

# HALL & ASSOCIATES

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December 11, 2009

## Via Email

Dr. Thomas Armitage  
U.S. Environmental Protection Agency  
Ariel Rios Building  
1200 Pennsylvania Ave, N.W.  
Mail Code 1400F  
Washington, DC 20460

Re: Follow-up Comments on SAB Ecological Processes and Effects  
Committee Draft Report

Dear Dr. Armitage:

The following comments are submitted by Hall & Associates ("H&A") on behalf of the Pennsylvania Periphyton Coalition in response to the discussions held on December 3, 2009 regarding the draft committee report. During the December 3, 2009 telephone call, EPA requested clarification regarding what constitutes a scientifically defensible "tiered weight of evidence" ("WoE") analyses under which the statistical methods may be used to derive criteria for nutrients. We agree that the clarification requested by EPA is necessary. We are not aware of any published EPA guidance on this subject and prior attempts to apply WoE to nutrient endpoint development by EPA appear to conflict with many of the recommendations made in the Committee's report. Our observations and concerns are outlined below.

The existing recommendations made by the Committee with regard to WoE in the draft report are summarized below.

*The Guidance should contain a quantitatively based "weight-of-evidence" (WoE) framework using multiple methods and then combining them into figures and tables for visualization. Multiple statistical methods on one dataset do not equate to a reasonable WoE that significantly reduces uncertainty. Rather, the WoE should involve different assessment methods (e.g., different datasets, different biological endpoints, measures of habitat, etc.). This premise has been embraced by other EPA programs and the scientific community. (at 16,17)*

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*The Guidance can be used to develop nutrient criteria in a tiered weight of evidence assessment using appropriately modified EPA approved procedures together with other approaches that address causation. (at 37)*

Based on the draft Committee report and detailed discussions, WoE evaluations must properly consider (1) the relevant factors previously identified by the Committee to properly assess nutrient impacts and (2) relate the nutrient impacts of concern to impairment thresholds to provide a sufficient level of certainty that the selected criteria will serve its intended purpose. The Committee report identifies the types of information that needs to be considered in such an evaluation:

*For criteria that meet EPA's stated goal of "protecting against environmental degradation by nutrients," the underlying causal models must be correct. Habitat condition is a crucial consideration in this regard (e.g., light [for example, canopy cover], hydrology, grazer abundance, velocity, sediment type) that is not adequately addressed in the Guidance. Thus, a major uncertainty inherent in the Guidance is accounting for factors that influence biological responses to nutrient inputs. Addressing this uncertainty requires adequately accounting for these factors in different types of water bodies. (at 36,37)*

Thus, WoE must include approaches that demonstrate causation with consideration of the critical habitat factors affecting nutrient impacts for difference classes of waters where nutrient impacts are expected to differ (e.g., small canopied streams; sandy bottomed streams; large rivers without canopy, deep lakes, shallow lakes, etc.).

### **PA TMDL Criteria Derivation using Weight of Evidence**

As the Committee is aware, EPA derived nutrient endpoints for several Pennsylvania TMDLs, claiming the endpoints were derived using a WoE assessment. (See Paul and Zheng, 2007<sup>1</sup>) A brief description of our concerns with this WoE approach, which lead to this SAB review, is provided below.

The Paul and Zheng (2007) report, used as the basis for setting the nutrient endpoints in the disputed PA TMDLs, claimed to apply a scientifically defensible WoE based on seventeen different lines of evidence. A review of the individual lines of evidence confirmed that (1) cause and effect was not considered or demonstrated, (2) several lines of evidence were derived from one dataset, (3) conflicting data and critical habitat factors showing nutrients were not causing the impairments were excluded from the analyses, and (4) no attempt was made to explain mechanistic relationships between the lines of evidence, endpoint selected and the impairment of concern. Moreover, several of the lines of evidence relied upon the statistical methods under review to determine the nutrient endpoints. It is respectfully submitted that this is not the type of probing WoE evaluation contemplated by the Committee to ensure appropriate criteria were being derived to protect the environment.

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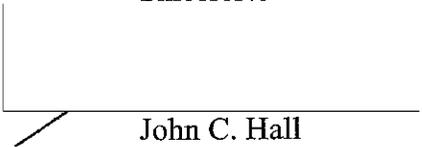
<sup>1</sup> Paul, Michael and Lei Zheng. 2007. Development of Nutrient Endpoints for the Northern Piedmont Ecoregion of Pennsylvania TMDL Application. The document was included in the original comments filed by H&A with the SAB.

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### Summary

In our view, it is important that the Committee reiterate that the purpose of a tiered WoE assessment is to provide a reasonable level of certainty that the selected criteria is both necessary and protective by conducting a more in-depth analysis of nutrient impacts on uses. It is not a vehicle to compile speculative information (e.g., studies not designed to confirm cause and effect or literature recommendations based on empirical evaluations of metadata that do not account for critical habitat differences) or to assert that such information when combined into “figures and tables for visualization” is sufficient for criteria derivation. We hope that the Committee finds this additional information useful in its deliberations.

Sincerely,



John C. Hall

cc: Dr. Dominic Di Toro  
Mr. Thomas Gallagher  
Pennsylvania Periphyton Coalition