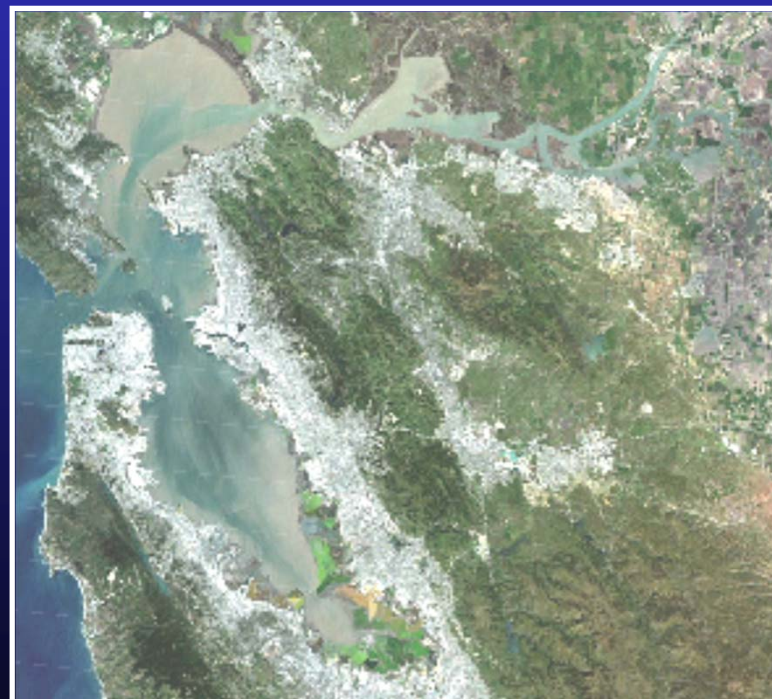


# Adapting continuous suspended sediment and water quality monitoring for new findings in San Francisco Bay

David H. Schoellhamer  
Maureen A. Downing-Kunz  
Tara L. Morgan-King  
Gregory G. Shellenbarger  
Scott A. Wright

USGS California Water Science Center

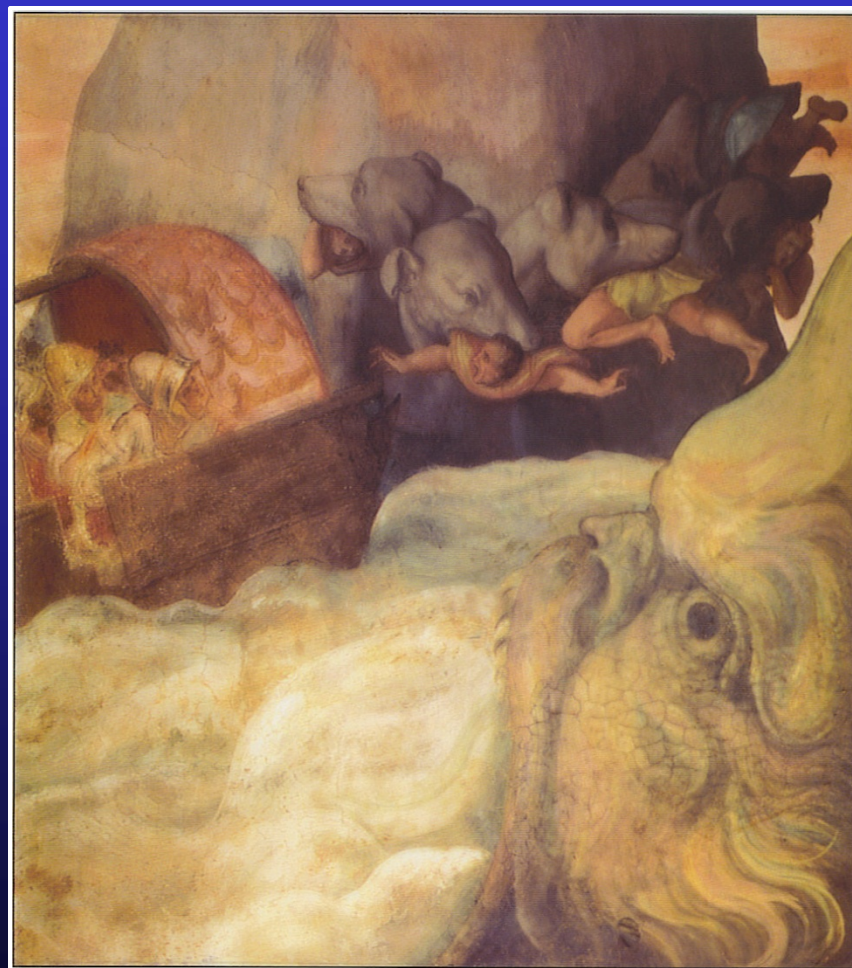


# Pitfall #1: Mindless Monitoring

*Scylla and Charybdis seem to have been reincarnated in today's scientific world as "mindless monitoring and factless modeling."*

-Jerry Schubel and Harry Carter, 1976

From Greek mythology, two monsters that guarded the narrow passage through which Odysseus had to sail in his wanderings.



# Pitfall #2: Failure to adapt

*Most companies that are great at something – like AOL dialup or Borders bookstores – do not become great at new things people want.*

-Reed Hastings, Co-founder and CEO of Netflix, September 20, 2011



The Netflix logo, consisting of the word "NETFLIX" in a bold, white, sans-serif font with a black outline, set against a solid red rectangular background.

The Borders logo, featuring the word "BORDERS" in a bold, black, sans-serif font with a white outline, set against a white rectangular background with a red horizontal bar at the bottom.

# SSC in SF Bay

Marsh restoration  
Endangered fish habitat  
Local tributaries

Monitor

Adapt

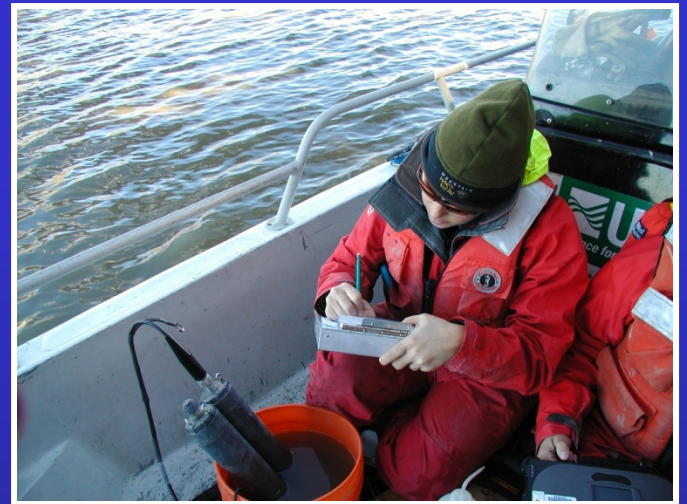
Interpret

New Findings

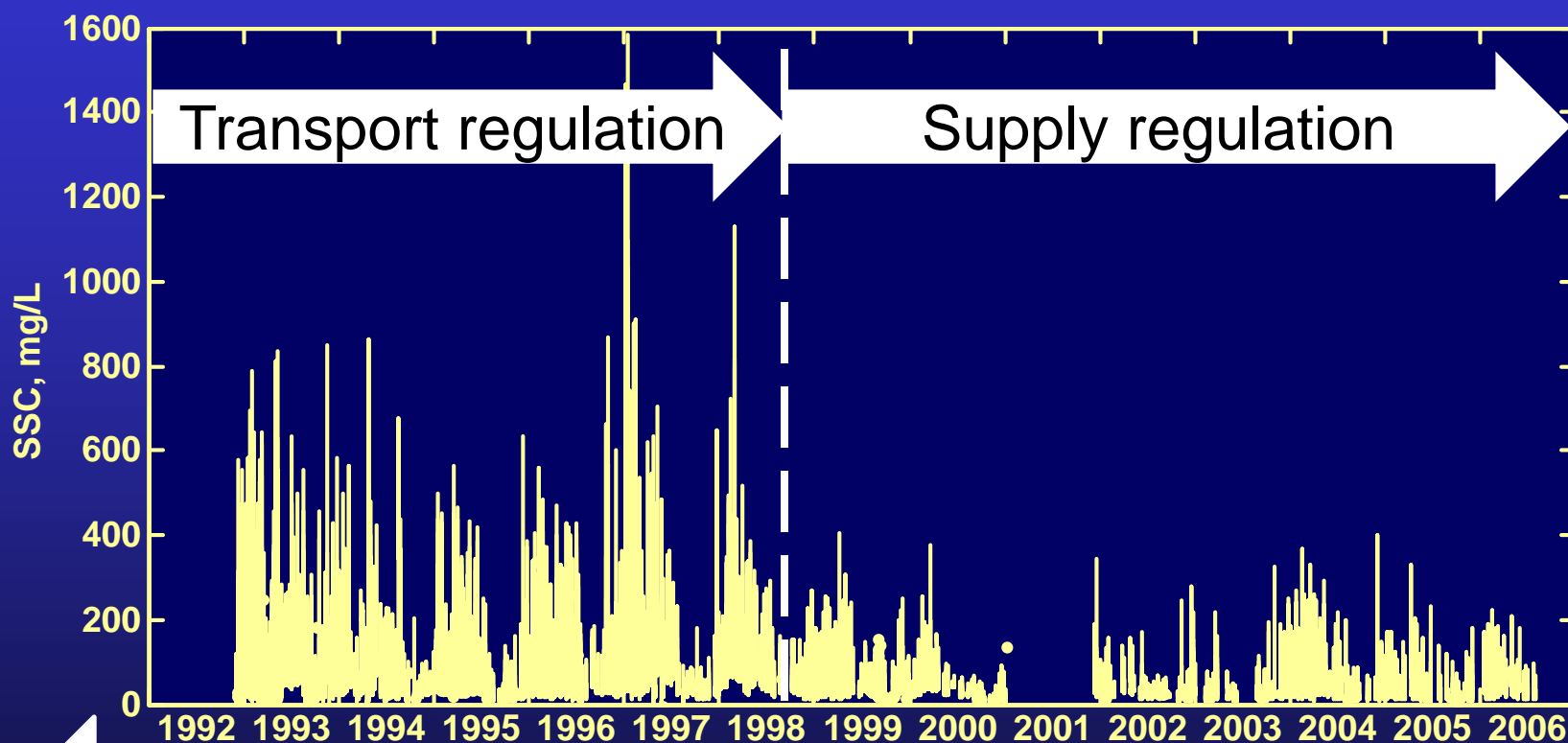
Step decrease  
in SSC in 1999

# Continuous monitoring of SSC 1991-present





# WY1999: 36% step decrease in Bay SSC

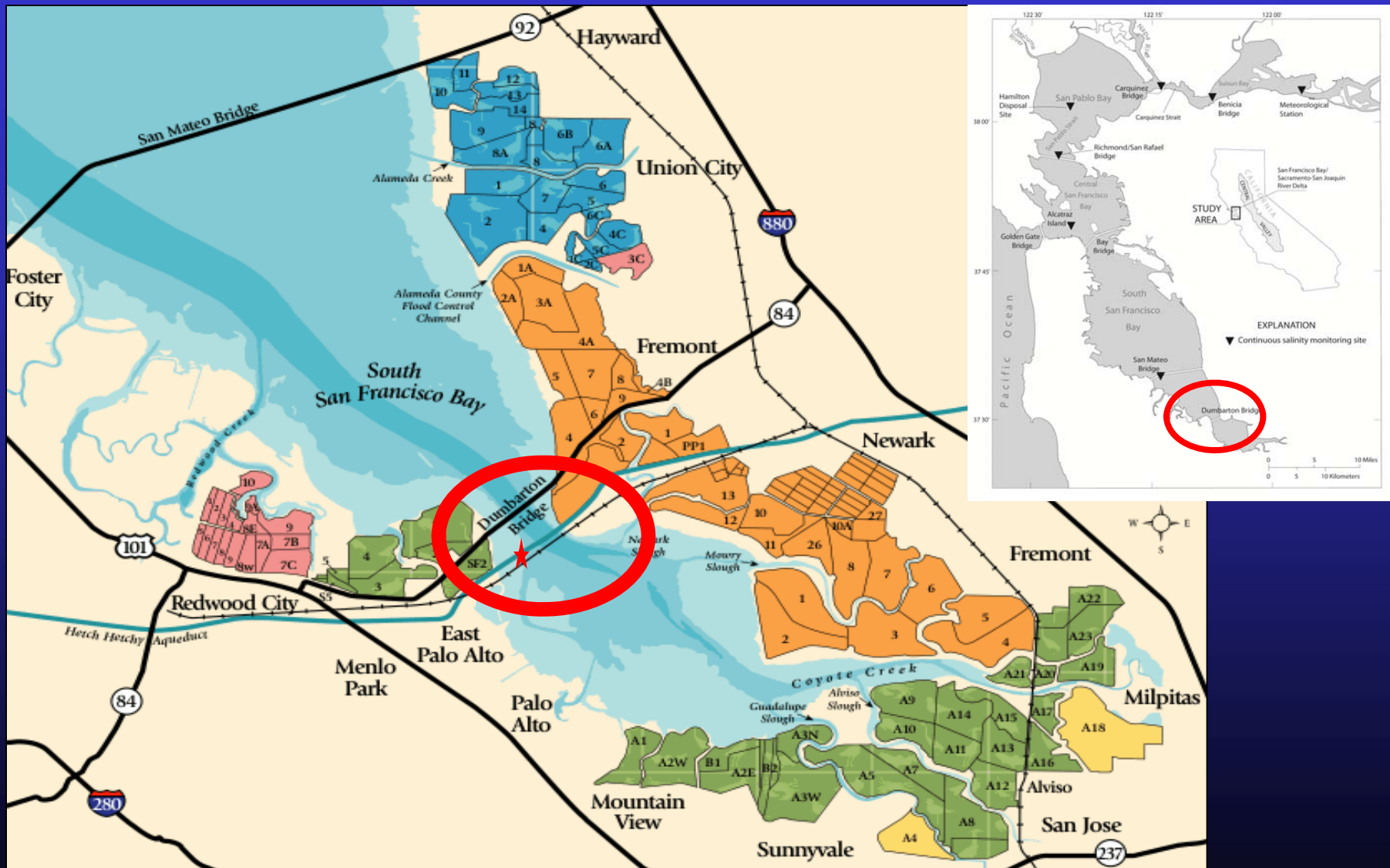


Hydraulic Mining

Record flow

Point San Pablo, mid-depth, Schoellhamer 2011

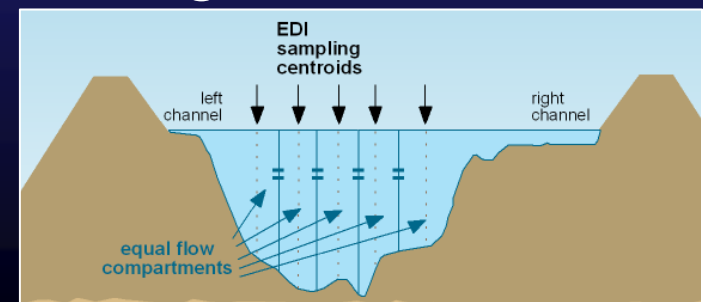
# Problem: Sediment for restoration



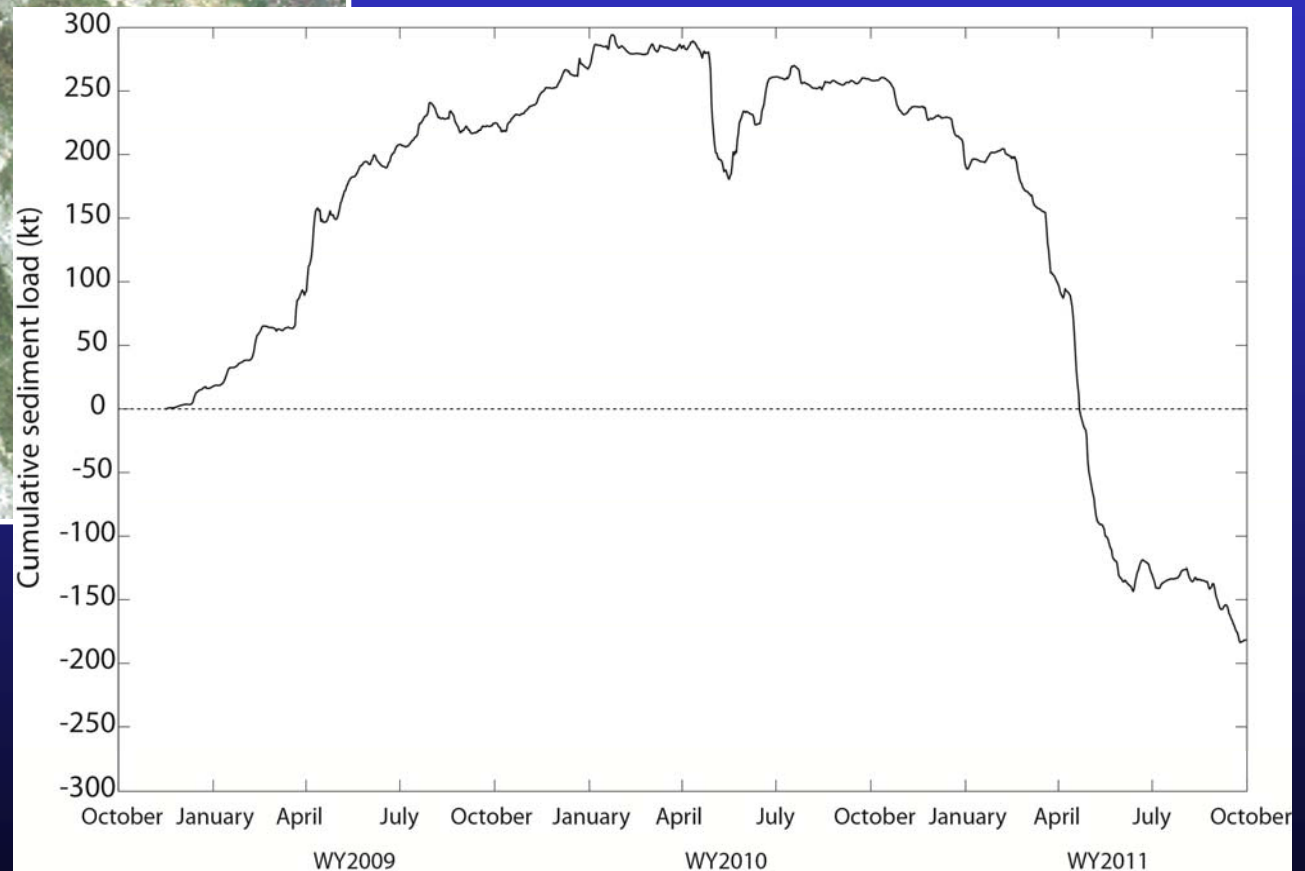
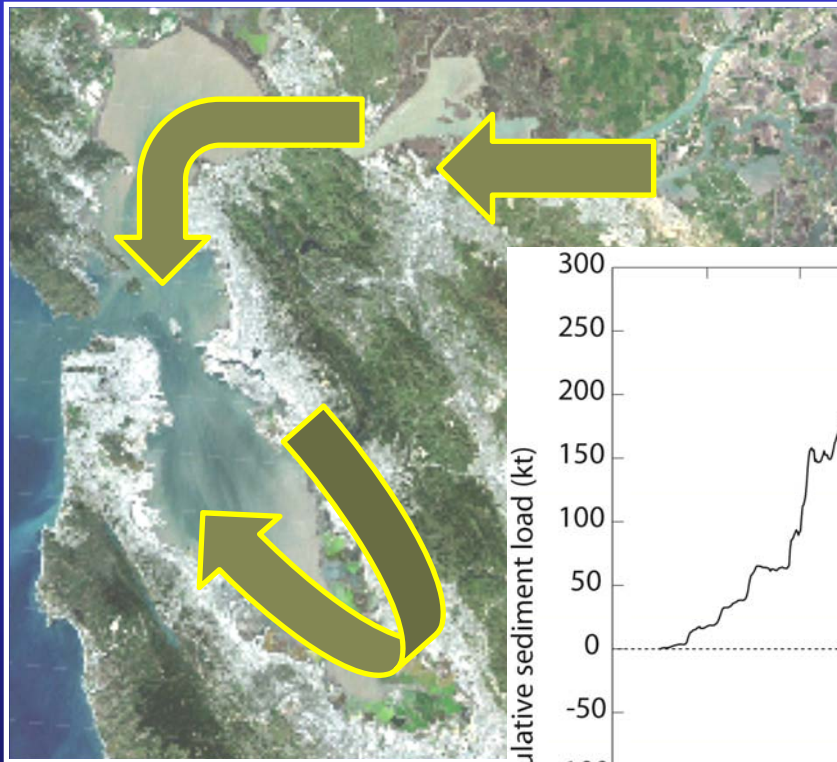


# Dumbarton Bridge sediment flux

- Continuous (15-min.) data
- Water velocity and stage
  - Acoustic current profiler with pressure
- Turbidity
  - Optical turbidity probes
  - Two: 4' a.b. and 25' a.b.
- Flux
  - Index-velocity method for discharge
  - EDI sampling for sediment



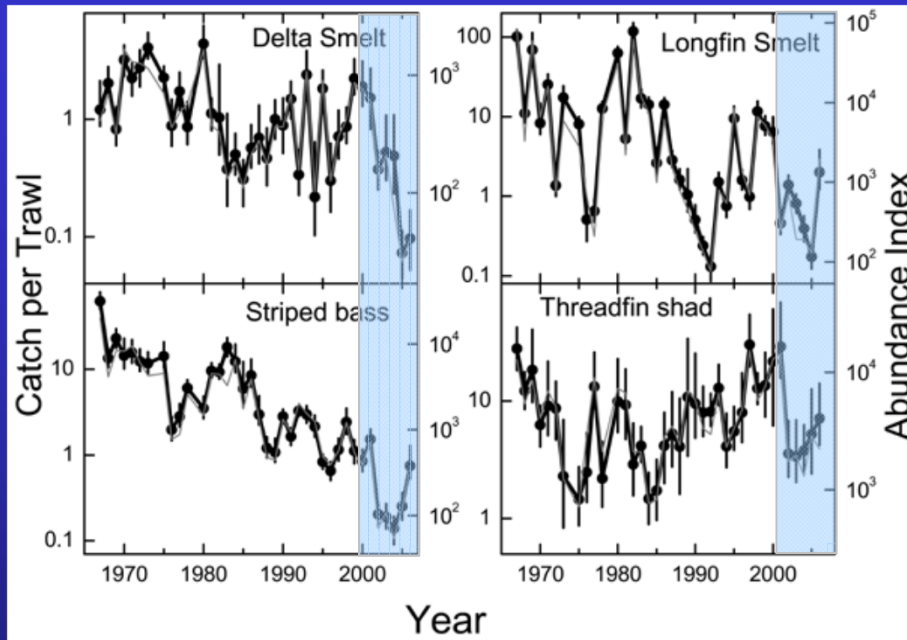
# Delta outflow controls sediment flux



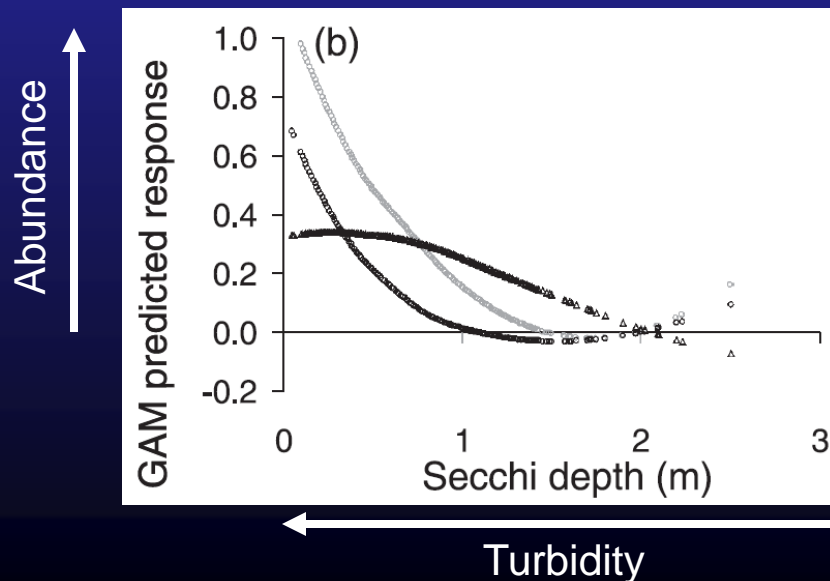
Shellenbarger et al. in prep.



# Problem: fish declines

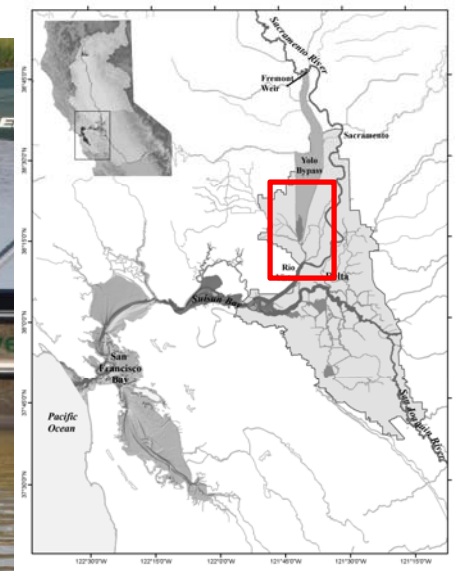
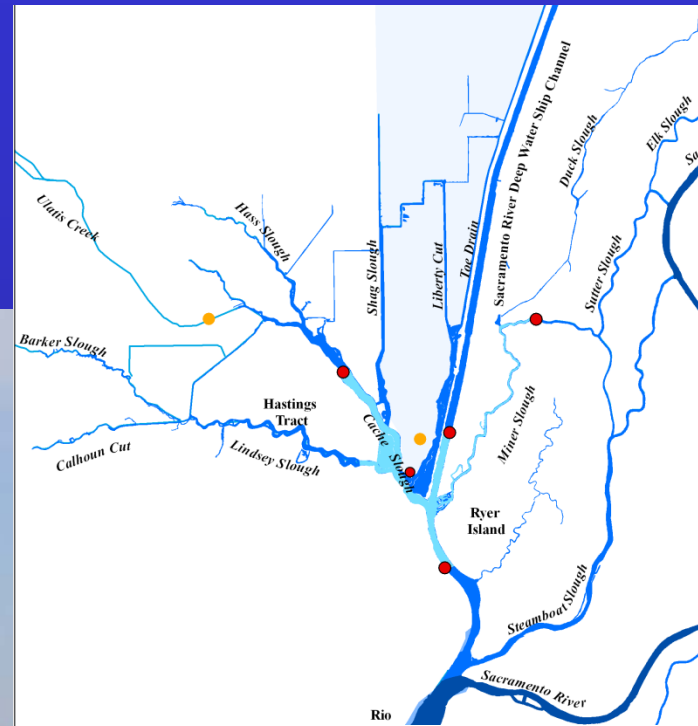


- Some species decline beginning 2000 (Sommer et al. 2007)
- Juvenile delta smelt stop feeding when turbidity less than 18 NTU (Baskerville-Bridges et al. 2004)
- Abundance of some species increases in turbid waters (Feyrer et al. 2007)



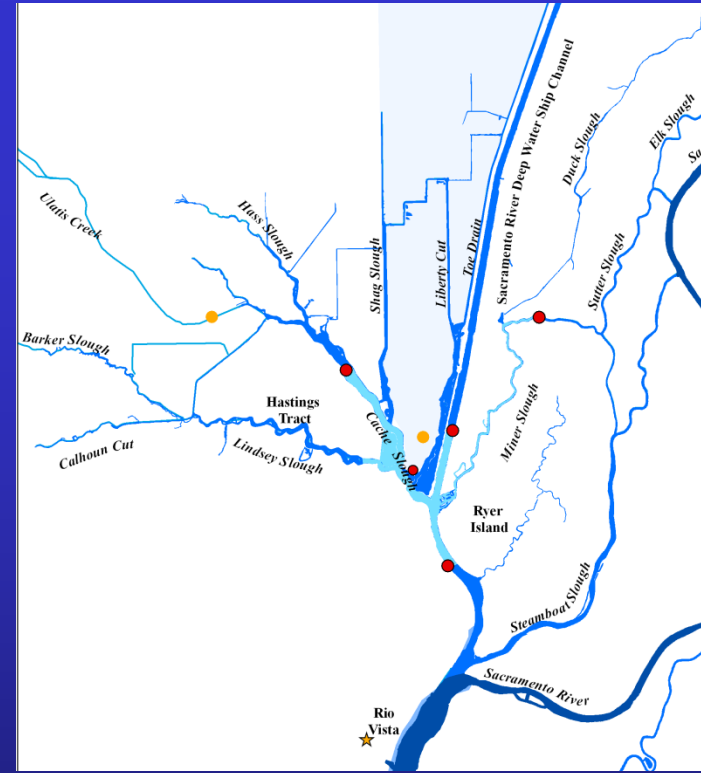
# Why is Cache Slough turbid?

- Flow and Water Quality Monitoring Sites
- Sediment Flux July 2008 to current



# Sediment Trapping

- 1) Sediment accumulates annually
- 2) Mechanisms:
  - Dead-end channels and low freshwater flow
  - Tidal asymmetry (flood dominant velocities)
  - Limited tidal excursion
- 3) Trapped sediment mass undergoes a repeated cycle of tidal and wind-wave resuspension

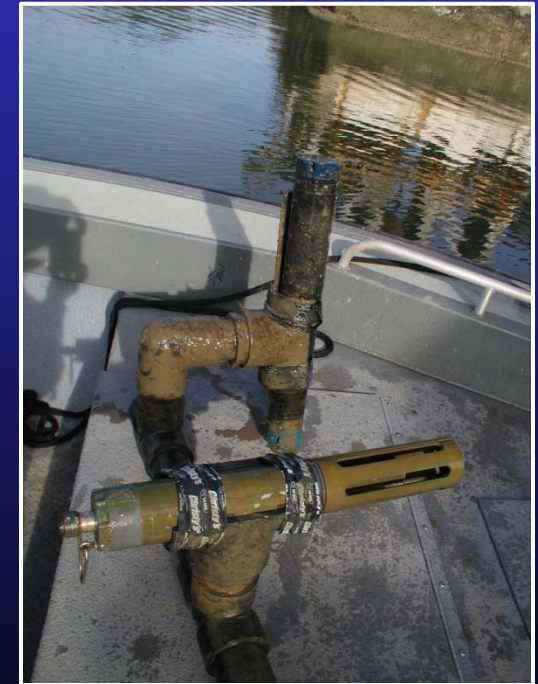
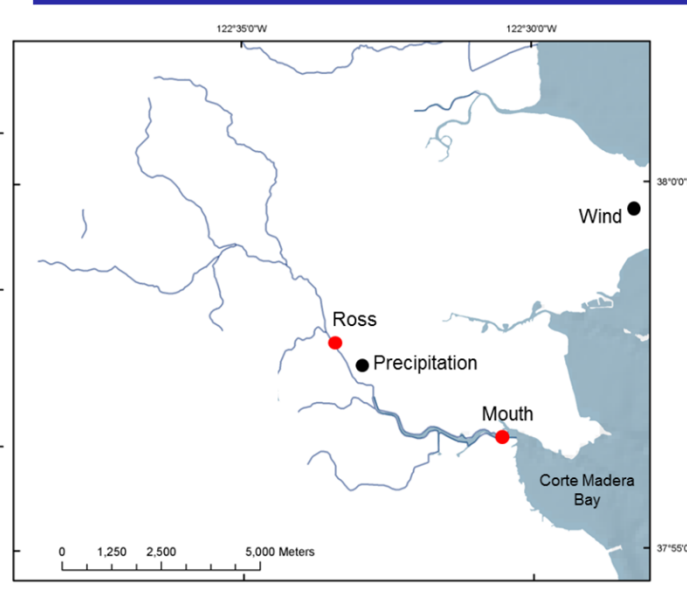
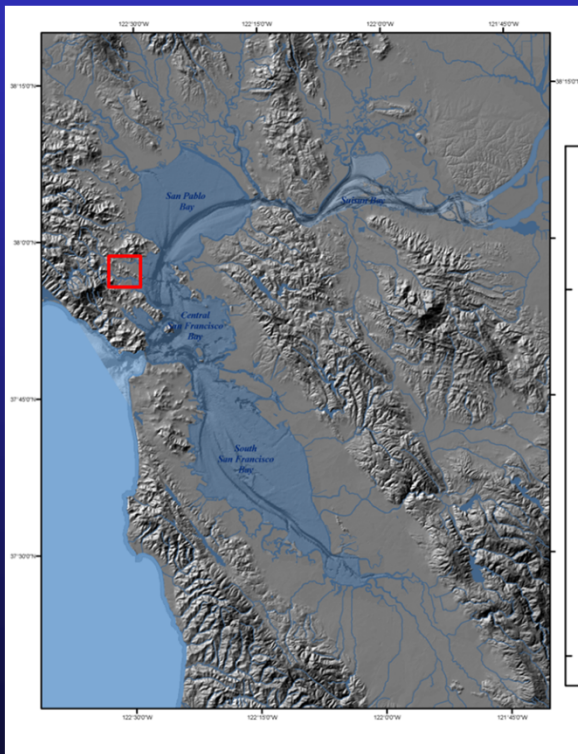


# Problem: sediment supply



- Sediment now a resource, not a nuisance: Regional Sediment Management
- Sediment supply from Central Valley decreasing
- Little monitoring of local tributaries
- Gages above head of tides; tidal reaches ignored

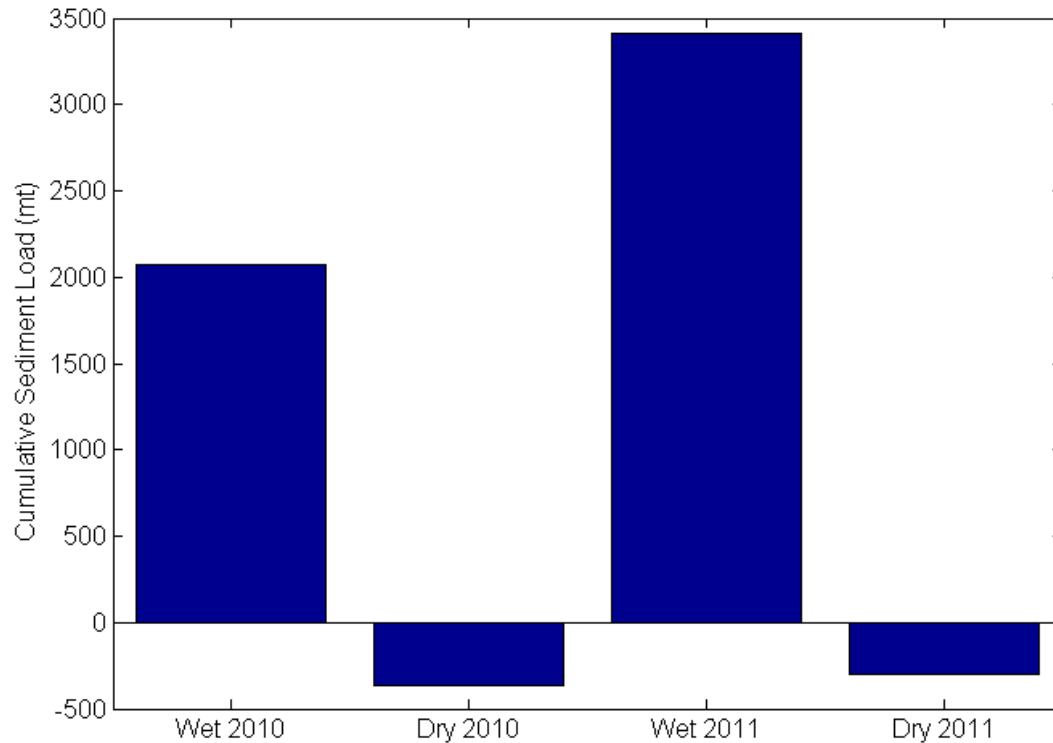
# Corte Madera Creek Sediment Supply



Downing-Kunz and Schoellhamer (submitted)



# Corte Madera Creek Results



- Creek is a source of sediment to the Bay during wet season
- Creek is a sink for sediment during dry season
- Sediment budget for tidal reach being developed



High quality data

Identify information gaps  
Design new monitoring  
Implement

Monitor

Adapt

Interpret

New Findings

Peer-reviewed publications

Acceptance by resource managers  
Ramifications

# Acknowledgements

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