South Bay Salt Pond Restoration Project

Restoring the Wild Heart of the South Bay

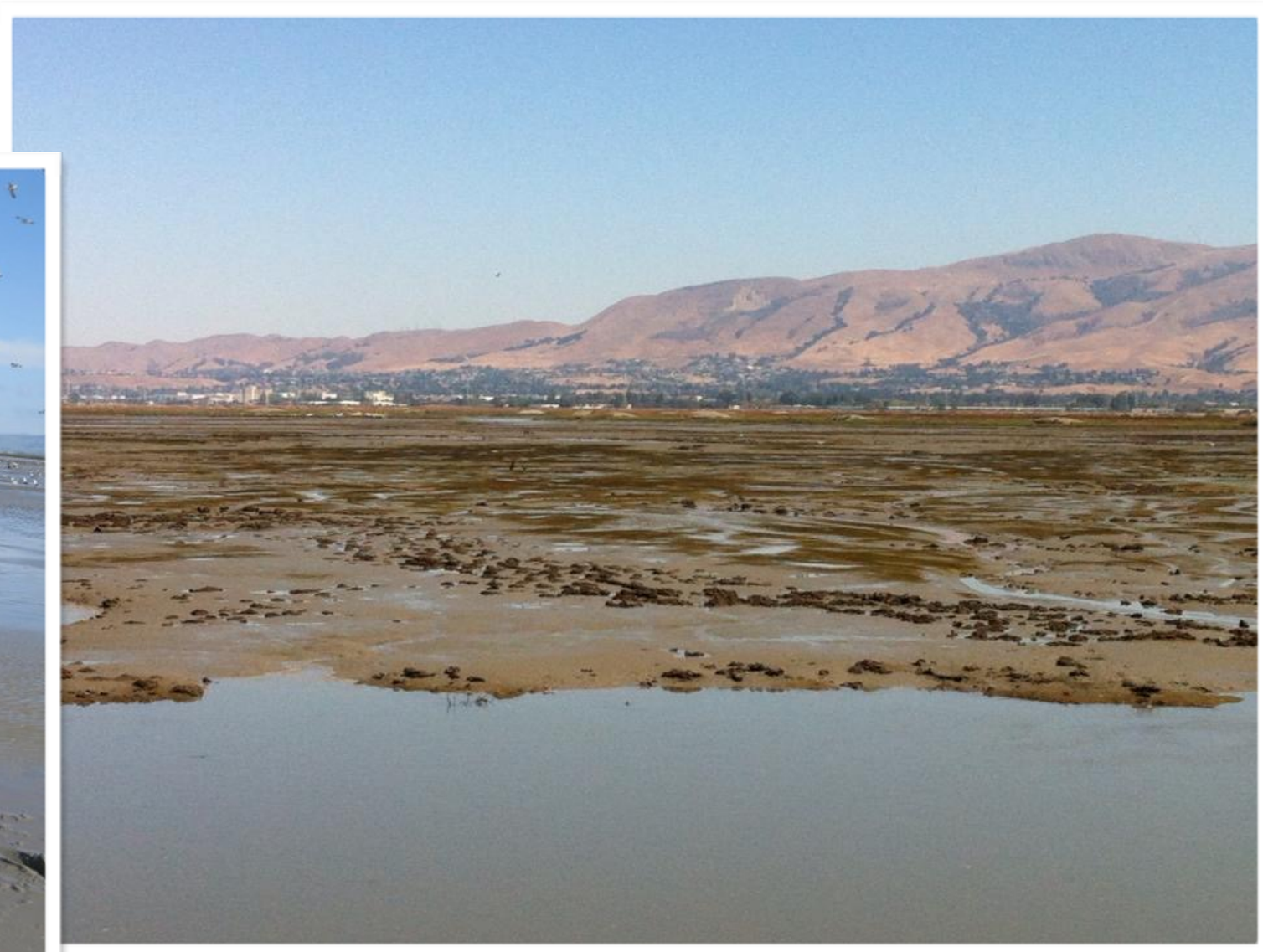
2015 Science Symposium

Adaptive Management Response: **Sediment Dynamics**

Anne Morkill
U.S. Fish & Wildlife Service
San Francisco Bay National Wildlife Refuge Complex

Breaching a levee is the “easy” part…

Sediment accretion is vital to maintaining mudflat habitat and restoring tidal marsh in formerly diked ponds

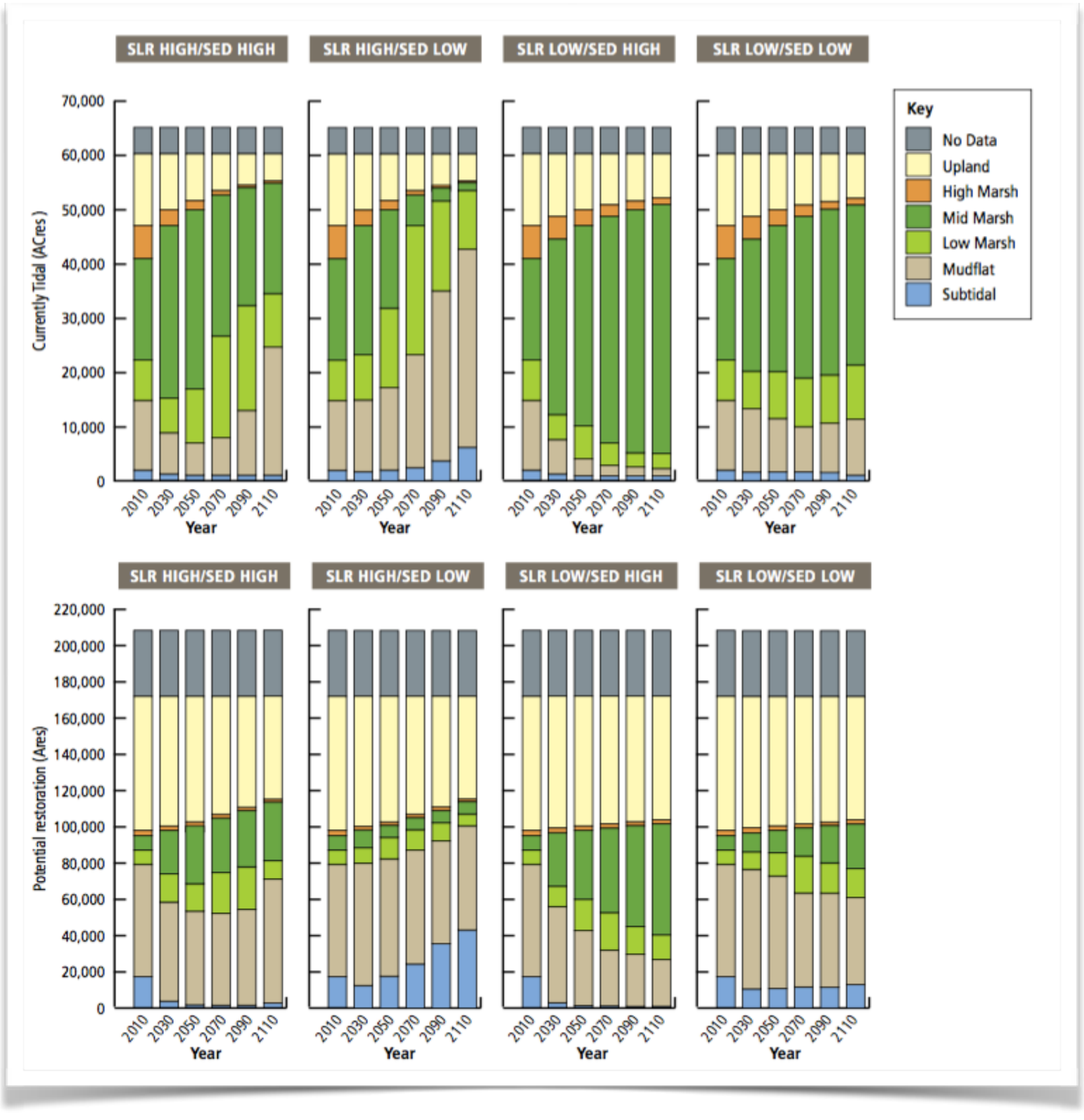


Sediment accretion is influenced by:

- Proximity to bay
- Starting elevation of pond bottoms
- Circulation

Sediment accretion in Pond 21 (Island Ponds) (shown above) were twice the rate of most typical marshes. Salt marsh harvest mouse and Ridgway's rail were documented in 2015, less than 10 years since breaching

If we act quickly, we can save over 80% of our existing wetlands over the next hundred years

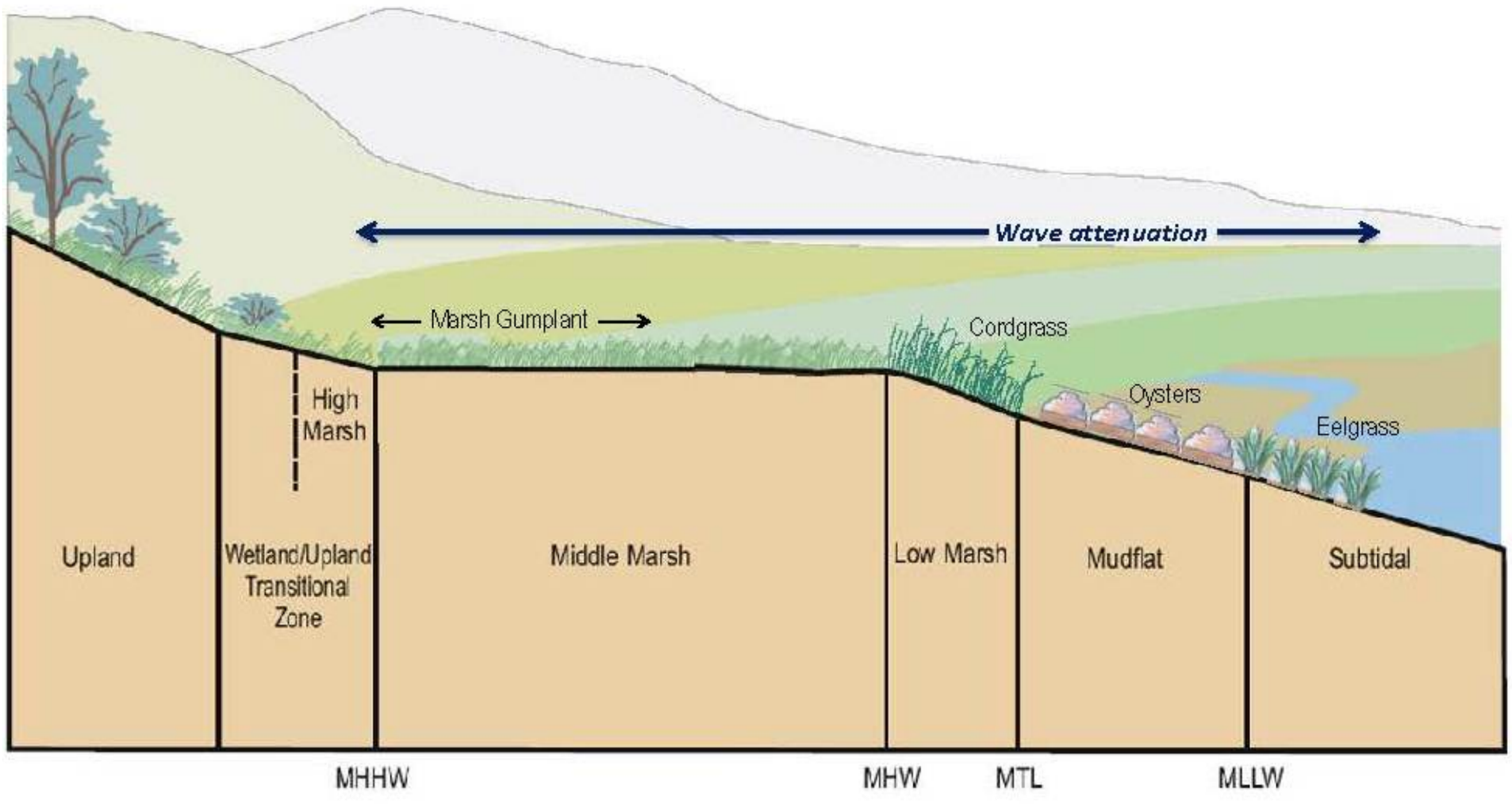


Graphic from *The Baylands and Climate Change: What We Can Do*

Overview of Adaptation Strategies

- Create marsh-upland transition zones
- Raise subsided areas with beneficially reused dredged sediment
- Import clean upland dirt
- Augment sediment supply with in-bay placement
- Construct wave-break berms & marsh mounds
- Add high-tide refuge islands & native plants

Schematic of the complete tidal wetland system



ESA PWA

Coastal Conservancy

Cross section of traditional 3:1 sloped levee

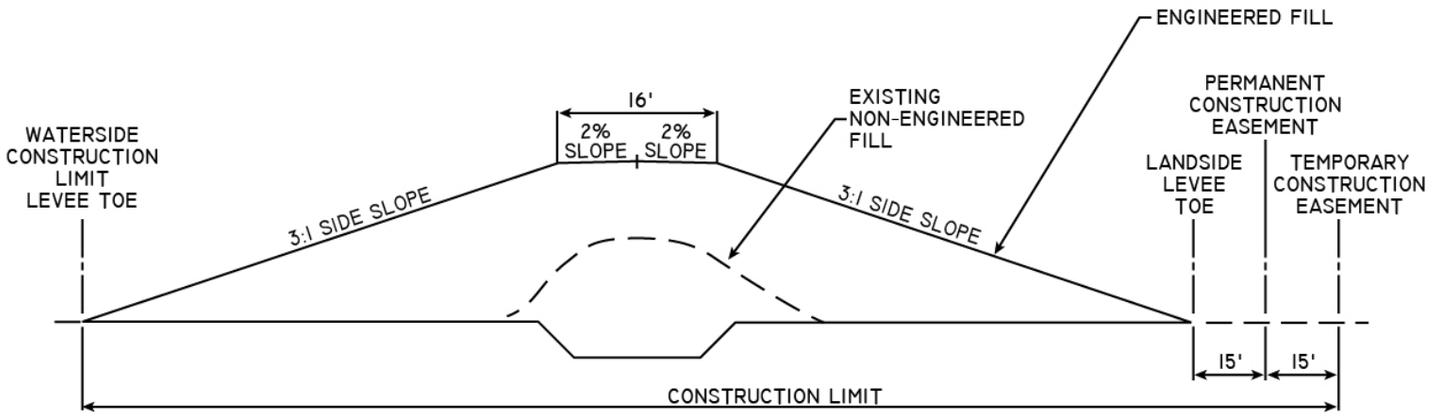
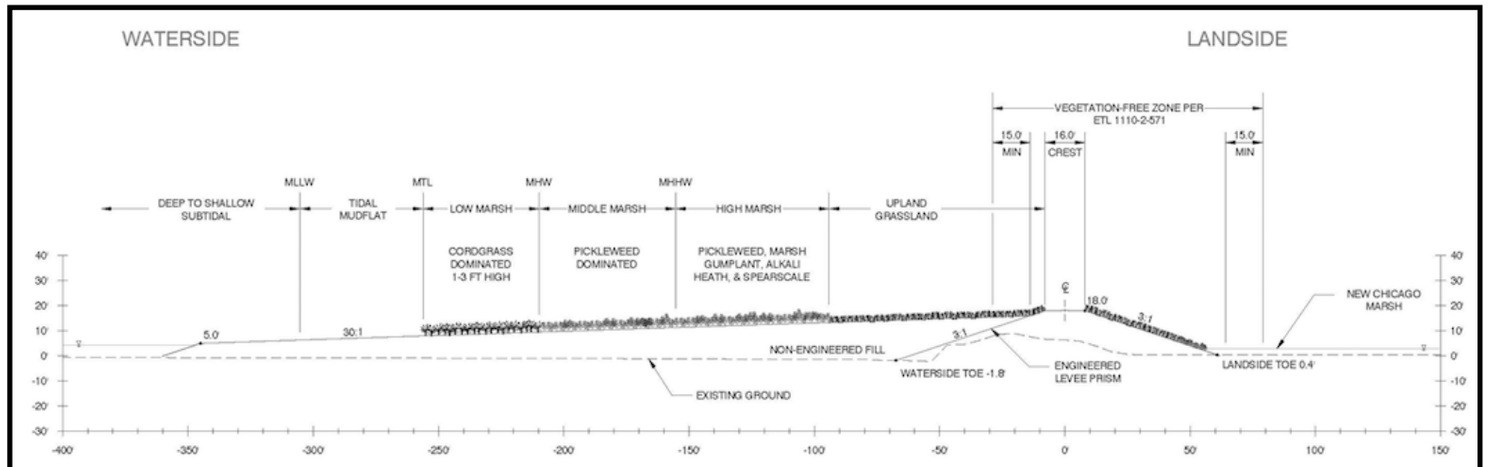



Photo: USACE via SLFPA-E

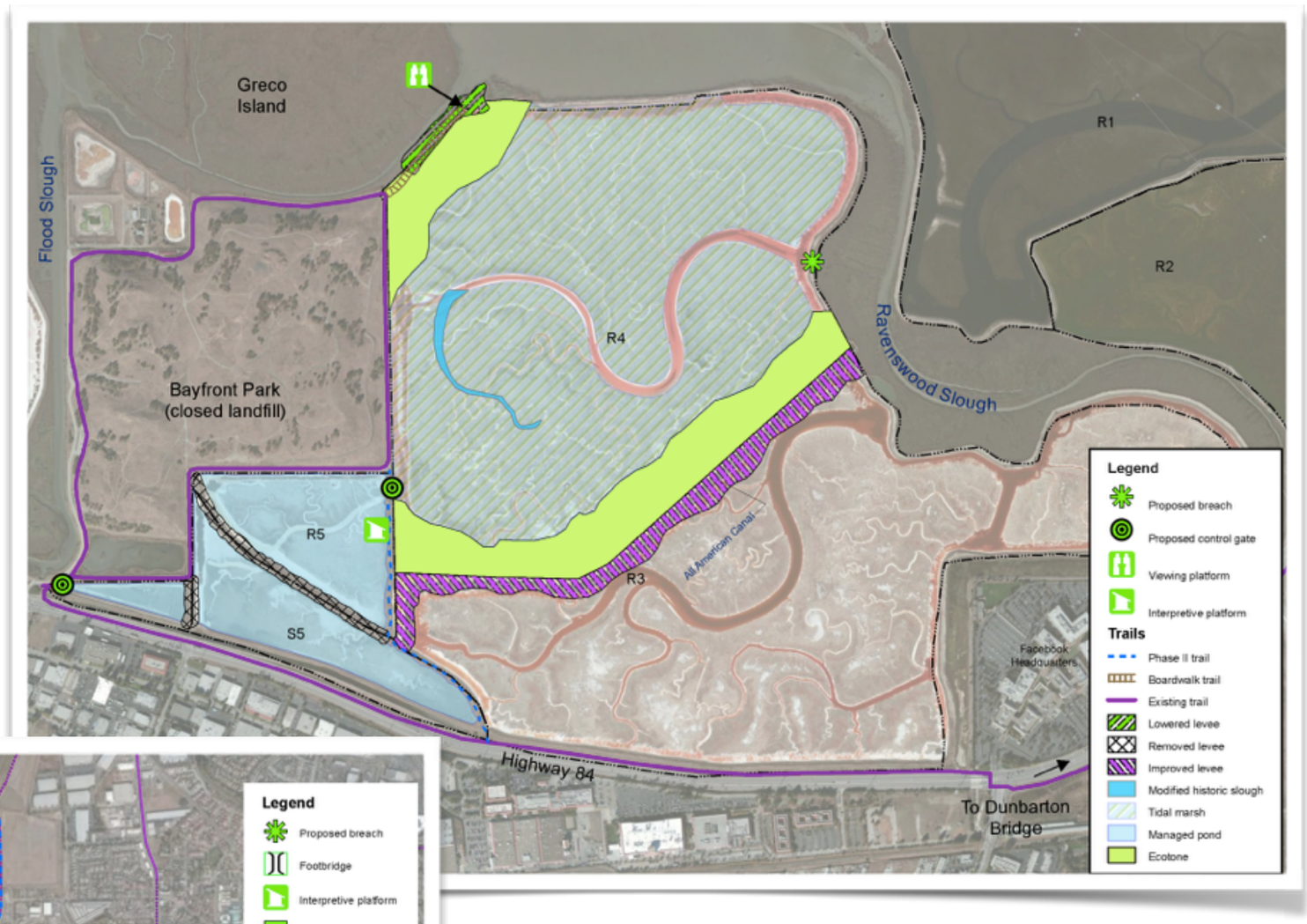
Build transition zones to connect tidal marsh to upland habitats & provide marsh migration space



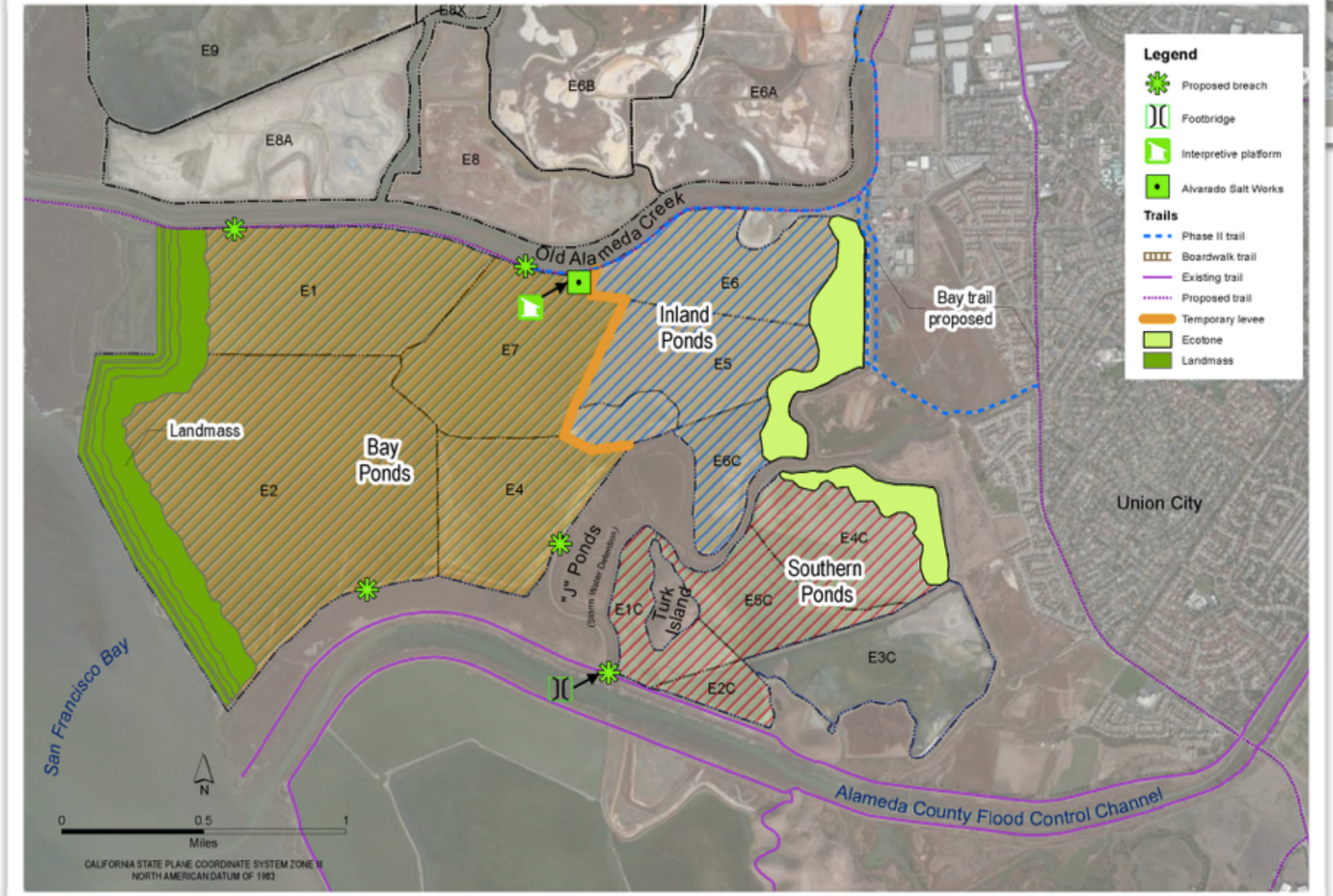
Cross section of 30:1 sloped levee

Horizontal levee graphic courtesy of Bay Institute

Examples: Phase 2 Alternatives



Ravenswood



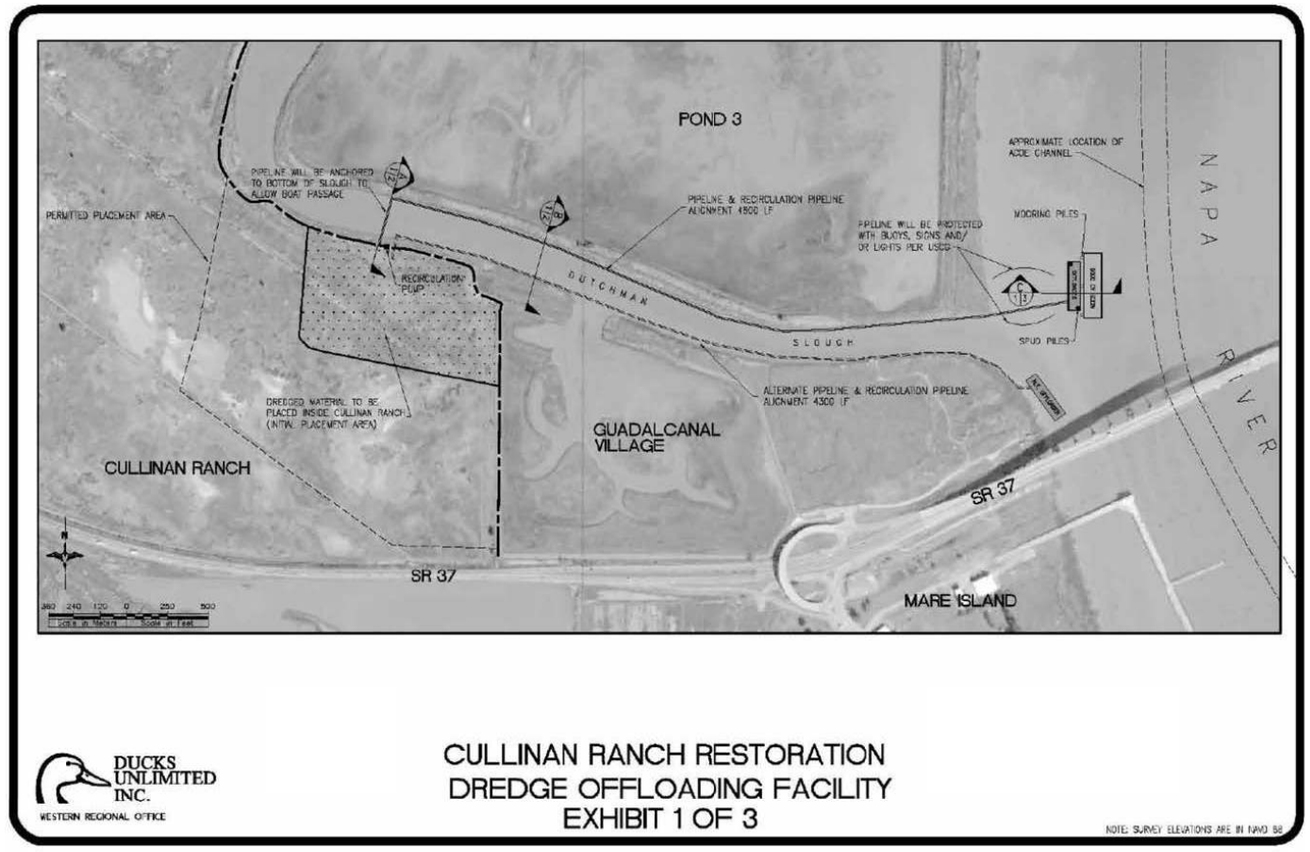
Eden Landing

Import clean upland fill material to build high marsh-upland transition zone

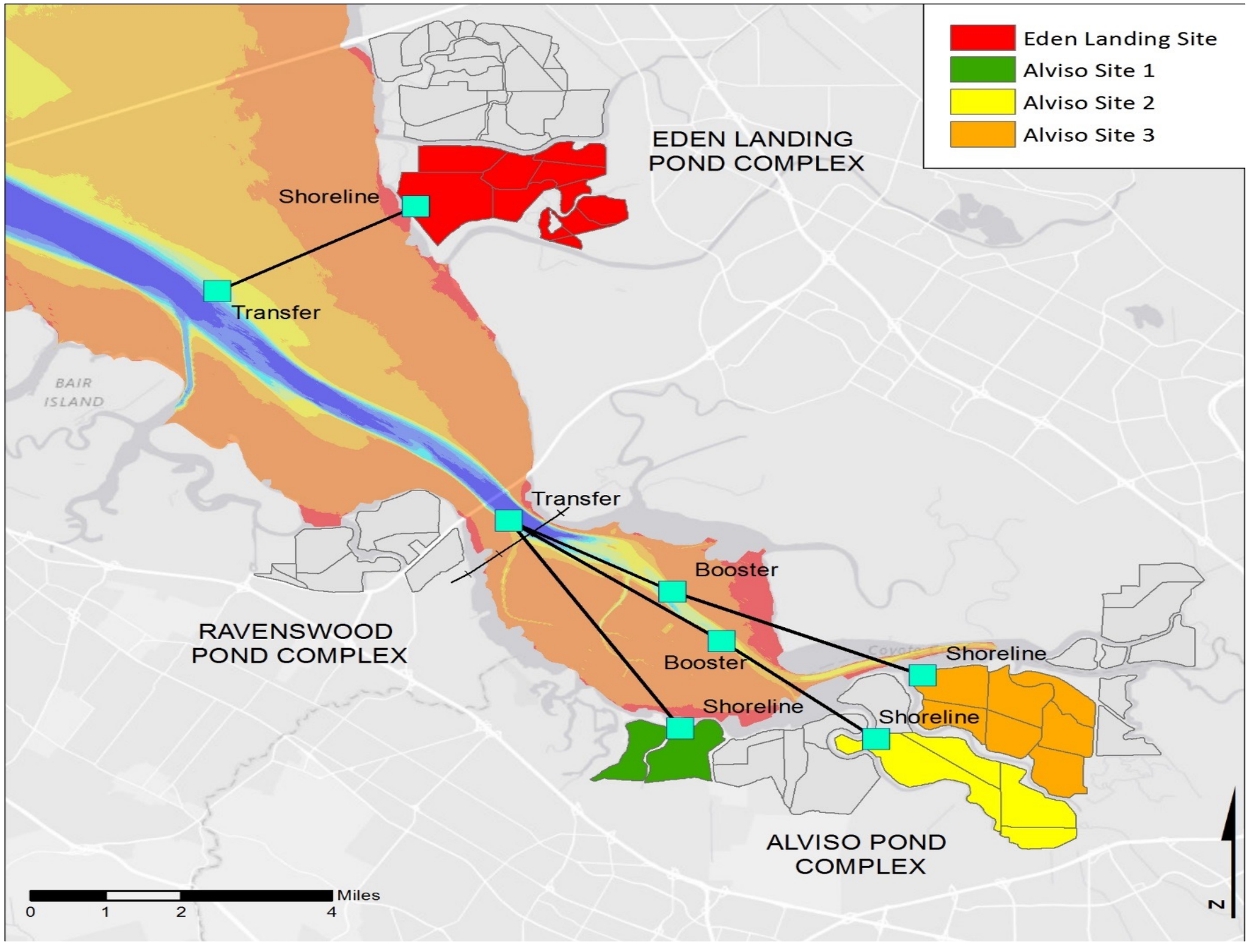
Example: Inner Bair Island Restoration

Raise subsided areas to accelerate marsh development by pumping in dredged sediment

Example: Hamilton Field Restoration

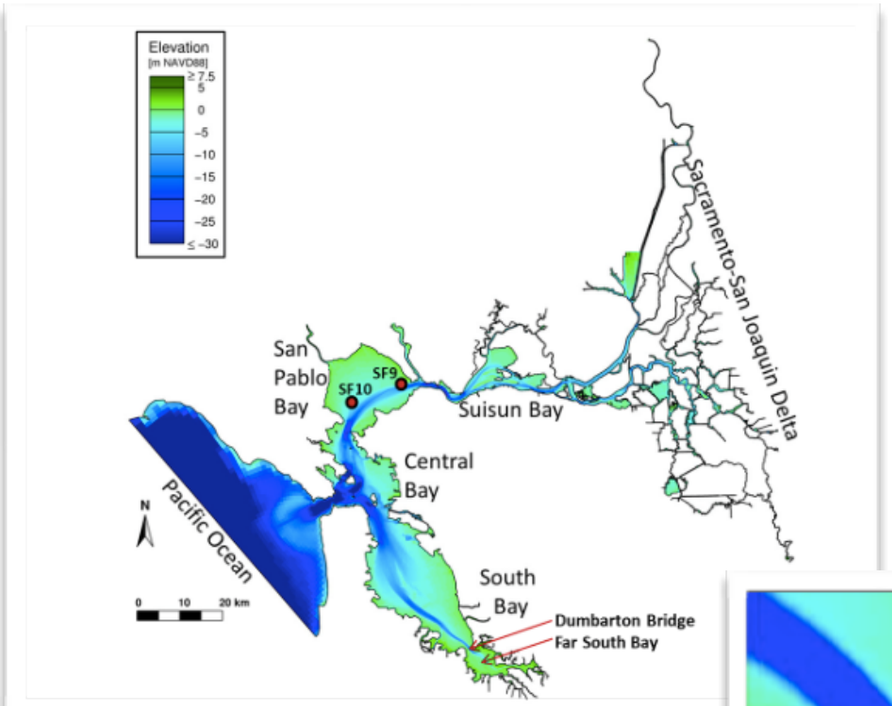


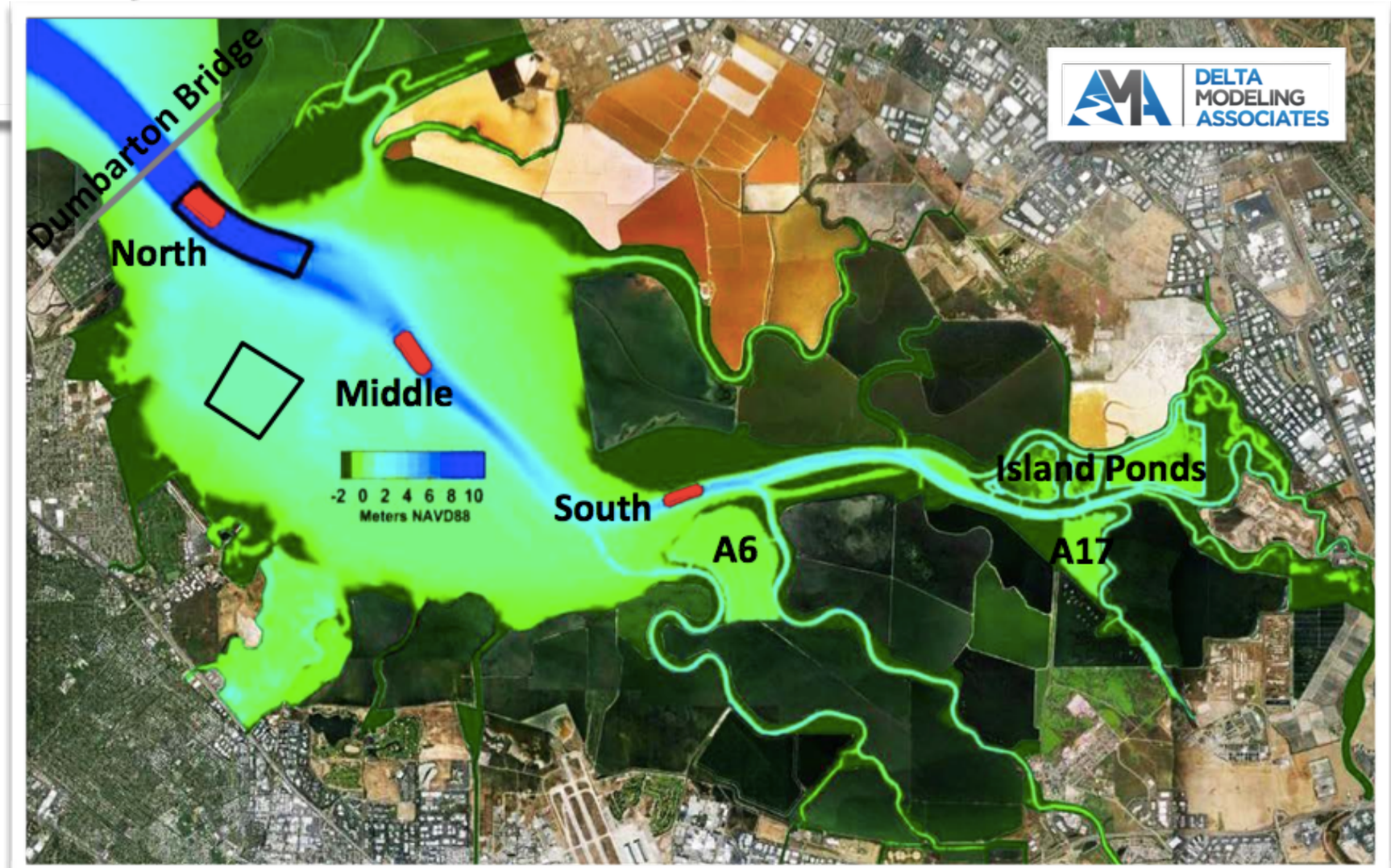
Example: San Pablo Bay NWR Cullinan Unit



Graphic from: SBSPRP Beneficial Reuse Feasibility Study prepared by Moffatt & Nichol et al.

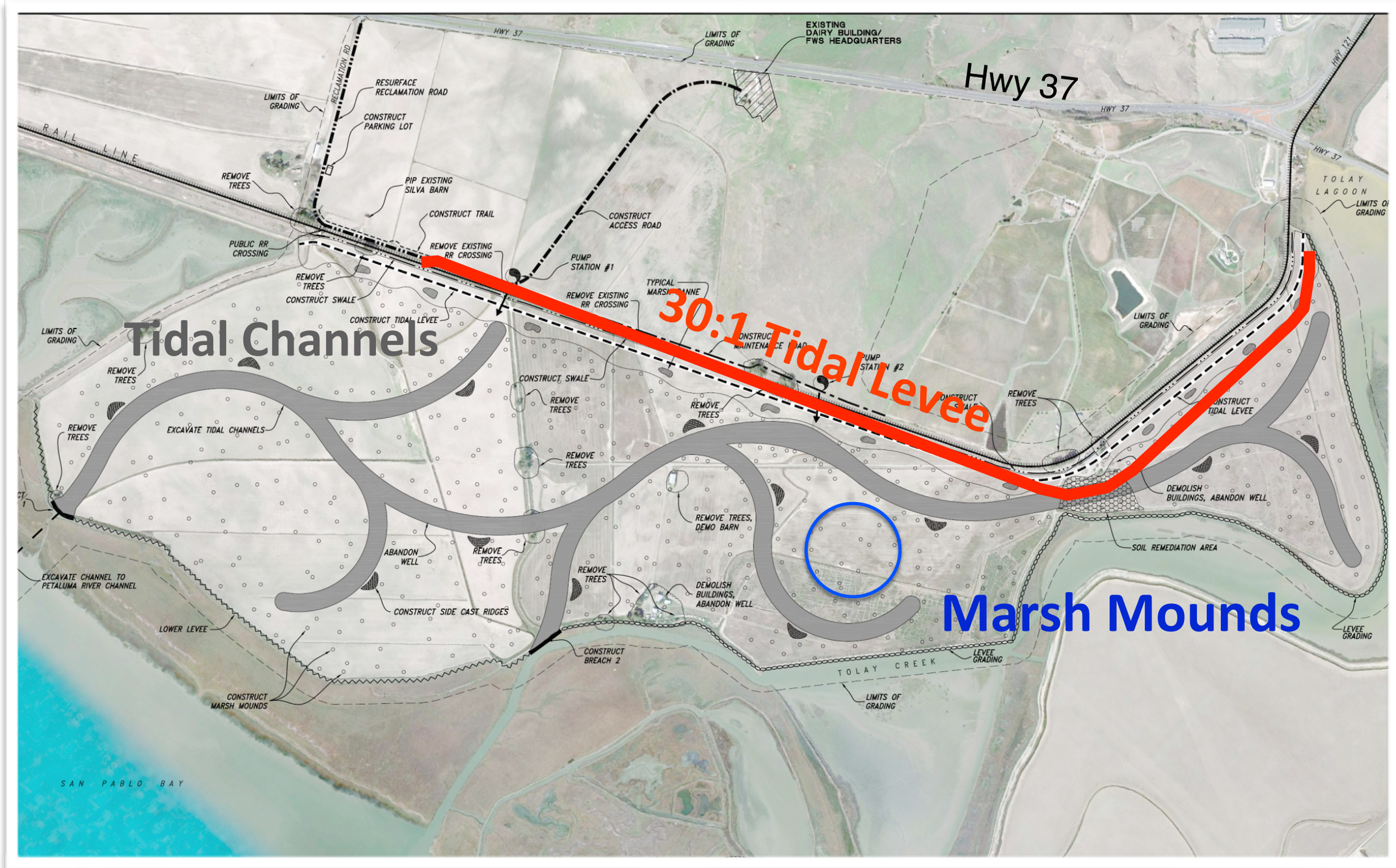
Augment natural sediment supply to mudflats and breached ponds with in-Bay placement of dredged sediment





UnTRIM San Francisco Bay-Delta Hydrodynamic Model graphics from: Bever et al. 2014

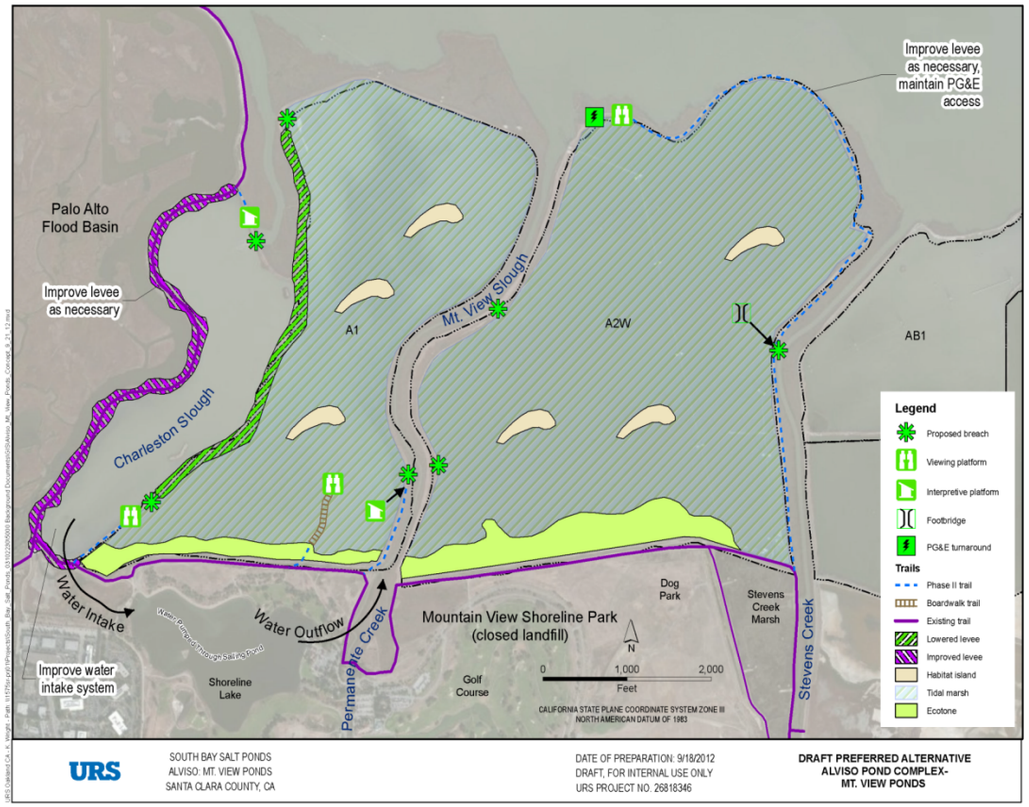
Add wave break berms & marsh mounds inside restored ponds to dampen wave action and capture sediment



Example: Sears Point Restoration

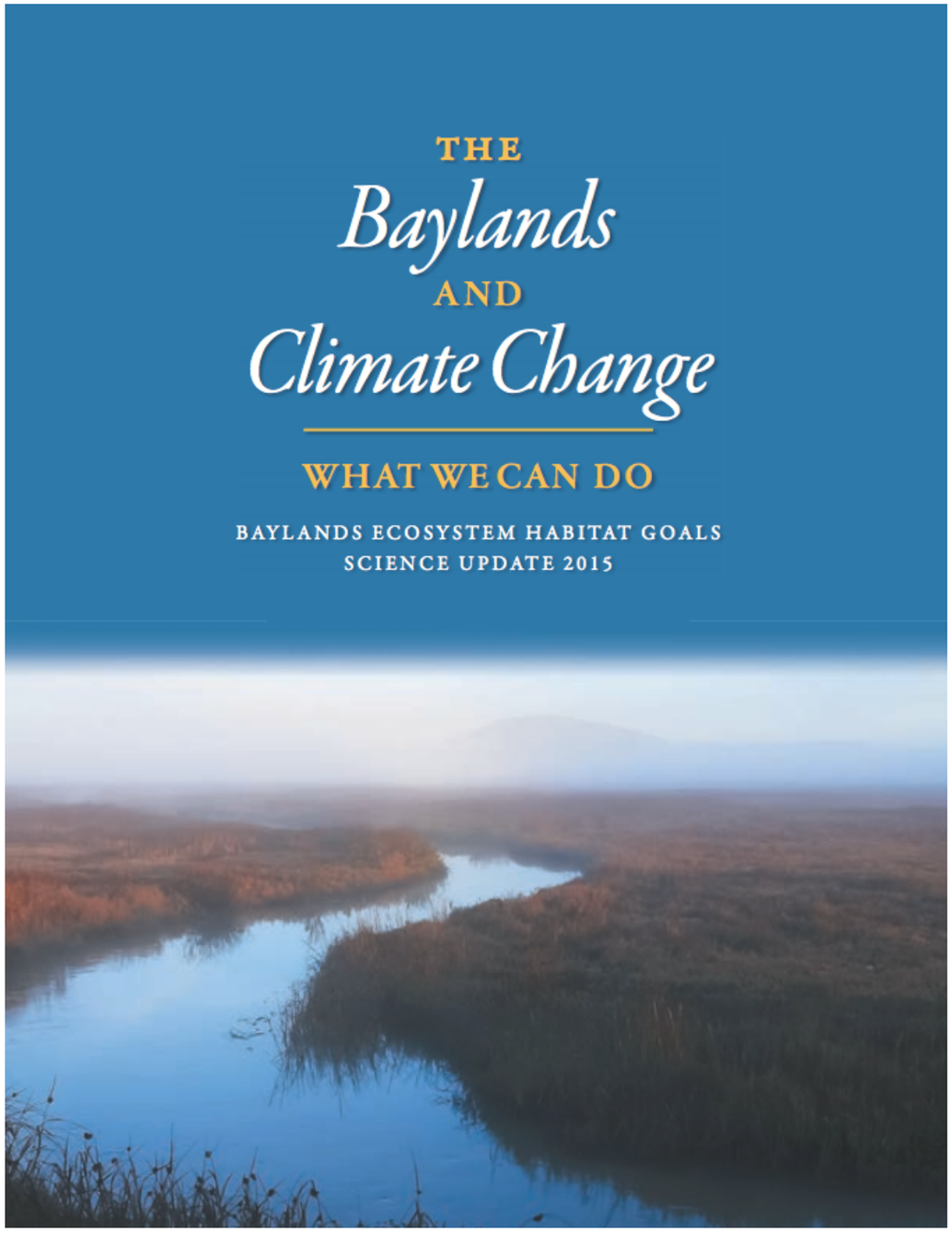
Graphic courtesy of Sonoma Land Trust

Strategic placement of bird nesting islands can also serve as wave breaks and sediment catchers



Enhance marsh benefits for wildlife by building high-tide refuge islands and planting native species

Photos courtesy of the Invasive Spartina Project



Key Messages:

- Restore processes to maintain baylands as sea level rises
- Accelerate restoration of baylands in strategic places
- Dredged and excavated sediment is a resource, not a waste product
- Plan for baylands to migrate landward in the long term

The Baylands and Climate Change: What We Can Do
www.baylandsgoals.org

RESTORE PROCESSES TO MAINTAIN BAYLANDS AS SEA LEVEL RISES

- The baylands' continued function as sea level rises relies on restoring not just the habitats, but also the processes that sustain the habitats.

- These processes include flows of water and sediment from the Bay, streams, and rivers; seasonal patterns of flow that include beneficial flooding; and the arrangement across the landscape of baylands habitats that allow wildlife to move when necessary.

ACCELERATE RESTORATION OF BAYLANDS IN STRATEGIC AREAS

- To maintain the benefits of the baylands for the future we should restore tidal marsh systems in strategic areas by 2030, in areas where they are likely to survive sea-level rise.

- Marshes established by 2030 are more likely to flourish when sea-level rise accelerates, in the middle of this century.

DREDGED AND EXCAVATED SEDIMENT IS A RESOURCE, NOT A WASTE PRODUCT

- Projections indicate that the current sediment supply is insufficient for marshes to grow fast enough vertically to keep up with sea-level rise.

- Once considered waste, dredged sediment is increasingly critical for tidal marsh restoration. It should now be managed as a resource for sustaining our shore.

PLAN FOR BAYLANDS TO MIGRATE LANDWARD IN THE LONG TERM

- Baylands have a natural ability to sustain themselves as sea level rises, by slowly migrating landward if space allows.

- We can take advantage of this natural phenomenon by conserving the transition zone between the baylands and adjacent uplands, which is important wildlife habitat.