

Development of the Technical Foundation for California's Sediment Quality Objectives

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PRESENTATION TOPICS

- **Scientific foundation**
- **Indicator development activities**
- **Scientific review and communication**

Scientific Foundation

- **Two principal modes of exposure and effects**
 - **Direct exposure** through sediment contact and ingestion
 - Aquatic life
 - **Indirect exposure** through feeding on contaminated organisms
 - Human health
 - Wildlife risk
- **Each mode requires a separate assessment method**
- **Focus has been on assessing effects from direct exposure**
 - **Assessment methods are better developed**
 - **Large amount of California data available for validation**
 - **Indirect effects assessment is a priority of Phase II SQO program**

Scientific Foundation

- **A multiple line of evidence (MLOE) approach is necessary**
 - **Sediments are complex and a diverse environments**
 - **Individual measures of chemistry or biological effects are insufficient to determine sediment contamination effects**
 - **Evidence of both chemical exposure and effect is needed**
- **Three types of information (sediment quality triad) needed**
 - **Sediment chemistry**
 - **Sediment toxicity**
 - **Benthic infaunal community condition**

Limitations of Individual Lines of Evidence

- **Benthos**
 - Habitat variability
 - Physical disturbance (anchor, dredging)
 - Oxygen stress
- **Toxicity**
 - Confounding factors (ammonia)
 - Laboratory-enhanced bioavailability
 - Species-specific responses
- **Chemistry**
 - Unmeasured chemicals
 - Chemical form (paint chip, tar ball)

Technical Challenges

- **The triad has been widely used in site-specific assessments, but has not found its way into most statutory frameworks**
 - Most applications are based on best professional judgment
- **There are substantial challenges in translating this scientific concept into a regulatory framework**
 - Consistency of methods throughout the state
 - Development of a transparent data interpretation and assessment framework
 - Must be feasible for use by individuals with limited technical expertise

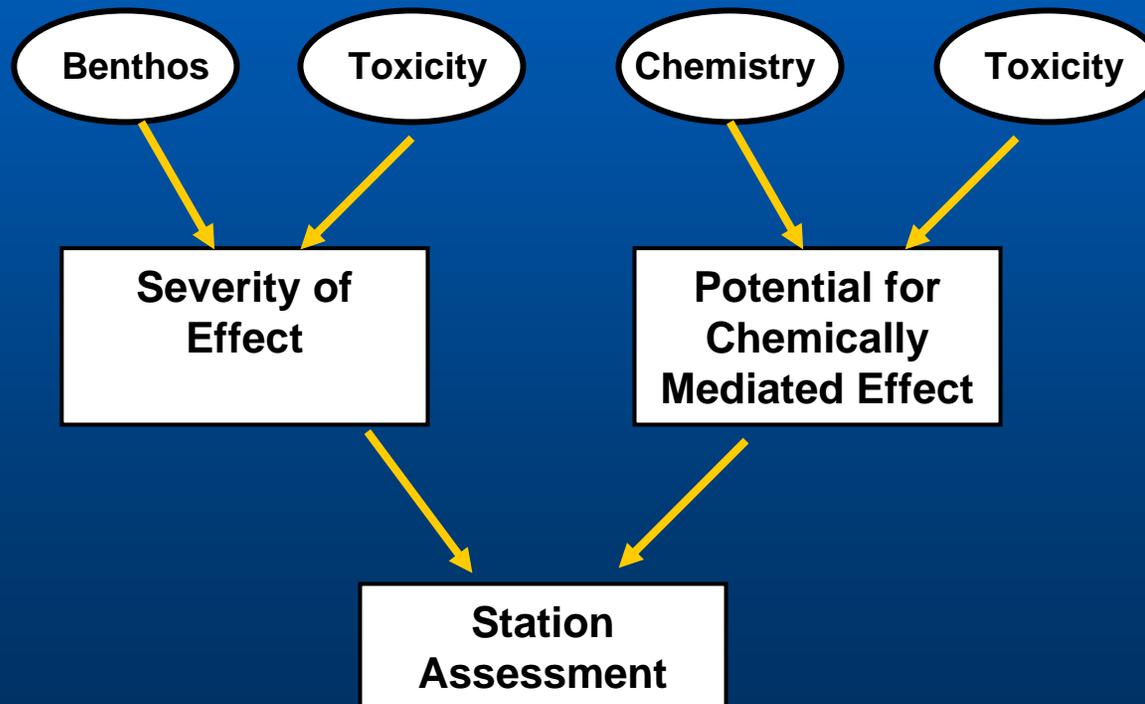
Science Activities to Support Technical Challenges

- **Developing methods/assessment consistency**
 - Evaluated and selected indicators for individual lines of evidence
 - Based recommendations on performance in California
- **Standardizing data interpretation**
 - Established quantitative thresholds for each indicator
 - Developed a framework for integrating across lines of evidence
 - Clear decision points
 - Simple, yet retains scientific content

SQO Assessment Framework

Direct Effects

Information on contaminant exposure and biological effects are needed to assess effects of sediment contamination



Indicator Development Activities

- **Calibrated methods for use in California bays and estuaries**
- **Evaluated indicators and selected best methods**
 - **Independent validation with California data**
- **Developed numeric thresholds for the recommended indicators**

Science Team

California Organizations:

- Southern California Coastal Water Research Project
- San Francisco Estuary Institute
- Moss Landing Marine Laboratories
- UC Davis Aquatic Toxicology Laboratory

National Organizations:

- NOAA
- US Army Corps of Engineers
- Marine Resources Research Institute, Charleston, SC
- University of Minnesota
- University of South Carolina
- Exa Data and Mapping

Review and Communication

- **Scientific Steering Committee**
 - Top scientists from outside of California
 - Guided and reviewed all phases of project
- **Stakeholder Advisory Committee**
- **Agency Coordination Committee**
- **Scientific Presentations and Publications**
 - Local and National meetings
 - National peer-reviewed journals

Scientific Steering Committee

- **Six nationally recognized experts in all aspects of sediment quality assessment**
 - Chemistry, ecology, toxicology
 - Sediment quality guidelines
 - Ecological risk assessment
- **National and state perspectives**
 - EPA, NOAA, Army Corps of Engineers
 - Washington, South Carolina
- **Frequent interactions throughout the project**
 - 5 multi-day review meetings
 - Follow-up conference calls
 - Review of technical reports
- **SSC has endorsed general approach and methods for direct effects component**
 - Still working on indirect effects approach

Acceptance of SQO Approach

- **SQO approach has been communicated to many potential user groups**
 - Regional Boards, SWAMP program, EPA (national and regional)
 - Regulated entities
 - Scientists
- **Approach is already gaining acceptance**
 - Methods being incorporated into monitoring programs
 - Assessment framework is being used in existing programs
 - Provides great opportunity to test approach under realistic conditions
- **Statewide 305(b) assessment of sediment quality**
 - EPA Region 9 and SWAMP program have adopted approach for latest assessment
 - Positive feedback so far

305(b) Sample Results



Summary

- **Incorporation of MLOE approach represents a milestone for sediment assessment policy development**
- **Indicator development and selection incorporated best available methods**
 - Still room for improvement
- **Multiple levels of scientific review and have occurred throughout the project**
 - Highly effective Scientific Steering Committee
 - Have improved the project in many ways