Developing Numeric Nutrient Criteria for Mississippi

Stakeholder Update

MDEQ Amite Street Offices
Hattiesburg, MS
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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

- 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

Data Collection Efforts

- Data collection efforts were developed to fill data and information gaps
- MDEQ-led data collection:
  - Data collection efforts in all water body types across the state
  - Awarded EPA GMPO grant for intensive nutrient study of St. Louis Bay watershed
  - Continued sampling of benthic macroinvertebrate communities within wadeable streams throughout the state (M-BISQ)
  - Sampling of benthic communities and DO data within Delta waters
  - 319/BMA Projects

Tool Development

- MDEQ has developed and continues to develop and evaluate 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 IBI for Delta waters

Timeline

- System-wide approach to criteria development to ensure protection of downstream uses

- Public Comment Period for Non-Delta waters begins no earlier than June 30, 2013
  - Lakes and Reservoirs
  - Wadeable Streams; Non-wadeable Streams
  - Coastal and Estuarine Waters
- Public Comment Period for Delta Waters begins no earlier than November 30, 2014
- Adoption by Commission
- Approval by EPA

MDEQ 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.

MDEQ Nutrient Technical Advisory Group

GULF COAST
RESEARCH LABORATORY
THE UNIVERSITY OF SOUTHERN MISSISSIPPI

United States Department Of Agriculture
Agricultural Research Service

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

TAG Meeting – March 2013

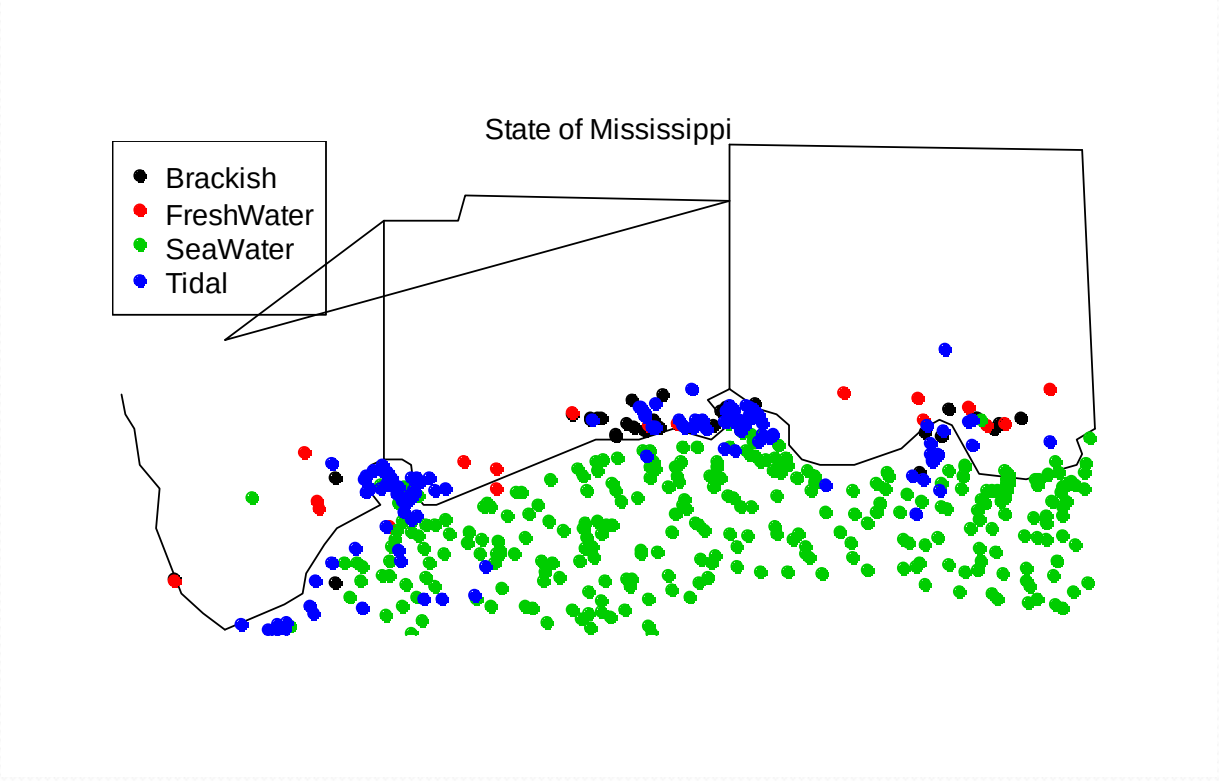
- Review and feedback of ongoing analysis of marine waters – estuary and coastal
- Reviewed empirical analysis of monitoring data
- Reviewed estuary specific mechanistic models and empirical analyses

Coastal and Estuarine Criteria

- Data Compilation
  - Sources
    - MCA, NCA, Other MDEQ WADES "coastal" data, special studies, targeted St. Louis Bay study
  - QA/QC
  - 9182 non-stream samples (754 stations)

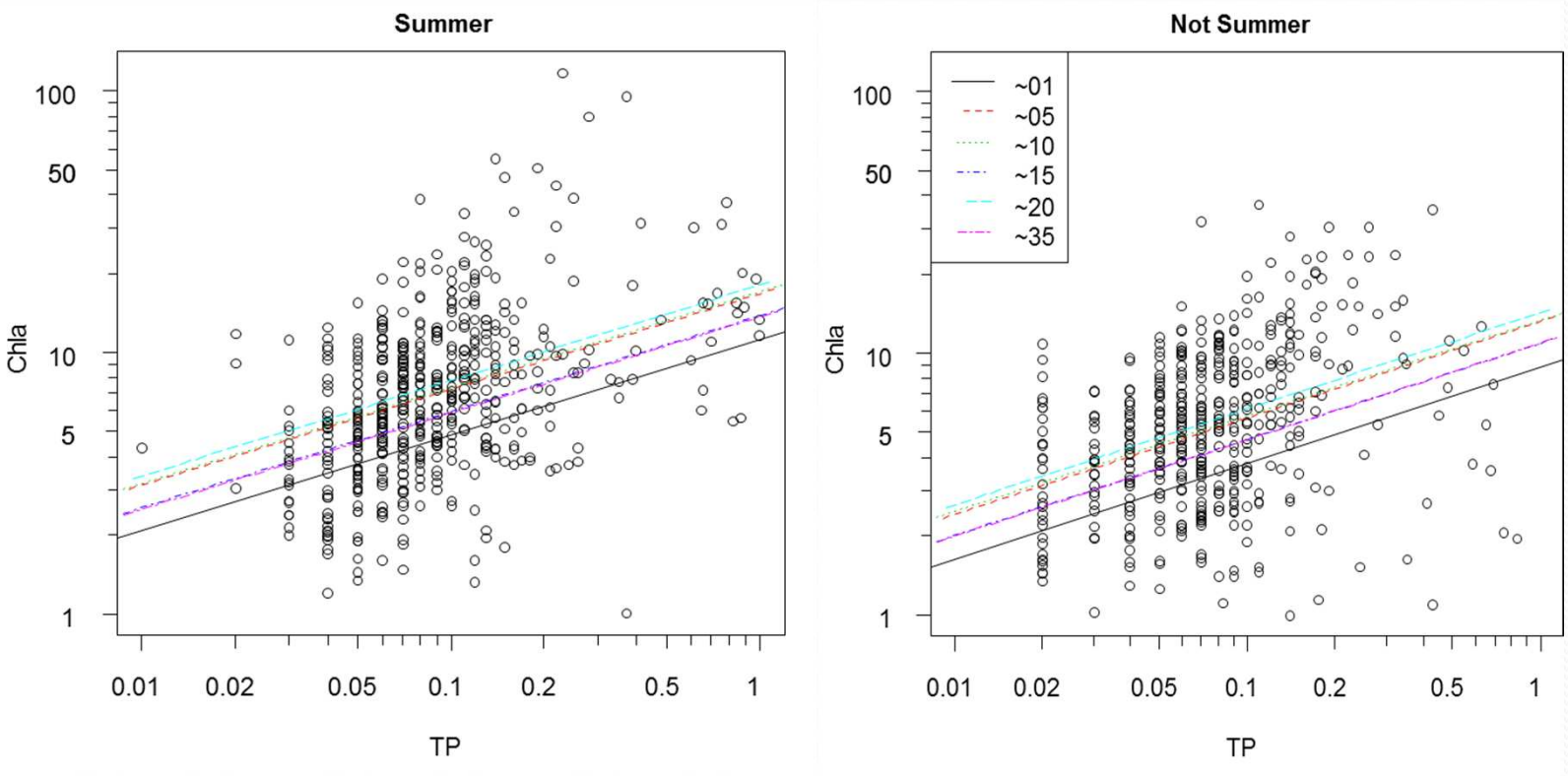
Coastal and Estuarine Criteria

- Classification
  - Analysis suggests Tidal Creeks, Bays, and Sound



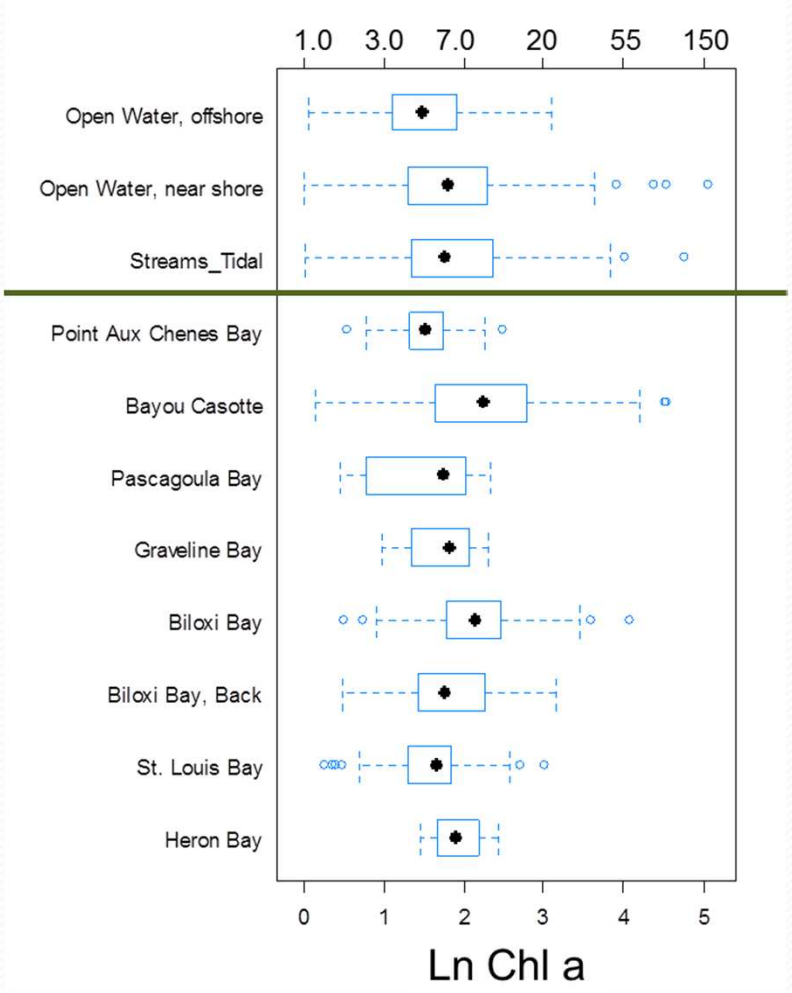
Coastal and Estuarine Criteria

- Analysis
  - Stressor-Response



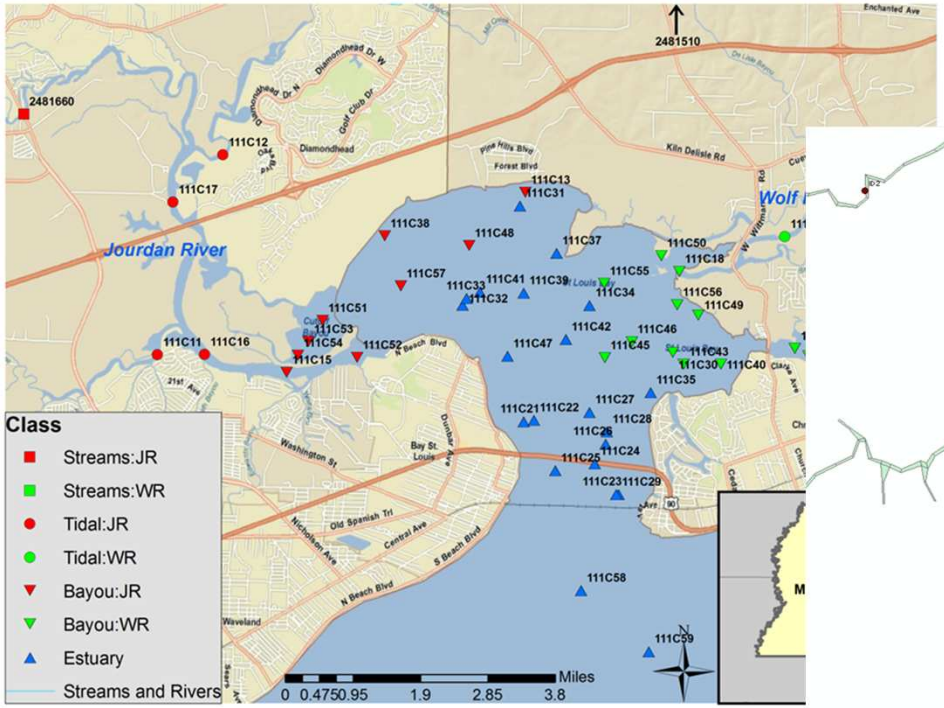
Coastal and Estuarine Criteria

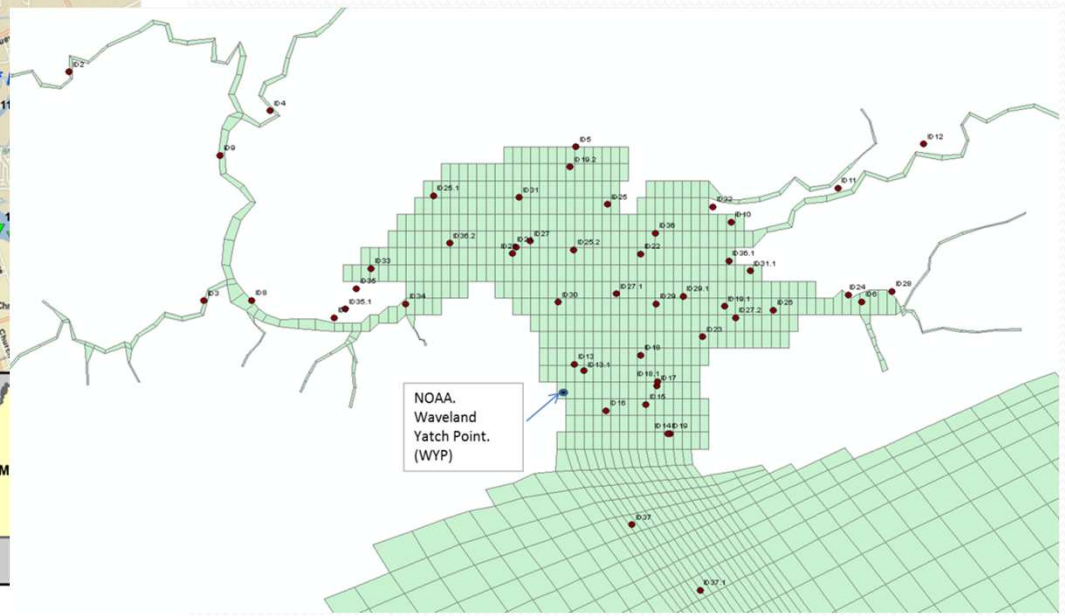
- Analysis
  - Reference
  - Existing Condition



Coastal and Estuarine Criteria

- Analysis
  - Mechanistic Modeling – St. Louis Bay





Coastal and Estuarine Criteria

- Weight of Evidence
  - Lines will be combined to generate endpoints
  - MDEQ anticipates generating options as for non-Delta Inland Waters
- Analysis ongoing
  - Completing mechanistic modeling efforts
  - Completing empirical analysis of monitoring efforts
  - Options anticipated by summer

Review of Previous Stakeholder Meeting: Inland Water Preliminary Options

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

Option 2 – Range 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: A site with no demonstrable nutrient effect (MBISQ, DO, or Section II.2 of MS WQS) and nutrients within or below range, does not violate criterion.

Site specific nutrient numeric would be adjusted to the long-term 75th percentile seasonal geometric mean.

*This was approach used for FL lakes

Option 3 – Range with bio-confirmation

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: A site is only impaired if it violates the upper range value and the MBISQ, DO, or Section II.2 of MS WQS. No impairment based on nutrients alone.

Could combine with option 2 for site specific adjustment.

*This was approach used for FL streams

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 – Range 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

- 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

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

Site specific nutrient numeric would be adjusted to the long-term 75th percentile seasonal geometric mean.

Option 3 – Range with bio-confirmation

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

Frequency: Not to be exceeded more than 2/5 years
- Based on stream criteria nutrient variability analysis

Implementation: A site would only be impaired which violates the chlorophyll a criterion or the upper range value and (the chlorophyll a criterion or DO minimum criterion or other nutrient related violation of Section II.2 of the MS water quality standards). No impairment would be made for violating the nutrient criterion alone. Could combine with option 2 as well, if desired, using the range.

Beyond the Number: Implementation Planning

- MDEQ formed interdivisional Implementation Workgroup to work through issues such as:
  - Permitting implications
    - Compliance Schedules
    - Variances/Mixing Zones/Others
  - Assessment implications
  - TMDLs/WLAs
  - Watershed Planning

Implementation Workgroup

- Workgroup developing implementation questions related to nutrient criteria 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?
- Subcommittees will develop responses to these questions
- Responses will ultimately be part of an implementation document/plan
- And other questions this stakeholder group may have

Moving Forward in MS

- MDEQ will continue work through the criteria development process with TAG support
  - Next TAG meeting: April 2013
- Stakeholder Outreach Continues to be MDEQ Priority
  - Opportunity for stakeholders to stay informed and also provide comments and/or concerns regarding criteria development efforts
- Heads Up! Next Nutrient Criteria Stakeholder Update
  - April 2013
  - Tupelo, MS

Moving Forward in MS

- Written comments on stream criteria have been received from stakeholders
  - Concerns about stressor-response analyses and defensibility
  - Agency reviewing concerns and communicating to TAG for their input
- We are not currently in the formal comment period – that will come later

Questions?
Comments?
Concerns?