

**Estimating sediment related
contaminant loads entering
San Francisco Bay from the
Central Valley: A contribution to
Region 2 and Region 5 TMDLs**

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Why are Particle Loads Important?

- Most contaminant that are currently of concern in the Bay attach to particles
 - Mercury
 - PCBs
 - OC pesticides
 - PCBs
 - Other trace metals
- The Central Valley the largest pathway of particles and therefore contaminants to the Bay

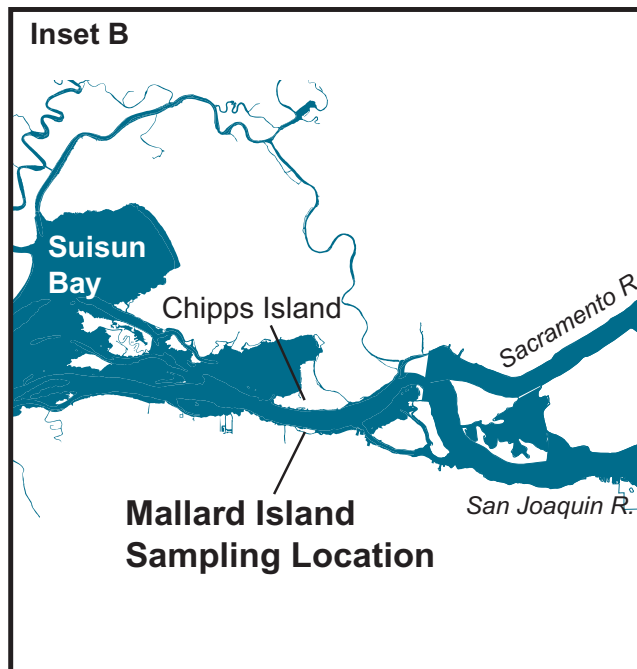
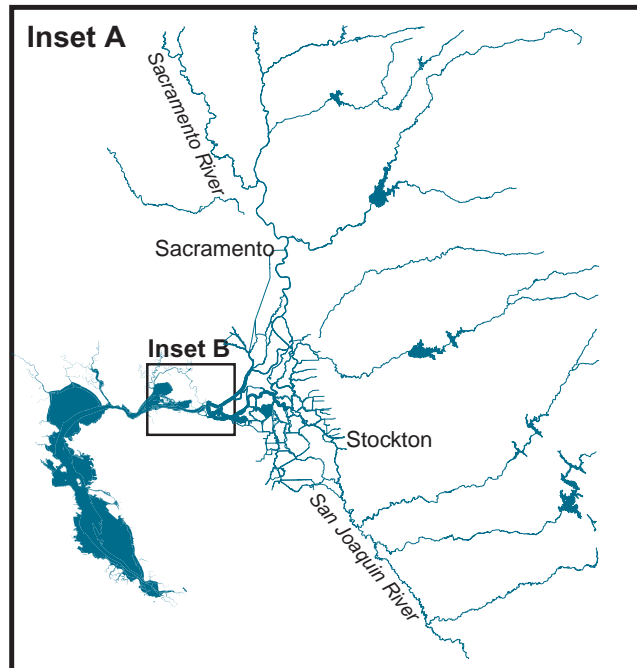
The Beginnings of the Mallard Island Study

- Literature Review of Loading of Sediment Particles to the Bay from the Central Valley (McKee, Ganju, Schoellhamer, Davis, Yee, Leatherbarrow, Hoenicke)

Conclusions

- The data collected at Mallard Island by the USGS are suitable for estimation of suspended sediment and contaminant loads associated with particles
- The loads of suspended sediment entering the Bay from the Central Valley averaged $2.1 \pm 0.3 \text{ Mt y}^{-1}$ for the water years 1995-98
- Data collected by the RMP is unsuitable for estimation of contaminant loads
- To improve accuracy of loads estimates new data focusing on floods must be gathered
- TRC approved funding for a three-year study at Mallard Is. to collect trace substance data during floods

Sampling Location



Sampling Team and Responsibilities

Suspended sediment sampling

- USGS

Contaminant sampling

- UCSC (2 persons)
- SFEI (1 person)

Laboratory analysis

- UCSC (Hg, TMs, and ancillary)
- AXYS (PCBs, PAHs, OCs)

Reporting and publishing

- SFEI
- UCSC
- USGS

Oversight

- SPLWG

Sampling Methods

- USGS has maintained an OBS instrument at Mallard Island since 1994
- USGS collects water samples for SSC analysis
- Regression and estimation of SSC
- Funded by CALFED through to 2004
- SFEI and UCSC collect samples using clean techniques during floods of greater than 40,000 cfs at Freeport
- A total of 90 samples will be collected with available funding over three years

Progress to Date

- Jan 2002: UCSC/ SFEI team begins sampling
- Jan/ Feb 2002: Peer-review comments used to refine the study design

Issues raised

- Are the point samples collected at Mallard Is. representative of the whole cross-section
- Is there a better method for estimation of discharge

Solutions proposed

- Doppler profiler to qualitatively test water column variability
- Collaboration with a modeling group to generate discharge data at an hourly time step

Use of Existing Data

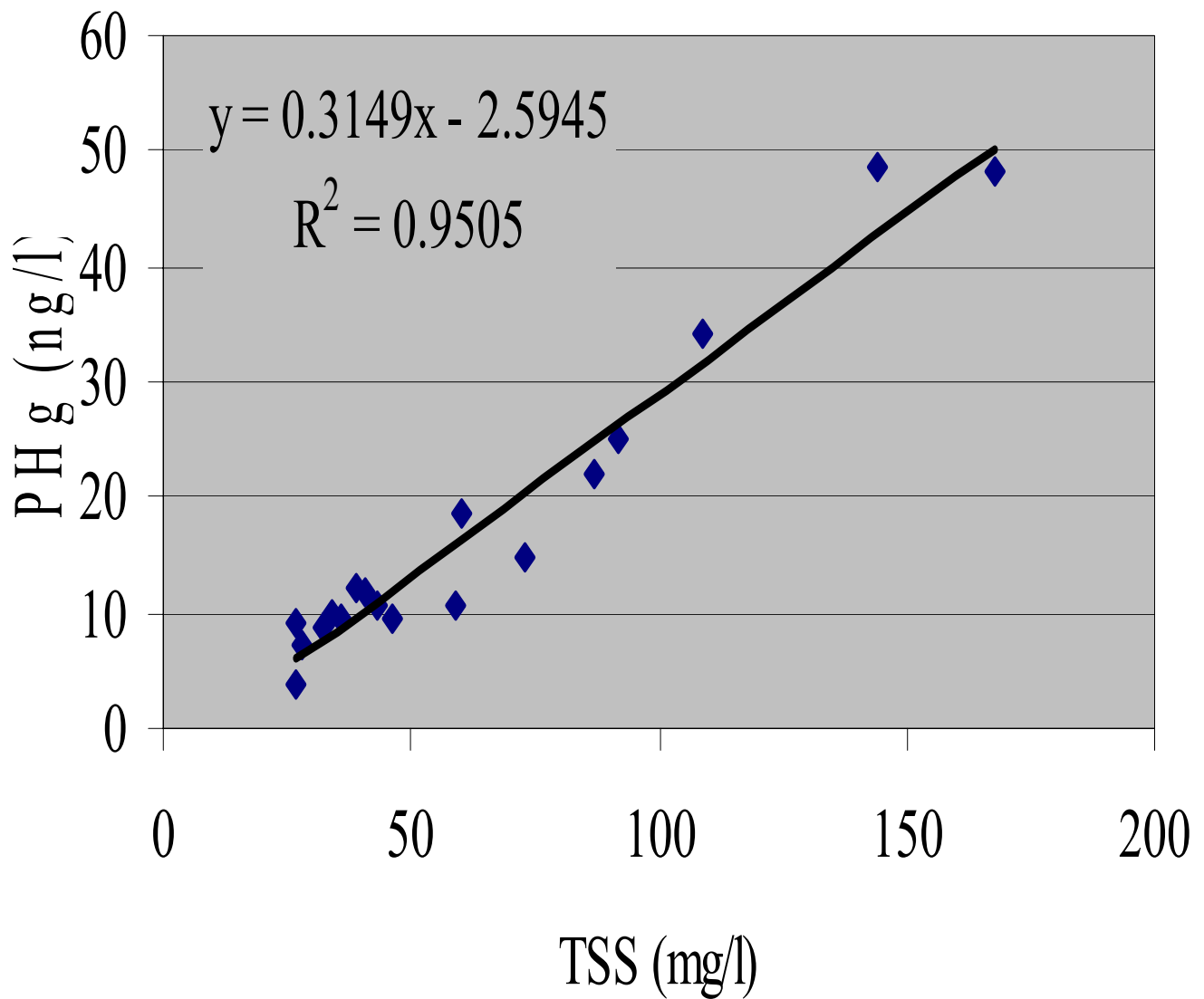
Data supplied by Chris Foe (Region 5 RB)

- March 2000 to October 2001 Hg data at X2
- Suspended sediment concentration and loads for water years 1995-98
- Delta outflow using the DAYFLOW

Issues

- Management actions will be sensitive to the accuracy of loads estimates
- If loads estimated too high, efforts by Region 5 may have little impact on SF Bay contaminant budget

The Regression Model



The Loads Estimates

Water year	Suspended sediment (Mt)	Particulate Hg (kg)
1995	2.6±0.4	701±154
1996	1.0±0.2	253±55
1997	2.2±0.4	612±134
1998	2.4±0.4	644±141
<u>4-year average</u>	<u>2.1±0.3</u>	<u>552±121</u>

Issues and Uncertainties

Laboratory Issues

- SSC versus TSS

Calibration space

- TSS concentrations collected at X2 were between 27 mg l^{-1} and 168 mg l^{-1}
- USGS data, SSC estimated using OBS sensors between 5 mg l^{-1} and 420 mg l^{-1}

The model

- The regression suggests that the relationship between SSC and Hg will remain constant under higher flow conditions
- It is known that source affects concentration
- That the Delta appears to be a net source

Summary

- SFEI has a study structure and team that will collect data over the next 3 years to provide better estimates of contaminant loads
- The data will help to improve management of contaminants in both R2 and R5 regions
- The data provided by C Foe of R5 has been used to:
 1. Build a hypothesis of Hg loads
 2. Formulate questions on how to evaluate future data
 3. May provide a great framework for building a consensus picture and collaboration between groups