Numeric Nutrient Criteria Implementation: Florida's Journey And Paths Forward in Other States

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NUMERIC NUTRIENT CRITERIA: PROGRESS AND PATHS FORWARD
EPA ABSTRACT

Nitrogen and phosphorus (nutrient) pollution is one of America's most widespread, costly, and challenging environmental problems. Nutrient pollution has impacted many streams, rivers, lakes, aquifers, estuaries, and coastal waters for the past several decades, resulting in serious environmental and human health issues, and impacting the economy.

Water quality, as well as human and aquatic life health, can be affected or degraded by nutrient pollution. Nitrogen and phosphorus pollution and poor habitat are documented widespread problems and are associated with a significant increase in risk for degraded biological condition. Some 16,000 waterways across the United States have been identified as impaired by nutrient pollution. Forty percent of the nation's river and stream miles have high levels of phosphorus and 27% have high levels of nitrogen. About 5.7 million acres of lakes, reservoirs, and ponds are threatened or impaired by nutrients, organic enrichment/oxygen depletion, and algal growth. Moreover, nearly 20% of lakes have high levels of nutrients. Lakes with excess nutrients are 2.5 times more likely to have poor biological health. Microcystin — an algal toxin that can harm humans, pets, and wildlife — has been found to be present in about one-third of U.S. lakes with high levels of nutrients. Nutrients and co-pollutants (sediment, pathogens, and disinfection by-products) account for the largest portion of drinking water violations for source water-related contaminants. Nitrate concentrations in incoming source waters and treatment costs are of mounting concern. And further downstream, 78% of our nation's assessed coastal waters exhibit eutrophication.

The concentration of nutrients in coastal and inland waters is largely driven by anthropogenic activities, including municipal wastewater treatment, atmospheric nitrogen deposition, urban stormwater, and agricultural livestock and row crop activities. Given the projected increases in population, intensive land use and climate change, the threat to water quality from these sources will continue in the future.

To address the impacts of nutrient pollution, EPA has developed a wide variety of resources. In 1998, EPA developed a National Nutrient Strategy that described EPA's plan to work with states and tribes to adopt numeric nutrient criteria. Numeric nutrient criteria are effective tools for water quality management because they provide quantitative and measureable goals. They are easier to implement than narrative statements for monitoring, assessment, setting permit limits, and remediation targets. They also facilitate better tracking of progress toward controlling nutrient pollution and are more transparent to the public. Numeric nutrient criteria can be more effective than narrative statements to help implement controls before problems occur.

EPA's involvement with numeric nutrient criteria has become more focused since EPA reaffirmed the need for states to adopt numeric values into their water quality standards to replace their narrative statements. While a number of states have made some progress to adopt numeric nutrient criteria for either specific waters or entire waterbody types in their state, only Hawaii had adopted a comprehensive set of numeric nutrient criteria for both fresh and marine waters, until Florida did so in September 2013, when EPA approved Florida's adopted numeric nutrient criteria for the majority of its waters. This accomplishment is particularly striking given Florida's numerous estuaries, streams, lakes, and springs. Previously, Florida had a narrative nutrient standard in place.

Other states continue to move ahead to adopt numeric nutrient criteria for their waters. Given the various sources of nutrient pollution, as well as the need to prevent impacts downstream, the challenges for these states promise to be demanding and significant. However, EPA has technical resources available to support these efforts and stands at the ready to provide technical assistance to those states moving forward.

EPA's goals are simple: Through a variety of means, EPA aims to restore and protect our nation's many valuable water resources. The agency is working at the federal, state, and local government levels to reduce sources of nitrogen and phosphorus pollution to protect human health and aquatic resources; restore surface and ground water already degraded by nutrient pollution; build federal, state, and local capacity to plan for and reduce such pollution through voluntary, as well as regulatory means; support and collaborate with states as they develop and implement numeric nutrient criteria; and enhance stakeholder understanding regarding the impacts of nutrient pollution to enable behaviors and practices that will lead to nutrient pollution reduction.

NUMERIC NUTRIENT CRITERIA: PROGRESS AND PATHS FORWARD

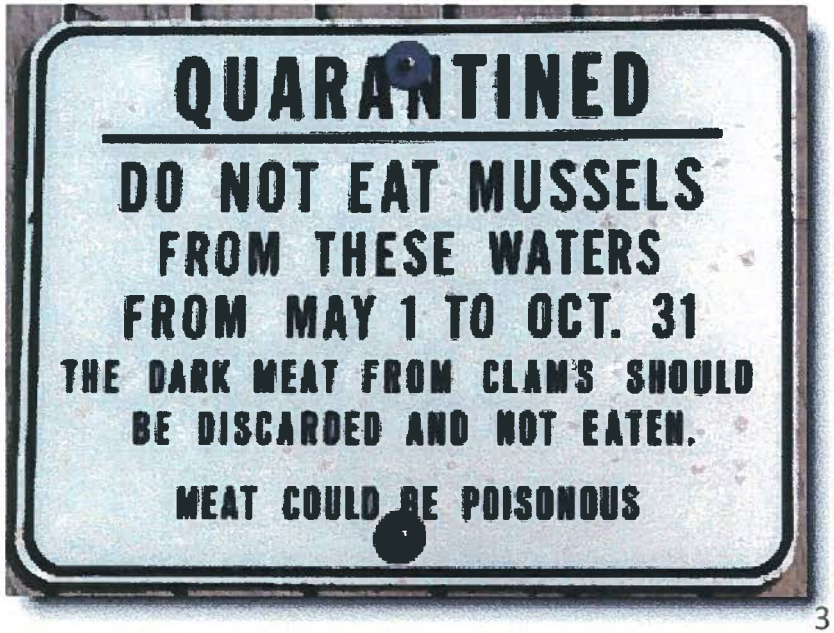
Betsy Southerland, Office Director
U.S. EPA, Office of Water, Office of Science and Technology

National Association of Environmental Professionals Annual Conference
April 2014

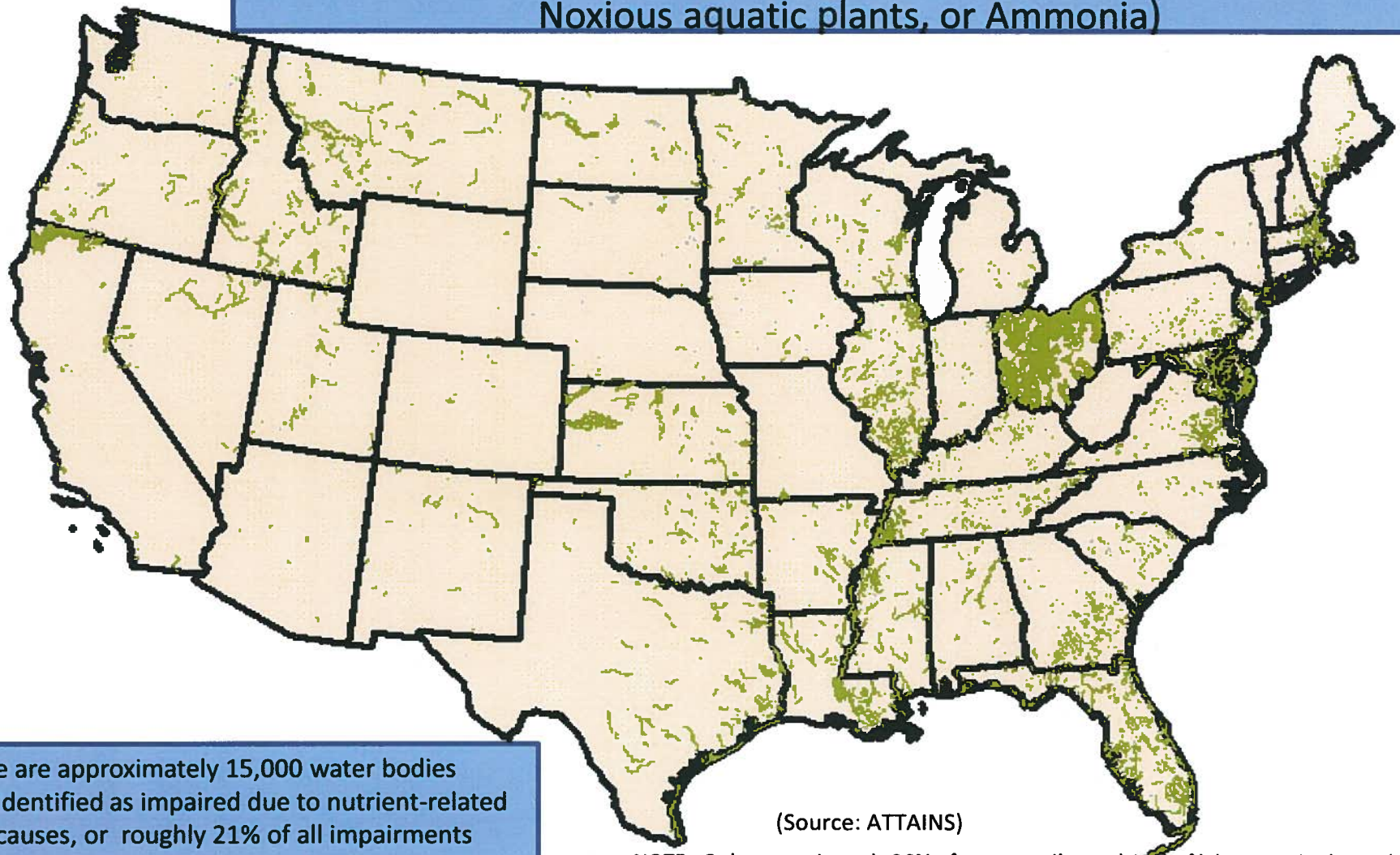
Outline

- Nutrient Pollution Overview
- Importance of Nitrogen AND Phosphorus
- Tools to Fight Nutrient Pollution
- Numeric Nutrient Criteria

Nutrient Pollution



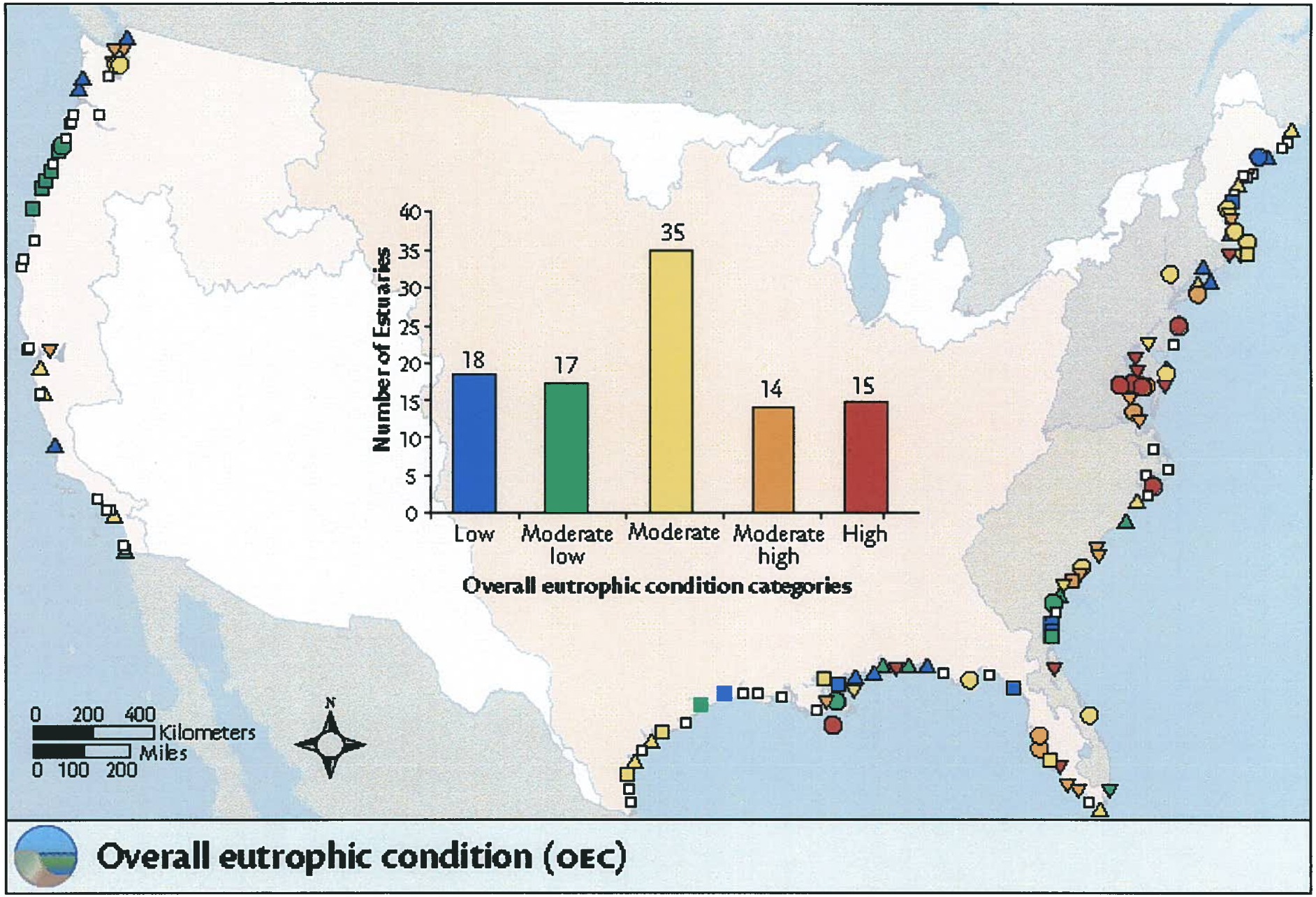
Waters Indentified as Impaired for Nutrient-related Causes (those with Parent Pollutants in the following categories: Nutrients, Algal growth, Organic enrichment/oxygen depletion, Noxious aquatic plants, or Ammonia)



There are approximately 15,000 water bodies identified as impaired due to nutrient-related causes, or roughly 21% of all impairments

(Source: ATTAINS)

NOTE: Only approximately 26% of stream-miles and 42% of lake-acres in the US have been assessed in order to determine compliance with applicable water quality standards. In addition, the geospatial information necessary for mapping is available for only approximately 70% of the known nutrient-related impairments. Thus, the image shown does not identify all waters that have nutrient-related problems.



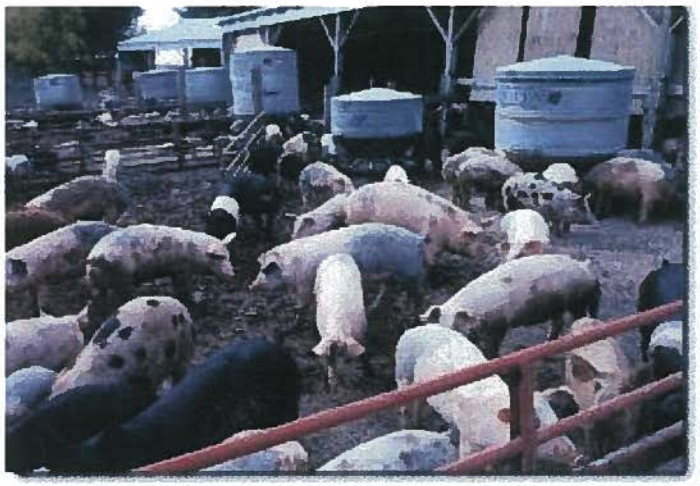
NOAA (2007)Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change

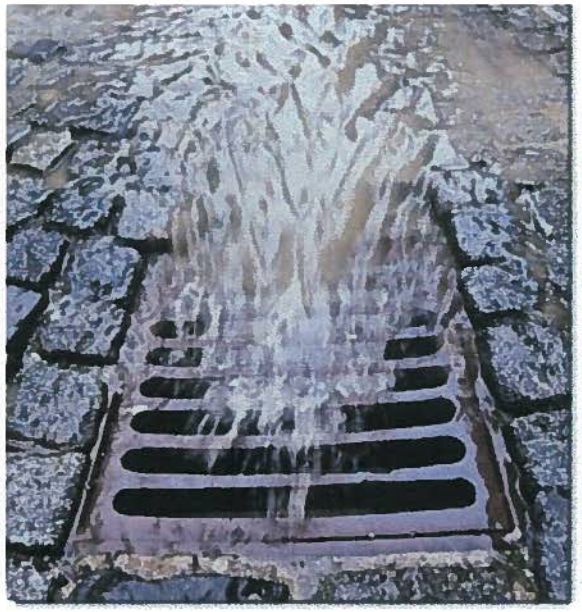
What are the Sources of Nutrient Pollution?

- **Municipal Wastewater Treatment**
  - Among most heavily regulated sectors in US
  - Treat more than 18 million tons of human waste annually
  - More than 15,200 municipal wastewater treatment facility permits
  - 14% have numeric limits for nitrogen (N) or phosphorus (P)
  - 30% monitor for these pollutants
- **Atmospheric Nitrogen Deposition**
  - In the Chesapeake Bay atmospheric N accounts for about 1/3 of the source contributions

What are the Sources of Nutrient Pollution?

- **Urban Stormwater**
  - 80% of U.S. population lives on 10% of land
  - 50% of existing urban landscape will be redeveloped by 2030
  - Additional 30% of currently undeveloped land likely to be developed
  - 40% of U.S. population lives near the coast
- **Agricultural Livestock**
  - $166 billion industry , more than 1 billion tons of manure annually
- **Agricultural Row Crops**
  - $120 billion industry





Nitrogen AND Phosphorus are Both Important

- **EPA 2012 *"Preventing Eutrophication: Scientific Support for Dual Nutrient Criteria"***
- **Research shows the need for controlling both to protect water quality**
  - Limitation by nitrogen and phosphorus can vary spatially and temporally
  - Aquatic flora and fauna have a diverse set of nutritional needs
  - Nitrogen fixation does not fully offset nitrogen deficiency in either fresh or marine waters
  - Both nitrogen and phosphorus have a role in protecting downstream waters

http://www2.epa.gov/sites/production/files/documents/nandpfactsheet.pdf

Technical Assistance in the Fight Against Nutrient Pollution

- **National Nutrient Strategy (1998)**
  - Created national and regional nutrient criteria programs
- **Published Technical Guidance Manuals**
  - Rivers/Streams (2000)
  - Lakes/Reservoirs (2000)
  - Estuaries and Coastal (2001)
  - Wetlands (2007)
  - Stressor-Response Approaches (2010)
- **Published Nutrient Criteria Recommendations (2000-01)**
  - By Ecoregion: 13 Rivers/Streams, 12 Lakes/Reservoirs, 1 Wetland
- **National Nutrient Criteria Technical Workshops (2014)**

2011 Framework for Managing N&P

- Results, results, results: build from existing state work, but accelerate progress and demonstrate clear results
- Encourage a collaborative approach between federal partners, states, and stakeholders
- States need flexibility to achieve near-term reductions in N and P pollution while they make progress on their long-term strategies

2011 Framework for Managing N&P

- Recommended elements of a state framework
  - Prioritize watersheds and set load reduction goals
  - Effective source reduction: point source permits, agricultural areas, storm water and septic systems.
  - Ensure accountability and report progress to public
  - Develop work plan for numeric criteria development

2011 Framework for Managing N&P - Element 8: Numeric Nutrient Criteria Development

Goal

For states to develop numeric nitrogen and phosphorus water quality standards on a reasonable schedule while making progress on reducing loads in the near-term

Develop work plan and phased schedule for developing numeric N and P criteria for classes of waters (lakes/reservoirs, rivers/streams, and estuaries)

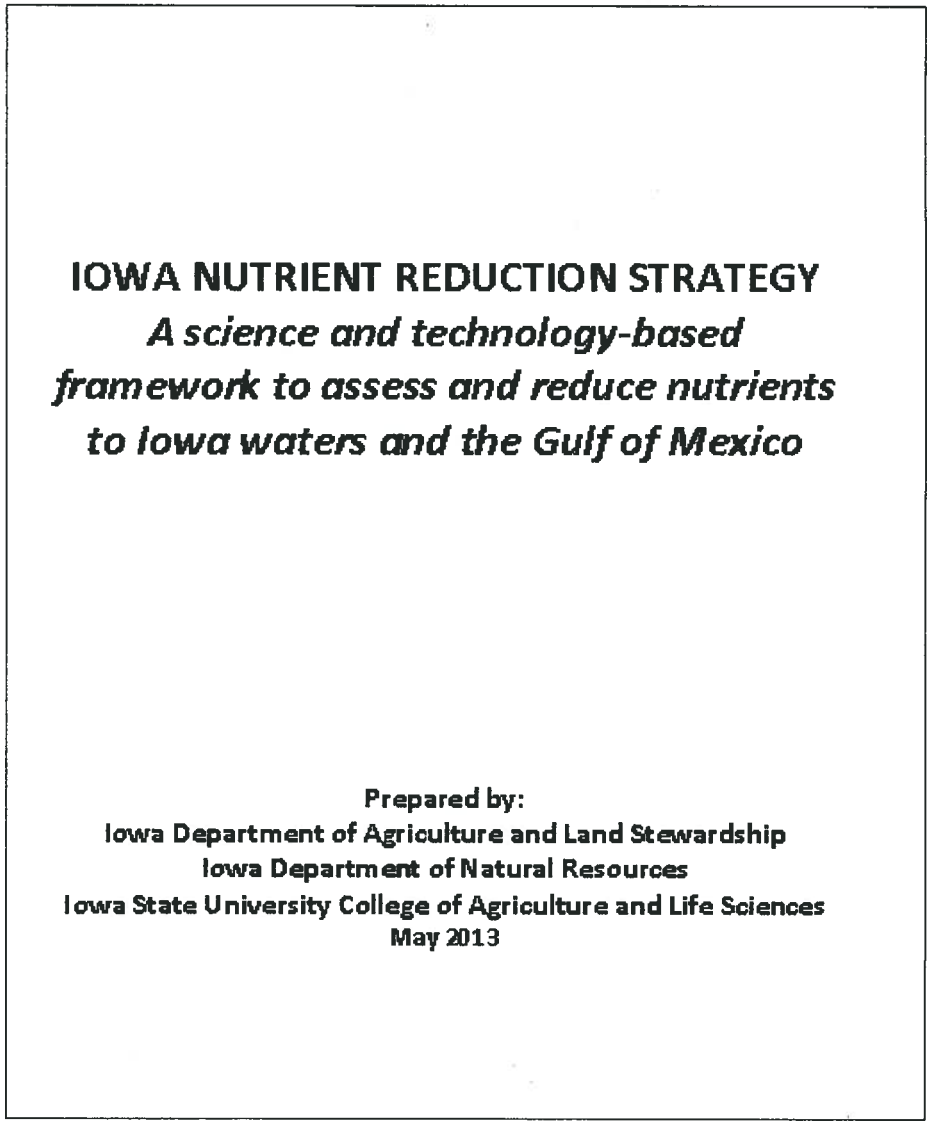
- Should contain interim milestones, e.g., data collection and analysis, criteria proposal, and criteria adoption consistent with the Clean Water Act
- Reasonable timetable

Why Numeric Nutrient Criteria?

- **Numeric nutrient criteria provide quantitative and measureable goals, advantages include:**
  - Easier to accurately implement for:
    - Monitoring, assessment, and listing (303(d) list)
    - Water quality-based pollutant limits (NPDES permits)
    - Remediation (TMDLs, nutrient budgets and allocations)
  - Better tracking of progress towards controlling N and P
  - More transparent to the public
  - Protective and preventative; easier than translating narratives when implementing controls before problems occur

Progress on Numeric Nutrient Criteria

- A number have or are developing nutrient reduction strategies or frameworks
- All states that are part of the Hypoxia Task Force have committed to complete strategies and many now have draft or final versions



IOWA NUTRIENT REDUCTION STRATEGY

A science and technology-based framework to assess and reduce nutrients to Iowa waters and the Gulf of Mexico

Prepared by:
Iowa Department of Agriculture and Land Stewardship
Iowa Department of Natural Resources
Iowa State University College of Agriculture and Life Sciences
May 2013

Numeric Nutrient Criteria Status

- X states have N and/or P criteria for at least one waterbody type throughout the state
- Y states have N and/or P criteria for one waterbody type throughout the state
- Z states have no N and/or P criteria on a statewide basis
  - May have site specific criteria

Numeric Nutrient Criteria Development in Florida

- EPA used a variety of methodologies to develop potential criteria for different types of waters
- Similar approaches were used by Florida in the final water quality standards approved by EPA

Numeric Nutrient Criteria

It's not one size fits all!

- Multiple approaches are available, including:
  - Reference Condition
  - Mechanistic Models
  - Stressor-Response Analysis
  - Multiple lines of evidence

- Approaches vary in levels of complexity and data needs

Numeric Nutrient Criteria

- Magnitude (how much?), duration (how long?), and frequency (how often?)
  - *"Criteria are expressed as annual geometric mean values not to be exceeded more than once in a three year period."*

- Important to consider downstream as well as near-field protection
  - Why?
    - Clean Water Act
    - Gravity.....because it all flows downstream
  - What tools do we have to address downstream protection?
    - Narrative approaches
    - Numeric approaches

Looking Ahead – Key Priorities

- Working with more and more states to develop and implement nitrogen and phosphorus pollution reduction frameworks that address all sources of nutrient pollution
- Continued commitment to updating science
- Broader and more effective outreach to stakeholders
- Broader EPA–USDA coordination
- Assistance with development of states' numeric nutrient standards
  - National Nutrient Criteria Technical Workshops (2014)
  - N-STEPS

EPA Website

EPA United States Environmental Protection Agency

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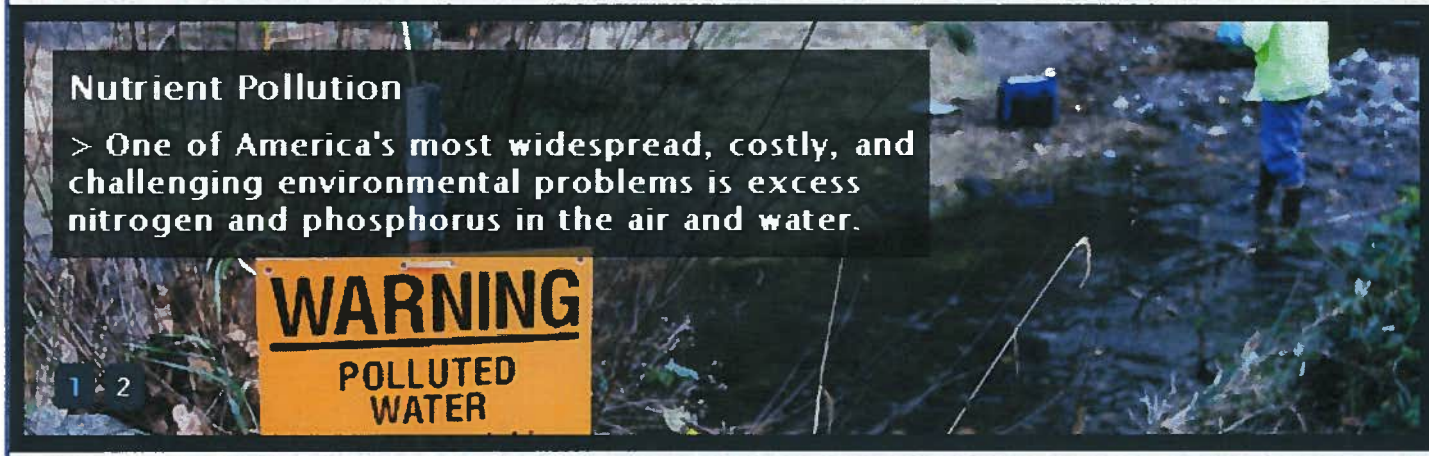

Join the Conversation About Water

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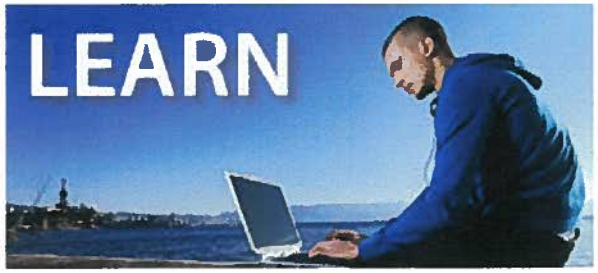
- Watershed News



- The Problem
- Sources and Solutions
- The Effects
- Where it Occurs

- In Your Community
- In Your Home
- In Your Yard
- In Your Classroom

Visit EPA's site for nutrient pollution policy and data.

http://epa.gov/nutrientpollution/

Thank You!

Numeric Nutrient Criteria: Florida's Journey, Next Steps, and the Gulf Dead Zone Challenge

By
Deborah A. Getzoff and Kathryn Rossmell
of
Lewis, Longman & Walker, P.A.

Abstract

In 1998, the EPA declared that numeric, rather than narrative, nutrient criteria would be preferred to help maintain water quality under the Clean Water Act. More than fifteen years later, Florida has become the second state to have numeric nutrient criteria for every type of water body within its borders. Florida's journey to this point provides a unique perspective on the future of NNC creation in other states, particularly because the Florida geography includes an extensive variety of water body types. This journey also illuminates some of the legal challenges states can face when dealing with deadlines, federal agencies, judicial and legislative processes, state rulemaking, and non-governmental organizations. This paper will address Florida's legal history with numeric nutrient criteria, discuss the state's next steps on the NNC path, and will separately examine the "Gulf Dead Zone" as of particular significance for future state and federal NNC coordination.

Florida's Legal History With NNC Development

The Clean Water Act requires that states adopt water quality standards for navigable waters.[1] States, including Florida, have generally chosen to adopt narrative rather than numeric standards.[2] In 1998, the United States Environmental Protection Agency ("EPA") declared that numeric nutrient criteria, or NNC, would be the preferred method of setting nutrient water quality standards. In 2002, the Florida Department of Environmental Protection ("FDEP") submitted a Draft Numeric Nutrient Criteria Development Plan (the "Plan") to the EPA, and by mid-2004, the EPA and FDEP declared mutual agreement to the Plan. FDEP, with EPA's concurrence, revised the Plan in 2007, and submitted a second revised Plan in early 2009.

Based on Florida's peninsular geography, it includes nearly all water body types subject to nutrient criteria: lakes, rivers, streams, springs, estuaries, coastal waters, and extensive manmade drainage and conveyance structures. While some areas and water bodies are more susceptible to nitrogen exceedences, others are primarily affected by phosphorus. Consequently, Florida has presented a virtual, universal "test case" for the adoption of numeric nutrient criteria.

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[1] Clean Water Act, § 303.

[2] Florida's original narrative standard stated: "In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural population of flora and fauna."

In 2008 between the first revision and the submission of the second revision to the Plan, several environmental groups filed a lawsuit in federal district court against EPA to enforce establishment of NNC standards.[3] A number of other interested groups also intervened,[4] and several Florida water management districts filed *amicus curiae* briefs.[5] As a result, on January 14, 2009, EPA declared that NNC were necessary to comply with the Clean Water Act in Florida.

The lawsuit resulted in a Consent Decree between EPA and the plaintiff NGOs that became effective on December 30, 2009.[6] The Consent Decree, which did not include the state as a party, set a schedule for two rulemaking phases during which EPA would set NNC for Florida waters, and provided that if FDEP submitted approved NNC before the EPA deadlines, then EPA would not be obligated to set the NNC.

EPA gave FDEP the opportunity to set NNC for lakes and flowing waters by January 14, 2010, and to set NNC for estuarine and coastal waters by January 14, 2011. However, due to time constraints in working with stakeholders and engaging in the state's administrative processes and challenge timeframes, FDEP could not meet the deadline and abandoned rule development for lakes and flowing waters at that time, leaving EPA to step in and propose the standards. In August 2010, EPA filed a supplemental notice in the Federal Register of data availability and requested public comment on certain potential changes to the January 2010 proposed rule, including changing the number of watershed regions from four to five based on additional information regarding the delineation of watershed boundaries and phosphorus-rich geological formations in Florida, changes to the statistical analysis and modeling used to determine NNC, and an alternative approach to protecting downstream lakes. The EPA received roughly 22,000 comments and conducted thirteen public meetings as a result of the notice. EPA adopted the Final Water Quality Standards for the State of Florida's Springs, Lakes and Flowing Waters on November 14, 2010, completing "phase one" of the consent decree requirements. This rulemaking included EPA's requirements for downstream protection values. However, these standards excluded South Florida flowing waters, which are largely man-made canals.

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[3] The plaintiffs included the Florida Wildlife Federation, Inc.; Sierra Club, Inc.; Conservancy of Southwest Florida, Inc.; Environmental Confederation of Southwest Florida, Inc.; and St. Johns Riverkeeper, Inc.

[4] The intervenors were the Florida Pulp and Paper Association Environmental Affairs, Inc.; the Florida Farm Bureau Federation; Southeast Milk, Inc.; Florida Citrus Mutual, Inc; Florida Fruit and Vegetable Association; American Farm Bureau Federation; Florida Stormwater Association; Florida Cattleman's Association; Florida Engineering Society; the South Florida Water Management District; the Florida Water Environmental Association Utility Council, Inc.; the Florida Minerals and Chemistry Council, Inc.; and the Florida Department of Agriculture and Consumer Services.

[5] The water management districts were the Northwest Florida Water Management District; the Southwest Florida Water Management District, and the Suwannee River Water Management District.

[6] Florida Wildlife Federation, Inc. et al. v. Jackson et al., 2009 WL 5217062, No. 4:08cv324-RH/WCS (N.D. Fla. December 30, 2009).

The adoption of the standards triggered a new series of legal battles,[7] involving thirteen different lawsuits challenging the 2009 determination that NNC were necessary to comply with the Clean Water Act in Florida and challenging the 2010 EPA rule. Twenty-five of the parties (in a total of eleven cases), including the State of Florida, the Florida Commissioner of Agriculture, and the South Florida Water Management District, alleged that the 2009 determination was arbitrary and capricious and should be set aside as invalid. The parties also argued that even if the 2009 determination was valid, the 2010 rule went too far. Conversely, seven environmental parties in two lawsuits asserted that the 2010 rule was valid but did not go far enough, making it arbitrary and capricious. The thirteen lawsuits were consolidated into one case and culminated in a February 18, 2012 federal court order upholding EPA's NNC for lakes and springs, but finding that that the values for flowing waters were arbitrary and capricious. The court also upheld the *idea* of downstream protection values, but found the way EPA derived the values to be arbitrary and capricious.

Before the issuance of the 2012 court order, in April 2011, FDEP had petitioned EPA to rescind EPA's 2010 rule and replace it with a FDEP proposed rule.[8] The petition also included a request to rescind the 2009 determination and to hand NNC rulemaking back to the state of Florida. After the court order, on June 13, 2012, FDEP submitted for EPA's review new, revised water quality standards for all freshwater lakes, springs, some flowing inland waters, certain estuaries, and certain coastal marine waters. The actual numbers FDEP submitted were much the same as EPA's numbers; however, FDEP's rule maintained the narrative criterion but interpreted it for applicable waters with numeric values.[9] Additionally, FDEP's rule relied on the Total Maximum Daily Load process to protect downstream waters rather than establishing downstream protection values, and included recognition of established TMDLs. FDEP's rule also accounted for biological conditions.[10]

EPA had a November 30, 2012 deadline to propose a rule for streams, downstream protection values, unimpaired lakes, marine waters, estuarine waters, and South Florida canals. Although EPA petitioned the court for an extension, it was denied, and EPA formally adopted

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[7] Consolidated Case 04:08-CV-324-RH-WCS

[8] As expected, the proposed rules were challenged by the environmental organizations who were party to the federal court action, and the rule adoption went to an administrative hearing, where the rules were found valid and reasonable by a Florida Administrative Law Judge on June 7, 2012. *Florida Wildlife Federation et al. v. Department of Environmental Protection et al.*, 2012 Wl 2118200, No. 12-0157RP (Fla. Div. Admin. Hrgs. June 7, 2012).

[9] The court later provided a useful analogy for this approach, explaining "a state could adopt a numeric speed limit – 70 miles per hour – or a narrative standard – don't drive too fast. Or a state could adopt a combination of both – don't drive over 70, and don't drive too fast for conditions." *Florida Wildlife Federation, Inc. v. McCarthy*, 2014 WL 51360, No. 4:08cv324-RH/CAS, *2 (N.D.Fla. January 7, 2014).

[10] The rule incorporates the use of floral response variables (excessive algae and plant production) to identify impaired streams. The rule also integrates the floral response variables, nutrient thresholds, and a response variable to address faunal health and procedures to address non-stable conditions. If a stream demonstrates healthy flora and fauna, and is in stable condition (i.e., it is not trending toward an increase in nutrient levels), it can meet the integration criterion.

the NNC rules promulgated by FDEP in their entirety. The rules covered inland lakes, springs, flowing waters (again excluding South Florida Canals), and certain coastal waters and estuaries. EPA proposed rules for the waters not covered by FDEP's rule, namely, the South Florida canals and the remaining coastal waters and estuaries. Also, to comply with the Consent Decree, EPA promulgated numeric downstream protection values for streams in order to protect downstream lakes and estuaries; however, EPA requested that the Court modify the Consent Decree to allow for other quantitative approaches that might be equally effective.[11]

On January 4, 2013, EPA filed a Motion for Approval to Stay Portions of EPA's Inland Waters Rule. EPA was concerned with the "poison pill" provision adopted as a rule by FDEP in the Florida Administrative Code, which states that the State's nutrient criteria rules[12] "shall be effective only if EPA approves these rules in their entirety, concludes rulemaking that removes federal numeric nutrient criteria in response to the approval, and determines, in accordance with 33 U.S.C. § 1313(c)(3), that these rules sufficiently address EPA's January 14, 2009 determination. If any provision of these rules is determined to be invalid by EPA or in any administrative or judicial proceeding, then the entirety of these rules shall not be implemented."[13] This "all or nothing" approach required approval by EPA of all Florida rules for NNC or Florida would be out of the picture. In April 2014, the court stayed the provisions that would not be duplicated in the prospective state rules (provisions establishing downstream protection values for unimpaired waters), but denied the stay for provisions that were very similar to the state prospective rule.[14]

The EPA and FDEP reached an Agreement in Principle on March 15, 2013, which announced a "path forward" towards state adoption of NNC before the Consent Decree deadline of September 30, 2013 for EPA to adopt NNC. The Agreement also announced FDEP's intention to adopt its implementation document into a rule clarifying which types of flowing waters do not require NNC, and EPA correspondingly committed to amend the scope of its 2009 determination. FDEP subsequently adopted "Implementation of Florida's Numeric Nutrient Standards" into rule on April 23, 2013.

EPA amended its 2009 determination for the second time on June 28, 2013, declaring that NNC are not necessary to meet the requirements of the Clean Water Act in the for certain flowing waters (canals) in the South Florida Region or marine lakes. EPA restated its support outlined in the June 27, 2013 approval document for the process where flowing waters may not meet FDEP's rule definition of a stream and may be affirmatively determined by FDEP as

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[11] EPA's November 30, 2012 Approval Letter to DEP states that other quantitative approaches to protecting downstream waters might be just as effective as downstream protection values.

[12] Specifically, subsections 62-302.200(4), 62-302.200(16)-(17), 62-302.200(22)-(25), 62-302.200(35)-(37), 62-302.200(39), Rule 62-302.531, and subsection 62-302.532(3), Fla.Admin.Code.

[13] Fla. Admin. Code. R. 62-302.531(9) (2012).

[14] Order Authorizing a Stay of the DPV Provisions but Denying a Stay of the Lake and Spring Provisions, Case No. 4:08-cv-324-RH-WCS., April 12, 2013, N.D.Fla.

exempt if the water is a tidally influenced segment, a non-perennial stream or an actively maintained "conveyance primarily used for water management purposes with marginal or poor stream habitat components."[15] In order for FDEP to make a determination that a water body or water body segment of a flowing Class I or III water does not meet the state's stream definition and is therefore exempt from NNC, DEP would need to make an affirmative, site-specific determination including geographic scope of the exempted area, presumably upon request by an outside party, to provide notice to all parties where applicable criteria apply.

EPA noted that any waters so excluded from the definition of a stream pursuant to state rules and therefore not subject to NNC would remain subject to the state's existing narrative numeric criteria. In its June 28, 2013 Amendment Letter, EPA described its confidence in the state to effectively and efficiently use NNC for these limited areas based on the data collected by Florida in the past five years and based upon the establishment of NNC and TMDLs in downstream waters that will provide guidance for the use of protective narrative criteria in upstream exempted areas.

The latest chapter in this legal narrative came to a close on January 7, 2014, when Judge Hinkle in the Northern District of Florida entered an order modifying the 2009 Consent Decree. Although EPA had already amended its determination, this did not in and of itself modify the Consent Decree. The January 2014 ruling modified the Consent Decree to match the June 2013 amended determination by excluding from the Consent Decree any requirement to adopt numeric downstream protection criteria or NNC for South Florida streams or for marine lakes, or for exempted tidally influenced streams, or conveyances primarily used for water-management purposes with marginal or poor stream habitat components. Notably, although no administrative challenges were brought against the amended determinations, the Court declared "nothing in this record suggests that EPA's actions were 'arbitrary, capricious, an abuse of discretion, or otherwise no in accordance with law."[16]

To summarize, the EPA declared that numeric nutrient criteria were the preferred method by which to comply with the Clean Water Act water quality standards requirements, then environmental groups and others sued to enforce that decision in Florida, which led to a Consent Decree between EPA and the groups (but not the State of Florida), which eventually led to EPA approving NNC developed by FDEP with the court's approval. This process spanned six years with state and federal litigation which included participation by the state's Attorney General's Office and Department of Agriculture, bill adoption by the Florida Legislature, and numerous rulemaking and decision points by EPA and the state.

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[15] EPA's second Amended Determination Letter dated June 28, 2013.
[16] *Florida Wildlife Federation, Inc. v. McCarthy*, 2014 WL 51360 at *5.

Next Steps In Florida

Although EPA has officially amended its determination and has approved FDEP's rules, EPA's rules are technically still in place. EPA must go through the formal process of withdrawing its rules in order for Florida's rules to take effect. EPA expects to complete this process sometime before the end of spring in 2014.

The Gulf Dead Zone and EPA Action

Every summer, the northern Gulf of Mexico suffers from hypoxia, a condition caused by excess nitrogen and phosphorus. The overload of these nutrients results in seasonal growth of large amounts of algae, which then die, sink, and decompose. The decomposition process diminishes the oxygen in the bottom waters, creating a "dead zone" in the Gulf that cannot support plant and animal life on the Gulf bottom. This condition has been created by the influx of nutrients from the Mississippi River, which historically has dumped nutrients from 31 states into the northern part of the Gulf. Much of the nutrient pollution comes from agricultural runoff, but a substantial portion also comes from other human activities in the watershed. The amount of nutrients flowing into the Gulf each year, particularly during April and May, determines the size of the dead zone, which varies year to year. Last year, 2013, the dead zone was 5,840 square miles, which is roughly the size of Connecticut. The previous year, 2012, had the fourth smallest dead zone on record - the dead zone was only the size of Delaware, or roughly 2,889 square miles.[17] Besides the outflow from the Mississippi River, other natural phenomena, such as rainfall and wind patterns also help determine the size, shape, and geographic distribution of each year's dead zone. Generally speaking, the area is located off the Louisiana and Texas coasts.

Similar to the Florida lawsuit, in 2008, multiple environmental groups filed a petition with EPA requesting that EPA find that NNC were necessary to protect this area as well. If EPA had granted the petition, it would have lead to the initiation of rulemaking to set federal criteria for the waters anywhere in the country where NNC were deemed necessary to address the downstream cumulative effects in the Gulf. EPA instead denied the petition, stating that while the Mississippi River Basin water quality was being harmed by excessive nutrients, state rather than federal efforts should be used to address the problem. In March 2013, the groups filed a lawsuit in the Eastern District of Louisiana federal district court.[18] The main issues centered on when EPA must find that NNC are necessary, and what factors it may consider in that determination. The court determined in September, 2013 that EPA can determine whether NNC are necessary but that decision is subject to judicial review. The court also determined that EPA is required to clearly articulate whether or not water quality criteria are necessary, but that it

[17] National Oceanic and Atmospheric Administration, *NOAA-supported scientists find large Gulf dead zone, but smaller than predicted*, July 29, 2013. http://www.noaanews.noaa.gov/stories2013/2013029_deadzone.html

[18] *Gulf Restoration Network v. Jackson*, 12-677 (E.D. La. Sept. 20, 2013).

could rely on a wide variety of non-scientific factors including cost, administrative burdens, policy, etc. EPA filed a notice of appeal on November 18, 2013. Most recently, on January 9, 2014, the Fifth Circuit granted EPA's and Administrator Gina McCarthy's motion to extend the time for filing its Appellant's Brief. At this time, EPA is offering coordination with individual states, which EPA hopes will move forward with state-based NNC processes and adoptions. This leaves ultimate responsibility for regulations addressing the far-downstream dead zone to many states in the middle of the country, which include major cities, livestock production, and the country's "breadbasket" agricultural area throughout the Midwest. EPA intends a focused coordination effort working with each state to effect appropriate standards in the future.

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Florida Department of Environmental Protection

Water Quality Standards Program

Florida's Numeric Nutrient Criteria: Lessons Learned on a Long Roller Coaster Ride

April 10, 2014
Division of Environmental Assessment and Restoration





Outline of Presentation

- **Lessons Learned from Florida's NNC Development Efforts**
- **Differences Between EPA's NNC and Florida's NNC**
- **Florida's Plans for Water Quality Credit Trading**

NNC Development in Florida

- **NNC Development in Florida driven by lawsuits**
- **Litigation began in 2008**
  - **August 2008 – Earthjustice filed suit to compel EPA to establish NNC, alleging that EPA's 1999 Clean Water Action Plan (CWAP) was a determination that NNC required to implement Clean Water Act**
  - **January 2009 – EPA filed "determination letter," stating that NNC were required in Florida to implement CWA**
  - **August 2009 – EPA agreed to Consent Decree with Earthjustice with schedule for NNC development**

Lessons Learned – Need Ability to Challenge Determinations

- **EPA and Federal Court consider that "Determinations" that NNC are required to implement the Clean Water Act are not agency action subject to independent challenge**
  - **Court said wait until NNC promulgated**
- **However, Determinations have huge monetary impacts on States and regulated parties, and should be challengeable**
  - **EPA proposed changes to Water Quality Standards regulations and we recommended they address**

Lessons Learned – Need Flexibility in Determinations and CDs

- **Determinations and Consent Decrees need flexibility in schedule and scope of waters**
  - **Original Determination and CD had rigid schedules for NNC development (proposal and final promulgation), and EPA had to revise dates multiple times**
  - **CD also implied coverage of entire State, and needed to be revised to exclude certain waterbody types**
- **NNC development is HARD work!**

Lessons Learned – Need Flexibility to Address Downstream Protection

- **There is flexibility in how States provide "Downstream Protection"**
  - **EPA's initial proposal included numeric "DPVs" (Downstream Protection Values), based on statewide SPARROW model, to protect downstream waters**
  - **Received many comments that model not sufficient to establish criteria**
- **EPA eventually agreed to our narrative approach**
  - **"The loading of nutrients from a waterbody shall be limited as necessary to provide for the attainment and maintenance of water quality standards in downstream waters." (Rule 62-302.531(4), F.A.C.)**

Lessons Learned – There is flexibility in Parameters Covered

- **EPA guidance "recommends" that States establish criteria for Total Nitrogen, Total Phosphorus, and a response variable (chlorophyll a) for all waters**
  - **Insisted Florida set both TN and TP for waters where only one parameter was limiting nutrient**
- **However, EPA acknowledged practical constraints when setting NNC for streams (did not include a response variable) and coastal waters (did not include TN or TP)**
  - **And later approved our similar criteria**

Lessons Learned – "Poison Pills" can be "Catch 22"

- **Florida's rule included a provision that key definitions, NNC for streams/lakes/springs, and schedule for estuary criteria development would only become effective if EPA**
  - **Approves the rules in their entirety,**
  - **Concludes rulemaking that removes federal numeric nutrient criteria in response to the approval, and**
  - **Determines that rules sufficiently address EPA's January 14, 2009 determination**

Lessons Learned – "Poison Pills" can be Catch 22

- **The "poison pill" was very important to stakeholders, who wanted to make sure that all elements of nutrient standards were kept together, including the definition of stream and hierarchy**
- **But, created a "Catch 22" of sorts, in that EPA felt they could not fully approve criteria given the provision, and criteria can't go into effect until EPA fully approves**
  - **EPA and Florida solved by developing a "Path Forward" Agreement, which included legislation**

Lessons Learned – Implementation is Key

- **After rule adopted, Florida prepared detailed document describing how NNC would be implemented in 303(d) and NPDES Programs**
  - **Included as part of submittal package**
- **Helped EPA with their review, but we received "non-rule policy" challenge and EPA's approval included implementation document**
- **Florida resolved by adopting document by reference into water quality standards rule**
  - **Extra rulemaking step, and included many details normally not in water quality standards**

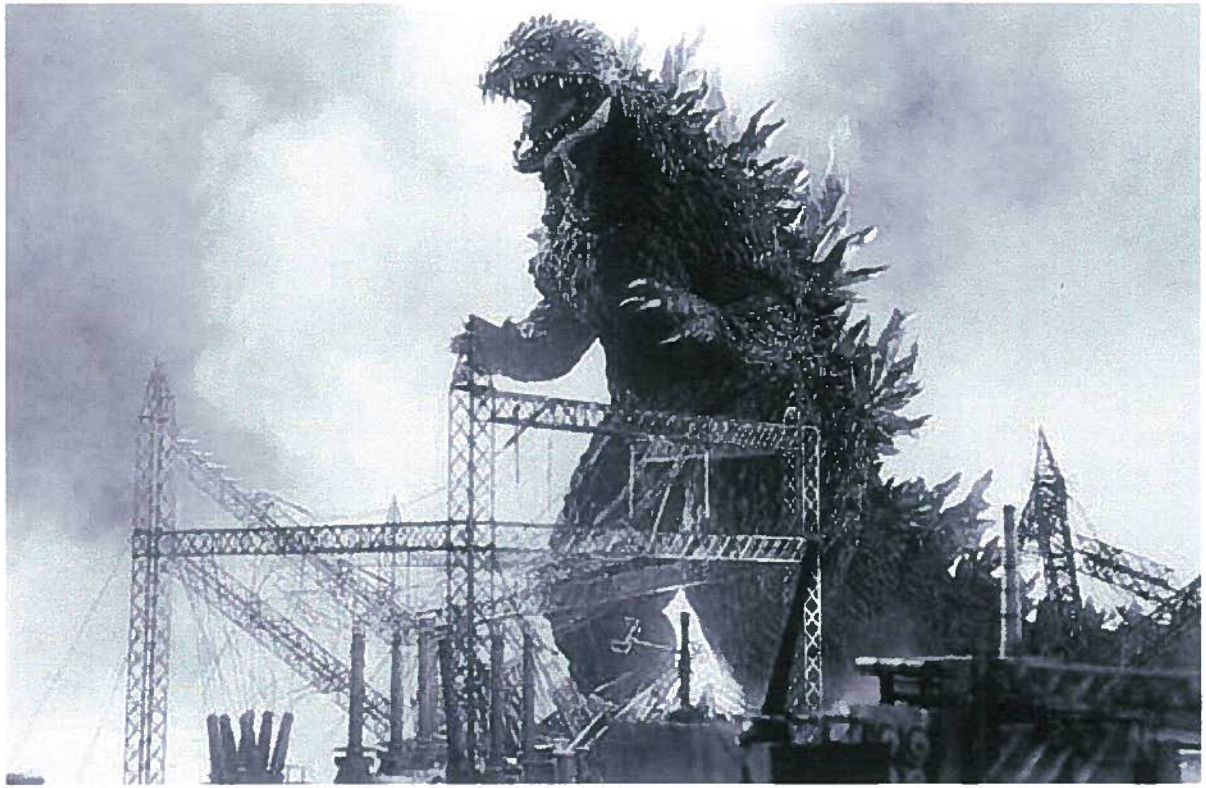
Lesson Learned - Everything's Relative

- **Federal and State numeric nutrient numbers are almost identical**
  - **Same magnitude, frequency and duration**
  - **Some differences in application of "modified criteria" for lakes**
- **So why have State nutrient rules been so much better received by regulated parties?**
  - **Key differences in implementation provisions**

Comparison between Federal and State NNC Rules

(short version)

EPA's NNC Rule



Slides courtesy of David Childs, Hopping Green & Sams

DEP's NNC Rule

Comparison between Federal and State Rules

- **Acknowledgment of previous site-specific interpretations**
  - **Our rule "hierarchy" recognizes nutrient TMDLs (and others), while EPA would require TMDLs to be adopted as Site Specific Alternative Criteria (SSACs)**
  - **EPA rule creates uncertainty about which nutrient standards apply (NNC or TMDL) after stakeholders may have invested billions to attain TMDL**

Hierarchical Approach

Nutrient Total Maximum Daily Loads, Site Specific Alternative Criteria ,
Estuary-specific Criteria, and
Level II Water Quality-Based Effluent Limitations (WQBELs)

Stressor-Response Relationships (lakes & springs)

Reference-based thresholds (streams)
combined with biological data (flora and fauna)

Narrative (wetlands, intermittent streams,
South Florida flowing waters)

Comparison between Federal and State Rules

(continued)

- **Use of Biological Information**
  - **Our rule allows bioassessment data to supersede stream nutrient thresholds, while EPA's did not**
    - **Acknowledges that "reference method' is not linked to impairment**
  - **Is not "biological confirmation" because it can go in either direction and biology not required**
    - **Standard not attained if biology fails even if stream nutrient thresholds met**
    - **If stream exceeds the thresholds and biological data are not available, it is placed on 303(d) List**

NNC for Streams

- **Nutrient standards for streams attained IF:**
  - **Information on chlorophyll *a* levels, algal mats or blooms, nuisance macrophyte growth, and changes in algal species composition do not indicate an imbalance in flora or fauna; AND EITHER**
  - **The average score of at least two temporally independent Stream Condition Indices (SCIs) is 40 or higher, with neither of the two most recent SCI scores less than 35, OR**
  - **The Nutrient Thresholds (expressed as annual geometric means) are not exceeded more than once in a three year period**

Comparison between Federal and State Rules

(continued)

- **Applicability of Stream Standards**
  - **Florida definition of "streams" excludes non-perrenial (intermittent) streams, tidal creeks, and manmade/altered canals, ditches, and other conveyances used for water management purposes and having poor habitat**
    - **Narrative nutrient criterion would continue to apply in these systems under state rule, while stream standards would apply under federal rule**
  - **Tidal creeks are important ecological resources, but are different and need different NNC**

Comparison between Federal and State Rules

(continued)

- **Spatial Component**
  - **Florida rule clearly states that standards are applied as a spatial average in waterbody, consistent with derivation**
  - **Federal rule is silent on spatial component, and as such, NNC would be applied like other criteria, which are applied as "end of pipe"**
  - **Huge ramifications on required treatment level and cost needed to comply**
  - **Also big ramifications on Water Quality Credit Trading because "end of pipe" concentration-based limits could effectively kill trading**
    - **Trading works much better with load-based TMDLs**

Water Quality Credit Trading

- **Florida established pilot trading program for Lower St. Johns River in 2008**
  - **Designed to help achieve nutrient TMDL and Basin Management Action Plan (BMAP)**
  - **BMAP details restoration actions and includes detailed allocations to all sources**
  - **Allocations developed with input from stakeholders**
    - **Included "aggregate allocations"**
    - **Some trading of allocations occurred prior to BMAP adoption**

Water Quality Credit Trading

(continued)

- **Rule adopted for post BMAP trading**
  - **Required at least one of trading parties to be permittee**
  - **Credits not generated by "standard" agricultural BMPs**
  - **Included Location Factors to prevent "hot spots" and "Uncertainty Factors" to address any uncertainty associated with estimated credits**

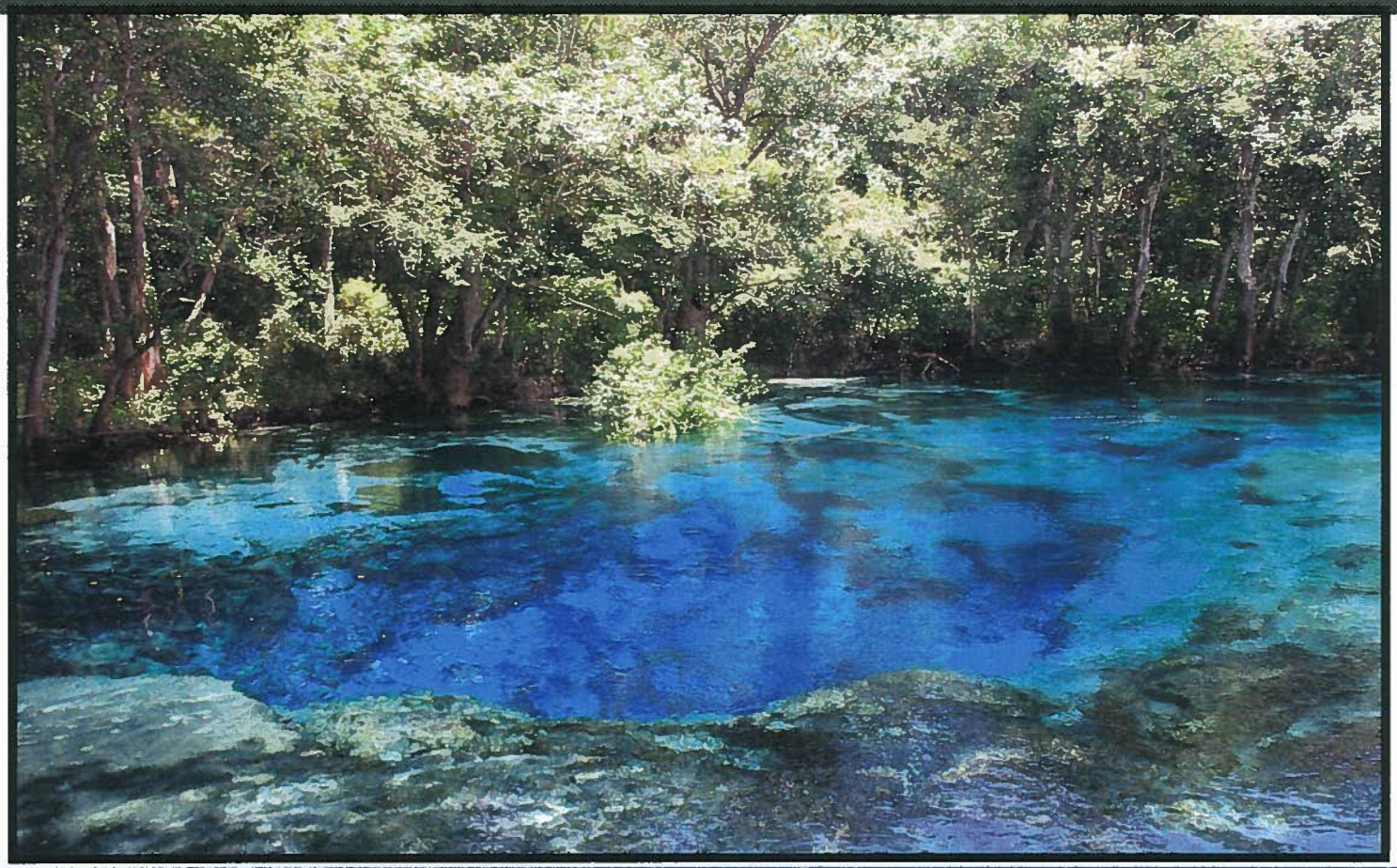
Water Quality Credit Trading

(continued)

- **Very little trading has occurred (2 trades)**
  - **At least partially due to uncertainty with NNC development and economy**
- **But expect increase and Florida supports trading as cost-effective tool to help restore impaired waters**
  - **Plan to expand statewide, wherever BMAP in place**
  - **BMAP provides detailed allocations needed for trading**

For More Information

http://www.dep.state.fl.us/water/wqssp/nutrients



Ohio's Development of a State Nutrient Reduction Strategy and Nutrient Water Quality Standards

There is little doubt that water pollution attributed to excess nutrients is a serious and growing problem. The challenge facing federal, state and local governmental agencies is devising effective programs that restore impaired waters. This paper offers some observations regarding the roles of regulatory and supporting agencies in efforts adopt nutrient criteria. It also presents a summary of the steps Ohio has undertaken to develop a State nutrient reduction strategy and to adopt nutrient water quality standards (WQS).

Ohio's Monitoring and Assessment Experience

U.S. EPA Region 5 and Ohio have enjoyed a generally good working relationship on matters relating to water quality monitoring and WQS since the 1980s. This was a result of a series of events that focused on the major water quality issues of the time. In the 1970s and early 80s the need to have extensive justifications for every advanced wastewater treatment plant built using federal construction grants dollars provided the impetuous and the funding to expand a fledging biological monitoring program. Water quality and biological surveys provided the data necessary to determine attainable aquatic life uses and to demonstrate that advance wastewater treatment, as opposed to secondary treatment, would be required to achieve the in-stream standards. The work done during those years laid the groundwork for later cooperative ventures with U.S. EPA including whole effluent toxicity case studies, stream regionalization and numerous national water body surveys. The stream regionalization project and long-term monitoring at reference locations allowed the development of numeric bio-criteria based on fish and macroinvertebrate assemblages. In 1990, the bio-criteria were adopted into State WQS regulations as the means to measure attainment of Ohio's tiered aquatic life uses. Bio-criteria serve as the cornerstone of Ohio's Section 303(d) and 305(b) reporting methodology and, combined with the shear number of locations sampled (nearly 10,000 sampling sites since 1980) it provides a robust assessment of water quality. The program has documented dramatic improvements in aquatic life attainment in Ohio's large rivers that is attributed to pollution controls at point sources and sediment reduction from non-point source runoff. In the 1980s only 21% of Ohio's large rivers attained aquatic life standards; today 89% of large rivers fully meet their aquatic life uses. While conditions in smaller rivers and streams have improved, approximately 40% of these smaller watersheds do not meet standards and nutrients are a significant cause of non-attainment more than half of the time.

These accomplishments in water quality were the result of an effective State-federal co-regulator relationship borne from several key ingredients: 1) scientifically sound, cost effective water quality assessment methods; 2) standardized information about the problem and issues; 3) the programs ability to demonstrate water quality improvements; 4) continuity in staffing and management; and 5) mutual trust. We intend to continue using this State-led co-regulatory

model to address nutrient pollution. A summary of the ongoing work on strategy and criteria development is described in the following sections.

Ohio's Nutrient Strategy

The resurgence of nutrient pollution was evident in Ohio in the late 1990s. In response, the Ohio EPA created a written protocol describing how the State's narrative water quality criteria could be applied in total maximum daily loads (TMDLs) and the management of nutrient sources. Here is an excerpt.

> "The establishment of in-stream numeric targets is a significant component of the total maximum daily load (TMDL) process. The numeric targets serve as measures of comparison between observed in-stream conditions and conditions that are expected to restore the designated uses of the water body. The TMDL identifies the load reductions and other actions that are necessary to meet the target, thus resulting in the attainment of applicable water quality standards. Numeric targets are derived directly or indirectly from narrative or numeric water quality standards contained in Chapter 3745-1 of the Ohio Administrative Code (OAC).
>
> This guidance summarizes Ohio EPA's authority for regulating the discharge of nutrients and developing TMDL implementation plans for nutrients, focusing on nitrogen and phosphorus in river/stream environments. This guidance was written at this time to address the immediate need to regulate discharges of nutrients through the TMDL program. U.S. EPA has identified state adoption of numeric water quality standards for nutrients as a priority and is in the process of developing recommendations. ..... Adoption of specific numeric water quality standards for nutrients in Ohio rules is probably two to four years away. In the meantime, the existing water quality standards provisions can be used to regulate the discharge of nutrients. The existing rule requirements for nutrients are general in nature and, therefore, must be applied on a case-by-case basis." (Ohio EPA 2000).

The day-to-day application of this WQS guidance document drew upon an analysis of over 15 years of data available from the monitoring and assessment program, the network of least impacted reference sites and the stream regionalization project. A system of tiered aquatic life uses linked directly to numeric bio-criteria adopted in rule was also important an element. Although not labeled a strategy as such, the report entitled "Association Between Nutrients, Habitat, and the Aquatic Biota in Ohio Rivers and Streams" (Ohio EPA 1999) was the de-facto nutrient reduction strategy used by Ohio EPA for nearly 15 years. This report contained an analysis of nutrient chemistry, bio-criteria scores and habitat data from least impacted regional reference sites and other sites impacted by a variety of causes. It applied the results to develop the TMDL target values for total phosphorus and nitrogen (nitrate plus nitrite) in Ohio's five ecoregions.

Since 2001, Ohio has used its narrative WQS standard and the associated TMDL target values to generate nutrient load reductions in 40 of 64 watershed scale TMDL reports approved by U.S. EPA. Ohio EPA can also show real world river responses to some of the early phosphorus load reductions mandated by these TMDLs. One example is the Upper Little Miami River in southwest Ohio. Based upon fieldwork conducted in 1998, the Exceptional Warmwater Habitat aquatic life use of the river was impaired or threatened due to excessive nutrients. The TMDL approved in 2002 called for a 60% reduction in total phosphorus loading and effluent limits were imposed on the major sewage plants. Follow up monitoring done in 2011 showed compliance with permit limits, lowered in-stream phosphorus concentrations and a river in full attainment of it aquatic life use. Complete stream survey reports for these and other studies are available on line at http://www.epa.state.oh.us/dsw/document_index/psdindx.aspx.

In 2009, Ohio initiated work on a more comprehensive nutrient reduction strategy in response to the recommendations of the Gulf Hypoxia Action Plan 2008 (Hypoxia Task Force 2008). Once again U.S. EPA Region 5 provided valuable assistance in laying the groundwork to effectively coordinate with the other State resource agencies in Ohio (Ohio Department of Agriculture and Ohio Department of Natural Resources). As the lead agency for water quality, Ohio EPA prepared the initial drafts for review and input by others. The document was further revised in 2012 to address the eight-point framework for State nutrient strategies laid out in guidance issued by U.S. EPA (2011). The final Ohio Nutrient Reduction Strategy was submitted in June 2013 (Ohio EPA 2013). Upon review by and at the request of U.S. EPA Region 5, Ohio EPA has prepared a 2-year action plan to address the 11 significant issues raised in U.S. EPA's comments on the final submittal. The most challenging gaps to fill concern the adoption of numeric nutrient criteria, describing how water quality based effluent limits are phased into National Pollutant Discharge Elimination System (NPDES) permit limits and the inclusion of logical adaptive management scenarios that are dependent upon the attainment of all designated water body uses.

Ohio's Trophic Index Criterion

Most existing numeric aquatic life water quality criteria are built on a sound technical basis owing to well-defined, dose-response relationships between individual pollutants and aquatic organisms. These relationships are so well defined as to allow confident predictions of environmental outcomes; hence, our administrative and regulatory infrastructure is largely predicated on tabular or algorithmic numeric criteria. However, unlike toxicants and oxygen demanding materials, the effects of nutrient pollution on fish or macroinvertebrates are indirect, and therefore not predictable through simple dose-response curves, or highly deterministic models.

The published literature provides evidence of a reasonably predictable and consistent response between increasing nutrient concentrations and periphyton (reviewed by Hillebrand 2002), and between periphyton and dissolved oxygen concentrations (Morgan et al. 2006, Huggins and

Anderson 2005, Miltner 2010). Ohio EPA conducted a nutrient criteria study predicated on tracing the steps from nutrients to periphyton (as given by chlorophyll-a), from periphyton to dissolved oxygen, and from dissolved oxygen to macroinvertebrates and fish. The objective was to identify benchmarks or thresholds at each step that would help define where a given water body is positioned along a continuum of enrichment. Results were published by Miltner (2010) and further explored in the context of Ohio EPA's water quality management system (Miltner 2011).

U.S. EPA Region 5 and Ohio EPA collaboratively developed the Trophic Index Criterion (TIC) - a composite index that brings together the measures of nutrients, periphyton, dissolved oxygen, and biological assemblages by awarding points to successive ranges of each indicator, where the ranges are defined by benchmarks identified in the nutrient study. Hence, the TIC provides a structured method of aggregating data collected on Ohio's streams and rivers into a nominal scale that is essentially a translator for the condition of a water body relative to nutrient enrichment. As such, it can be applied independently to dictate the imposition of appropriate nutrient management programs including NPDES permits and TMDLs. Tables 1 and 2 present some details on the metric scoring system. Waters scored as threatened or impaired have total phosphorus TMDLs target concentrations set according to their habitat conditions and designated tiered aquatic life use (values range from 60 ppb to 300 ppb total phosphorus).

Remaining Challenges

The political realities of today being what they are, environmental regulations are seldom adopted without a great deal of initial opposition. Here are the steps being taken in Ohio to build consensus. Information about all these activities can be accessed on line at http://www.epa.state.oh.us/dsw/wqs/NutrientReduction.aspx.

Formation of ad hoc work groups on the important issues. Examples include:

   a. Ohio Lake Erie Phosphorus Task Force, Parts 1 and 2
   b. Director's Agricultural Nutrient Water Quality Working Group
   c. Point Source Urban Runoff Work Group
2. Ohio Nutrient Forum – a visioning workshop open to the public with over 200 participants held in November 2011.
3. Early Stakeholder Outreach on Developing Rules to Reduce the Impacts of Nutrients in Surface Waters (public comments invited April – May 2013)
4. Technical Advisory Group for Nutrient Water Quality Standards (formed in November 2013)

There have been tangible results attributable to these outreach efforts. The public and media attention drawn to western Lake Erie's deteriorating water quality and the work of the Lake Erie Phosphorus Task Force prompted the General Assembly to pass the Ohio Clean Lakes Initiative which provided modest funding for innovative agricultural best management practices (BMPs) in

a 5 county area of northwest Ohio. The General Assembly is currently debating a bill that includes recommendations from the Director's Agricultural Nutrient Water Quality Working Group (includes licensure of fertilizer applicators and more complete record keeping). Ohio's farm community has collectively and publicly taken some ownership in the problem through educational campaigns and through funding research.

The Early Stakeholder Outreach on nutrient criteria rules provided an opportunity for point source aligned interest groups to express general support for the TIC while urging additional further consultation. That led directly to the formation of a 12 member Technical Advisory Group (TAG) with representation from point sources, the farm community, Lake Erie economic interests and environmental groups. The TAG is charged with advising Ohio EPA as it drafts nutrient WQS rule and implementation language over the next year.

Conclusions

Although Ohio's TIC does not fully equate to the classic interpretation of numeric nutrient criteria, it is an important refinement to Ohio's nearly 15 year application of the existing narrative WQS criteria. By constructively engaging key stakeholders in drafting new rule language Ohio has the opportunity to create a widely accepted diagnostic tool for nutrient impairment of aquatic life uses and the specific numeric TMDL targets upon which to assign load reductions. The long running support for Ohio's monitoring and WQS program at U.S. EPA Region 5 and more recently U.S. EPA headquarters is important and appreciated. Still, the continued national program emphasis on adoption of numeric nutrient criteria is concerning to Ohio. A more complete measure of program accountability and success should account for the overall effectiveness of a State's nutrient pollution abatement efforts. U.S. EPA must continue to place State agencies in the fore of adopting WQS that fit their unique circumstances regardless of whether a numeric or narrative methodology is applied.

Table 1. The Trophic Index Criterion (as currently proposed in draft form).

Biological Assemblages	Dissolved Oxygen	Benthic Algae	Nutrients[†]	Trophic Index Criterion
Meet applicable biocriteria (12)	Normal variation‡ <6 mg/l (12)	<107 mg/m^2 (8)	Concentrations typical of low disturbance systems (6)	Acceptable (38-22)
	Modest swings >6 mg/ (6)	107-183 mg/m^2 (4)	Concentrations typical of healthy streams in working landscapes (3)	
Within the range of non-significant departure (6)	Wide swings >7 mg/l (1)	Enriched 183-320 mg/m^2 (1)	Concentrations observed with high-intensity land use and WWTP loadings (1)	Threatened 21-14
Fail biological criteria (0)	Extreme swings >9 mg/l or swings >7 mg/l and minimum D.O. <WQS (0)	Thick to nuisance levels >320 mg/m^2 (0)	Concentrations typical of highly disturbed systems; effluent domination; >50% chance of biological impairment (0)	Impaired 13-0

[†]See Table 2 for nutrient concentration ranges

‡Measured as the difference between the daytime maximum concentration and the morning minimum

Table 2. Trophic Index Criterion scoring for the nutrient component.

Total Phosphorus (mg/l)	Dissolved Inorganic Nitrogen (mg/l)				
	≤0.44	0.44-1.10	1.10-3.60	3.60-6.70	≥6.70
≤0.04	6	3	3	1	0
0.04-0.08	3	3	3	1	0
0.08-0.13	3	3	1	1	0
0.13-0.40	1	1	1	0	0
≥0.40	0	0	0	0	0

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