EPA’s Guidance on Nutrient Criteria Development

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History of Nutrient Criteria

- Nutrients (Nitrogen and Phosphorus) were consistently one of the top pollutants on the CWA Section 303(D) Lists to Congress Reports beginning in the early 1990s.

- The “Nutrient Criteria Program” was initiated in 1995.

- Public recognition of the problem increased in 1998 and the program was accelerated by....
The “Cell from Hell”

- Stories about Pfiesteria *piscicida* were carried *daily* by the Baltimore Sun during the summer of 1997, and hundreds of other newspapers.
Early EPA Actions

- **Principal Goal:** Develop Nutrient Criteria across the nation in 3 years.

- The criteria needed to address nutrient pollution, not natural enrichment.
  - **Primary Parameters:**
    - Total P, Total N, Chlorophyll a, some measure of water clarity (e.g., Secchi disk depth, turbidity, TSS), response measure
  - **Types:**
    - Numeric criteria, or narrative with numeric translator
Initial Approach

- EPA calculated “estimated reference conditions” using a frequency distribution of ecoregional data.

- These CWA § 304(a) criteria were recommended for use as **starting points** for states to develop their own criteria, using this, or other scientifically defensible methods.
Ecoregional Classification

Draft Aggregations of Level III Ecoregions for the National Nutrient Strategy
Distributional Approach

The 25\textsuperscript{th} or 75\textsuperscript{th} percentiles were an estimate of reference conditions – protective of all uses.

![Graph showing EPA 304(a) Criteria Based on Reference Conditions with reference sites and sample values.](chart.png)
Shift in Policy

- EPA responded to the critique of the percentile approach in 2001 with a policy of “flexibility”, encouraging states to make progress on developing nutrient criteria using different approaches.

- Many states moved towards a “stressor-response” approach and began field studies to identify the algal (diatom and periphyton) or macroinvertebrate response to N and P.

- Where are we now?
National Scope of Nutrient Problem

Well Documented Problem and Impacts:

- EPA:
  - Science Advisory Board (2007)
  - Wadeable Streams and Lakes Assessments (2006, 2008),
- National Research Council:
  - Mississippi River Water Quality (2008)
  - Urban SW (2008)
- USGS: Impact of Nutrients on Groundwater (2010), SPARROW Loadings (multiple)
- Many published articles, State and university reports
- State EPA Nutrient Innovations Task Group (NITG) Call to Action Report
National Scope of Nutrient Problem

- **14,000 Nutrient-related Impairment Listings in 49 States…**
  - 2.5 Million Acres of Lakes and Reservoirs & 80,000 Miles of Rivers and Streams
  - >47% of Streams have Med to High P; >53% have Med to High N

- **168 Hypoxic Zones in U.S. Waters**

- **78% of Assessed Continental U.S. Coastal Area Exhibits Eutrophication Symptoms**

- **Public Health Risks** – Contaminated Drinking Water is Significant & Costly
  - Rate of nitrate violations in community water systems doubled over past 7 years
State Reports

- 14,000 Nutrient-related Impairment Listings in 49 States
- Approximately 50% of Streams have medium to high levels of nutrients
- One third of U.S. estuaries eutrophic
Nitrate Violations at Public Water Supplies
National Trend
Progress Toward Clean Water Act
Adopted Numeric Nutrient Criteria

Legend
- Statewide numeric nutrient criteria for one or more class of waterbodies
- Some site-specific numeric nutrient criteria
- No numeric nutrient criteria
- N for rivers/streams
- P for rivers/streams
- N for lakes/reservoirs
- P for lakes/reservoirs
- N for wetlands
- P for wetlands
- N for estuaries
- P for estuaries

*NJ Statewide for PP
**VT Statewide for NNP
***FL Statewide for NPN

American Samoa
Guam
Puerto Rico
U.S. Virgin Islands
Commonwealth of Northern Mariana
And Then, There was Florida

- **January 2009**: EPA determination
  - Florida’s existing narrative nutrient criterion (“In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora and fauna.” 62-302.530(47)(b), F.A.C.) insufficient to meet requirements of the Clean Water Act

- **December 2009**: Consent decree to establish criteria in 2 phases
  - Phase 1: Florida’s lakes and flowing waters
  - Phase 2: Florida’s estuaries and coastal waters

Photo credit: Charlotte Sun Newspaper
Phase 1 Rule:
Florida’s Lakes and Flowing Waters

- **January 2010**: EPA proposed numeric nutrient criteria
- **November 2010**: EPA finalized numeric nutrient criteria
  (Published December 6, 2010 – 75FR 75762)
  - Final rule included delayed effective date – Site-specific Alternative Criteria (SSAC) provision effective on Feb. 4, 2011; remainder of rule effective on Mar. 6, 2012
- **December 2011**: EPA proposes to extend Mar. 6, 2012 effective date of Phase 1 rule to June 4, 2012
Phase 2 Rule:
Florida’s Estuaries and Coastal Waters

- **November 2010**: OST submits proposed approaches to EPA’s Science Advisory Board (SAB) for review
- **July 2011**: SAB concludes their review
- **March 15, 2012**: Consent Decree deadline for EPA Administrator to sign **proposed** rule
- **November 15, 2012**: Consent Decree deadline for EPA Administrator to sign **final** rule
EPA’s Nutrient Framework

- Serious problem that is getting worse; potential to become one of the costliest and most challenging environmental problems

- Growing population = more N and P pollution from urban stormwater, municipal and industrial wastewater discharges, air dep., agriculture

- To protect public health and the environment, need to act now to reduce N and P loadings -- while states continue to develop numeric nutrient criteria and standards

- Focuses on flexibility and partnering with state to address nutrient reductions
Elements of the Nutrient Framework

- Prioritize watersheds on a statewide basis for nutrient loading reductions
- Set watershed load reduction goals based upon best available information
- Ensure effectiveness of point source permits in priority watersheds
- Ag areas—develop watershed scale plans targeting BMPs
- Stormwater and septic systems – assure N and P reductions
- Verify that load reductions are in place
- Annual public reporting
- Develop a workplan and schedule for adopting criteria
Other EPA National Activities

- **State-EPA Numeric Nutrient Criteria Implementation Workgroup**
  - **Purpose:** Evaluate key barriers and tools within the CWA; identify opportunities for addressing these barriers
  - Examples of barriers identified by the group include:
    - Use of variances as a tool for addressing nutrient criteria issues.
    - Need for additional guidance for using biological indicators in conjunction with NNC.
    - Additional clarification needed for use of adaptive management approaches in TMDL development and implementation
    - Evaluate BMP cost-effectiveness
    - Nutrient permitting issues
EPA Technical Assistance: N and P Pollution Data Access Tool (NPDAT)

- Consists of a geospatial viewer, introductory website, and data download tables, available at: www.epa.gov/nutrientpollution/npdat

- Generally contains “Pre-assembled” data that is publicly available elsewhere
  - Provides streamlined access to these data in one place, in commonly-used formats

- Supports states as they consider
  - Extent and magnitude of N and P pollution
  - Water quality problems and vulnerabilities related to this pollution
  - Potential pollution sources
Nutrient Permitting Guidance

- EPA HQs (OWM) is discussing development of a permitting guidance document
  - Document would provide tools to develop WQBELS for nutrients
  - Guidance would clarify recommendations for WQ-based permits for nutrients
  - Would be similar to the TSD for toxics
Region 8 Nutrient Activities

- Recent efforts have focused on providing support to states (i.e., CO, MT) that are proposing to adopt numeric nutrient criteria
Colorado

- CO is proposing a 15-yr (2011-2025) phased implementation approach for nutrients.
- Rulemaking scheduled for March 2012.
- Two components: Reg #85 and #31
- New Regulation 85:
  - Proposes effluent limits for municipal and industrial dischargers
  - Effluent limits based on BNR technology: 1 mg/l TP; 10 mg/l TIN
  - Exemptions for lagoons and disadvantaged and smaller towns
  - NOT a WQS rule; NOT subject to EPA review and approval
  - To be implemented as permits expire, beginning in 2012
Colorado

- Regulation #31:
  - Criteria are proposed for protection of aquatic life, recreation uses, and direct use water supplies.
  - Phased adoption of WQS:
    - 2012-2022: numeric values may be adopted for DUWS reservoirs and segments upstream of dischargers.
    - Adoption of total nitrogen criteria for the same universe of waters will begin in 2017.
    - Post 2022: Criteria adoption may begin for waters downstream of point source discharges.
  - The WQCD plans to list waters as impaired for nutrients (based on the narrative) starting in 2014.
Table 4. Draft Interim Values for Rivers and Streams for Aquatic Life Use Protection

<table>
<thead>
<tr>
<th></th>
<th>Cold Water</th>
<th>Warm Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorophyll a</td>
<td>150 mg/m²</td>
<td>150 mg/m²</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>110 µg/L</td>
<td>170 µg/L</td>
</tr>
<tr>
<td>Total Nitrogen</td>
<td>1250 µg/L</td>
<td>2010 µg/L</td>
</tr>
</tbody>
</table>

Table 7. Interim Nutrient Values for Lakes and Reservoirs (summer average concentrations, allowable exceedance frequency of once in five years)

<table>
<thead>
<tr>
<th></th>
<th>Cold Water</th>
<th>Warm Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorophyll a (ug/L)</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Total Phosphorus (ug/L)</td>
<td>25</td>
<td>83</td>
</tr>
<tr>
<td>Total Nitrogen (ug/L)</td>
<td>426</td>
<td>910</td>
</tr>
</tbody>
</table>
Median Nitrogen Concentrations
Colorado Rivers and Streams
Montana

- MDEQ plans to initiate rulemaking for numeric nutrient criteria in Summer 2012.
- WQS variances are a key aspect of MT program for nutrients
- MDEQ also plans to adopt a trading policy
## Montana’s Draft Criteria

### Table 1. Montana Draft Nutrient Criteria

<table>
<thead>
<tr>
<th>Level III Ecoregion</th>
<th>Period When Criteria Apply</th>
<th>Total P (mg/L)</th>
<th>Total N (mg/L)</th>
<th>Benthic Algae Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Rockies</td>
<td>July 1 -Sept. 30</td>
<td>0.025</td>
<td>0.3</td>
<td>120 mg Chl α/m² (36 g AFDW/m²)</td>
</tr>
<tr>
<td>Canadian Rockies</td>
<td>July 1 -Sept. 30</td>
<td>0.025</td>
<td>0.3</td>
<td>120 mg Chl α/m² (36 g AFDW/m²)</td>
</tr>
<tr>
<td>Middle Rockies</td>
<td>July 1 -Sept. 30</td>
<td>0.030</td>
<td>0.3</td>
<td>120 mg Chl α/m² (36 g AFDW/m²)</td>
</tr>
<tr>
<td>Idaho Batholith</td>
<td>July 1 -Sept. 30</td>
<td>0.030</td>
<td>0.3</td>
<td>120 mg Chl α/m² (36 g AFDW/m²)</td>
</tr>
<tr>
<td>Northwestern Glaciated Plains</td>
<td>June 16-Sept. 30</td>
<td>0.12</td>
<td>1.1</td>
<td>n/a</td>
</tr>
<tr>
<td>Northwestern Great Plains, Wyoming Basin</td>
<td>July 1 -Sept. 30</td>
<td>0.12</td>
<td>1.0</td>
<td>n/a</td>
</tr>
<tr>
<td>Yellowstone River (Bighorn R. confluence to Powder R. confluence)</td>
<td>Aug 1 -Oct 31</td>
<td>0.09</td>
<td>0.70</td>
<td>Nutrient concentrations based on limiting pH impacts</td>
</tr>
<tr>
<td>Yellowstone River (Powder R. confluence to stateline)</td>
<td>Aug 1 -Oct 31</td>
<td>0.14</td>
<td>1.0</td>
<td>Nutrient concentrations based on limiting nuisance algal growth</td>
</tr>
</tbody>
</table>
Montana

- Montana’s legislature passed SB 367 in 2011.
- Statute requires that MDEQ grant general variances for 3 categories of dischargers:
  - Facilities discharging >1 MGD -- 1 mg/l TP and 10 mg/l TN;
  - Facilities discharging < 1 MGD -- 2 mg/l TP and 15 mg/l TN; and
  - Lagoons capped at their current load.
- Values will be revisited in 2016 and could be lowered if the costs for treatment technologies are reduced.
- EPA has indicated support for MT’s proposed approach
Areas for Flexibility

- Phased adoption of WQS
- Implementation efforts that achieve incremental progress in reducing nutrient loads
- Use of variances to address stringent numeric nutrient criteria
- Use of trading
- Use compliance schedules in permits to meet nutrient WQBELs
CWA Context

- Impaired Water Listing
- Permitting Issues
- Adoption of Criteria
CWA Compliance Issues

- CWA Section 303(d) and 40 C.F.R. Section 130.7 303(d):
  - Effective process needed for identifying waters impaired for nutrients

- 40 C.F.R. 122.44(d): Requires WQBELs that derive from and comply with WQS (where there is Reasonable Potential)
WQS Considerations

- State adopted criteria must meet the following requirements (40 CFR 131.11(a)):
  - Protect the designated uses, using the criterion most protective of the most sensitive use
  - Be based on a sound scientific rationale
  - Include sufficient parameters (e.g., acceptable concentrations) to protect the designated use

- CWA § 303(c) requires EPA to review and approve/disapprove State WQS
WQS Considerations

- Adopting numeric criteria helps to:
  - restore impaired waters
  - facilitate using antidegradation to protect high quality waters.
  - Streamlines development of TMDLs

- States should also consider what WQS provisions are needed to provide protection for downstream WQS as required by 131.10(b).
Questions?

Photo Credit: Peter Ismert