

MEMORANDUM

SUBJECT: Request for a U.S. Environmental Protection Agency Science Advisory Board review of the Methods and Approaches for Deriving Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Estuaries, Coastal Waters, and Southern Inland Flowing Waters

FROM: Ephraim S. King, Director, Office of Science and Technology
Office of Water

TO: Stephanie Sazone, Designated Federal Official
USEPA Science Advisory Board Staff Office

This memorandum is to request a review from the U.S. Environmental Protection Agency (USEPA) Science Advisory Board (SAB) of proposed methods and approaches to derive numeric criteria for nitrogen/phosphorus pollution in Florida estuaries, coastal waters, and southern inland flowing waters.

On January 14, 2009, EPA made a determination¹ that "new or revised water quality standards for nutrients in the form of numeric nutrient criteria are necessary in the State of Florida to meet the requirements of the CWA (CWA section 303(c)(2)(A) and 40 CFR § 131.11(a)(1))."

To support EPA's establishment of numeric nutrient criteria, EPA has developed a document entitled: "Methods and Approaches for Deriving Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Estuaries, Coastal Waters, and Southern Inland Flowing Waters." This document describes methods and approaches that EPA is considering for the derivation of numeric criteria to protect Florida estuaries, coastal waters, and southern inland flowing waters from nitrogen/phosphorus pollution. In addition, the document describes the approach EPA is considering for developing downstream protection values (DPVs) for Florida streams to ensure the attainment and maintenance of downstream water quality standards.

EPA is submitting the attached documents listed below for a SAB review by the Nutrient Criteria Review Panel to assist us in ensuring that the numeric criteria derived have a strong scientific basis. If you have any questions, please contact Betsy Behl, Director of the Health and Ecological Criteria Division at (202)566-0788.

Attachments:

1. Charge to the Science Advisory Board (SAB) Nutrient Criteria Review Panel
2. Methods and Approaches for Deriving Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Estuaries, Coastal Waters, and Southern Inland Flowing Waters."

¹ U.S. EPA determination letter from Benjamin Grumbles to Mike Sole, January 14, 2009, <http://www.epa.gov/waterscience/standards/rules/fl-determination20090114.pdf>

**Charge to the
Science Advisory Board
Nutrient Criteria Review Panel**

**Methods and Approaches for Deriving Numeric Criteria for Nitrogen/Phosphorus
Pollution in Florida's Estuaries, Coastal Waters, and Southern Inland Flowing Waters**

Background

In 2011, EPA will propose numeric criteria for nitrogen/phosphorus pollution to protect estuaries, coastal areas and South Florida inland flowing waters that have been designated Class I, II and III¹, as well as downstream protective values (DPVs) to protect estuarine and marine waters. This is the second phase of a rulemaking effort as EPA has already established numeric criteria for Florida's lakes, flowing waters² and springs within the State of Florida, including DPVs for lakes.

As part of this current effort to derive chlorophyll-a, total nitrogen (TN) and total phosphorus (TP) criteria to protect estuarine and coastal water bodies, EPA must also develop additional criteria to assure that upstream criteria will meet standards established for downstream estuarine and marine waters in Florida. These DPVs, will supplement the existing inland water TN and TP stream criteria, if the applicable DPV is more stringent.

Overall, these numeric criteria are being developed to translate and implement Florida's existing narrative nutrient criterion, to protect the designated use that Florida has previously set for these waters, at Rule 62-302.530(47)(b), F.A.C. which provides that

"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."

Under the Clean Water Act and EPA's implementing regulations, these numeric criteria must be based on sound scientific rationale and reflect the best available scientific knowledge.

EPA has previously published a series of peer reviewed technical guidance documents³ to develop numeric criteria to address nitrogen/phosphorus pollution in different water body types. EPA recognizes that available and reliable data sources for use in numeric criteria development vary across estuarine and coastal waters in Florida and flowing waters in South Florida. In addition, scientifically defensible approaches for numeric criteria development have different requirements that must be taken into consideration in the context of the specific application and

¹ Class I Potable water supplies; Class II Shellfish propagation or harvesting; Class III Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife.

² In the November 2010 rulemaking, EPA did not establish numeric criteria for inland flowing waters in South Florida. For the purpose of this effort, EPA has distinguished South Florida as those areas south of Lake Okeechobee and the Caloosahatchee River watershed to the west of Lake Okeechobee and the St. Lucie watershed to the east of Lake Okeechobee.

³ U.S. EPA. 2000. Nutrient Criteria Technical Guidance Manual: Rivers and Streams. EPA-822-B-00-002; U.S. EPA. 2001. Nutrient Technical Guidance Manual: Estuarine and Coastal Marine Waters. EPA-822-B-01-003; U.S. EPA. 2010. Using Stressor-response Relationships to Derive Numeric Nutrient Criteria. EPA-820-S-10-001;

available information. This document describes the scientific approaches EPA is considering the derivation of numeric criteria to address nitrogen/phosphorus pollution in Florida estuarine and coastal waters, and inland flowing waters in South Florida, given the available data currently available.

Review Document: The SAB is asked to review the draft document, *Methods and Approaches for Deriving Numeric Criteria for Nitrogen/Phosphorus Pollution in Florida's Estuaries, Coastal Waters, and Southern Inland Flowing Waters*, and respond to the following charge questions.

Charge Questions:

1. General Approach

a) EPA has introduced a general conceptual model in Chapter 2, including the selection of assessment endpoint and indicator variables. What is your perspective of the general conceptual model?

b) EPA has delineated the State of Florida into 4 general categories of waters—Florida estuaries, Florida coastal waters, South Florida inland flowing waters, and South Florida marine waters—for purposes of considering approaches to numeric nutrient criteria development. Are these categories appropriate and scientifically defensible? (Note that the details of segmentation of waters within these categories is addressed in subsequent charge questions.)

Florida Estuaries (Chapter 3)

EPA is considering three approaches: (1) reference conditions, (2) stressor/response models, and (3) water quality simulation modeling that could be used independently or in combination to develop numeric criteria for estuaries (exclusive of marine waters in South Florida that are covered in Chapter 5). Estuarine waters are defined as “a part of a river or stream or other body of water that has an unimpaired connection with the open sea and where the sea water is measurably diluted with fresh water derived from land drainage”⁴.

2. Estuaries

- a) Are the data sources identified appropriate for use in deriving numeric criteria in Florida's estuaries (as discussed in Sections 2.4 and 3.2)? Is the SAB aware of additional available, reliable data that EPA should consider in delineating estuaries or deriving criteria for estuarine waters? Please identify the additional data sources.
- b) Are the assessment endpoints identified in Sections 2.3 and 3.2 (healthy seagrass communities; balanced phytoplankton biomass and production; and balanced faunal

⁴ U.S. EPA. 2000 Estuaries and Clean Waters Act of 2000, <http://water.epa.gov/type/oceb/nep/320.cfm> (accessed 11/1/2010)

communities) appropriate to translate Florida's narrative nutrient criterion (as cited above) into numeric criteria for Florida's estuaries, given currently available data? Does the SAB suggest modification or addition to these assessment endpoints? A literature review of endpoints considered can be found in Appendix B.

- c) EPA describes potential approaches in Section 3.3 (reference conditions, stressor response relationships, and water quality simulation models) for deriving numeric criteria in Florida's estuaries. Compare and contrast the ability of each approach to ensure the attainment and maintenance of natural populations of aquatic flora and fauna for different types of estuaries, given currently available data?

Florida Coastal Waters (Chapter 4)

EPA is considering a reference-based approach to derive numeric criteria for most of Florida's coastal waters. Coastal waters are defined as marine waters up to three nautical miles from shore⁵. Specifically, EPA is considering the use of a remote sensing method to develop numeric Chl_{RS-a} criteria for the Northwest Gulf Coast, West Gulf Coast, and Atlantic Coastal areas. Due to interference from colored dissolved organic matter and bottom reflectance on satellite measurements, EPA is not considering the derivation of Chl_{RS-a} criteria using remote sensing data in coastal waters from Apalachicola Bay to Suwannee River (Big Bend) and South Florida.

3. Coastal Waters

- a) Are the data sources identified in Sections 2.4, 4.1.1 and 4.2 appropriate for use in deriving numeric criteria in Florida's coastal waters? Is the SAB aware of additional available, reliable data that EPA should consider in delineating coastal waters or deriving criteria for coastal waters? Please identify the additional data sources.
- b) Is the assessment endpoint identified in Section 4.2 (chlorophyll-a to measure balanced phytoplankton biomass and production) appropriate to translate Florida's narrative nutrient criteria (described above) into numeric criteria for Florida's coastal waters, given currently available data? Does the SAB suggest modification or addition to this assessment endpoint?
- c) Does the approach EPA describes in Section 4.2 appropriately apply remote sensing data to ensure attainment and maintenance of balanced natural populations of aquatic flora and fauna in Florida's coastal waters? If not, please provide an alternate methodology utilizing available reliable data and tools, and describe the corresponding advantages and disadvantages.

⁵ Based on the Clean Water Act definition of "Waters of the United States"

South Florida Inland Flowing Waters (Chapter 5)

EPA is considering a reference-based approach to derive numeric criteria for South Florida inland flowing waters using least-disturbed sites that support balanced natural populations of aquatic flora and fauna. Alternative methods of criteria derivation for inland flowing waters include stressor-response relationships between chlorophyll-a and TN and TP, and a distributional approach using all sites. South Florida inland flowing waters are defined for this effort as free-flowing, predominantly fresh surface water in a defined channel and include, streams, rivers, creeks, branches, canals, freshwater sloughs, and other similar water bodies located in the South Florida nutrient watershed region⁶.

4. South Florida Inland Flowing Waters

- a) Are the data sources identified in Section 2.4 and 5.4 appropriate for use in deriving numeric criteria in South Florida's inland flowing waters (as discussed in Chapters 2 and 5)? Is the SAB aware of additional available, reliable data that EPA should consider in delineating or deriving criteria for South Florida's inland flowing waters? Please identify the additional data sources.
- b) Are the assessment endpoints identified in Section 5.4 (balanced faunal communities, i.e., aquatic macroinvertebrates, and balanced phytoplankton biomass and production) appropriate to translate Florida's narrative nutrient criteria (described above) into numeric criteria for South Florida's inland flowing waters, given currently available data? Does the SAB suggest modification or addition to these assessment endpoints?
- c) EPA describes two approaches in Section 5.4 (reference conditions and stressor-response relationships) for deriving numeric criteria in South Florida inland flowing waters. Compare and contrast the ability of each approach to ensure attainment and maintenance of balanced natural populations of aquatic flora and fauna in different types of flowing water or geographical areas, given currently available data?

⁶ The South Florida nutrient watershed region is the area *south* of Lake Okeechobee and the Caloosahatchee River watershed to the west of Lake Okeechobee and the St. Lucie watershed to the east of Lake Okeechobee. EPA is not deriving criteria that would apply to waters located on the Seminole Indian Reservation or the Miccosukee Indian Reservation, waters located in stormwater treatment areas (STAs), wetlands, or marshes; or Class IV canals. EPA is also not establishing new TP criteria for the Everglades Protection Area (EvPA) in deference to the Everglades Forever Act (EFA).

South Florida Marine Waters (Chapter 5)

EPA is considering a reference-based approach to derive numeric criteria in South Florida marine waters using least-disturbed sites that support balanced natural populations of aquatic flora and fauna. South Florida marine waters include estuarine and coastal waters extending three nautical miles offshore. Estuarine and coastal waters in South Florida are considered together because the watershed based approach for delineating water bodies is less suited in South Florida due to its highly managed inland flows and open-water dominated systems (i.e., Florida Bay and Keys)

5. South Florida Marine Waters

- a) Are the data sources identified in Section 2.4 and 5.5 appropriate for use in deriving numeric criteria in South Florida's marine waters (as discussed in Chapters 2 and 5)? Is the SAB aware of additional available, reliable data that EPA should consider in delineating or deriving criteria for South Florida's marine waters? Please identify the additional data sources.

- b) EPA describes two methods in Section 5.6 for using a reference condition approach for deriving numeric criteria in South Florida marine waters (least-disturbed sites or bionomial test). Compare and contrast the ability of each approach to ensure attainment and maintenance of balanced natural populations of aquatic flora and fauna in South Florida marine waters, given currently available data?

Downstream Protection Values for Florida Estuaries and South Florida Marine Waters (Chapter 6)

The approach that EPA is considering for developing stream DPV criteria is to adjust upstream limits on TN and TP loading rates that are needed to support balanced natural populations of aquatic flora and fauna in downstream estuarine waters. The loading limits will be determined as part of the criteria development effort for estuarine and marine waters (as described in Chapters 3 and 5) and are scaled based on the average streamflow entering the estuary to determine criteria for TN and TP concentrations in streams as they discharge into estuaries or marine waters.

DPVs can be determined for upstream reaches within watersheds by accounting for expected loss or permanent retention of TN and TP within the stream network. Because of the complexities associated with the managed flows in South Florida inland flowing waters that are covered in Chapter 5, the fraction of TN or TP from the upstream tributary reach that eventually flows into the marine waters in South Florida cannot be estimated or predicted. Therefore, EPA is considering expressing DPVs at the terminal reach of the tributary into a South Florida estuary as protective concentrations or, alternatively, protective loads.

6. Downstream Protection Values for Florida Estuaries and South Florida Marine Waters

- a. Are the methods EPA is considering for deriving downstream protection values (DPVs) for estuaries (excluding marine waters in South Florida) as described in Section 6.1-6.4 appropriate to ensure attainment and maintenance of downstream water quality standards, given available data? Please describe additional approaches and their advantages and disadvantages that EPA should consider when developing numeric criteria to protect these downstream estuarine waters (excluding marine waters in South Florida), given available data?
- b. Are the methods that EPA is considering for deriving downstream protection values (DPVs) for marine waters in South Florida as described in Section 6.5 appropriate to ensure attainment and maintenance of downstream water quality standards, given available data? Please describe additional approaches and their advantages and disadvantages that EPA should consider when developing numeric criteria to protect downstream marine waters in South Florida, given available data?