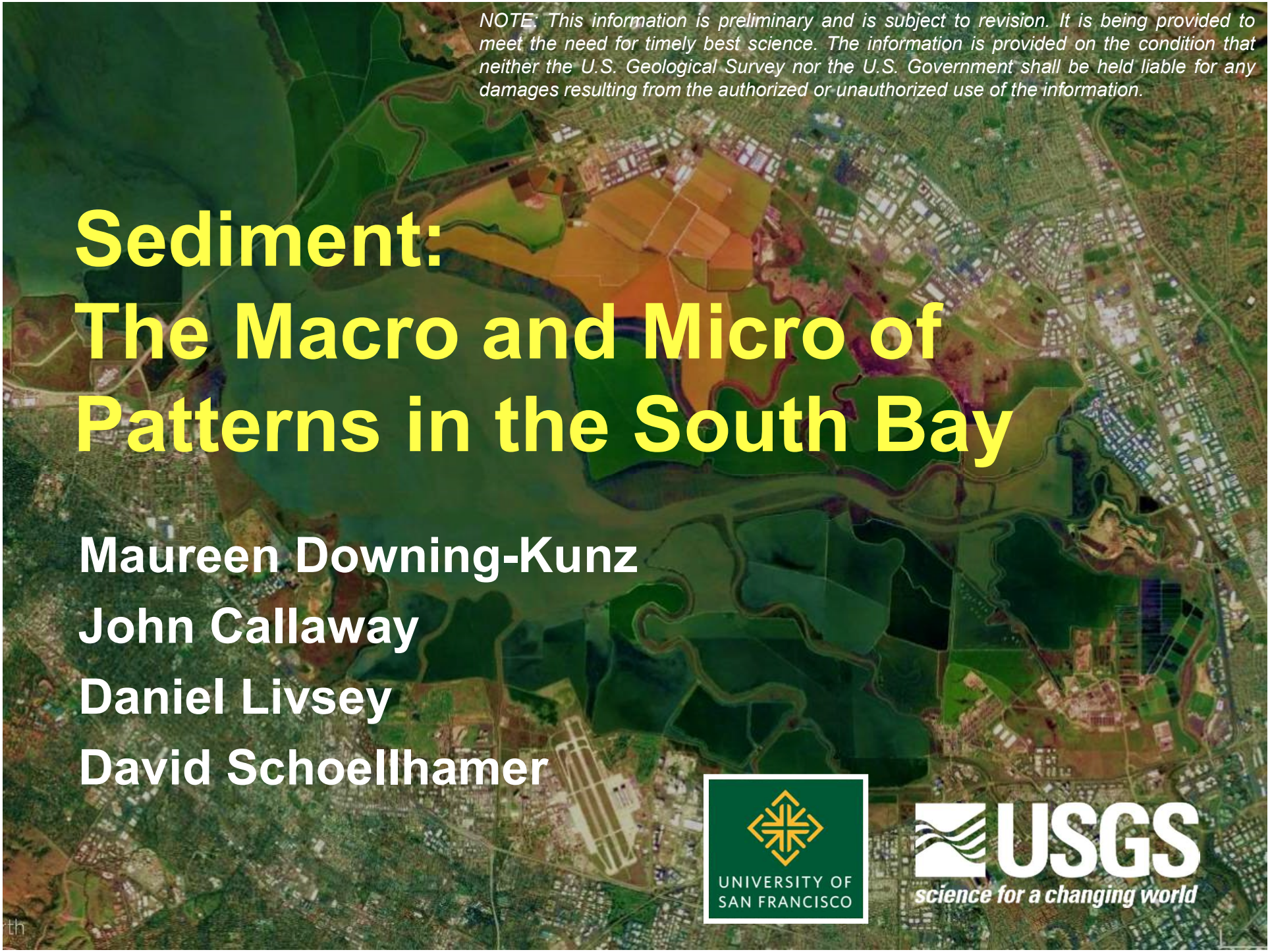


*NOTE: This information is preliminary and is subject to revision. It is being provided to meet the need for timely best science. The information is provided on the condition that neither the U.S. Geological Survey nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information.*

# Sediment: The Macro and Micro of Patterns in the South Bay


**Maureen Downing-Kunz**

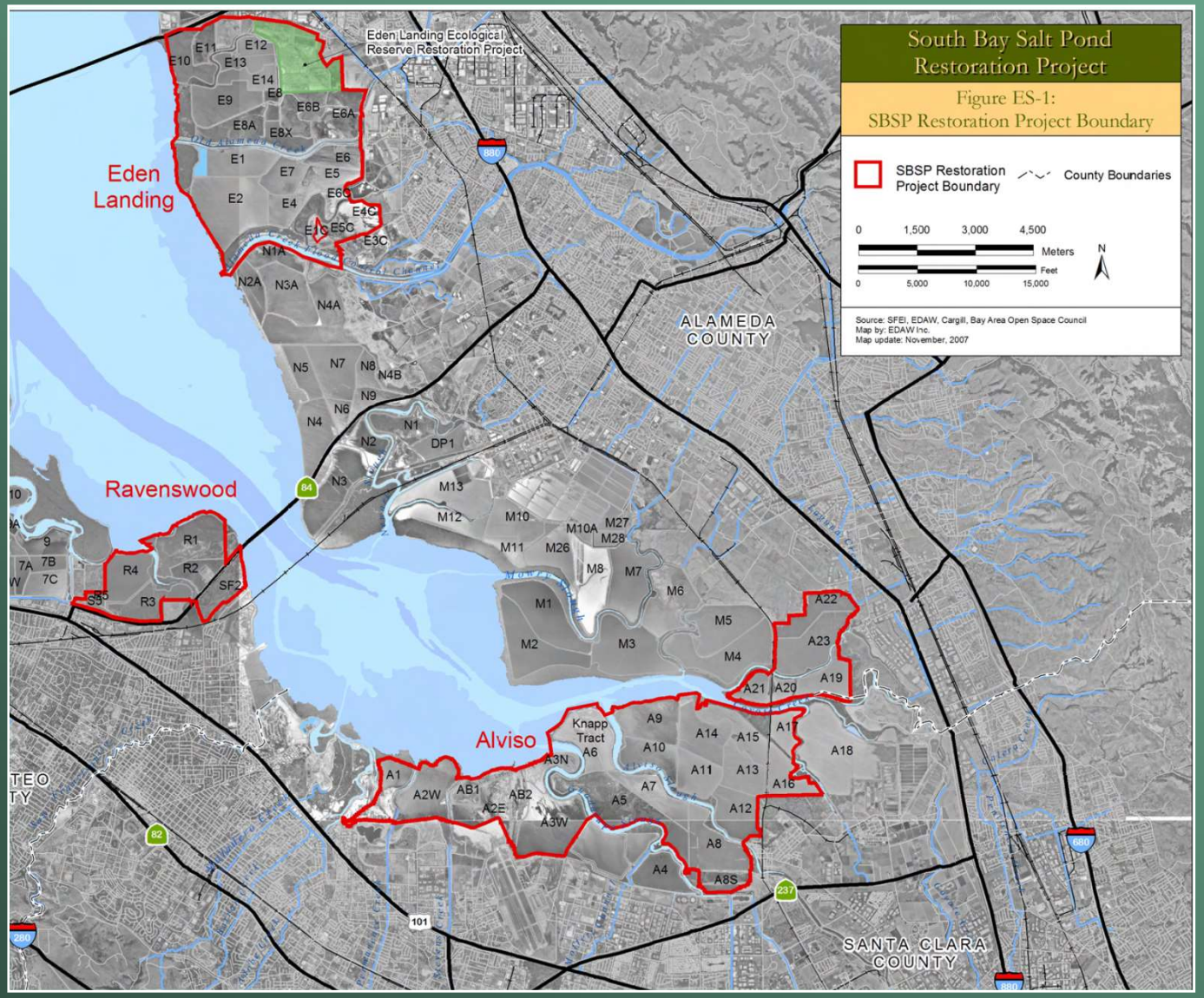
**John Callaway**

**Daniel Livsey**

**David Schoellhamer**

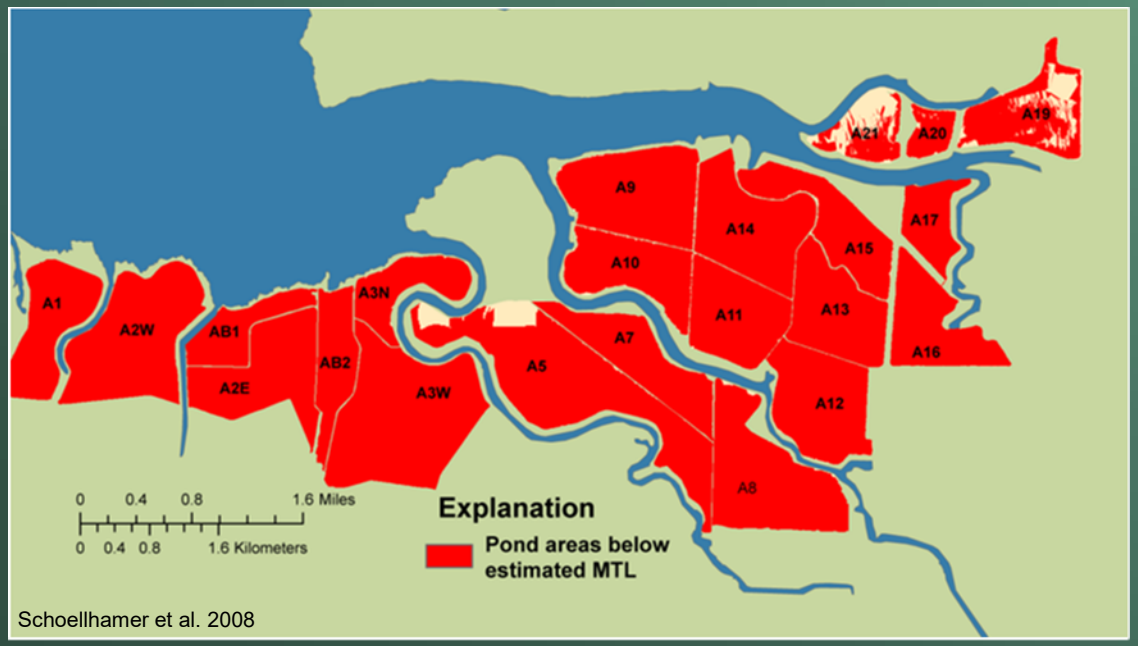
UNIVERSITY OF SAN FRANCISCO

USGS science for a changing world


South Bay Salt Pond Restoration Project
Figure ES-1:
SBSP Restoration Project Boundary
SBSP Restoration Project Boundary
County Boundaries
0 1,500 3,000 4,500
Meters
0 5,000 10,000 15,000
Feet
N
Source: SFEI, EDAW, Cargill, Bay Area Open Space Council
Map by: EDAW Inc.
Map update: November, 2007
Eden Landing Ecological Reserve Restoration Project
Eden Landing
Ravenswood
Alviso
ALAMEDA COUNTY
SANTA CLARA COUNTY
E1 E2 E3C E4 E4C E5 E5C E6 E6A E6B E6C E7 E8 E8A E8X E9 E10 E11 E12 E13 E14
N1A N2A N3A N4 N4A N4B N5 N6 N7 N8 N9
DP1
R1 R2 R3 R4 SF2 S5
M1 M2 M3 M4 M5 M6 M7 M8 M10 M10A M11 M12 M13 M26 M27 M28
A1 A2E A2W A3N A3W A4 A5 A6 A7 A8 A8S A9 A10 A11 A12 A13 A14 A15 A16 A17 A18 A19 A20 A21 A22 A23
AB1 AB2
Knapp Tract
84
880
82
101
237
280
680
880

# Key Uncertainties

- How much sediment is available for restoration?
- How long to restore salt ponds to tidal marsh?

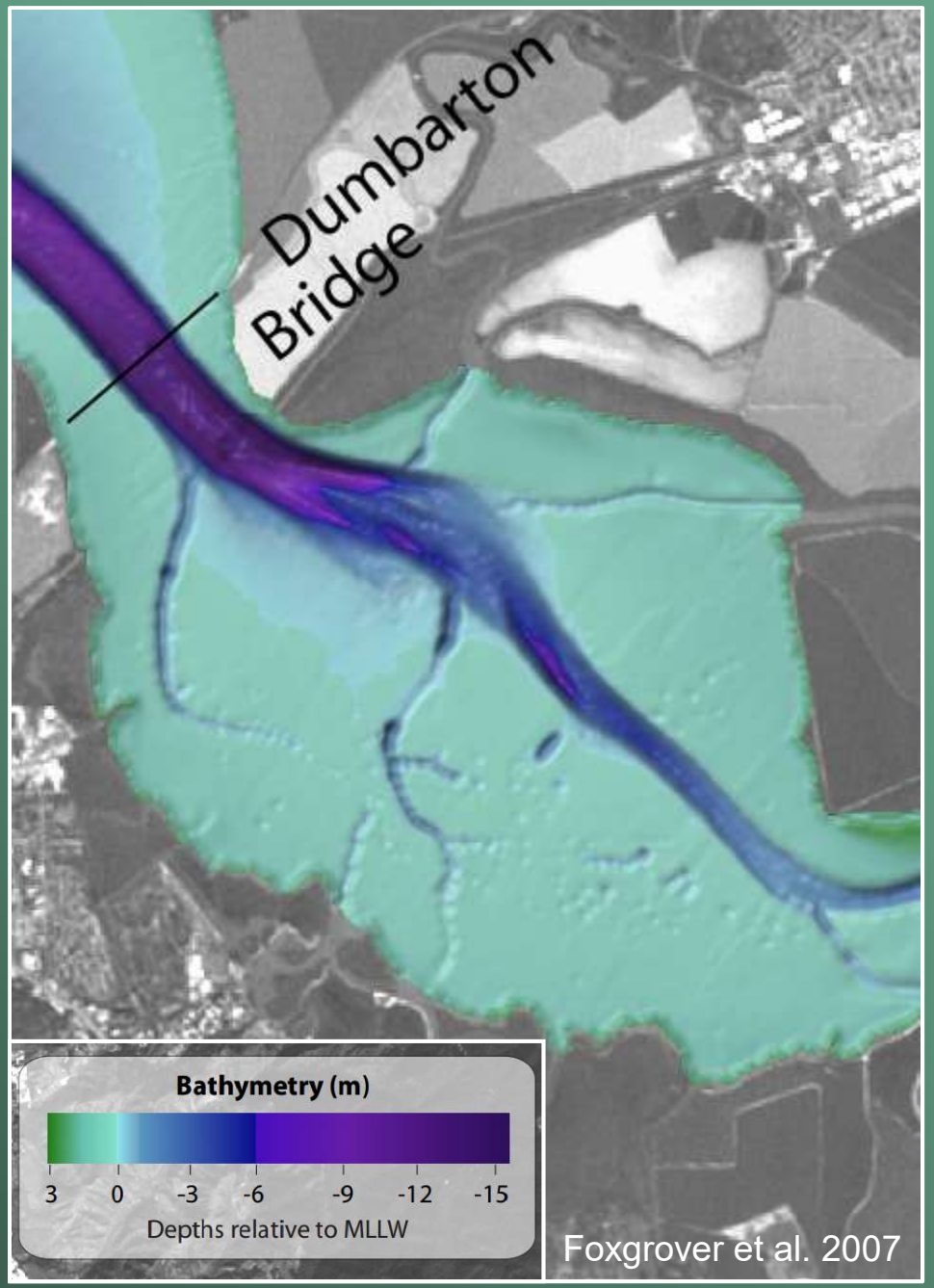



Schoellhamer et al. 2008

Photos by C. Benton

# Key Uncertainties

- **Will restoration erode sediment from existing mudflats?**

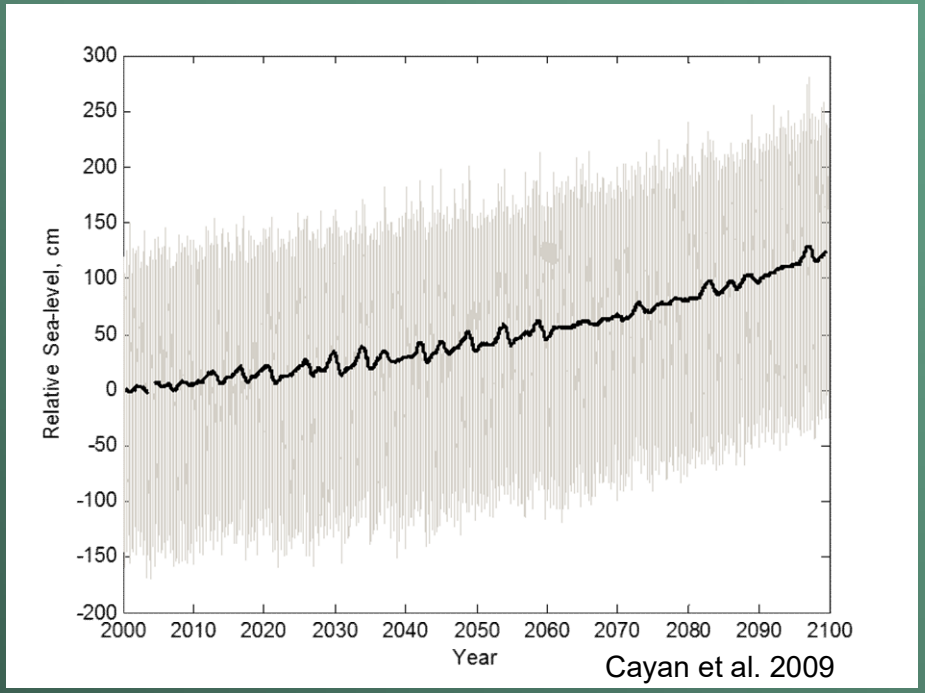



# Key Uncertainties

- How will restoration affect legacy mercury contamination?


# Key Uncertainties

- How can we optimize sediment accretion in ponds?




Cayan et al. 2009

# Overview of Research

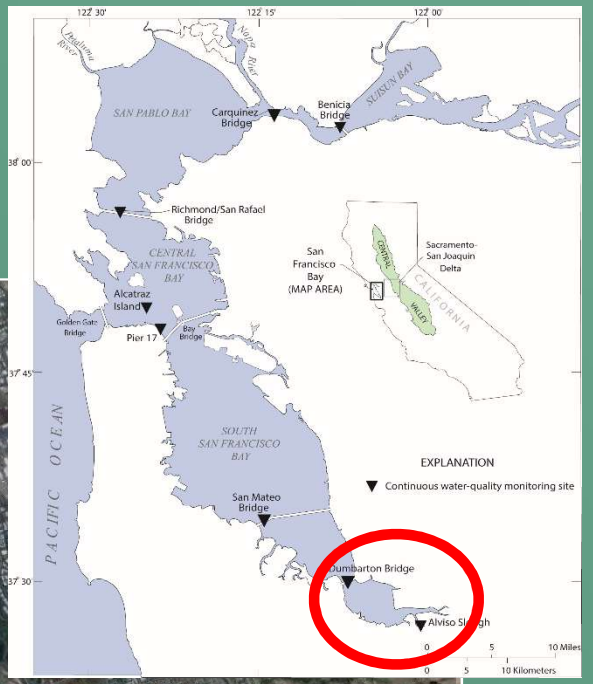
- **Measure sediment flux at 3 locations in Lower South Bay (LSB)**
- **Measure sediment accretion in 2 ponds restored to tidal action in LSB**
- **Measure changes in LSB bathymetry**

**CHECK OUT THE FOLLOWING POSTERS IN THE SEDIMENT CLUSTER!**

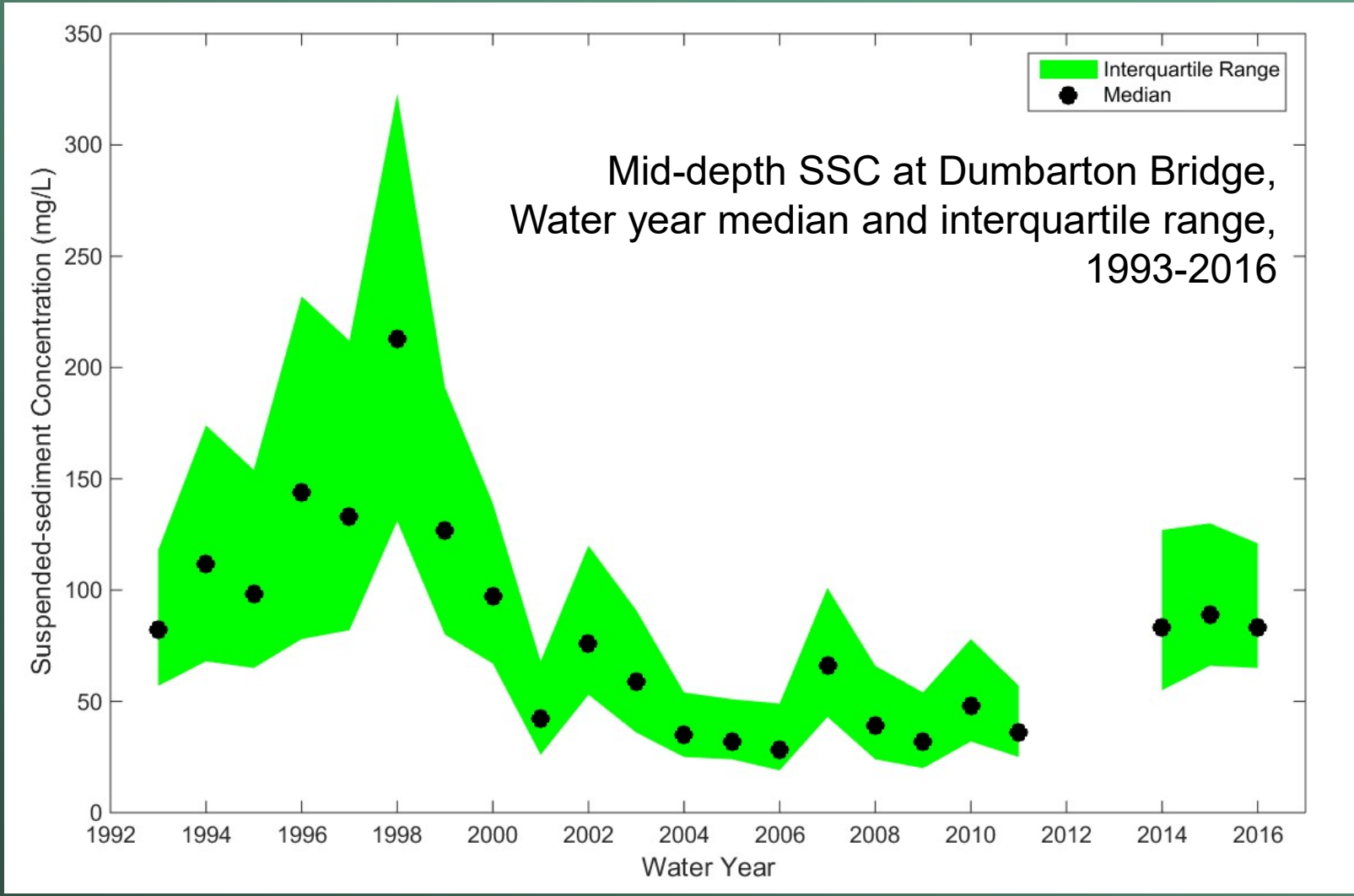
Bathymetric Change within Alviso Slough as Salt Pond Restoration Progresses: 2010 – Mar 2017; **A. Foxgrover et al.**

Processes Governing Tidal Mudflat Width in South San Francisco Bay; **B. Jaffe et al.**

# Lower South Bay Study sites

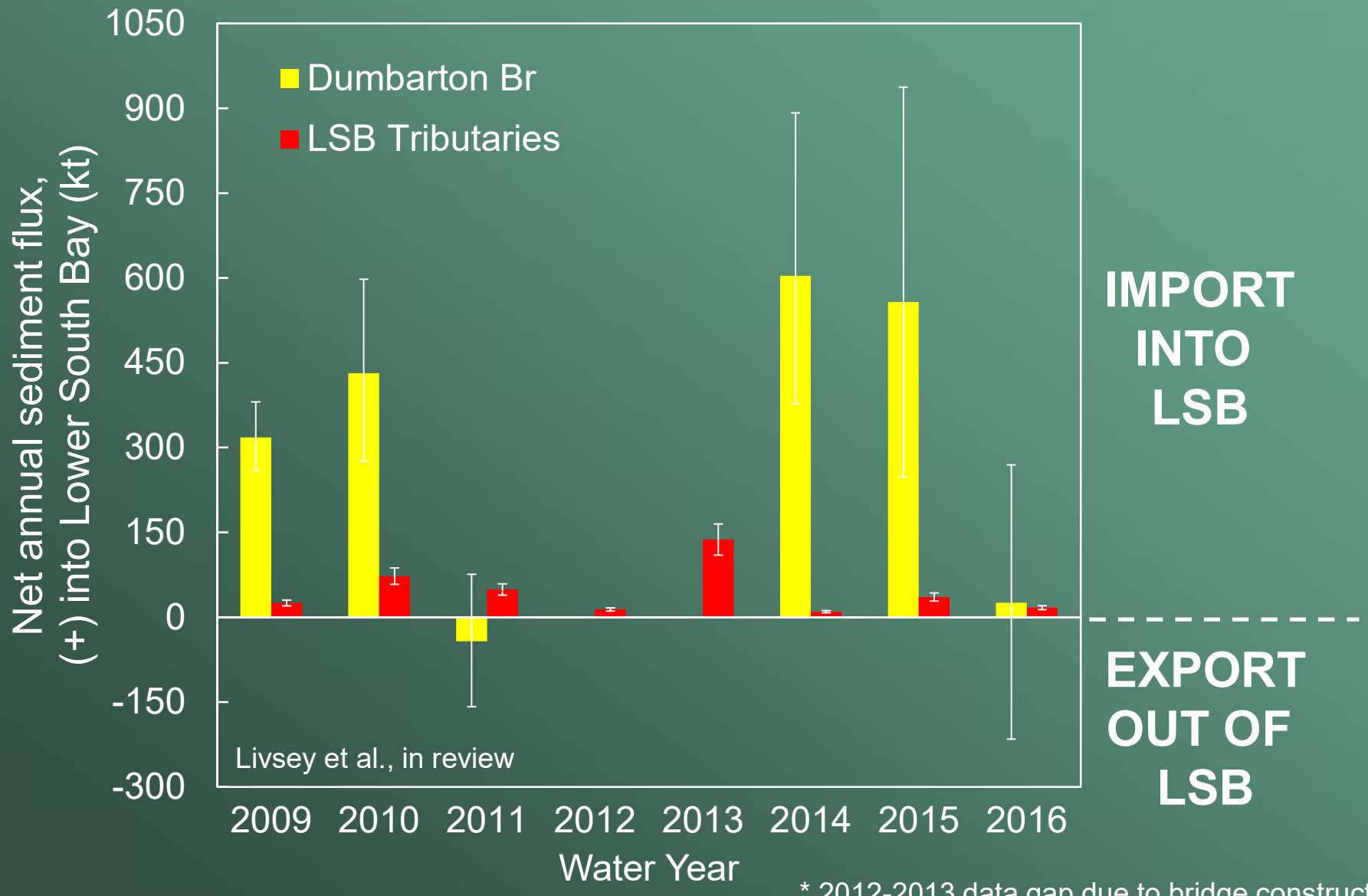



# Dumbarton Bridge concentration




* 2012-2013 data gap due to bridge construction

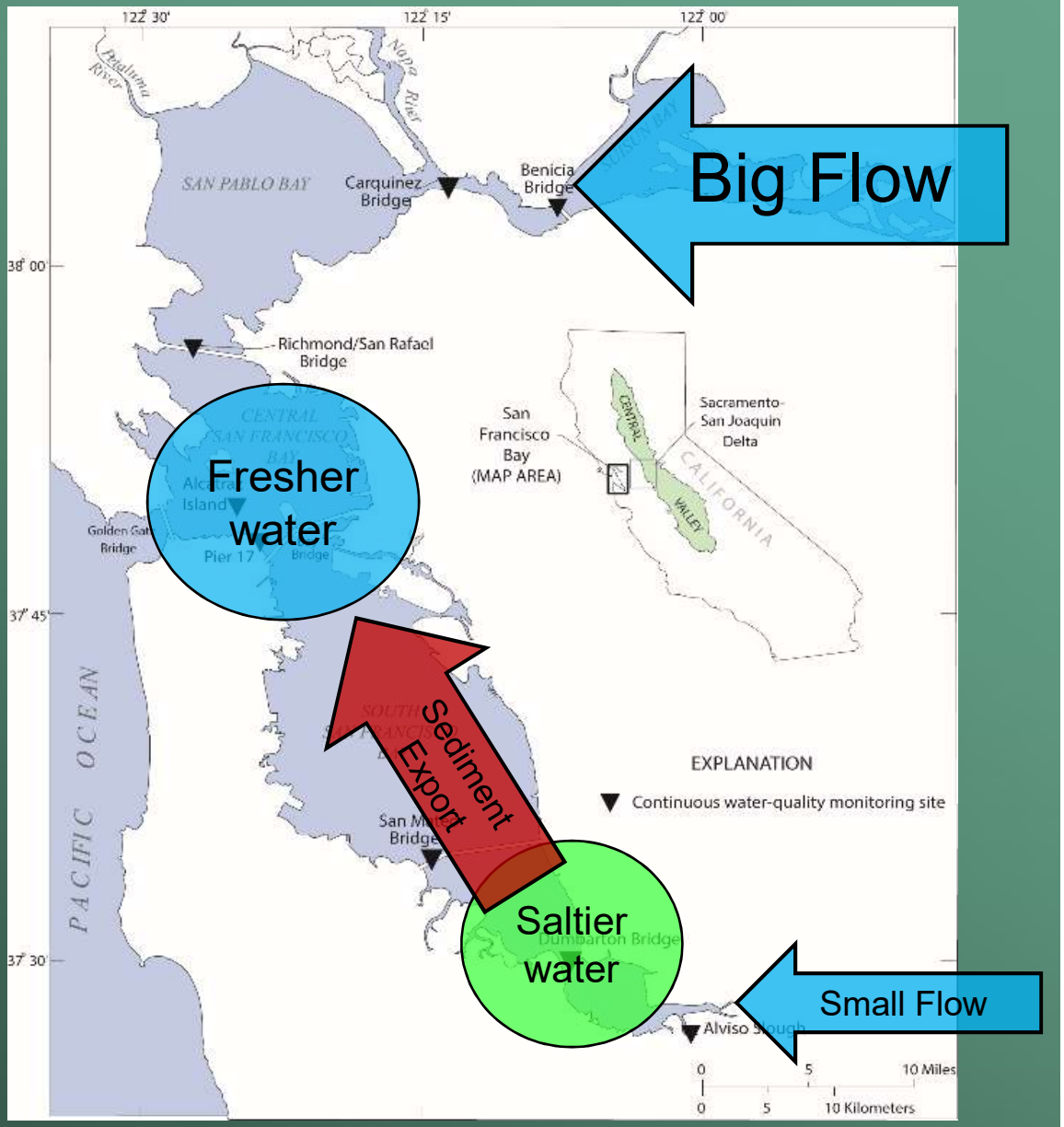
# Lower South Bay sediment flux




* 2012-2013 data gap due to bridge construction

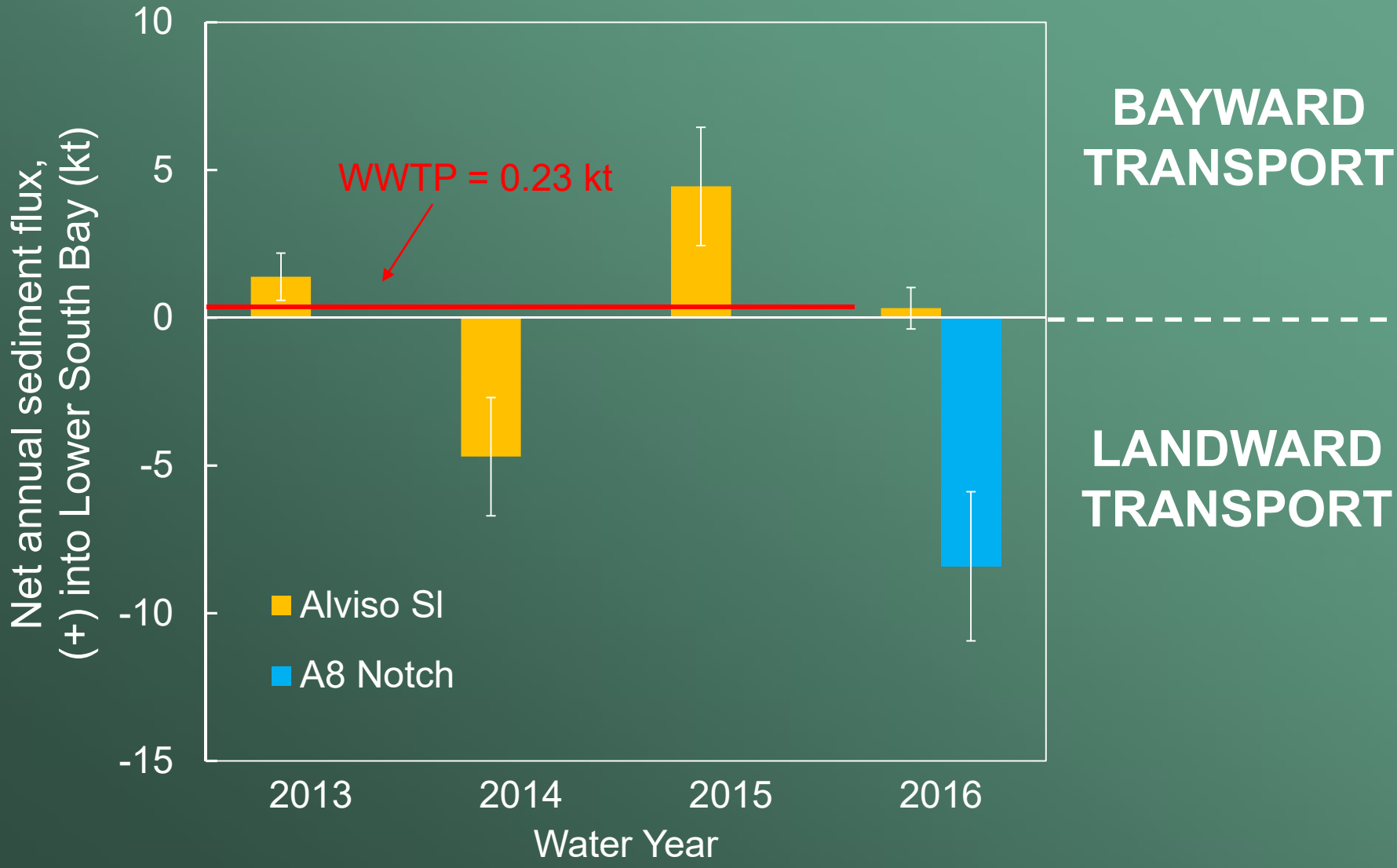
# Wet year flushing of LSB

Wet year:
Central Bay fresher than Lower South Bay, inverse estuarine gradient, sediment flux OUT OF Lower South Bay




A21
A6
Alviso SI
A8 Notch
Concentration & Flux
Accretion

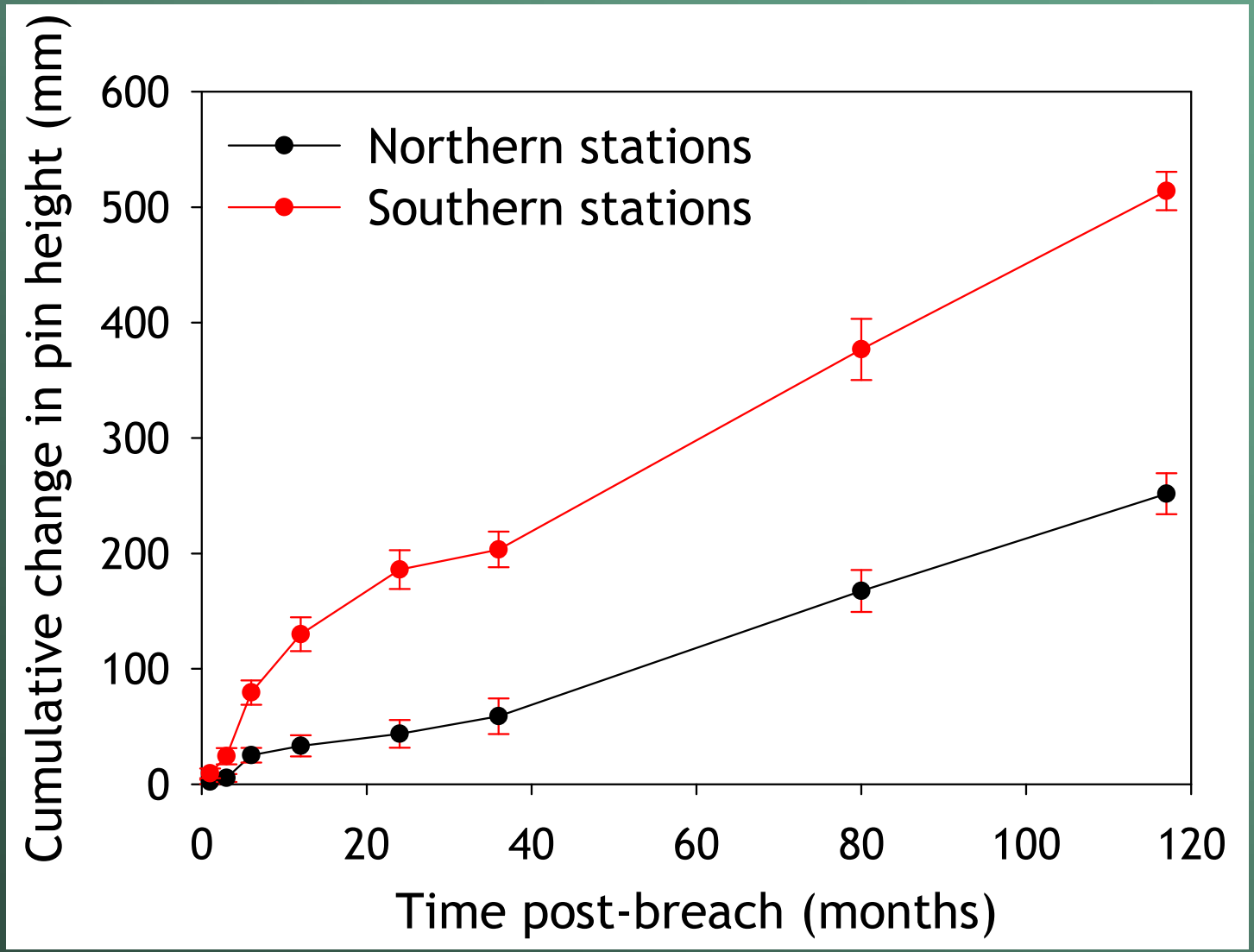
# Alviso Slough and A8 Notch flux



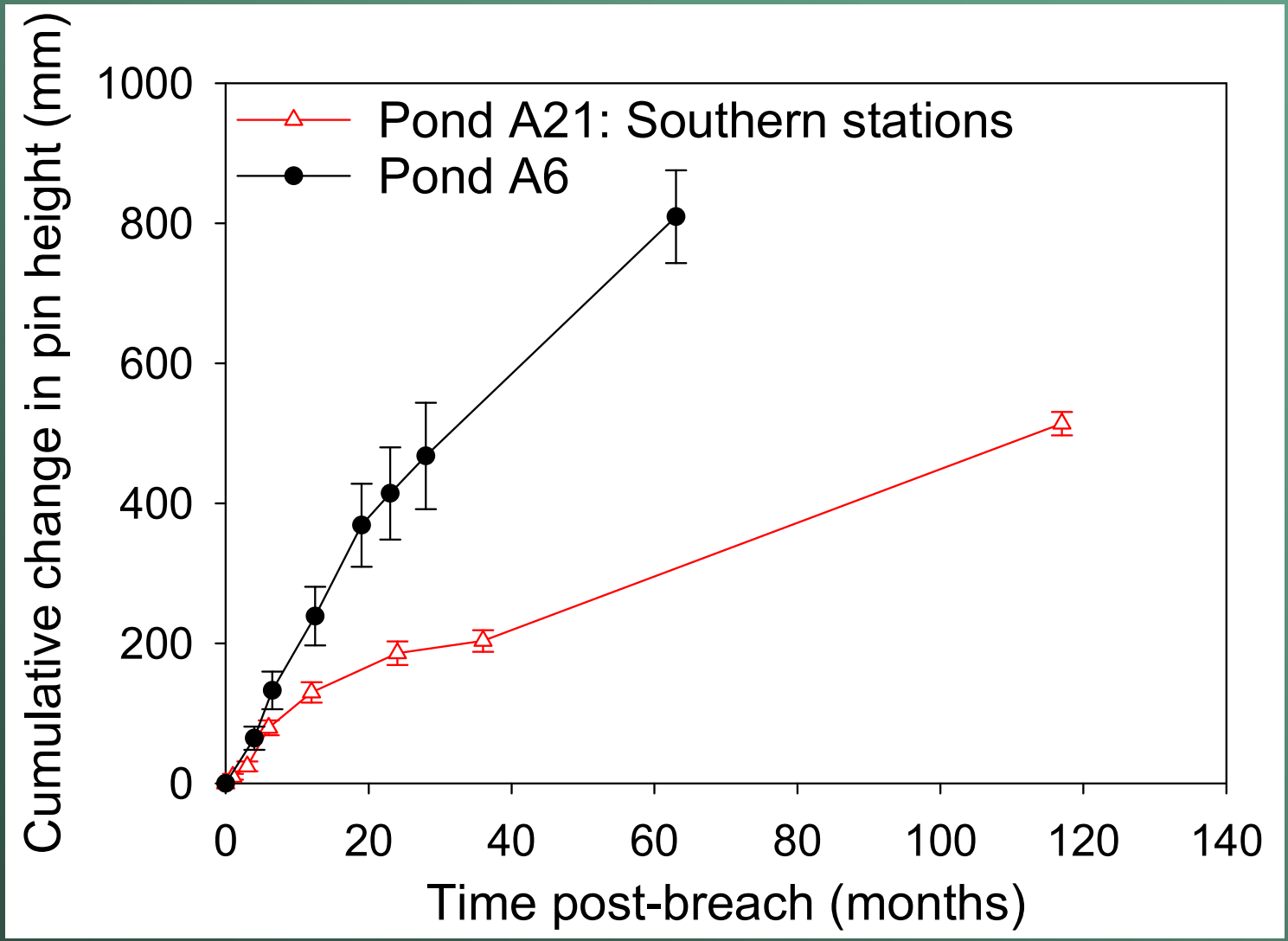

*Preliminary Information—Subject to Revision*


A21
A6
Alviso SI
A8 Notch
Concentration & Flux
Accretion

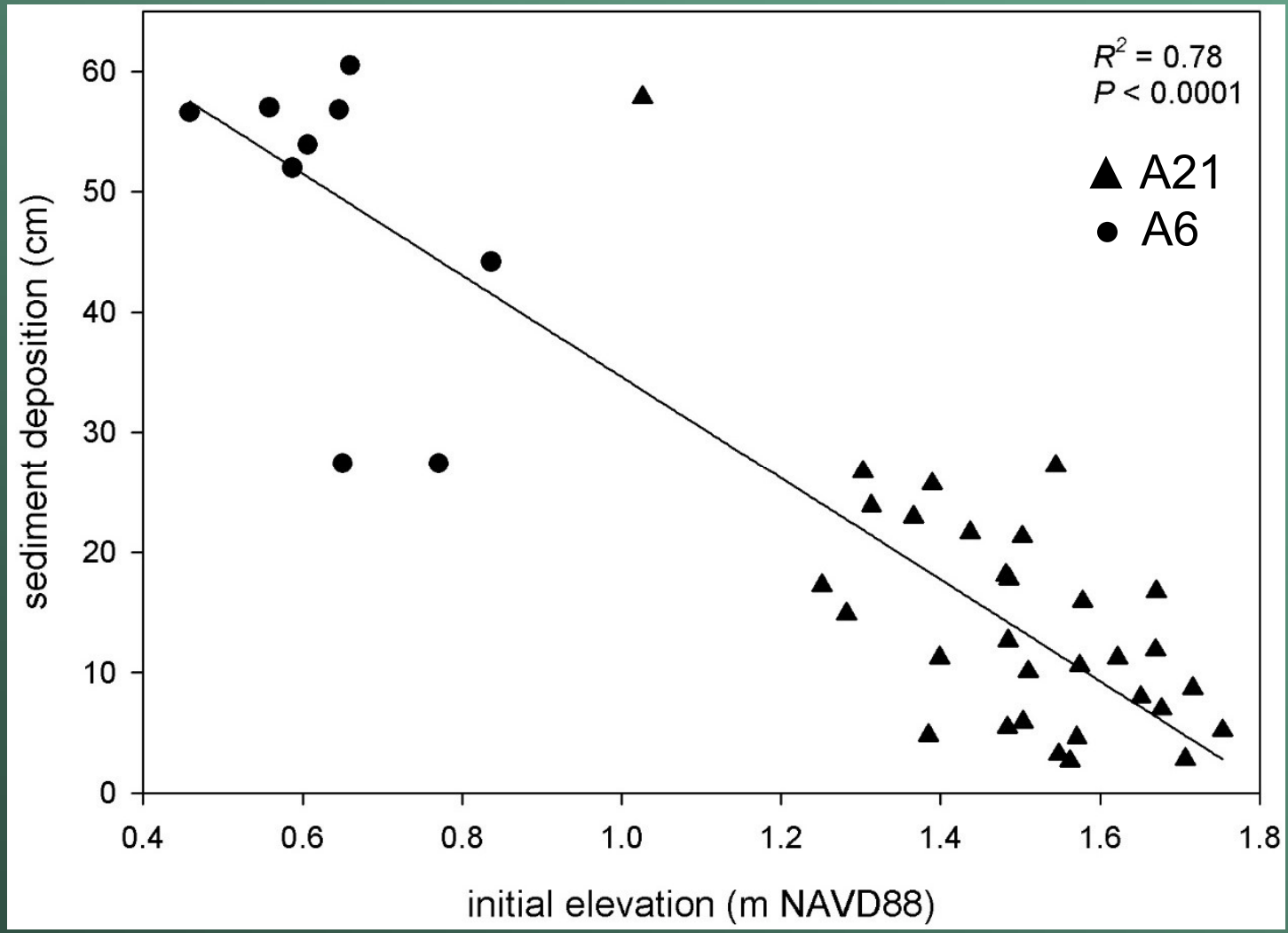
# Accretion at Island Ponds: A21



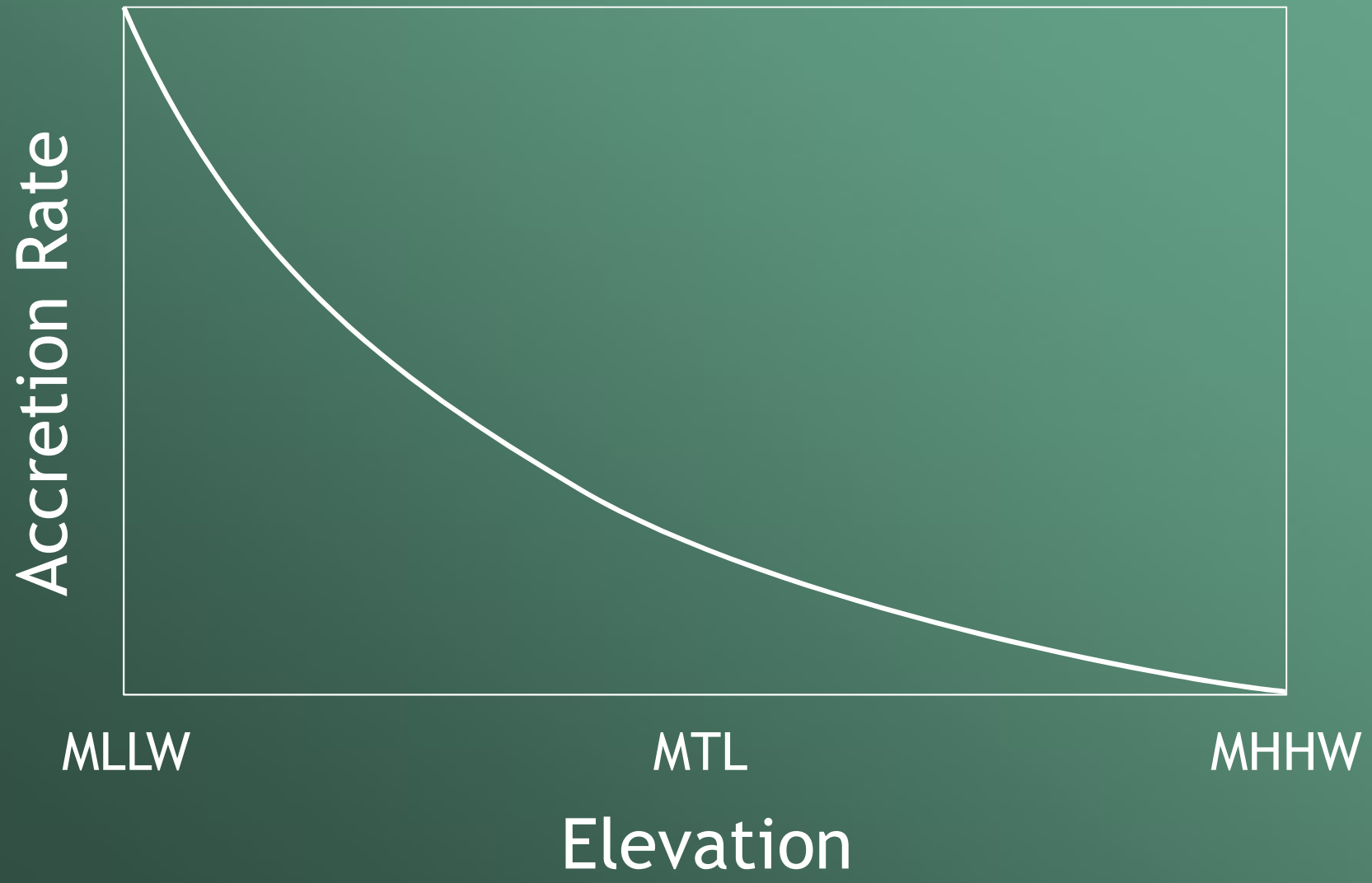
# Accretion at A21 and A6



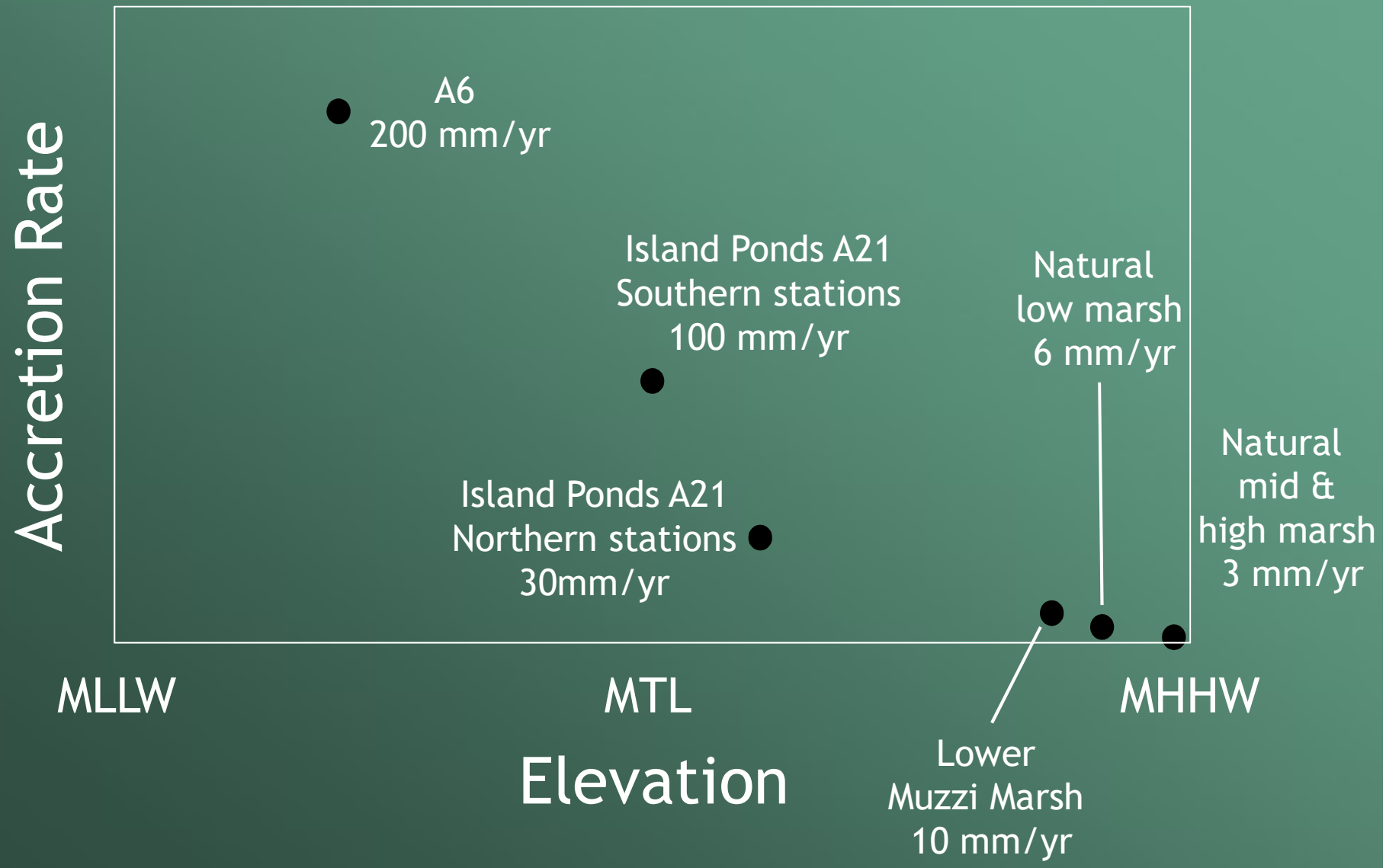
# Elevation vs. Accretion (A21 and A6)



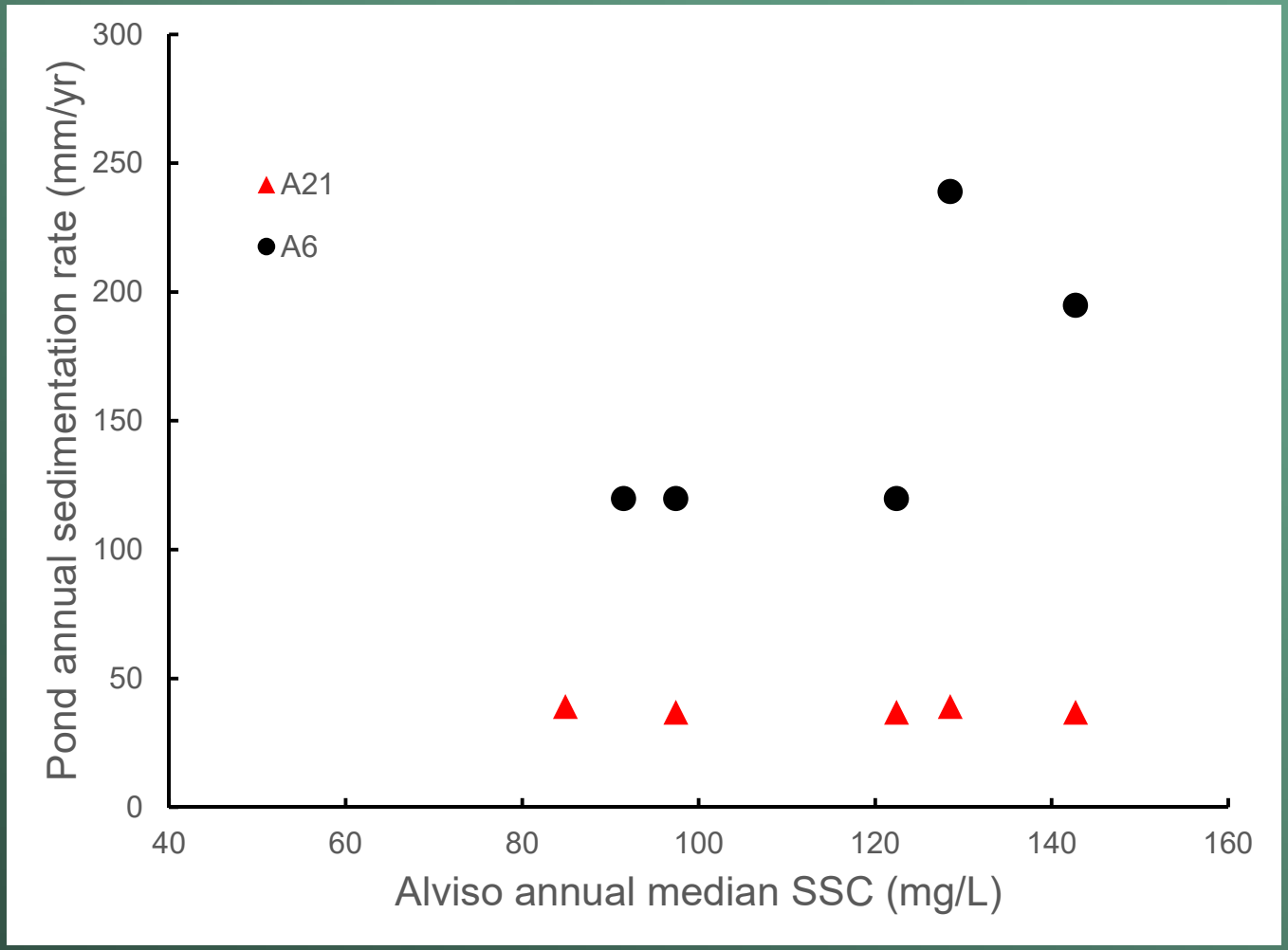
# Theoretical Tidal Wetland Development



# Measured Tidal Wetland Development



# Alviso SSC vs. Annual Accretion




*Preliminary Information—Subject to Revision*

# Management Adaptations to Science Results

- Restore more ponds and sooner rather than later:  sediment is not presently a limitation
- We can move further along the “restoration staircase”
- Mudflat erosion does not appear to be a problem with current restoration plans

# Future Science Needs

- Evaluate larger spatial variation in pond accretion rates:  Alviso vs. Eden Landing ponds
- Continue to monitor mudflat dynamics and improve overall sediment budget estimates
- Develop better understanding of sediment delivery from the Bay and watershed into ponds
- Evaluate feasibility of augmenting sediment directly or indirectly

# Acknowledgements


- California Coastal Conservancy and South Bay Salt Pond Restoration Project
- San Francisco Bay Regional Monitoring Program
- San Francisco Estuary Institute
- San Francisco Estuary Partnership
- Santa Clara Valley Water District
- US Army Corps of Engineers
- US Environmental Protection Agency
- US Geological Survey Priority Ecosystem Science Program and Office of Water Quality
- H.T. Harvey and Associates
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- Colleagues: Lisa Schile, Evyan Borgnis and many others who have helped in the field over the years of salt pond monitoring