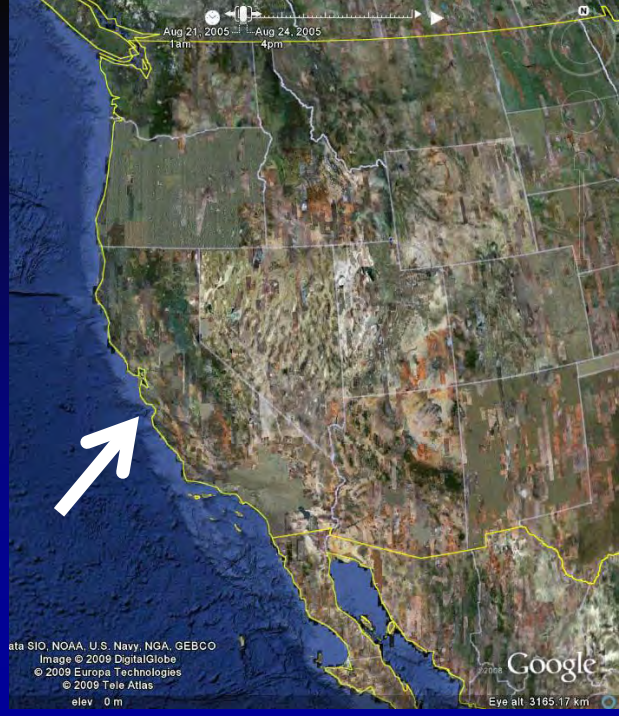
Elkhorn Slough Tidal Wetland Project

An Ecosystem Based Management Effort

Purpose: preserve and restore the ecosystem services of Elkhorn Slough



Bryan Largay

Elkhorn Slough National Estuarine Research Reserve

Western Coastal Managers Meeting
January 27, 2009

Funding

- NOAA CIAP
- David and Lucille Packard Foundation
- Resources Legacy Foundation Fund
- Environmental Protection Agency
- California Coastal Conservancy

Ecosystem Based Management
Key Components

Goal: protection/restoration of ecosystem services

Process and scope

- Whole ecosystem, including people
- Stakeholder engagement

Understanding the system

- Natural boundaries
- Connections between components
- Cumulative impacts

Management options

- Uncertainty
- Trade-offs
- Adaptive management

❖Adapted from K. Heiman 2008

West Coast EBM Network

San Juan Islands, WA

Port Orford, OR

Humboldt Bay, CA

Elkhorn Slough, CA

Morro Bay, CA

Ventura watershed, CA

- Coalition of 6 projects
- Share lessons learned and overcome challenges
- Formed in February 2008
- 1st annual meeting in October 2008 hosted by the San Juan Initiative

Elkhorn Slough
An exceptional resource

750+ species
50,000 visitors each year

Salt Marsh & Tidal Creeks
800 acres

Mudflat
1,600 acres

Channel &
Tidal Creeks
300 acres

Focus threat: Marsh die back, 20% in 50 years

Marsh Loss

200 acres of marsh have died back

80% gone by 2053

Factors contributing marsh die back: River diversion - 1908

Originally shared mouth with Elkhorn Slough
Sediment helped to build marshes

1853

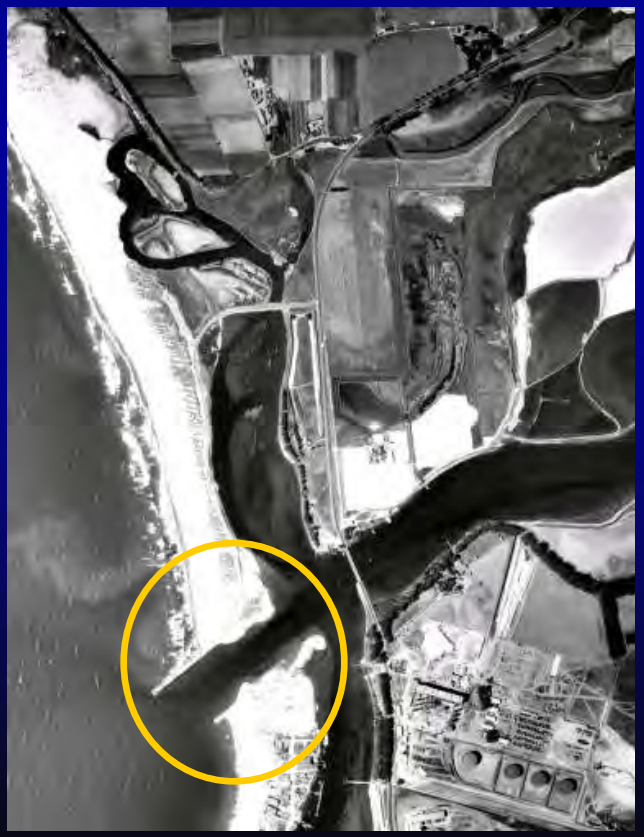
Salinas River in Flood

Factors contributing to marsh die back
Harbor construction - 1947

High tide shifted upwards by 30 cm

Result: Rapid rise in sea level relative to the marshes

1931



1949

An Ecosystem Based Management Approach:

Science directed towards Implementation

Project Leads

- MBARI - Ken Johnson & Judy Kildow
- ESNERR - Kerstin Wasson, Becky Suarez, Eric Van Dyke
- ESF - Mark Silberstein
- Ocean Foundation – Linwood Pendleton

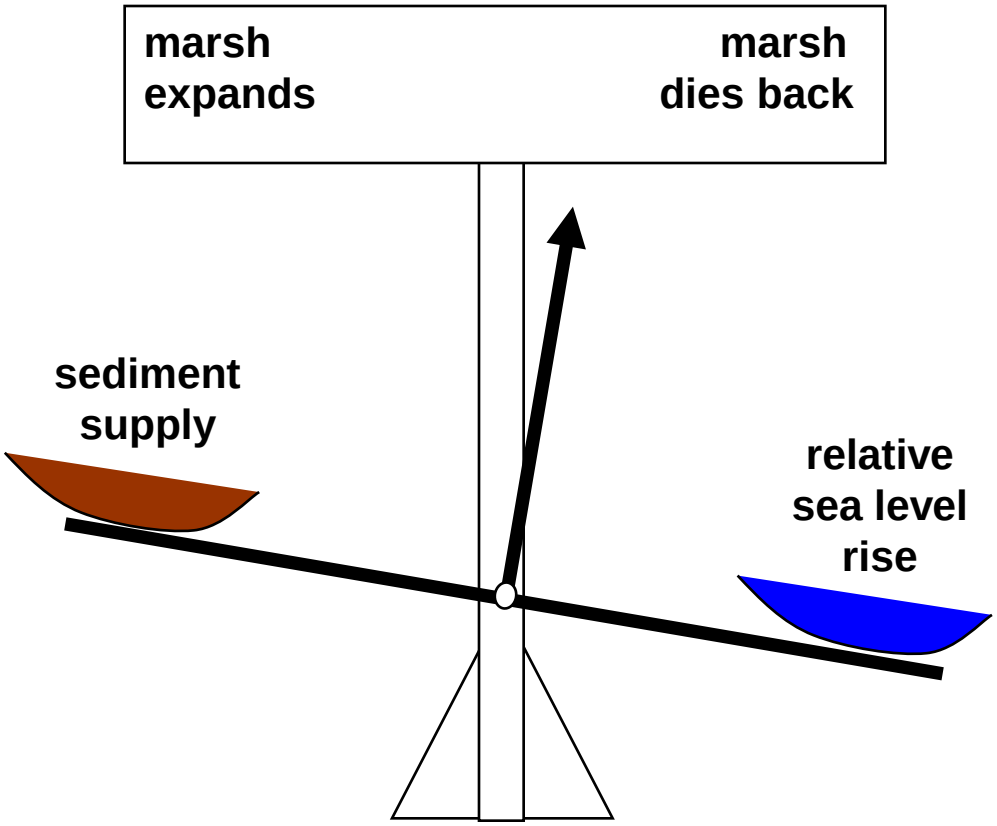
Consulting Team

- Philip Williams and Associates, Ltd. & H.T. Harvey & Associates

Modeling Advisory Team

- CSUMB, USGS, USF, SFEI, UC-Davis, Bay Modeling

Marsh geomorphic processes are heavily influenced by sedimentation and sea level rise



Conceptual diagram after Lane, 1955

Tidal Wetland Preservation: Management options

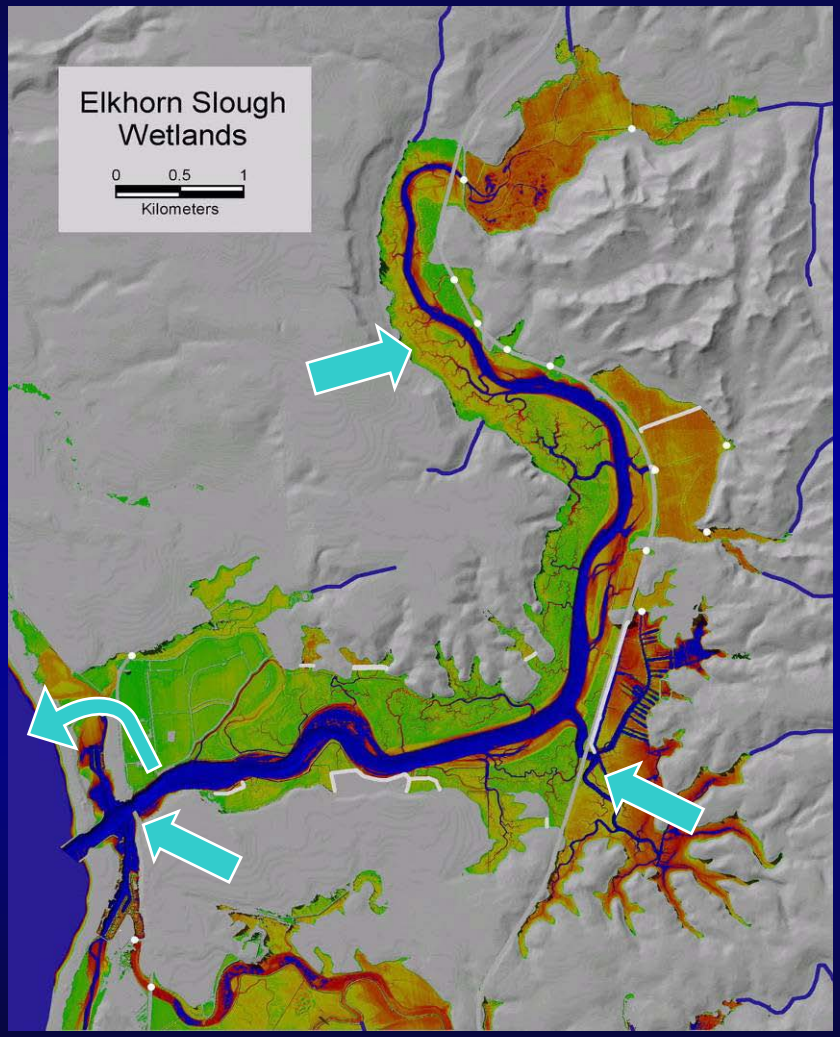
<u>Large Scale Actions</u>

New ocean inlet

Submerged tidal barrier

Add sediment to marshes

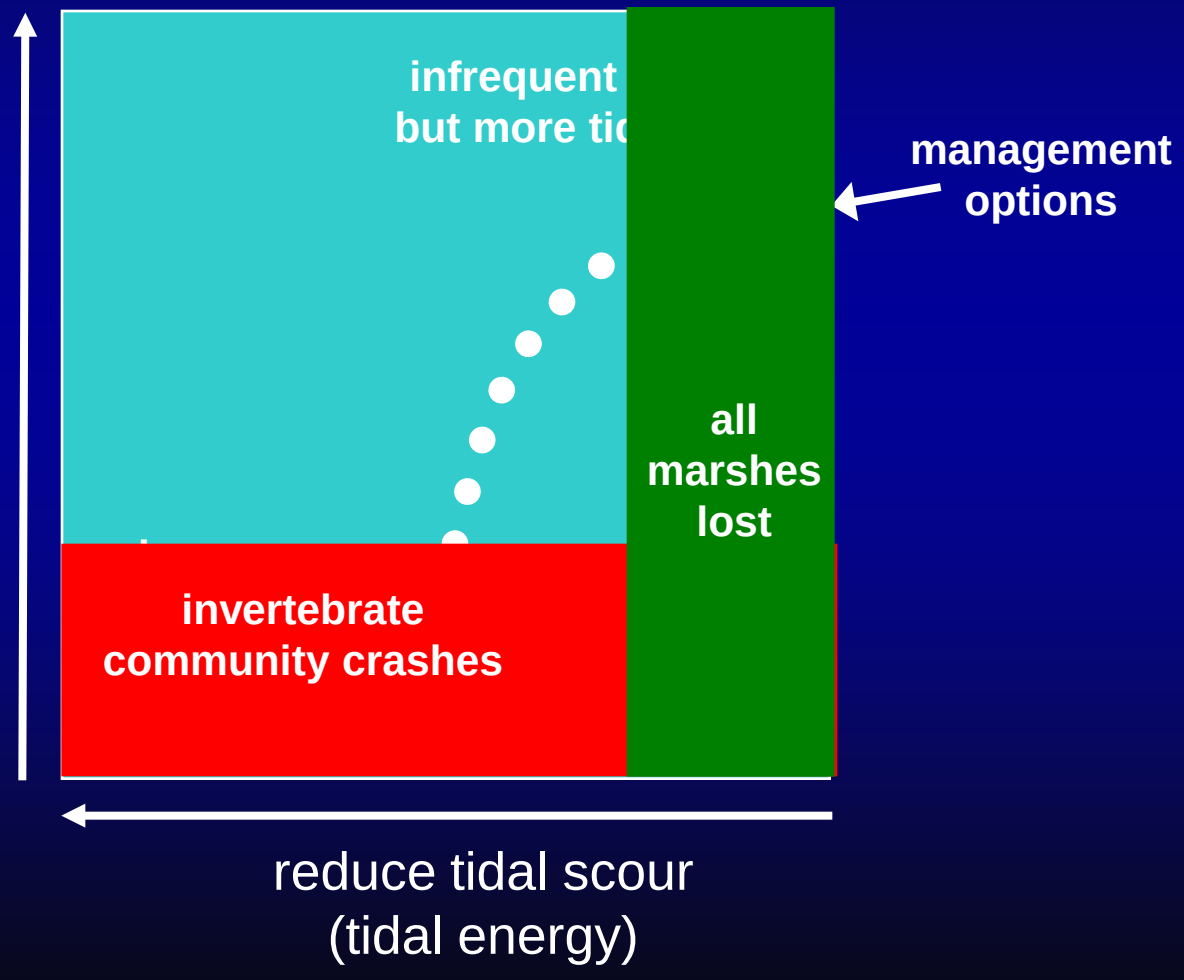
Reconnect a major river



Finding:
The faster sea level rises, the less of a difference the projects make

Trade-offs: Identify constraints
Eliminate alternatives
Key: Define objectives, rank goals

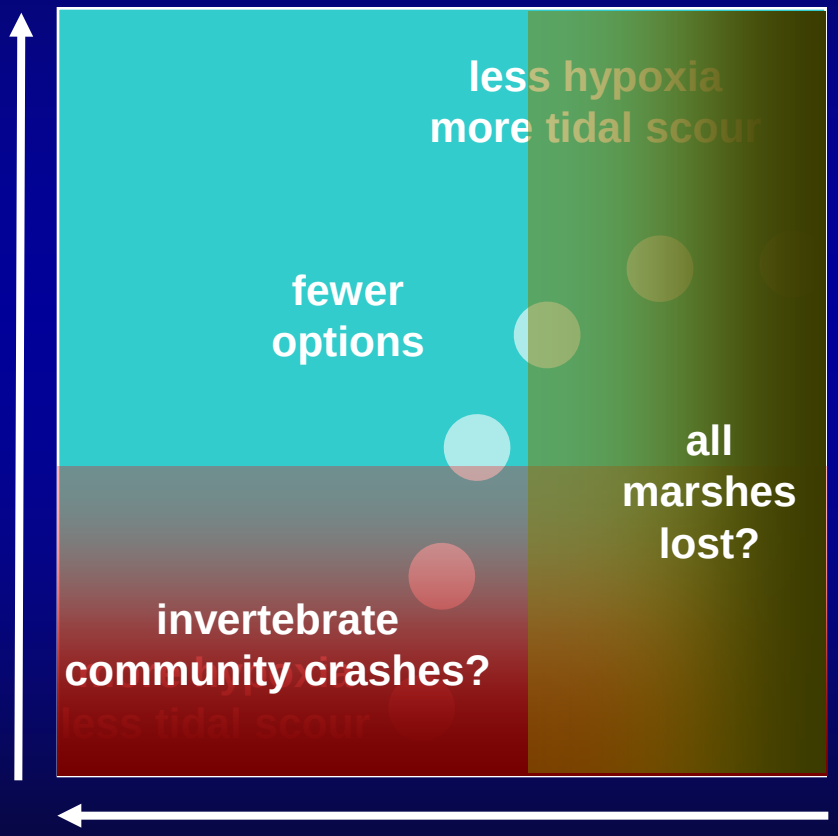
Comparison of two objectives



Tradeoffs:
Uncertainty, Adaptive Management
Know what you don't know

Reality sets in

improve water quality
(dissolved oxygen)



reduce tidal scour
(tidal energy)

Is wetland preservation worth it?
Will rapid sea level rise negate the project's benefits?

If sea level rises quickly
preservation efforts may not last long

If sea level rises slowly, the project should last a long time

Lessons from Risk Management:

probability of an event

X severity of the hazard

risk

Risk Management and accelerating sea level rise
Urban settings – how risky is ignoring sea level rise?

Urban infrastructure

Scenario: We ignore accelerating sea level rise

probability that sea level actually rises quickly

X hazard: $100s billions in losses, lives lost

The Risk is high even if the probability is low

Prudent course of action:

Prepare for accelerating sea level rise

Risk Management and accelerating sea level rise
Tidal wetland preservation: two approaches

Scenario 1: Wetland preservation moves ahead

probability that sea level rises quickly

X hazard: loss of investment in the project ($)

Scenario 2: Wetland preservation effort is abandoned

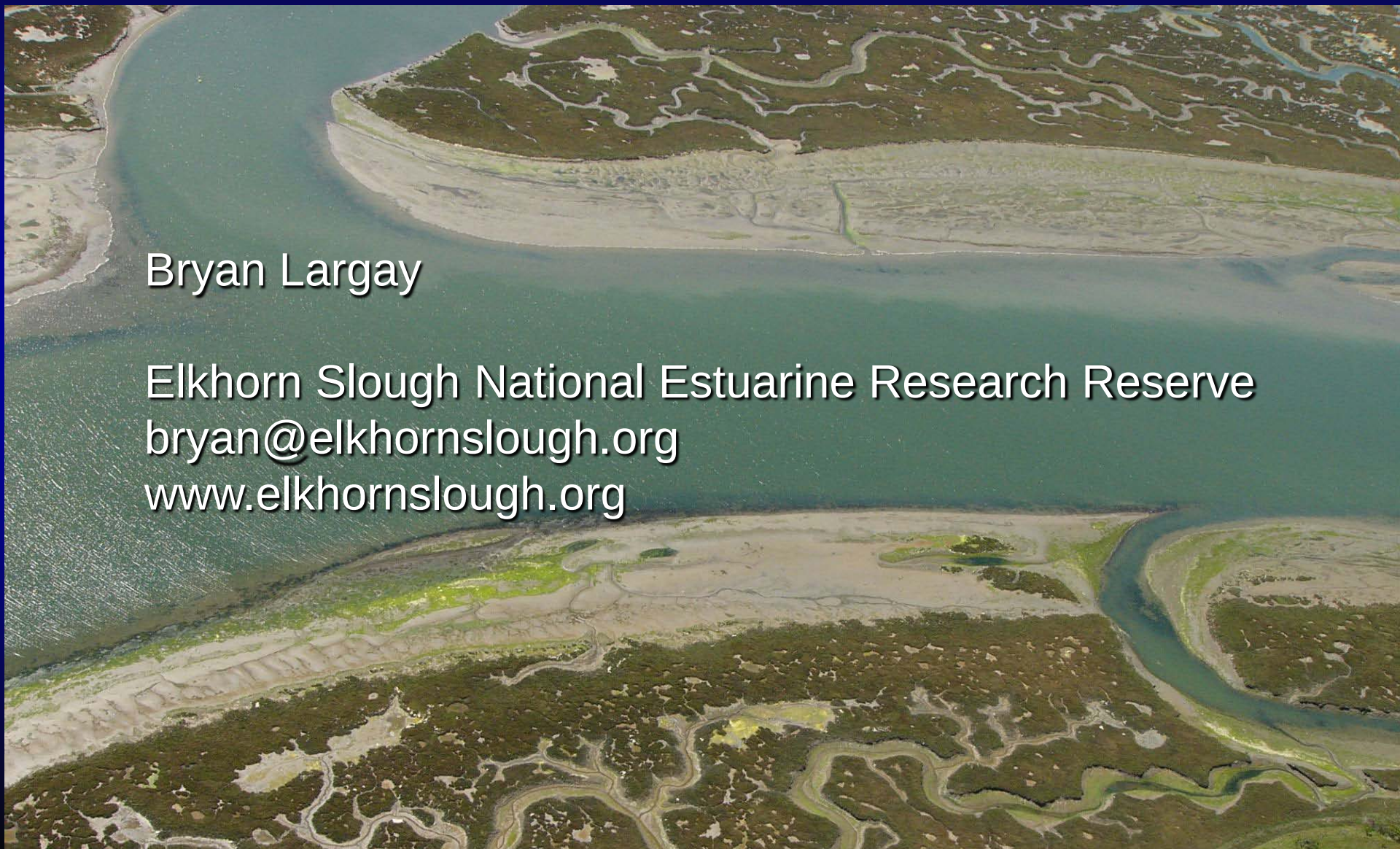
probability that sea level rises gradually

X hazard: loss of the wetlands ($ + ?)

Which approach has the greater risk?

Should habitat and urban settings use the same assumptions?

Elkhorn Slough Tidal Wetland Project
Ecosystem Based Management



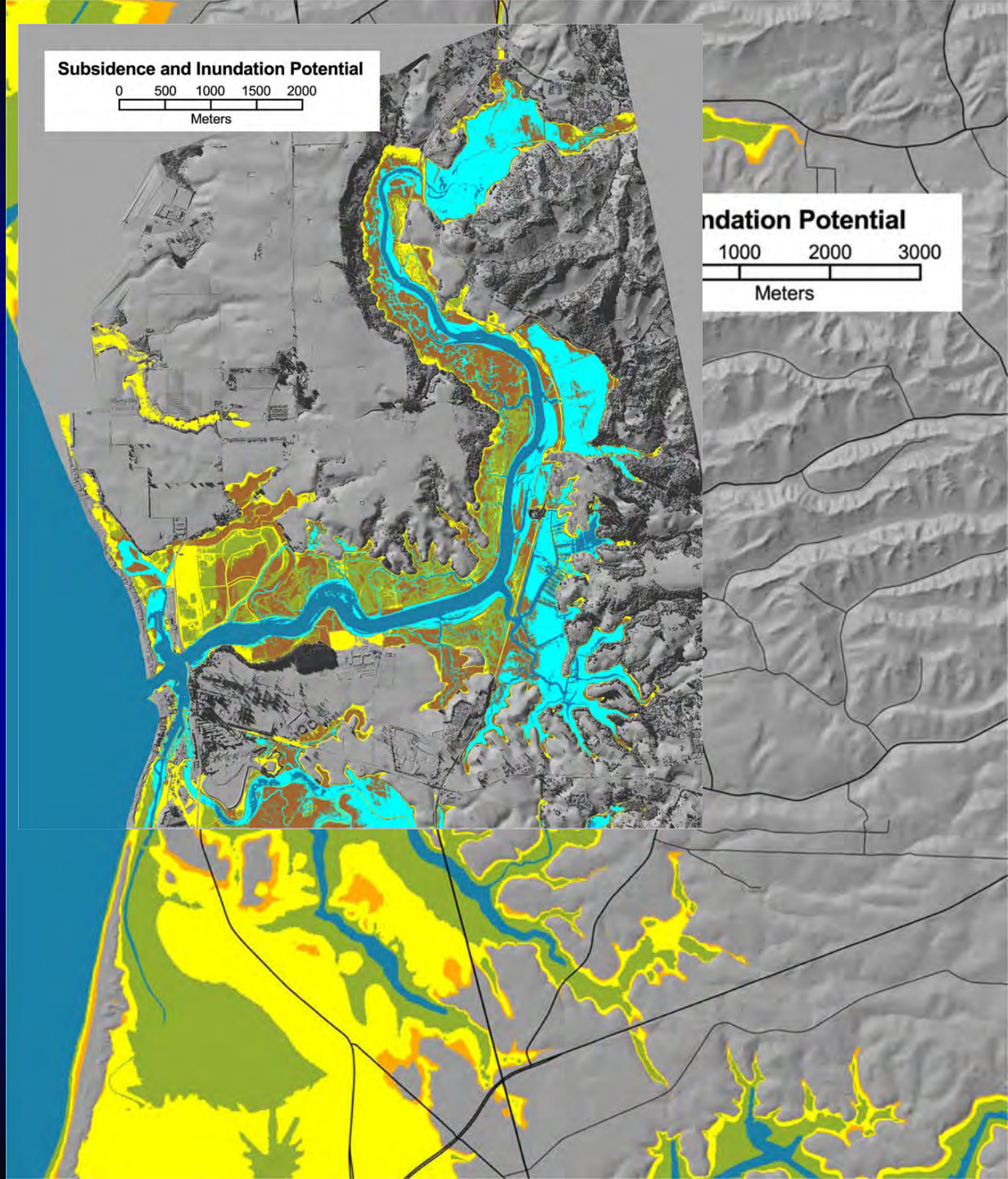
Bryan Largay

Elkhorn Slough National Estuarine Research Reserve
bryan@elkhornslough.org
www.elkhornslough.org

Risk Management and accelerating sea level rise
Adaptive management

Adaptive management strategies

- Incremental planning horizons (10 years)
- River floodways: sediment to offset sea level rise
- Adjustable structures
- Landward migration of habitats

Extent of regional subsidence:

Nearly all lower valley lands