

Baylands habitat evolution: How sea level rise and other drivers may change the Bay

Bay-Delta Science Conference

Sacramento

October 29, 2014

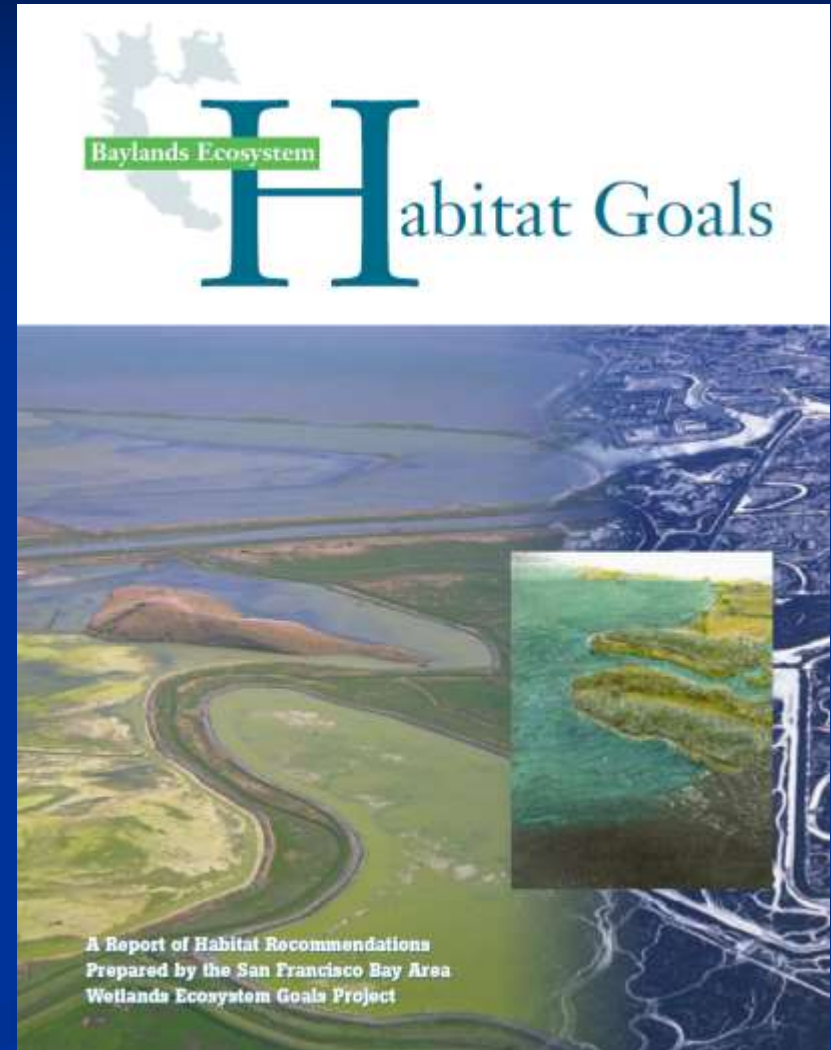
Jeremy Lowe¹ and John Bourgeois²

1. ESA, 2. State Coastal Conservancy

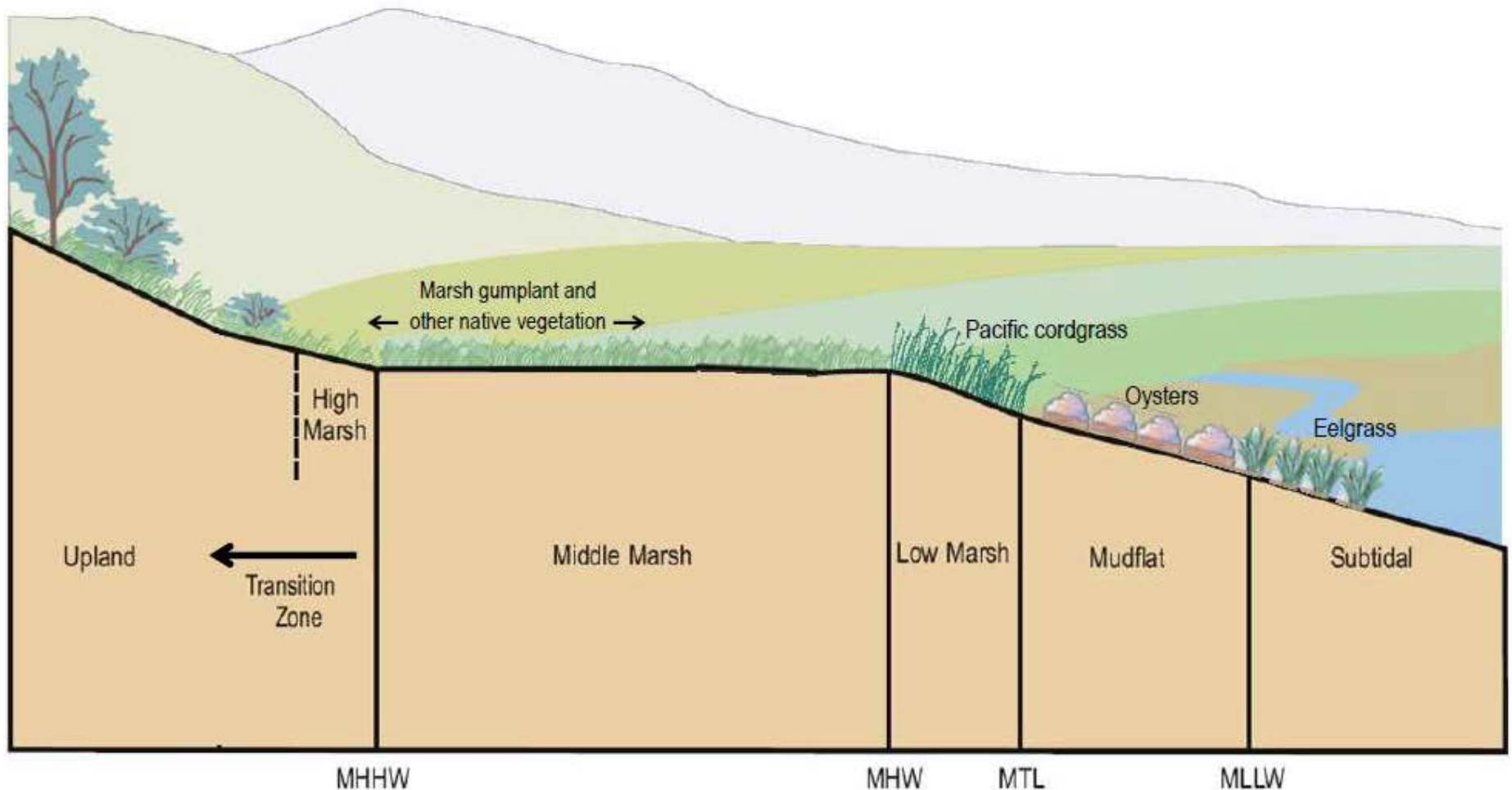
- BEHGU process
- Two key questions:
 1. How are Baylands habitats likely to evolve?
 2. What management actions can we take?
- Key recommendations

Baylands Goals Update

- 15 years of research, planning and implementation
- Better understanding of drivers of change
- Climate change and sea level rise
- Reinforces existing concepts



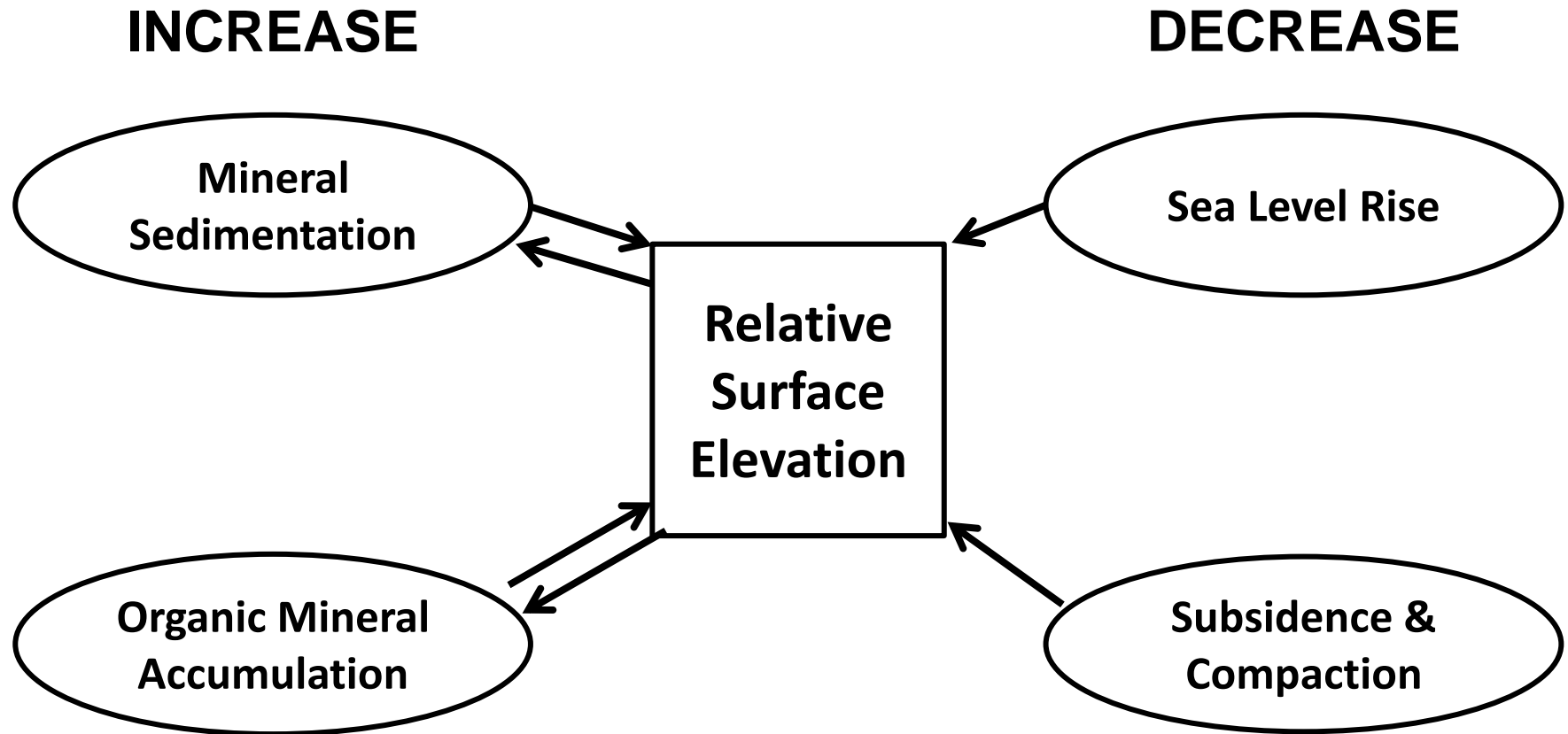
Complete tidal wetland system

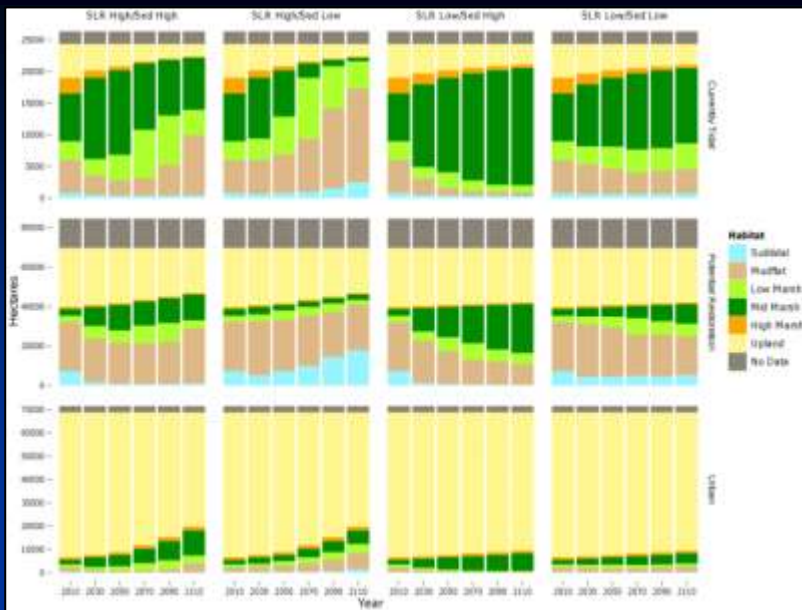


Key Physical and Chemical Drivers

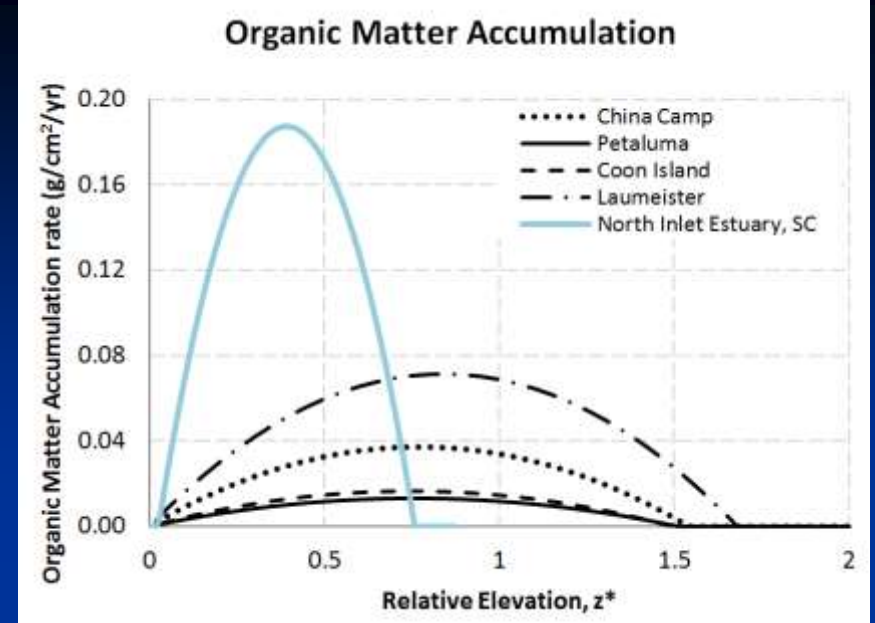
- Sediment Supply, Demand and Transport
- Freshwater Flows
- Nutrients
- Storm Events
- Temperature
- Sea Level Rise

Baylands Evolution: Accretion

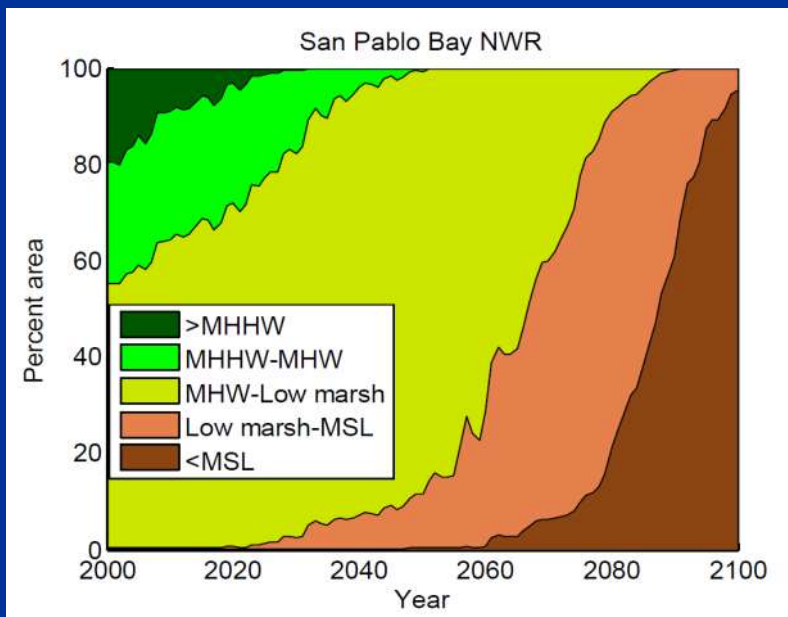




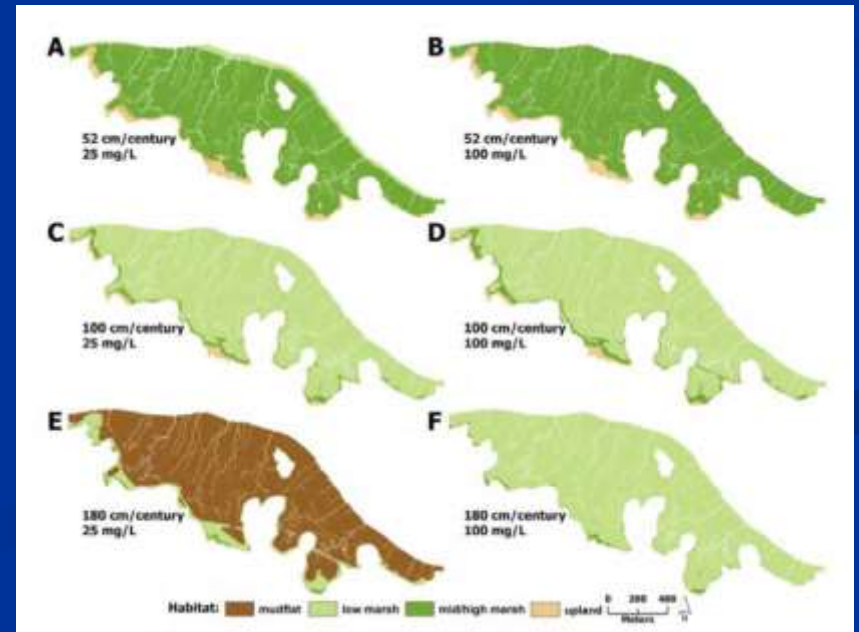
From Stralberg et al. (2011)



Derived from Morris (2002) and Swanson et al. (2013)



From Thorne et al. (2013)



From Schile et al. (2014)

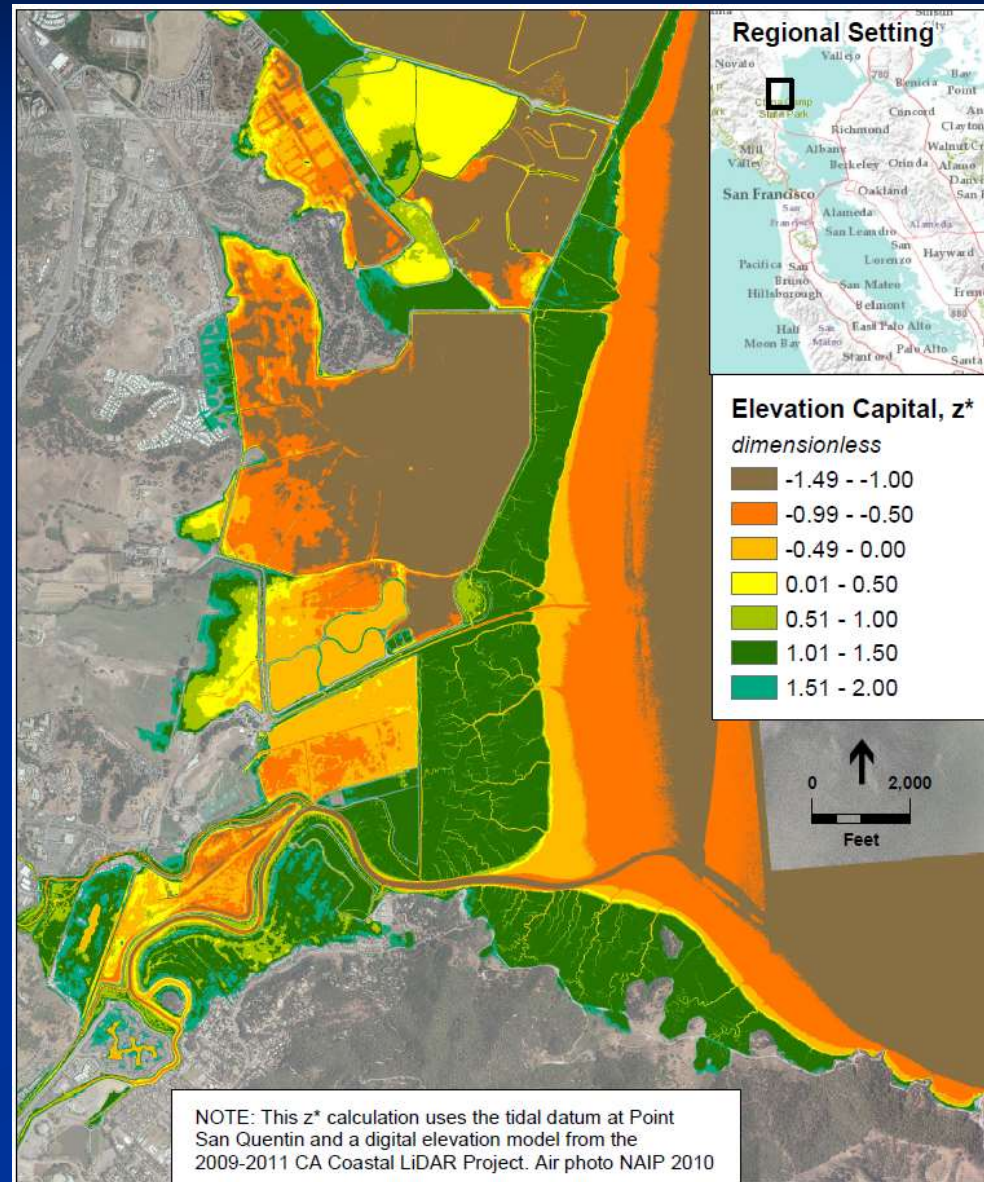
Elevation Capital

- Compare absolute elevation of a marsh with the local water levels and tide range

$$z^* = \frac{z - MSL}{MHHW - MSL}$$

- Tidal marshes $z^* > 1$
- Diked and subsided areas inland $z^* < 1$

Cahoon and Guntenspergen, (2010)
Swanson et al. (2013)



Baylands Evolution

- Drowning** - conversion to habitats lower in the tidal frame.
- Erosion** - loss of Baylands where they meet the Bay.
- Migration** - movement up slope into watersheds.

Elevation Capital

Broad natural levee
extending into former tidal
marsh



Natural fluvial levee of Sonoma Creek
innervating historical tidal marsh

Supratidal area caused by flood
deposits of sediment on top of
tidal marsh

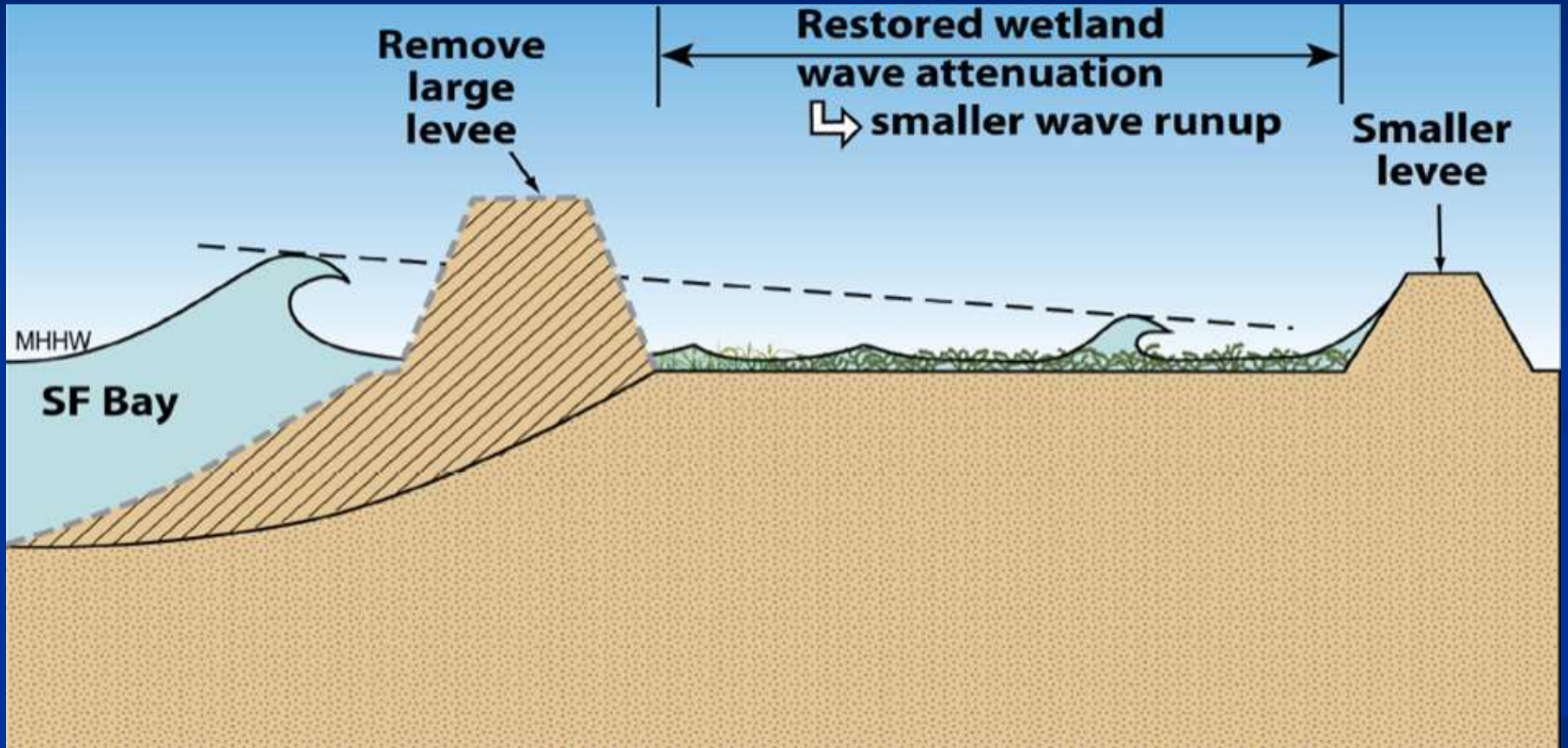


Flood deposits of
alluvial sediments
over marsh

Shoreline Measures

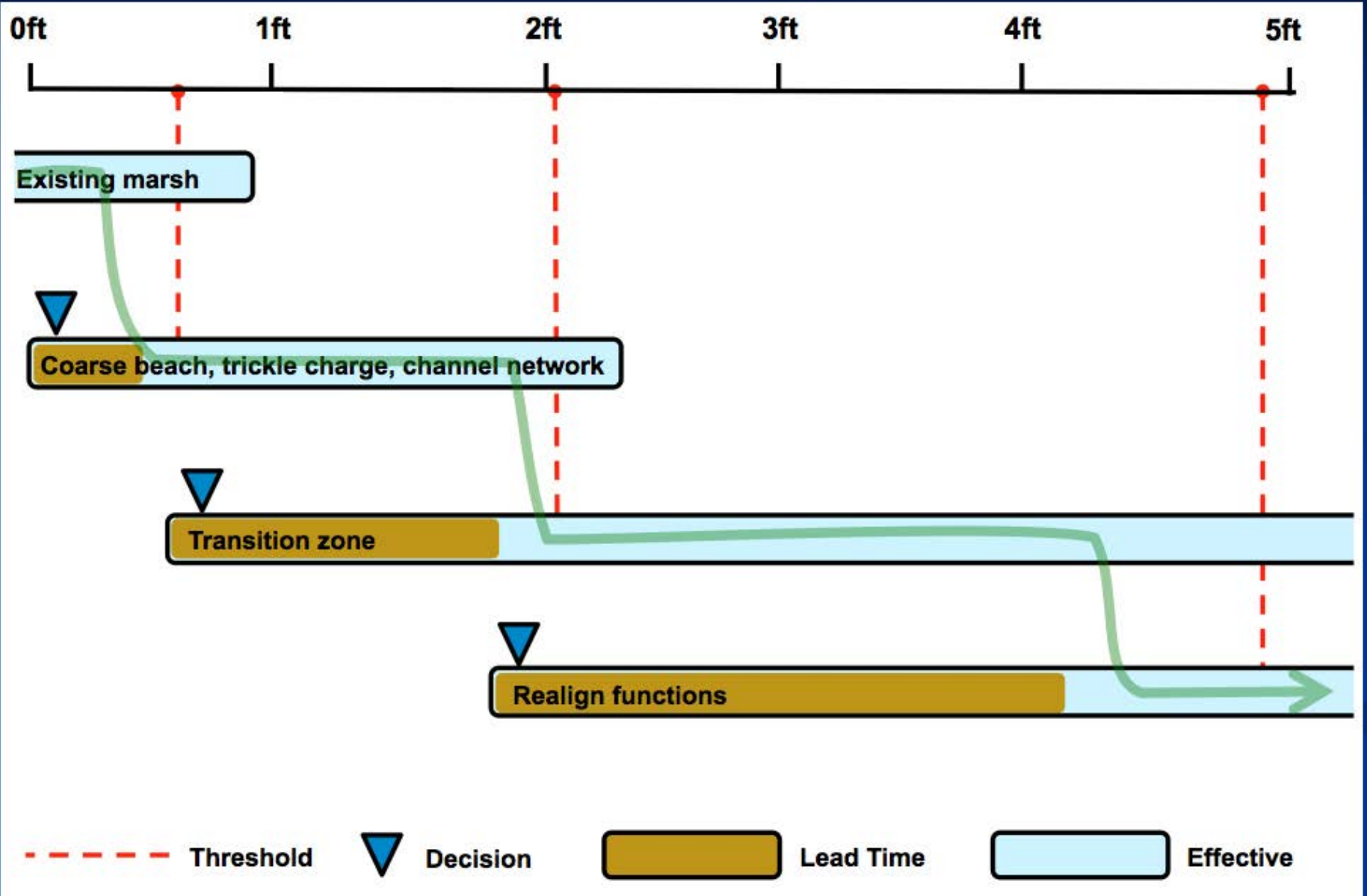


Migration-Space Measures



Example of a levee realignment, coupled with tidal marsh restoration

Conceptual Phasing of Measures



Baylands Goals Update Regional Recommendations

- 1 **Restore estuary-watershed connections.**
- 2 **Design complexity and connectivity into the Baylands landscape.**
- 3 **Restore and conserve complete tidal wetlands systems.**
- 4 **Restore Baylands to full tidal action prior to 2030.**
- 5 **Plan for the Baylands to migrate.**
- 6 Actively recover, conserve, and monitor wildlife populations.
- 7 Develop and implement a comprehensive regional sediment management plan.
- 8 Invest in planning, policy, research and monitoring.
- 9 Develop a regional transition zone assessment program.
- 10 Improve carbon management.

Thank you

And thank you to...

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