

Chapter 2: General Approach for Numeric Nutrient Criteria Development in Florida Waters



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Presentation Outline

- Delineation of Florida waters
- Review conceptual model
 - Selecting biological assessment endpoints
 - Selecting water quality variables
 - Linking biological endpoints to nutrient stressors
- Review of analytical approaches
- Request feedback from the SAB:
 - Waterbody Delineation
 - Conceptual Model

Goal for Numeric Nutrient Criteria Development in Florida Waters

- Derive numeric values to translate Florida's existing narrative criterion based on:
 - Published peer reviewed technical guidance including:
 - *Nutrient Criteria Technical Guidance Manual: Rivers and Streams* (USEPA 2000)
 - *Nutrient Criteria Technical Guidance Manual: Estuarine and Coastal Marine Waters* (USEPA 2001)
 - *Using Stressor-response Relationships to Derive Numeric Nutrient Criteria* (USEPA 2010)
 - Best available data
 - Compiled data for Florida waters
 - Sound scientific rationale
 - Use the latest scientific knowledge

Delineating Florida Waters

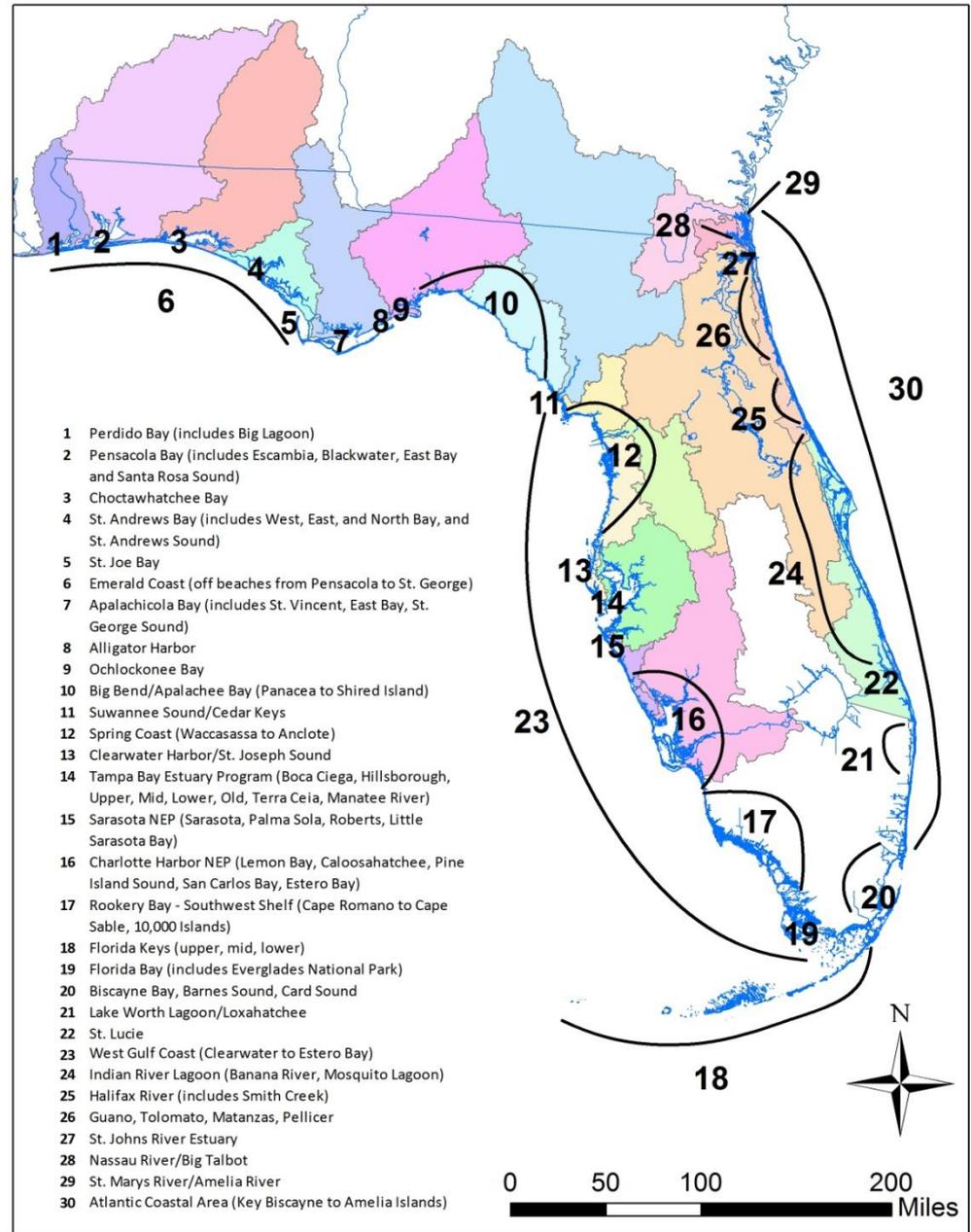
4 General Waterbody Classifications

1. Estuaries
2. Coastal Waters
3. Southern Inland Flowing Waters
4. Southern Marine Waters

Proposed Delineation for Estuary and Coastal Waters

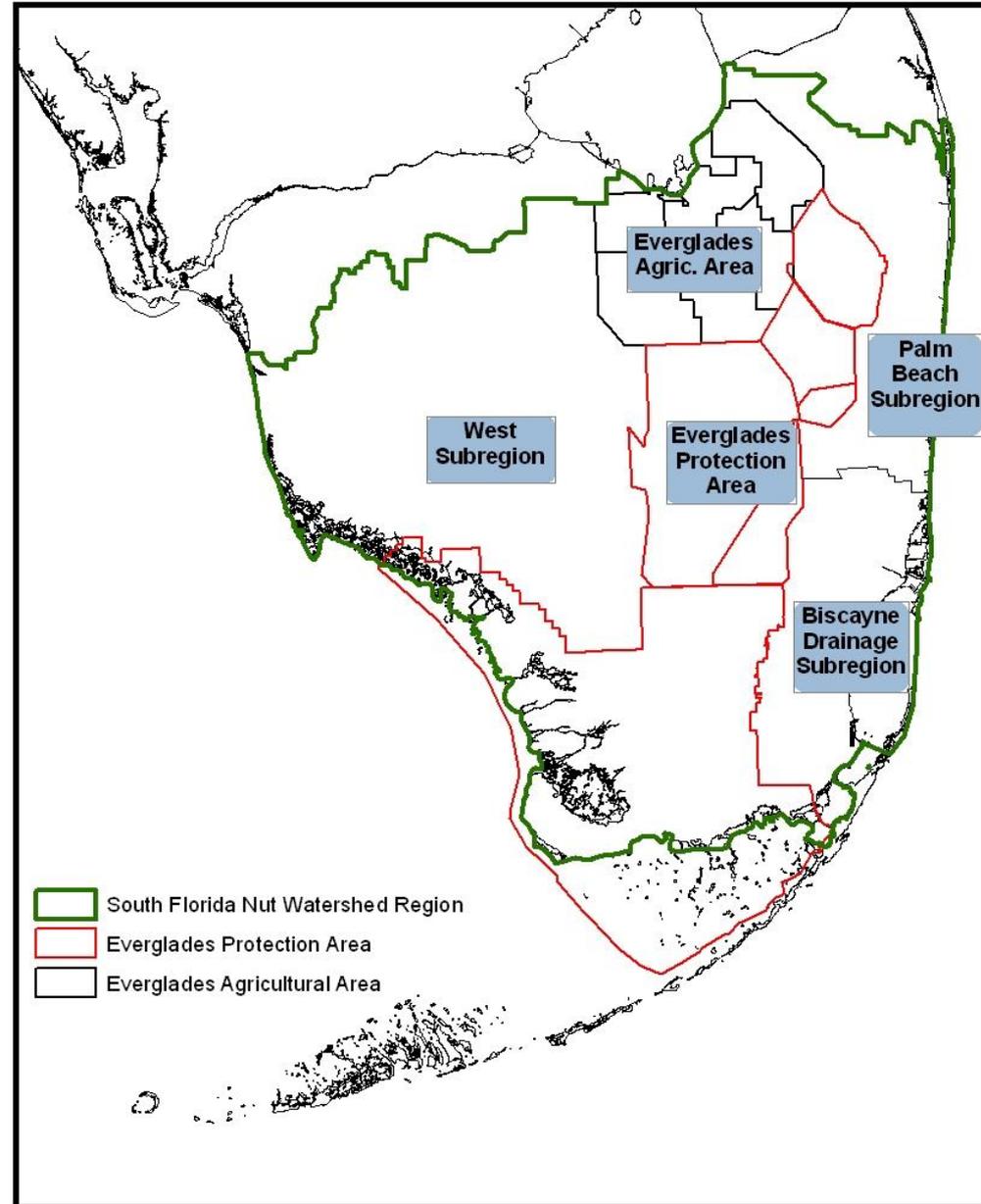
30 Systems

- 23 Estuaries
- 3 Coastal
- 4 Southern Marine



Potential classification system

- Soil type
- Drainage basins
- Existing management areas

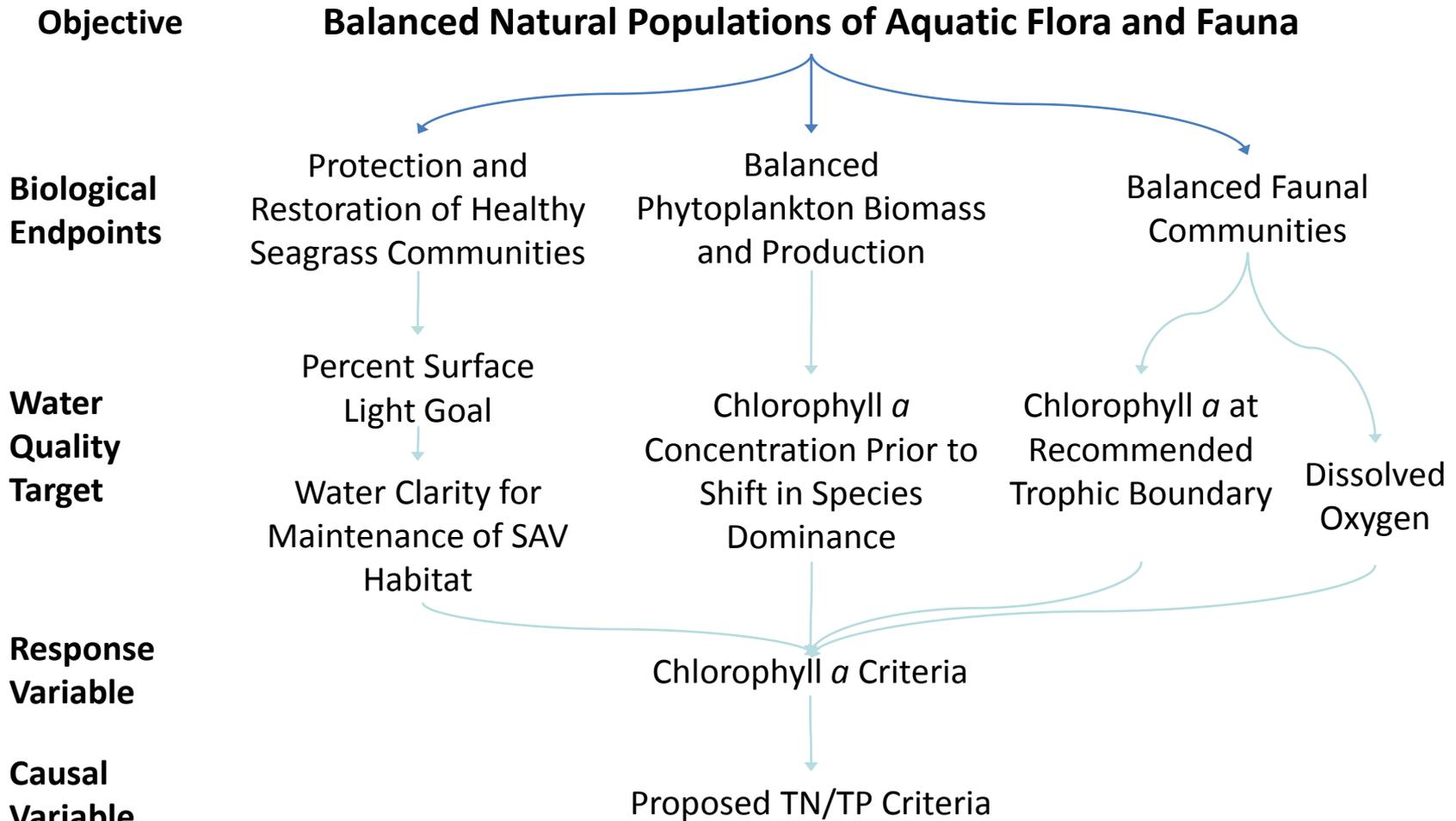


Conceptual Model: Characterizing Florida's Narrative Standard

Florida's Narrative Standard = Aquatic Life Use Protection

- Biological assessment endpoints can be used to characterize aquatic life use protection
 - Correlated with ecosystem health
 - Expected to be sensitive to nutrients
- Water quality indicator variables relate to biological assessment endpoints
 - Provide the expression of the numeric criteria

Conceptual Model: Defining Aquatic Life Use Support for Florida Waters



Conceptual Model:

Defining Aquatic Life Use Support for Florida Waters

Healthy Seagrass Communities

- Seagrasses widely distributed in Florida estuaries, but not present everywhere.
- Seagrass depth of colonization is a quantifiable indicator of seagrass community condition.
- Nutrient enrichment expected to decrease depth of colonization.
- Water Clarity is an indicator of chlorophyll-a.
- Chlorophyll-a criteria can be derived based on light requirements of seagrasses.
- TN and TP criteria could be based on relationships between TN or TP and chlorophyll-a.



Conceptual Model: Defining Aquatic Life Use Support for Florida Waters

Balanced Phytoplankton Biomass and Production

- Some Florida waters are naturally without seagrasses and are unlikely to develop low oxygen due to physical factors.
- Studies link high biomass to increased incidence of nuisance algal species.
- EPA is considering chlorophyll-a as an indicator of balanced phytoplankton biomass and production.
- TN and TP criteria could be based on relationships between TN or TP and chlorophyll-a.



Conceptual Model: Defining Aquatic Life Use Support for Florida Waters

Balanced Faunal Communities

- Low dissolved oxygen (hypoxia) is a potential cause of degradation of faunal communities, especially benthic species.
- Dissolved oxygen requirements can be associated with chlorophyll-a concentrations
- EPA is considering chlorophyll-a as an indicator to support faunal communities.
- TN and TP criteria could be based on relationships between TN or TP and chlorophyll-a.



Biological Endpoints and Indicator Variables Not Selected

Biological Assessment Endpoints

- Balanced population of macroalgae
- Balanced production of epiphytes
- Natural occurrence of harmful algal blooms
- Protection and restoration of coral communities
- Protection of healthy salt marsh communities

Water Quality Indicator Variables

- Water clarity
- Dissolved oxygen

General Analytical Approaches

Reference condition

Stressor-response relationships

Water quality simulation models

- All are scientifically robust approaches that depend on:
 - Ecological characteristics of the system
 - Types and quantity of data available
- Can be used separately or in combination

Charge Questions

- a) EPA has introduced a general conceptual model 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?