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November 13, 2017

Mary Barnett, Water Quality Planning Section Ecologist Coordinator
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118

RE: 2018 Assessment Methodology

Ms. Barnett:

Thank you for the opportunity to review and comment on the 2018 Assessment Methodology. The Water Quality Planning Branch and Arkansas Department of Environmental Quality should be lauded for the open, transparent and inclusive process they initiated and implemented to gather public and stakeholder input on the draft 2018 Assessment Methodology. The Panel believes that the 2018 Assessment Methodology should use the best science available and all evaluation protocols should be science based.

3.4 Tiered Approach to Qualifying Data

Data received by ADEQ may be used in assessments and for attainment decisions, ***may be used for screening purposes only,*** *or may not be used at all depending on the level of data quality.*

Question: What does it mean that data be used for "screening purposes?"

4.1 Antidegradation

The Assessment Methodology outlines a methodology for protecting and evaluating Tier 1 waters. If ADEQ is implementing an antidegradation policy and using alternative methods for assessing Tier II and Tier III waters when assessing waters for the 303(d) list more information should be included on this assessment process.

6.9 Nutrients

The 75th percentile screening values are calculated from only discrete samples collected during the period of record. Nutrient screenings will be made by calculating the average concentration of each site for the period of record. Nutrient screenings will be made by calculating the average concentrations of each site for he period of record which will be compared to the 75th percentile for that ecoregion.

Please elaborate on why the screening value was chosen and how this screening criterion is helpful for full nutrient assessment.

General Comment

Binomial Statistical Type I and Type II Errors

Sampling the natural environment is characterized by variability. The Assessment Methodology could benefit from being reviewed by a professional statistician trained in statistical methods applicable to water quality monitoring remains. The intent of the Department to use statistics to identify the amount of uncertainty in their sampling results and structuring their analysis to calculate the level of Type I and Type II errors is appropriate. The binomial method proffered by the Department will allow the staff to have confidence in impairment listing decisions. However, there is an underlying policy assumption in the binomial testing method recommended by the Department. The method seeks a high level of certainty against making Type I (false positive) statistical errors- or in this case declaring a stream impaired when it is actually not. By doing so, the Department increases the possibility of making a Type II (false negative) error- or concluding a stream is not impaired when it actually is.

Structuring the statistical analysis to guard against false impairment decisions assumes the societal and economic costs of impairment decisions are significantly higher than the societal, economic and environmental costs of not recognizing the waterbody as impaired when it is actually impaired. For the many of situations, that assumption may be true, particularly in Category 2 stream. But it should not be assumed in all cases- waters with existing drinking water uses, Extraordinary Resource Waters and Ecologically Sensitive waters contain societal and economic values that arguably more costly if subject to a Type II error. It should also be noted that the Clean Water Act itself is premised on the principle that fishable, swimmable and drinkable have inherently more societal and economic value than waters that do not support those uses.

Just as importantly, the department's emphasis on avoiding false impairment declarations at the expense of increasing the probability of false supporting decisions is a public policy decision and should be treated as such. The Department should be able to defend this policy decision on the same basis it does any regulatory decision- on it's economic and environmental merits. The statistical analysis method that includes a discussion of both Type I and Type II errors should be included not only in the Assessment Methodology publication, but also the 305b Integrated Water Quality Assessment Report and 303d Impaired Waters List. These reports should include a description of the statistical method used and the rationale for avoiding Type I errors. It is misleading to the public to state an exceedance value (e.g. 10%) for a water quality standard when in the analytical practice the actual exceedance value may be as high as 30% due to sample size and the high degree of certainty being placed on impairment findings.

In summary:
1. The use of statistics to increase certainty in Department's analysis and decisions is appropriate and encouraged. A thorough review of the statistics used in the Assessment Methodology should be

performed by a professional statistician trained in the application of statistical analysis to sampling of the natural environment.
2. The emphasis on avoiding Type I errors (false positives) suggests the Department assumes the societal and economic cost of a false impairment listing is significantly higher than the societal, economic and environmental costs of not remediating impaired waters overlooked due to a Type II error. That assumption should not be made for waters with existing public drinking water uses, Extraordinary Resource Waters and Ecologically Sensitive Waters. A high confidence in avoiding Type II errors should be afforded these waters.
3. The emphasis on avoiding false positives is a policy decision that should be described in the Assessment Methodology, the 305b Integrated Water Quality Monitoring Assessment Report and the 303d Impaired Waters List.

Sincerely,

Anna Weeks
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