San Francisco Bay Restoration: Restoration Opportunity and the Scientific Basis

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Bay tidal marsh was reduced from 200,000 acres to 40,000 acres.

Restoration can re-establish 100,000 acres of tidal marsh.
2000
0 in
2100
1-in-20-chance
42-52 in
2100+ ?? in
• Science synthesis

• Goal: healthy ecosystem, providing a resilient shore for people and wildlife
WHAT WE CAN DO

• Restore complete systems, including processes
 Restore COMPLETE SYSTEMS

Pickleweed, marsh gumplant, and other native vegetation

Upland  High Marsh  Marsh Plain  Low Marsh  Mudflat  Subtidal

Transition Zone

Pacific cordgrass  Oysters  Eelgrass

Adapted from ESA
MEANS
RESTORING

PROCESSES

NOT JUST PLACES

COURTESY PETER BAYE

TIDAL OVERBANK DEPOSITION

ALLUVIAL FAN DEPOSITION

WAVE EROSION of MARSH SCARP

WAVE DEPOSITION of BARRIER BEACH

STREAM DELTA DEPOSITION
WHAT WE CAN DO

- Restore complete systems, including processes

- Restore soon, in areas marshes are likely to persist
Build up of sediment and vegetation takes time.

Higher starting elevation means marshes survive sea-level rise for longer.
WHAT WE CAN DO

- *Restore complete systems, including processes*

- *Restore soon, in areas marshes are likely to persist*

- *Plan for the Baylands to migrate*
PLAN FOR THE BAYLANDS TO migrate
WHAT WE CAN DO

- Restore complete systems, including processes
- Restore soon, in areas marshes are likely to persist
- Plan for the Baylands to migrate
PLAN FOR A RESILIENT landscape

- Re-establish upland transition zones
- Create a horizontal seepage levee
- Create a depositional marsh plain
- Elevate highway and railroad
- Remove levees and restore tidal marsh
- Re-establish marsh ponds
- Coordinate with existing projects

Novato Creek Baylands
EXPERIMENT WITH pilot projects
PLAN FOR adaptation

INCREASING SEA LEVEL

Existing marshes

Restore natural processes, enhance existing marshes

Conserve, acquire, and construct mitigation space

Realign functions

KEY

Threshold

Decision point

Lead time

Effective
South Bay Salt Pond Restoration Project

Restoring the Wild Heart of the South Bay

April 2008

SALT POND A21 SOUTH BAY SALT POND RESTORATION PROJECT

Kite aerial photographs of a small channel in the northeast corner following the 2006 breach to tidal flow. Field of view is ~ 120 feet. C. Benton

John Bourgeois, Executive Project Manager
South Bay Salt Pond Restoration Project
2003 Transfer: A Public/Private Partnership

- 16,500 acres
  - 15,100 in South Bay
  - 1,400 along Napa River

South Bay Salt Pond Restoration Project
Restoring the Wild Heart of the South Bay

Coastal Conservancy
Fish & Wildlife Service
California Department of Fish & Game
Cargill
San Francisco Bay Today

Source: U.S. Army Corps of Engineers Digital Visual Library
Key uncertainties

- Wildlife use of changing habitats
- Habitat evolution and sediment dynamics
- Mercury methylation
- Water quality
- Invasive species
- Public access
- Infrastructure support
- Sea level rise and climate change
Ecological Trade-offs

- Tidal Marsh species vs. Salt Pond species
Adaptive Management Restoration

Phased implementation of Project

Amount of tidal marsh restored

Time

2008

2058
Adaptive Management Restoration

Phased implementation of Project

Amount of tidal marsh restored

50:50 tidal marsh: ponds

Time

2008

2058
Adaptive Management Restoration

Amount of tidal marsh restored

Phased implementation of Project

50:50 tidal marsh: ponds

90:10 tidal marsh: ponds

Time

2008

2058
South Bay Salt Pond Restoration
Proposed “Bookend” Alternatives

Managed Pond Emphasis

Tidal Marsh Emphasis
1,600 acres tidal restoration
1,440 acres muted tidal
710 acres reconfigured ponds
7 miles of new trails
Adaptive Management Restoration

Phased implementation of Project

Amount of tidal marsh restored

2008

You are here

50:50 tidal marsh: ponds

90:10 tidal marsh: ponds

2058

Time
SEA LEVEL RISE FOR CALIFORNIA

you are here

HIGH

PROJECTION

LOW

0 ft

2.5 ft

5 ft

2000

2020

2040

2060

2080

2100

Courtesy NRC 2012
Adaptive Management Restoration

Phased implementation of Project

Amount of tidal marsh restored

2008

50:50 tidal marsh: ponds

2058

90:10 tidal marsh: ponds

Time
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Partnerships

South Bay Salt Pond Restoration Project
Restoring the Wild Heart of the South Bay