

A PRESENTATION of the Regional Monitoring Program for Water Quality in the San Francisco Estuary



# REVISITING STATUS & TRENDS



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September 27<sup>th</sup>, 2011



# Today's Agenda:

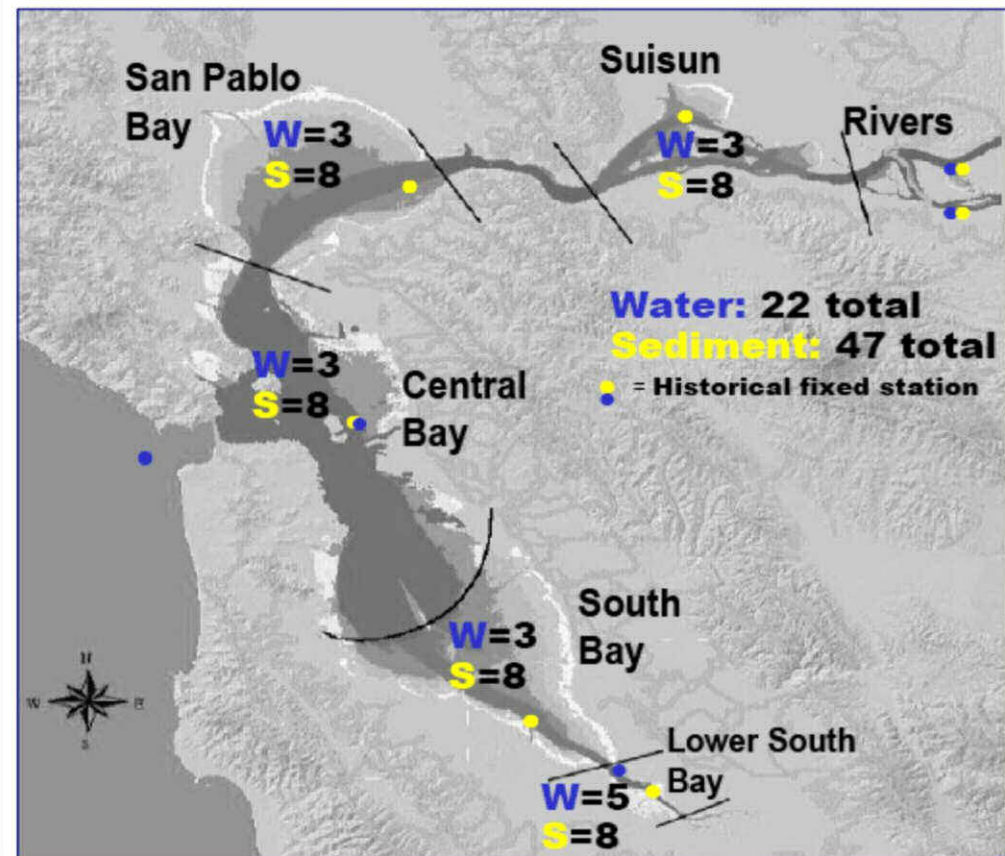
- Meetings with dredgers/refineries
- Discuss options for changing water to biennial starting 2012
- Consider future changes:
  - Sediment (pending modeling needs)
  - Sport fish (reduce frequency? – Fish comm.)
- Consensus on status quo
  - Bivalves & Birds
- Next steps



# S&T Water Monitoring

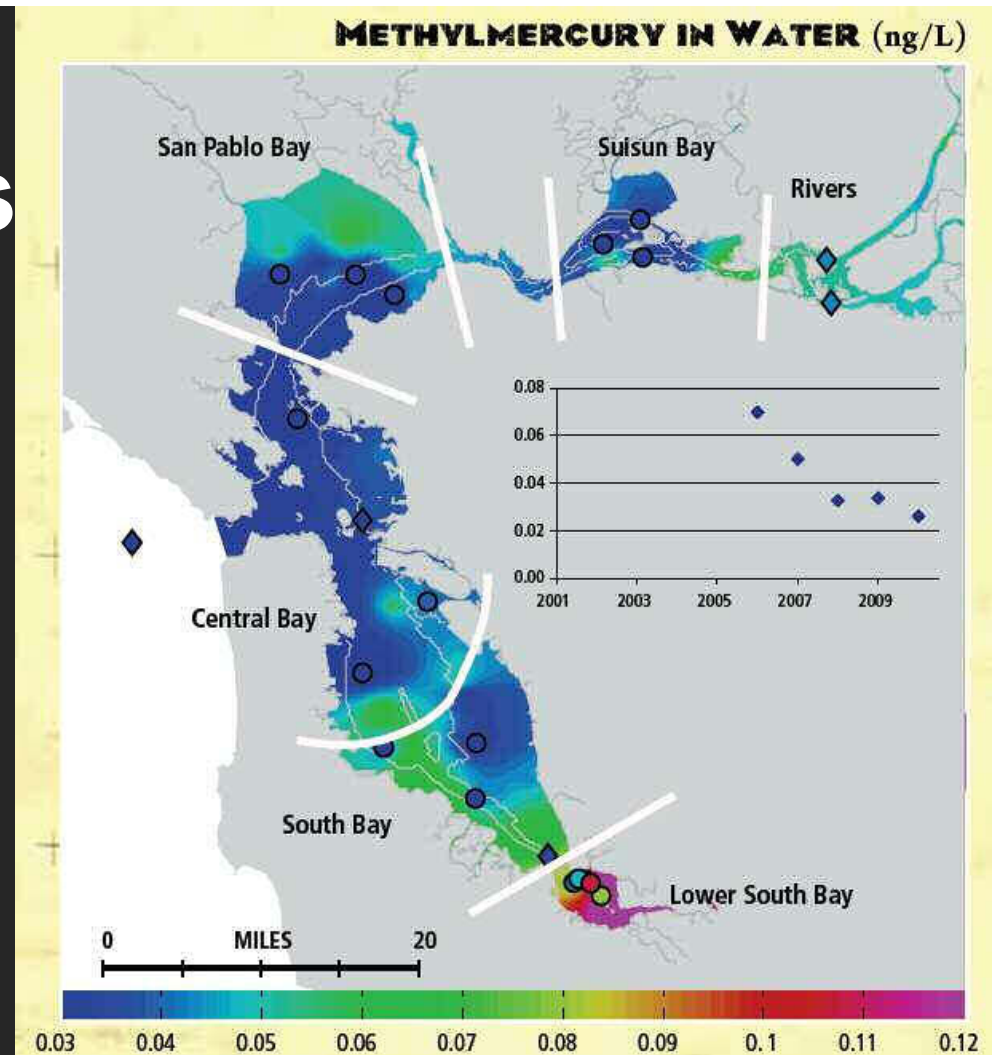
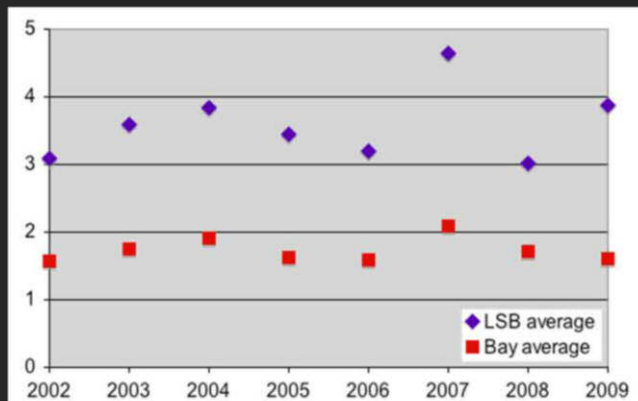


- 22 Water sites
  - Annual - metals and PBDEs
  - Biennial -PAHs, pesticides, & PCBs
  - Every 5 yrs - Aquatic toxicity
- Useful for evaluation of WQC
- Less useful for trends



# TE Water Trends

- Spatial trends
  - Generally higher in Lower South Bay (less dilution)
- Temporal trends
  - A not a good matrix

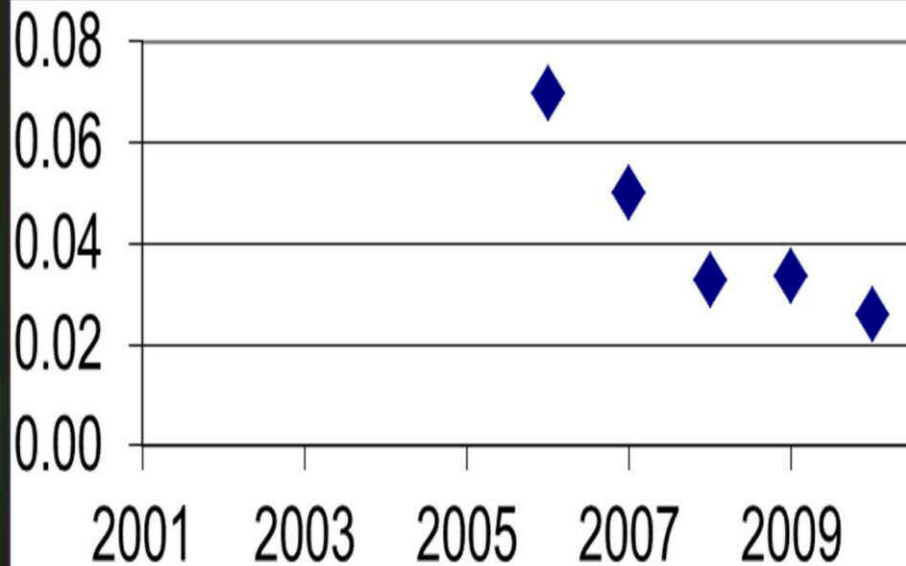


Dis Cu (ug/L)

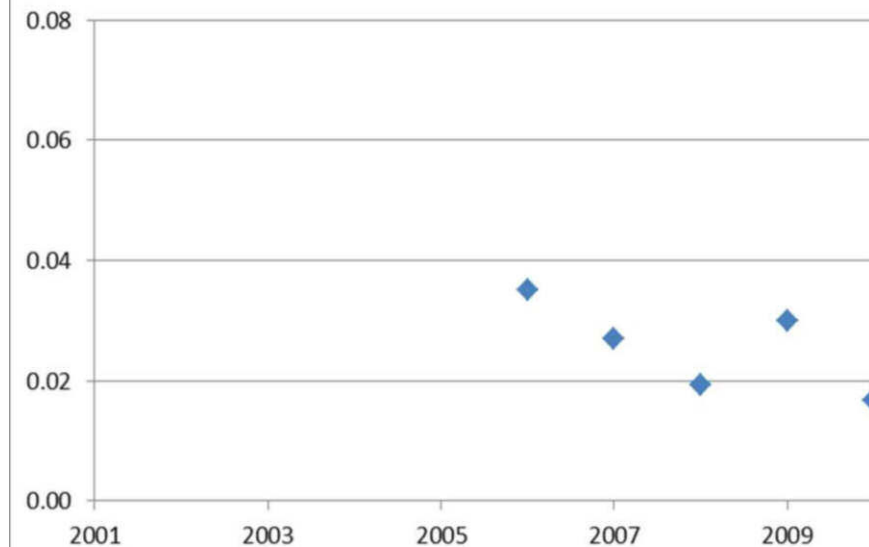
# But water maybe an indicator of some changes in Estuary?



- MeHg declining?
  - Photodemethylation?

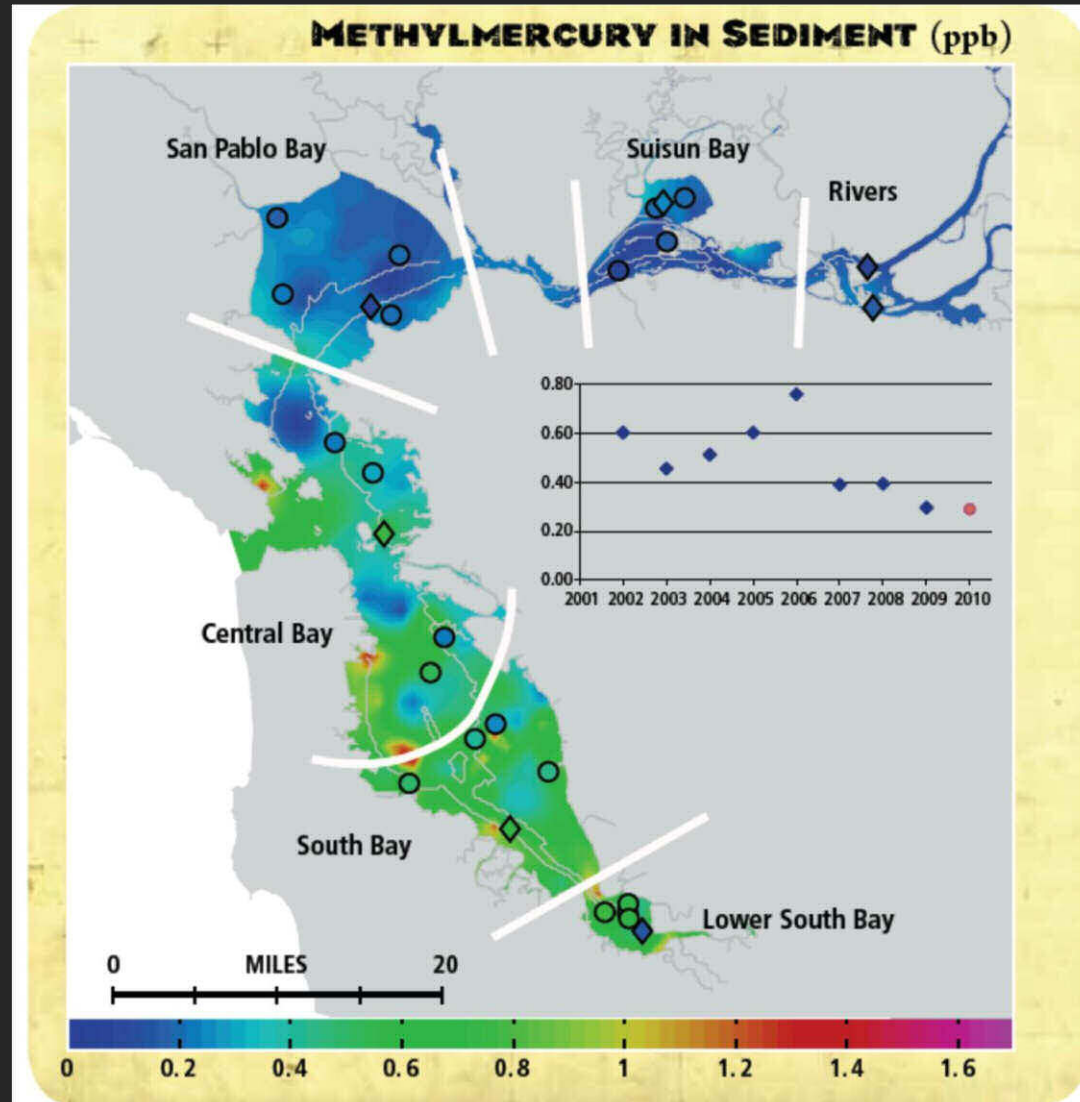


Total MeHg



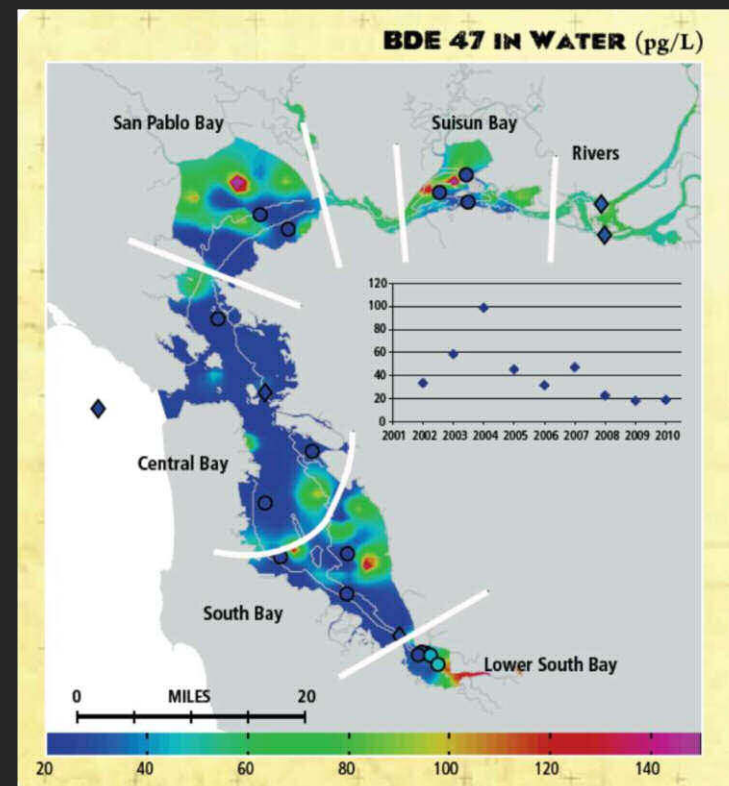
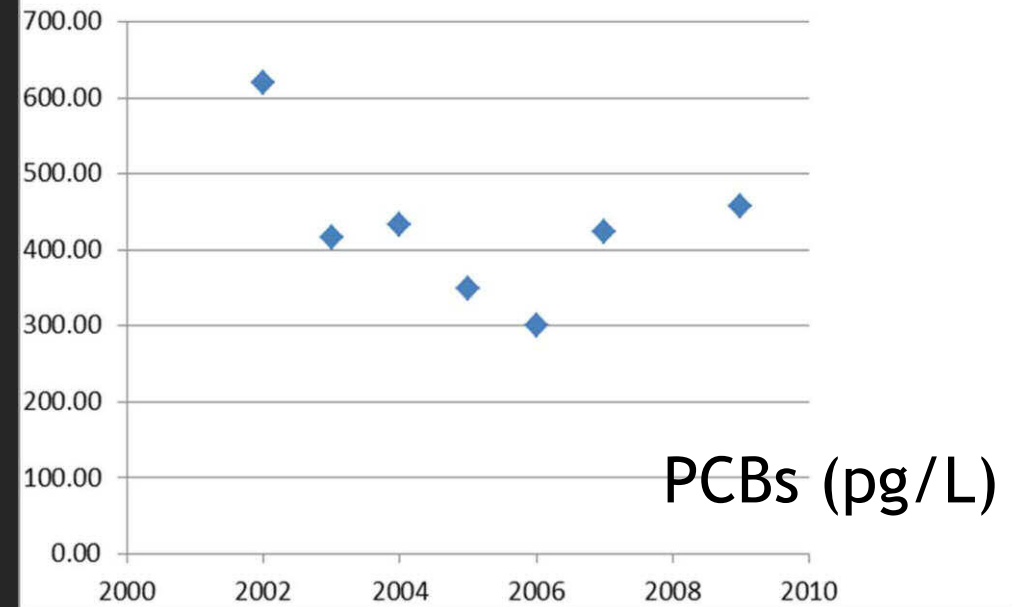
Dis MeHg

# MeHg “Trend” is also observed in sediment



# Organic Trends

- Spatial
  - Generally higher in Lower South Bay (again less dilution)
- Temporal
  - None observed for legacy PCBs/PAHs
  - Possible trend for PBDEs
- PCB driver is biota; Hg driver is biota





# Water Quality Drivers

- Water quality criteria and Cu/ CN SSO
  - Chemicals (metals, organics, ammonia, sulfide, etc.)
  - Oxygen, temperature, color, pH, sediment, etc.
- Narrative
  - Prohibition of biostimulatory substances
  - Prohibition of toxicity
- Reasonable Potential Analysis
- 303 (d) Listings
- Modeling/ nutrient needs?
- Evaluate a changing Bay?





# Frequency

- Water not a good indicator of trends
- Recommend biennial (skip 2012)
  - “Low regret”
  - Continues to provide data to assess a potentially changing Bay (in reasonable time frame)
  - Continues to provide data for CN, Cu, MeHg etc.
  - Consider augmenting depending on modeling/ nutrient strategies and PCB, Hg, and EC syntheses

# Options for Water



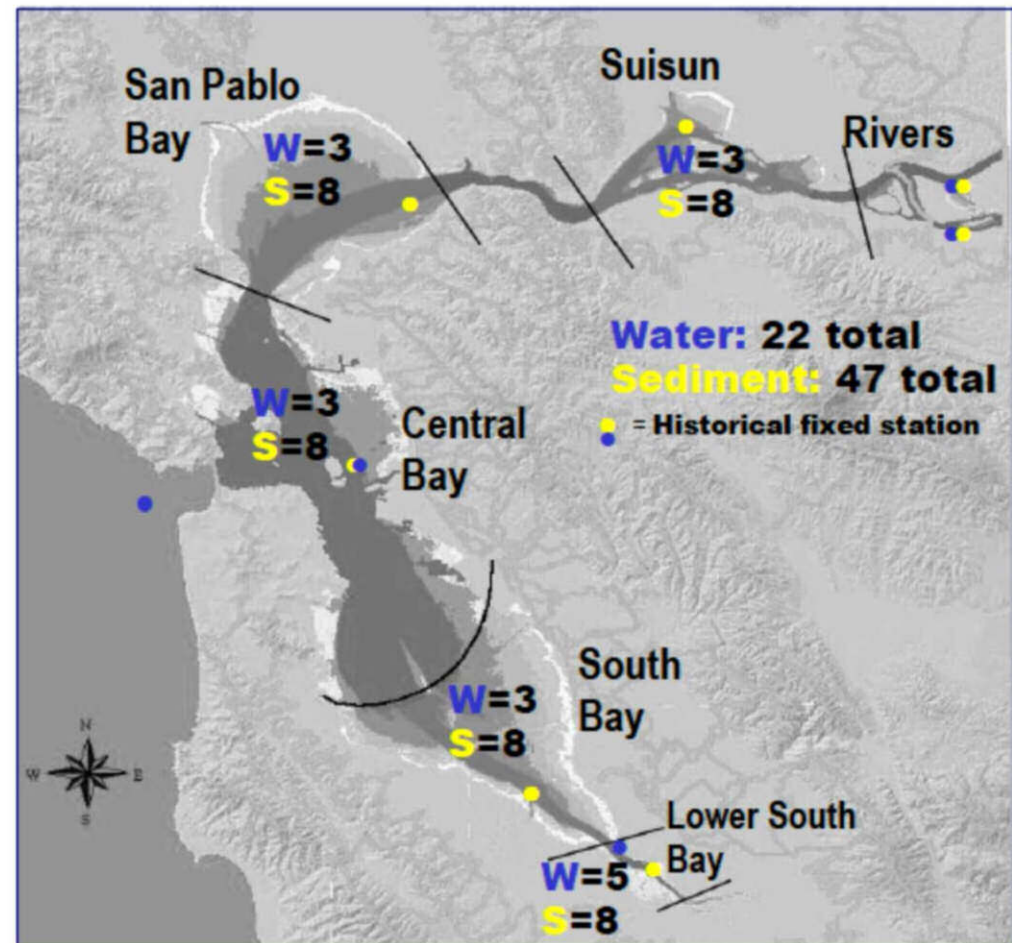
<b>Water Option</b>	<b>Cost per year</b>
<b>1. Status Quo</b>	\$140K/year
TE and modified Organics	
<b>2. Biennial Premium</b>	\$90K/year
Organics/TE every other year	
<b>3. Biennial Select</b>	\$70K/year
BDE/TE every 2 years	
PCBs/PAHs/Pesticides every 4 years	
<b>4. Biennial Select 2</b>	\$64K/year
BDE/TE every 2 years	
PCBs/PAHs/Pesticides every 6 years	
<b>5. Biennial Select 3</b>	\$56K/year
BDE/TE every 2 years	
PAHs/Pesticides every 6 years - No PCBs	



# S&T Sediment Monitoring



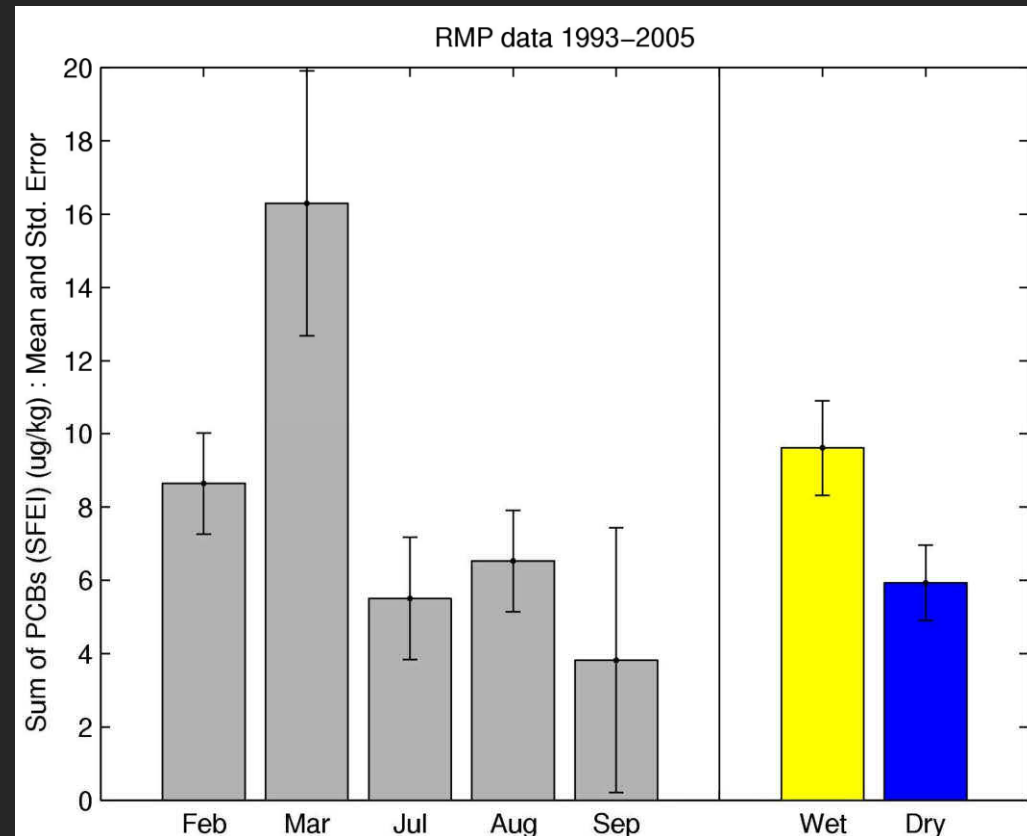
- Alternate wet (27 sites) /dry (47 sites)
- PAHs, PCBs, PBDEs, pesticides, & metals
- Trends and Thresholds



# Sediment Trends



- Seasonal trends (wet vs dry)
  - Toxicity
  - Less so for contaminants
- Spatial trends
  - Important
- Annual trends

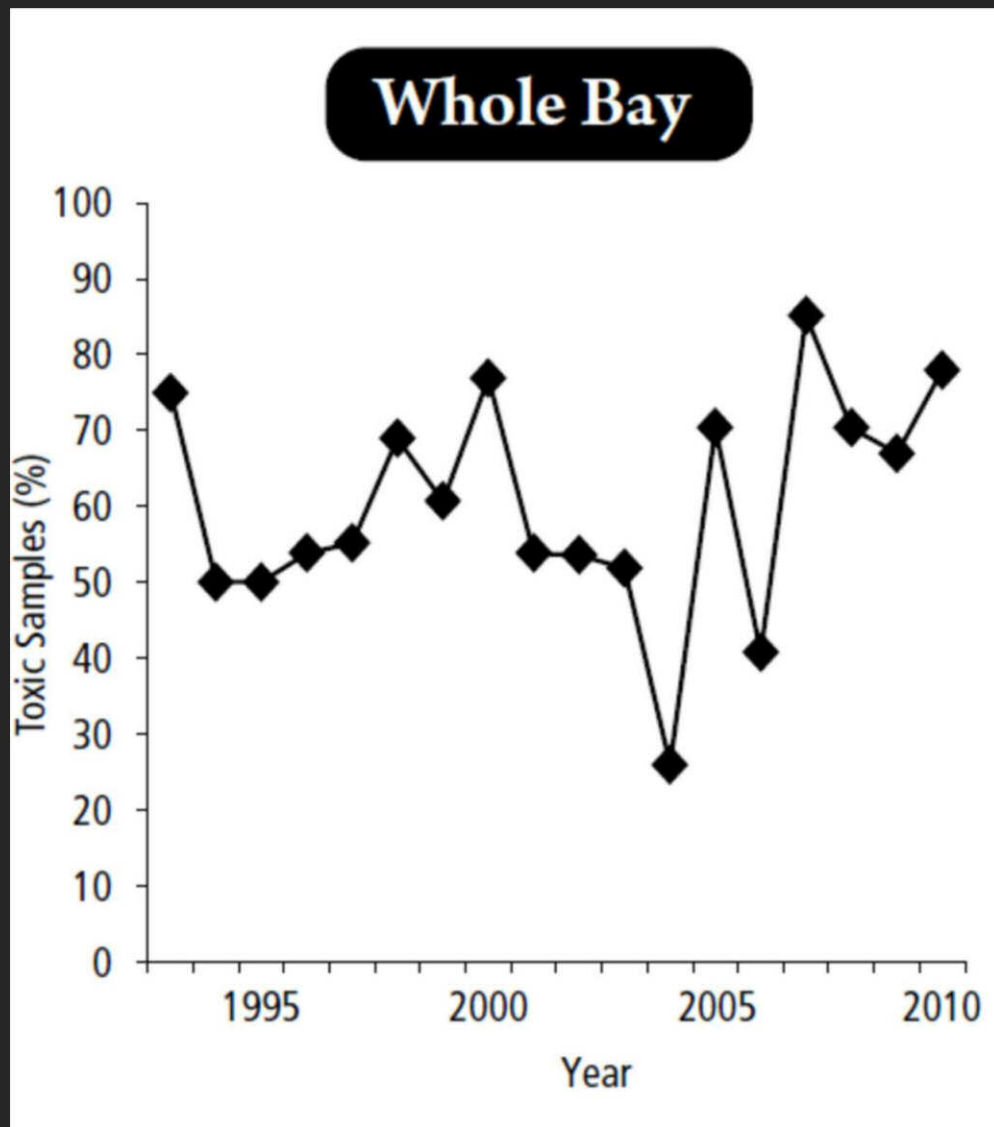


# Seasonal Sediment Toxicity

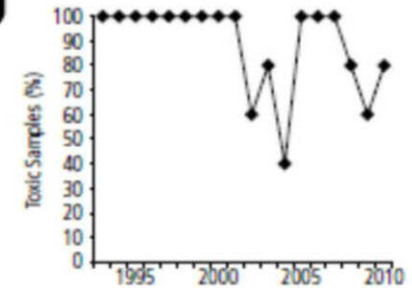


- Seasonal variation was observed in wet weather data (prior to 2002)
  - Higher toxicity in winter
    - Particularly for amphipods (W-51% vs D-16%)
- Causes not known with certainty
  - Mixtures? Metals? PAHs?

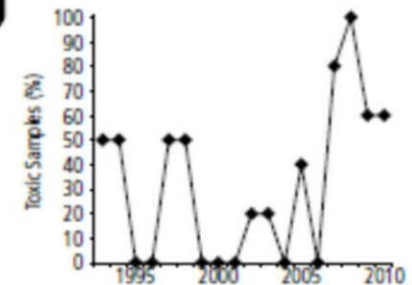
# Sediment Toxicity



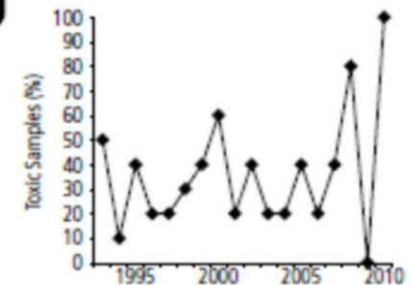
### Suisun Bay



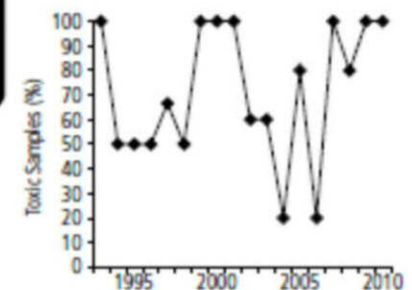
### San Pablo Bay



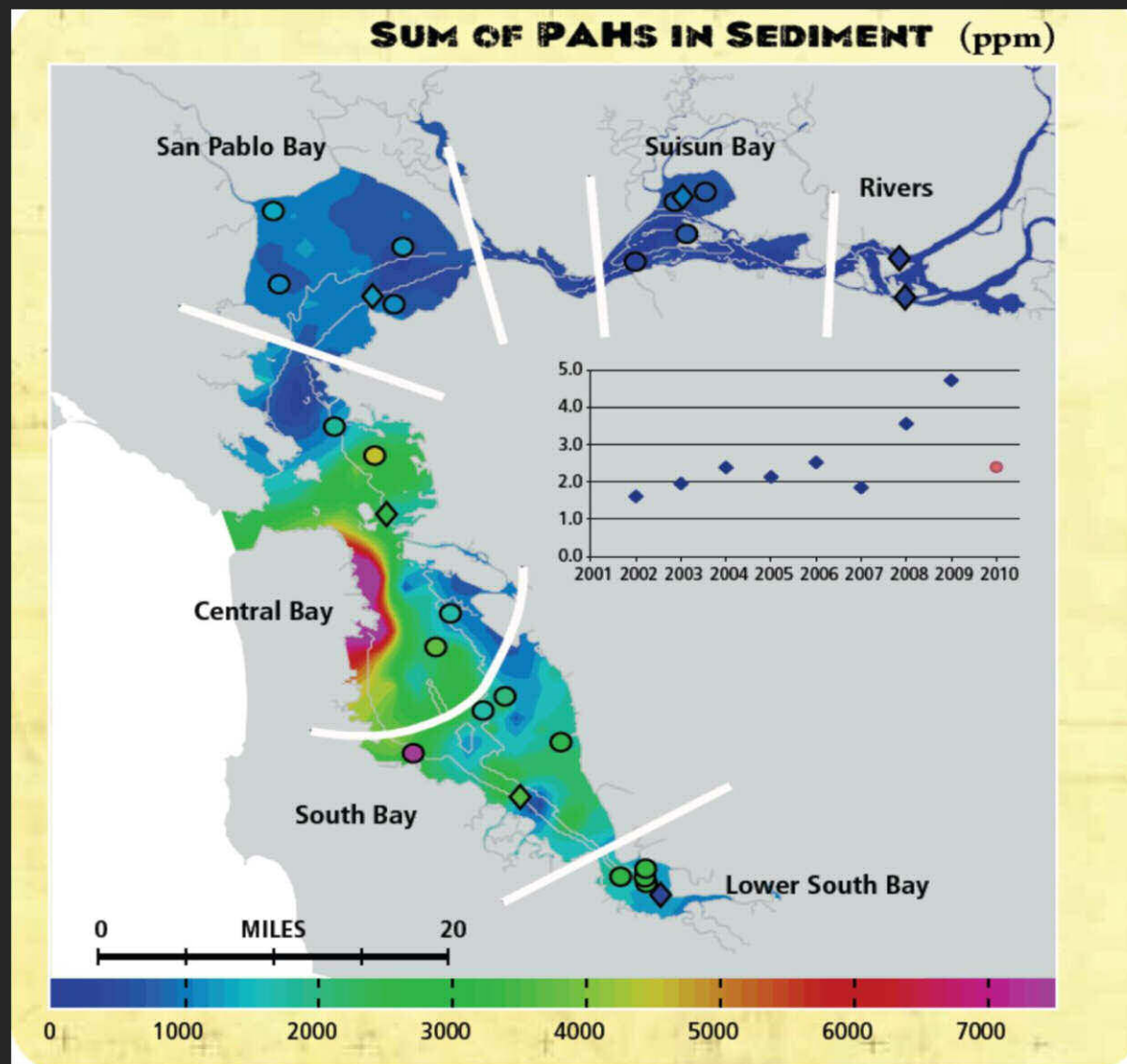
### Central Bay



### South Bay and Lower South Bay



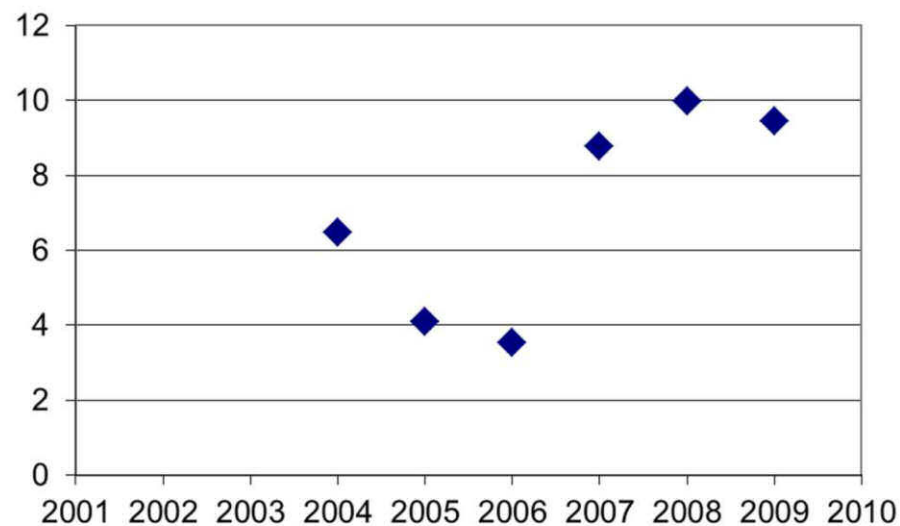
# Spatial Trends



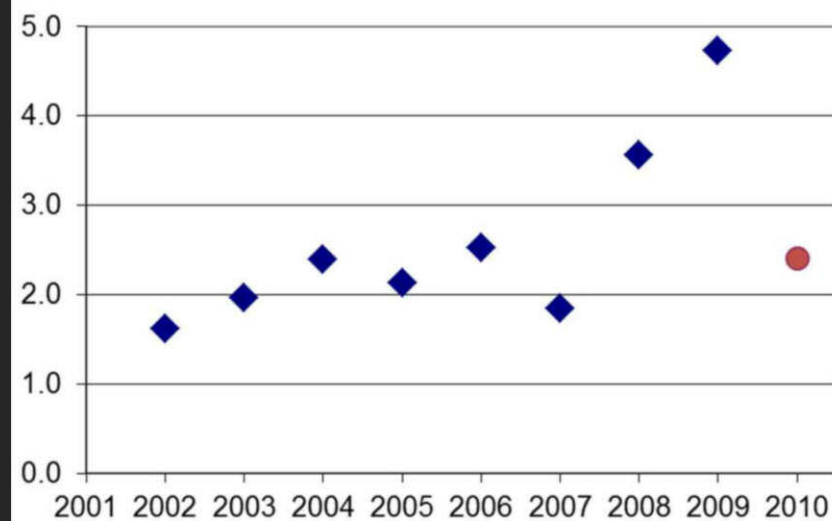
# Annual Trends



PCBs (ppb)



PAH (ppm)







# Drivers

- Sediment TMDL targets for sediment disposal
  - Hg and PCBs (99<sup>th</sup> percentile)
- Management of dredged sediments (requirements for additional testing)
  - PAHs, PCBs, and Hg (90<sup>th</sup> percentile)
- Forecasting impact of management actions (development of models)
- SQOs/ Permit conditions
- Sediment Toxicity – Narrative in Basin Plan
- Cu SSO - Investigate cause of sediment toxicity



# Frequency

- Annual
  - Dredging management
  - SQOs
  - Modeling
- Number of sediment sites?
  - Power analyses suggests ability to maintain trends if drop 2 sites per segment (8 to 6 sites)
    - Not much of saving ~\$35K



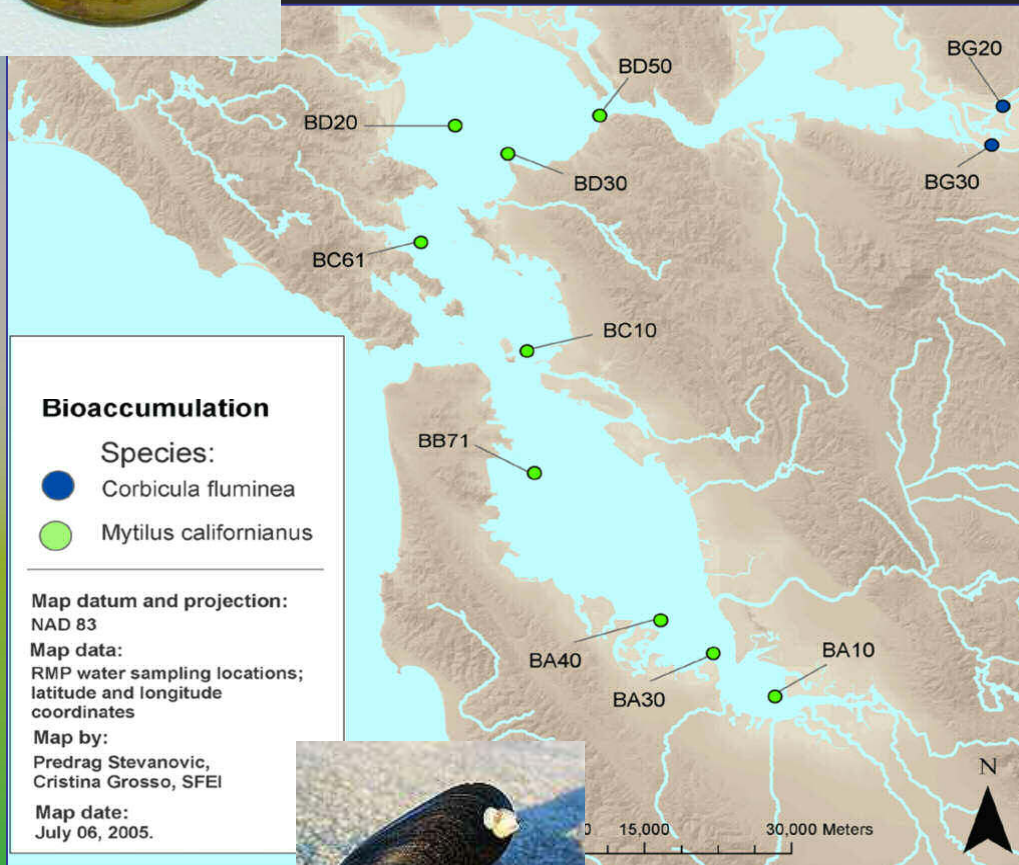
# Sediment

- Maintain status quo
- Re-consider after preparation of modeling plan
  - Need for margin data?

# S&T Bivalve Monitoring



*Corbicula fluminea*

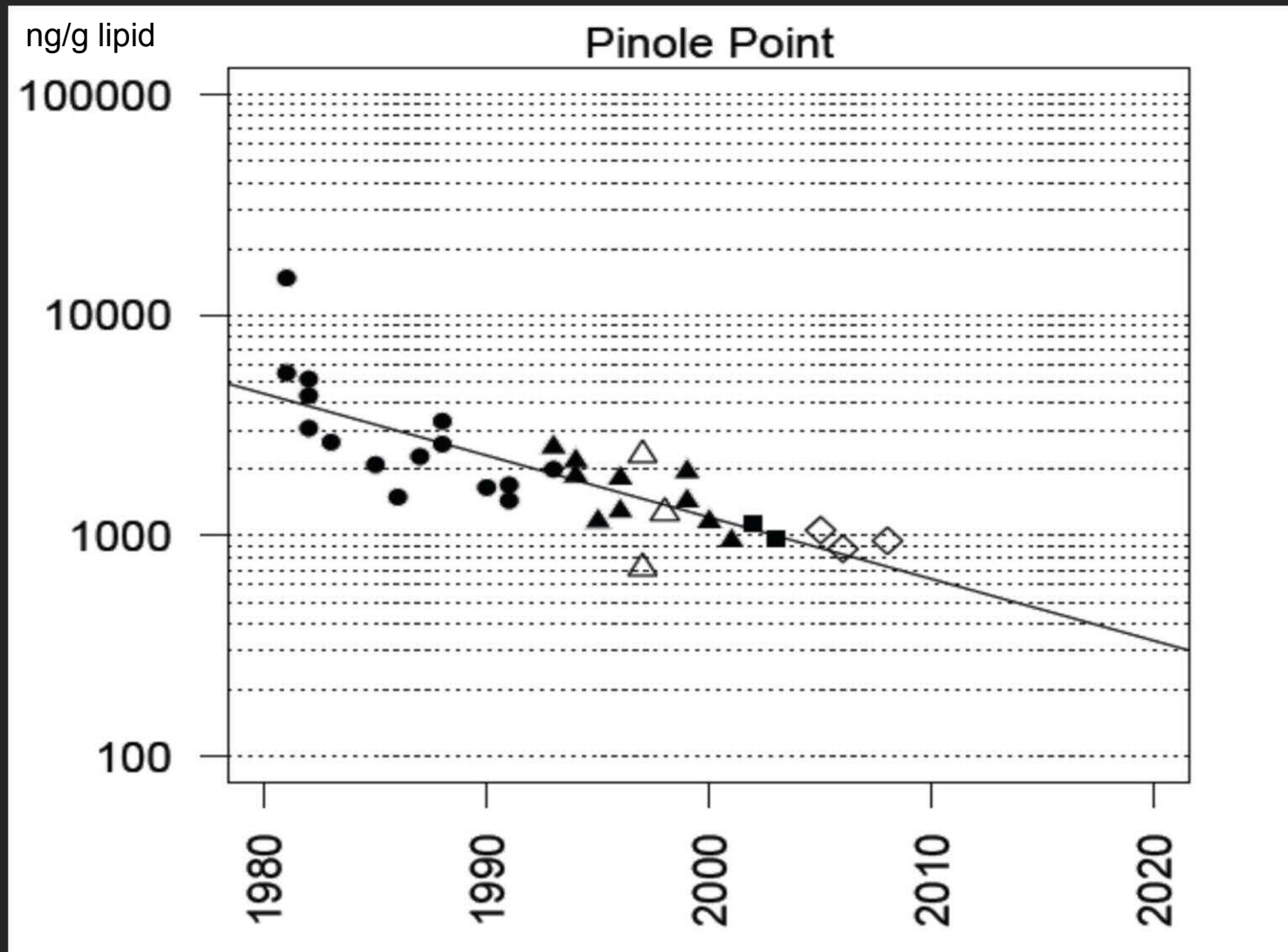


- Biennial - 11 sites (all historical RMP)
- Organics and inorganics

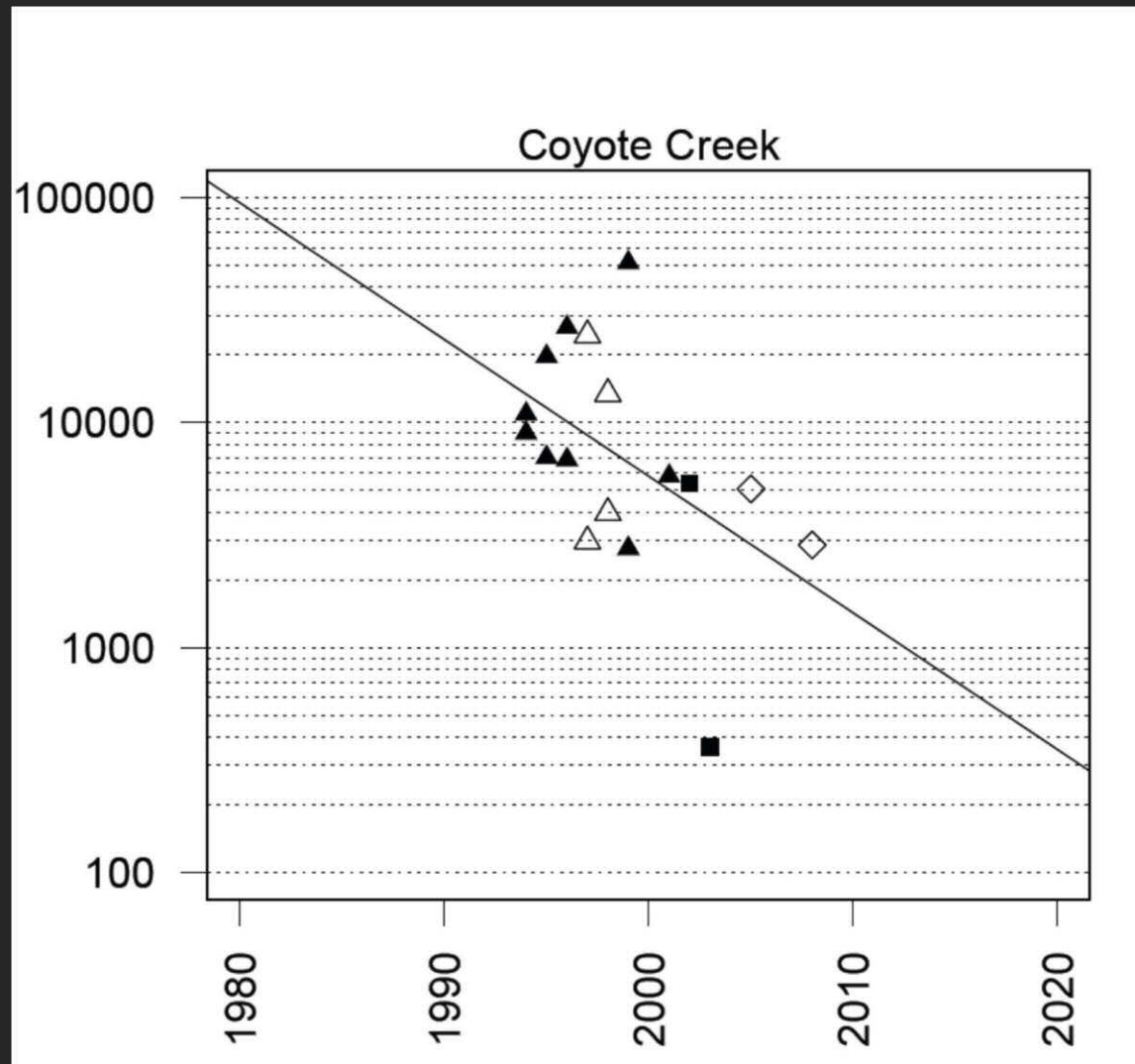


*Mytilus californianus*

# Trends of PCBs in Bivalves



# Trends of PAHs in Bivalves





# Bivalves

- Can decrease to once every 5 years and still identify a 50% decline in PCB concentrations in 20 years with >95% power
- Great trend indicator for organics (PCBs, PAHs, etc.)
- Consider adding ECs?
  - AXYS pro bono work 17 detected
  - Doesn't work for all contaminants (PFCs)
- Maintain status quo

# S&T Sport Fish Monitoring



- Triennial at 5 popular recreation sites
  - PCBs, PBDEs, PAH, dioxin, pesticides, Se, Hg, ECs

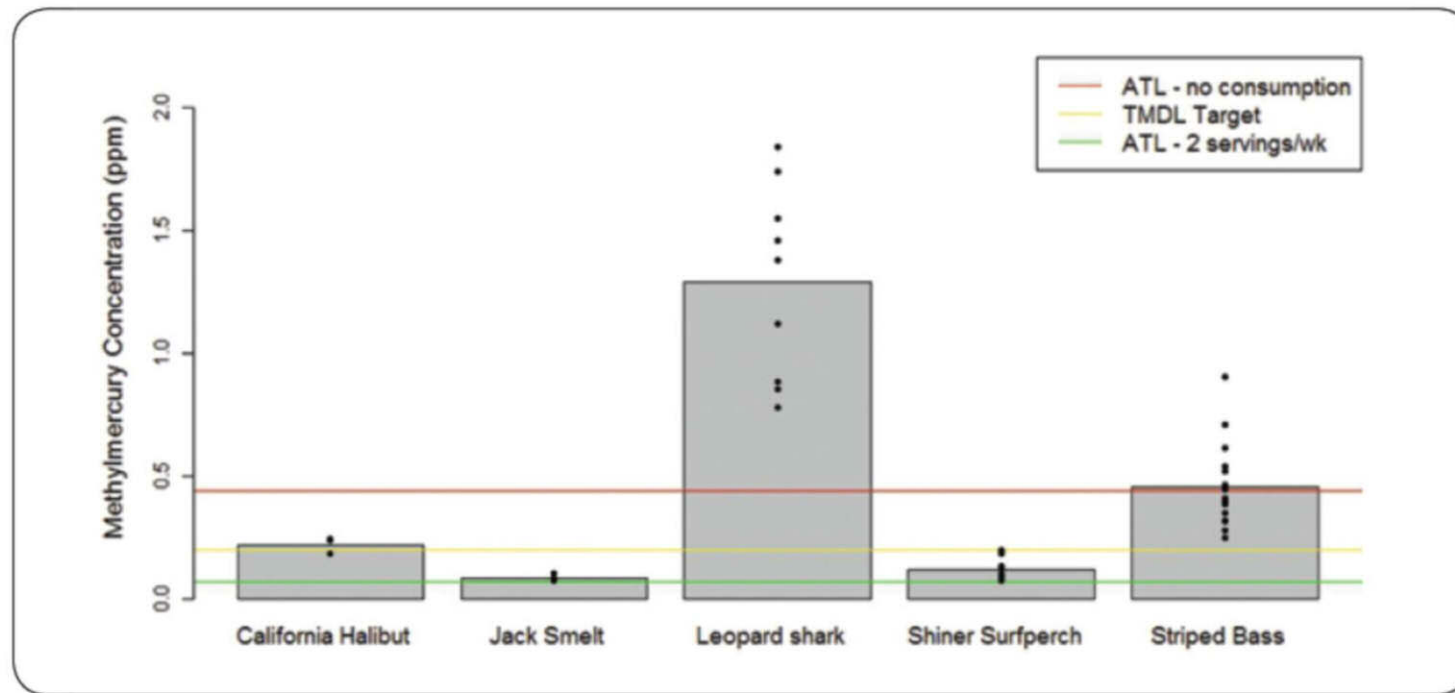


Figure 5-1. Methylmercury concentrations (ppm) in sport fish species in San Francisco Bay, 2009. Bars indicate average concentrations. Points represent individual samples (either composites or individual fish).



# Power Analysis for Sportfish



- Shows with existing design do not have sufficient power to detect exceedances
- Trends are flat
- Consider going to 5-yr cycle to sync with SWAMP/ Bight monitoring
  - Have RMP Fish committee evaluate this Fall

# Fish Options



<b>Fish Options</b>	<b>Cost per year</b>
<b>1. Status Quo (every 3 yrs)</b>	\$87K/year
<b>2. Quintennial</b>	\$52K/year

# S&T: Bird Eggs



- Cormorants: triennial at 3 sites
  - Hg, Se, PBDEs, PCBs, Pesticides & EC
- Cormorants better for trend monitoring of average condition in the Bay



- Terns: Triennial
  - Hg, Se, PBDEs
- Terns better for effects-oriented monitoring, high exposure, shallow habitat, TMDL target

# Power Analysis for Bird Eggs



- >80% ability to detect trends in PCBs, DDT and Hg
- Maintain status quo



# Future Additions to S&T

- Small fish
  - Recommendations from PCB/Hg synthesis
- Contaminant profile with depth
  - Consider as special study?
- Modeling needs
  - Sediment
  - Nutrients
  - Evaluate in conjunction with modeling plan
- ECs
  - Evaluate after EC synthesis

# Summary of “Low Regrets” for S&T:



- Change water to biennial starting 2012:
  - With some analytes being analyzed even less frequently (e.g., PCBs)
  - Consider augmenting based on syntheses/strategies
- Consider changing:
  - Sediment pending modeling/ nutrient needs
  - Sport fish to 5 year cycle with SWAMP
- Maintain status quo
  - Bivalve
  - Birds

# Next Steps



- Preparation of memo summarizing rationale for change/ status quo
- Preparation of “thumbnail” S&T Strategy