Lessons Learned From Community-Based Restoration in Transition Zones

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Bay-Delta Science Conference
Sacramento, CA
October 30, 2014

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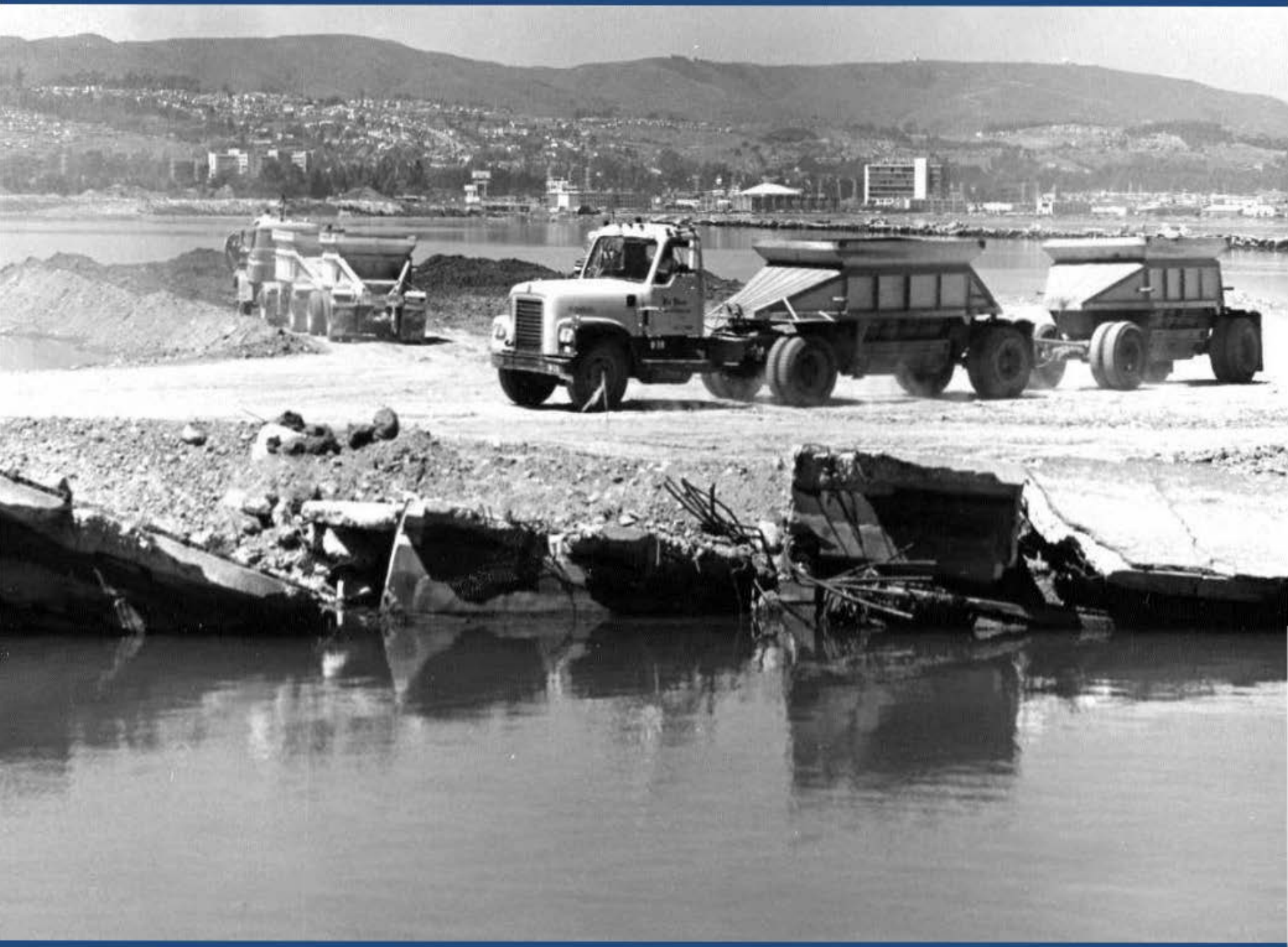

Photo by FoCC
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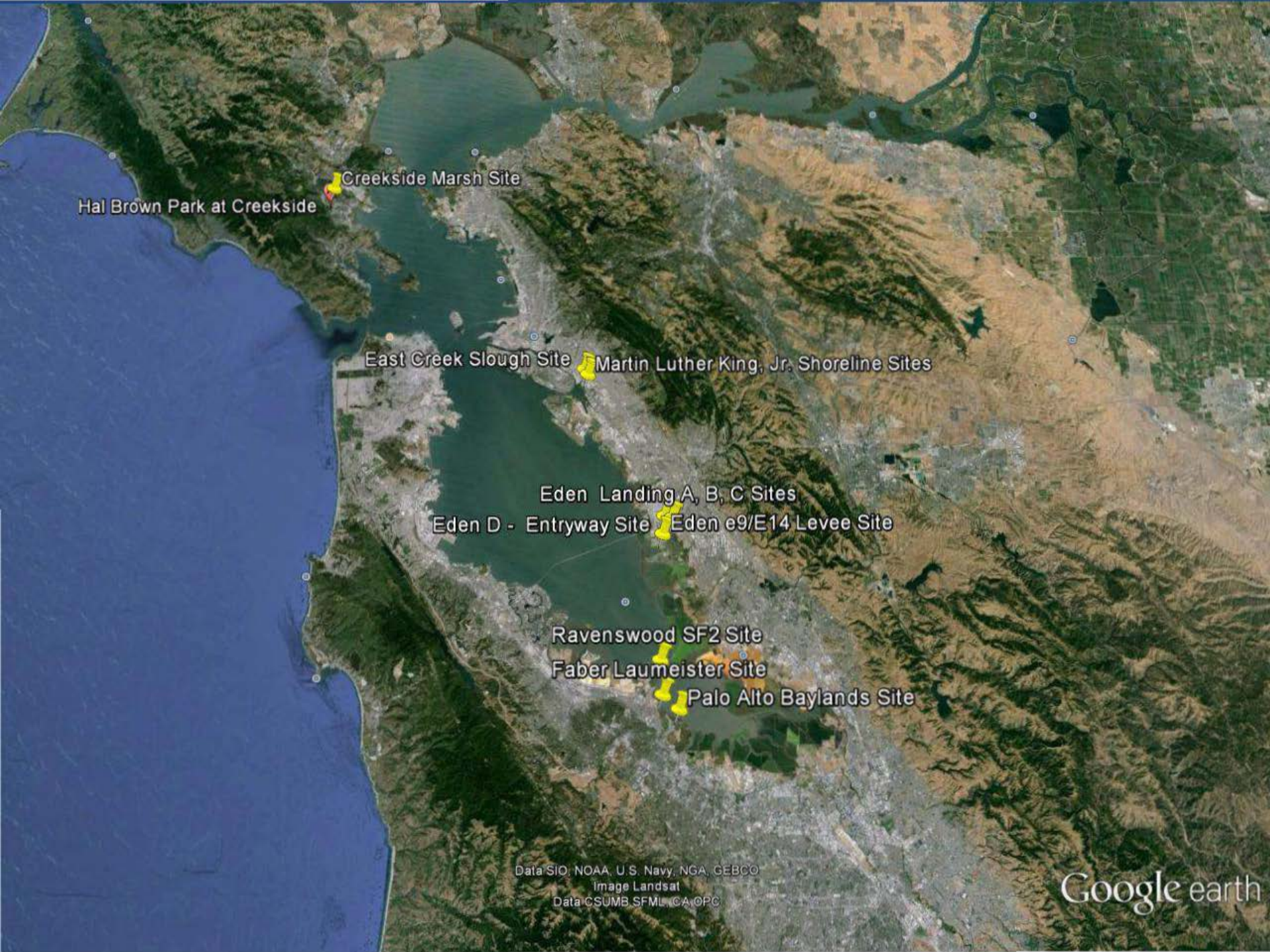
Creekside Marsh Site
Hal Brown Park at Creekside
East Creek Slough Site
Martin Luther King, Jr. Shoreline Sites
Eden Landing A, B, C Sites
Eden D - Entryway Site
Eden e9/E14 Levee Site
Ravenswood SF2 Site
Faber Laumeister Site
Palo Alto Baylands Site
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
Data CSUMB SFML, CA OPC
Google earth

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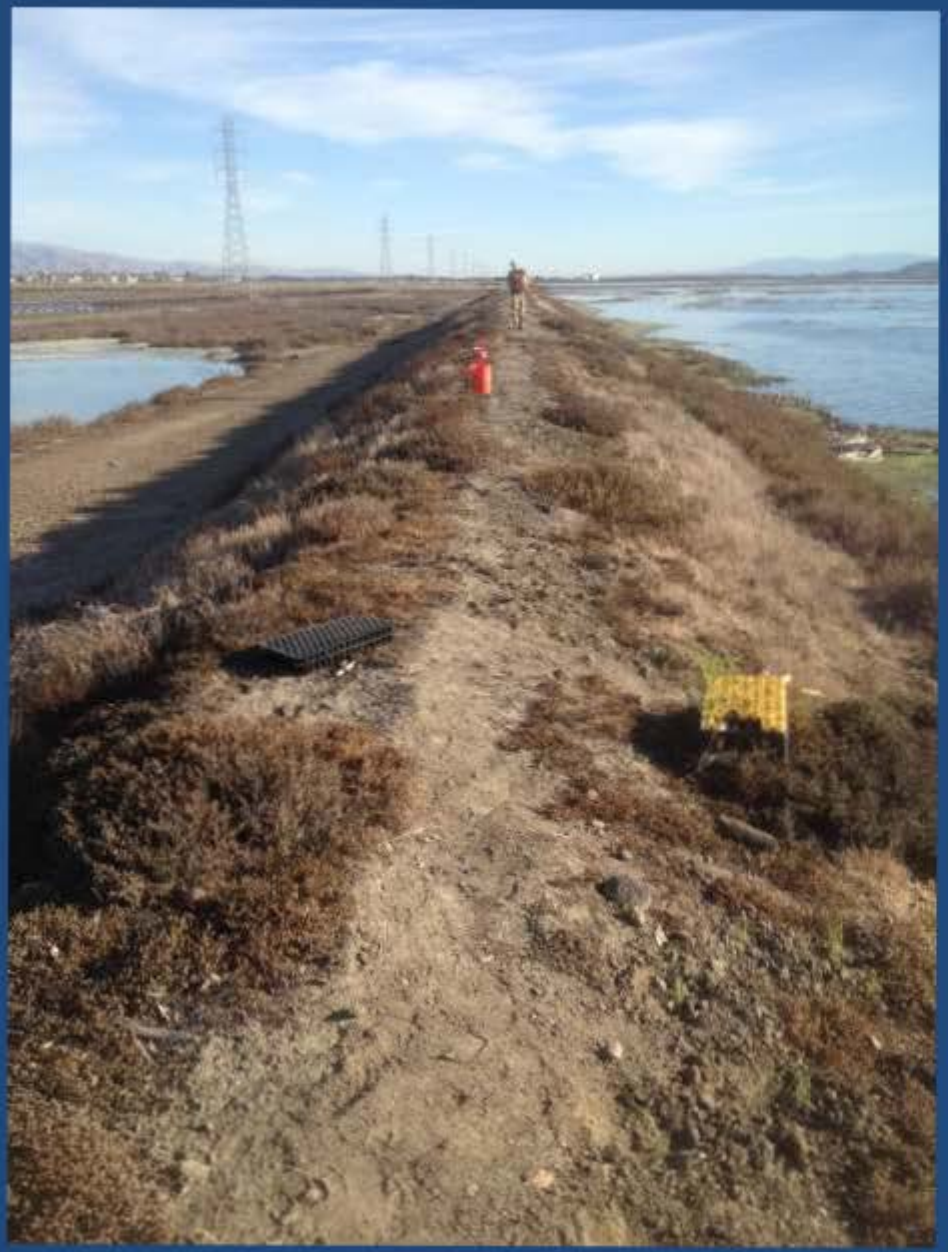
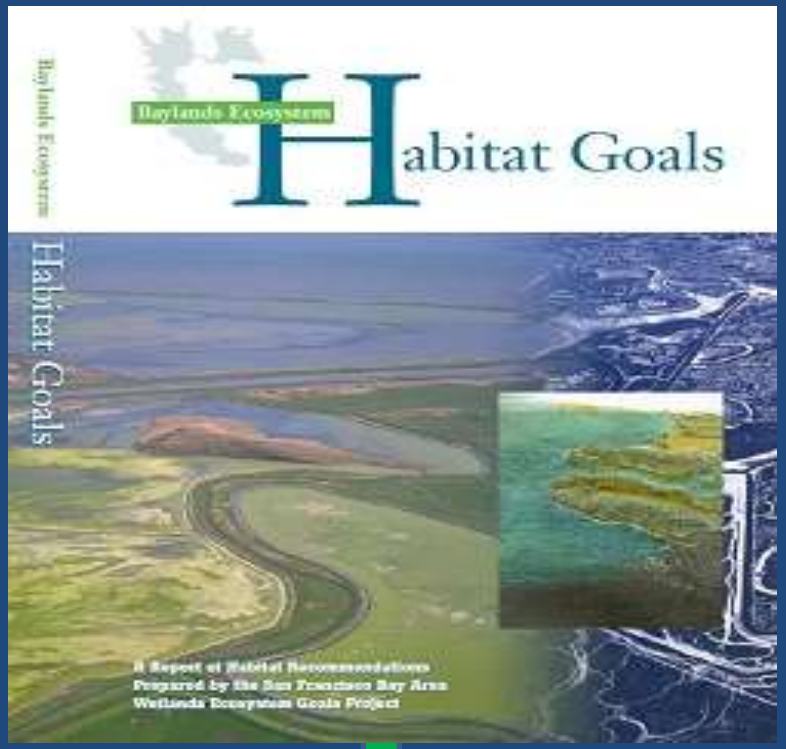




Transition Zones

Climate Change

Baylands Ecosystem Habitat Goals Update

BEHGU Transition Zones!!!

What is a Transition Zone?

Zone blending adjacent habitats across a broad area.

“….the gradient between terrestrial and tidal marsh habitats “(Baye 2008)

Recommended Definition

Area of existing and predicted future interactions among tidal and terrestrial or fluvial processes that result in habitat mosaics, assemblages of plant and animal species, and sets of ecosystem services that are distinct from those of adjoining estuarine, riverine, or terrestrial ecosystems.

Three Main Principles

- T-zone is delimited by the existing *and likely future* landward effects of the tides on fluvial and terrestrial conditions, and the bayward effects of runoff on intertidal conditions.

- T-zone exists all around the Bay and along the tidal reaches of tributary rivers and streams.

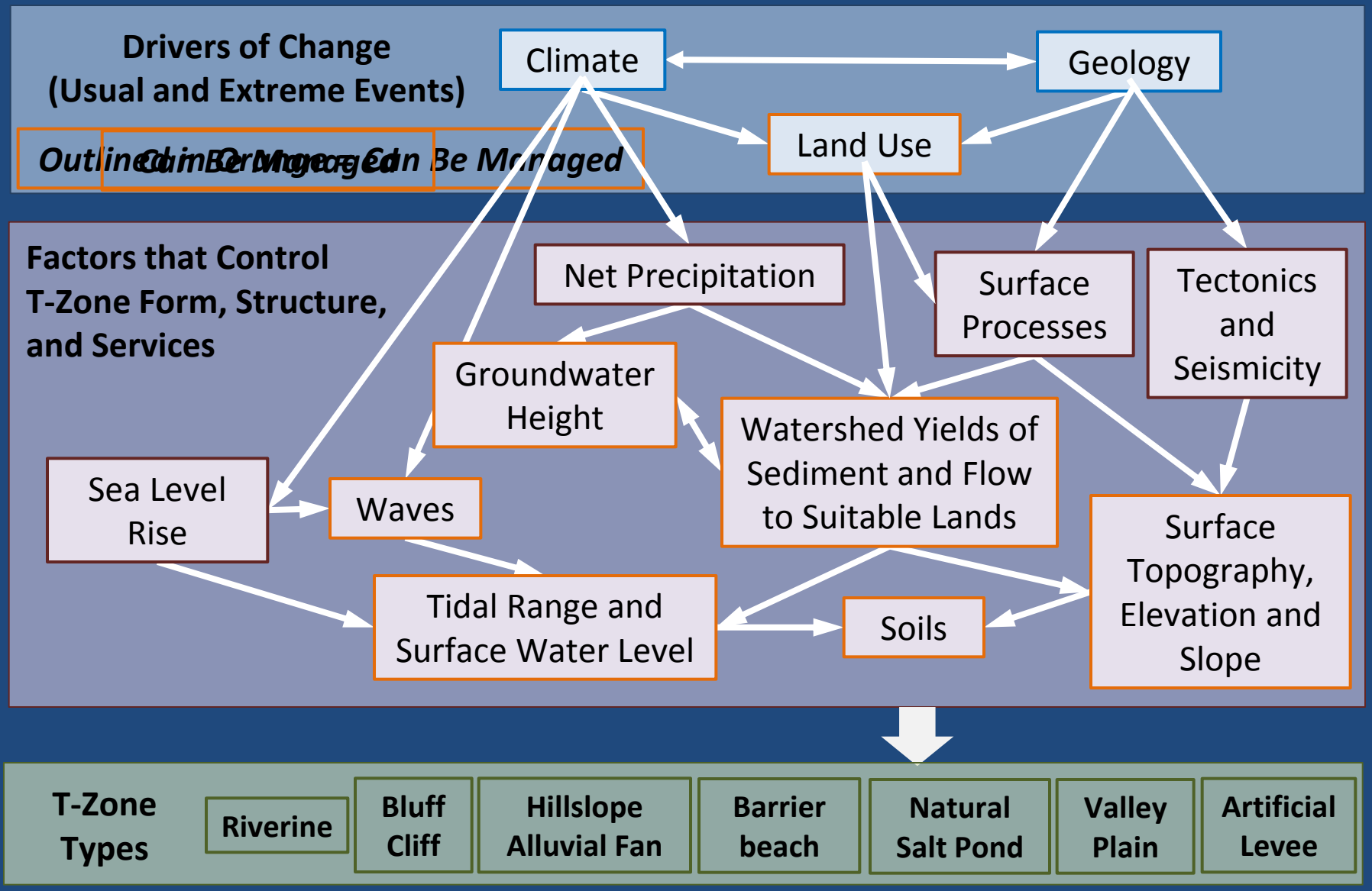
- At any given setting, T-zone width varies with ecosystem service. In other words, services determine width.

Historical Perspective

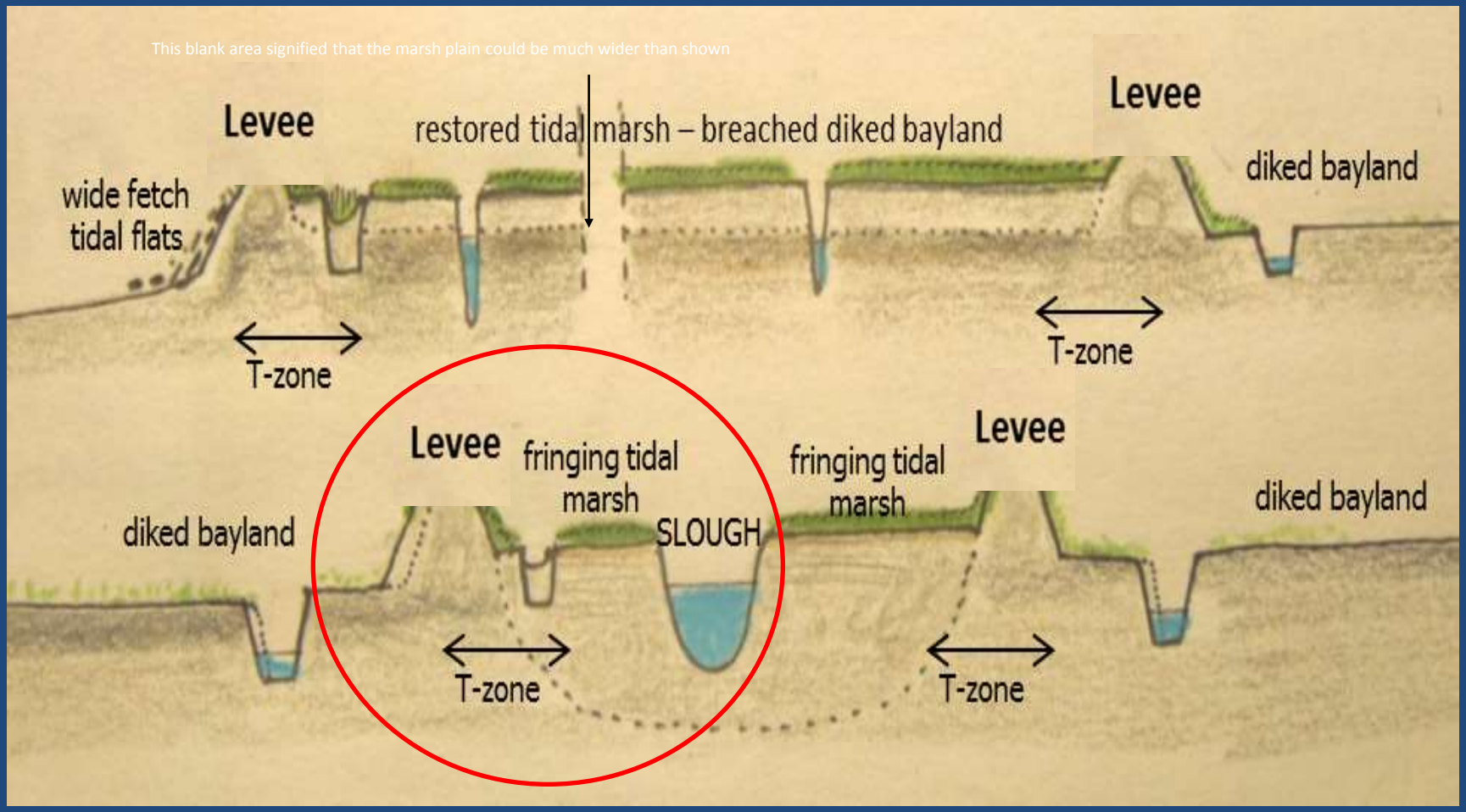
"First there was the great salt marsh, with all its winding sloughs and creeks, covered with samphire grass [*Salicornia*] and tufts of Grindelia; next was a line of natural salt pan; next again was a strip of land of varying width, from a few hundred yards to one fourth mile, with a short wiry hard grass [*Distichlis*]…" (Beardsley, in Cooper 1926)

In Beller et al. 2013 (SFEI)

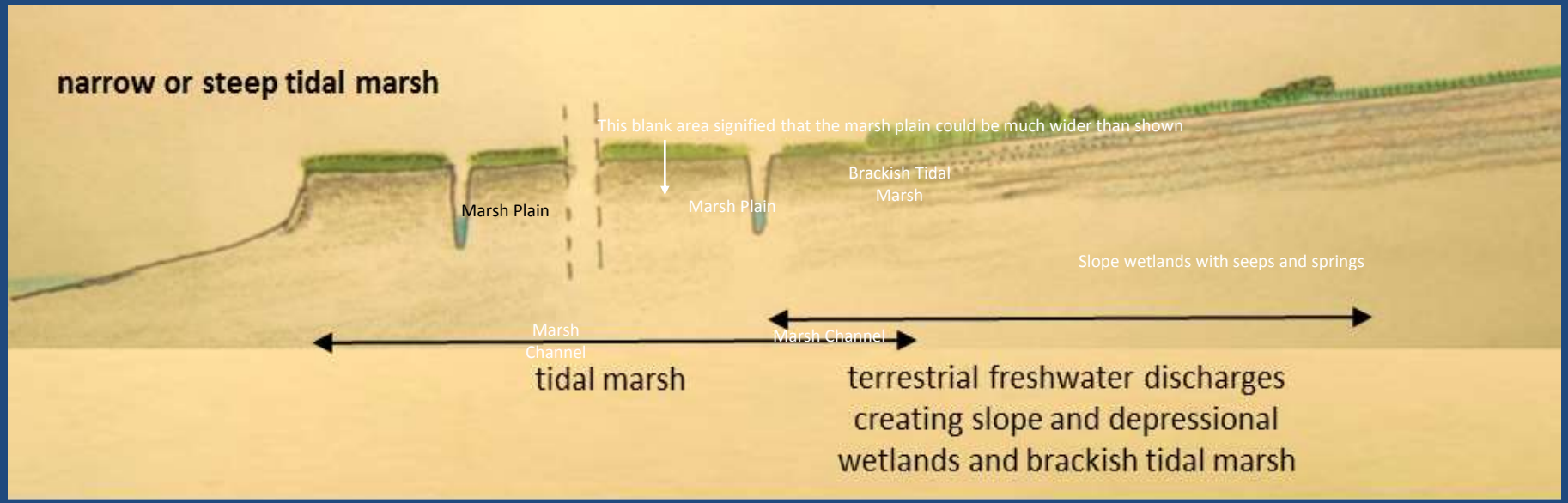
Conceptual Model of Formative Processes

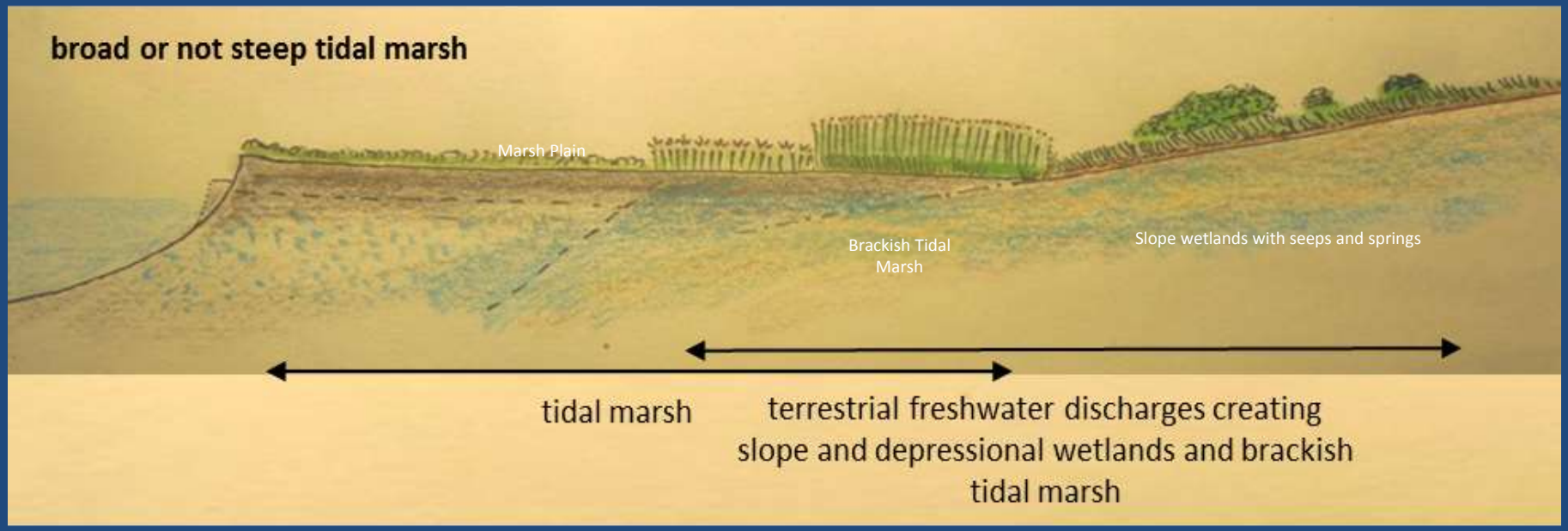


Artificial Levee



Hillslope or Alluvial Fan and Valley or Plain





California Vole

Salt Marsh Wandering Shrew

Song Sparrow. Photo from PBCS by Tom Grey.

California Black Rail

Salt Marsh Common Yellowthroat

Savannah Sparrow

Western Harvest Mouse

Ecosystem Services

Buffering	Pollution Control
	Non-native Invasion Control
	Erosion Control
Flood Control	
Sea Level Rise Accommodation	
Nutrient Processing	
Groundwater Recharge	
Biological Diversity Support	Refuge and Predation
	Wildlife Movement
	Evolutionary Adaptation
	Landscape Complexity
Cultural Support	
Carbon Sequestration	

3 Key Attributes

T-zone extends landward and bayward of backmarsh.

T-zone adjoins the entire intertidal area of the Bay.

T-zone varies in width depending on ecosystem service.

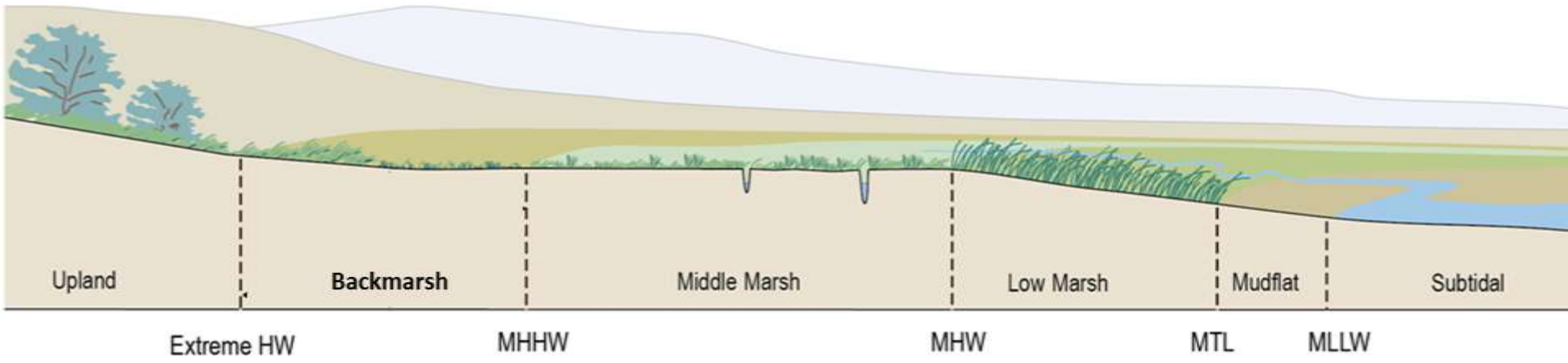
Service-based Sub-zones

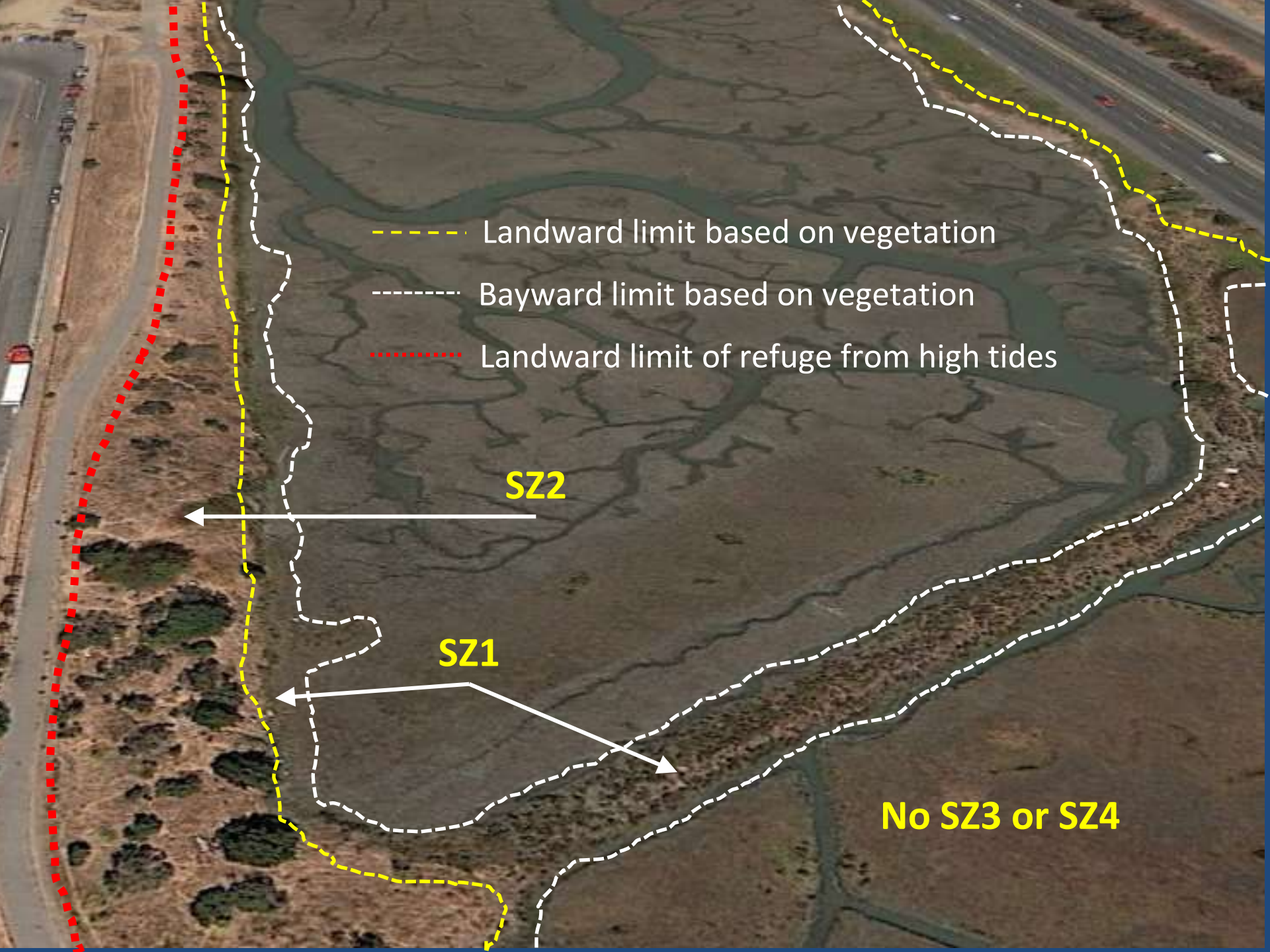
SZ4: SLR Accommodation, Groundwater Recharge , Cultural Support, Carbon Sequestration

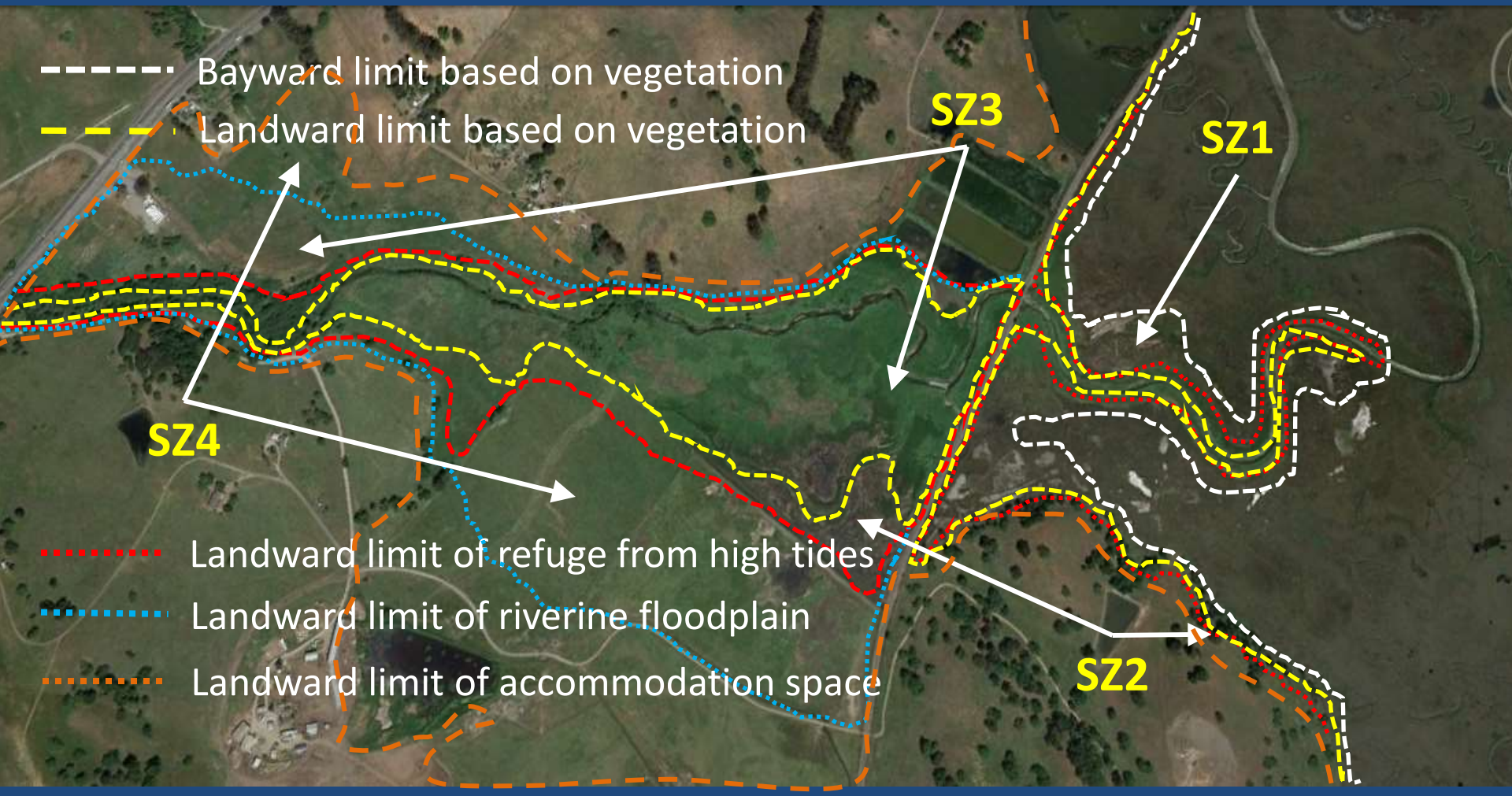
SZ3: Flood Control, Groundwater Recharge, Buffering, SLR Accommodation, Carbon Sequestration

SZ2: Wildlife Refuge, Cultural Support, Evolutionary Adaptation, Buffering

SZ1: Evolutionary Adaptation , Nutrient Processing, Buffering, Carbon Sequestration




Landward limit based on vegetation
Bayward limit based on vegetation
Landward limit of refuge from high tides
SZ2
SZ1
No SZ3 or SZ4


Bayward limit based on vegetation
Landward limit based on vegetation
SZ3
SZ1
SZ4
Landward limit of refuge from high tides
Landward limit of riverine floodplain
Landward limit of accommodation space
SZ2

Maximum extent of T-zone
based on S1-4 services

Recommendations

- Protect as much sustainable, high priority existing and potential T-zone areas as possible
- Manage existing T-zone areas to enhance their ecosystem services
- Build T-zone areas into intertidal restoration and compensatory mitigation projects
- Consider adjusting public policies to permit filling shallow areas of the Estuary where the T-zone is ecologically critical and no other means of creation are feasible

Eden Landing

Eden Landing

Eden Landing

Summer 2013

E9/E14 Levee

Blue-eyed grass

Marsh baccharis

Salt grass

Creeping wild rye

Pacific aster

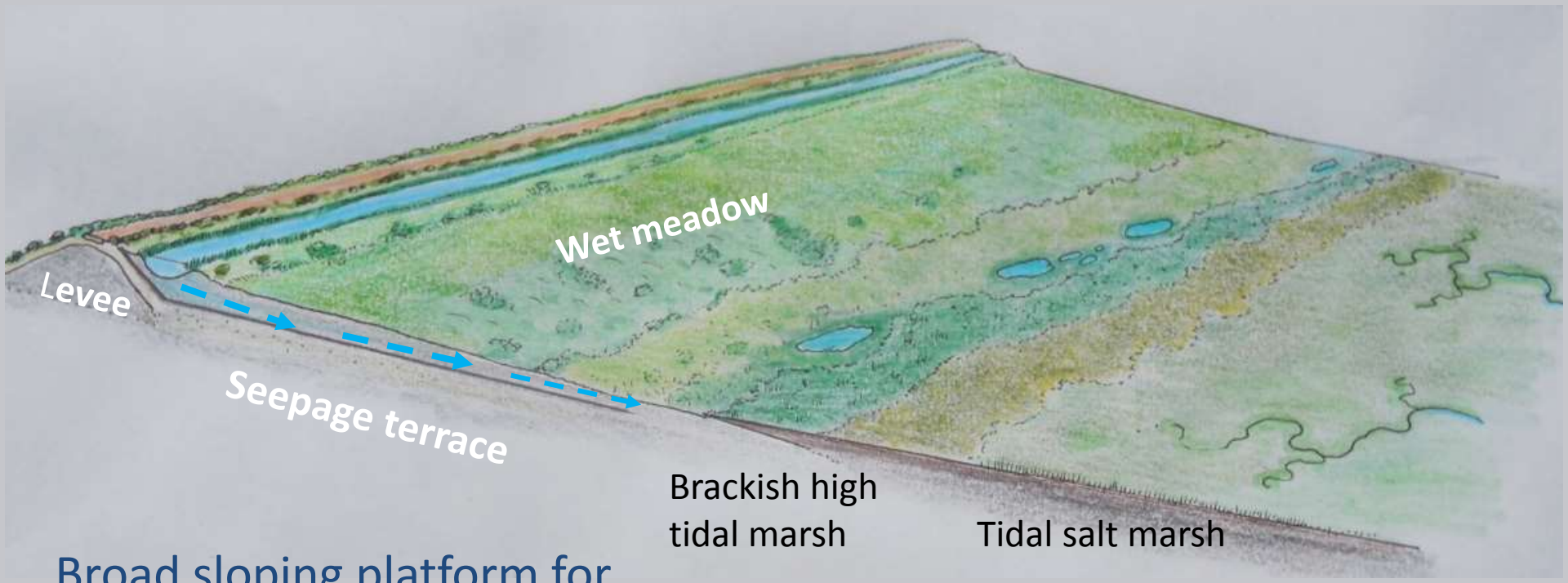
Marsh gumplant

Marsh goldenrod

Alkali heath

Seaside arrowgrass

Transition Zone Slope



Broad sloping platform for fringing high marsh migration with sea level rise

Freshwater seepage buffers high marsh hypersalinity during droughts

ABAG ASSOCIATION OF BAY AREA GOVERNMENTS
SAN FRANCISCO ESTUARY PARTNERSHIP
ORO LOMA SANITARY DISTRICT
CVSan
EBDA EAST BAY DISCHARGERS AUTHORITY
ESA PWA

NOAA
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U.S. DEPARTMENT OF COMMERCE

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East Bay Regional Park District

WCB
State of California
Wildlife Conservation Board

Restore America's Estuaries
Saving Our Coastal Heritage

National Fish and Wildlife Foundation

CITY OF PALO ALTO
CALIFORNIA

Santa Clara Valley Water District

WOODSIDE - ATHERTON GARDEN CLUB

U.S. FISH & WILDLIFE SERVICE

CALIFORNIA CONSERVATION

Coastal Conservancy

South Bay Salt Pond Restoration Project
Restoring the Wild Heart of the South Bay

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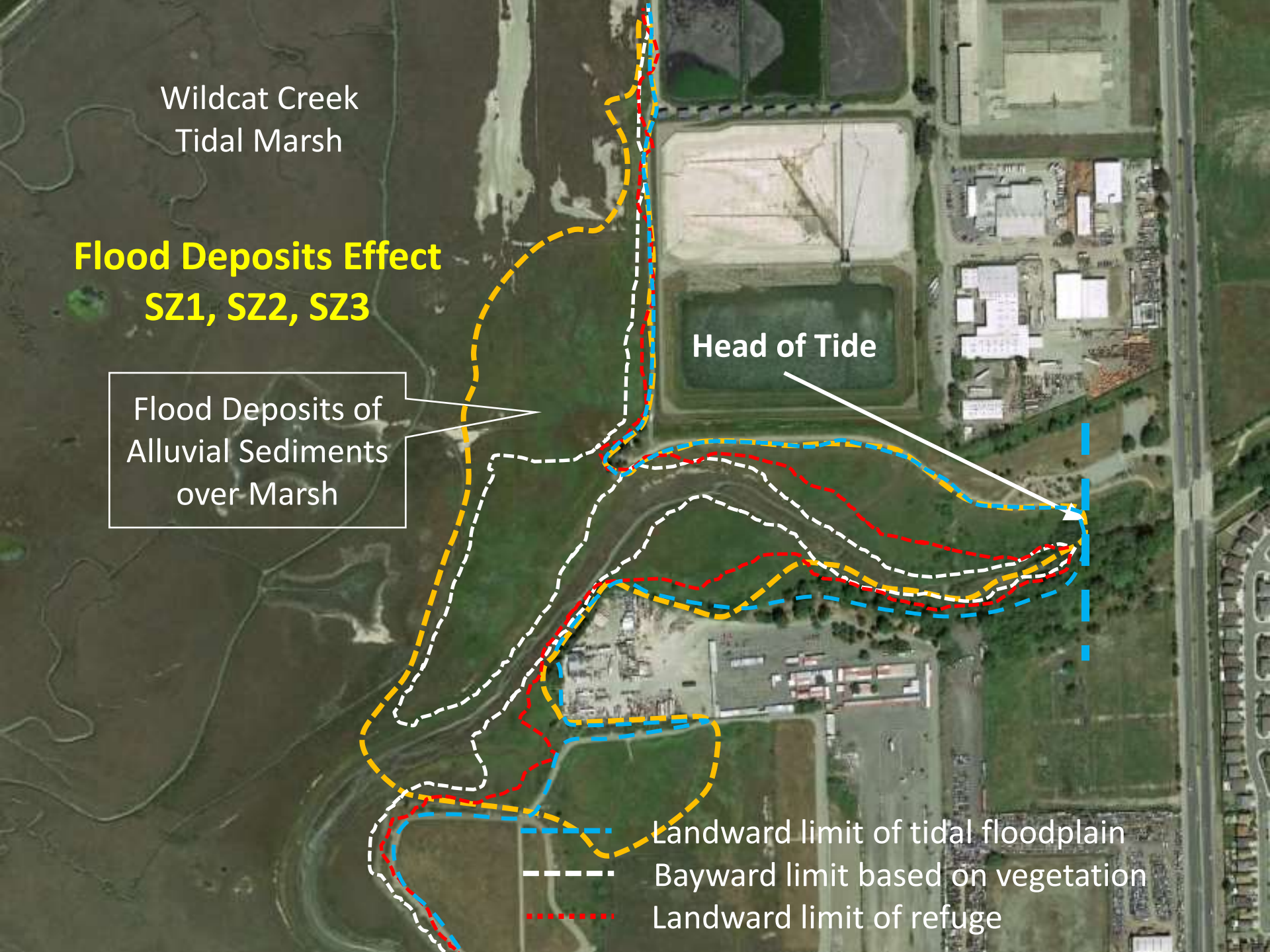
ESA PWA

Thank You!

Extra Slides

/30/2007
Head of Tide
No SZ3 or SZ4
SZ1 and SZ2
Flood Deposits of Alluvial Sediments Creating Marsh
Landward limit of refuge from high tides
Bayward limit based on vegetation


Wildcat Creek
Tidal Marsh
Flood Deposits Effect
SZ1, SZ2, SZ3
Flood Deposits of
Alluvial Sediments
over Marsh
Head of Tide
Landward limit of tidal floodplain
Bayward limit based on vegetation
Landward limit of refuge

- Recognize that change is ahead
- Look at new, creative solutions
- Experiment, evaluate, and re-design to inform the future
- Collaborate despite differences
- Evaluate the use of hardscape versus natural solutions (levees vs. marshes)
- Combine solutions (if necessary)
- Challenge existing paradigms
- Look at new/different land uses

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Narrative Description of Natural Physical Condition and Setting

- *Landscape position*
- *General description*
- *Substrate*
- *Hydrology*
- *Terrestrial vegetation types at tidal marsh edge*

Not only endangered species……

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Song Sparrow. Photo from PBCS by Tom Grey.

California Black Rail

Salt Marsh Wandering Shrew

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Related Definitions

Baylands: *all intertidal areas plus the areas that would be tidal if not for levees, sea walls, tide gates, and other water control structures*.

Backmarsh: *the area between Mean Higher High Tide (MHHT) and the landward limit of the highest tide of the 19-yr tidal epoch.*

Ecosystem Service: *the processes of ecosystems and their material and energy outputs that benefit people.*

Indicative Habitat Elements

Wrack and other debris between SZ1 and SZ2

Indicative Habitat Elements

Brackish plants near landward edge of SZ1

Indicative Habitat Elements

Pans in SZ1

Oro Loma Demonstration Project

Indicative Habitat Elements

Habitat types of SZ1-4 on alluvial fan

Freshwater Marsh

Brackish Marsh

Willows