LINKAGE OF MITIGATION AND ADAPTATION ACTIVITIES

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International Blue Carbon Policy Working Group
European Parliament

January 10-11, 2012

The coast comprises….

a nested series of small landform (beaches, shingle ridges, sand dunes, flats, salt marshes) within larger landform (estuaries, deltas, open coast, etc.)

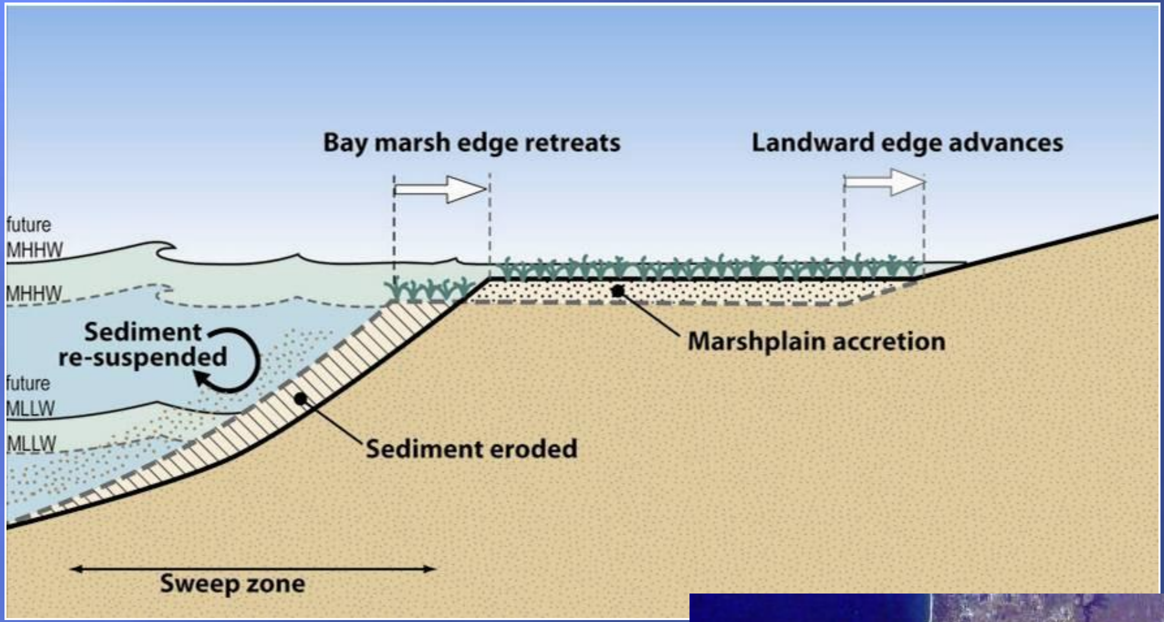
in which:
•each landform occupies an energy niche
•each landform responds to change dynamically

Dune fields and beaches behave dynamically to attenuate seasonal wave activity…

The system is stable as long as the recovery time is less than the perturbation return interval (ability to accommodate change defines landform resilience)

…as do saltmarshes but more slowly and over greater time intervals

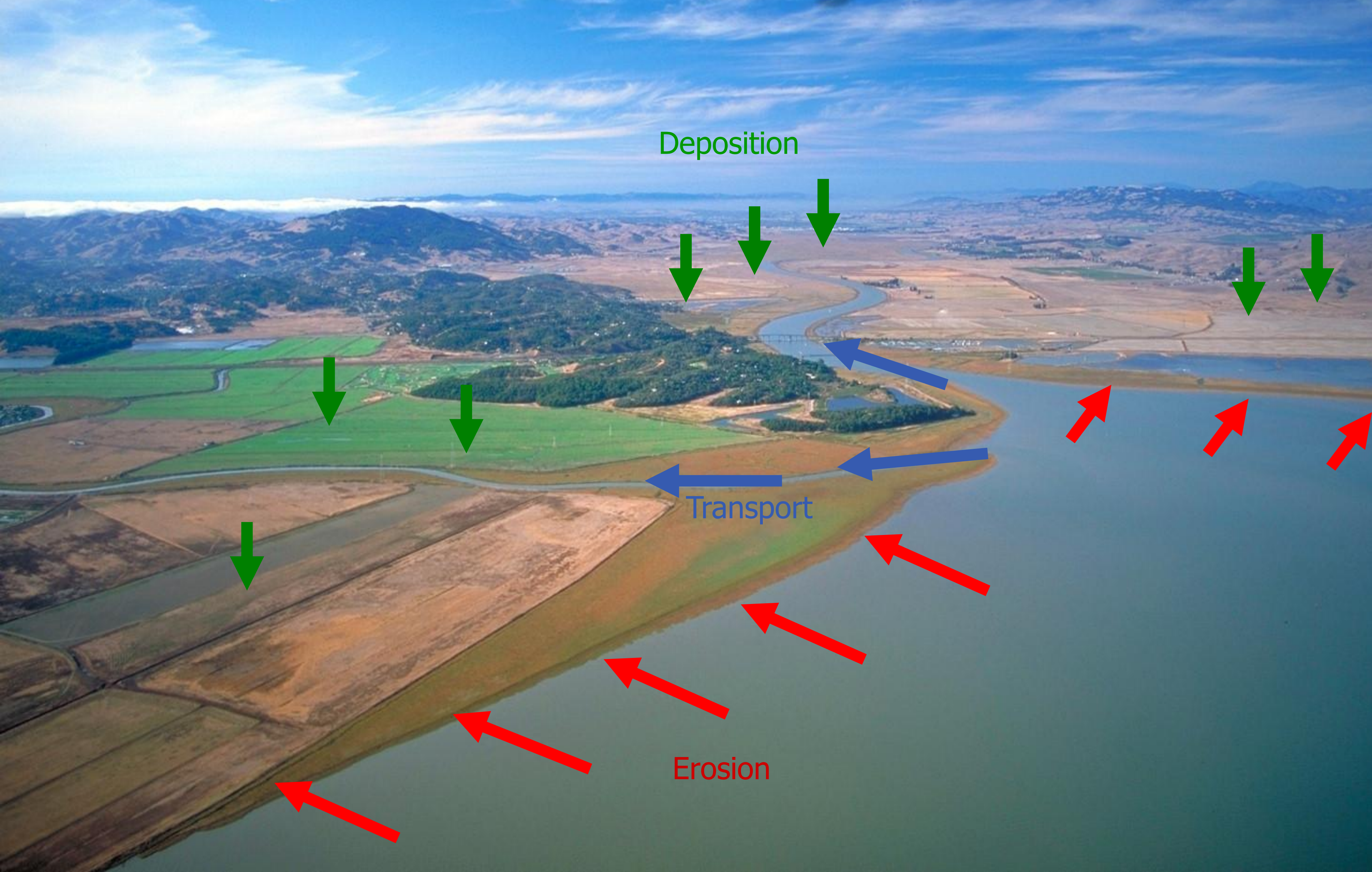
With sea level rise the coast adjusts



Copper River Delta

Betsiboka River Delta

Plan for a moving baseline

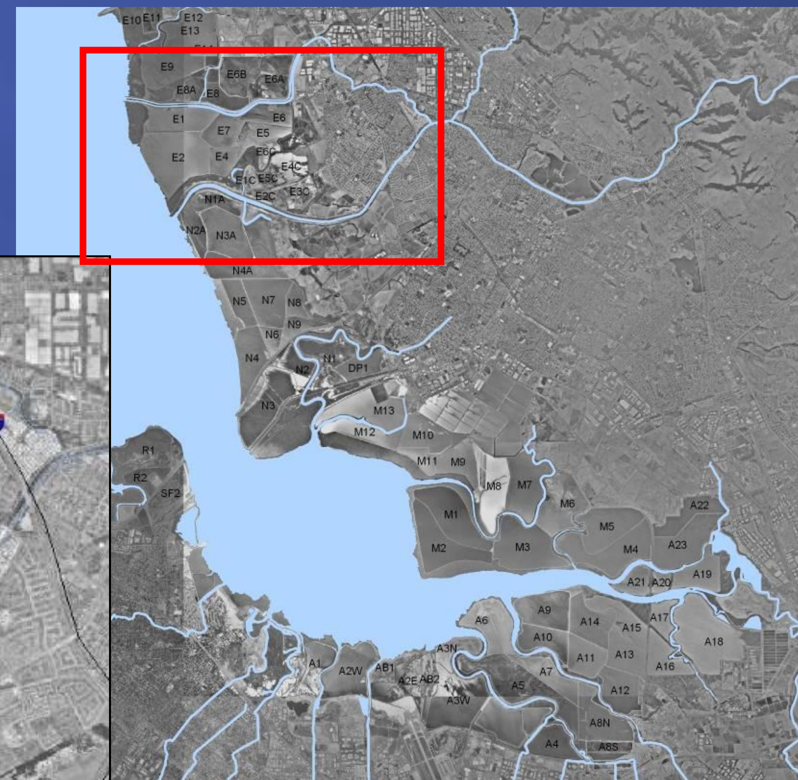


Connecting mitigation with adaptation

(integrating with green infrastructure)

Restoring wetlands to reduce flooding

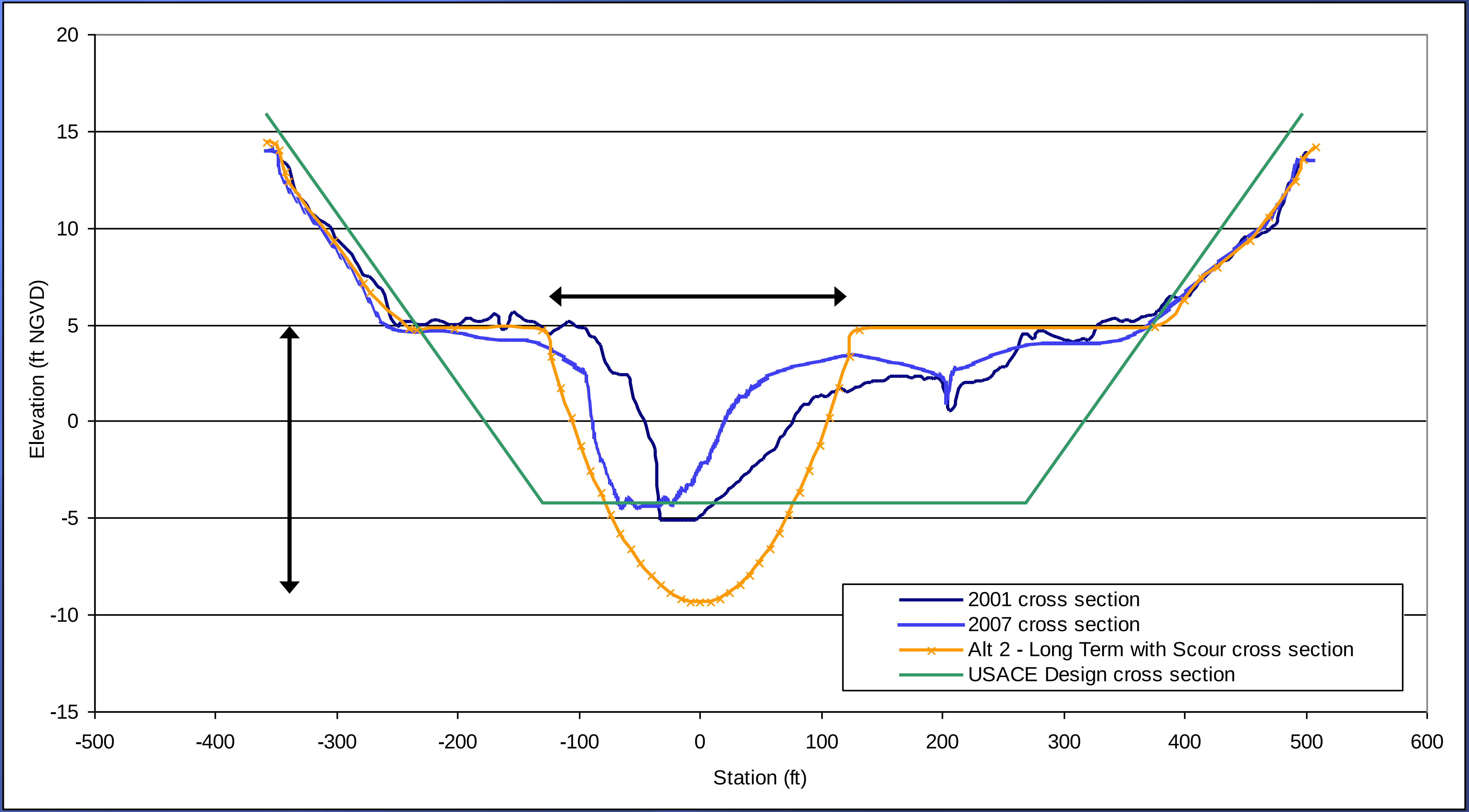
- ACFCC is a USACE flood control project constructed in the 1960's to pass the SPF
- Watershed area of ~700 square-miles
- Channel conveyance capacity reduced by sedimentation – no longer contains SPF



PWA Project Goal - Optimize ACFCC flood management while integrating with the SBSP restoration project

- Study Reach = 4 miles / tidally-influenced
- Three project alternatives / short-term, long-term (50-year project horizon)
- Geomorphic Evaluation / channel scour and marsh plain sedimentation

Problem: diking wetlands causes sedimentation



Channel response to hydraulic change

Sonoma Baylands, Main Channel

1996

Tidal prism = 1 million ft^3

2003

Tidal prism = 26 million ft^3

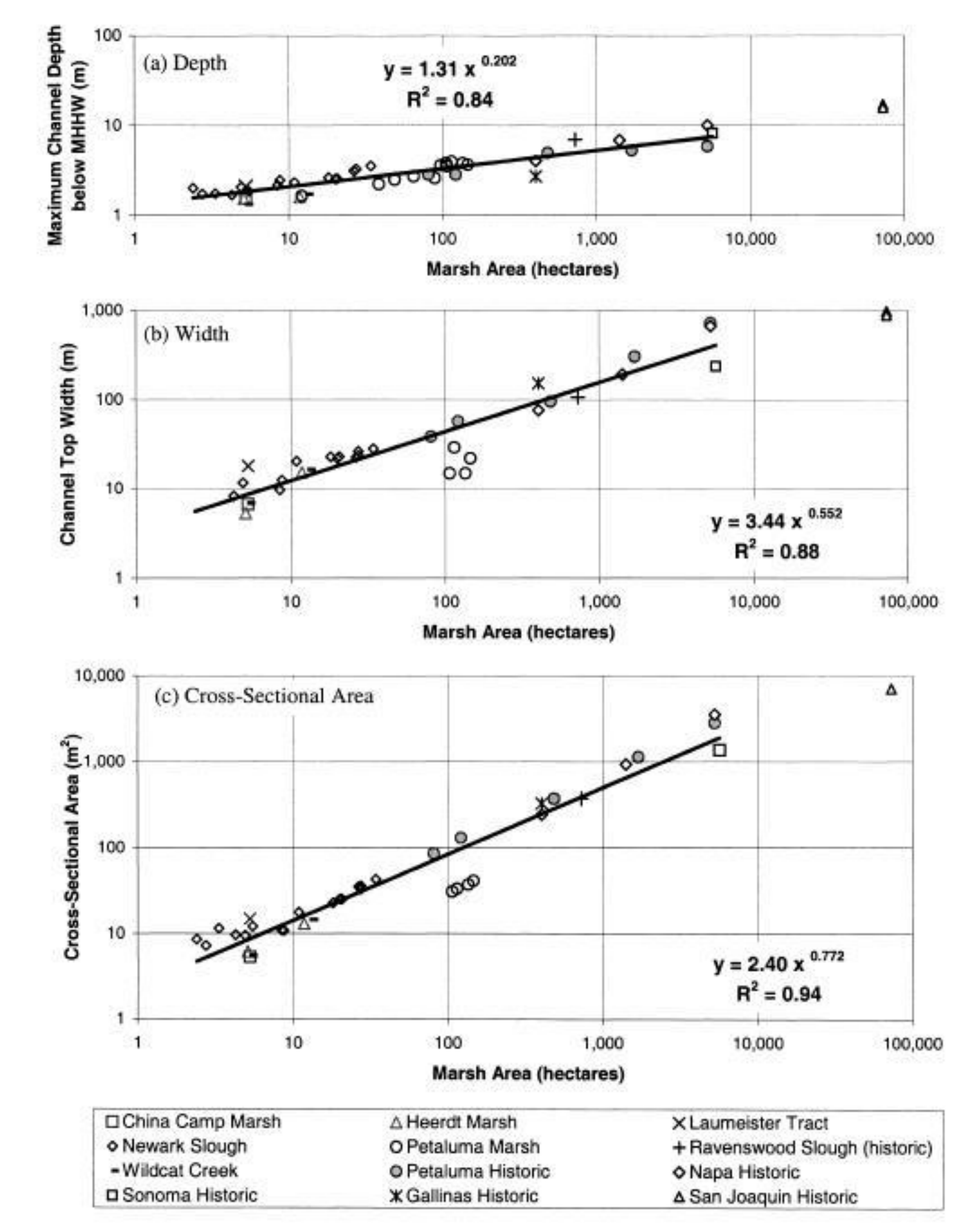
Geomorphic Analysis

Williams, Orr, & Garrity (2002)

Hydraulic Geometry for SF Bay Tidal Channels:

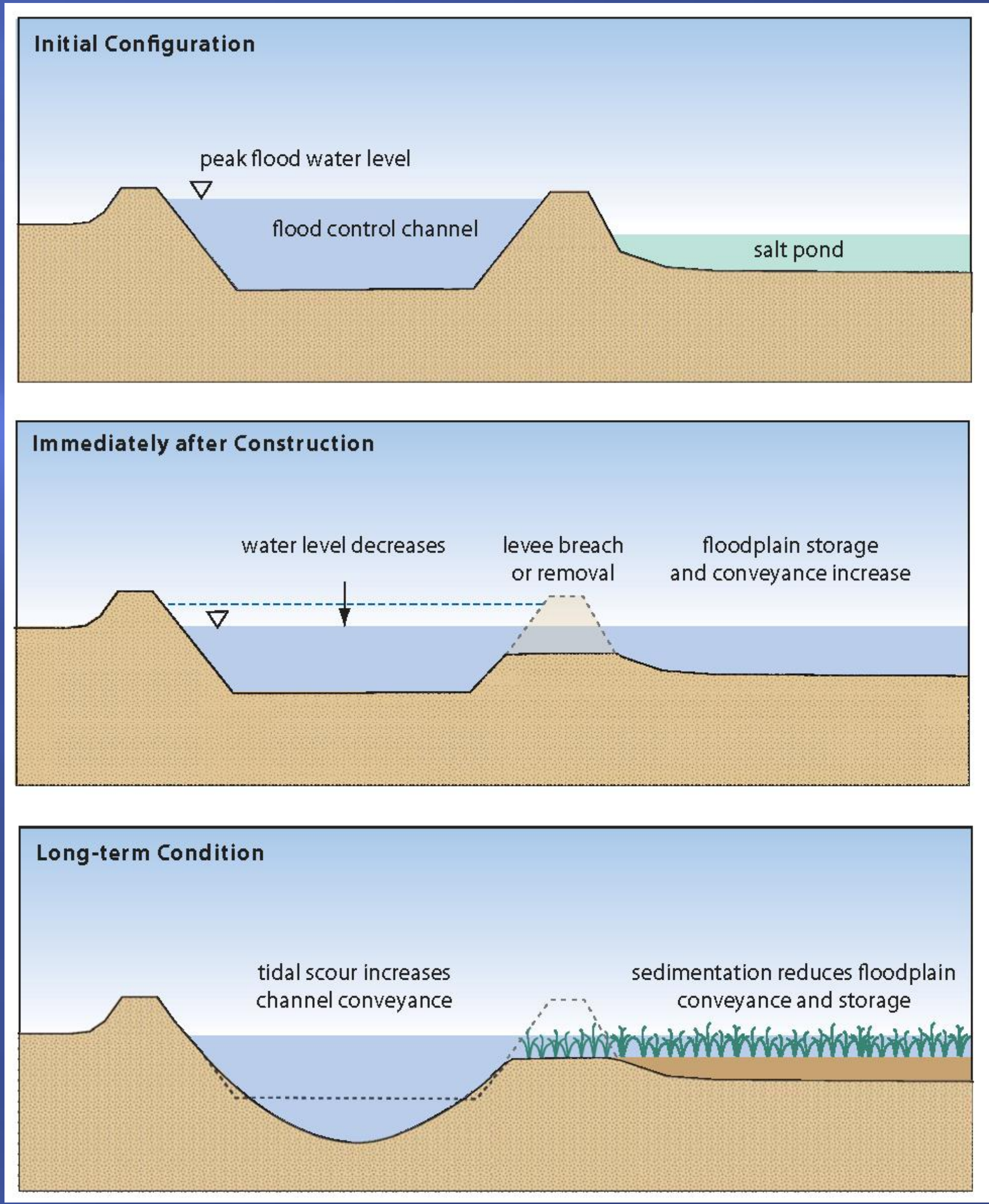
A set of empirical geomorphic relationships that predict tidal channel cross section dimensions as a function of contributing marsh area or tidal prism

Tidal prism is the volume of water upstream of a cross-section that is exchanged between high tide and low tide

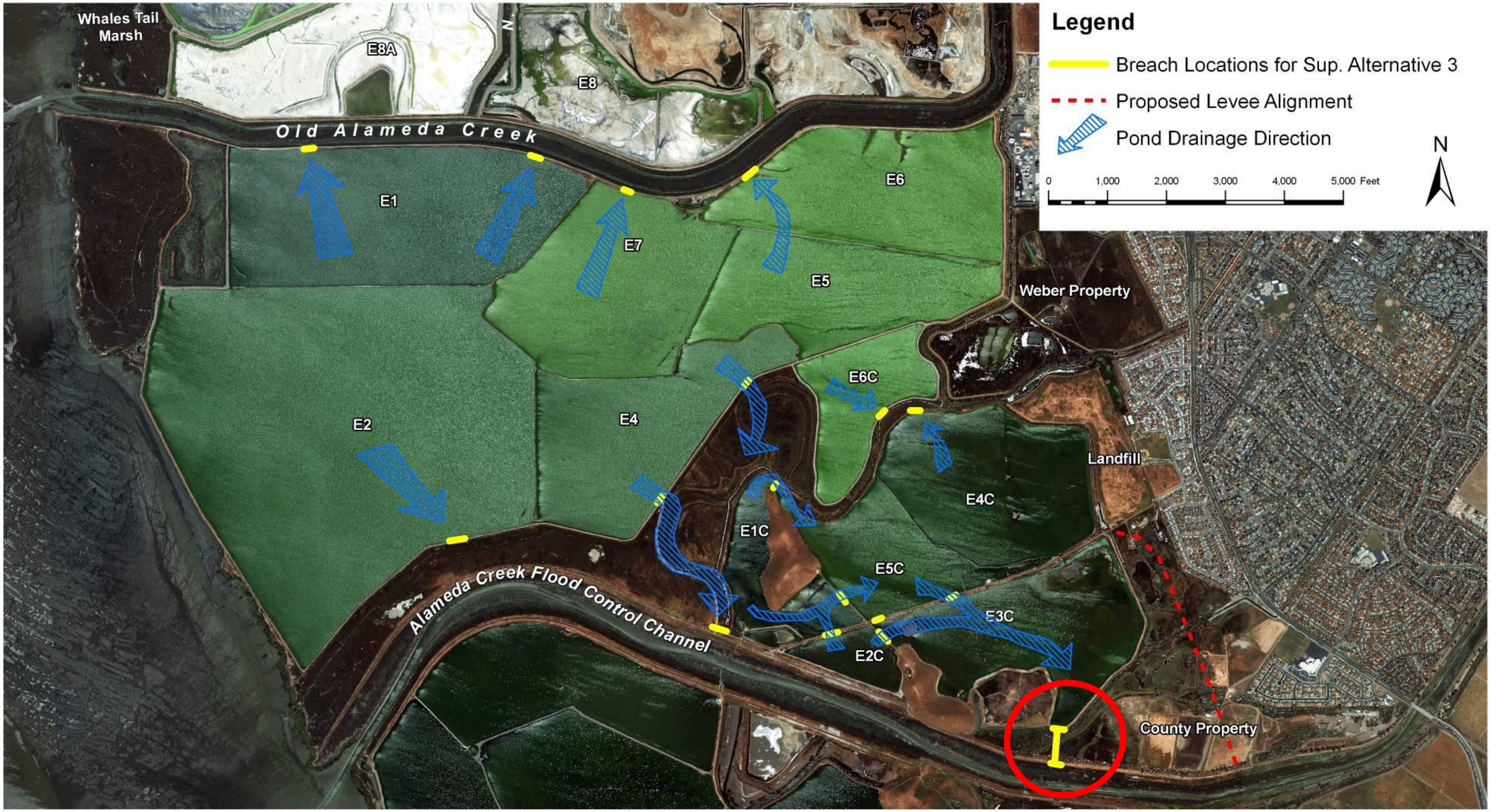


Tidal Scour and Fluvial Flooding

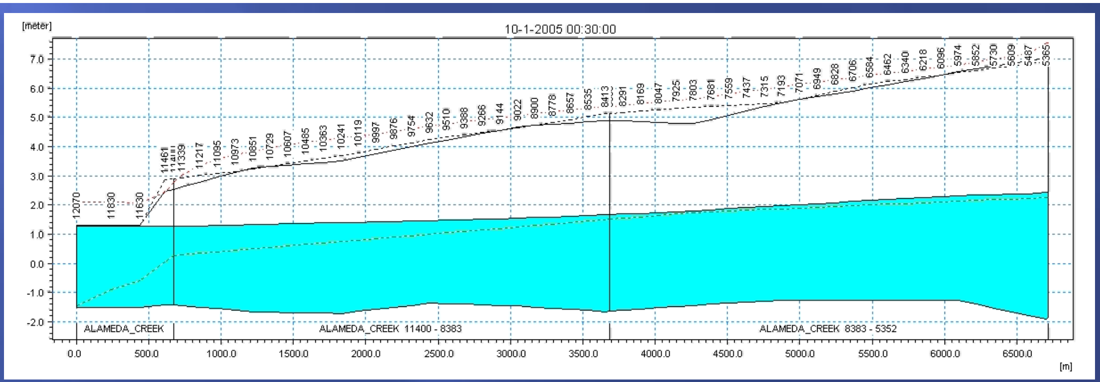
- Levees constructed to convey watershed runoff through the salt ponds - Over time channels fill in with sediment and salt ponds subside
- Levee lowering/ removal causes channel scour and marsh sedimentation
- Salt pond restoration reduces fluvial flood hazards by improving conveyance to the Bay



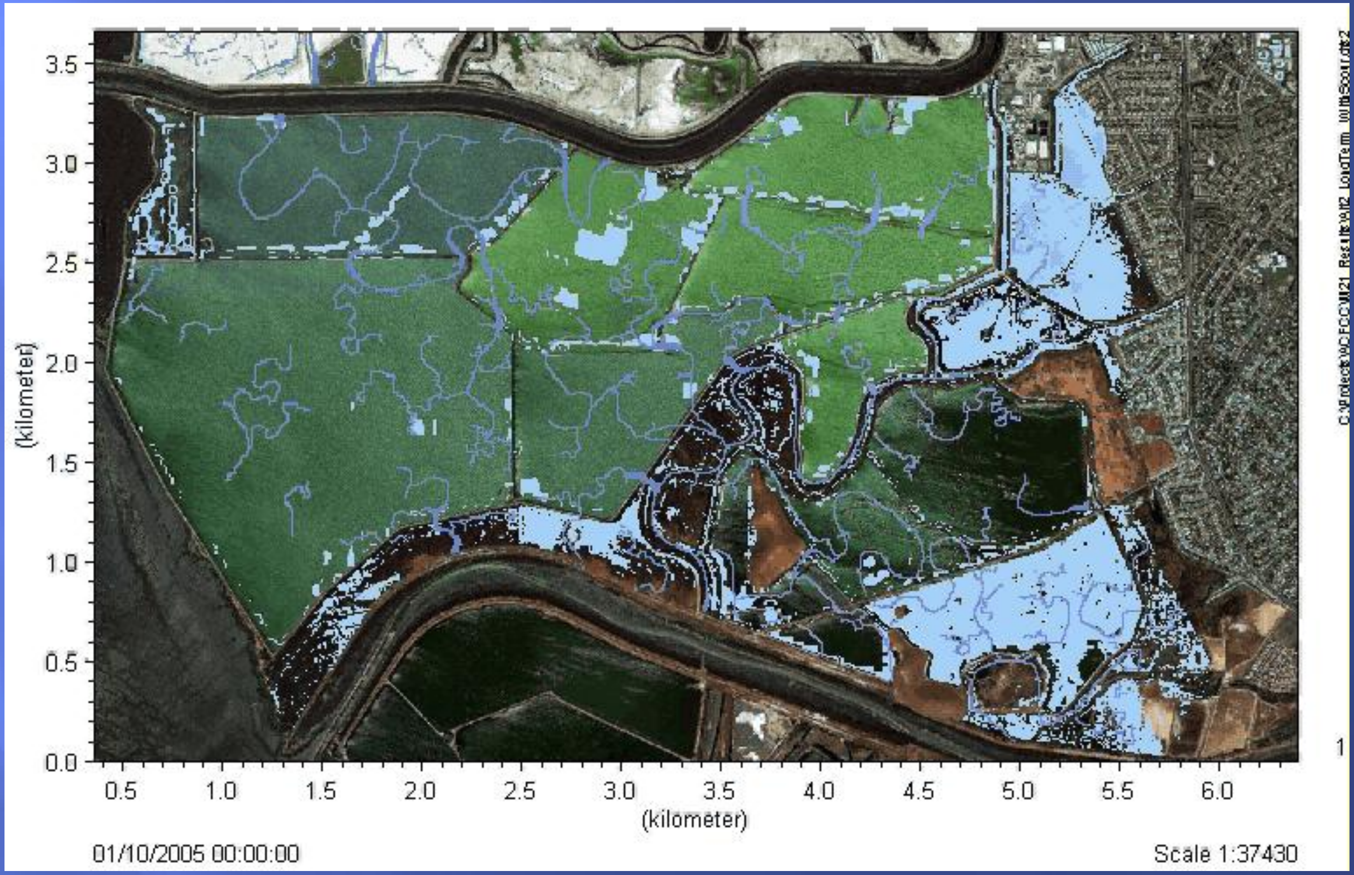
Levee Breach Locations

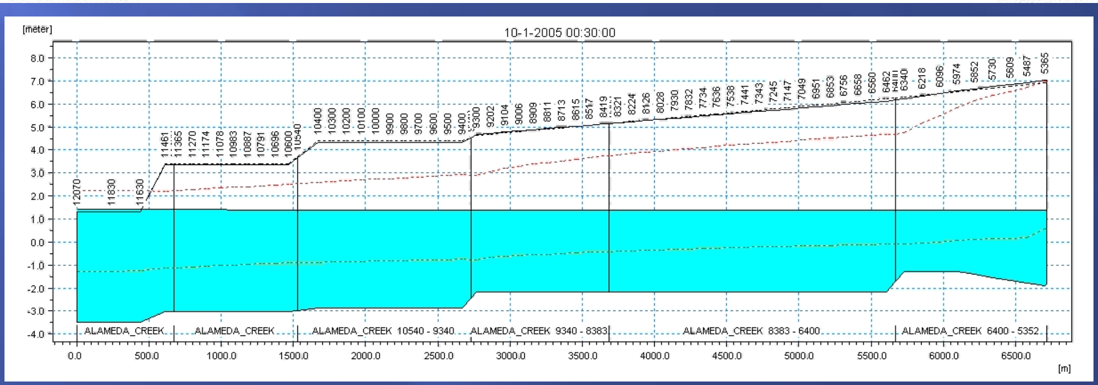


Baseline Conditions Results



Alternative 2 Results





Closing comments

1. Coastal systems are subject to moving baselines
2. Successful mitigation is embedded within an adaptation plan
3. Historic failures in planning can offer mitigation opportunities through green infrastructure approaches to management
4. Conservation (avoided emissions) and working at landscape scales offers the highest potential for carbon management.

Lessons for demonstration projects

1. Inform public and policy
2. Do no harm (have no regrets)
3. Be strategic – have a vision
4. Follow a clear planning process
5. Restore process, do not mimic structure
6. Consider multiple scales – landscape, project
7. Consider drivers of geomorphology – eg SLR
8. Integrate experimentation
9. Document and share learning
10. Be patient