

Critical Evaluation of Waterbody Assessment Processes

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Project Background

- WERF Sponsored Research Project
- Critical Evaluation of Assessment Methodologies for States Integrated Reports
- Final Report - September, 2006



Project Objectives

- Gather info on *current* assessment methodologies
- Identify approaches that *optimize* data and *best characterize* waterbody conditions
- Provide recommendations to serve as guidance to states on how to:
 - *Integrate* monitoring design with analysis methods
 - Use *robust methods* that adequately characterize water quality
 - Determine with greater *confidence* waters that are impaired



Research Tasks

- Lit Review of State Integrated Reports
- Lit Review of Assessment Guidance
- Telcoms with State Personnel
- Development of Critical Evaluation Matrix
- Development of Recommendations



Research Findings

- **How states determine WQS attainment**
 - Different method per use
 - Chemical Data: Binomial (9) vs. Raw Score (27)
 - Biological Data: Bioassessments (30) compare community to reference
 - Toxics: 1 or 2 exceedances
 - Unique methods



Research Findings

- **What data states use to conduct assessments**
 - All readily available data considered
 - Exceptions: minimum sample size (27), QA/QC, last 5 years, representative of conditions
- **Data QA/QC requirements of the states**
 - Specific requirements listed by 27 states
 - Credible data laws (WA, AZ, FL, IA, MO, OH, WY)



Research Findings

- How states quantify uncertainty associated with assessments
 - Only 13 states statistically quantify uncertainty
- How state monitoring efforts are tied to assessment methodologies
 - Handful of States have monitoring network specific to 305(b) assessments
 - No network specific for 303(d) assessments



Research Findings

- **How states extrapolate assessments to non-monitored waters**
 - Define “assessment units”
 - Probability-based monitoring networks (9) used for 305(b) assessments
- **Public involvement in assessments and methodology development**
 - Data solicited from public
 - Public Review of 303(d) list
 - 12 states published draft methodology for public comment



Preliminary Recommendations

- **WQS Attainment Assessment Methodologies**
 - Must be tied to standards
 - Better Integrate 305(b) with 303(d)
 - Allow for weight-of-evidence for both attainment and non-attainment
 - Statistical basis to reduce uncertainty
 - Develop site-specific biocriteria to draw more defensible conclusions from bioassessments
 - Transparent and auditable
 - Develop de-listing methodologies



Preliminary Recommendations

- **Data used in Waterbody Assessments**
 - Develop data quality requirements, including minimum temporal/spatial coverage
 - Address how to deal with non-detects and outliers
 - Specifically state how to address waterbodies that do not meet DQRs



Preliminary Recommendations

- **Integration of Monitoring Design**
 - Need better integration of “statewide” 305(b) monitoring with 303(d) assessments
 - Focus on monitoring for biocriteria development



Preliminary Recommendations

- **Waterbody Assessment Extrapolation**
 - Standardize definition of AUs
 - Georeference AUs and sampling sites



Preliminary Recommendations

- **Public Involvement**
 - Need technical discussion with public during development of methodology and AUs
 - Need EPA buy-in *prior* to performing assessments



Preliminary Recommendations

- **Bayesian Approach**
 - analyze data for (1) probability of sample being representative, and then (2) probability of exceedance
 - Use translators developed by the user to “update” analysis of probability of exceedance
 - Translators include WQ criteria, additional constraints, etc..



Summary

- Critical evaluation of current waterbody assessment methodologies
- Each states program has strengths and weaknesses
- Recommendations to serve as guidance for developing more robust methods that will help states characterize water quality with greater *consistency and confidence*

