

# Physical Processes and Tidal Marsh Evolution: Cooley Landing and Warm Springs Marsh

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# Location



Cooley Landing  
2000

Warm Springs  
1986



# Warm Springs: 15' Deep Borrow Pit PWA



# Warm Springs at Breaching 1986





# Warm Springs at Breaching 1986



# South Breach at turn of tide T+2





# Key Monitoring Questions



- **Rate of sedimentation / colonization**
- **Slough channel response**
- Wind wave effects
- Levee erosion
- Marsh vegetation evolution

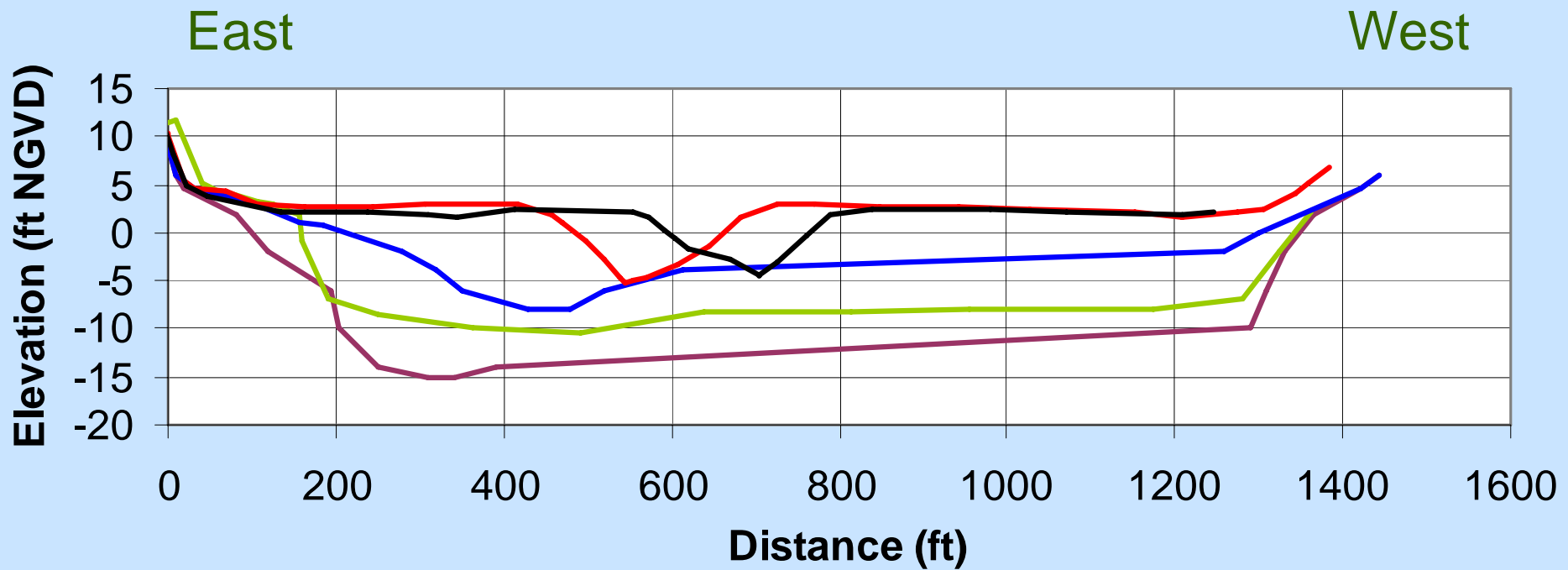


# Warm Springs Monitoring Transects





# Cross-section 200



— 1986 (pre-breach) — 1988 — 1992 — 1999 — 2002

# Looking North 2003, T+ 17



1995



2003



# Coyote Slough Transect



# Coyote Slough XS 71



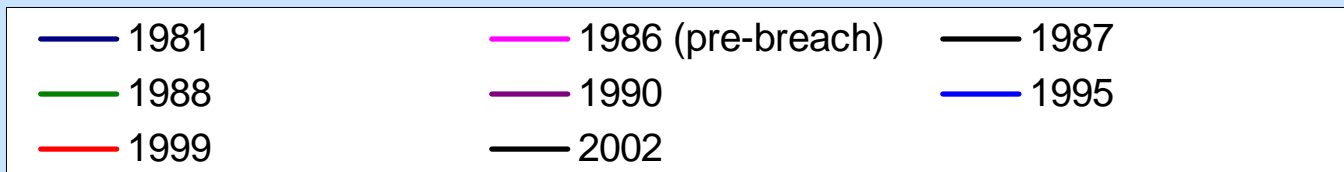
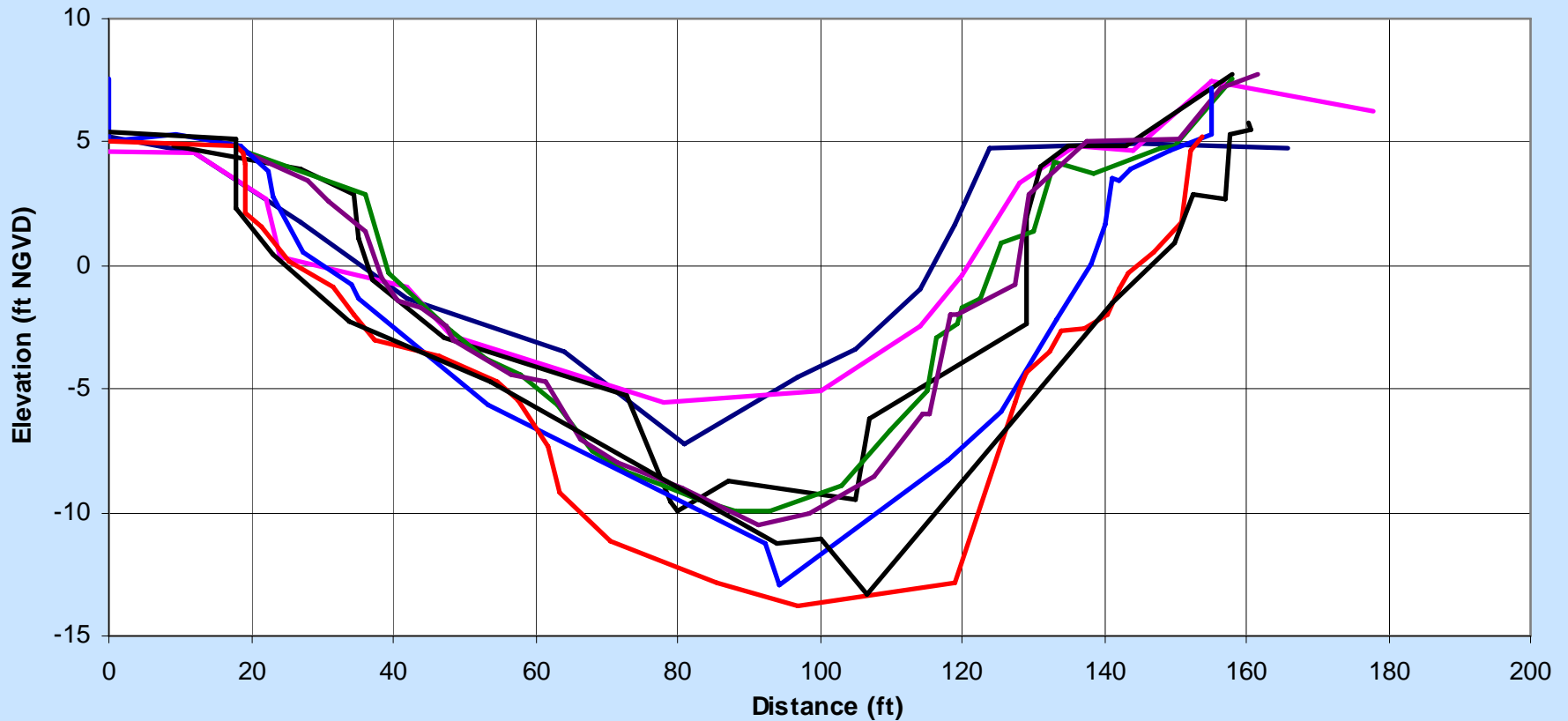


# Coyote Slough sections

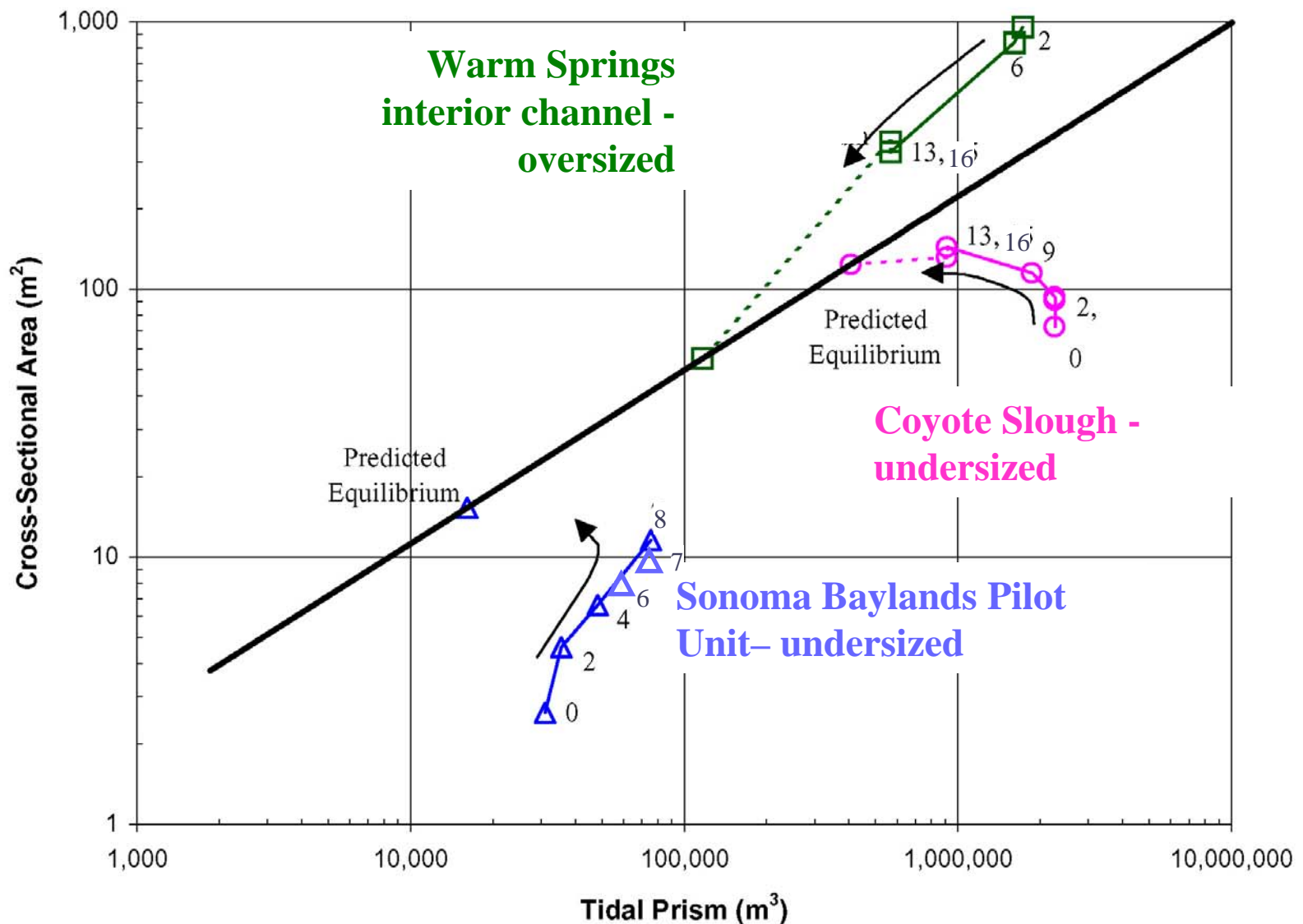


South

North



# Hydraulic Geometry Trajectory





# Cooley Landing: Former Salt Pond



Outboard  
Mudflat  
Channels

# Key Monitoring Issues



- **Rejuvenation of tidal channel system**
- Rates of sedimentation
- Marsh vegetation evolution
- Mudflat channel evolution





# Cooley Landing 1948 & 1997



Cooley Landing Marsh, September, 1948



Cooley Landing Marsh, August, 1997

# Restoration Design





# Channel nickpoint, bed erosion and side slumping





# First order channel re-occupation



Pre-breach, Dec 2000

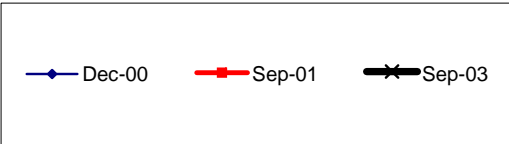
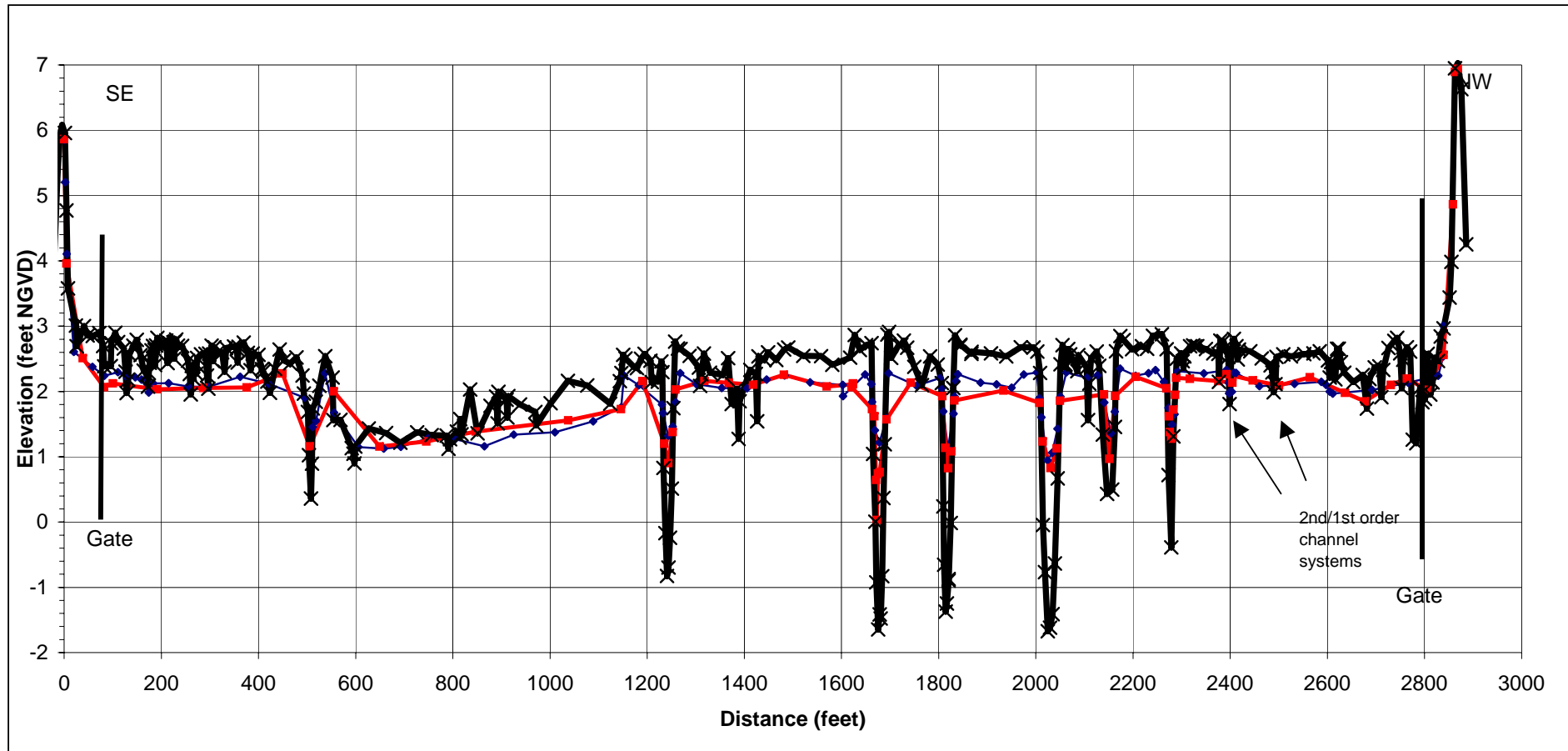


Year 3, Sept 2003





# Marshplain Transect Across southern part of site



Cooley Landing  
Interior Boardwalk Transect  
Elevation Transect is 6' from Ely edge of Bdwk



# Performance of Ditch Blocks, T+3

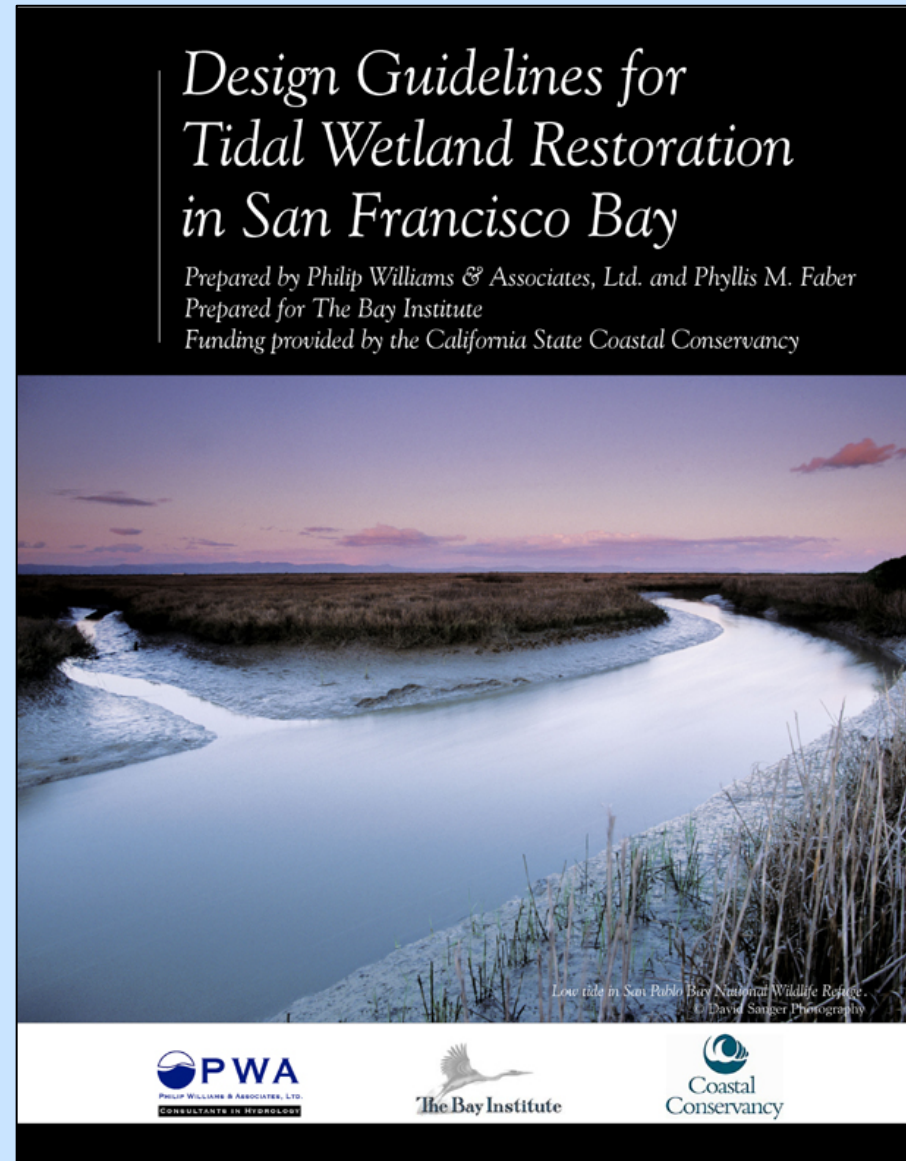




# Design Guidelines



[www.wrmp.org](http://www.wrmp.org)



# Acknowledgments



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1989





1991





1994





1997





2003





2003





# Vegetation Expansion



1994



2003



# Headward erosion of nickpoint



Post-breach, Jan 2000



Year 3, Sept 2003

