Assessment of Contaminated Sediments and Selection of Cleanup Levels

Steven Bay
Southern California
Coastal Water Research Project

What is Needed

- Determine cleanup levels for contaminated sites
  - Monitor attainment of cleanup goals
  - Protect beneficial uses
  - Satisfy water quality policy
- Identify indicator chemicals
  - Simplify monitoring program

Cleanup Level Approaches

- Zero (no chemicals present)
- Regional background (pristine)
- Local background (San Diego Bay)
- Sediment Quality Guideline (e.g., ERL)
- Site-specific cleanup level (using local data)
  - Based on local standards

Some Facts

- San Diego Bay is affected by multiple sources
  - Not a pristine environment
  - Bay Cu = 7x coastal ambient,
  - Bay PAH = 10x coastal ambient
- Different organisms (e.g. humans and clams) respond differently to environmental contamination
  - Contaminants of concern may vary among beneficial uses
  - Example: Chollas Creek stormwater

    Freshwater COC = diazinon

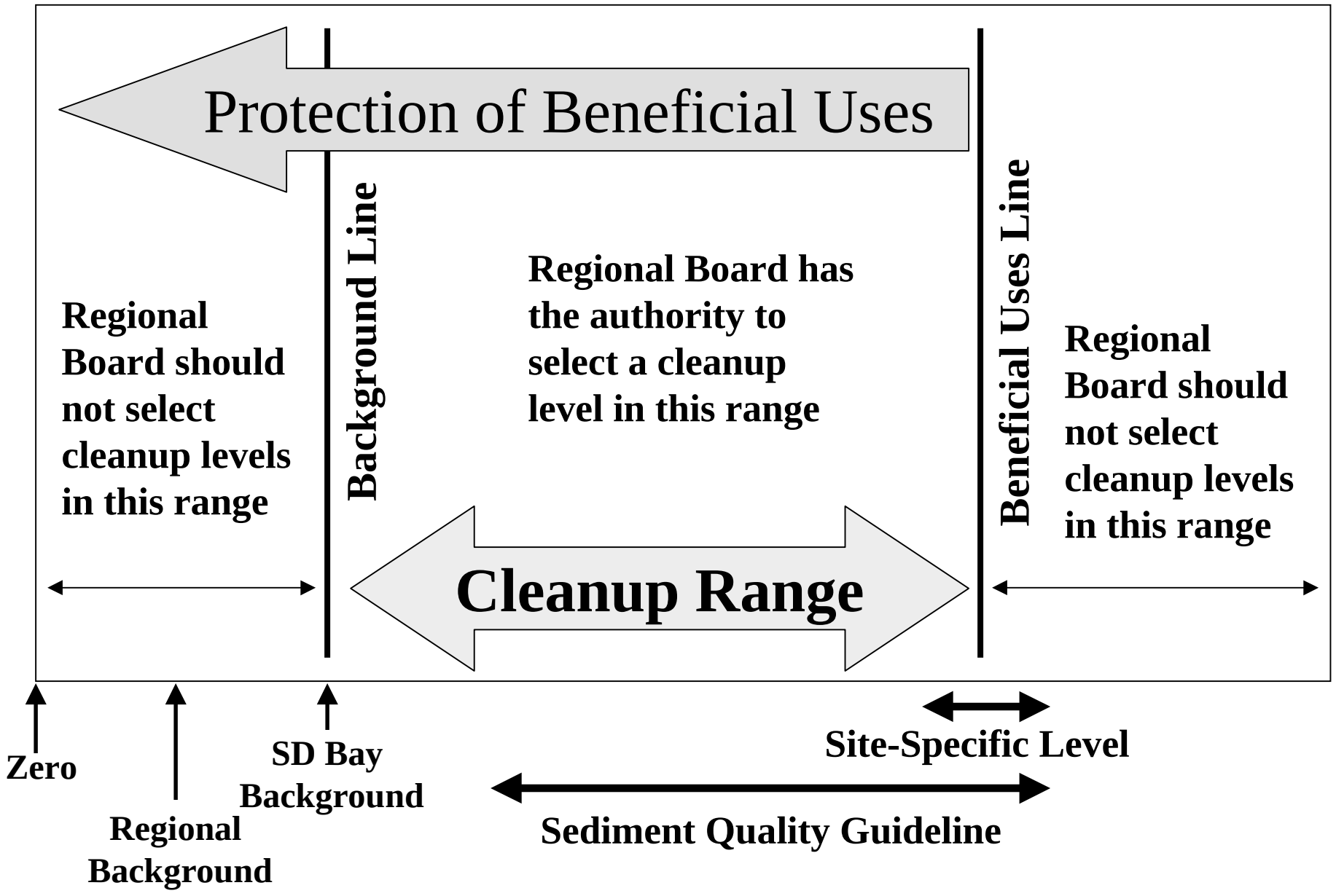
    Marine COC = zinc

Some Facts

- The biological effects of contaminant exposure cannot be predicted with certainty
  - Chemical measurements are insufficient
  - Toxicology understanding incomplete
  - Geochemistry is not fully understood or measured
- Causality cannot be determined without directed studies

Some Facts

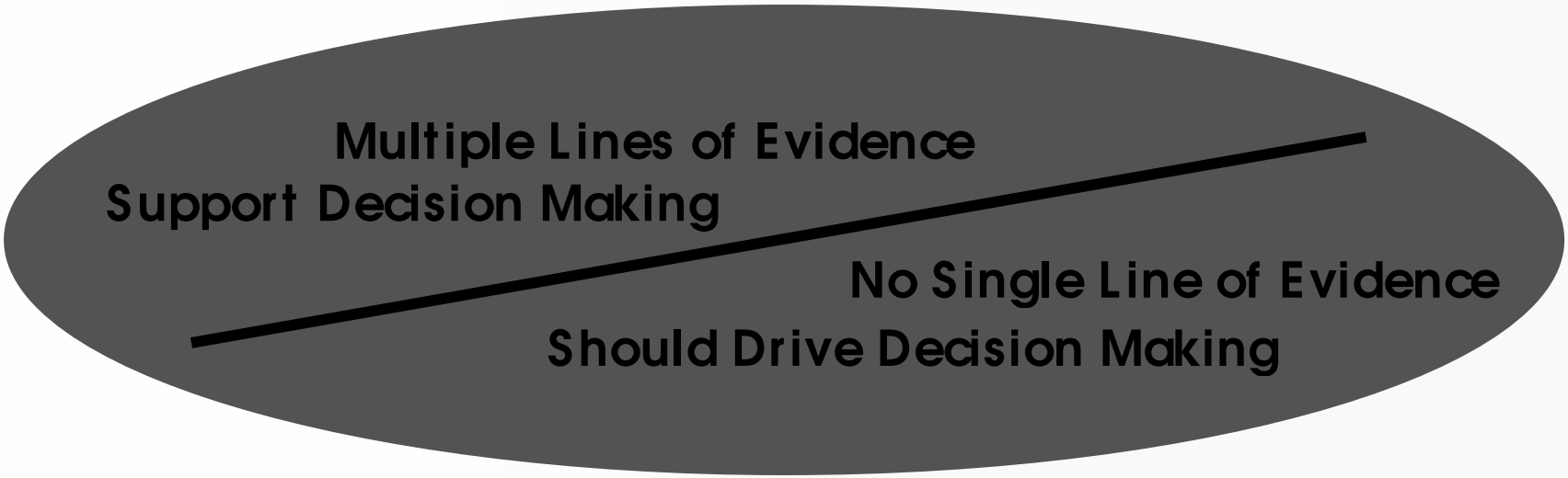
- Most Sediment Quality Guidelines are not intended as regulatory tools
  - Statistical analysis products
  - May not relate to beneficial uses of interest
  - May not reflect cause and effect
  - Developed as screening tools


Protection of Beneficial Uses
Background Line
Beneficial Uses Line
Regional Board should not select cleanup levels in this range
Regional Board has the authority to select a cleanup level in this range
Regional Board should not select cleanup levels in this range
Cleanup Range
Zero
Regional Background
SD Bay Background
Site-Specific Level
Sediment Quality Guideline

Sediment Quality Indicator Characteristics

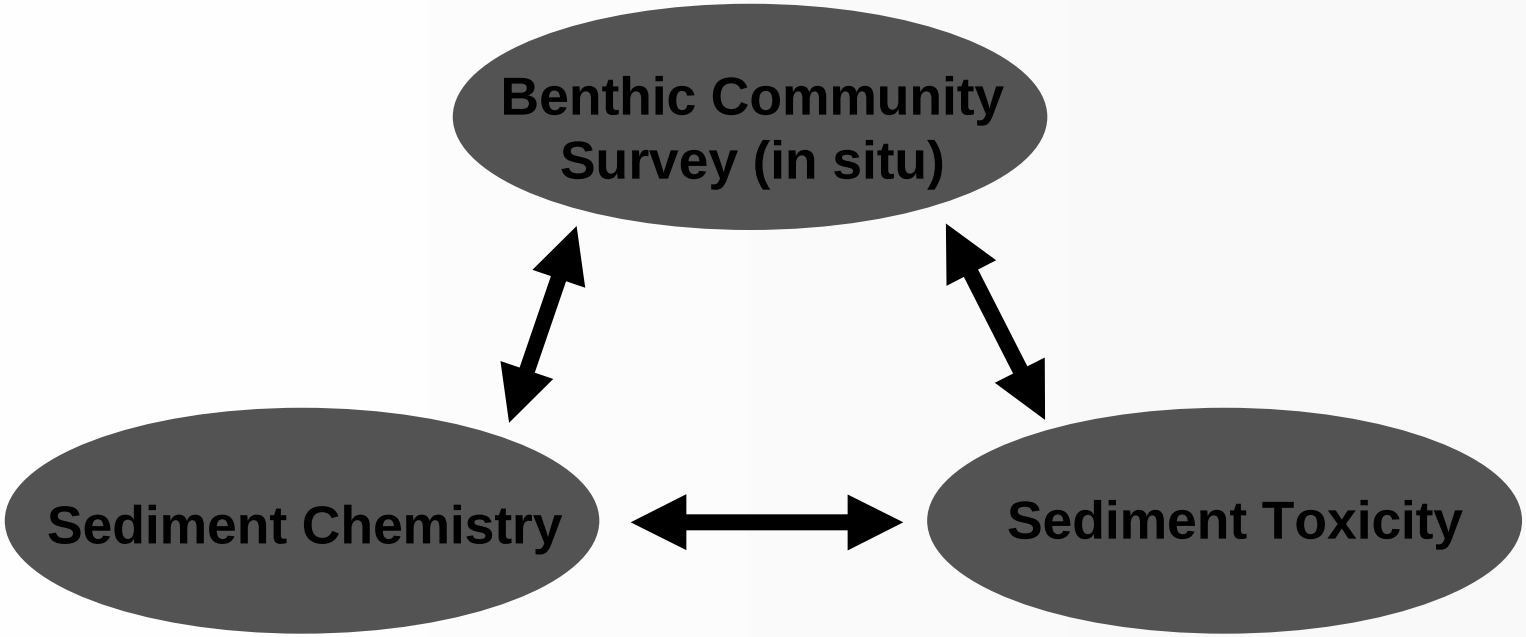
Indicator	Strengths	Weaknesses
Chemistry	Established methods Historical data Link to sources and loads	Does not address: bioavailability, joint action, new compounds
Toxicity	Ecological relevance Comprehensive Interaction effects Rapid	Variability Confounding factors Species-specific Handling artifacts
Benthos	Ecological relevance Chronic exposure Comprehensive	Variability Confounding factors Habitat specific
Bioaccumulation	Bioavailability Link to health effects	Difficult Labor intensive Species-specific

Weight of Evidence Approach



- A tiered approach calls for increasingly complex evaluations only as needed to quantify and reduce uncertainties associated with risk estimates
- Weight of evidence required should be proportional to the weight of the decision

Sediment Quality “Triad”



(Other lines of evidence include biomarkers, histopathological analyses, and microcosm/mesocosm studies)

How Does the San Diego Bay Assessment Approach Compare?

- Contains all key elements of the Sediment Quality Triad and uses established methods
  - Sediment chemistry: Consistent with regional monitoring programs
  - Benthic community: Standard methods of analysis
  - Bioaccumulation: Standard clam test used
  - Toxicity: Whole sediment and porewater tests are widely used throughout the U.S. Interface test is used in other state programs
- Contains flexibility in cleanup level selection method
  - Incorporate site-specific factors and local concerns
- Implementation of approach will increase understanding of San Diego Bay

Challenges in the Site-Specific Approach

- Outcome dependent upon local decisions
  - Reference sites
  - Tissue criteria
  - Analysis methods
- Results may vary within the bay
  - Different cleanup levels at “similar” sites
- Technical peer review is necessary
  - Regional board staff have sought outside input and been responsive to suggestions