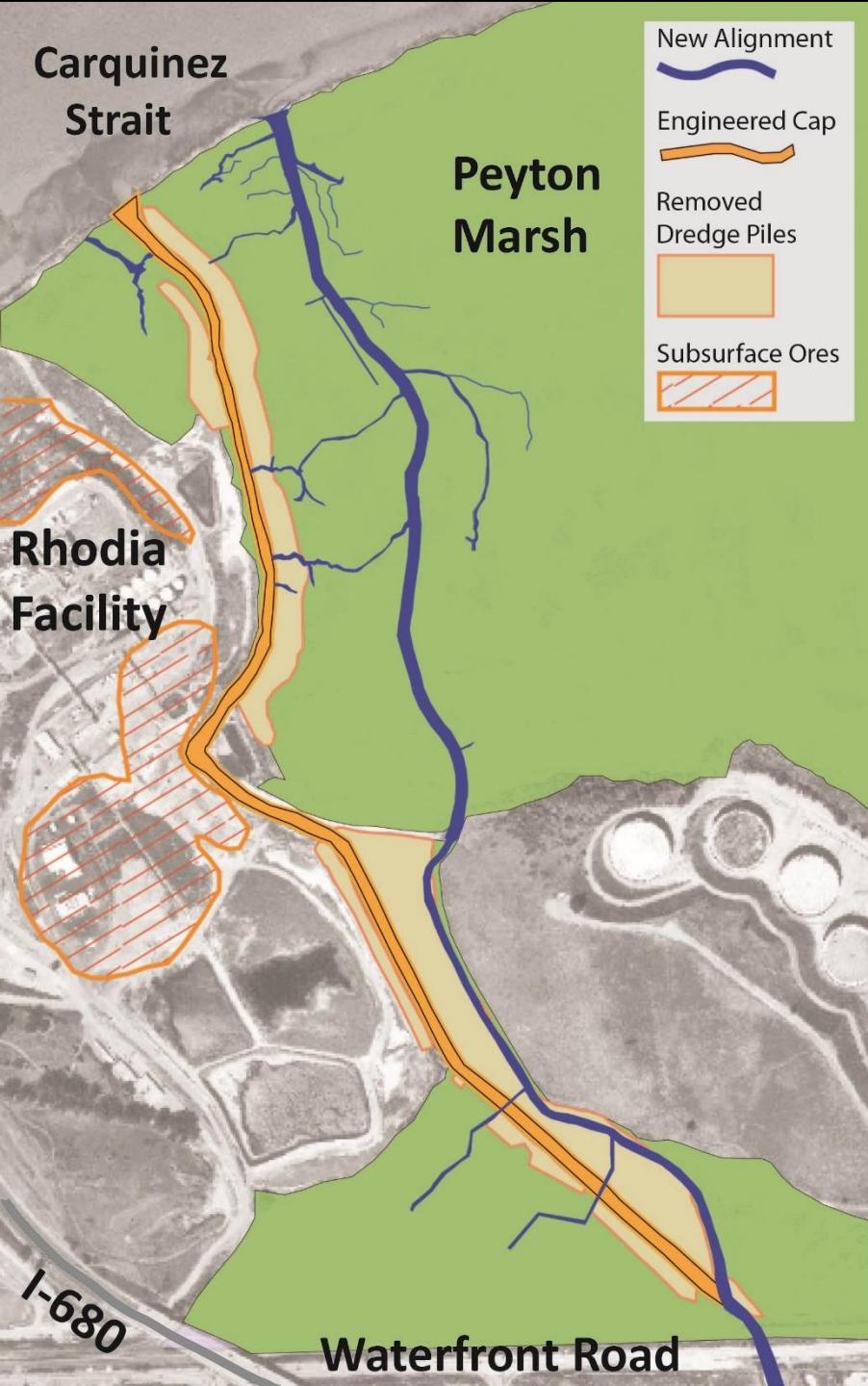


Step-by-Step Summary of Remediation Plan

- 1) Using an already existing drainage, excavate a new channel
- 2) Remove dredge piles

Dredge Pile Removal





Step-by-Step Summary of Remediation Plan

- 1) Using an already existing drainage, excavate a new channel
- 2) Remove dredge piles
- 3) Cap existing slough

Setting Fish Exclusion Zones



Threatened Fish Species



Sacramento Splittail



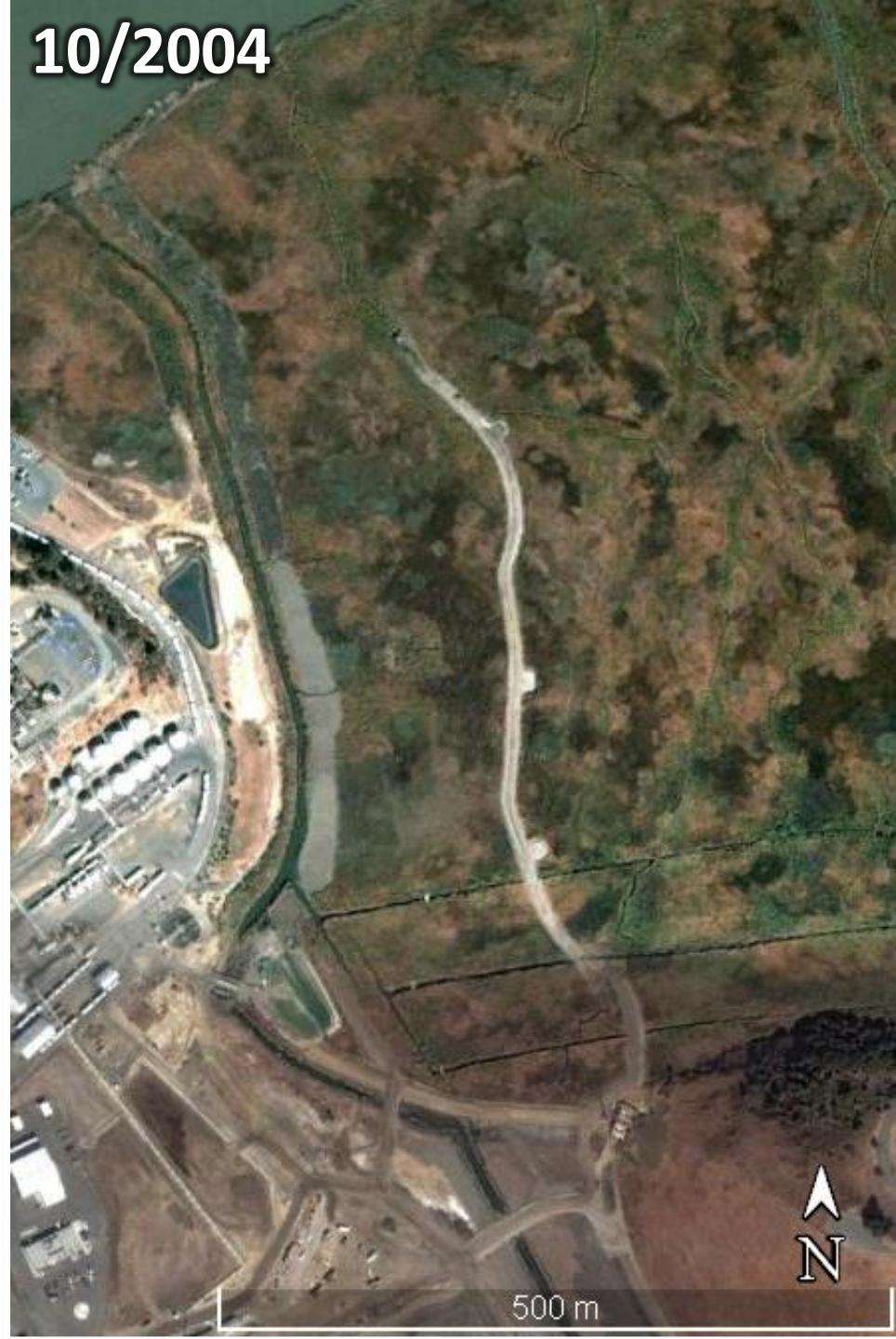
Step-by-Step Summary of Remediation Plan

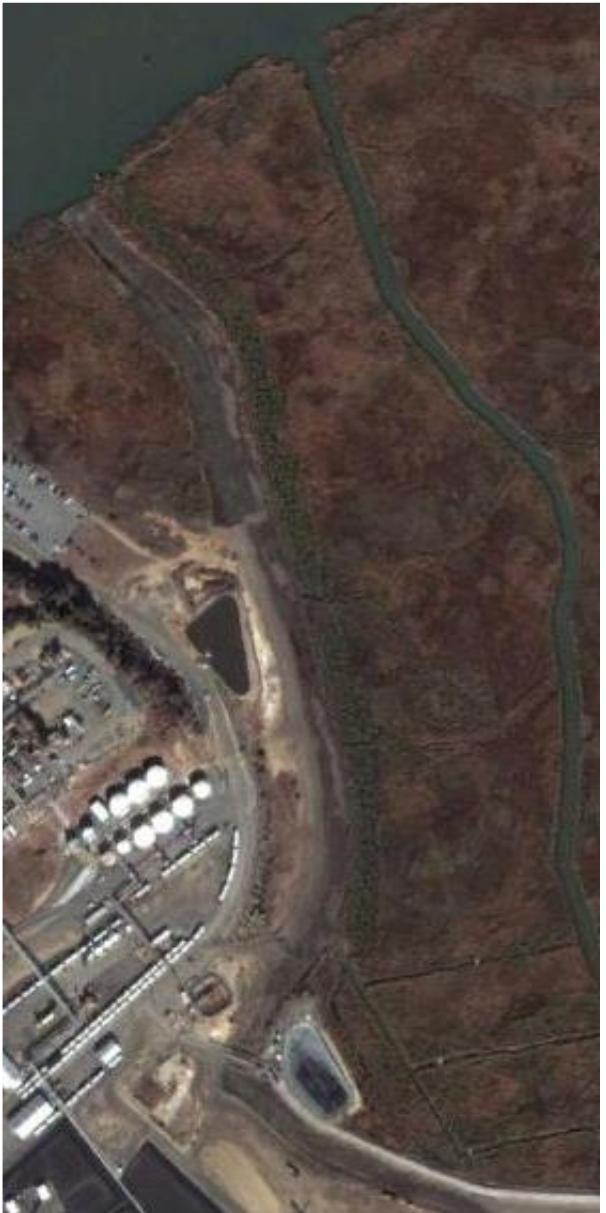
- 1) Using an already existing drainage, excavate a new channel
- 2) Remove dredge piles
- 3) Cap existing slough
- 4) Restore impacted areas to wetland habitat

10/2002



10/2004





10/2005



10/2009



10/2015



Completed Project

Did we meet our
“preserve” and “fix”
goals?

Sacramento Splittail



Benefits

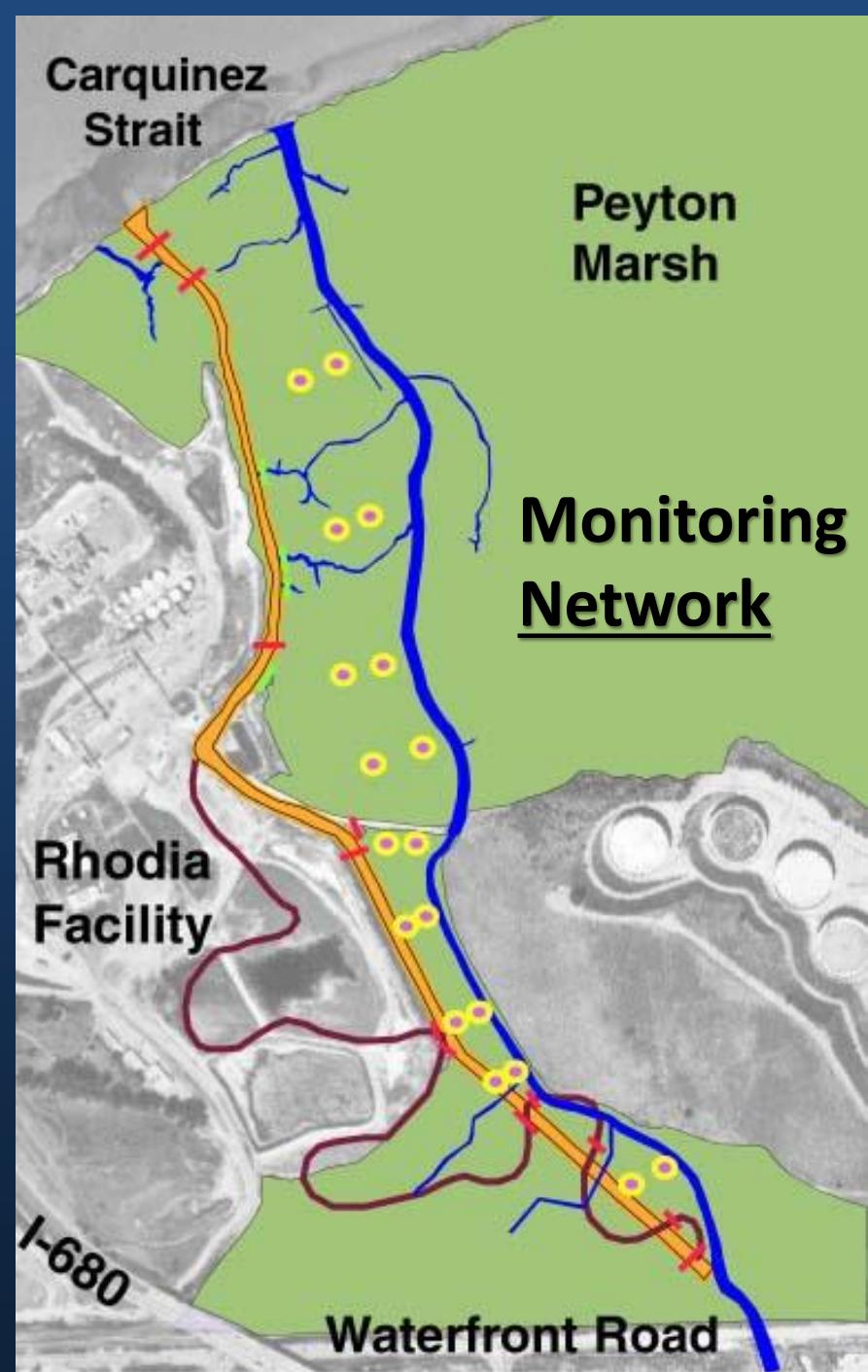
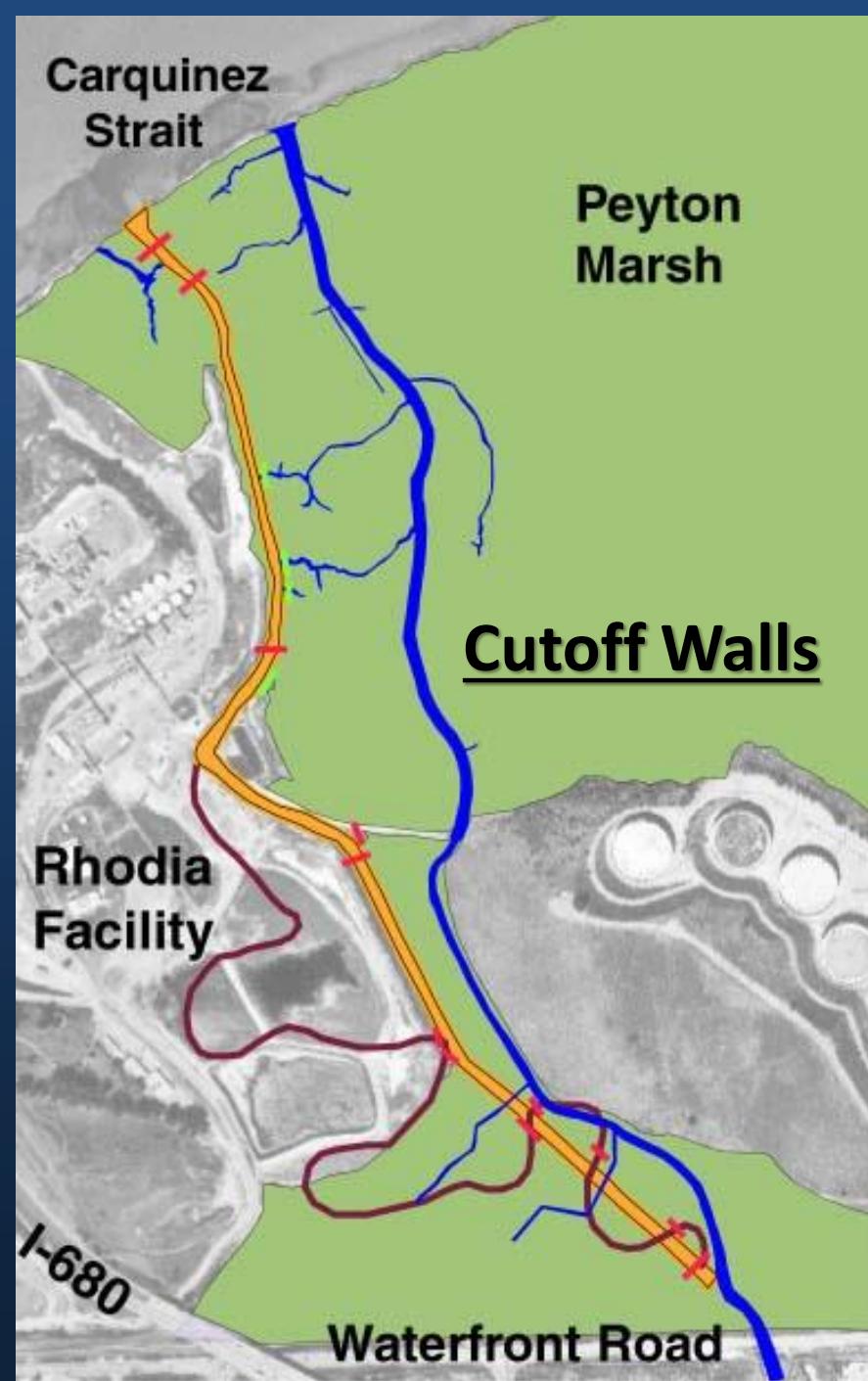
Salt Marsh Harvest Mouse



- Reduced contamination
- Improved hydrologic connection between slough and marsh
 - increased size and sinuosity
 - more side channels
- Created new marsh habitat (5.5 acres)
- Enhanced flood/mosquito control (tide gate and maintenance dredging)

What More is Needed?





Monitoring and Long-term Assurance

- Monitoring for Contaminants of Concern:
 - Copper, Zinc, pH monitored for 10 years
 - Sediment, Water Column, Groundwater
- Monitoring for Habitat
 - Hydrology, sedimentation, vegetation monitored for 10 years

Cost of project = \$30 million

