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Committee on Transportation and Infrastructure, Subcommittee on Water Resources and Environment

Regarding

Ohio's Nutrient Approach

Good morning Chairman Gibbs and Members of the Subcommittee. I am grateful for the opportunity to speak on an issue of great importance to the state of Ohio.

My name is George Elmaraghy and I am Chief of the Ohio Environmental Protection Agency's Division of Surface Water. I have more than 30 years of experience in water quality development and implementation. I am also a long standing member in the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA). Developing nutrient criteria has been one of the most difficult and debated water quality issues that I have seen in my career.

Ohio Environmental Protection Agency (Ohio EPA) has the delegated authority from the U.S. Environmental Protection Agency (U.S. EPA) to implement the federal Clean Water Act programs in the State of Ohio. Since 1972, Ohio EPA has built a nationally recognized chemical and biological water quality monitoring program. This work serves as a strong foundation to develop new Ohio water quality standards.

Today I would like to discuss Ohio's experience with nutrient pollution and our state's development of water quality standards to address this challenge (which is referred to technically as an "impairment" in a water body). I will highlight the benefits of our approach and stress the need for U.S. EPA to support states' ability to constructively implement defensible nutrient criteria in a targeted and reasonable manner.

Ohio is a water-rich state bounded on the south by the Ohio River and the north by Lake Erie with approximately 58,000 miles of rivers and streams. In addition, Ohio is a populous and heavily industrialized state with a strong agricultural sector. We also have a long history with nutrient pollution. In the late 1960s, Lake Erie was declared "dead"

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because of nutrient over enrichment. The problem was greatly abated thanks to the bi-national Great Lakes Water Quality Agreement of 1978 and passage of the federal Clean Water Act. In response to dedicated management efforts the water quality of Lake Erie – as measured visually, chemically and biologically – greatly improved and Lake Erie subsequently became known as the walleye capital of the world. Ohio's clean water and excellent fishing brought economic benefit to the state. The Lake Erie fishing industry is valued at $800 million annually, contributing to the $10.7 billion fishing and tourism economy of the Lake Erie region.

Unfortunately, conditions in Lake Erie have markedly changed again, for reasons we do not completely understand. We do know, since the mid-1990s, concentrations of dissolved phosphorus has increased in Lake Erie and nuisance algal blooms have returned and continue to worsen. Ohio's largest inland lake, Grand Lake St. Marys, experienced harmful algal blooms resulting in toxin (microcystin) levels last summer several times higher than the World Health Organization recommendation for recreation – forcing the state to issue a no contact advisory, essentially closing the lake for the recreation season. The sharp decline in tourism around the lake has been economically devastating to marinas, restaurants, camp grounds and other local businesses dependent upon lake visitors.

Regulating nutrients is very challenging. Unlike chemical pollutants, in the case of nutrients we cannot accurately predict a "dose-response" relationship. In other words, when it comes to nutrients, we don't know how much is too much in a particular water body. As a result, nutrient water quality standards must be based on a stressor-response relationship, or as it is more commonly known, weight of evidence. Thus, nutrients are not responsive to a "one-size-fits-all" approach to regulation.

For more than twelve years, Ohio has been using the results of a statistical analysis of existing water body biological scores and total phosphorus concentrations to translate Ohio's narrative standard, which has been in place since 1978, that waters shall be free from nutrients entering waters as a result of human activity in concentrations that create nuisance growths of aquatic weeds and algae, into targets for Total Maximum Daily Load (TMDL) reports. Many Ohio's publicly owned wastewater treatment plants receive total phosphorus effluent limits as a result of the TMDL reports, and total phosphorus load reductions identified by the TMDLs for agricultural non-point sources of pollution are on the order of 50 to 90 percent. We have had limited success in achieving these load reductions.

Ohio's experience illustrates that narrative water quality standards can result in partial progress. However, the resurgence of algal blooms means that more needs to be done. Nutrient enrichment, in short, is an unchecked threat to recreation in Ohio's waters.

New approaches are needed – stronger water quality standards for phosphorus and nitrogen are a good first step.

For nearly ten years, Ohio has been developing tools to effectively measure the relationship between nutrient concentrations and biological health. This research has been instrumental to allow us to derive nutrient criteria that is protective of stream quality. We are proud that Ohio is a national leader in this area of applied science.

The response variables that we have identified include primary productivity of the stream (meaning measured chlorophyll a and dissolved oxygen swings), biological health (meaning measures of fish and aquatic invertebrate species and abundance) and the concentration level of nutrients in the stream. We have distilled information into an unique multi-metric scoring system that accurately and effectively characterizes the degree of nutrient enrichment in a stream today and, through modeling projections, under future land use and wastewater treatment scenarios.

Let me provide a bit more background regarding Ohio's system. The Ohio Trophic Index Criteria (or TIC) identifies scores to measure four different categories, including: algal growth – using chlorophyll a levels; dissolved oxygen levels; biological criteria; and total phosphorus and dissolved inorganic nitrogen.

Table 1. Ohio's Trophic Index Criteria (TIC)

$$TIC = P_{chl\ a} + P_{DO} + B + N$$

Metric	Description	Metric Score
$P_{chl\ a}$	Primary productivity as measured by chlorophyll *a* concentrations	0 to 4
P_{DO}	Impact of primary productivity as measured by dissolved oxygen concentrations and ranges	0 to 5
B	Response of stream biology as measured by biological survey results	0 to 6
N	Degree of enrichment as measured by total phosphorus and dissolved inorganic nitrogen concentrations	0 to 4

The tally of these scores provides a numeric measure of a stream's nutrient status. We have developed three levels of trophic index scores—acceptable, threatened and impaired.

Table 2. Ohio's DRAFT Trophic Index Criteria Score Levels

Status of Stream	TIC
Acceptable – nutrient enrichment is not likely.	9 to 19
Threatened – nutrient enrichment is likely now or in the future.	5 to 8
Impaired – nutrient enrichment is documented.	0 to 4

The implementation of the TIC can be conceptually explained through Figures 1 and 2 below. These figures detail how Ohio EPA would determine if numeric nutrient criteria should be included in permits based on current and future scenarios.

Figure 1. TIC Implementation – Current Scenario

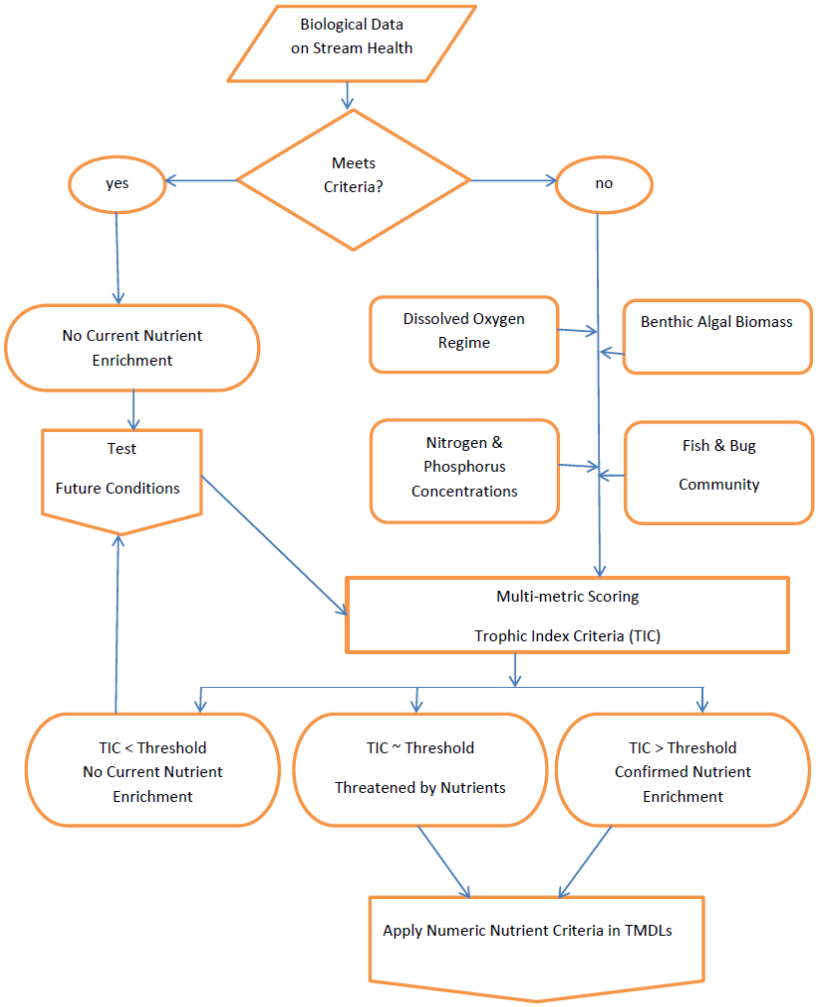
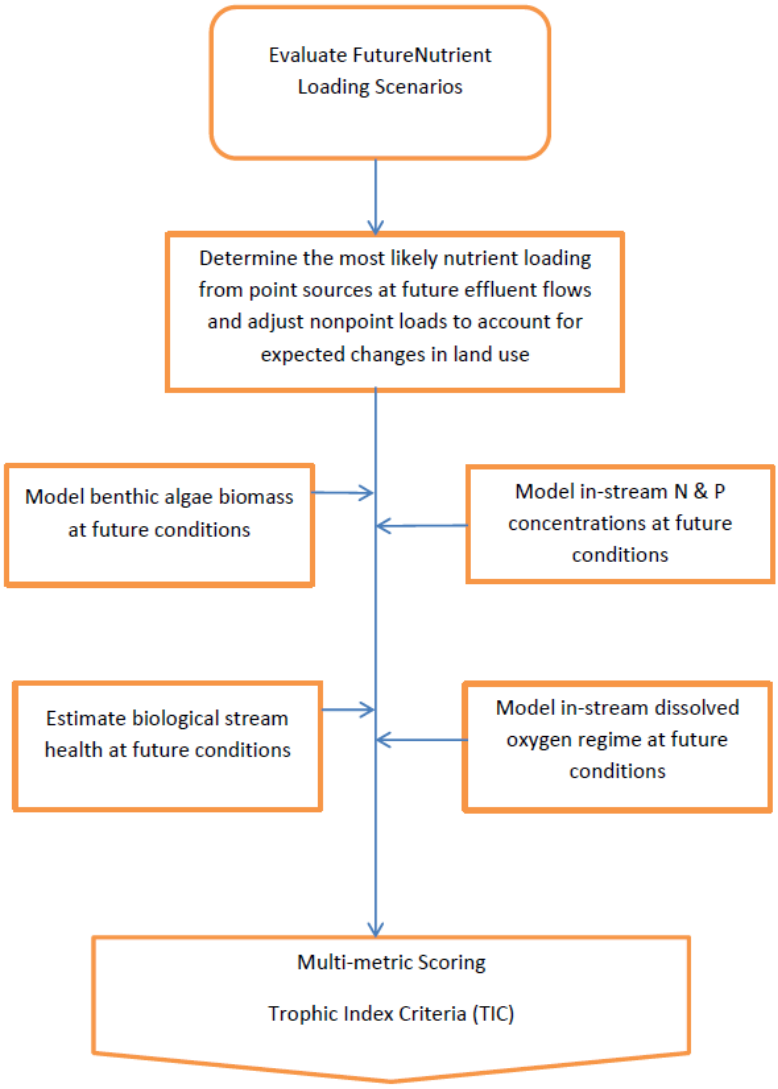


Figure 2. TIC Implementation – Future Scenario



To help support the use of the Tropic Index Criteria, Ohio has also developed a water quality trading option that is available as a tool for all dischargers to help address nutrient threatened and impaired conditions. Less stringent effluent limits may be "traded for nonpoint source best management practices" to provide a discharger up to three NPDES permit cycles to meet the final water quality based nutrient limits.

Basically, an existing source would be given the opportunity over ten years to meet the difference between technology based nutrient effluent limitations and more stringent water quality based effluent limitations through the implementation of a water quality trading program in accordance with Ohio's regulations in Ohio Administrative Code Chapter 3745-3. If after ten years, the trading program has not been successful in reducing stream nutrient loads sufficiently to eliminate reasonable potential, the

permittee would then be given a schedule of compliance to meet the nutrient water quality based effluent limits through treatment.

Ohio EPA hopes to move forward and formalize the Ohio approach in a draft rulemaking for streams and small rivers by releasing new and revised regulations for initial public review and comment later this year. Ohio cannot begin the implementation of our new approach for nutrients until this rulemaking is adopted and approved by U.S. EPA.

In addition to the efforts Ohio is undertaking for nutrient criteria for streams and small rivers, we are also working on nutrient standards for inland lakes. We are currently reviewing public comments received on a draft rulemaking containing draft nutrient standards for Ohio's inland lakes.

Ohio has also proposed to apply technology-based nutrient controls for all new and expanded publicly owned wastewater treatment works. Under our draft antidegradation rulemaking currently available for initial public comment, total nitrogen limits of 10 mg/L and total phosphorus limits of 2 mg/L will apply to new dischargers over 0.5 million gallons per day. We recognize that nutrient effluent limitations on larger wastewater treatment plants are likely either through a TMDL, or based on the future nutrient water quality standards; therefore, we believe it is good policy to require new treatment plants to be designed and constructed to provide nutrient removal upfront rather than retrofitting later at a higher cost. We are also reviewing public comments submitted on this draft rulemaking.

Industries and municipalities are faced with a wide array of regulatory requirements. We should not require industries and municipalities to meet stringent new nutrient limits unless we are sure that imposing these limits will result in stream improvement especially with the difficulty we are having in reducing nonpoint source pollution loads. Ohio's approach would require water quality based nutrient effluent limitations in situations where nutrients are causing biological impairments today (the weight of evidence approach) and through modeling projections, under future land use and wastewater treatment scenarios. Our approach also provides flexibility through the water quality trading option detailed above in achieving these limits.

Ohio has been working closely with our federal partners in Region 5 in the development of our approach and addressing concerns so that the long standing disagreement over the weight of evidence approach verses independent applicability (which means the imposition of water quality based effluent standards if any criteria are exceeded) does not stand in our way. I cannot emphasize enough that States need flexibility to build creative nutrient reduction strategies and water quality standards that effectively reduces nutrient impairment.

Ohio feels our tools and approach provide a flexible solution for controlling nutrients, allowing the weight of the evidence to drive decision making. We believe that our approach is comprehensive, protective, creative, fully-integrated, and results-oriented. We feel this approach will gain stakeholder support and allow the required rulemaking to move forward. And finally, with legally adopted, scientifically defensible nutrient standards in place, we will have the necessary mechanisms to assess the quality of our water resources and the means to make informed public policy decisions on the steps needed to restore, protect and maintain these resources.

Forty-two years ago, Ohio's burning Cuyahoga River appeared on televisions throughout the country. In response, Congress enacted the Clean Water Act and today such stories of gross water pollution have all but disappeared. However, new issues emerge, and today—too many nutrients are washing from the landscape and threaten the hard-won progress that has been made.

In closing, controls that we have implemented in the past are not sufficient to address the issues being caused by nutrients to our rivers, lakes and streams. Moving forward, we must have the flexibility to make reasonable and effective changes that will provide the necessary tools to ensure our waters achieve and maintain the Clean Water Act's fishable and swimmable goals.

Mr. Chairman and Members of the Subcommittee, thank you for this opportunity to share Ohio's thoughts on the importance of state input and flexibility in nutrient standards. I am happy to answer any questions you have.