

# Deriving Numeric Nutrient Water Quality Criteria

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# Scope and Impacts of Nutrient Pollution

- The amount of nutrients entering our waters has escalated over the last 50 years.
- Nutrients pose significant water quality and public health concerns across the U.S.
- As the U.S. population continues to increase, the rate and impact of nutrient pollution will also accelerate.

# Water Quality Impairment

- Nationally, nutrient pollution is one of the top causes of water quality impairment.
- States continue to report over 14,000 nutrient related impairments.
  - Over 80,000 miles of rivers and streams
  - Over 2.5 million acres of lakes and reservoirs
  - 168 hypoxic zones in U.S. estuarine and coastal waters

# Major Sources of Nutrient Pollution

- Urban Stormwater Runoff
- Municipal Wastewater Treatment
- Atmospheric Nitrogen Deposition
- Agricultural Livestock Activities
- Agricultural Row Crops

# Examples of Recent Key Reports on Nutrient Pollution

- EPA SAB 2009: *Reactive Nitrogen in the United States: An analysis of Inputs, Flows, Consequences, and Management Options*
- EPA SAB 2007: *Hypoxia in the Northern Gulf of Mexico*
- NRC 2008: *Mississippi River Water Quality and the Clean Water Act: Progress, Challenges, and Opportunities*
- NRC 2008: *Urban Stormwater Management in the United States*
- EPA 2008: *National Coastal Condition Report III*
- EPA 2006: *Wadeable Streams Assessment*
- NOAA 2007: *Effects of Nutrient Enrichment in the Nation's Estuaries: A Decade of Change*

# Clean Water Act

- §101(a): objective is to restore and maintain the chemical, physical and biological integrity of the Nation's waters
  - National goal of "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water"
- §303(c): provides for State adoption and EPA approval of water quality standards that include the designated use, **criteria**, and antidegradation provisions
- §304(a): requires EPA to develop and publish water quality criteria for pollutants accurately reflecting the latest scientific knowledge that serve as recommendations to the States

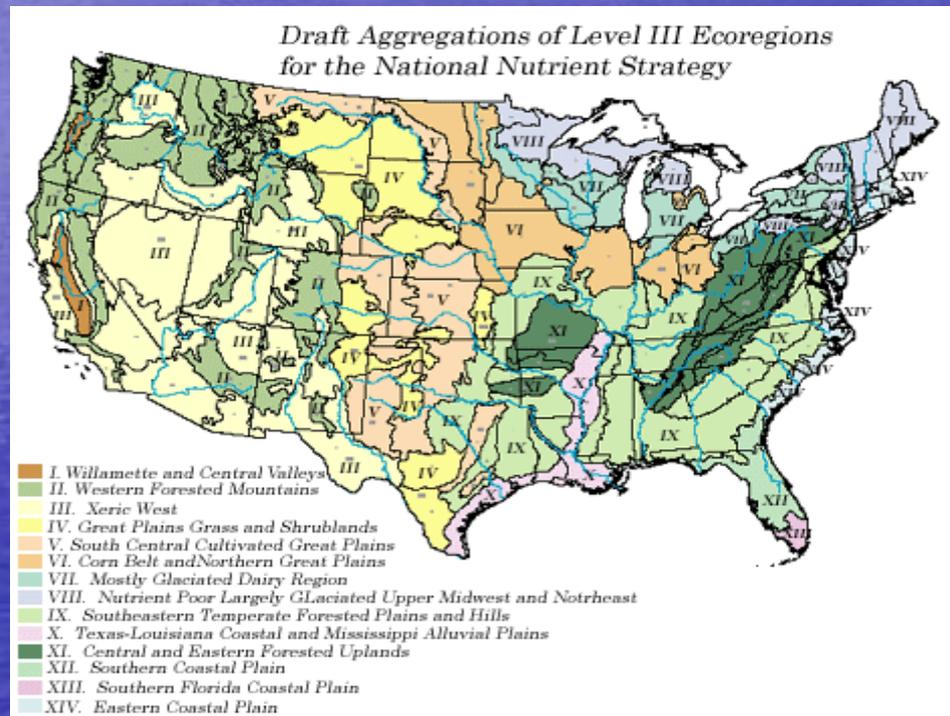
# Why Numeric Nutrient Criteria are Important

- Water quality baselines against which to measure environmental progress
- Facilitate the writing of protective NPDES permits
- Easier and timely development of TMDLs
- Targets to support trading programs

# National Nutrient Strategy

- The National Nutrient Strategy (June 1998) provided blueprint for developing nutrient information and collaborating with States to adopt numeric nutrient criteria into water quality standards.
- Strategic focus on
  - Development of waterbody type technical guidance manuals
  - Ecoregional numeric nutrient criteria recommendations
  - Regional Technical Assistance Groups (RTAGs)
  - Funding of nutrient criteria development efforts in States, Territories and Tribes

# National Nutrient Ecoregions



# Technical Guidance Manuals

- Waterbody specific technical guidance manuals recommended approaches for deriving numeric nutrient criteria including reference condition, stressor-response, and mechanistic modeling.
  - Lakes & Reservoirs (2000)
  - Rivers & Streams (2000)
  - Estuaries & Coastal Marine Waters (2001)
  - Wetlands (2008)

# Ecoregional Nutrient Criteria

- Using the reference condition approach, EPA published numeric nutrient criteria recommendations for 4 parameters – TN, TP, chl *a*, and a measure of clarity
  - Lakes & Reservoirs (12 ecoregions)
  - Rivers & Streams (13 ecoregions)
  - Wetlands (1 ecoregion)

# Current Status

- Progress has been made, but slower than expected.
- In 2008, EPA analyzed the status of State adoption of numeric nutrient criteria over the past 10 years.
  - 7 States have adopted numeric criteria for at least one parameter for at least one waterbody type.
  - 18 States have adopted numeric criteria for at least one parameter for selected waters.
  - 25 States have no numeric criteria.

# EPA Office of Inspector General Evaluation Report

- In August 2009, the OIG published their review of EPA's nutrient criteria program
  - "EPA Needs to Accelerate Adoption of Numeric Nutrient Water Quality Standards"
- Key findings:
  - States have been slow to adopt numeric standards
  - EPA needs to ensure the protection of downstream waters
  - EPA needs to better monitor State progress and hold itself and the States accountable

# Future Directions

- Continue to provide technical guidance and support that reflect the state of the science to facilitate criteria derivation and the standards adoption process
- Look for ways to accelerate the adoption of numeric nutrient water quality standards to meet CWA requirements

# State Nutrient Criteria Plans

- 43 States have nutrient criteria development plans that have been reviewed and mutually agreed upon by EPA.
- Of these, the majority of States are interested in deriving numeric criteria using stressor-response relationships.

# About the Empirical Approaches Document

- The purpose of this document is to provide current information on the scientific foundation for using empirical approaches to describe stressor-response relationships for deriving numeric nutrient criteria.
- This document acts as a supplement to the previously published guidance on nutrient criteria derivation.
- The document is intended for use by State water quality scientists and resource managers.

# Prior Review of this Document

- EPA internal peer reviews from:
  - Scientific, Regional, and Management
- Informal external peer reviews from:
  - Academia and one State

# Overall Charge to SAB

- What technical suggestions do you have that will improve the utility of the draft document for State water quality scientists and resource managers to derive numeric nutrient criteria based on stressor-response relationships?