

Dutch Slough

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The Promise of Restoration and the
Challenge of Adaptive Management

Or perhaps –

The Threat of Urbanization and the
Sideshow of Adaptive Management

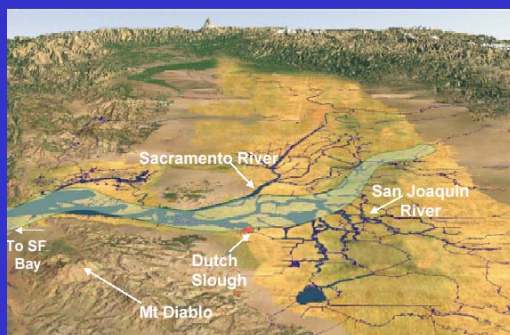
Restoration • Rehabilitation • Reconciliation

*Reconciliation Ecology is the science of
inventing, establishing and maintaining new
habitats to conserve species diversity in places
where people live, work or play.*

Adaptive Management: A Response to Uncertainty

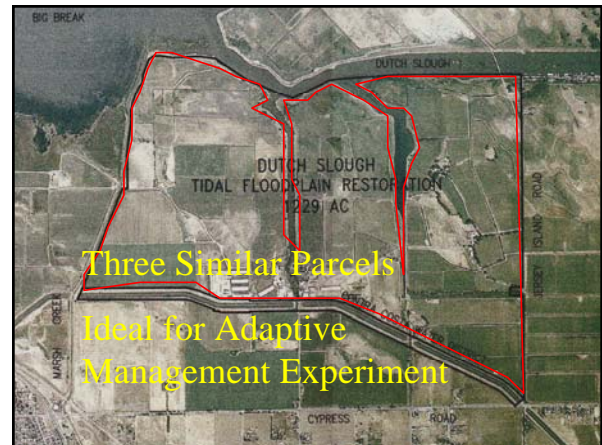
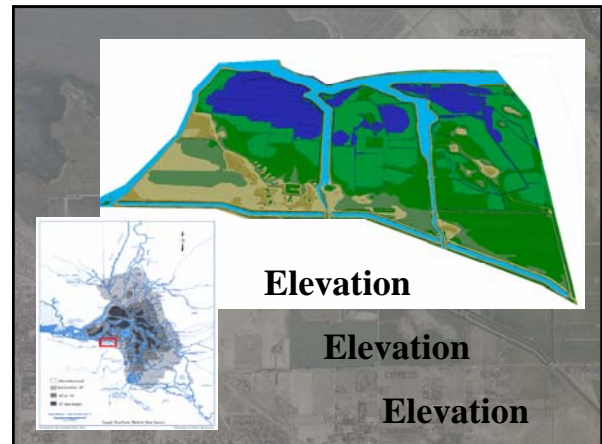
- Designing restoration projects as experiments to test hypotheses and increase understanding about how ecosystems function and how humans can best restore them.
- All policies are experiments, learn from them.

**Where there is no uncertainty, there is
no need for adaptive management.**



Dutch Slough

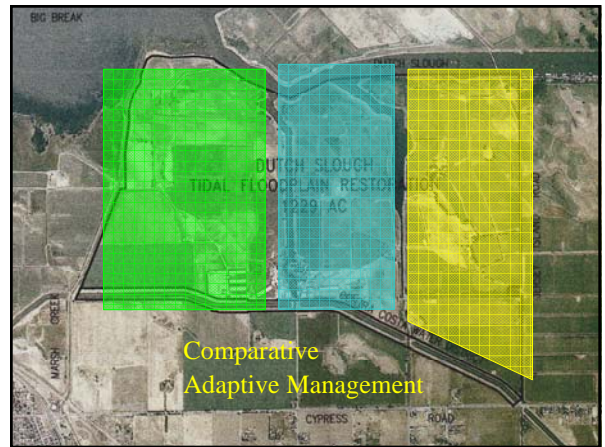
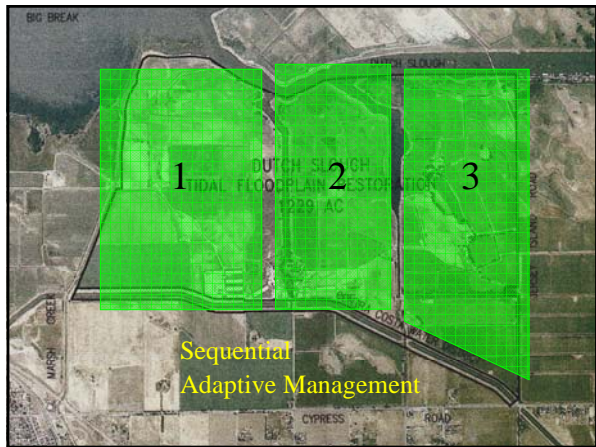
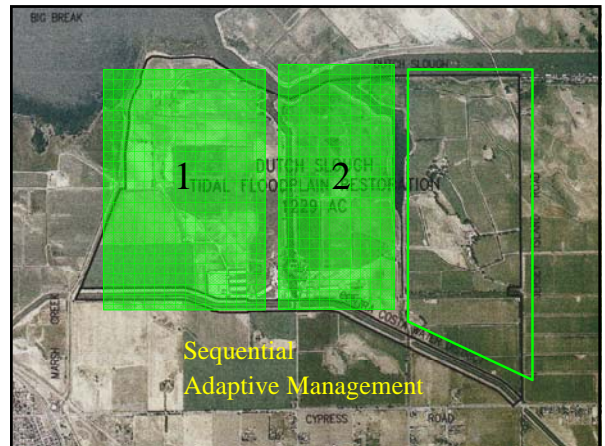
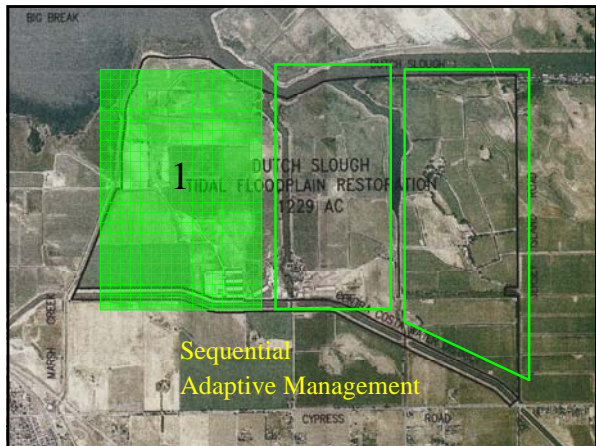
- 1,166 Acre Tidal Marsh Restoration Project
- Historically Managed as a Dairy
- Previously Slated for Development of 4,500 Homes
- Purchased for \$28 million by CALFED and the SCC
- Owned and Managed by DWR
- Planning Managed by SCC with Consulting Team led by PWA.

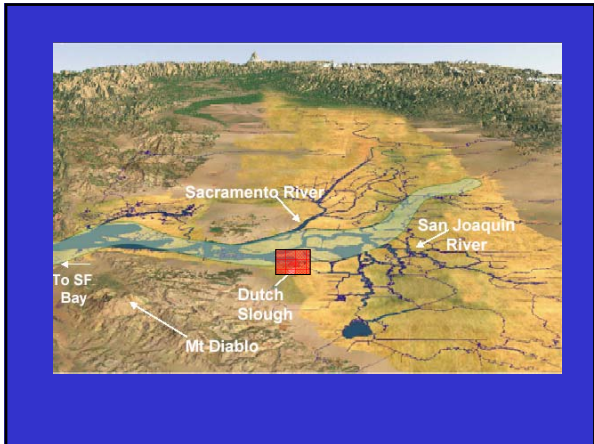


Project Goals

1. Provide Shoreline Access, Educational, and Recreational Opportunities.
2. Benefit native species by re-establishing natural ecological processes and habitats.
3. **Contribute to scientific understanding of ecological restoration by implementing the project under an adaptive management framework.**





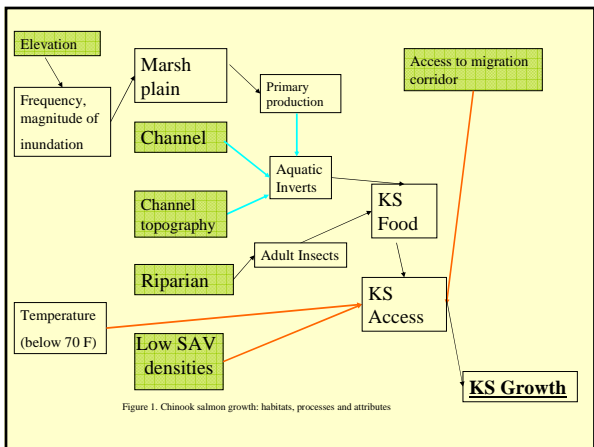


Adaptive Management

- Problem Statement
- Goals and Objectives
- Conceptual Models
 - Assumptions
 - Hypothesis

Design Project to test hypothesis and design monitoring program to test assumptions

But What is the Conceptual Model?



AMWG Categories of Uncertainties

1. Fish Limiting Factor Uncertainties
2. Uncertainties Regarding Linkages between *Structural Characteristics* (scale, elevation, channel density, etc.) and *Functional Response* (fish or bird density, mHG, DOC)
3. Geomorphic Process Uncertainties
4. SAV Uncertainties
5. Construction Feasibility Uncertainties

Marsh Plain Elevation and Channel Density

What is the relationship between marsh plain elevation and:

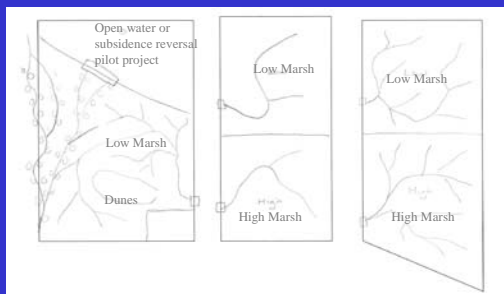
- salmon and splittail growth and survival
- fish food production and availability
- splittail and Delta smelt spawning
- mercury methylation
- DOC formation and export

Marsh Scale and Channel Order

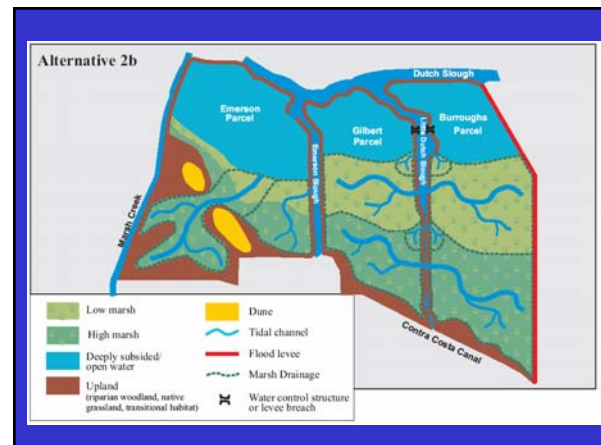
What is the relationship between marsh scale and channel order:

- salmon and splittail growth and survival
- fish food production and availability
- splittail and Delta smelt spawning

AMWG Experimental Design Charette



Option 1: Assumes major fill. Designed to test the impacts of marsh plain elevation, channel density, and to a lesser extent, riparian vegetation on target species.

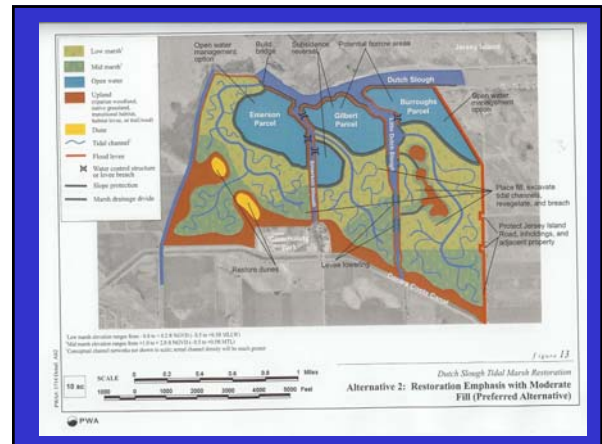
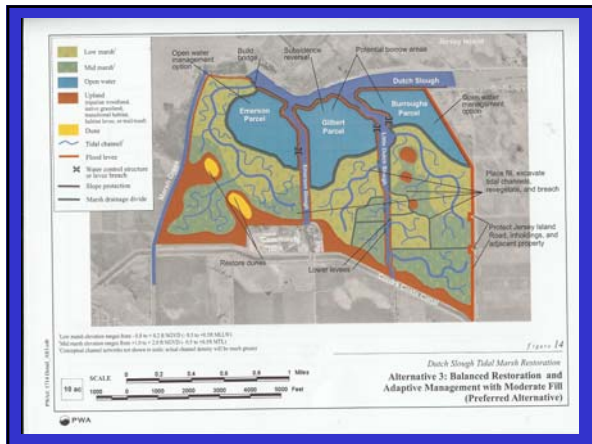


Hypotheses

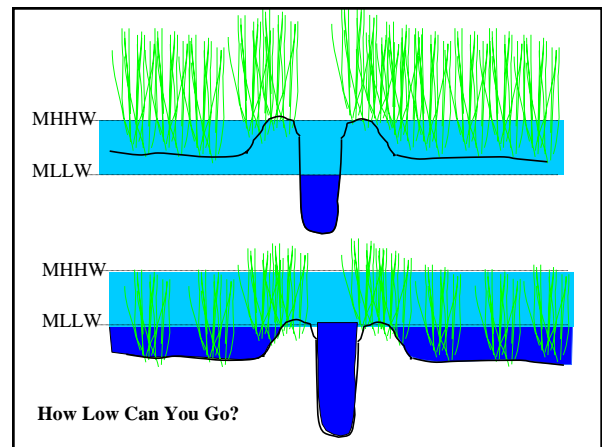
1. Juvenile salmon and splittail will have higher survival rates on high marsh because there will be less fish predators.
2. Food resources will be greater in lower marsh due to increased residence times.
3. Fish survival will be greatest with intermediate scale channel network because higher order networks will harbor predators and lower order networks lack sufficient refuge during low tides.

Limitations and Conflicts

- Measures restored marsh rather than mature marsh
- Pseudo-replication
- What if the fish don't come?
- Restoration vs. Research (scale and connectivity vs. learning potential)
- Topographic diversity vs. marsh area

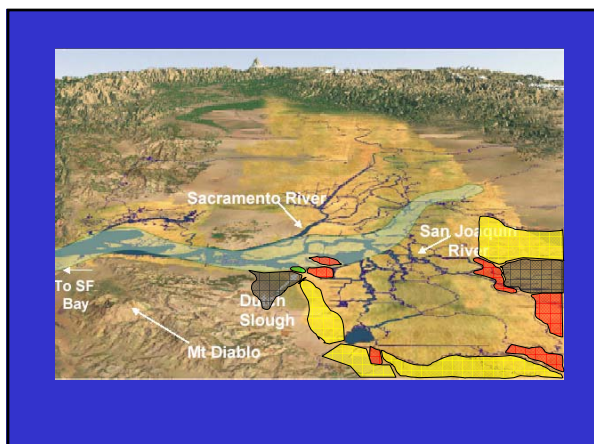
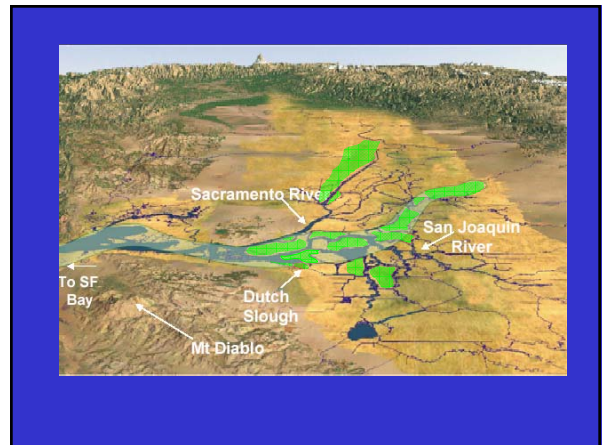
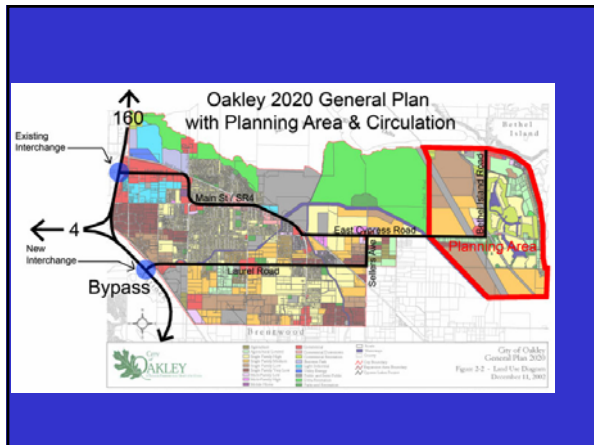
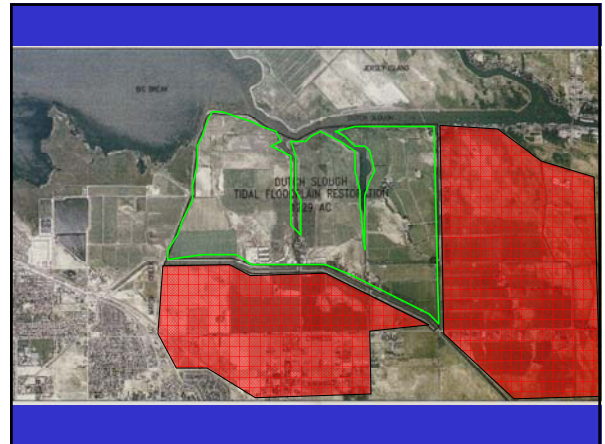


- ### Criteria for Selecting Uncertainties
1. What variables/uncertainties have the greatest implications for the future cost and feasibility of marsh restoration elsewhere in the Delta?
 2. What variables can we test at Dutch Slough? What variables can be just as easily tested elsewhere?
 3. What design feature variables will maximize the chances of seeing a response?
 4. What variables can be experimentally tested while still maximizing the restoration value of the project?
 5. What variables can be experimentally tested without significantly increasing the restoration costs?



- ### Restoration is Contagious
- Friends of Marsh Creek
 - Marsh Creek Delta Restoration
 - Jersey Island Subsidence Reversal
 - Marsh Creek Fish Passage
 - 1,900 feet of Riparian Restoration
 - New Partners Everyday





There is little Uncertainty that Urbanization of the Delta will Harm:

- The Delta Ecosystem
- Drinking Water Quality
- Flood Protection System
- Water Supply System
- Quality of Life in the Bay Area

Now is the Time for Action

Restoration Can Wait, but Acquisition
and Protection are Essential Now.

- Expand the Delta Protection Commission
- Enforce Regulations
- Acquire Conservation Easements