Illinois Nutrient Science Advisory Committee (NSAC)
Work Plan Framework

Version Date: 09 June 2016

Objectives

- Make recommendations to Illinois EPA regarding river and stream eutrophication water quality standards that are appropriate for protecting aquatic life uses in Illinois waterbodies, which may include numeric water quality criteria for phosphorus, nitrogen, and biological response variables as components of eutrophication water quality standards, and may include narrative eutrophication water quality standards to supplement numeric criteria.
- Consider whether recommended standards should vary spatially (e.g., statewide, ecoregion, watershed, river, specific site), by water body type, or by other classification factors, and consider recommending procedures that may be used to derive site-specific eutrophication water quality standards.
- Consider characteristics of eutrophication water quality standards and their development that may assist Illinois EPA in obtaining USEPA approval for standards recommended by the NSAC.

Approach

The term "eutrophication water quality standards" is used throughout this document to encompass the potential suite of causal, as well as biological response variables, for which numeric and/or narrative criteria components may be appropriate for attaining aquatic life and other designated uses, where the causal (or stressor) variables include phosphorus and nitrogen, and the biological response variables include, but are not limited to, measures of and surrogates for algal or primary productivity and measures of macroinvertebrate and fish community health. The biological response variables will include measures that are expected to be altered as a response to increased phosphorus and nitrogen concentrations.

In deriving eutrophication water quality standards recommendations consistent with the charge to the committee, the NSAC is adopting an overall approach that is based generally on USEPA's Ecological Risk Assessment (ERA) framework, with application to numeric criteria development. Documents that may help guide NSAC activities include EPA's ecological risk assessment guidance (USEPA 1998), Suter and Cormier (2008) and nutrient-criteria related guidance and supporting documents provided by USEPA (2000, 2010, 2014). Adopting this approach is not a commitment by the NSAC to implement all aspects of a formal ERA. Rather, it is to provide a clear context and a general outline to guide NSAC activities. Three main components of this framework reflect primary phases of the work anticipated by the NSAC. They include (1) planning/problem formulation, (2) analysis, and (3) synthesis/characterization. An initial description of activities expected under each phase is provided below.

1. Planning/Problem Formulation

Planning and problem formulation is expected to include the following:

- Identify existing water quality standards and management goals relevant to the development of eutrophication standards for Illinois rivers and streams (see Box 1).

- Develop one or more conceptual models, as needed, demonstrating the effect of increased nitrogen and/or phosphorus on aquatic life (including algal, plant, benthic macroinvertebrate, and fish communities) in Illinois rivers and streams.

- Evaluate the relationships between nutrients, habitat, and other environmental factors to ecological response variables, such as algal abundance, dissolved oxygen, and various indicators of stream health based on fish and invertebrate communities.

- Develop an analysis plan that describes how existing data and information will be used to achieve the NSAC objectives (this NSAC work plan represents the initial draft of the analysis plan).

Box 1. Current Water Quality Standards for Illinois

Section 302.202. Purpose. The General Use standards will protect the State's water for aquatic life (except as provided in Section 302.213), wildlife, agricultural use, secondary contact use and most industrial uses and ensure the aesthetic quality of the State's aquatic environment. Primary contact uses are protected for all General Use waters whose physical configuration permits such use. (Source: Amended at 21 Ill. Reg. 370, effective December 23, 1996)

Section 302.203. Offensive Conditions. Waters of the State shall be free from sludge or bottom deposits, floating debris, visible oil, odor, plant or algal growth, color or turbidity of other than natural origin. The allowed mixing provisions of Section 302.102 shall not be used to comply with the provisions of this Section. (Source: Amended at 14 Ill. Reg. 2899, effective February 13, 1990)

2. Analysis

The overall objective of the analysis phase will be to identify a suite of initial candidate causal and/or biological response variables and associated numeric thresholds or breakpoints that may inform eutrophication standards. Several activities are anticipated during this phase, including the following:

- Consider how quantitative relationships may be developed from conceptual models that reflect the predicted stressor-response linkages describing the effects of increased phosphorus and nitrogen on aquatic life.

- Consider the potential for existing data and/or methods to support numeric eutrophication standards at statewide-, watershed-, ecoregion-, and/or site-specific or other spatial scales and water body types or other classification variables as considered during planning/problem formulation.

- Identify/develop stressor-response relationships by summarize existing information and past analyses of the relationships between nutrient levels and biological endpoints selected in the planning/problem formulation phase.

- Determine the need for, and scope of, additional data analyses using new methods and/or more recent data, and carryout or request such analyses as appropriate.

- Identify nutrient concentrations that meet objectives for selected response variables identified during problem formulation.

- Consider frequency and duration of the standards in conjunction with magnitude.

- Determine the appropriate form of the eutrophication standard based upon available analyses and evaluation of approaches used in other states, specifically considering an approach where information on stressor and response criteria components are used together in implementation of the criteria.

- Consider whether the candidate eutrophication standards are consistent with the Clean Water Act and implementing regulations, as further explained in EPA's Water Quality Standards Handbook, including (but not limited to) those considerations explained in Chapter 6 of the handbook. As explained in Chapter 6, "The EPA determines whether the state and tribal criteria are sufficient to protect the designated uses by ensuring that all numeric criteria are based on Section 304(a) guidance, Section 304(a) guidance modified to reflect site-specific conditions, or other scientifically defensible methods. The EPA's decision to approve or disapprove standards based on site-specific calculations or alternative scientific methods is based on whether the resulting standards are sufficient to protect the designated use and whether the supporting scientific methods and assumptions are valid and adequate."

3. Synthesis/Characterization

The synthesis/characterization phase is expected to include the following, and may involve iteration with additional analysis:

- Refine and evaluate candidate criteria, considering weight of evidence assessment as appropriate.

- Evaluate uncertainty (accuracy and precision) associated with candidate criteria.

- Ensure eutrophication standard recommendations consider all designated uses for Illinois rivers and streams, including Illinois' general use and drinking water uses for some of the state's water bodies, consistent with the Clean Water Act and associated regulations. For example, to the extent that recreational, aesthetic, or drinking water uses are shown to be more sensitive to the impacts of eutrophication than aquatic life, such considerations will be taken into account in the final recommendations and report.

Final Report

- The NSAC will produce a final report that includes eutrophication standard recommendations, as well as a detailed description of the data, methods, and analyses supporting the derivation of the standards consistent with the Clean Water Act and associated regulations for water quality standards, for Illinois EPA to use in establishing eutrophication standards consistent with their risk management goals.

References

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USEPA. 2010. Using Stressor-response Relationships to Derive Numeric Nutrient Criteria. Office of Science and Technology and Office of Water. EPA-820-S-10-001. November.

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