

Developing Numeric Nutrient Criteria for Mississippi



Stakeholder Update

MDEQ Amite Street Office
Jackson, MS
July 10, 2015

Criteria are required by law



- Water quality standards (WQS) are required by the Clean Water Act for waterbodies in MS
 - A water quality standard = A designated use + **criteria** to protect the use + policy to prevent degradation
 - MDEQ has many criteria to protect designated uses from different pollutants

Water Quality Criteria



- A concentration, level, or narrative statement
- Represent a level of water quality that supports a particular designated use
- States must adopt criteria that protect the designated use(s)
 - Based on a sound, scientific rationale
 - Sufficient parameters to protect the designated use
 - Must support the most sensitive use

Nutrient Criteria



- Nutrients are a major pollutant contributing to impairment of waters nationwide
- EPA developed an Action Plan for nutrients in 2001 that included states developing numeric nutrient criteria to protect uses from nutrient pollution
- Early on...MDEQ developed a task force and a plan for developing nutrient criteria
- MDEQ's Mission:
Develop appropriate and protective numeric nutrient criteria for Mississippi's waters that are scientifically defensible.

MS Nutrient Task Force



- Initiated criteria planning in 2000
- Decided that criteria should be developed based on water body type
 - Lakes and Reservoirs
 - Streams and Rivers
 - Estuaries and Coastal Waters
- Established different committees to focus on different water body types
- Developed the first Nutrient Criteria Development Plan for Mississippi

Implementing Our Plan



- Took action on the Task Force's recommendations
- Data and information gaps were identified by the Task Force
- Efforts were initiated to address these gaps
 - Data collection across various water body types
 - Establishing biological indicators
 - Preliminary nutrient criteria analyses

A Work In Progress



- **Collecting data to fill data gaps identified**
 - Data collection across various water body types
 - Establishing biological indicators
 - Preliminary nutrient criteria analyses
- **Tool development**
 - Multiple tools in an attempt to make the connection between nutrient concentrations and biological response
 - ✦ M-BISQ Recalibration
 - ✦ Benthic Index for Coastal Waters
 - ✦ Benthic Index for Delta Waters
 - ✦ Fish data for Delta waters

Timeline



- **Mutually-agreed upon plan (Oct 2010) with EPA**
 - Public Comment Period for Non-Delta Waters begins no earlier than June 30, 2013
 - Public Comment Period for Delta Waters begins no earlier than November 30, 2014
 - Postponed public notice of criteria to focus on implementation planning
- **Currently working with EPA Region 4 to update our plan/timeline**
 - **Sequenced Approach**
 - ✦ Lakes and Reservoirs
 - ✦ Coastal and Estuarine Waters
 - ✦ Streams (Non-Delta)
 - ✦ Delta Waters
 - ✦ Large Rivers – will be addressed through site-specific criteria in the order that they are prioritized/needed and as resources allow
- **Criteria adoption/approval includes**
 - Public notice/public comment period/public hearing
 - Respond to comments received
 - Adoption by the Commission
 - Approval by EPA

MS Nutrient Technical Advisory Group



- MDEQ is committed to a defensible, science driven process for deriving protective criteria
- At the core of this process is the input, review, and guidance of technical work by a committee of research, state and federal agency scientists with technical expertise relevant to nutrient science
- MDEQ formed the Nutrient TAG to be this committee
- TAG's Mission:
Provide technical expertise and regional knowledge to MDEQ for the development of scientifically defensible numeric nutrient criteria.

MS Nutrient Technical Advisory Group



Nutrient Criteria Analysis



- Goal: scientifically defensible, protective criteria developed using a transparent, well-documented process
- Methods based on USEPA Nutrient Criteria Guidance
 - Data Compilation
 - Classification of Waters
 - Data Analysis using Multiple Lines of Evidence
 - Criteria Derivation

Data Analysis: Multiple Lines of Evidence



- Using multiple lines of analysis to define a specific endpoint
- Alternative to single analysis approaches
- Especially useful with complex systems

“A weight of evidence approach that combines any or all of the three approaches above will produce criteria of greater scientific validity”

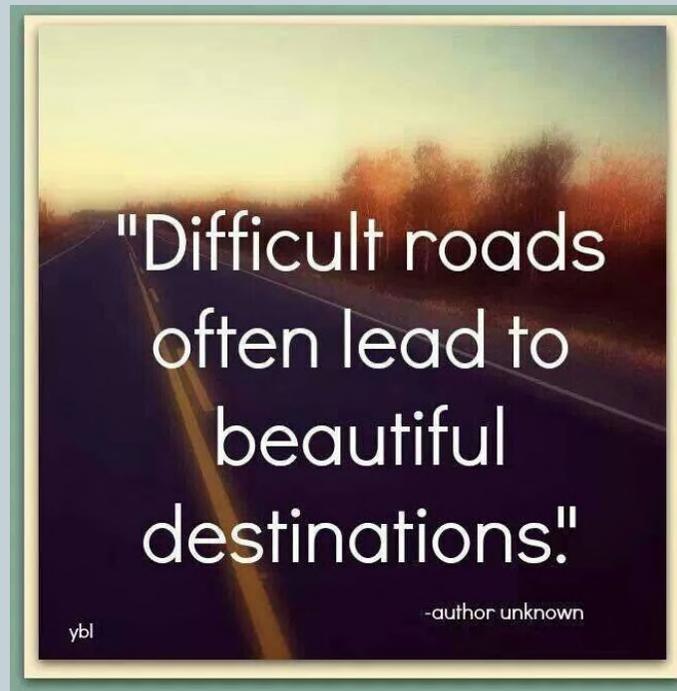
-USEPA 2000, SAB 2010

Lines of Evidence



- Distributions of nutrient values in minimally disturbed sites and sites attaining designated uses
- Stressor-response empirical models of nutrients versus biological/chemical responses
- Mechanistic water quality model output
- Scientific literature on nutrient effects

Status of Technical Efforts Inland Waters



Lakes



Lake Criteria



- Analysis Essentially Complete
- Multiple Lines of Evidence
 - Reference
 - Stressor-Response
 - Literature
- Two Technical Support Documents Complete
 - Addendum being developed that provides additional support for DO endpoint (based on Stakeholder feedback)
- Decision Agreement Analysis (per Stakeholder feedback)
- Options Developed

Lakes/Reservoirs

Option 1 – Single values



Magnitude:

TP: 0.090 mg/l

TN: 1.25 mg/l

Chlorophyll a: 20 ug/l

Duration: Seasonal (June-October) Geometric Means

- Consistent with assessment periods for DO
- Acute could be considered

Frequency: Not to be exceeded more than 2 out of 5 years

- Based on stream criteria nutrient variability analysis

Lakes/Reservoirs

Option 2 – Combined criteria
with site specific adjustment



Magnitude:

TP: 0.050 – 0.160 mg/l

TN: 0.680 – 1.70 mg/l

Chlorophyll a: 20 ug/l

Duration: Seasonal (June-October) Geometric Means

Frequency: Not to be exceeded more than 2 out of 5 years

Implementation: As long as chl a criterion/DO/nuisance criteria are met and nutrients are within range or below, nutrient criteria not violated.

One time site specific nutrient numeric adjusted to the long-term 75th percentile seasonal geometric mean within the range for assessment moving forward.

If there are no data on responses, a default single numeric value (e.g., within the range) would be used

Lakes/Reservoirs

Option 3 – Combined Criteria with no adjustment



Magnitude:

TP: 0.050 – 0.160 mg/l

TN: 0.680 – 1.70 mg/l

Chlorophyll a: 20 ug/l

Duration: Seasonal (June-October) Geometric Means

Frequency: Not to be exceeded more than 2/5 years

Implementation: As long as chl a criterion/DO/nuisance criteria are met and nutrients are within range or below, nutrient criteria not violated.

No site specific adjustments made.

If there are no data on responses, a default single numeric value (e.g., within the range) would be used

Lakes



- **TAG meeting yesterday:**
 - Reviewed technical materials
 - Continued discussion of pros and cons for each criteria option
 - Prioritized options
 - These will be synthesized and presented to MDEQ management consideration

Streams



Streams



- Analysis Essentially Complete
- Multiple Lines of Evidence
 - Reference
 - Stressor-Response
- Two Technical Support Documents
- Decision Agreement Analysis (per Stakeholder feedback)
- Options Developed

Streams

Option 1- Single values



Magnitude:

TP: 0.060 - 0.150 mg/l

TN: 0.75 - 1.20 mg/l

Duration: Geometric annual mean

- Based on underlying data

Frequency: Not to be exceeded more than 2 out of 5 years

- Based on variability analysis

Streams

Option 2 – Combined criteria
with site specific adjustment



Magnitude:

TP: 0.040 - 0.2 mg/l

TN: 0.45 - 1.40 mg/l

Duration: Geometric annual mean

Frequency: Not to be exceeded more than 2 out of 5 years

Implementation: As long as MBISQ/DO/nuisance criteria are met and nutrients are within range or below, nutrient criteria not violated.

Site specific nutrient numeric adjusted to the long-term 75th percentile seasonal geometric mean within the range for assessment moving forward.

If there are no data on responses, a default single numeric value (e.g., within the range) would be used

Streams

Option 3 – Combined Criteria
with no adjustment



Magnitude:

TP: 0.040 - 0.2 mg/l

TN: 0.45 - 1.40 mg/l

Duration: Geometric annual mean

Frequency: Not to be exceeded more than 2 out of 5 years

Implementation: As long as MBISQ/DO/nuisance criteria are met and nutrients are within range or below, nutrient criteria not violated.

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Coastal and Estuarine Waters



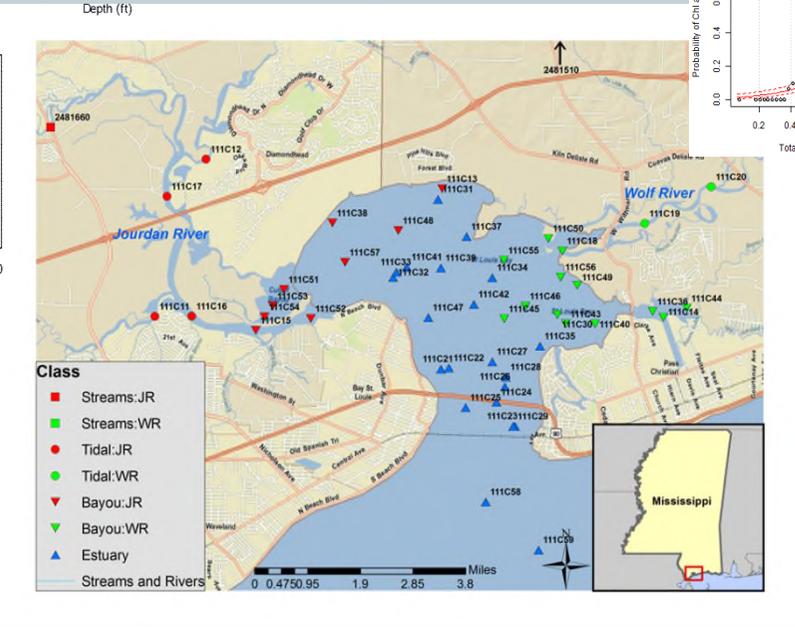
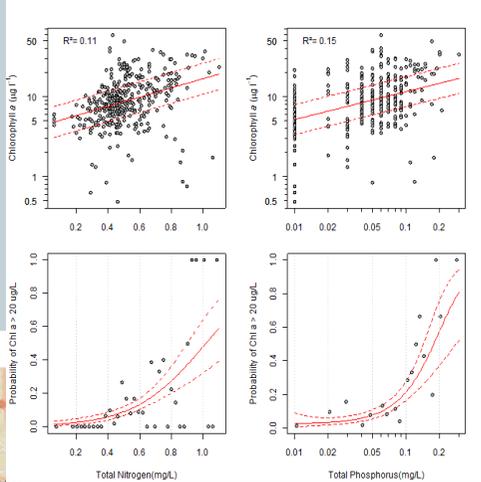
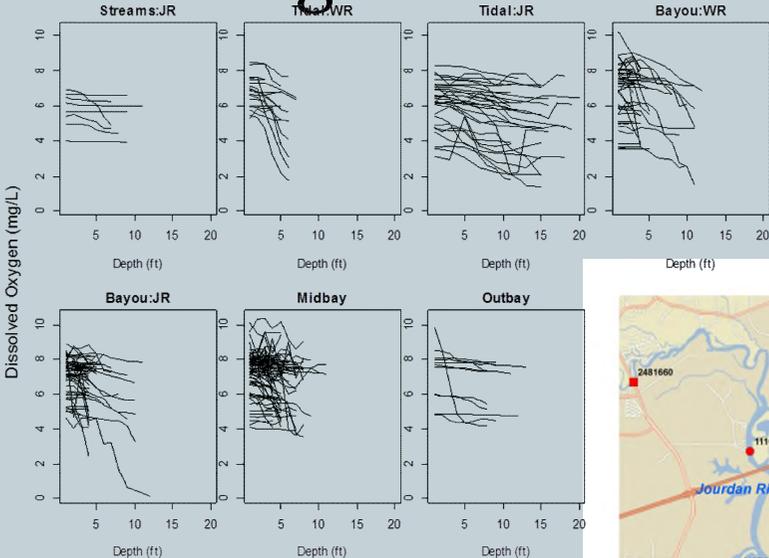
Coastal Waters Update



- **St. Louis Bay, MS: Nutrient Sources, Fate, Transport, and Effects Study**
 - Funded by the USEPA Gulf of Mexico Program
 - Part of several case studies through the Gulf of Mexico Alliance (FL, TX, AL)
 - Comprehensive estuarine water quality model with field calibration/validation

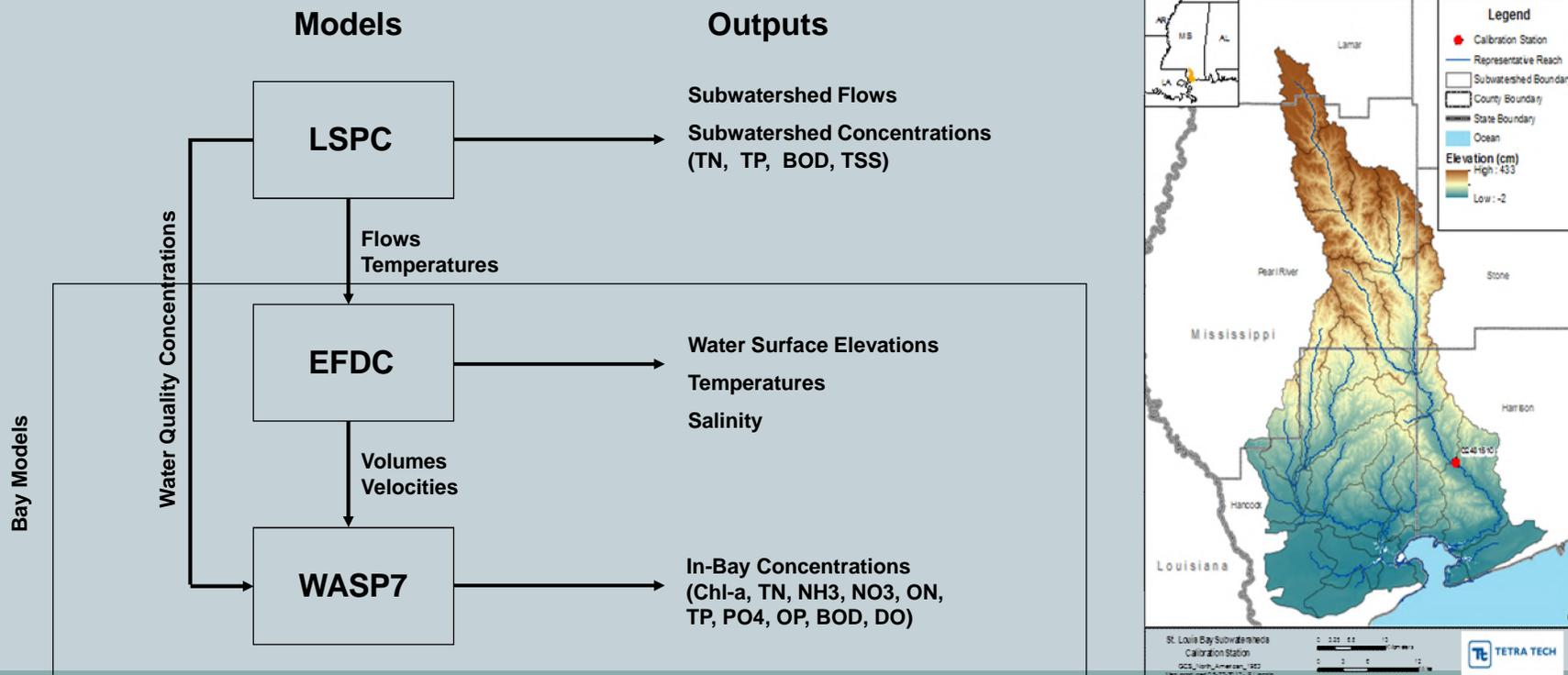
Modeling Efforts – Bay Saint Louis

- Field sampling – calibration, validation, empirical modeling



Modeling Efforts – Bay Saint Louis

- Linked watershed loading (LSPC) - hydrodynamic (EFDC) - water quality (WASP7) models



Coastal Empirical Analysis



- Using coastal/estuarine/tidal water quality data
- Classification
 - Open sound, estuaries, and tidal waters were defensible
- Literature
 - MS Coastal Region generally medium-low eutrophication
- Reference (Existing Condition)
 - Based on identifying and using existing conditions to set criteria
- Stressor-response modeling
 - Developing nutrient-response models for different classes

Coastal/Estuarine/Tidal



Preliminary Analysis: Empirical and SLB Results

- Magnitude:
 - Ranges from multiple analyses to date (SLB)
 - ✦ Chl a: 6 – 15 ug/L (10 – 20 ug/L)
 - ✦ TN: 0.60 – 1.0 mg/L (0.6 – 0.8 mg/L)
 - ✦ TP: 0.05 – 0.20 mg/L (0.06 – 0.08 mg/L)
- Duration: Seasonal (June-October) Geometric Means
- Frequency: Not to be exceeded more than 2/5 years
- Implementation: Same options as for other waters
 - Single numeric
 - Range with combined criteria/site specific option

Coastal Efforts



- Completing Revised Technical Reports on Coastal Estuarine Numeric Thresholds – Fall 2015
- TAG review Fall/Winter 2015
- Pursuing additional modeling options for support

Delta Waters



Mississippi Delta – April 2015



- EPA HQ and R4: Introduction to Delta and Tour of Delta Waters
- TAG meeting focused on NNC for MS Delta Waters:
 - Revisited and further developed the Delta Waters NNC Study Plan (building on work from previous Delta TAG meetings)
 - ✦ Problem Formulation
 - ✦ Data inventory and Conceptual Model Building
 - ✦ Classification
 - ✦ Assessment Endpoint Development
 - ✦ Exploratory Analysis
- Continuing to develop a strategy and workplan and working to find funding for implementation
- Considering/Exploring Revised Uses
 - May precede criteria development

Improving Tools for the MS Water Quality Standards Program:



Natural Conditions Framework
and
Revised Aquatic Life Use Options

Take Home Message



- Two documents developed in a collaborative effort between MDEQ and EPA with recommendations for:

Natural Condition Framework:

Process for establishing where natural conditions provision applies and justify setting site specific criteria

- ✦ A consistent and replicable process for MDEQ to apply its natural conditions narrative provision

Use Revision Options:

An exploration for options to revise aquatic life uses in MS

- ✦ Provide options for exceptional and modified aquatic life use classes
- ✦ Refining MS's current one size fits all aquatic life use and related narrative criteria

History



Natural Conditions

- MDEQ has a narrative natural condition provision
- MDEQ has applied this provision to some previous waters
- Seeing an increasing interest in applying this provision – DO, pH, temperature, and possibly nutrient criteria
- Desired a standard process for consistent application of the provision

Water Body Use Revisions

- MDEQ has a single aquatic life use classification and narrative criteria
- Identified the need to revisit and perhaps refine this use and the associated criteria
- Desired an exploration of options

Natural Conditions



MS WQS Definition and Provision:

“Natural conditions are defined as background water quality conditions due only to non-anthropogenic sources...Waters may naturally have characteristics outside the limits established by these criteria. Therefore, naturally occurring conditions that fail to meet criteria should not be interpreted as violations of these criteria.” (State of Mississippi Water Quality Criteria for Intrastate, Interstate and Coastal Waters, WPC-2, Section 1, 4. Natural Conditions)

***Other sections reference natural condition

Natural Conditions



- Natural Condition Framework: Standardized process for (1) establishing where the natural conditions provision applies and (2) providing justification for setting site specific criteria based on the provision
- 4 part framework for determining applicability of natural conditions

Revised Aquatic Life Use Options



- Goal: Develop a framework to organize aquatic life use revision issues and options for MDEQ
 - Not a road map for use revision
- Explore both natural and modified uses/classifications
- Provide use/classification revision options for consideration

Revised Aquatic Life Use Options



- Document explores various options for MDEQ:
 - Existing aquatic life use
 - Exceptional aquatic life use (such as...Outstanding MS Water)
 - Modified aquatic life use
 - Agricultural drainage waters
- Reviews national examples
- Discusses implementation options
- Provides example waterbodies that might go in each class
- Still exploratory, but something Agency is pursuing

Implementation Planning



Beyond the Number: Implementation Planning



- Many questions surround implementation both internally and from our stakeholders
- MDEQ Interdivisional Implementation Workgroup formed to work through issues identified by MDEQ staff, partners, and stakeholders
 - Permitting implications
 - ✦ Compliance Schedules
 - ✦ Variances/Mixing Zones/Others
 - Assessment implications
 - TMDLs/WLAs
 - Watershed Planning

Beyond the Number: Implementation Planning



- MDEQ Implementation Planning Workgroup developed a list of implementation questions such as
 - How will the number be written into our standards?
 - How will we monitor/assess for nutrients?
 - How will we incorporate this number into permits?
 - How long will it be before facilities see nutrient limits in their permits?
 - How long will facilities have to comply with new permit limits?
- Stakeholder survey in January 2014
 - Feedback on the prioritization of implementation issues
 - Additional opportunity at end of survey for stakeholders to express other comments and concerns regarding implementation
- Implementation questions will ultimately be addressed in a Nutrient Criteria Implementation Plan that will be developed and finalized in a parallel effort to the nutrient criteria development process

Draft Implementation Plan

- Subcommittees developing responses questions
- Responses are included as part of draft implementation plan
- Sections on:
 - Criteria Options
 - Standards
 - Assessment and Monitoring
 - TMDLs/WLA/NPDES
- Implementation planning is on-going, parallel effort to NNC development
 - MDEQ adding more information to plan over time as more details about draft criteria values are determined

Implementing Numeric Nutrient Criteria into Mississippi DEQ Water Quality Programs:
Question and Answers

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Moving Forward



Moving Forward in MS



- Revised Nutrient Criteria Development Plan and Timeline
- MDEQ continuing criteria development process with TAG support and stakeholder input
- Upcoming Activities
 - MDEQ management considers Lake Criteria Options
 - ✦ Pros, cons, implementation aspects of each option will be considered
 - Begin preparing Lake Nutrient Criteria Package for public comment
 - Complete Second Coastal Technical Support Document
 - Continue development of Delta Waters NNC Workplan
 - Continue efforts exploring potential water body use/classification refinements
 - 2015 Triennial Review of Water Quality Standards

Moving Forward in MS



- **Stakeholder Outreach an MDEQ Priority**
 - MDEQ will continue regular Stakeholder Update Sessions
 - Continue to provide the opportunity for stakeholders to stay informed and also express their comments and/or concerns regarding both the criteria development efforts and plans for implementation of those criteria
- **We are not currently in the formal comment period – that will come later**

The sooner we know about your concerns, questions, and suggestions the better...
MDEQ can start looking at those now

Questions? Comments? Suggestions?



THANK YOU FOR BEING HERE TODAY!

