



## The Conceptual Models and Science Strategy



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## Topics Covered in this Talk

- Role of the Science Team
- Conceptual Model Development
- Science Strategy Guidance
- Moving Forward



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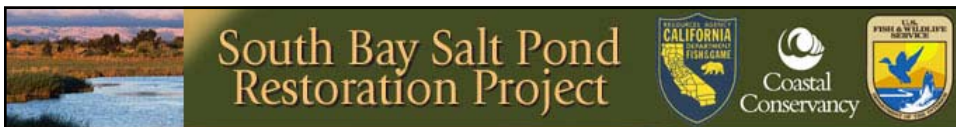


**South Bay Salt Pond Restoration Project**

The participants of the Project have established the following mandate as one of its Guiding Principles:

*“The Long-Term Restoration Plan is based on the best available science, and independent scientific review is an integral part of its development and implementation.”*

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## Charge of the Science Team

- Bring science into all phases of the restoration process and to all involved parties
- Develop a science strategy and conceptual models to guide the restoration of South Bay ecosystems
- Identify critical data needs
- Identify uncertainties
- Help guide consultant activities and review products

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## Science Strategy and Conceptual Model Process

- **Drafted by the Science Strategy Team**
- **Reviewed by expanded Science Team, PMT, Consultant Team**
- **Currently in Draft form; available on the website**
- **To Be Presented to NSP on April 20-21**
- **Will Finalize Science Strategy**
- **Continual Conceptual Model Review**

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## Tidal Marsh Restoration



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**But, many species use the ponds**



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**Ecological Goals Require...**

- **Restore Vegetated Tidal Salt Marsh**
- **Manage Ponds of Various Salinities**
- **Maintain Ecological Functions of Mudflat and Slough Habitats outside Ponds**

*How do we restore tidal salt marsh and manage salt ponds while maintaining the ecological support provided by habitats outside the ponds?*

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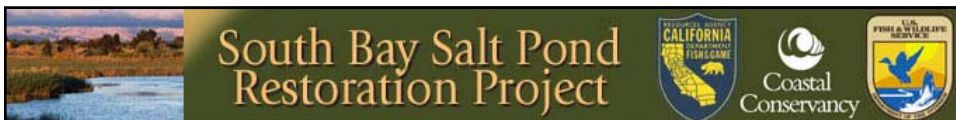


## Three Linked Conceptual Models

- **Landscape/Slough Model**: bay, mudflats, sloughs
- **Tidal Marsh Model**: salt marsh, brackish, transitional uplands
- **Managed Pond Model**: varying salinities, seasonal wetlands

(Currently in Draft form)

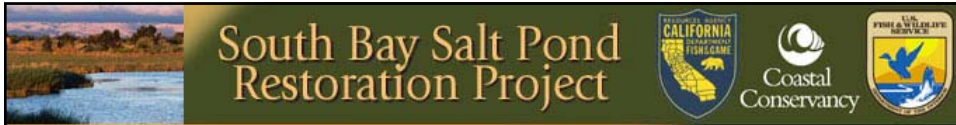
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## Conceptual Model Types

- **Control Model:**
  - illustrates ecological functioning
  - processes, structures, feedback, interactions
- **Stressor Model:**
  - illustrates human effects on ecological systems
  - stressors/activities, ecosystem components, effects, indicators
  - South Florida and Everglades Restoration Plan

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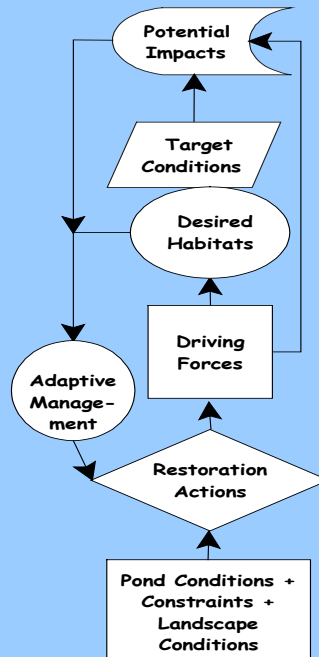


## Conceptual Models Uses

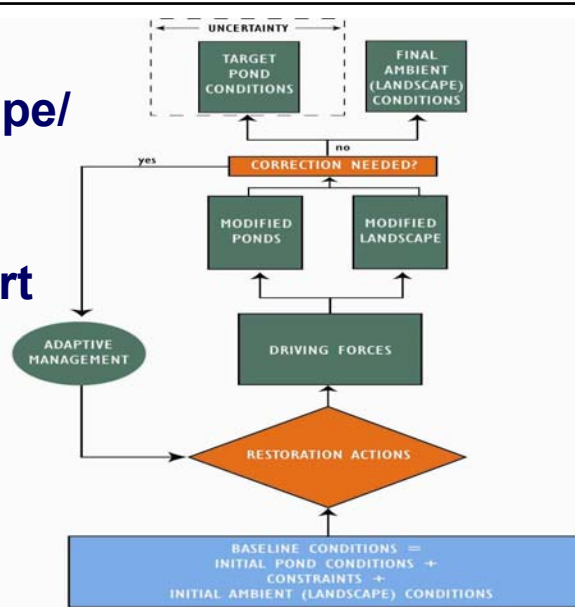
- Identify targets of restoration and enhancement
- Clarify the trade-offs between different habitat mixes
- Identify uncertainties in cause and effect linkages
- Target processes requiring further modeling
- Provide the public with an understandable view of the restoration process
- Provide a template for recording our evolving knowledge of South Bay restoration and enhancement

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## Elements in Each Conceptual Model




## Landscape/ Slough Scale Flowchart



**Figure B.1.1. Flowchart of Landscape Conceptual Model**



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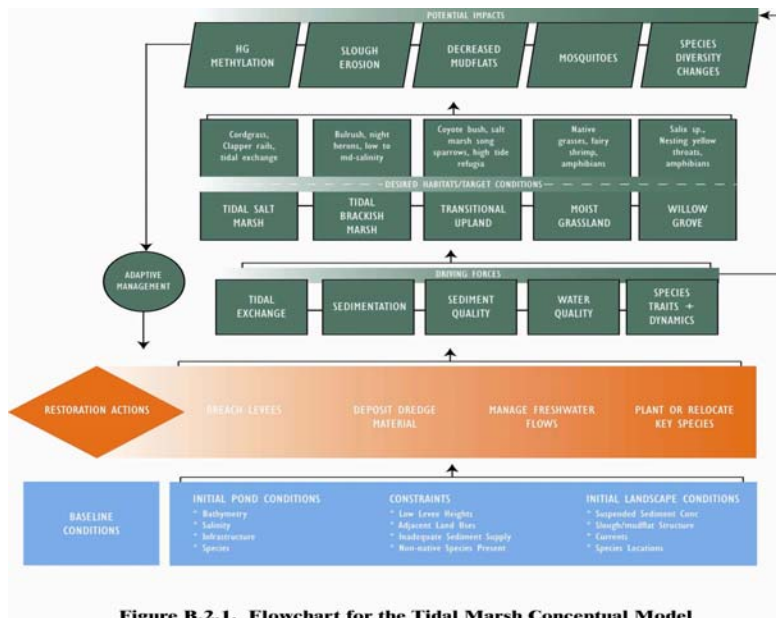

## Landscape/Slough Model Features

### How will restoration/management actions change landscape/slough conditions?

- Baseline Conditions: amount of mudflat, plant community distribution, water salinities, species diversity and abundance
- Driving Forces: wind and currents, sediment concentrations, water quality
- Target Conditions: a mosaic of habitat types that support existing species and improve conditions for rare species
- Potential Changes: changes in mudflat area, changes in slough scour, changes in habitat connectivity




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## Tidal Marsh Flowchart





# South Bay Salt Pond Restoration Project

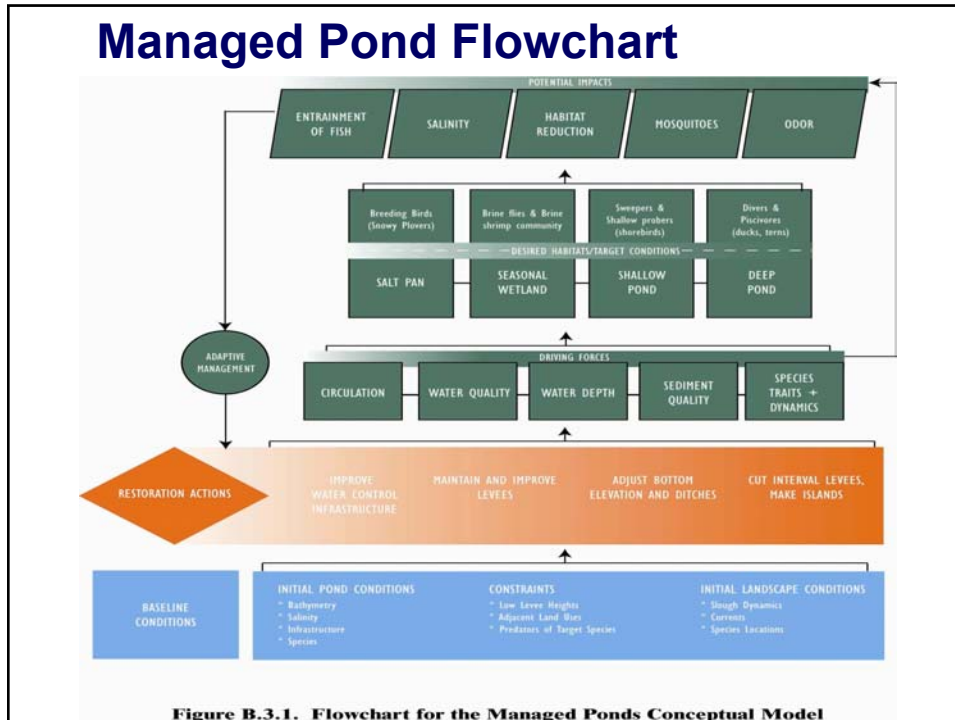
## Tidal Marsh Model Features

**What restoration actions will move current conditions toward target conditions and what might other impacts be?**

- **Baseline Conditions:** pond bathymetry, sediment concentrations, levee elevations
- **Restoration Actions:** levee breach, culverts, dredged material use, non-native species control
- **Driving Forces:** tidal action, sediment concentration, internal pond chemical cycles
- **Desired Habitats:** tidal marsh, brackish marsh, transitional upland, moist grassland, willow grove
- **Potential Impacts:** Hg methylation, mudflat loss, change in species composition

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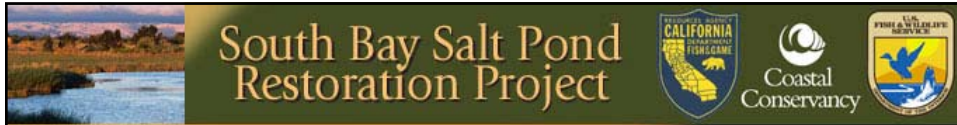
Coastal Conservancy

## Managed Pond Model Features

**What restoration actions will provide habitat for existing species in fewer managed ponds and what might other impacts be?**

- Baseline Conditions: pond salinity, current species use, relationship to other ponds
- Restoration Actions: improve water control structures, change bathymetry, add islands
- Driving Forces: circulation, water & sediment quality
- Desired Habitats: salt panne, seasonal wetland, shallow pond, deep pond
- Potential Impacts: fish entrainment, salinity, odor

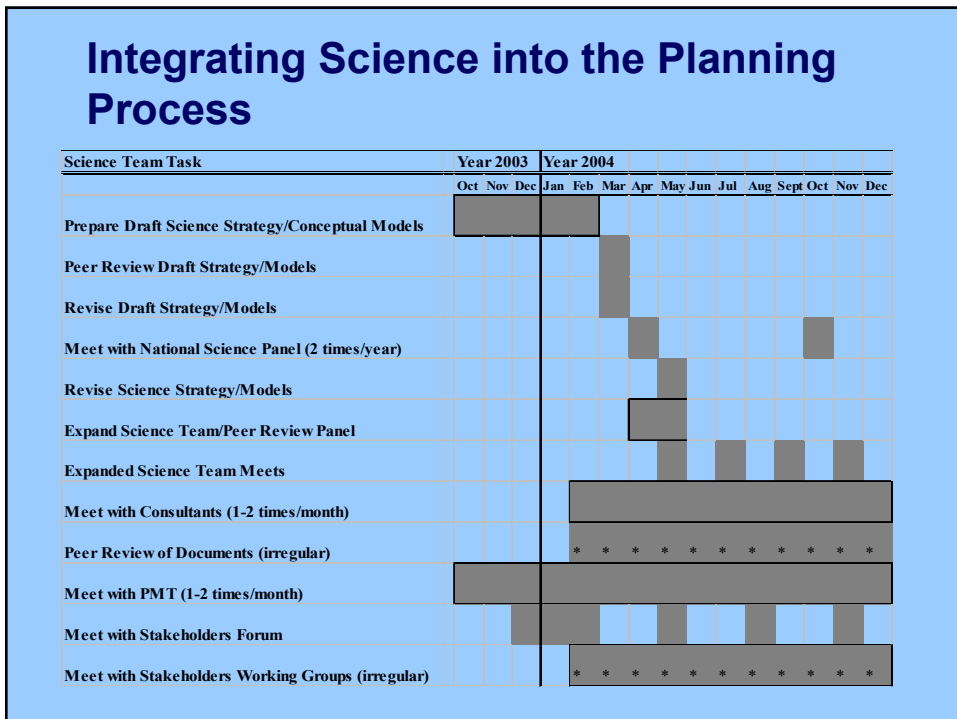
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## What is a Science Strategy?

- Provides a scientific framework by identifying:
  - Key Questions and Data Needs
  - Modeling Guidance
  - Monitoring/Applied Study Strategies
  - Research Approaches
  - Peer Review Requirements
  - Science Integration
  
- Provides scientific input at all stages:
  - Guidance to Consultants
  - Guidance for PMT

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**Some Key Questions**

**Non-native Species**

- Can we prevent non-native, species, esp. *Spartina alterniflora* and predators, from dominating restored marshes?



**Sediments**

- To what extent is the suspended sediment supply adequate for restoration?

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**Some Key Questions**

**Habitats and Species**

- What ecosystem functions are provided by the existing habitats and habitats planned for restoration?



**Pollutants**

- To what extent might restoration activities release contaminants, especially mercury?

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## Pilot Project/Study Possibilities

- Data collection at Eden Landing Ecological Reserve
- Data collection at Alameda Flood Control Project
- Pilot studies at the ISP “Island Pond” restorations
- Existing restoration projects



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## Science Integration: Next Steps

- Continue refining Conceptual Models
- Peer review technical products
- Work closely with PMT, Stakeholders
- Identify targeted research--promote implementing those applied studies




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## Ensuring a Mix of Habitats




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## For a Diversity of Species



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The banner features a photograph of a salt pond on the left. To the right, the text "South Bay Salt Pond Restoration Project" is displayed in a gold serif font. Further right are three logos: the California Department of Fish and Game logo, the Coastal Conservancy logo, and the U.S. Fish and Wildlife Service logo.

## Thank you to the Science Strategy Team

- **John Callaway**
- **Ed Gross**
- **Fred Nichols**
- **Jessica Lacy**
- **John Takekawa**

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