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Sediment Quality Objectives for California Bays and Estuaries

Pesticide Registration and Evaluation Committee
and E
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Presentation

- Sediment Quality Objectives
- Conceptual Approach
- Phase I Summary
- Phase II Summary
- Preliminary Results - Delta Sampling
- Future Activities and Contact information

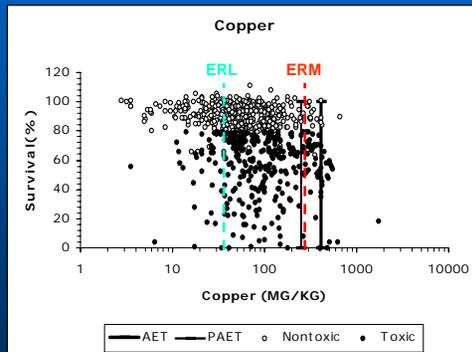
Sediment Quality Objectives

- A Standard for Sediment Quality...*that is a means to differentiate sediment impacted by bioavailable toxic pollutants from those that are not*
- Legally no different than a Water Quality Objective
- But.....very difficult to develop
 - There are no state wide sediment quality objectives in the Country
- Applicable to enclosed bays and estuaries only
 - Not applicable to ocean waters
 - Not applicable to inland surface waters

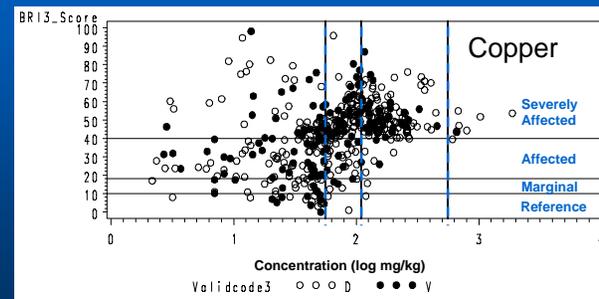
Conceptual Approach

- No single tool can reliably predict whether pollutants in sediment may pose a risk or not
- Applying multiple tools can reliably predict sediment quality
 - *Multiple Lines of Evidence Approach or Sediment Quality Triad.*
 - Rarely applied within a regulatory framework. Typically applied using best professional judgment

Dose-Response Relationship Sediment Toxicity



Dose-Response Relationship Benthos



Phase I Overview

- **Direct Effects**

Narrative SQO: Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California.

Receptor: Benthic Communities

Exposure: Direct contact

Indicators

- Sediment toxicity, chemistry and benthic community condition

Interpretation:

- Tools and methodology to classify sediments at individual and multiple stations in marine SF bay and SCB bays
- Interim approach for estuaries and other bays*

Phase I Overview

- **Indirect Effects**

Narrative SQO: Pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health

Receptor: Human Health risk via consumption of fish and shellfish

Exposure: Indirect exposure to contaminants in sediment primarily through the food chain

Habitats: Enclosed Bays and Estuaries

Interpretation: Non-specific, relies upon existing approaches

Phase I Overview

- **Status of Regulatory Provisions**
Water Quality Control Plan for Enclosed Bays and Estuaries Part 1 Sediment Quality was re-adopted September 16, 2008
Administrative Record submitted to Office of Administrative Law in November.
Final approval required by EPA Region IX
- **Phase I SQOs will not become effective until OAL approves the Regulatory Record and EPA approves the standards.**

Contents of Part 1 Sediment Quality

- I. Intent and Summary
 - A. Intent of Part 1 of the Water Quality Control Plan for Enclosed Bays and Estuaries (Part 1)
 - B. Summary of Part 1
- II. Use and Applicability of SQOs
 - A. Ambient Sediment Quality
 - B. Relationship to other narrative objectives
 - C. Applicable Waters
 - D. Applicable Sediments
 - E. Applicable Discharges
- III. Beneficial Uses
- IV. Sediment Quality Objectives - Narratives
 - A. Aquatic Life - Benthic Community Protection
 - B. Human Health

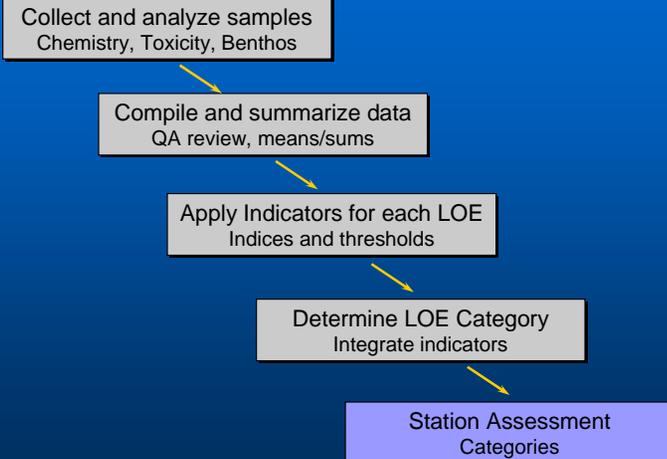
Contents Continued

VII. PROGRAM OF IMPLEMENTATION

- A. Dredge Materials
- B. NPDES Receiving Water and Effluent Limits
- C. Exceedance of Receiving Water Limit
- D. Receiving Water Limits Monitoring Frequency
- E. Sediment Monitoring
- F. Stressor Identification
- G. Development of Site Specific Management Guidelines

VIII. GLOSSARY

SQOs and Interpretation



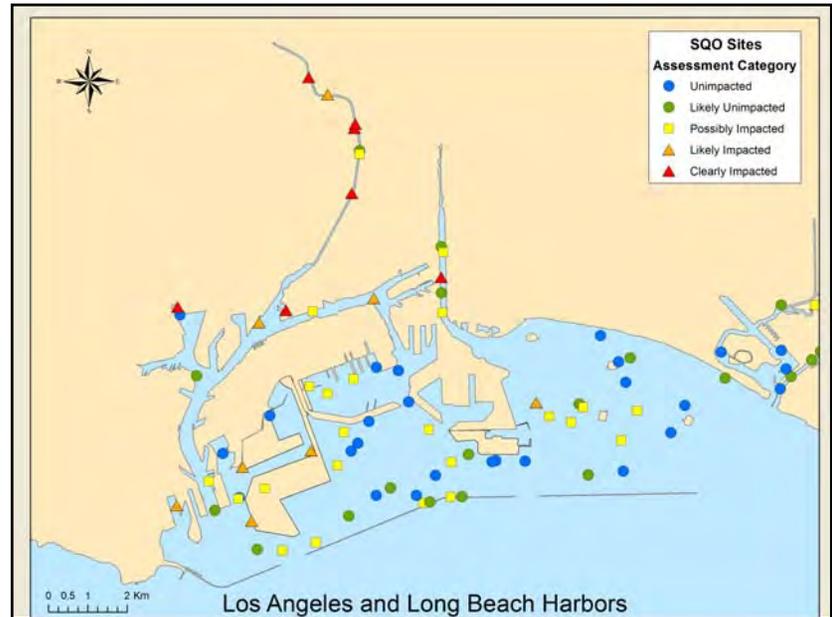
SQOs and Interpretation

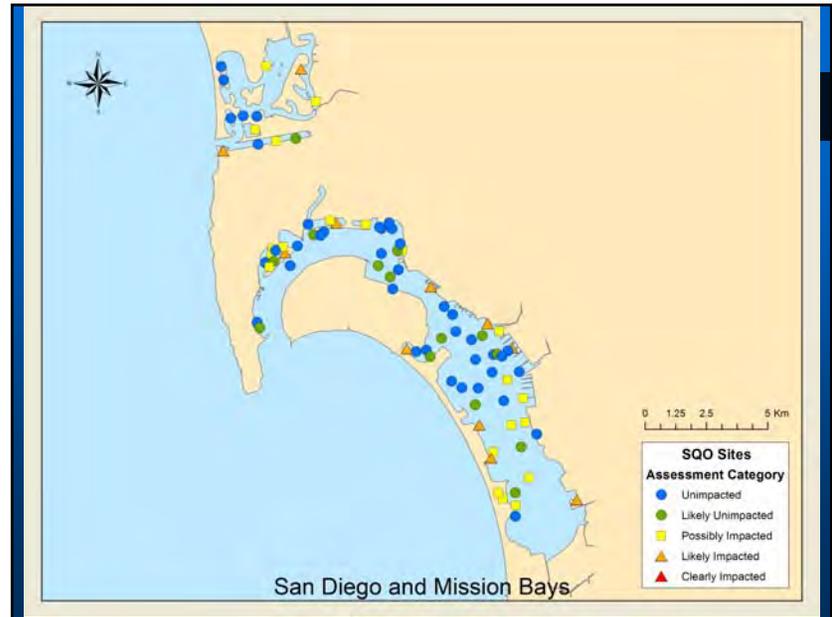
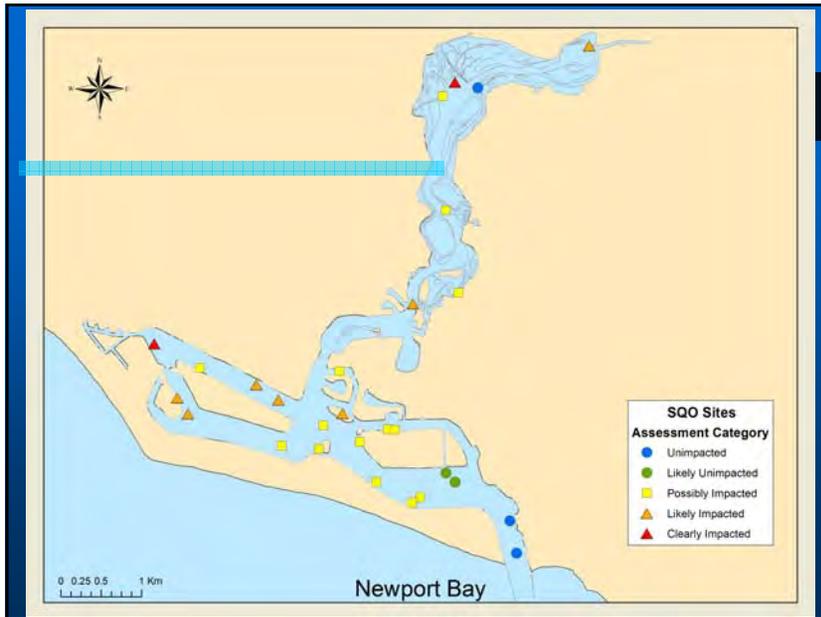
LOE CATEGORY COMBINATION	SEDIMENT CHEMISTRY EXPOSURE	BENTHIC COMMUNITY CONDITION	SEDIMENT TOXICITY	STATION ASSESSMENT
1	Minimal	Reference	Nontoxic	Unimpacted
14	Minimal	High	Low	Inconclusive
29	Low	High	Nontoxic	Likely Unimpacted
38	Moderate	Low	Low	Possibly Impacted
58	High	Moderate	Low	Likely Impacted
59	High	Moderate	Moderate	Clearly Impacted

SQOs and Interpretation

Station Assessment categories

- Unimpacted U
- Likely Unimpacted LU
- **Possibly Impacted PI**
- **Likely Impacted LI**
- **Clearly Impacted CI**
- Inconclusive





Phase II Goals

- **Direct Effects**
 - Develop chemistry, sediment toxicity, and benthic community tools for the Delta to support the narrative SQO protecting benthic communities
 - Develop tools for other water bodies where data is available
- **Indirect Effects**
 - Develop a standard means to interpret the narrative SQO protecting human health from consumption of shellfish and fish tissue containing contaminants that migrated from sediment up through the food chain.

Phase II Status

- **Direct Effects**
 - Delta sampling with DWR in Fall 2007, Spring 2008
 - Data: Preliminary chemistry and sediment toxicity data available only awaiting benthic community data*
 - Indicator Approach: Conceptual approach expected to be similar to that used in Phase I
- **Indirect Effects**
 - Evaluate alternative approaches for interpreting the indirect effects SQO
 - Multi-tiered risk assessment - high complexity
 - Relative risk ranking - intermediate
 - Stepwise decision tree - Low complexity

Phase II Status

- **July 2008 Scientific Steering Committee Meeting**
Expanded Panel: Peter Landrum, Todd Bridges, Rob Burgess, Donna Vorhees, Jim Shine, Bruce Hope, Charlie Menzie
- **SSC Recommendations**
First priority: address sediment contamination in framework, acknowledging that tissue residues may be related to other sources or waters.
Support a tiered approach with flexibility to include multiple on-ramps/off-ramps
Use food web models with BSAFs.
Develop case studies highlighting different types of applications.

Phase II Plans

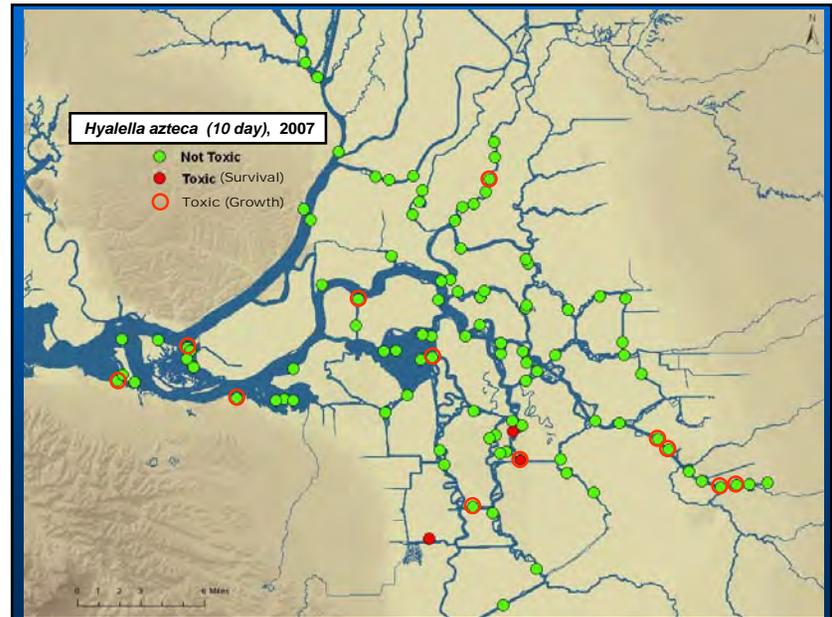
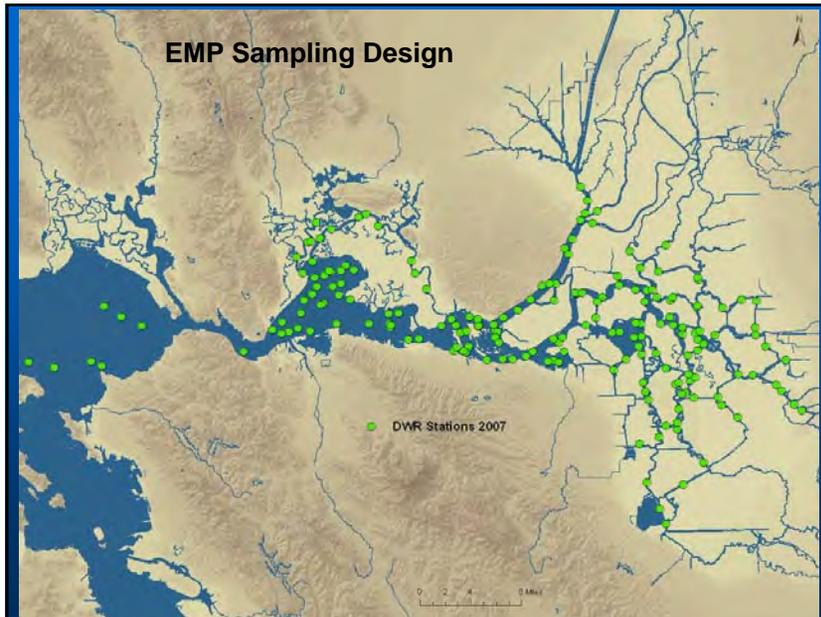
- **Indirect Effects Technical Work Elements**
Revise Technical Workplan
Refine multi-tiered conceptual framework
Develop a modeling and decision-support tool appropriate for performing the Tier 1 and 2 phases of the SQO evaluation
Develop general technical guidance for performing indirect effects SQO evaluations
Perform "case studies" to evaluate technical and feasibility issues
Work on integrating Phase II SQOs with exiting Water Board programs

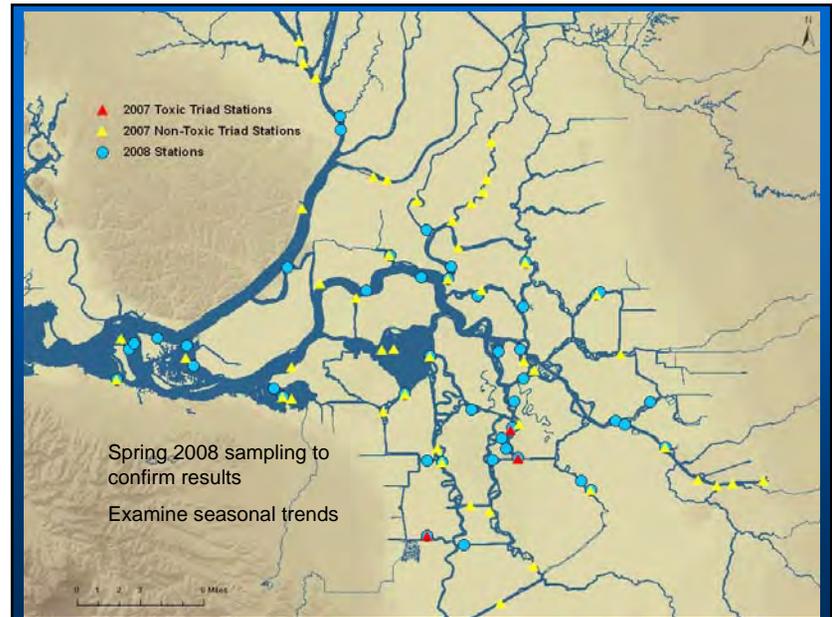
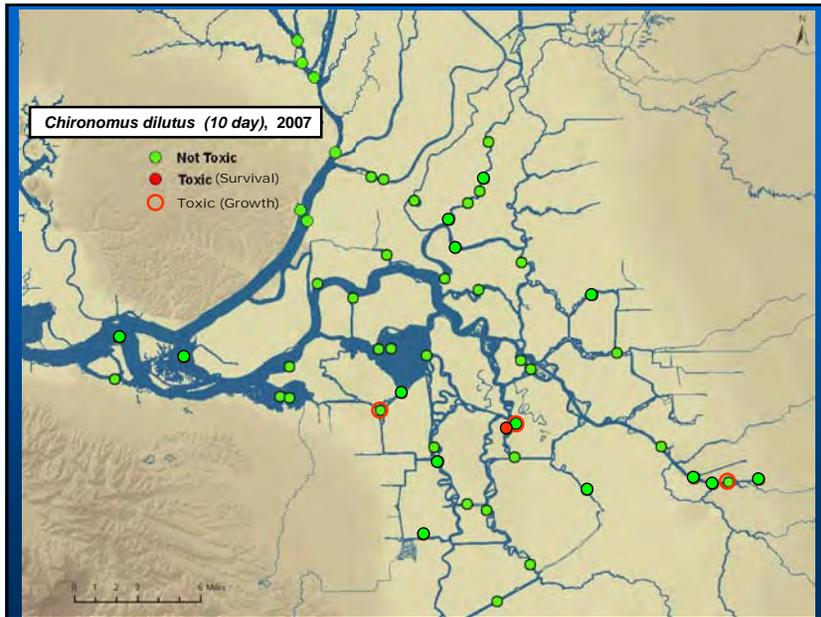
Delta Sampling

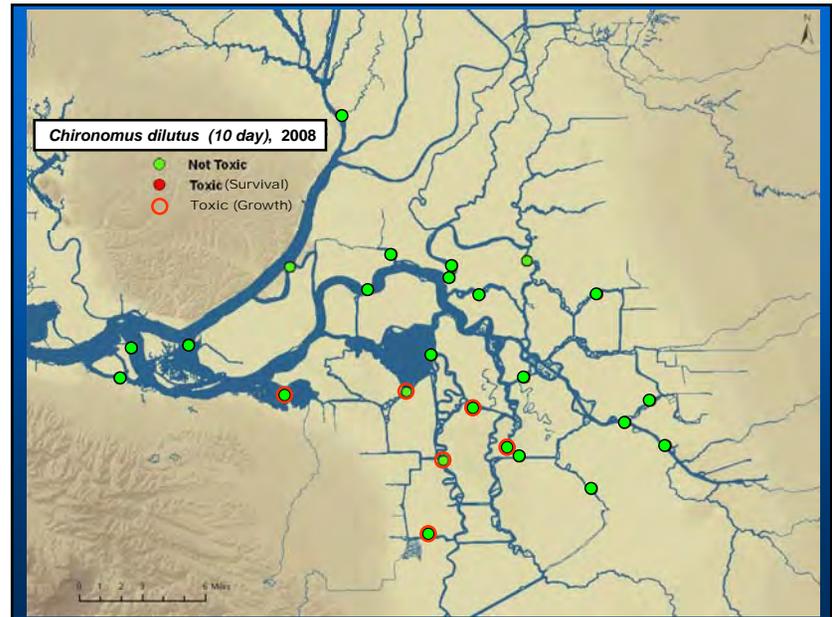
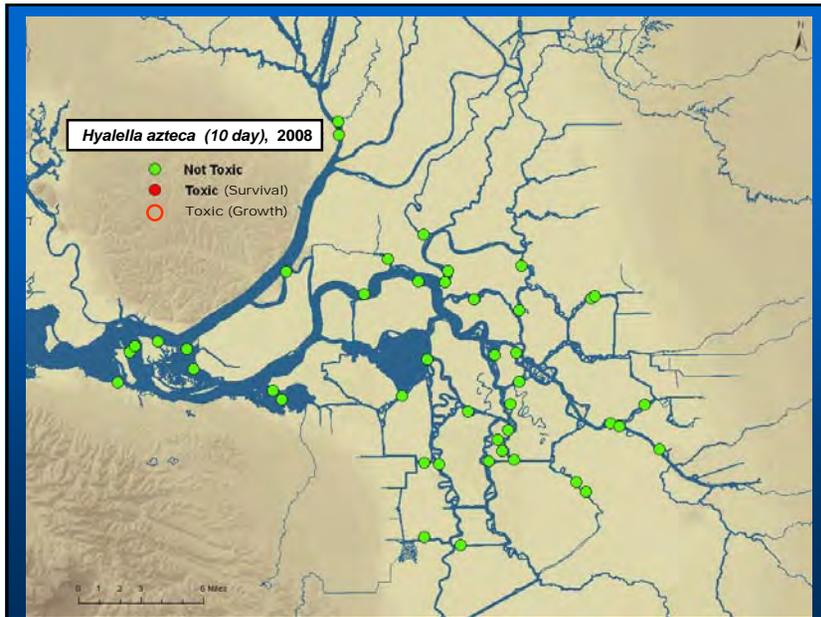


Delta Analytes

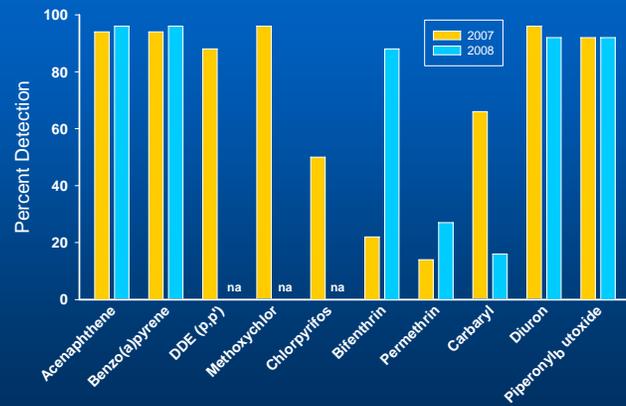
- Sediment toxicity tests
 - Hyalloella azteca growth and survival
 - Chironomus dilutus growth and survival
- Benthic Community Analysis
- Sediment Chemistry including:
 - Metals
 - PAHs
 - Cyclopentadienes
 - Chlordanes
 - DDTs
 - PCBs congeners
 - Bifenthrin, Cyfluthrin, Beta-Cyfluthrin, Cypermethrin, S-Cypermethrin, Delta/Tralomethrin, Esfenvalerate, enpropathrin, G-Cyhalothrin, L-Cyhalothrin, Permethrin and Piperonyl butoxide
 - Chlorpyrifos, Carbaryl, Fipronil, Fipronil degradates
 - HCH
 - Hexachlorobenzene, Mirex, Diuron, DCPA, Metolachlor, Trifluralin



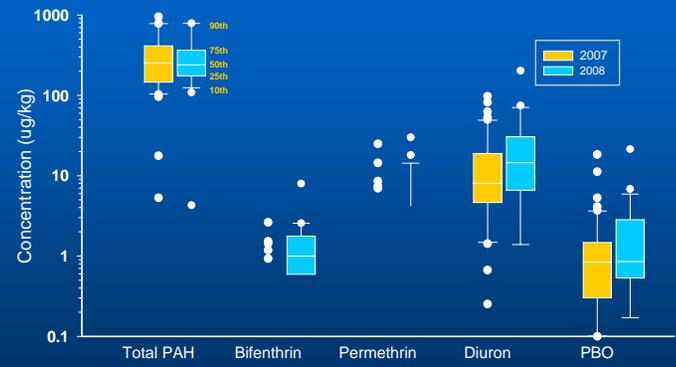




Percent Detection



Concentration



Delta Summary

- **A work in progress**
 - First comprehensive examination of Delta sediment quality
 - Analyses still underway
 - Limited spatial and temporal extent
 - Results will complement SQO and other programs
- **Results to date indicate that sediment contamination is widespread, but relatively low**
 - Mixture of historic and current activities
- **Little short-term toxicity**
 - Low prevalence of mortality and growth effects
 - Difficult to associate toxicity with sediment chemistry
- **Benthic community status uncertain**
 - Development of benthic indices needed
 - Priority for SQO program

Future Activities

- **Phase II**
 - Develop a revised workplan for indirect effects
 - Await benthic community data for delta sampling
 - Begin working with Agency Coordination Committee (Regional Boards, DPR, DFG, OEHHA, DTSC, EPA, NOAA, USF&W) and Advisory Committees (Stakeholders) on SQO policy issues

More Information

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- Steve Bay Steveb@sccwrp.org 714 755 3204

- **Electronic Subscriptions**

- <http://www.waterboards.ca.gov/>
- Lower right "email subscriptions"
- Click subscribe
- Click on sediment quality objectives