Item 4. Episodic Toxicity

Summary: aquatic toxicity program

sediment toxicity program

Toxicity WG recommendations

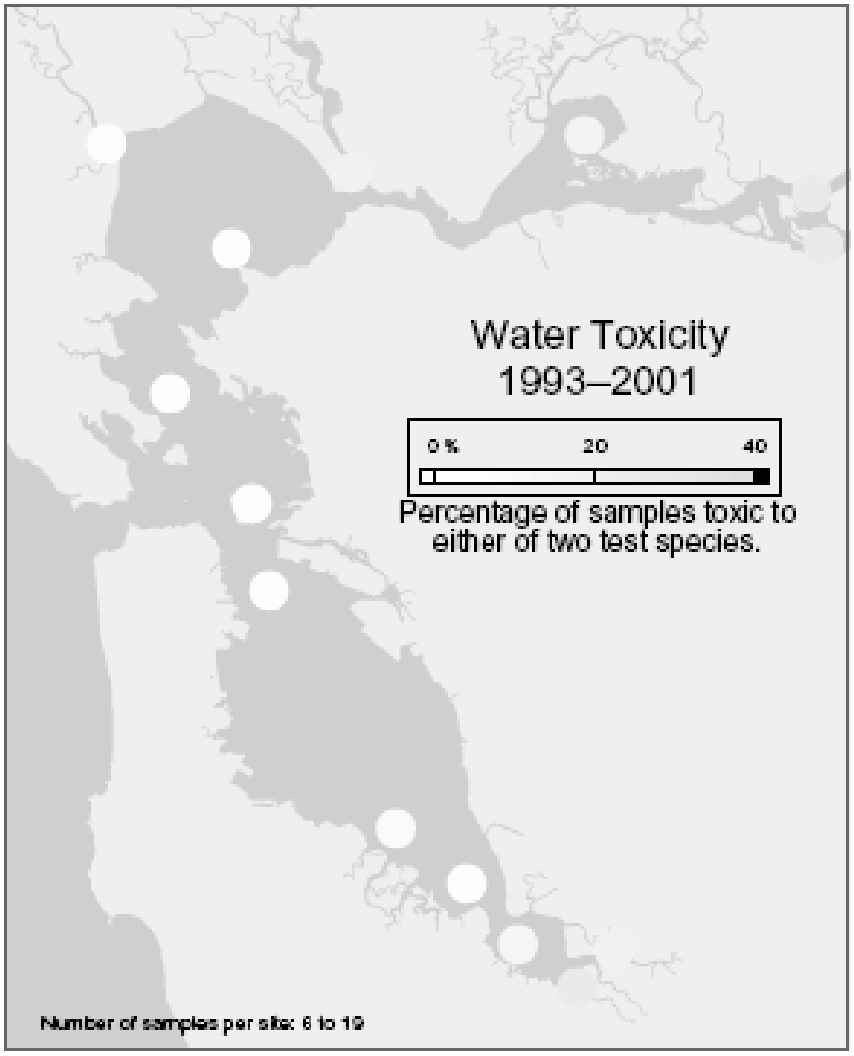
RMP/PRISM 2004-2005

Big picture of toxicity work in RMP

Proposed sediment toxicity study and how it relates to issues of getting at the persistent-tox and SQO.

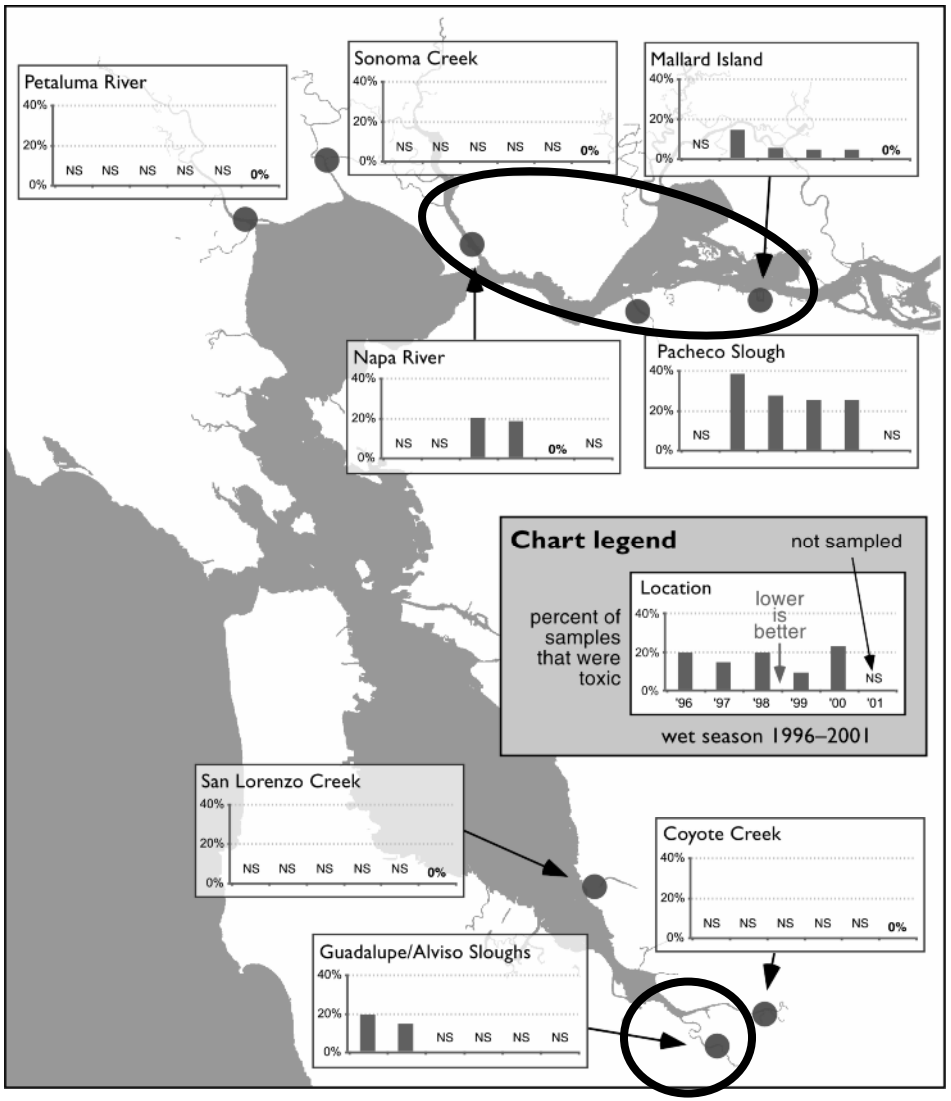
TRC Oct 3, 2006

Aquatic Toxicity Monitoring
S&T Overview



- Between 1993-2001 ~13% of the S&T water samples were toxic to either of 2 species
  - More toxicity seen in wet season
- Ep Tox Pilot Study initiated in 1996 to investigate potential toxicity in surface runoff events

Episodic Toxicity Monitoring Overview 1996-2001



- Several tributaries and several storm events

  (Nov - Apr each year)

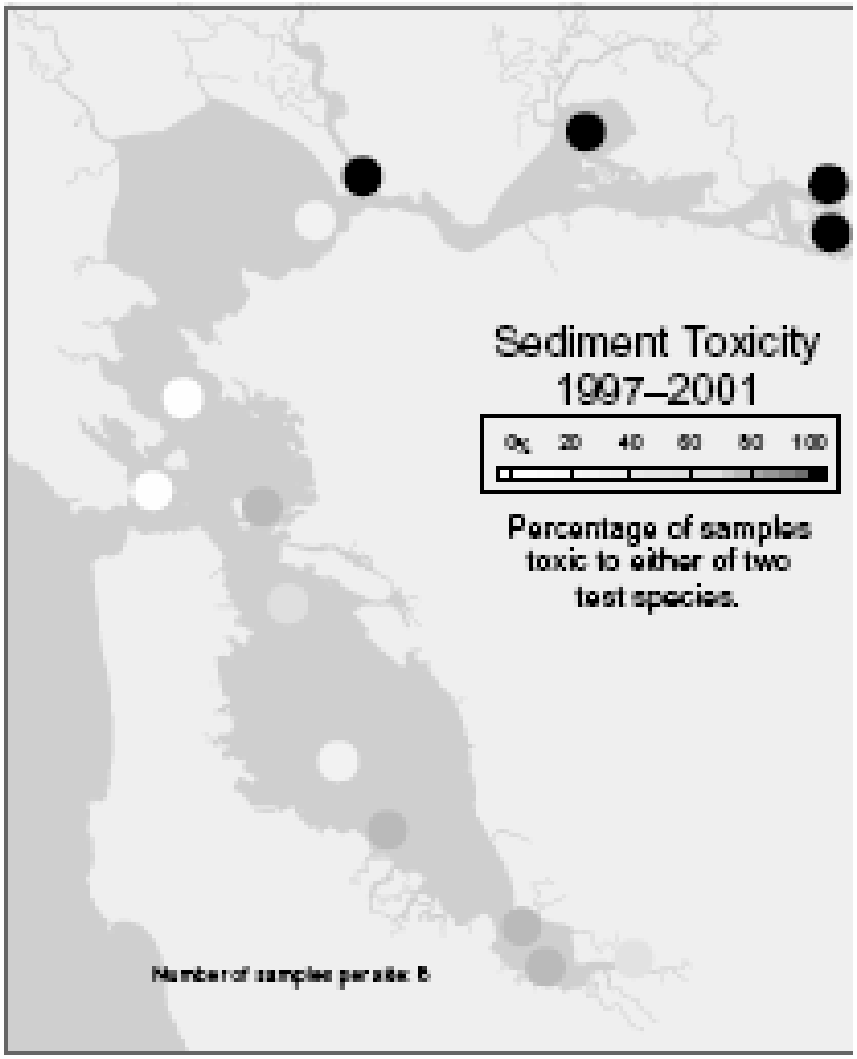
- Two test species

  Americamysis (shrimp)

  Menidia (fish larvae)

- Diazinon and chlorpyrifos
- Toxicity has declined at these 4 sites

Sediment Toxicity Monitoring
S&T program 1993-2005



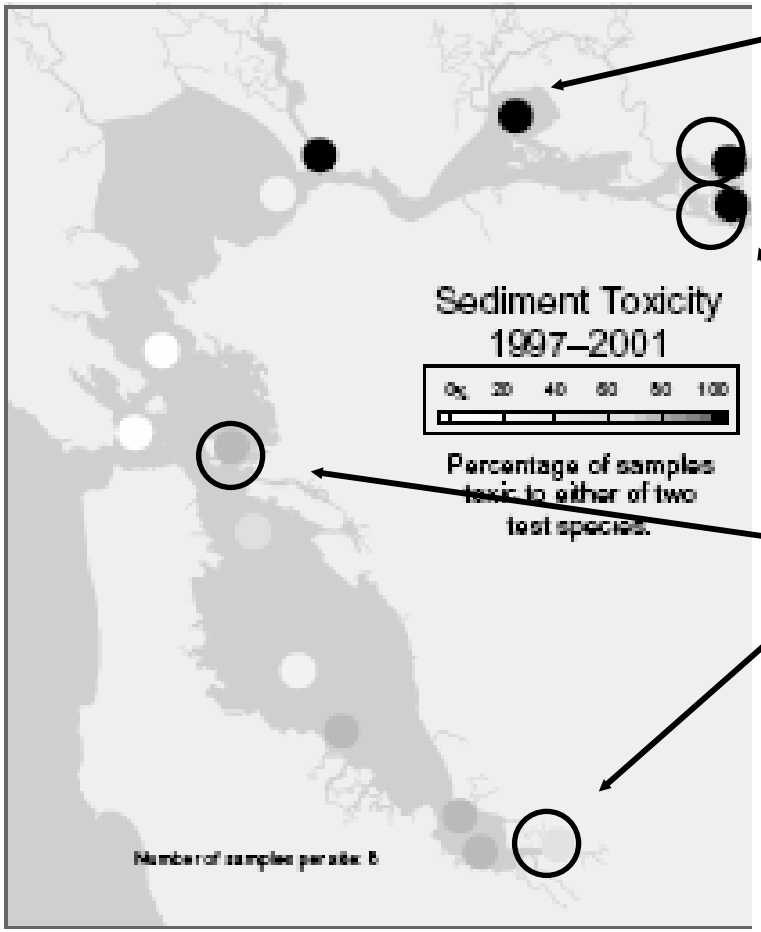
- Toxicity is persistent in the Estuary and more frequent in the northern and southern regions.
- Between 1997-2001

  67% of S&T sediment samples were toxic to either species:

  *Eohaustorius (*amphipod)

  Mytilus (bivalve larvae)

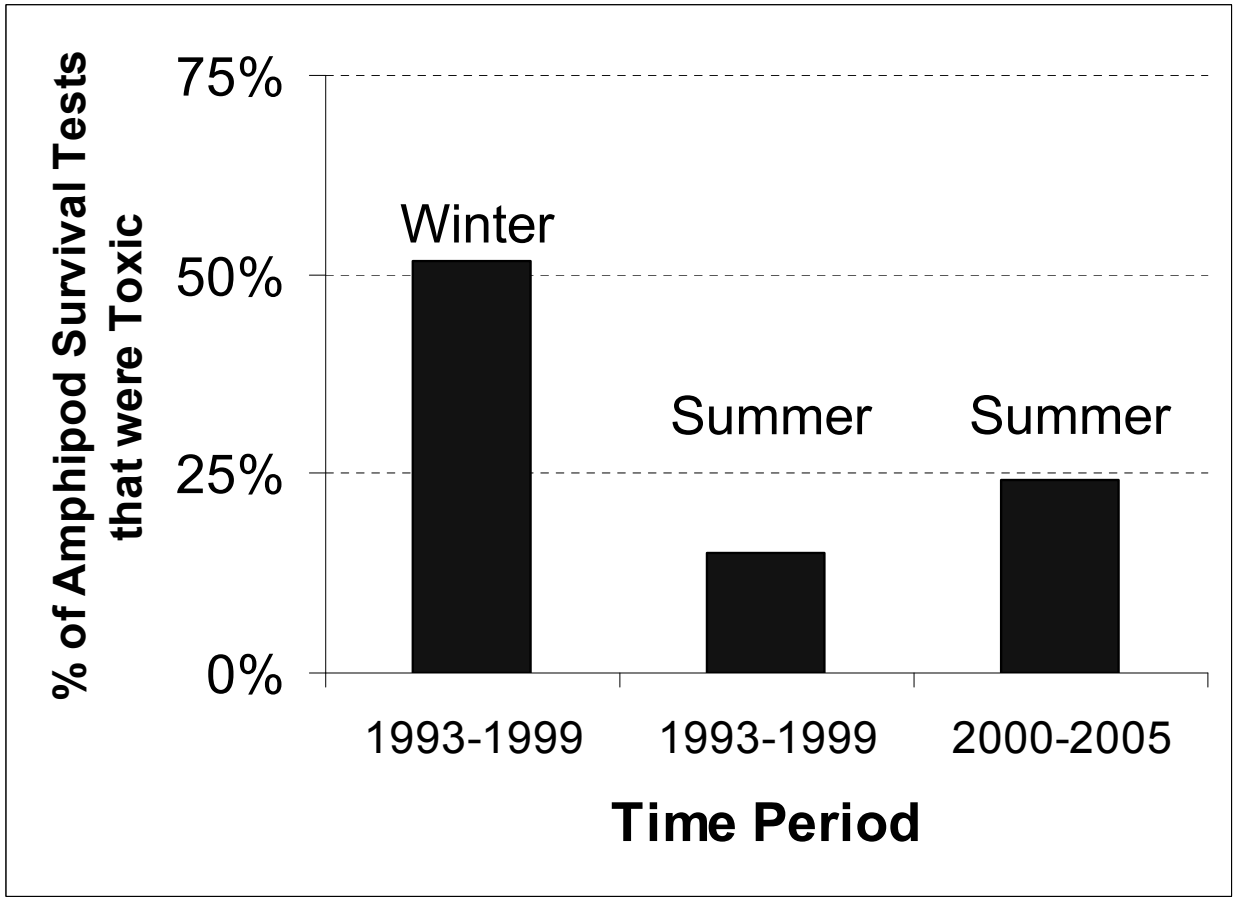
Sediment Toxicity Monitoring
S&T program 1993-2005



Grizzly Bay (BF21)

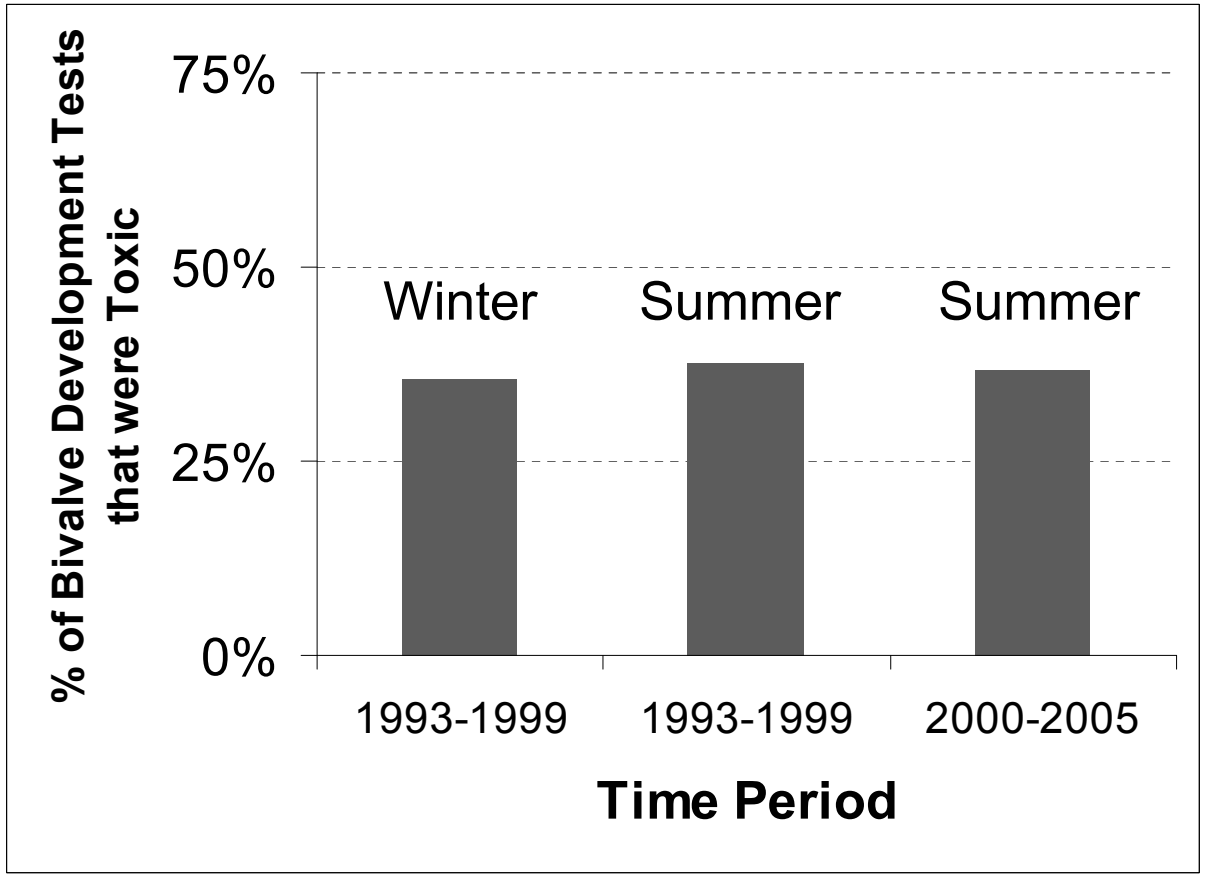
- TIEs from Grizzly Bay sediment showed Cu as the potential source of bivalve development toxicity.
- Metals also the likely cause of observed bivalve toxicity at other sites.

Change in the S&T Experimental Design



Less toxicity seen in the summer

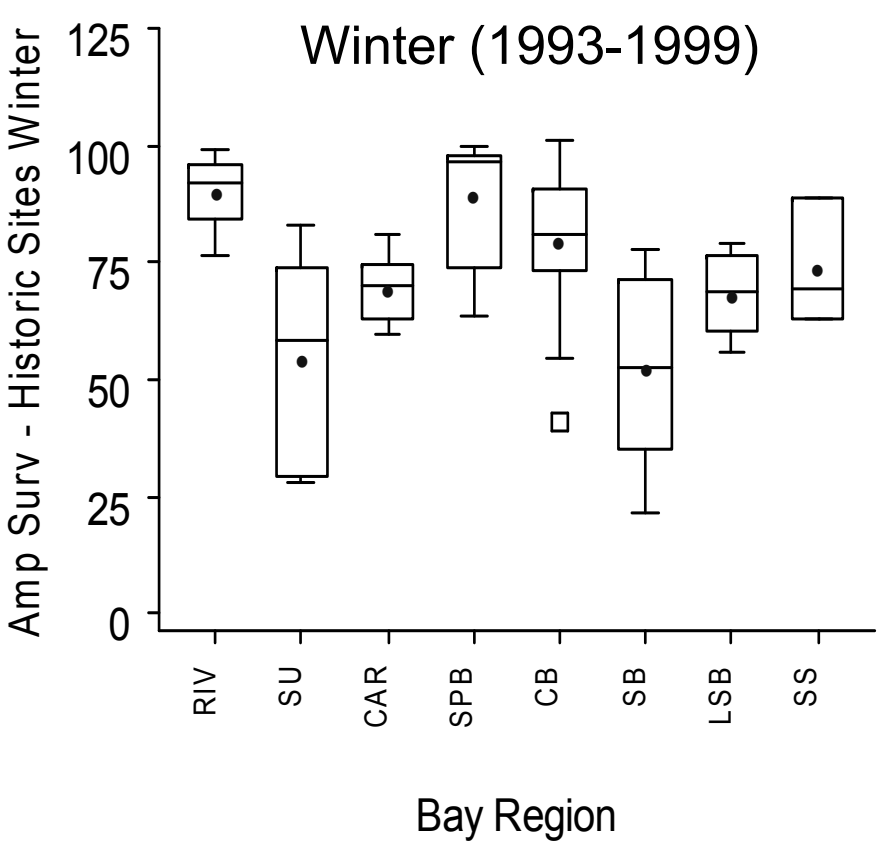
Change in the S&T Experimental Design

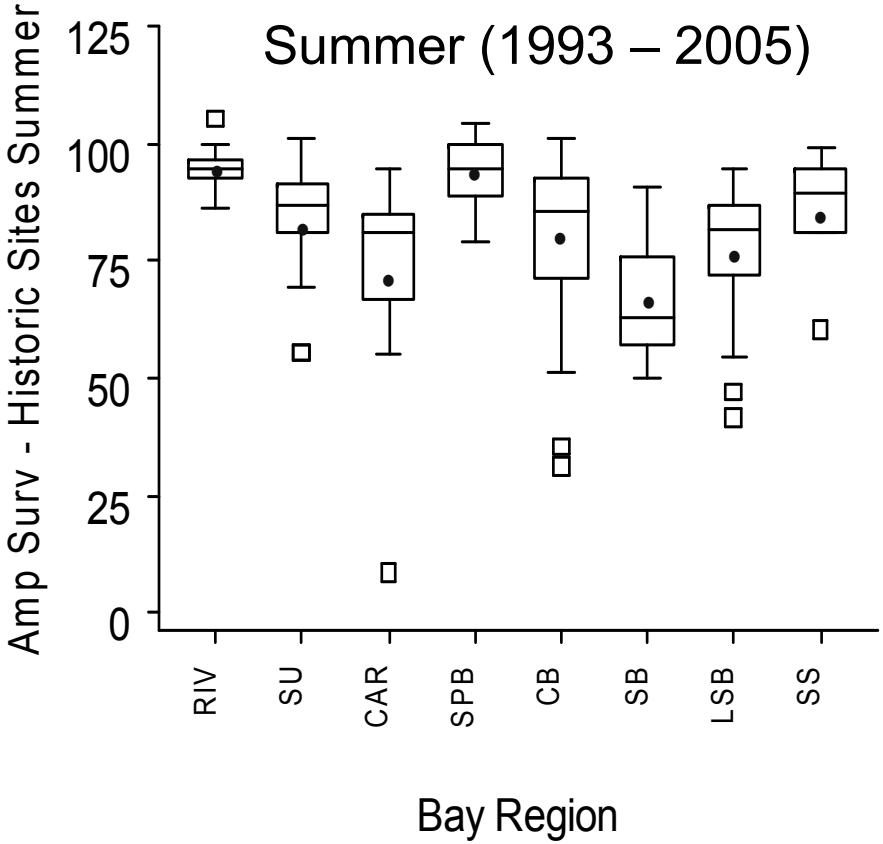


Bivalve tests do not show a seasonal difference

Sediment Toxicity Monitoring
S&T program 1993-2005 Historic sites

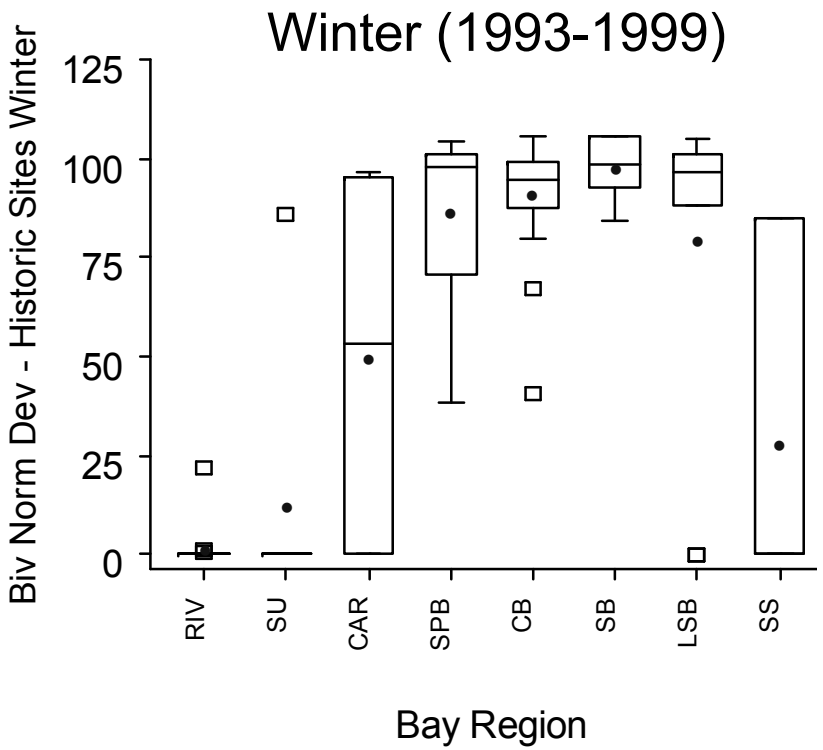
Amphipod Percent Survival (normalized to control)

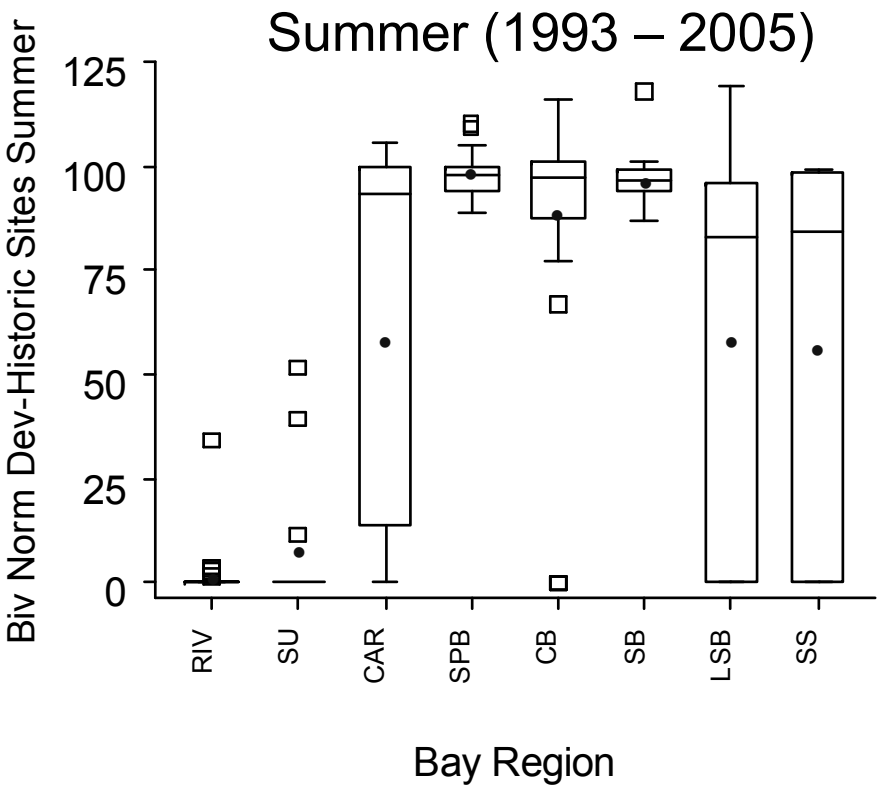




Sediment Toxicity Monitoring
S&T program 1993-2005 Historic sites

Bivalve % Normal Development (normalized to control)





Toxicity Workgroup Recommendations:

- Evaluate toxicity during Winter near potential sources
- Follow the most relevant matrix
- Investigate causes of persistent sediment toxicity
- Develop LC50s for estuarine species

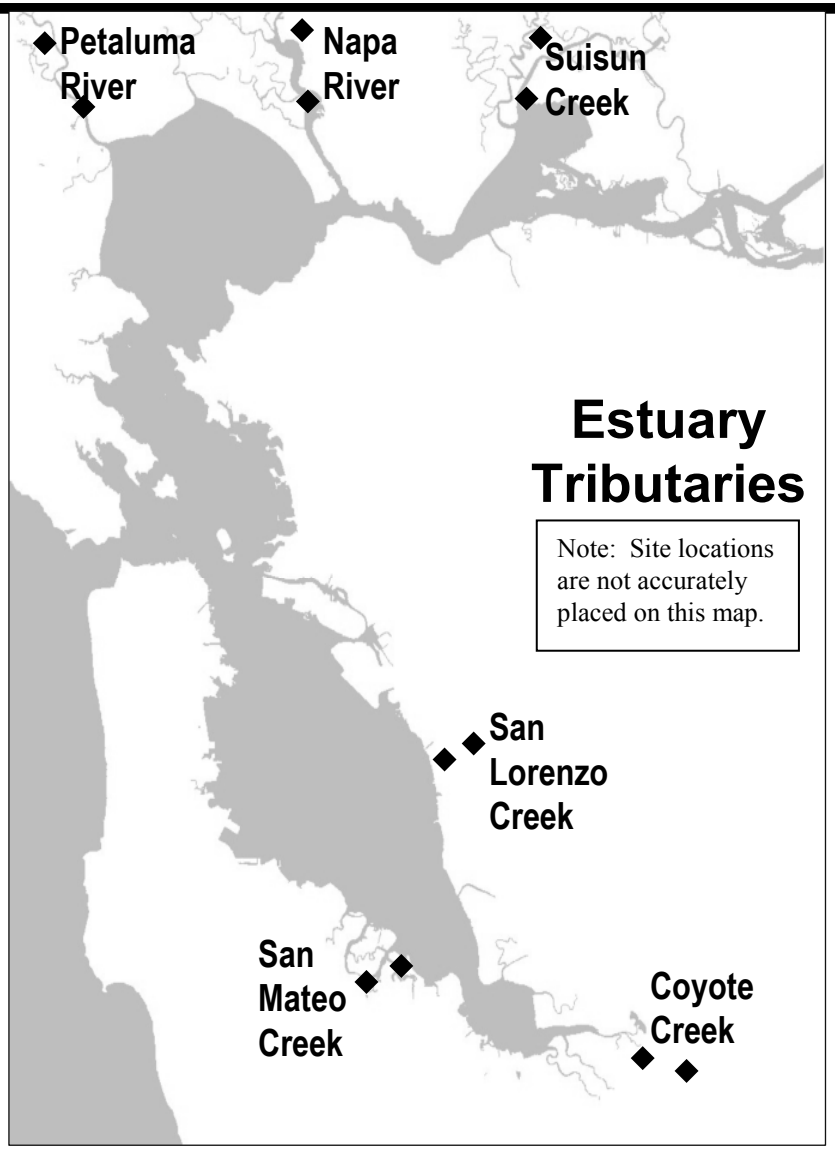
2004-2005 studies began to address the recommendations:

- Evaluate toxicity During the Winter near potential sources, and
- Follow the most relevant matrix
  - Sediment toxicity & chemistry survey in six tributaries with
  - Aquatic toxicity screening in five tributaries
- Dose-response study of relevant contaminants:
  - Dose-response sensitivity studies (PAH, copper, chlordane)
  - Dose-response sensitivity studies (3 pyrethroids) and
- Investigate causes of the persistent sediment toxicity
  - Sediment TIE development (pyrethroids)

Funded by:
RMP – Episodic Toxicity (2004: $75K)
RMP – EEPS (2005: $80K)
PRISM – Toxicity ($188K)
PRISM – Methods (intercomparison)

2004-2005: EpTox & PRISM

SEDIMENT INVESTIGATION IN THE TRIBUTARIES

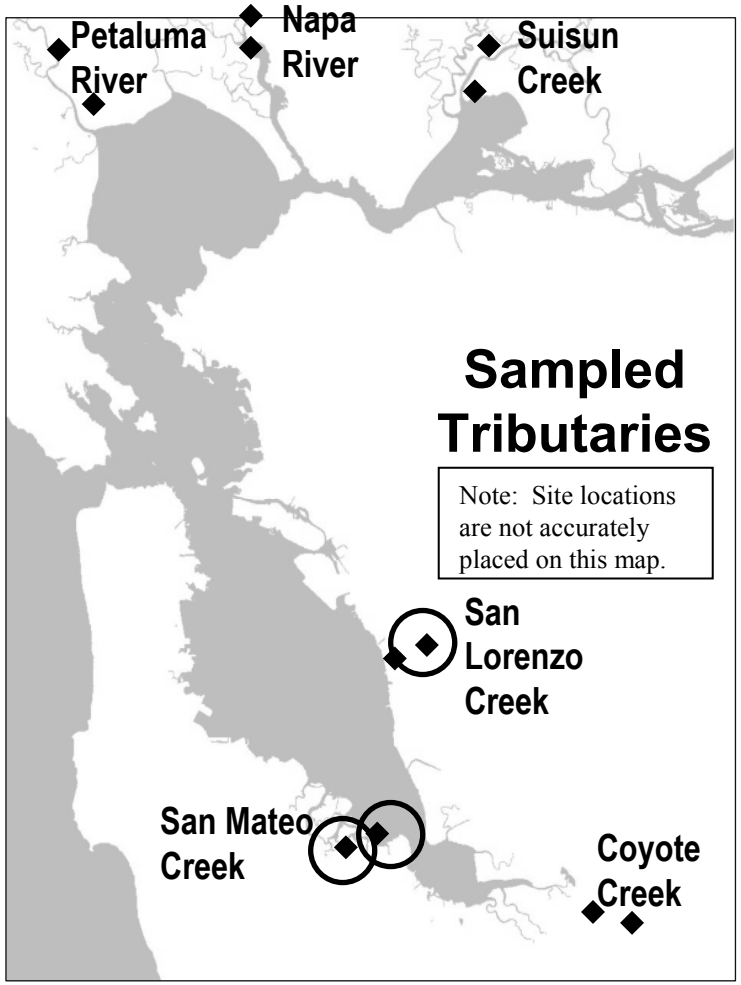


Nov & April (2004-2005)

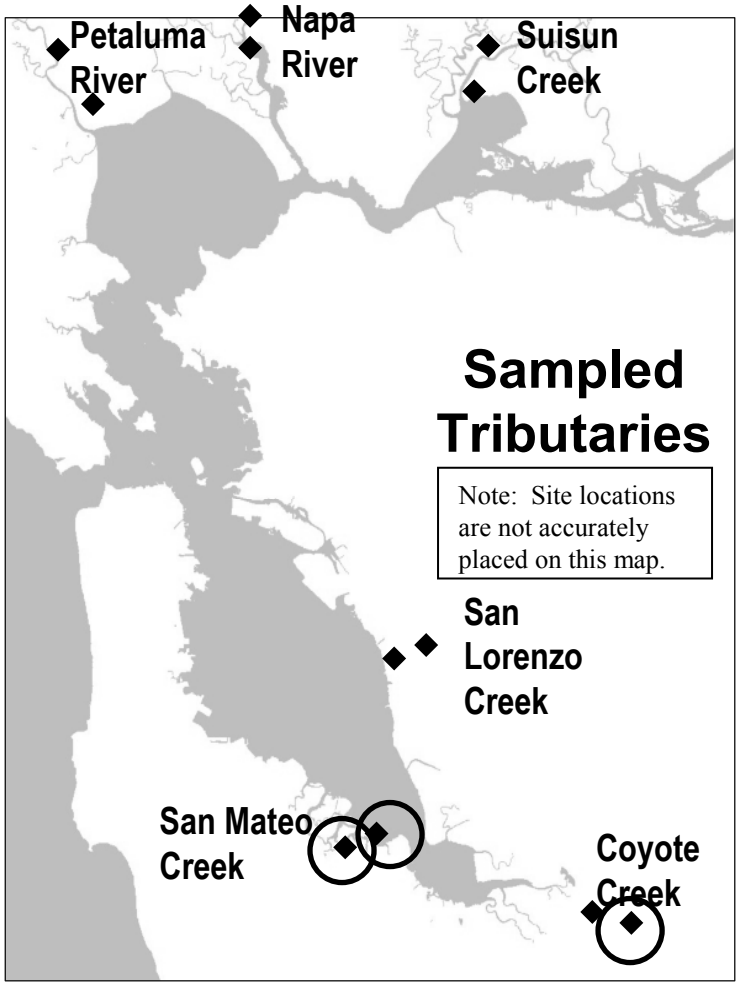
- Sediment toxicity-two amphipods
  Hyalella (FW) + *Eohaustorius* (Est.)
- Sediment chemistry at upstream sites and toxic downstream sites
  RMP analyte list + pyrethroids
- Water chemistry (April)
  Pyrethroids, diazinon, chlorpyrifos
- Water toxicity (April)

Results – Sediment Toxicity

November - 2004



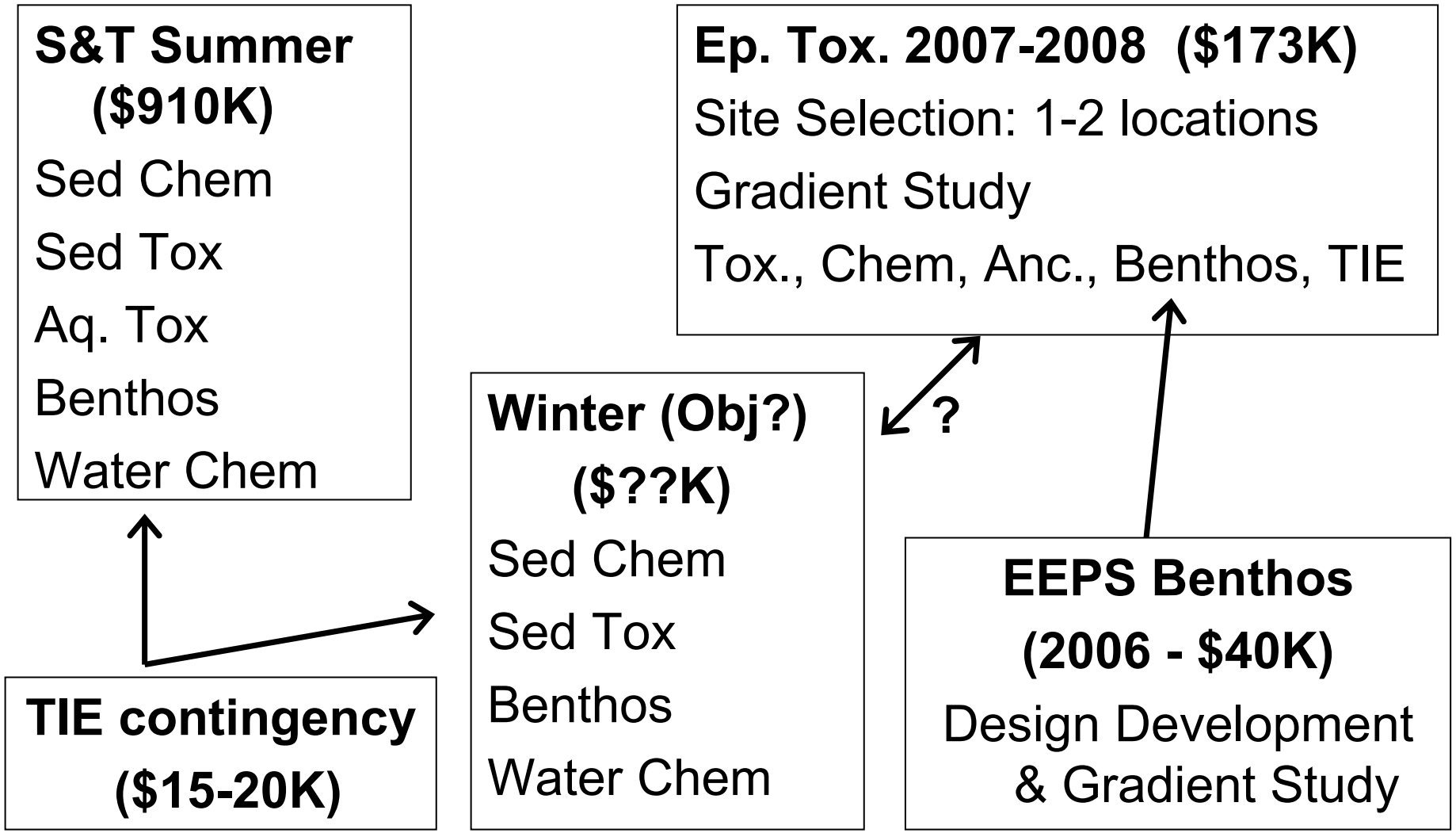
April - 2005



Proposal for 2007 and 2008:

- Focus on locations that are known to be toxic
- Evaluate toxicity during Winter near potential sources
- Investigate causes of persistent sediment toxicity
- Integrate this study with EEPS Benthic work and other SQO work that is planned.

Big Picture
RMP Toxicity efforts: 2007-2008



Budget:

Episodic Toxicity Annual Allocation: $140K

Recent years:

- 2004: $75K
- 2005: $8K
- 2006: none
- 2007 - 2008: Site selection $65K
  Gradient Study $108K
  > Total: $173K

Unspent allocation: $107K Left for other studies

Proposal:

1. Jan-Mar 2007: Screen for appropriate location (significant & persistent sediment toxicity)
2. Winter 2007-2008: Toxicity tests with sed.quality

if toxic sediments

↘ Resample to investigate duration of toxicity
Perform sediment chemistry (RMP list + pyrethroids)
Sample benthos for community analyses

if really toxic sediments then concurrently add

↘ Sediment TIEs

Proposal Part 1 Jan-Mar 2007: $65,000

Screen for appropriate inter-tidal locations

Target 4 tributaries (Sediment Toxicity and Quality):

Re-sample the two most toxic sites twice to evaluate persistence (total 8 samples))

If targeted tributaries are not suitable then target additional tributaries.

Evaluate Sed. Chem. at up to 4 sites

RMP analytes + pyrethroids

Budget Includes funding for up to 3-TIEs

Part 2 Winter 2007-2008: $108,000

Gradient Study

3 Sites in 1-2 tributaries:

Perform Sediment Toxicity and Quality

If toxic then

re-sample SedTox to evaluate duration
perform sediment chemistry & quality
sample benthos

If really toxic then

perform TIEs

Budget includes Tox, Chem, Qual, Benthos, and TIEs.