Improving Tools to Link Nutrients to Adverse Effects on Stream Ecosystem Services in California

Peer Review Charge Questions

Background Information:

The California State Water Resources Control Board (SWRCB) is developing nutrient water quality objectives for the State's surface waters. Among the approaches that the SWRCB staff is considering is the cause-effect approach, known as the Nutrient Numeric Endpoint (NNE) framework (Tetra Tech 2006). As the California SWRCB prepares to propose nutrient objectives for wadeable streams, improved data from statewide stream probabilistic and targeted bioassessment surveys can strengthen the scientific basis for policy decisions by 1) using the empirical stress-response approach to characterize the relationship and quantifying thresholds at which eutrophication stressors (e.g., nutrient concentrations, algal abundance) begin to exert adverse effects on aquatic life use, 2) provide context for these thresholds by summarizing available data on reference and ambient concentrations of candidate nutrient and algal abundance indicators and 3) evaluate the existing BBST model performance in predicting algal abundance, given variation in the nutrient status and influence of other environmental factors (e.g., hydrology, light, etc.).

The objectives of the project were three-fold:

1. Estimate the natural background and ambient concentrations of nutrients and candidate indicators of primary producer abundance in California wadeable streams;

2. Explore relationships and identify thresholds of adverse effects of nutrient concentrations and primary producer abundance on aquatic life use indicators in California wadeable streams;

3. Evaluate the Benthic Biomass Spreadsheet Tool (BBST) for California wadeable streams using existing data sets, and recommend avenues for refinement.

This study found that the majority of the State's Wadeable Streams sampled are below the 75th percentile of minimally disturbed "reference sites." Statistically detectable thresholds were found for benthic chlorophyll *a*, AFDM, and nutrients; benthic chlorophyll *a* thresholds were below those described in TetraTech (2006). The validation exercise of the BBST indicates room for improvement; inclusion of landscape and site-scale factors provides an avenue for model refinement.

The objective of this peer review is to obtain expert feedback on the soundness of the methodology, as well as the soundness of the conclusions drawn from the data and analyses.

Charge Questions:

In your review of this document, please provide written responses to the best of your ability to the following questions. Additional comments and recommendations for improving this document and associated methodology are also welcome.

Is the report organization optimal for a document of this length? Would it be better if each of the report sections was a stand-alone piece?

Is the cited literature sufficiently comprehensive? Are there any key references that have been omitted?

Are any limitations of the datasets and monitoring approaches employed to support the analyses in this report adequately addressed?

Executive Summary

Does the executive summary adequately capture the major findings of the report? Are the summary statements adequately supported in the body of the report?

Chapter 1

Does Chapter 1 provide sufficient background information to put the rest of the report into context with respect to information needs for the state of California?

Chapter 2

Are the methods used to estimate reference and ambient values for stream eutrophication indicators pooling data across multiple monitoring programs scientifically valid?

Chapter 3

Have the different methods for evaluating response thresholds of primary producer biomass and nutrient effects been described adequately so that someone previously unfamiliar with these methods can understand the approach and the method strengths and weaknesses and interpret the results?

Are the methods used to estimate response thresholds scientifically valid? Have statistical assumptions been adequately tested?

Are the conclusions of this chapter adequately supported by the analyses and results?

Does this chapter do a good job of synthesizing the results of multiple analyses contributing to a weight-of-evidence approach that could be used to support numeric nutrient endpoint development? Can you suggest any improvements?

Chapter 4

Is the evolution of the NNE benthic biomass spreadsheet tool adequately explained to allow the reader to understand its use and potential strengths and weaknesses?

Are the methods used to evaluate the performance of the NNE benthic biomass spreadsheet tool scientifically valid? Have statistical assumptions been adequately tested?

Are the conclusions of this chapter adequately supported by the analyses and results?

Does the analysis of residuals for model predictions presented in this chapter help to guide future improvements in these models?

Please provide your written comments to me no later than **four weeks from contract initiation.** Comments may be sent by regular mail to the address below, or by email to houk.virginia@epa.gov.

If you have any questions concerning the draft report or the charge, please contact me at 919.541.2815 or houk.virginia@epa.gov. We sincerely thank you for your input to our peer review process.

Virginia S. Houk
Peer Review Coordinator / Designated Federal Officer
USEPA/NHEERL
Maildrop B305-02
Research Triangle Park, NC 27711
T: 919.541.2815
houk.virginia@epa.gov