Panel 5 Synthesis: Comparison-Based Decision Making

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The Role of Tradeoffs in Sediment Management (Logan/McShea)

EPA’s Regulatory Decision Framework for Sediment Sites is Risk-Based
[The goal is to reduce risk, often driven by fish consumption]

- Tradeoffs at sediment sites may not be necessary or useful when:
  - Stakeholders agree on the course of action
    - Science is clear
    - Outcome is reasonably certain

Study vs. Action

- Tradeoffs are made when extensive study is occurring vs. implementation of action

- Impasse can be created – but there are ways out
  - Bring in outside experts
  - Combine study and action
  - Use a phased approach
The Role of Tradeoffs in Sediment Management

Limitations of Technology vs. Risk Based Goals
• Examples of effective balance of tradeoffs
  – Focus on system-wide performance
  – Use of pilots or other studies to establish realistic, site-specific technology expectations
  – Allows rationale evaluation of achievable goals

Cost vs. Degree of Protection
• There is an interplay between cost-effectiveness and cost-benefits
• Cost-benefit can be a component of cost-effectiveness
• Question: What is the relative incremental cost compared to the risk reduction of each alternative?
• Examples of effective balance of tradeoffs
  – Conduct early, discreet actions that are expected to be beneficial and prioritize resources
  – Expend resources to get best bang for the buck

Short-term Impacts vs. Long-term Risk Reduction
• The science needs to be improved to provide realistic assessments of risk and impacts
• All remedial options will have risk tradeoffs
  – Risks should be assessed against no action
  – Some options may transfer the risk
  – Risks may be manageable, but should be understood
  – Time to implement a remedy is a factor
• Examples of less effective balance of tradeoffs
  – Remedial response that causes harm
  – Failure to account for short term impacts can skew remedy evaluation
The Role of Tradeoffs in Sediment Management

Finality vs. Long-term Management
• Role of Permanence
  – Relates to the potential for long-term risk
  – Does not necessarily equate to mass removal
• Examples of effective balance of tradeoffs
  – Realistic assessment of relationship between remedial options and long term management needs
  – Flexible phased approaches that provide for modifications based on performance

Balancing Tradeoffs
• Need to maintain focus on risk reduction as the goal for sediment cleanups

Application of Multi-Criteria Decision Analysis Tools
(Kiker/MacNair)

• Decision-making tools may be useful to identify values or decision criteria that are important to each stakeholder
• These may help reduce the factors that have to be dealt with at a complex site
• Has application as a potential stakeholder organizational tool
• Intuition is not always right
• Decision tools can help identify potential areas for compromise
• Decision tools help us be transparent about the basis for our decision
• A decision matrix may help make sense of multiple lines of evidence or multiple criteria
Dollars and Sense in Risk Management Decision Making
(Evison/Stansbury/Grosso)

- Mean total project cost of sediment removal projects is $200 per cubic yard (based on 49 projects)
- Mean total project costs of in-situ caps is about $60 per square yard (based on 8 projects)
- Regulators and industry should work together to make actual costs for all types of remedies more available
- We should dissect average and mean costs to help us make better cost estimates
- Regulators should evaluate policy changes that could save cost
- Uncertainties around both cost and effectiveness should be incorporated into decision-making
- The cost-effectiveness analysis may benefit from incorporating some of the aspects of cost-benefit analysis techniques

Incorporating Public Stakeholder Interests
(Siegel)

- It’s important to ask what stakeholders envision as end uses for a site
- Habitat restoration issues are often very important to public
- Bringing the public into the process early increases the likelihood of finding creative, practical, and affordable ways to meet public concerns
- Community Advisory Groups help the community be heard and can organize diverse points of view
- It’s important to provide technical assistance to communities, whether through EPA grants or privately funded
- Frequent meetings allow community representatives to gradually understand technical issues
- Look for win-win solutions that at least partly meet community goals
The Need for Comparative Net Risk Evaluation
(George on behalf of the SMWG)

Comparative Net Risk Defined

• Comprehensively Considers Risks Due to
  – Direct Impacts/Target Risks
  – Those associated with the presence of contamination in sediments
  – Indirect Impacts/Competing Risks
  – Those associated with remedy implementation
  – CNRE Seeks to Measure the Net Effect of Intervention, Offset by the Degree of Competing Risk Created

The Need for Comparative Net Risk Evaluation

Basis & Need for Comparative Net Risk

• “All remediation technologies have advantages and disadvantages when applied at a particular site and it is critical to the risk management that these be identified individually and as completely as possible for each site.”
• “For a site, it is important to consider "overall" or "net" risk in addition to specific risks.”*


• EPA Management Principle Nos. 8 and 10 emphasize risk management and risk reduction
The Need for Comparative Net Risk Evaluation

Shortcomings of Traditional Approach

• The Net Effectiveness of the Remedial Alternative is not Considered, for example:
  – If Post-Dredging Residuals Remain, What Would the Long Term Effectiveness of the Remedy be, Such as the Length of the Time to Remove Fish Consumption Advisories?
  – If MNR is Selected, What Would the Impact on its Long Term Effectiveness Be if There is a Flood Event?
• Consideration of Implementation Risk is Either Not Considered or is Deferred to a “Design Consideration”
• Often Does Not Consider Real-World Barriers Which Impede or Diminish the Anticipated Effectiveness of One or More of the Sediment Management Alternatives
• Lack of Incorporation of These Factors May Drive Remedy Decisions that are:
  – Less Protective than Anticipated
  – More Injurious to the Environment
  – More Costly than Necessary

Possible Benefits of CNRE Approach

• By Incorporating Consideration of Broader Range of Impacts, Helps to Ensure that both Traditional Risks (Human Health/Environment) and Risks of Remedy Implementation are Considered
  – Direct Impacts
  – Indirect Impacts
• Comparative Format Allows Each Remedial Alternative to be Evaluated on its Merits Against its Potential Impacts
• Helps to Ensure that All Relevant Criteria are Evaluated Throughout the Process
• Enables Uncertainty to be Portrayed in Comparing Alternatives
  – Current Alternatives Analysis Tends to View Outcomes as More Well-Defined than they Really Are
The Need for Comparative Net Risk Evaluation

Components of a Comparative Net Risk Protocol

- Basic Components
  - Baseline Exposure Forecast
  - Acceptable Risk Target
  - Time to Reach Targets
  - Cumulative Exposure & Risk
  - Net Effectiveness Evaluation of Each Alternative

- Uncertainty is Associated with Each Component and Must be Satisfactorily Bounded

Consistency with CERCLA 9 Criteria

- CNRE is consistent with CERCLA’s 9 Criteria which requires evaluation and balancing of short-term and long-term risks and benefits, including residual risk

Closing Thoughts

- Current Risk Assessment/Decision Paradigms do not Address a Sufficiently Broad Array of Risk

- Current Remedy Evaluation Does Not Evaluate the Net Risk Reduction of the Remedial Alternatives

- Comparative Net Risk is Essential to Development and Selection of Robust and Effective Sediment Remediation Alternatives

- Interest exists amongst various stakeholders in developing a comparative risk protocol for use in decision-making at contaminated sediment sites