



*Florida Department of
Environmental Protection*

Numeric Nutrient Standards Concepts

Drew Bartlett, Director

Daryll Joyner, Bureau Chief

Division of Environmental Assessment and Restoration



Summary of Presentation

- **Background Info**
- **DEP's Goal for Nutrient Rulemakings**
- **Need for Different Approach**
- **Guiding Scientific and Policy Principles**
- **Proposed Concept**
- **Implementation**
- **What's Next?**





Sequence of Events

- **January 14, 2009 EPA “determination letter”**
- **EPA Settlement Agreement with EarthJustice**
- **EPA established final standards in Dec. 2010**
 - **EPA criteria take effect on March 6, 2012**
 - **Site-specific alternative criteria (SSAC) provision became effective February 4, 2011**
- **DEP submitted petition to EPA in April, 2011 requesting EPA withdraw the determination and rule, and stop further rulemaking**





DEP's Goal for Nutrient Rulemaking

- **Manage nutrients in surface (and groundwater) at loadings or concentrations that result in protection and maintenance of healthy, well-balanced aquatic communities**







Nutrients Need a New Conceptual Model

- **Nutrients are typically not toxic, and effects on aquatic ecosystems are moderated in their expression by many natural site specific factors**
 - **light penetration, hydraulic residence time, presence of grazers, and habitat considerations**
- **Makes broad based numeric criteria development more complicated than for most pollutants (e.g., toxic substances)**



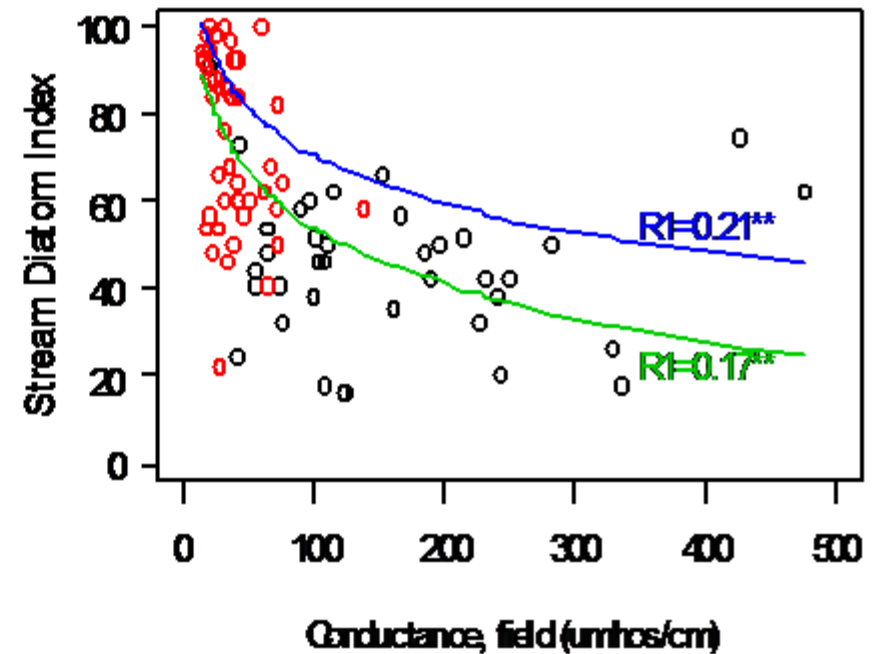
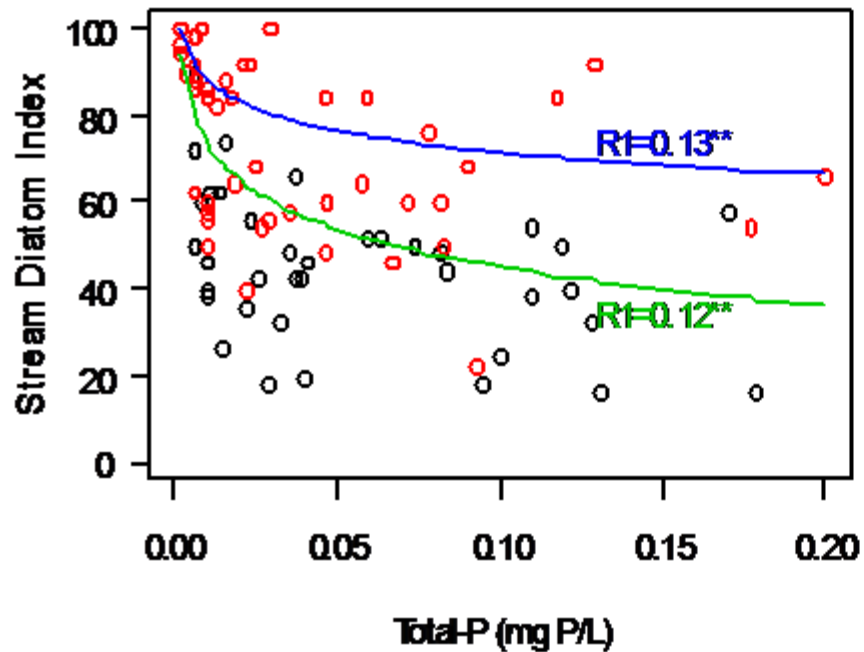


Nutrient Expression Is Site-Specific

- **DEP has extensively studied nutrients in Florida and found there is considerable variability and uncertainty in predicting nutrient effects in many aquatic systems**
 - **Only statistically weak relationships were found between nutrients and biological effects in streams**
 - **Wide range of TP and TN can produce same chlorophyll response in lakes**

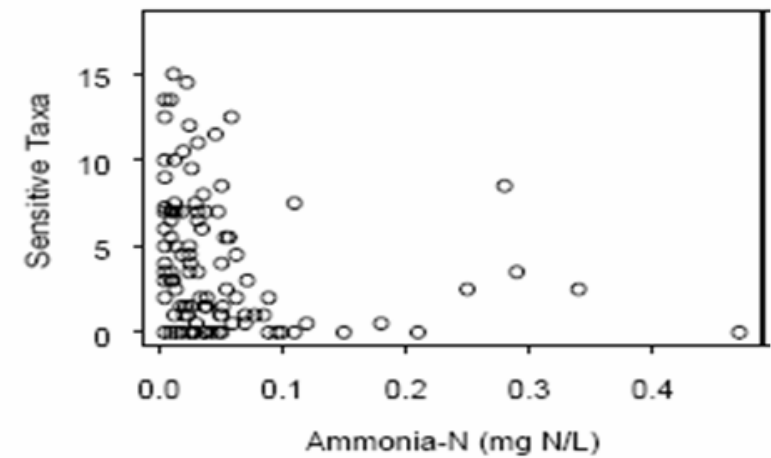
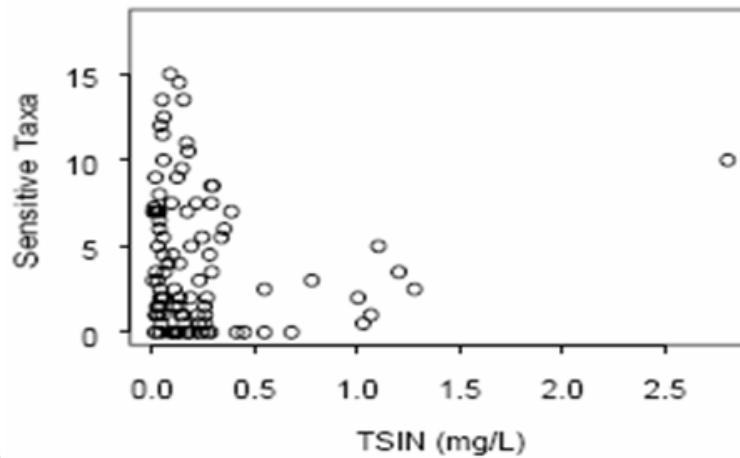
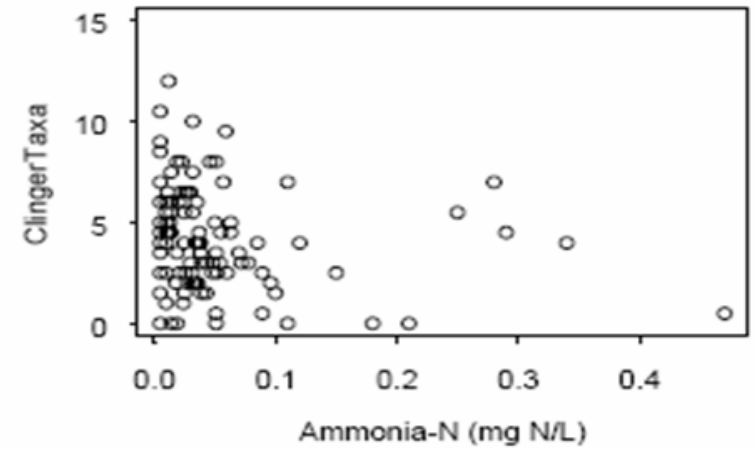
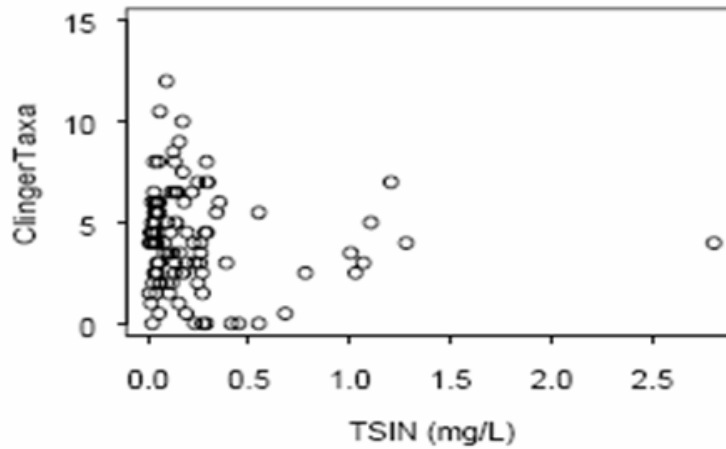


TP and Conductivity: Stream Diatoms



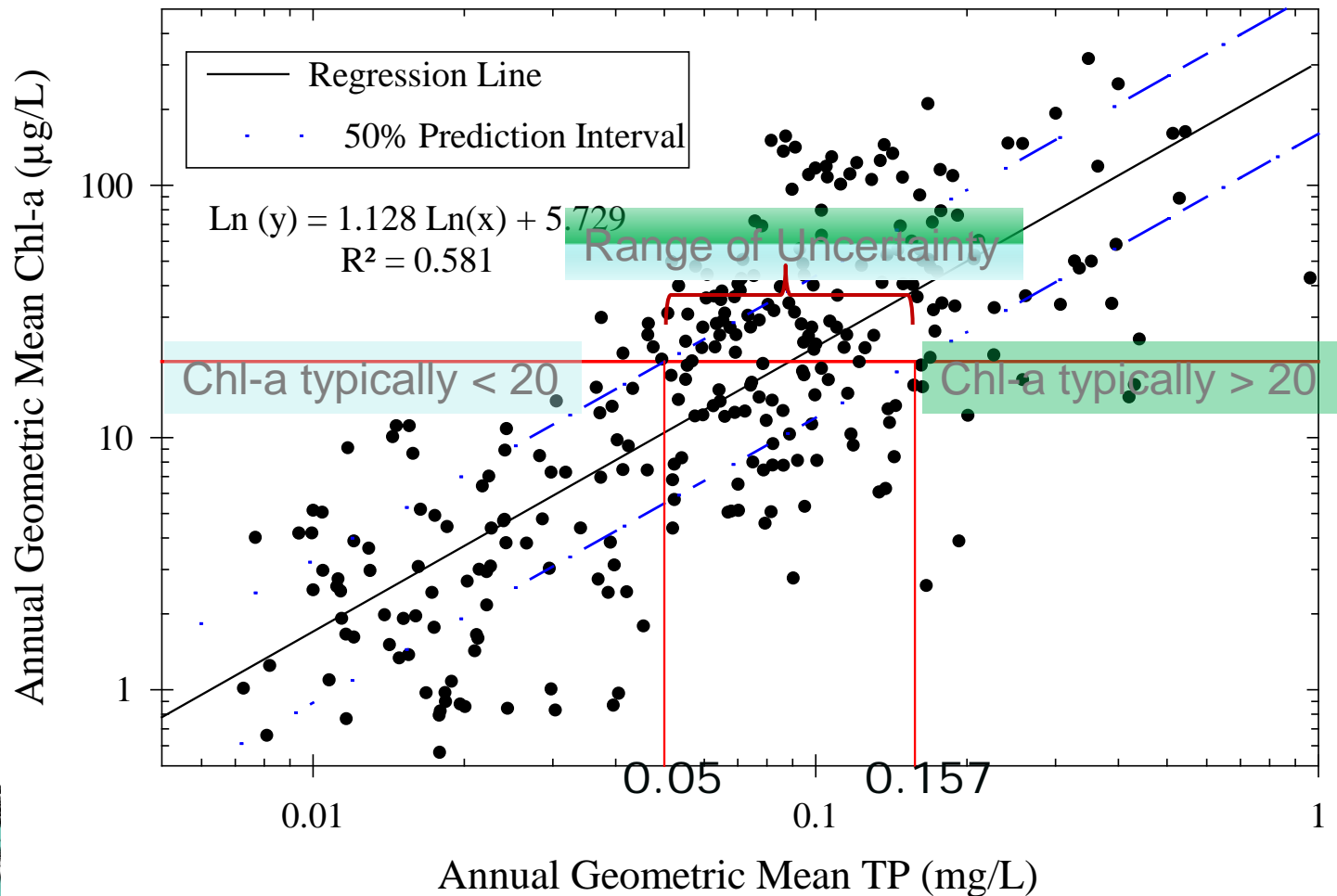


Stream Invertebrate Responses





Colored Lake Chl-a Response to TP





Guiding Scientific and Policy Principles

- **Numeric interpretations are most accurate when determined as a site-specific function**
- **Therefore, nutrient Total Maximum Daily Loads (TMDLs), Site Specific Alternative Criteria (SSAC), and other site specific actions written to achieve the narrative nutrient criteria should be given preference over more broadly applicable interpretations**





Guiding Scientific and Policy Principles (cont.)

- **Absent site-specific analyses, criteria based on a quantifiable linkage between anthropogenic nutrient enrichment and a biological response can be used to numerically interpret the narrative nutrient criteria**





Guiding Scientific and Policy Principles (cont.)

- **There is value in knowing whether nutrient concentrations are potentially elevated to environmentally harmful levels, but it is important to identify adverse biological effects and determine they are linked to nutrients before deciding that nutrient reductions should be pursued**





Guiding Scientific and Policy Principles (cont.)

- **Given the potentially burdensome administrative effects of developing site-specific alternative criteria and high costs of implementing numeric nutrient criteria, care should be taken to avoid any unnecessary and duplicative procedures that do not add value to actual waterbody protection and restoration**





Proposed Concept

- The Department recognizes the role of site-specific factors that affect numeric responses and proposes to base new standards on establishing a **systematic numeric interpretation of the existing narrative criteria**
- As was the case for EPA's rule (40 CFR 131.43(e) [Federal Register, Volume 75, Number 233, Page 75762], this concept is intended to implement **Rule 62-302.530 (47)(b), FAC**





Rule 62-302.530 (47)(b), FAC

- States, “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 or fauna.”



Conceptual Structure: General

- **The narrative nutrient criteria would continue to apply to all waterbodies, and numeric interpretations would be applied based on the scientific information available**
- **The narrative would be implemented using a systematic structure that numerically interprets the narrative nutrient criteria for each waterbody in a hierarchical manner**





Conceptual Structure: Site Specific

- 1. Established site specific numeric interpretations of the narrative criteria (including TMDLs, SSACs, and other interpretations embodied in an official Department action) would be the primary interpretation of the narrative nutrient criteria**





Conceptual Structure: Cause-Effect

2. If “1” (above) is not available for a waterbody, the interpretation of the narrative criteria would be based on **established, quantifiable nutrient cause and effect relationships where the nutrient concentrations responsible for causing an imbalance of natural populations of aquatic flora or fauna is understood**
 - **Currently, this is limited to fresh water springs and lakes**





Conceptual Structure: Reference Values

3. If “1” and “2” (above) are not available, a combination of reference-based nutrient thresholds and biological information will be used in the following manner (next slide)
 - Currently, this is limited to fresh flowing waterbodies excluding largely intermittent streams



Potential Use of Reference Values (cont.)

- A. Waters achieving the nutrient thresholds that are also biological healthy (*e.g.*, using SCI and measures of floral health) are deemed to meet the narrative criteria**
- B. Waters that exceed the nutrient thresholds but reflect balanced flora and fauna (*e.g.*, using SCI and measures of floral health) are deemed to meet the narrative nutrient criteria**



Potential Use of Reference Values (cont.)

C. Waters that meet the nutrient thresholds but are not biologically healthy

- Deemed to not attain Aquatic Life Use Support goals
- These waters would be targeted for a stressor identification study to determine the causative factor(s)
- These waters are initially deemed to attain the narrative nutrient criteria unless the stressor identification study links the adverse biological effects to nutrients





Potential Use of Reference Values (cont.)

- D. Waters that exceed the nutrient thresholds that are not biologically healthy and would be deemed to not attain the narrative nutrient criteria unless a stressor identification study determines that nutrients are not the causative pollutant**



Potential Use of Reference Values

		Biology ⁽¹⁾	
		Healthy	Not Healthy
Nutrients	Meet Threshold	<p>Attains narrative nutrient criteria.</p> <p style="font-size: 48px; opacity: 0.5; text-align: center;">A</p>	<p>Does not attain Aquatic Life Use Support. Attains narrative nutrient criteria unless stressor ID links adverse effects to nutrients.</p> <p style="font-size: 48px; opacity: 0.5; text-align: center;">C</p>
	Exceed Threshold	<p>Attains narrative nutrient criteria.</p> <p style="font-size: 48px; opacity: 0.5; text-align: center;">B</p>	<p>Does not attain narrative nutrient criteria unless stressor ID shows nutrients are not causative pollutant.</p> <p style="font-size: 48px; opacity: 0.5; text-align: center;">D</p>



(1) If biological data are not available, but nutrient thresholds are met, water attains narrative nutrient criteria. If biological data are not available, but nutrient threshold exceeded, water placed on “study list”.



Potential Spatial Expression

- **Attainment of the narrative criterion should be assessed as a spatial average for the waterbody**
 - **For SSACs and TMDLs, spatial component is as defined in the TMDL or SSAC document**
 - **If based on cause-effect relationship, stated in a manner consistent with the derivation of the criterion**
 - **Lake Criteria were based on lake averages**





Potential Spatial Expression (cont).

- For reference-based thresholds, rule would clarify that they are implemented as a spatial average, but the spatial extent would be determined by site-specific considerations such as
 - Relative system homogeneity, system classification, biological expectations, or empirically measured responses
 - WBIDs or aggregations of segments may be appropriate in many cases





Most Recent Applies

- **If there are both a TMDL and a SSAC for a given waterbody, the most recently adopted TMDL or SSAC would take precedence**



Downstream Protection

- **Protection of downstream waters can be provided using a narrative, rather than “downstream protection values”**
 - **In no case shall the loading of nitrogen or phosphorus from a Class I or III fresh water stream or lake cause or contribute to an exceedance of water quality standards in a downstream waterbody**
 - **Upstream actions taken by the Department would consider downstream standards pursuant to this narrative**





TMDLs as Basis for Nutrient Criteria

- Only State-adopted TMDLs would be eligible
- All TMDLs written that protect the “imbalance” narrative are included
- If TMDLs are expressed as loads instead of concentrations, the loads do not have to be translated into concentrations to be deemed the numeric interpretation of the narrative nutrient criteria





TMDLs (cont.)

- TMDLs may be modified based on new data, new science, or different target/endpoints (such as DO)
- When TMDLs are modified and readopted, they would become the new interpretation of the narrative
- Future TMDL rules may include a response target (chlorophyll a, for example) designed to implement the narrative nutrient criterion





TMDLs (cont.)

- **Scientific information relating to the TMDL response target can be used to establish a site-specific listing threshold pursuant to Rule 62-303.450, F.A.C.**
- **TMDLs may be written to achieve numeric nutrient values established in Chapter 62-303 (e.g., lakes or springs)**



TMDLs (cont.)

- **TMDLs may be written to achieve conditions necessary to protect the narrative nutrient criteria**
- **If written to achieve the narrative nutrient criteria, the site-specific thresholds used for the TMDL would become the numeric interpretation of the narrative pursuant to “1” of the hierarchy**





SSACs

- Plan to eliminate restriction on establishing Type II SSACs for nutrients (Rule 62-303.800(2), F.A.C.)
- Propose to include a new, predictable approach to developing nutrient SSACs (Type III SSAC) with clear expectations on the water quality and biological data needed to characterize existing nutrient concentrations and aquatic health
 - Stations determined on site specific basis





SSACs (cont.)

- **Basic premise is if the biology is found to be healthy, then the existing nutrient concentrations are protective**
 - **The nutrient SSAC will need to address the natural variability in nutrient concentrations**
- **Any SSAC must demonstrate that the designated use is being protected**



SSACs (cont.)

- **Waterbodies where the average of two temporally independent Stream Condition Index (SCI) results is greater than 40 and that do not exhibit excess algal growth or nuisance aquatic plants are biologically healthy**



Potential Cause-Effect Interpretation

- **Springs: Nitrate criterion of 0.35 mg/L, as an annual average**
- **Lakes: Use the existing chlorophyll/nutrient regression equations, acknowledging the uncertainty in the equations by allowing for “modified” criteria when chlorophyll targets are achieved**



Potential Cause-Effect (cont.)

- The scientific bases for the spring and lake criteria have been previously presented in DEP 2009 document, “Development of Numeric Nutrient Criteria for Florida Lakes and Streams”
- In highly colored lakes (long term average >140 PCU) where there is no longer a cause and effect relationship, the narrative nutrient criteria should continue to apply





Scope of Reference-Based Thresholds for Streams

- Reference based nutrient values were derived in generally perennial streams, and application of these values to intermittent streams is not justified given their derivation and expression



Cases with Insufficient Information

- **Narrative will continue to apply in aquatic systems where insufficient information currently exists to accurately interpret the narrative nutrient criteria, such as**
 - **Class III wetlands, Class III flowing waters in South Florida, and Class III intermittent streams**
- **The Department will numerically interpret the narrative criteria as the information is developed**





Implementation

- EPA's regulation was silent on implementation regarding both permitting and assessment, and we would like feedback on best way to address in rulemaking process
- General plans are as follows





Potential Implementation : Permitting

- **Nutrient effluent limits for discharges to surface waters can continue to be developed through the WQBEL process pursuant Chapter 62-650, FAC**
- **Nutrient WQBELs developed to attain the narrative nutrient criteria remain in effect unless**
 - **A more recent wasteload allocation (WLA) is developed for the facility,**
 - **The WQBEL is revised pursuant to the WQBEL rule, or**
 - **The WQBEL is superseded by an agency action**





Potential Implementation : Permitting (cont.)

- For new or revised WQBELs, will use the approach that best interprets the narrative nutrient criteria as outlined in the hierarchical structure
- The site specific analysis performed as part of the WQBEL process can be written to achieve “1”, “2” or “3” of the structure, or result in a new interpretation of the narrative that could be considered a Department action relevant to

“1”





Potential Implementation: Assessment

- **DEP will revise the IWR to be consistent with the revisions to Chapter 62-302, F.A.C., including provisions to implement the NNC for lakes and springs and to assess TMDLs**
- **Attainment of the allowable TMDL loads is evaluated as part of the BMAP reporting process, and nonattainment can be assumed until information is provided to demonstrate attainment**





Potential Implementation: Assessment (cont.)

- Waters can be deemed in attainment if they meet the TMDL loads (or concentrations) and targets (*e.g.*, chlorophyll) and nutrients are no longer causing biological imbalances
- If the waterbody attains the allowable loading but there is site-specific information indicating an imbalance in flora or fauna, the TMDL can be revised as needed



Potential Implementation: Assessment (cont.)

- **Propose to create “study list” for waters that do not attain water quality standards, but for which we do not know the causative pollutant**
 - **Would be in addition to the planning list (potentially impaired) and verified list**
- **Need to know cause to determine appropriate actions to rectify the situation**



Potential Implementation: Assessment (cont.)

- Waters placed on the verified list for nutrients if they need a reduction in a nutrient loading to attain the narrative nutrient criteria or restore the waterbody's designated use
- Placement on either study list or verified list would be based on the current interpretation of the narrative criteria as outlined earlier
 - If nonattainment is based on assessment against a SSAC or cause and effect derived criteria, place on verified list





Potential Implementation: Assessment (cont.)

- Waters that exceed reference-based nutrient thresholds would be placed on the “study list” unless there are bioassessment data indicating the stream has balanced flora and fauna
- Waters that exceed bioassessment thresholds would be placed on the “study list” because aquatic life use support is not attained
 - Cause evaluated through a Stressor Identification Study (site-specific physical, chemical, and biological investigation)





Potential Implementation: Assessment (cont.)

- **If a stream exceeds both nutrient thresholds and biological thresholds, it is identified as impaired due to nutrients and the water can be listed on the verified list for TMDL development, which will determine nutrient targets through a site specific analysis**



Other Concepts for Discussion

- **Should trends be incorporated into the framework?**
 - **Current IWR includes some trend provisions**
 - **How to account for natural, hydrologically influenced cycles**
- **If study list reflects nonattainment with the narrative, how should that relate to the CWA 303(d) list?**





What's Next? - Rulemaking Schedule

- **We have not set specific dates yet, but the schedule outlined in our Petition was:**
 - **2nd Public Workshop on Draft Rule - July, 2011**
 - **3rd Public Workshop on Revised Rule - Sept., 2011**
 - **ERC Briefing - November, 2011**
 - **ERC Adoption - January, 2012**
 - **Legislative Ratification - 2012 Legislative Session**

