

Restoring Sustainable Estuaries

Steve Crooks Ph.D.

Philip Williams and Associates, Ltd.

Primer Taller Sobre Sitios Ramsar en Baja California Sur

November 7 2008

Structure of IPCC Fourth Assessment Report, showing contributions from the School of Environmental Sciences



SUMMARIES FOR POLICY-MAKERS

Working Group I

Working Group II

Working Group III

TECHNICAL SUMMARIES

Working Group I

Working Group II

Working Group III



WORKING GROUPS



WORKING GROUPS

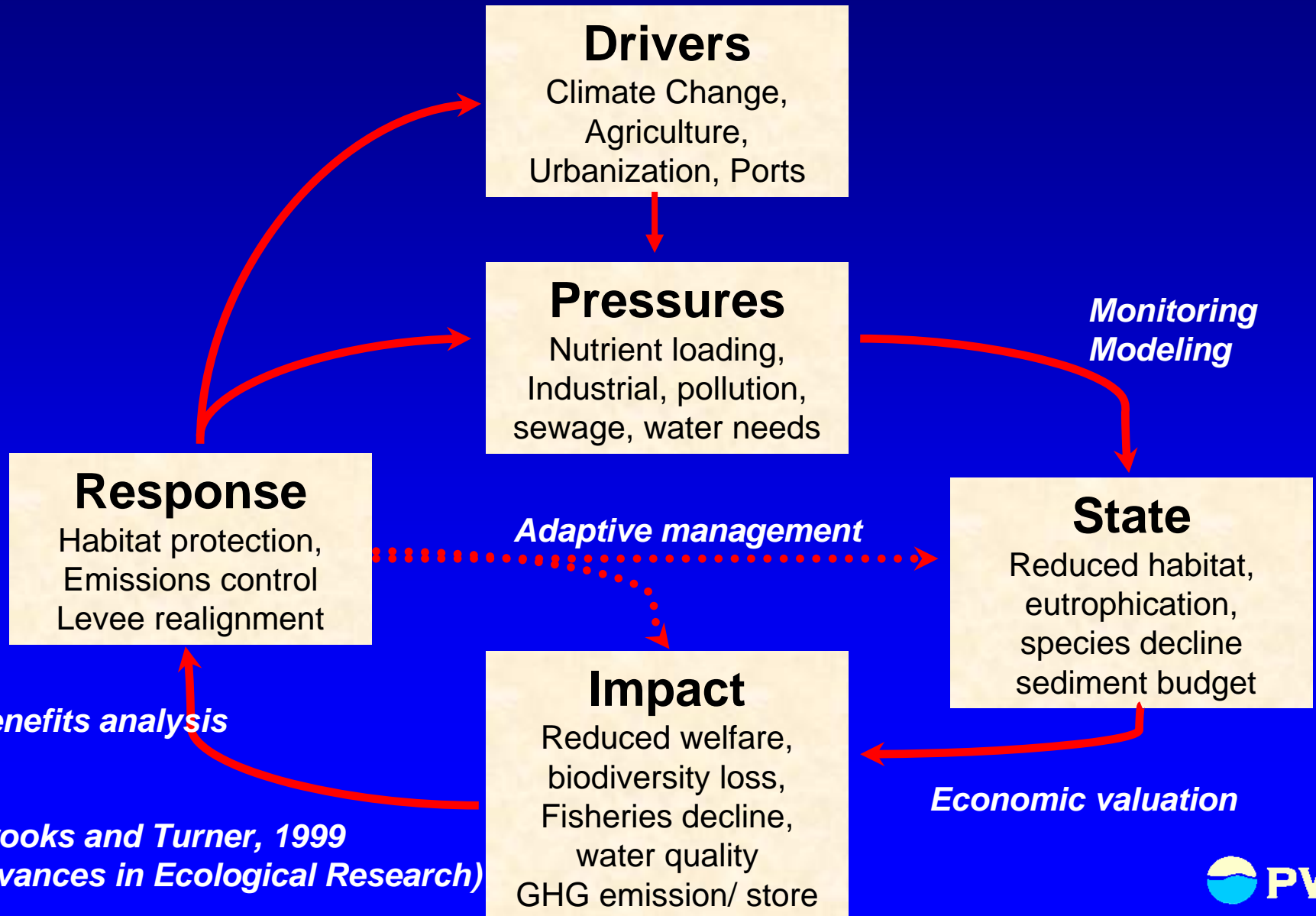


The Physical Science Basis
11 chapters

Impacts, Adaptation & Vulnerability
20 chapters

Mitigation of Climate Change
13 chapters

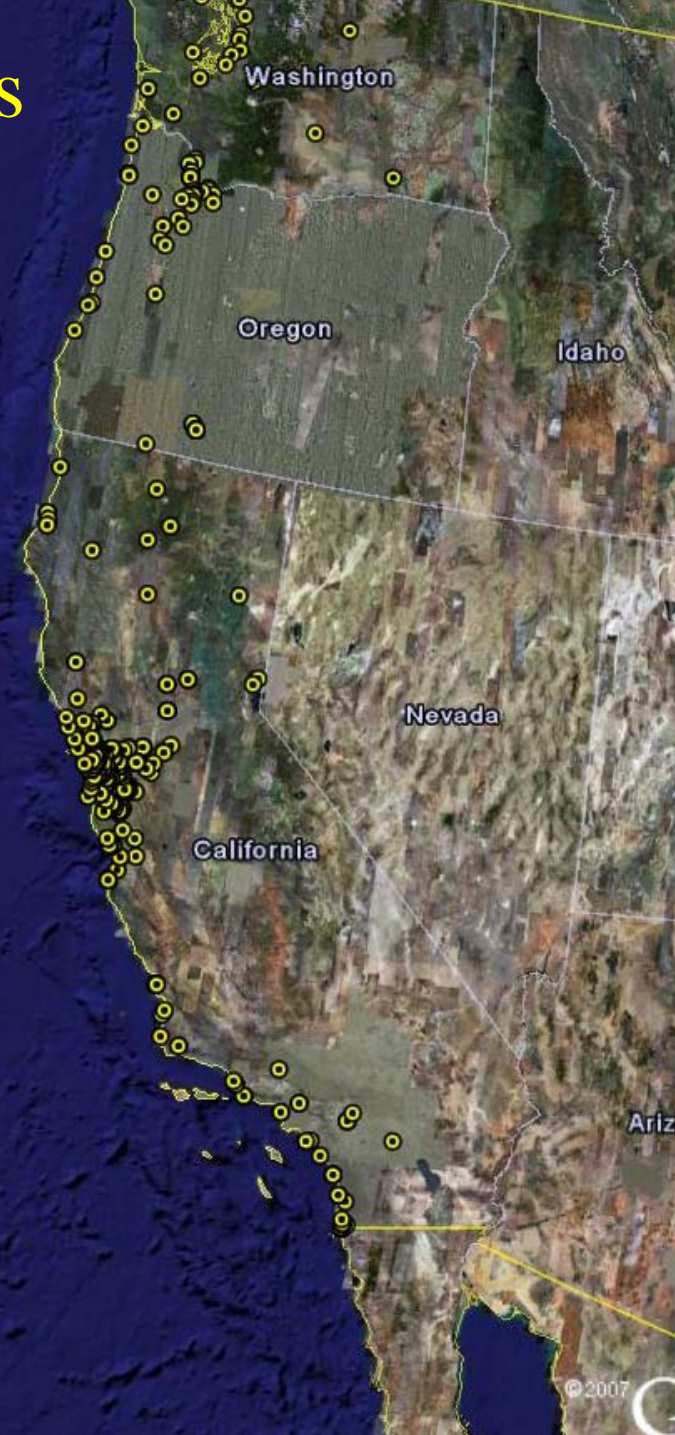
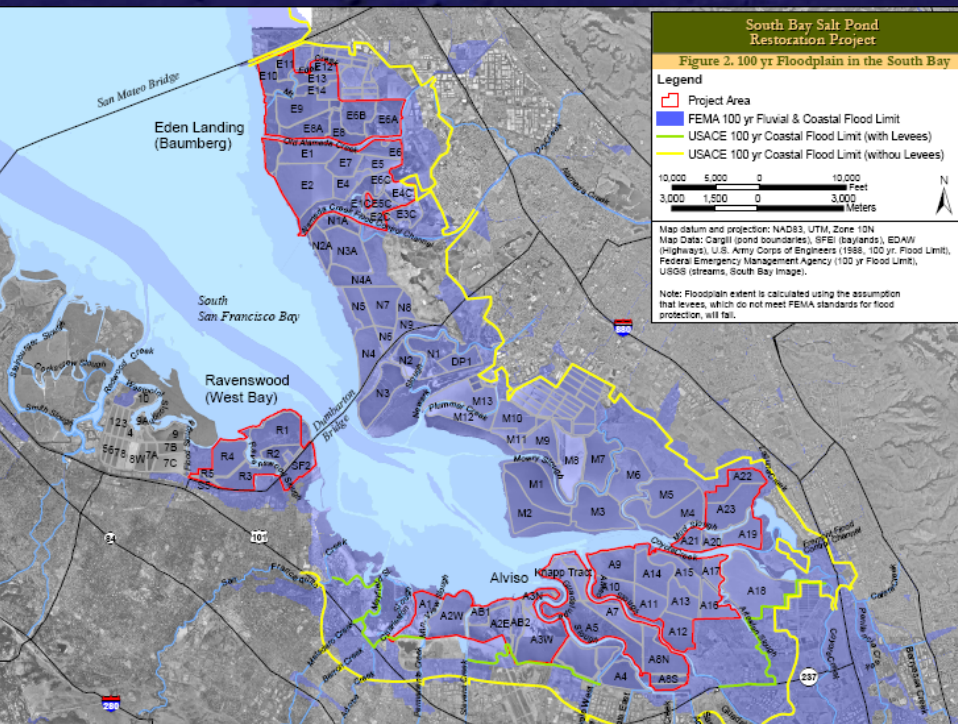
Sustainable Development



Philip Williams and Associates

30 years of restoration experience

Plans developed for most major Estuaries on west US coast



Planning Framework

Place technical information within a planning context

1. Set goals and objectives
2. Identify opportunities and constraints
3. Develop conceptual models of ecosystem restoration
4. Define evaluation criteria
5. Fill information gaps
6. Refine alternatives, include baseline (business as usual) scenario
7. Forecast future conditions
8. Document preferred alternative and decision process

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Restoration Goal

To restore a sustainable estuary within an urban and agricultural landscape that is resilient to human impacts and resilient to climate change and extreme weather conditions.

Restoration Objectives

(incomplete list)

- To protect the ecology of the San Jose Estuary, particularly native and endangered species
- Enhance the environment to benefit sustainable (environmentally sensitive) tourism and improve quality of life for local people
- To establish water management practices that support urban areas, agriculture and the estuarine ecology within the carrying capacity of the available water supply
- To balance natural variability in hydrology with protecting properties from flooding

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Opportunities

(incomplete list)

1. Restore estuarine native habitat and ecology
2. Improve water quality
3. Supply freshwater to groundwater aquifer
4. Reduce flood risk of flooding
5. Enhance estuary recreational amenity
6. Enhance quality of life for people around the estuary

Constraints

(incomplete list)

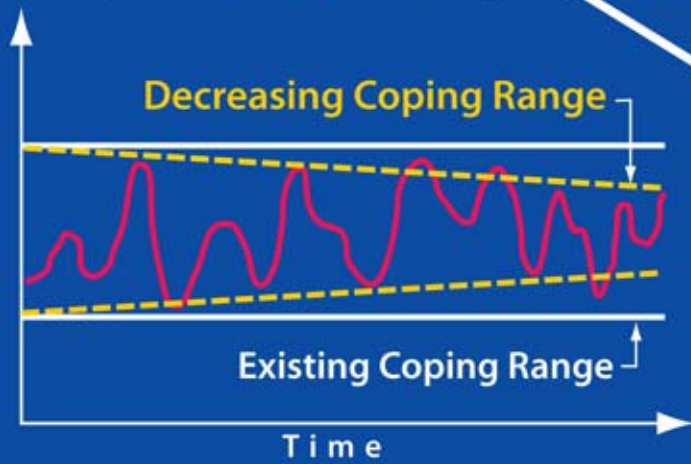
1. Lack of planning framework
2. Over-abstraction of groundwater
3. Configuration of existing infrastructure
4. Ongoing construction/ fill on floodplain and in wetlands
5. Downstream impacts of land use outside site administrative boundary
6. Flood risk to properties adjacent to estuary
7. Increased risk of flooding due to sea level rise (to be determined)
8. Loss of wetland recreational amenity
9. Available budget

Planning Framework

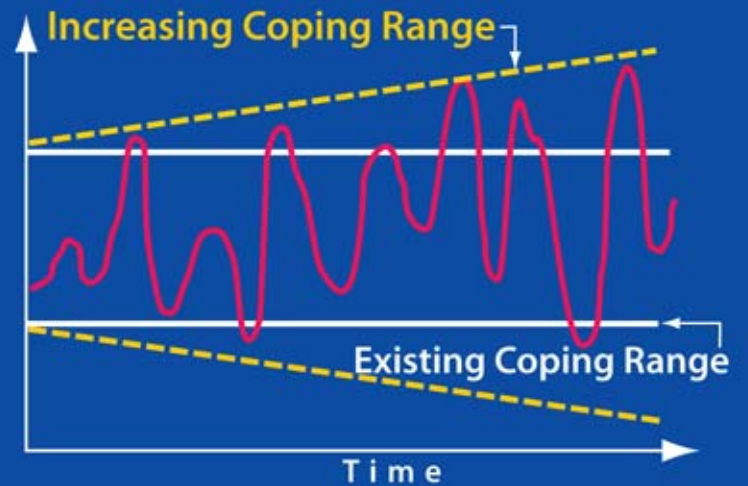
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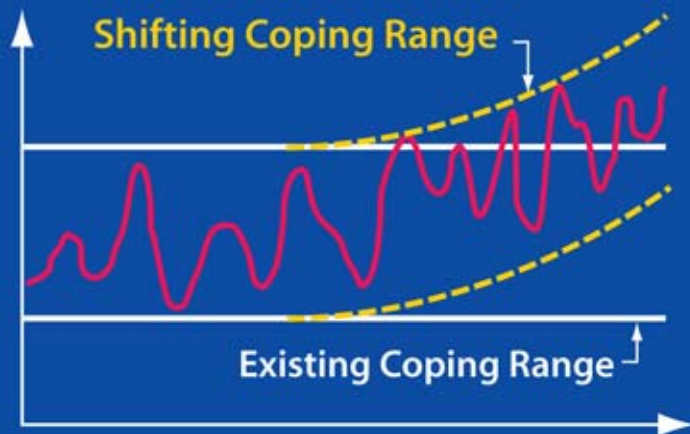
Degraded Estuary



Restoring Estuary



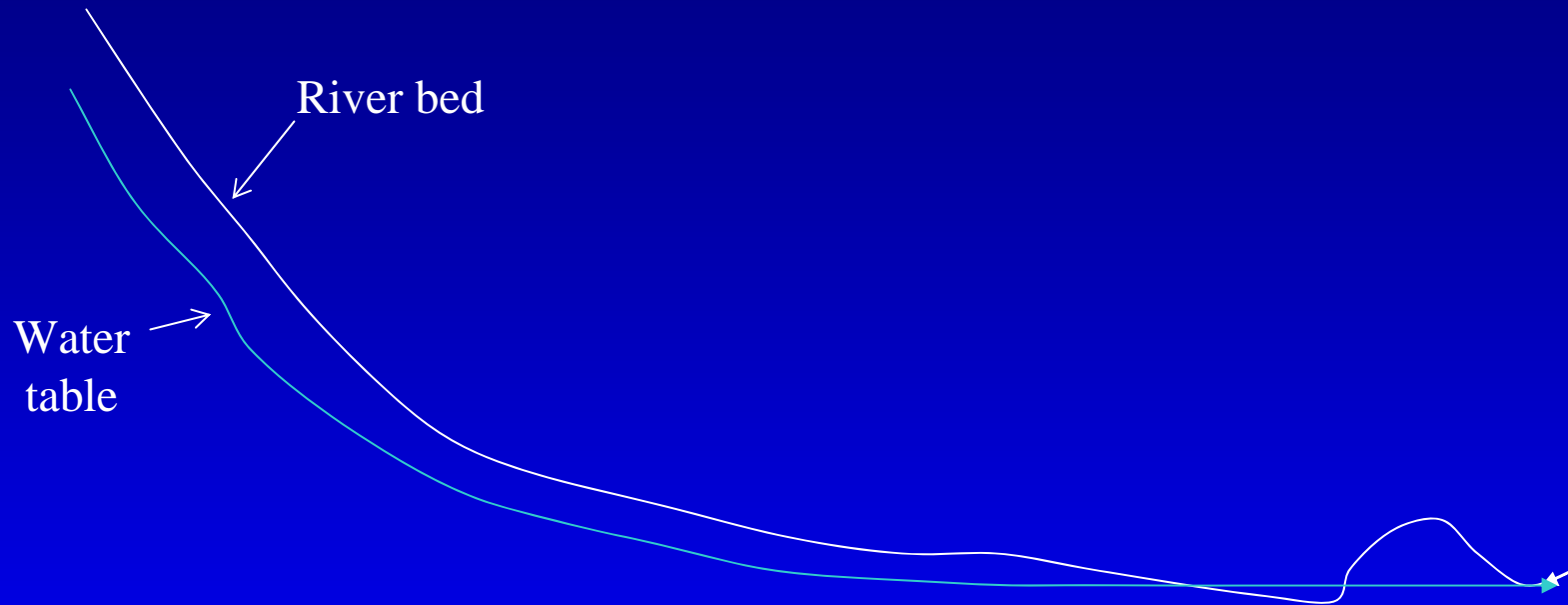
Sustainable Estuary



Mountain

Wetland

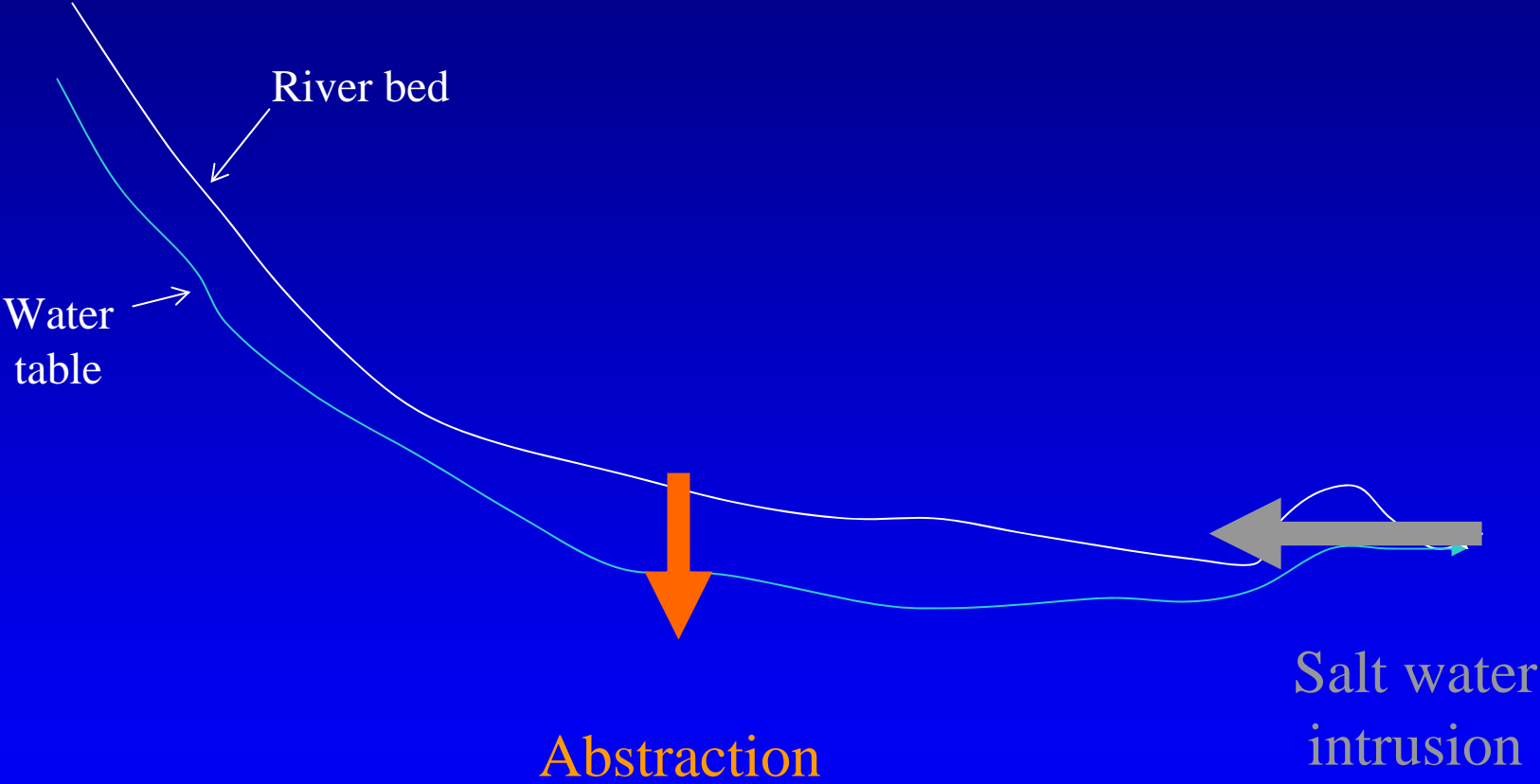
Sea



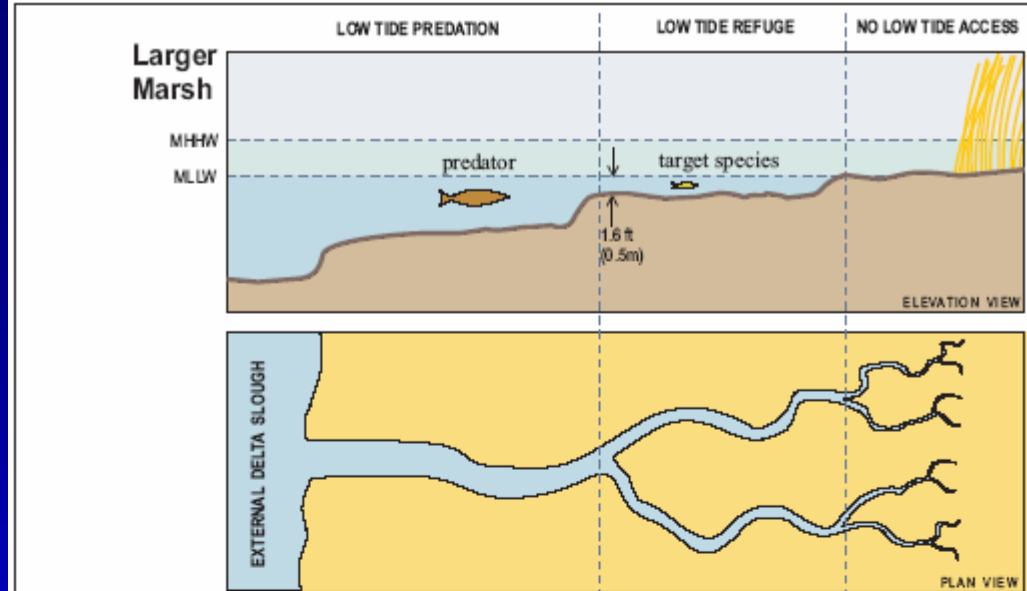
Mountains

Wetland

Sea



Design to Maximize Ecological Benefits



Hypothesis

Tidal channel networks in larger marshes provide shallow water refuge from predation throughout the tide cycle, whereas smaller channel networks in smaller marshes do not. Thus, larger marshes are expected to provide greater survival opportunities for juvenile salmon and splittail than smaller marshes.

Legend

- tule vegetation
- tule vegetation
- predator fish species
- target special status native fish species (juvenile salmon and splittail)

Notes:
MHHW = mean higher high water
MLLW = mean lower low water
Not to scale

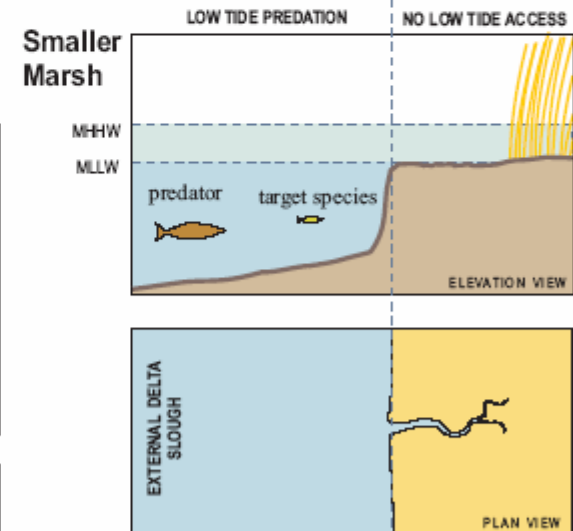


figure 12

Liberty Island Restoration Project - Phase 1

Hypothetical Relationship between Channel Geometry and Fish Refuge (schematic)

SIMPLIFIED CONCEPTUAL MODEL OF HOW RESTORATION ACTIONS TO CREATE SEASONAL WETLANDS BENEFIT SHOREBIRDS

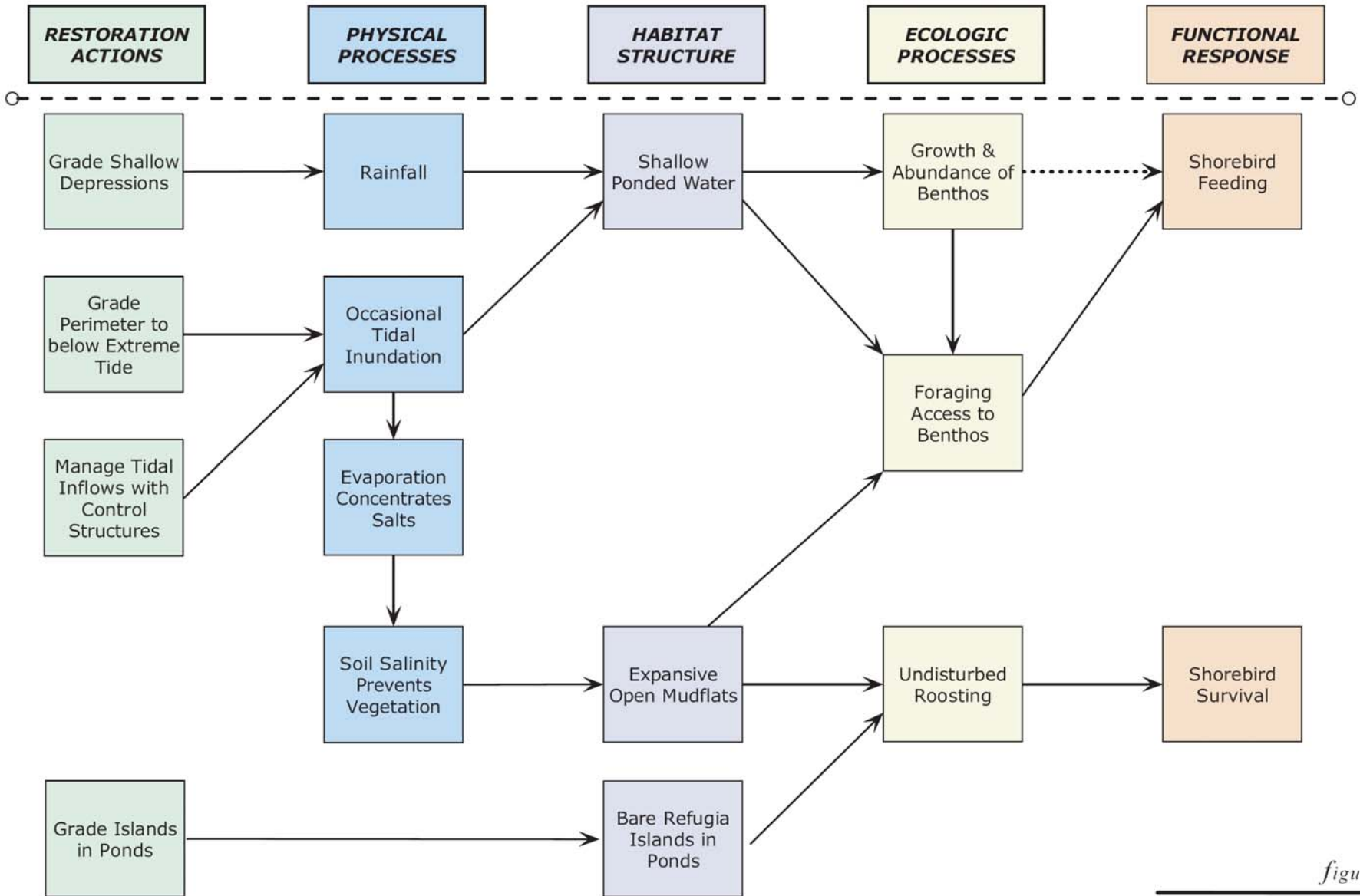


figure 2

HWRP Seasonal Wetland

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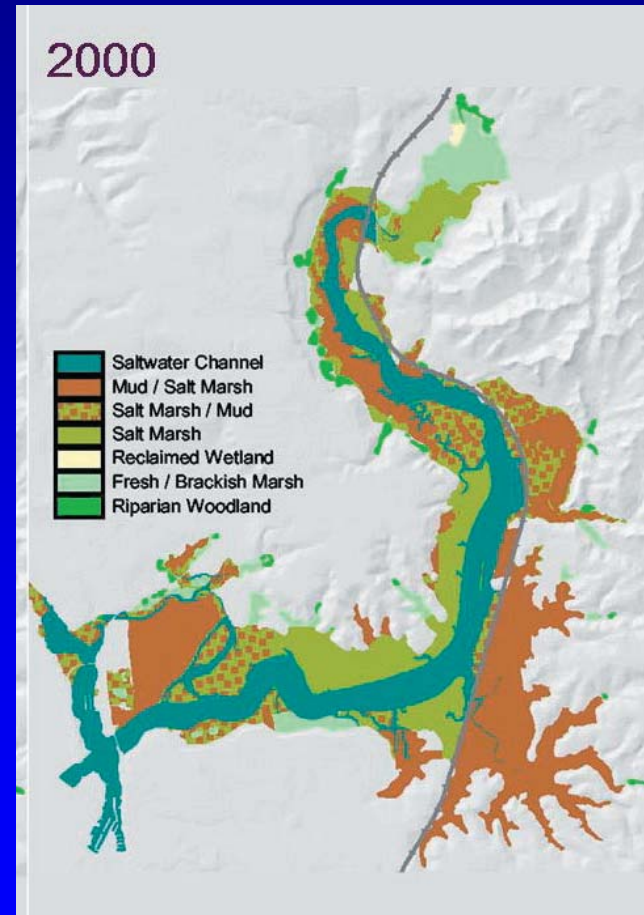
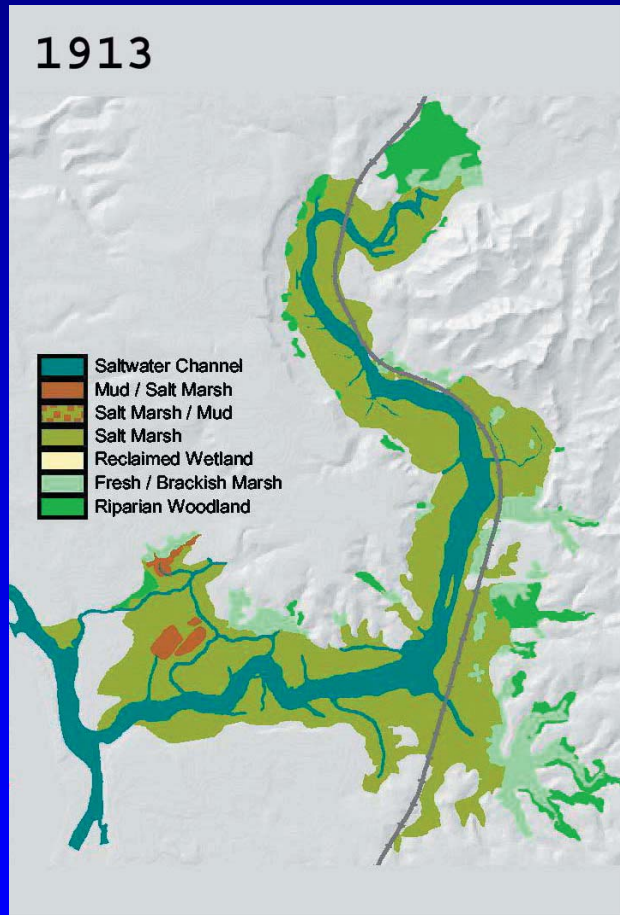
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Elkhorn Slough, Monterey Bay



Change observed in Elkhorn Slough are characteristic of sediment starvation



Van Dyke, E. and Wasson, K. 2005. Historical ecology of a central California estuary: 150 years of habitat change. *Estuaries* 28(2):173-189

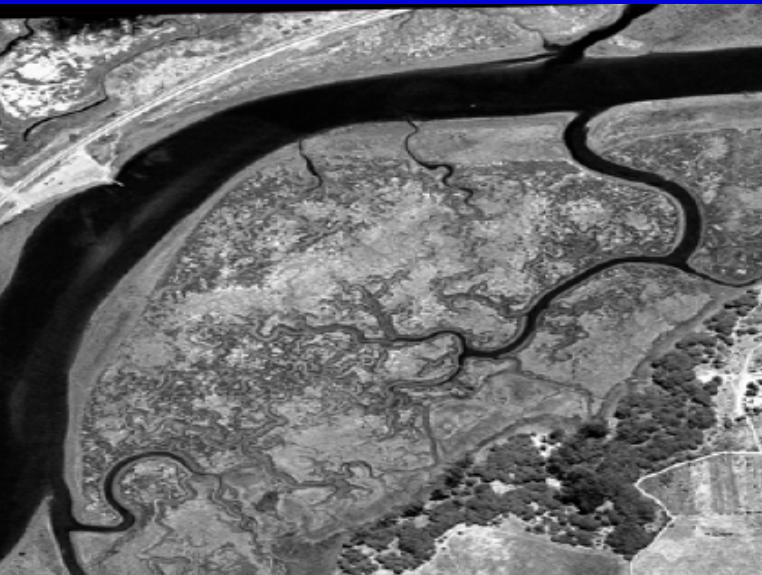
Elkhorn Slough – A Starved Estuary



1931

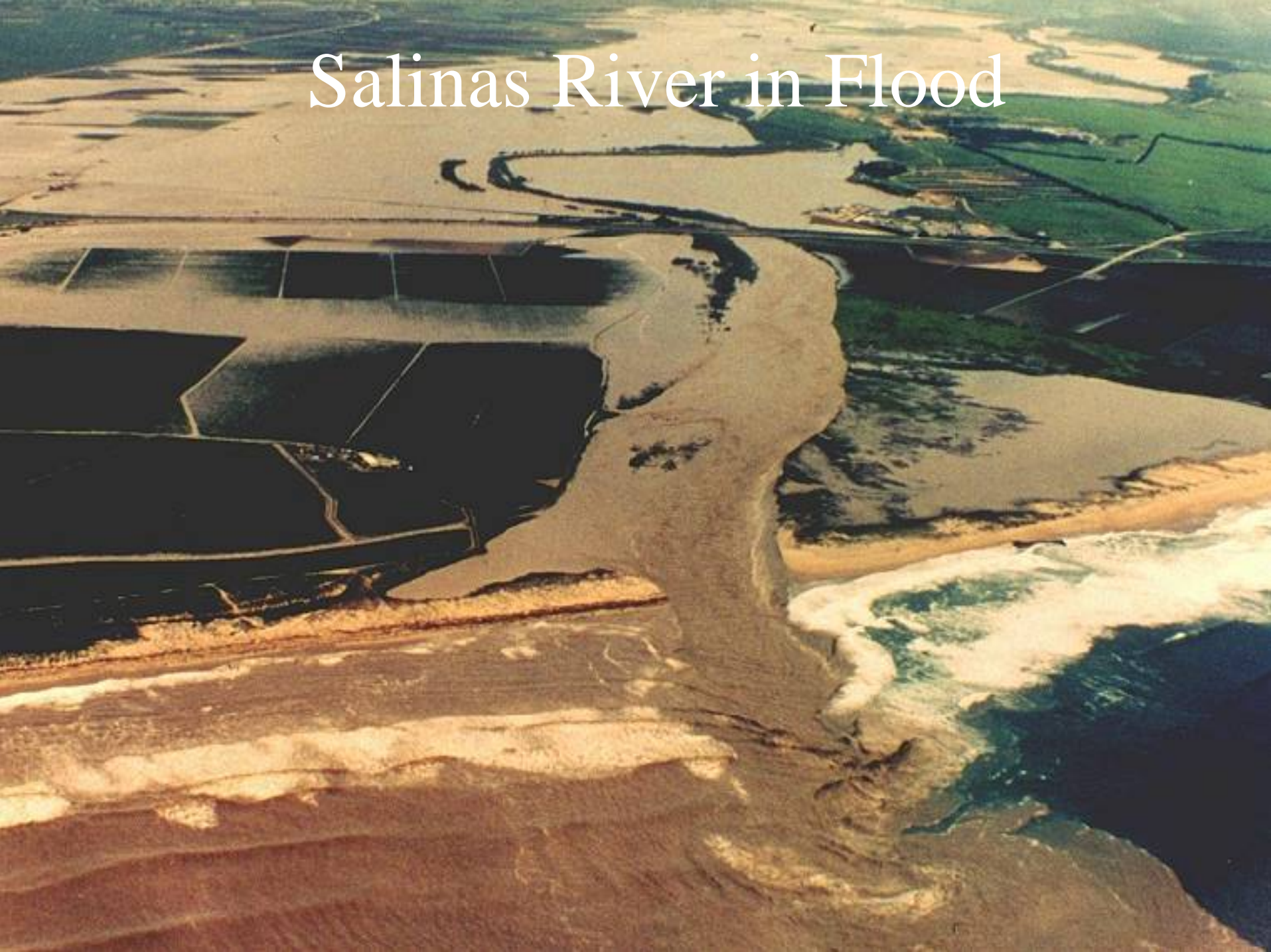


1956



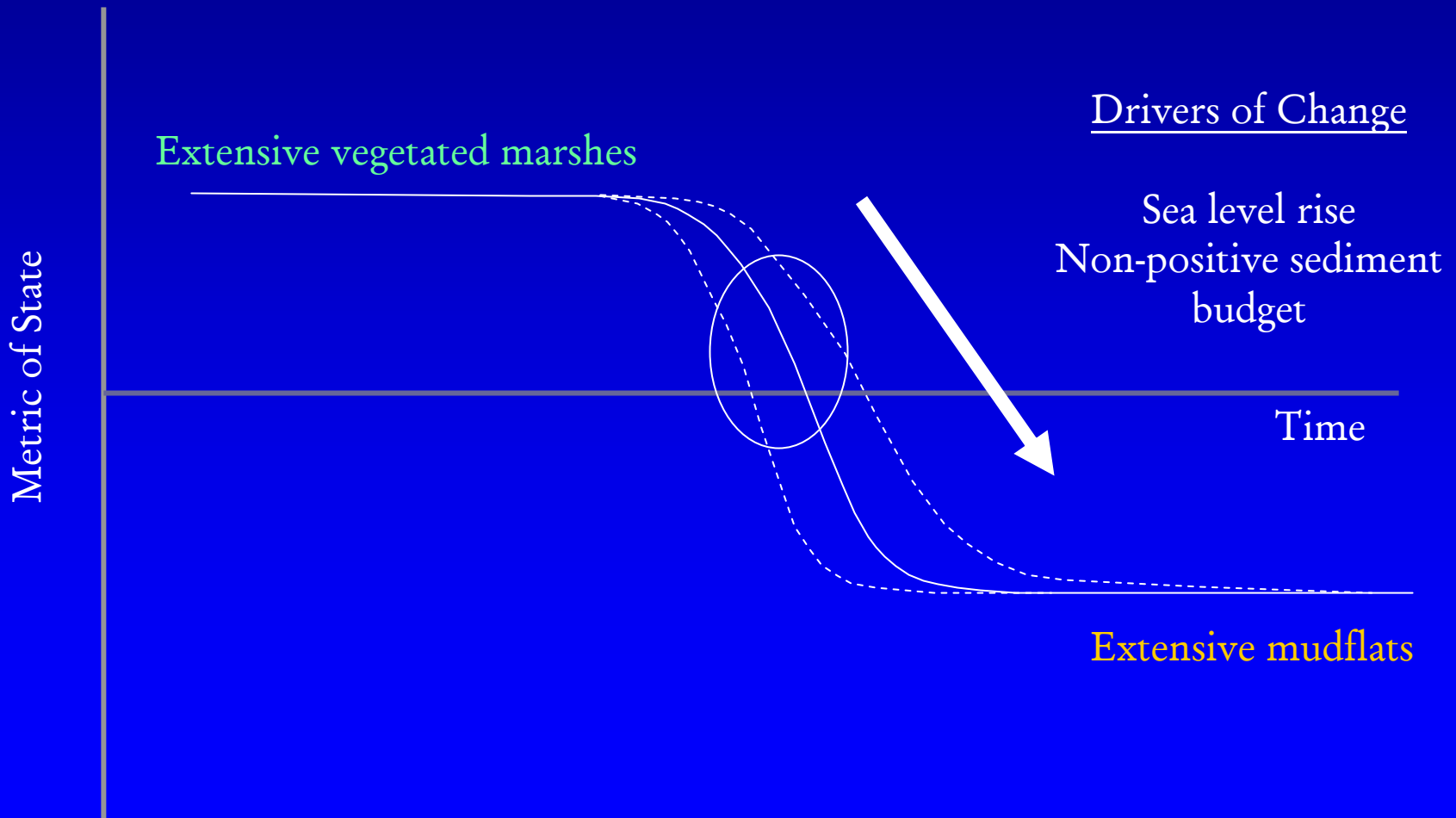
2003

Salinas River in Flood

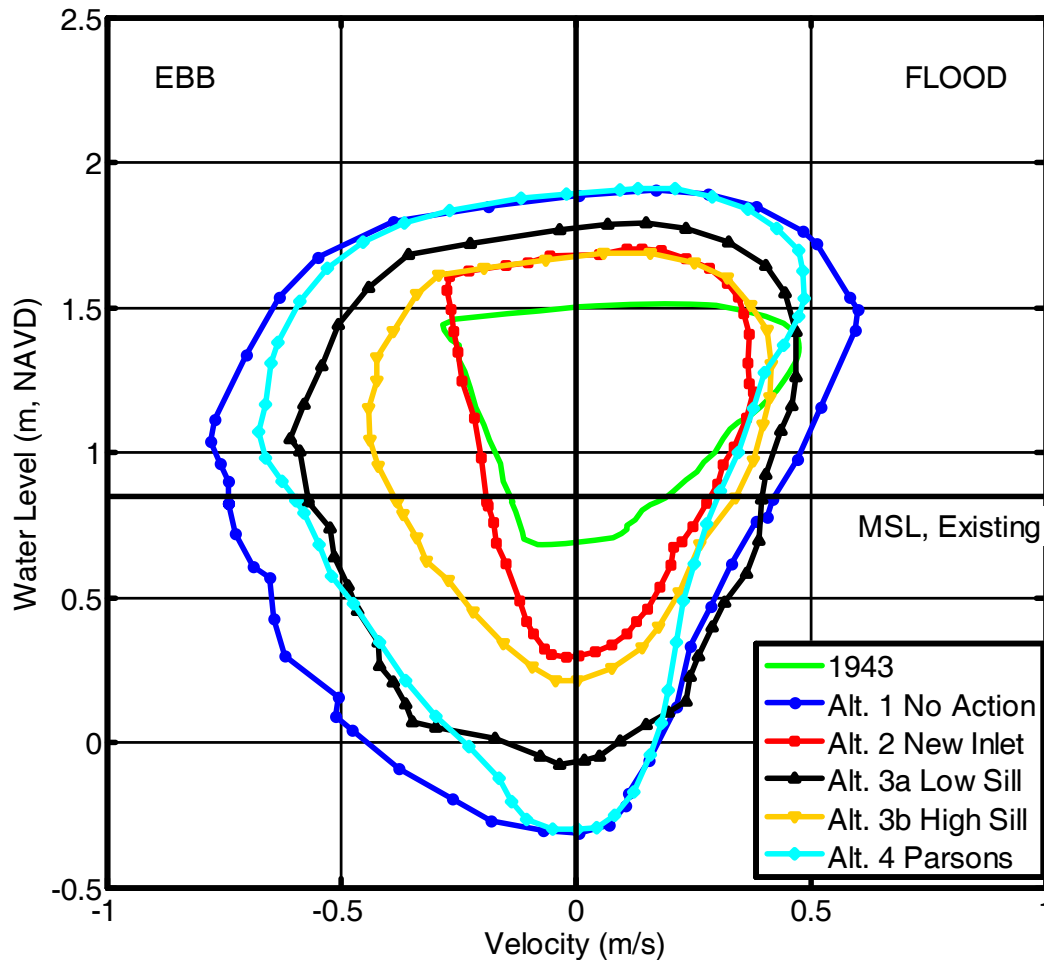




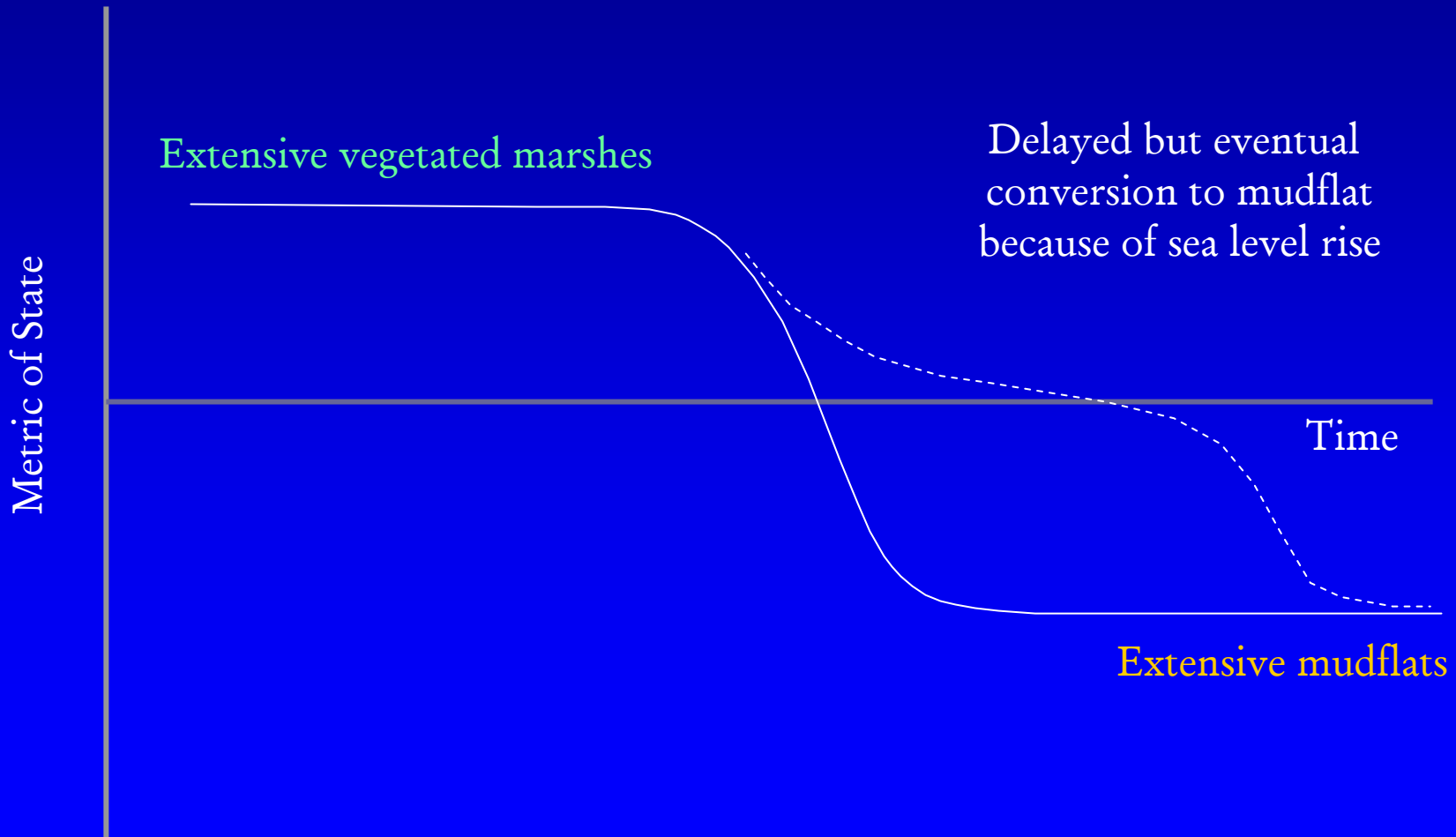
Baseline Condition



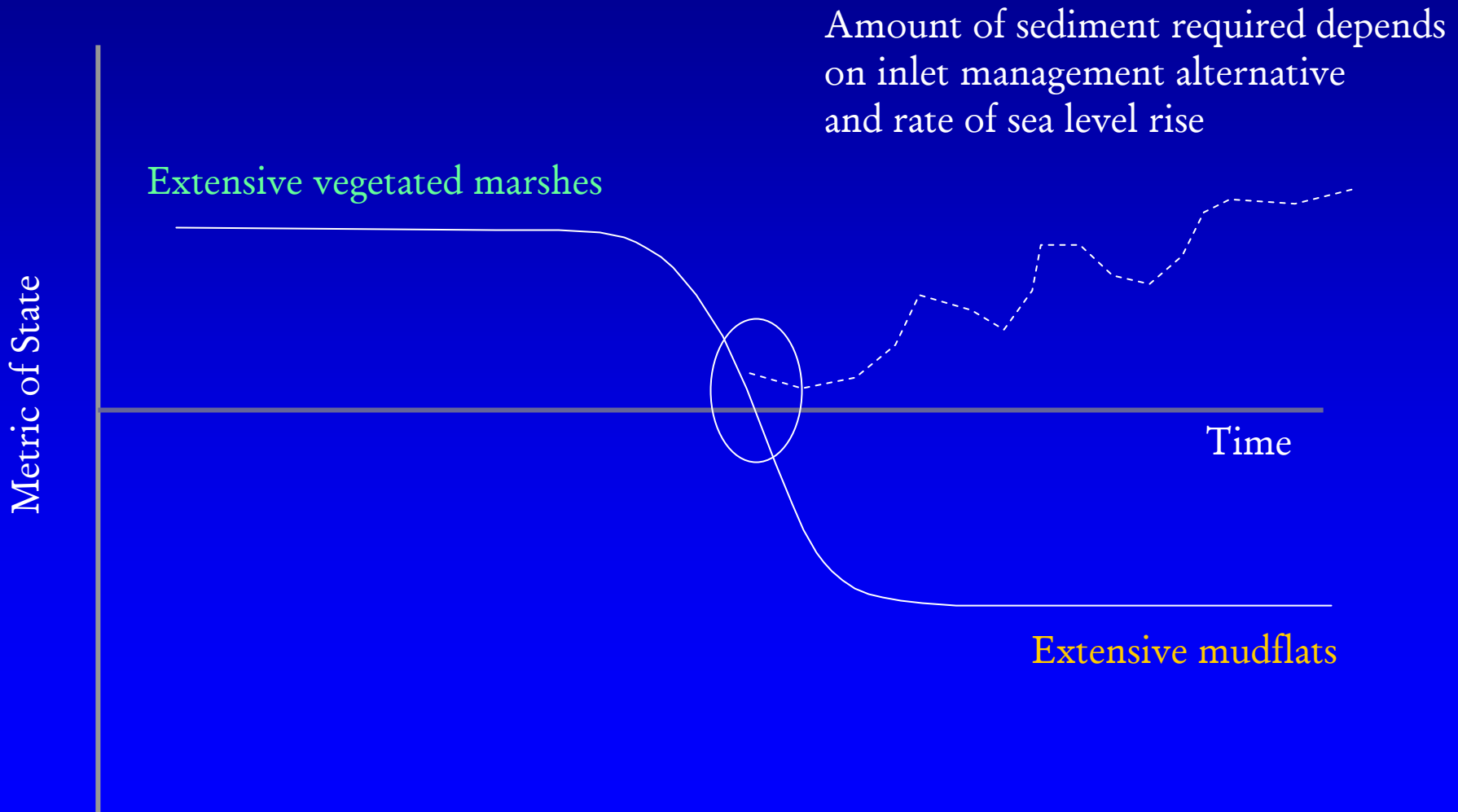
Management Alternatives: Flow Characteristics



Management Alternative without Restored Sediment Source



Alternative with Long-Term Sediment Management



http://www.elkhornslough.org/tidalwetland/williams_final_report/index.htm

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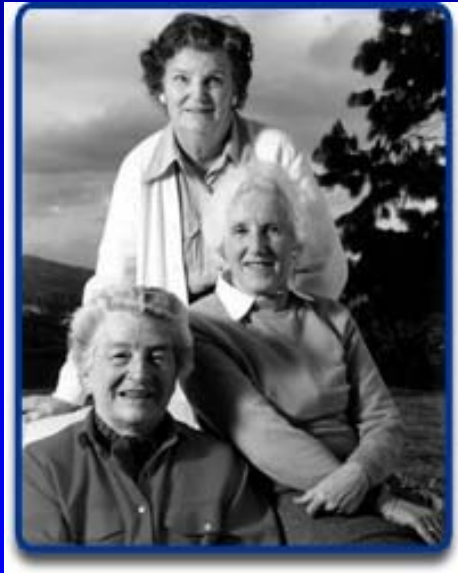
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Establish a Vision



An Age of Environmentalism



- 1961 Save San Francisco Bay Association
- 1965 The McAteer-Petris Act. (prevents fill in bay)
- 1969 The Bay Conservation & Development Commission (BCDC)
- 1968 USGS begin monitoring of San Francisco Bay
- 1972 Clean Water Act
- 1973 Endangered Species Act
- 1976 California State Coastal Conservancy
- 1976 California Coastal Commission
- 1976 PWA started by Phil Williams
- 1986 San Francisco Estuary Institute
- 1999 Baylands Ecosystem Habitat Goals

Kay Kerr, Sylvia McLaughlin and Esther Gulick

Conclusions

- Europe and the US historically made big mistakes while building around estuaries because, at the time, the value of wetlands was not appreciated and the tools to assess impacts were not available.
- The US is now spending billions of dollars to repair damage to its coastal environment caused by a history of unintended consequences.
- We now have the tools to predict impacts to coastal areas and wetland before they happen.
- Here in Mexico we have the opportunity to develop sustainable coastal areas balancing ecology, urban growth and tourism.

ITR Team

PWA

- Philip Williams Ph.D P.E. Project Director
- Steve Crooks Ph.D. Project Manager
- Matt Brennan Ph.D. Hydrodynamic Modeling
- Bob Battalio P.E. Engineering Design
& Cost Estimating

Steward and Associates

- Cleve Steward Estuarine Ecology
- Prof. Kirk Steinhorst Environmental Statistics

ECONorthwest

- Ernie Niemi Socio-economics

Recommendation 1

Develop a common project understanding

1. *Estuarine restoration*: action in a converted or degraded natural estuary that will result in the re-establishment of hydrologic, geomorphic and ecological processes, functions and biotic linkages and lead to a persistent, resilient system integrated within the landscape (based on SWS, 2000).
2. *Feasibility*: proposed action will achieve desired benefits within the limits of acceptable costs.

Recommendations

1. Develop a common project understanding
2. Clarify planning and study expectations
3. Place technical information in the planning context
4. Integrate information transfer through technical studies
5. Define baseline conditions (Change? How fast? Why?)
6. Identify alternatives