

Chapter 5: Numeric Nutrient Criteria Development in South Florida Marine¹ and Inland Flowing Waters



Photo credit: Dan Scheidt

Presented by:
Dr. Jacques L. Oliver
EPA Office of Water
Office of Science and Technology

EPA Science Advisory Board
December 13–4, 2010
Washington, D.C.

¹ Includes estuarine and coastal marine waters

Outline

- South Florida
- Analysis Plan for Inland Flowing Waters
- Analysis Plan for Marine Waters
- Key Issues

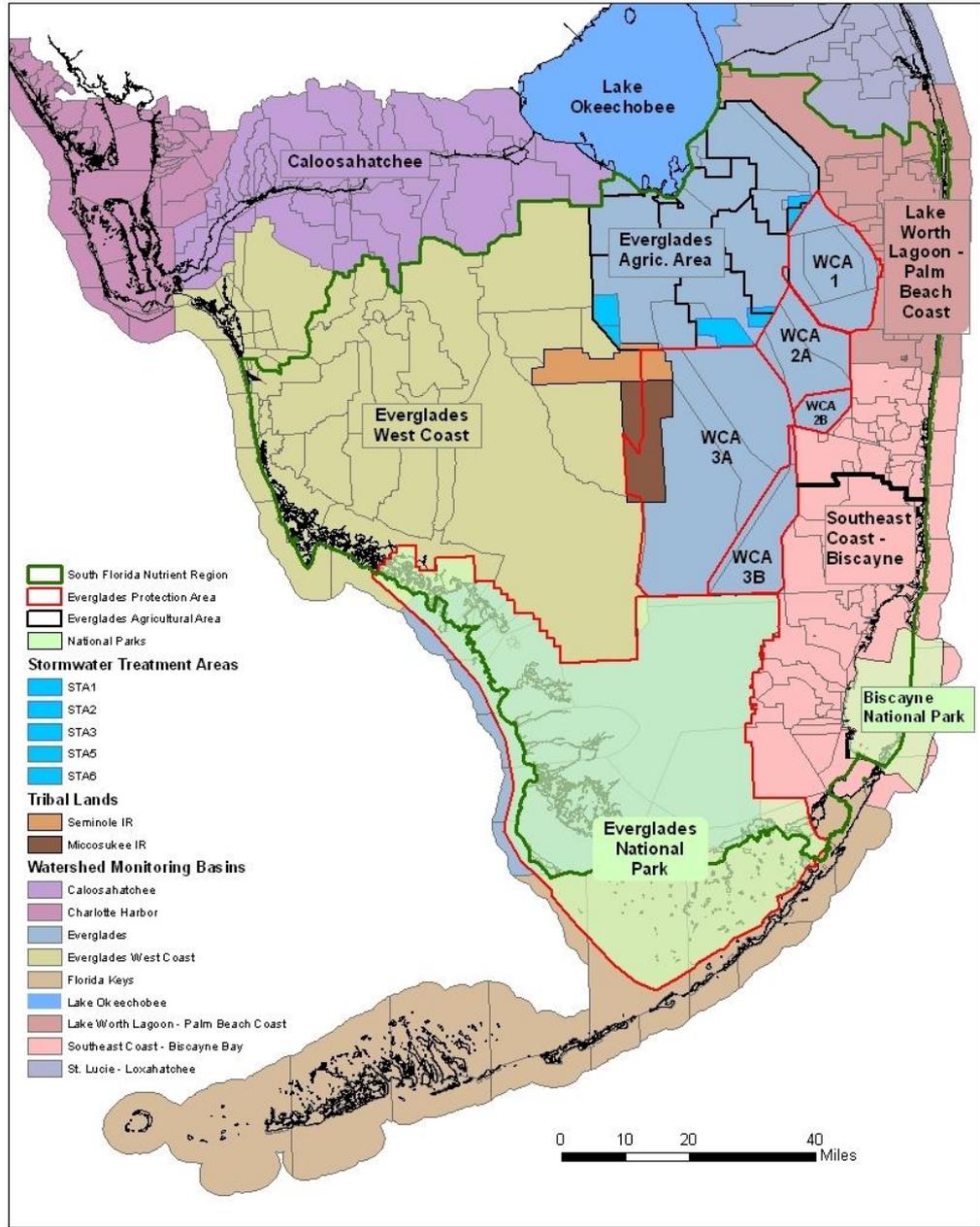
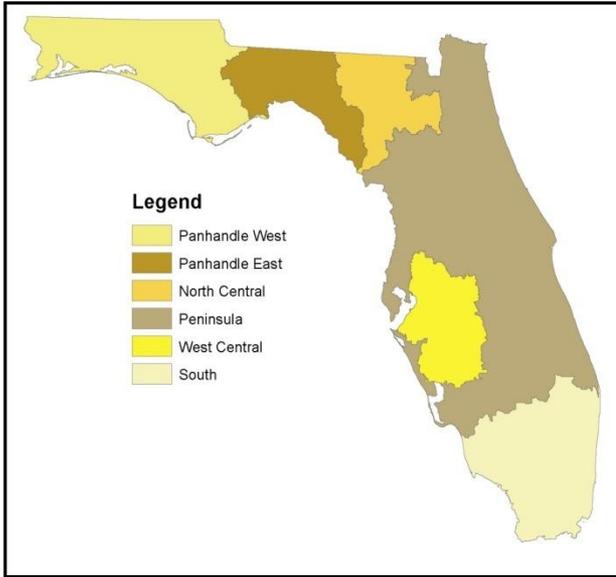
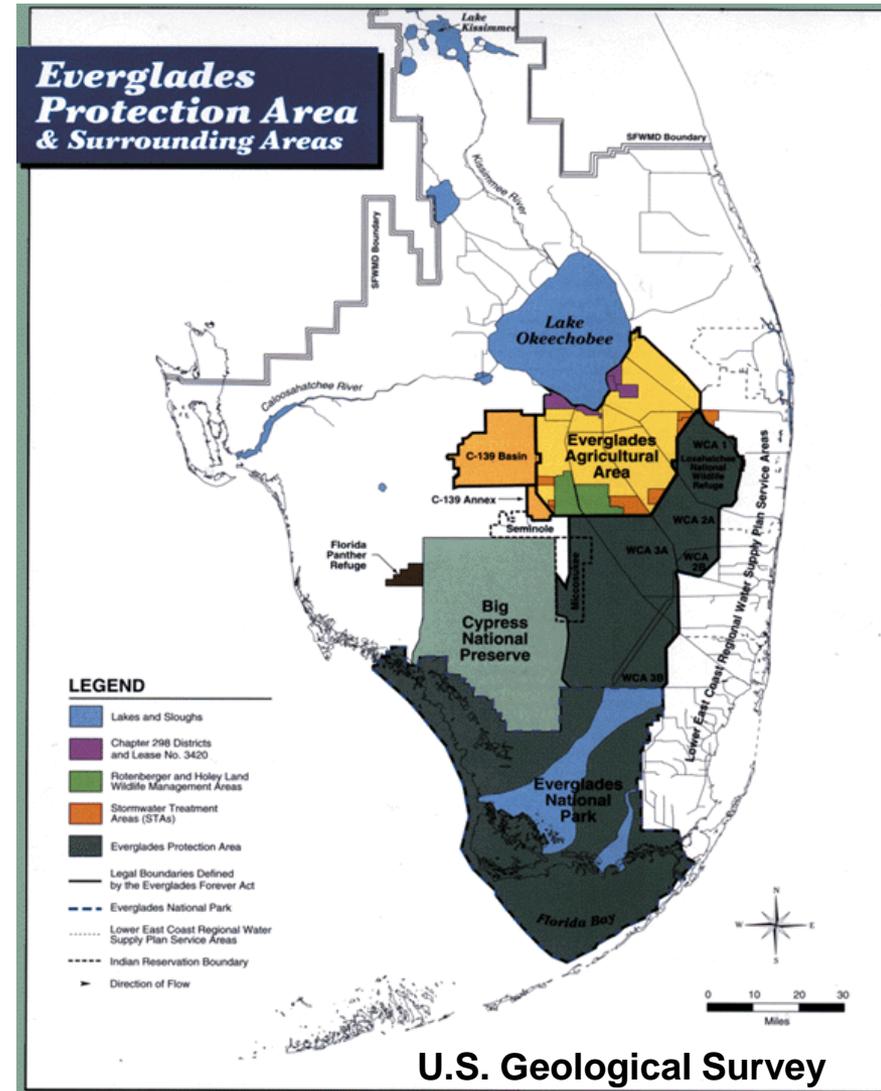


Photo credit: Dan Scheidt

- Everglades Protection Area (EvPA) TP criterion
 - 10 $\mu\text{g/L}$, long-term geometric mean
 - Presence of Stormwater Treatment Areas (STAs)
 - Designed to remove surface water phosphorus prior to discharge into the EvPA

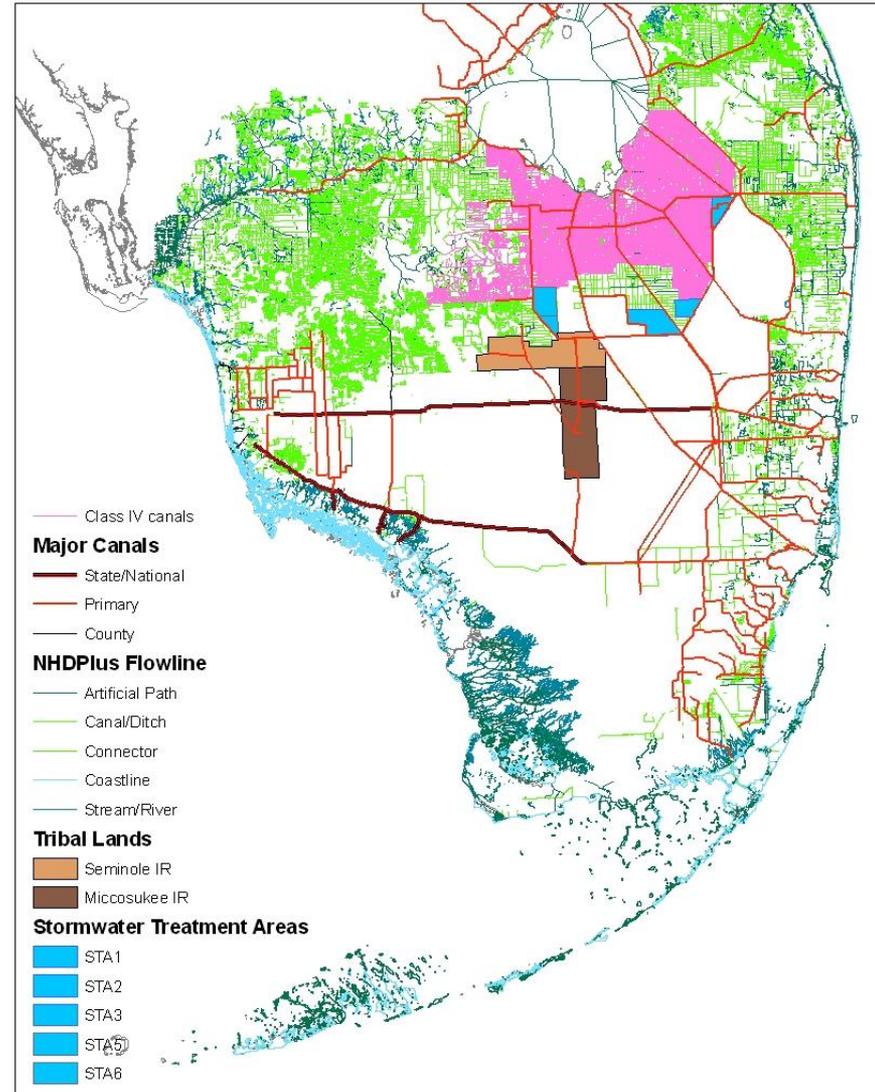


Analysis Plan: Inland Flowing Waters

1. Identify inland flowing waters
2. Classification
3. Criteria development
 - Reference approach
 - Stressor-response approach

Inland Flowing Waters: Identification

- “Predominantly fresh waters” (surface water chloride concentration < 1,500 mg/L)
- Data sources:
 - FL’s Impaired Waters Rule (IWR) data
 - National Hydrograph Dataset (NHDPlus)
 - GIS coverage of Class IV waters
 - Surrounding land use information
- Exclude Class IV waters

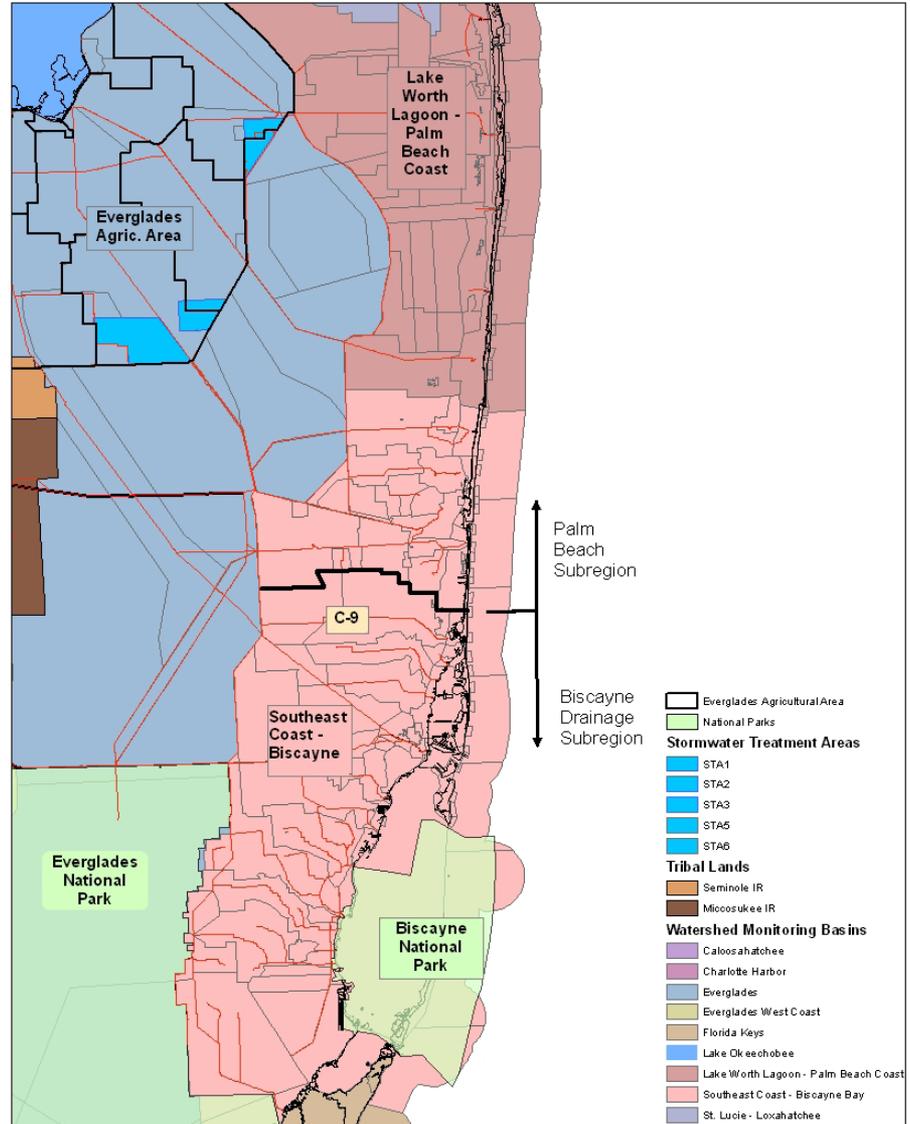
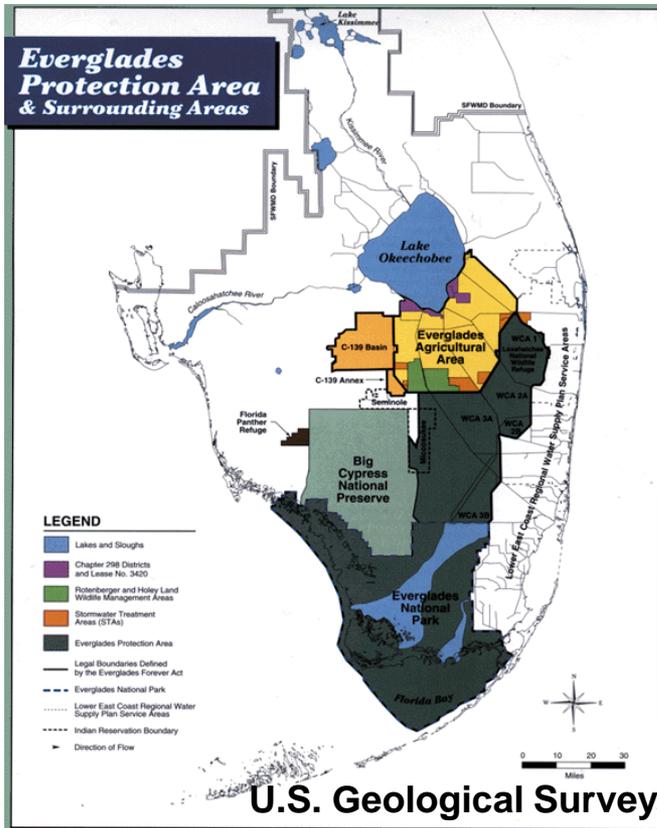
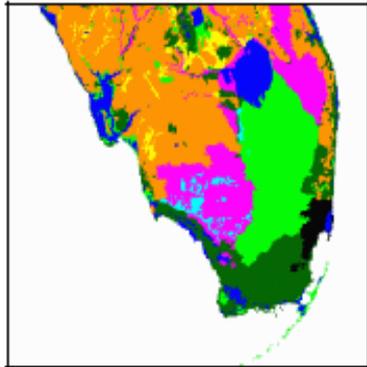


Inland Flowing Waters: Classification

STATSGO

Soil Orders

- Alfisol
- Entisol
- Histosol
- Inceptisol
- Mollisol
- Spodosol
- Ultisol
- Urban Land
- Water



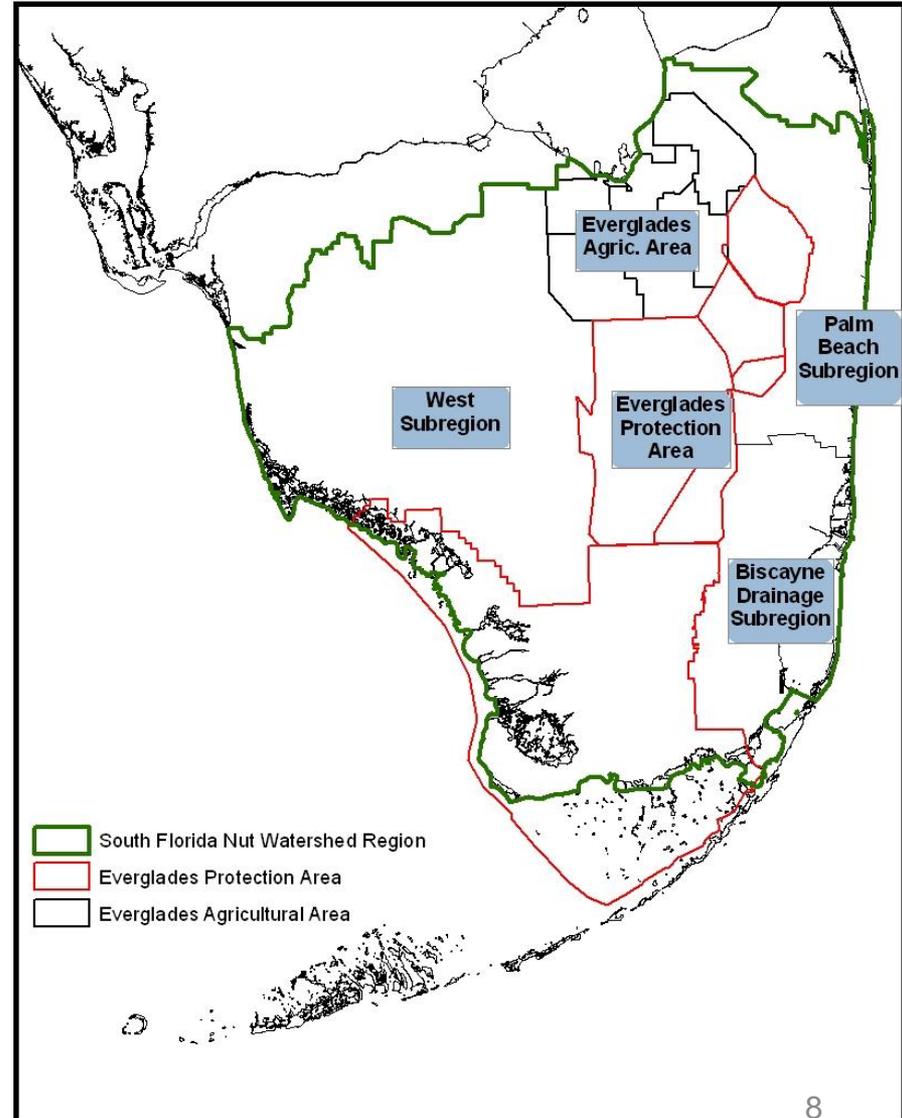
Inland Flowing Waters: Classification

Potential Classification

- Everglades Agricultural Area (EAA)
- Everglades Protection Area (EvPA)
- West Subregion
- Biscayne Drainage Subregion
- Palm Beach Subregion

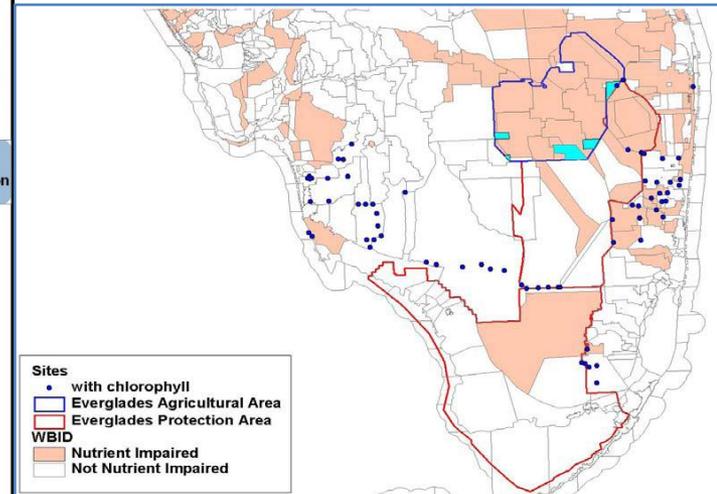
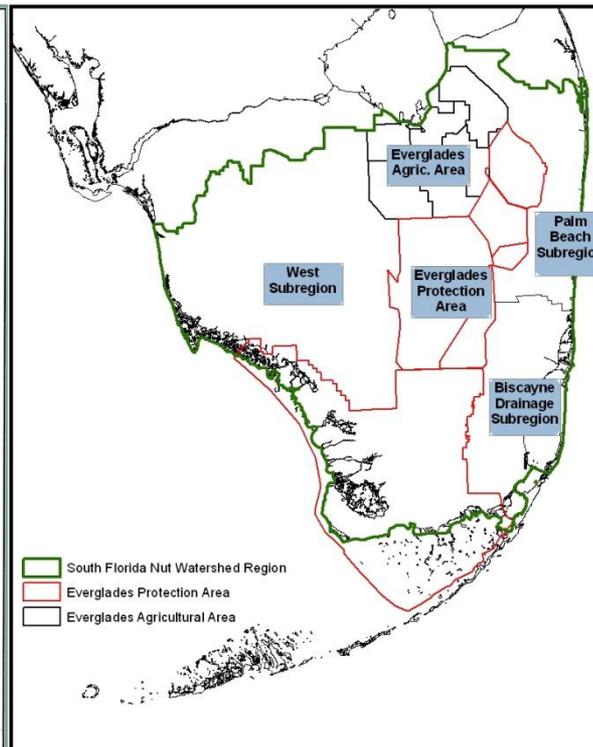
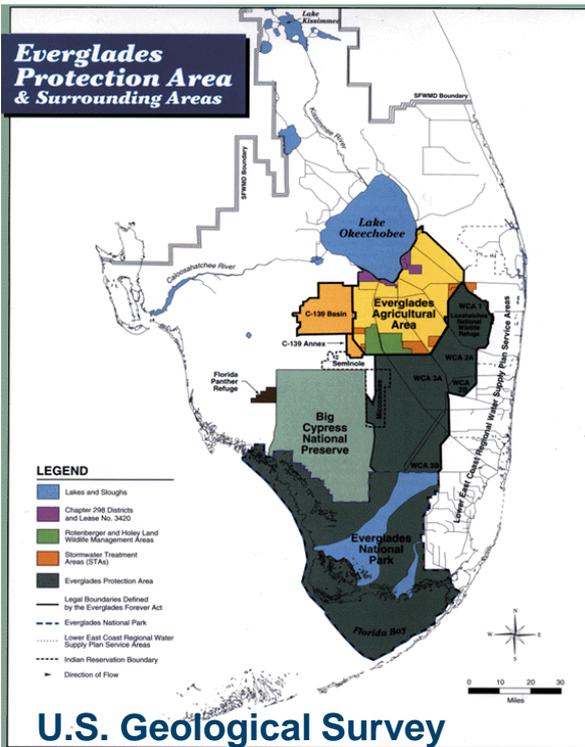
Alternatives

- Combinations of subregions



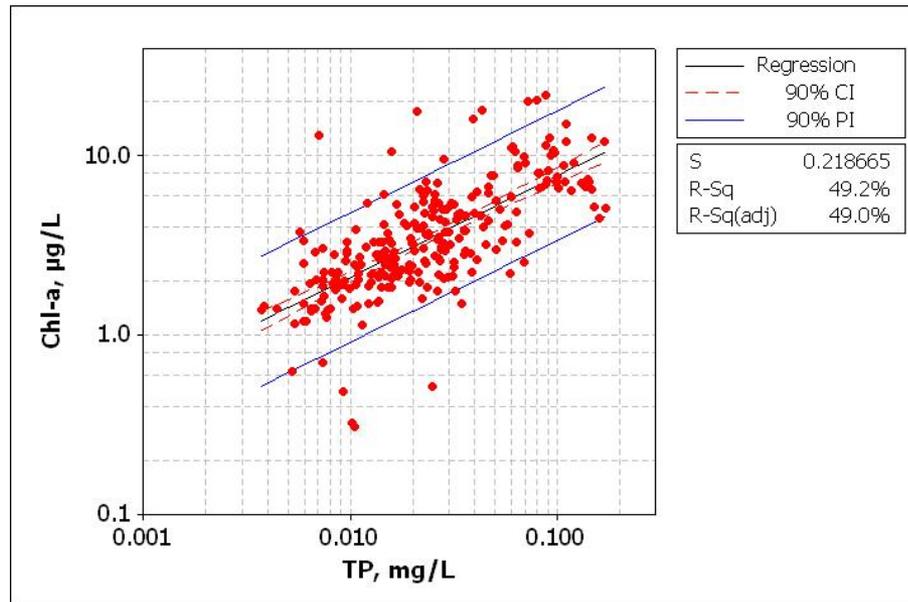
Inland Flowing Waters: Approaches and Data Sources

- **Reference Approach – TN, TP criteria**
 - Comparative reference: least-disturbed sites, all sites
 - Water quality data sources: IWR Run 40, South FL Water Management District (i.e., DBHYDRO), local agencies (e.g., Broward and Miami-Dade Counties)



Inland Flowing Waters: Approaches and Data Sources

- **Stressor-Response Approach** – TN, TP based on empirical relationship with a response endpoint
 - Stressors: TN, TP
 - Response: chl-a
 - Water quality data sources: IWR Run 40, South FL Water Management District (i.e., DBHYDRO), local agencies (e.g., Broward and Miami-Dade Counties)



Analysis Plan: Marine Waters

1. Identify marine waters
2. Classification
3. Criteria development
 - Reference approach

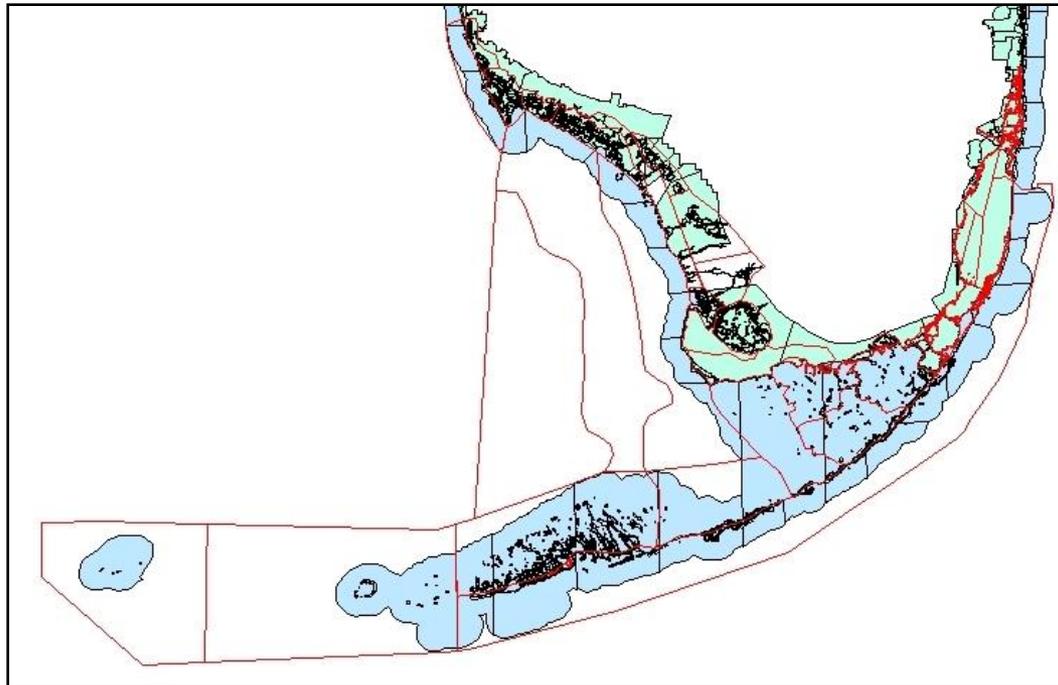
Marine Waters: Identification

- Estuarine/marine waters
 - Surface water chloride concentration > 1,500 mg/L
- Data sources:
 - FL's Impaired Waters Rule (IWR) data
 - FL's estuarine and coastal waterbody ID (WBIDs)

Marine Waters: Classification

Principal component and cluster analysis

- Segments waters based on geomorphologic and geochemical characteristics
- Considers areas of distinct nutrient composition, SAV distribution, bathymetry, salinity, and a variety of other water quality related parameters



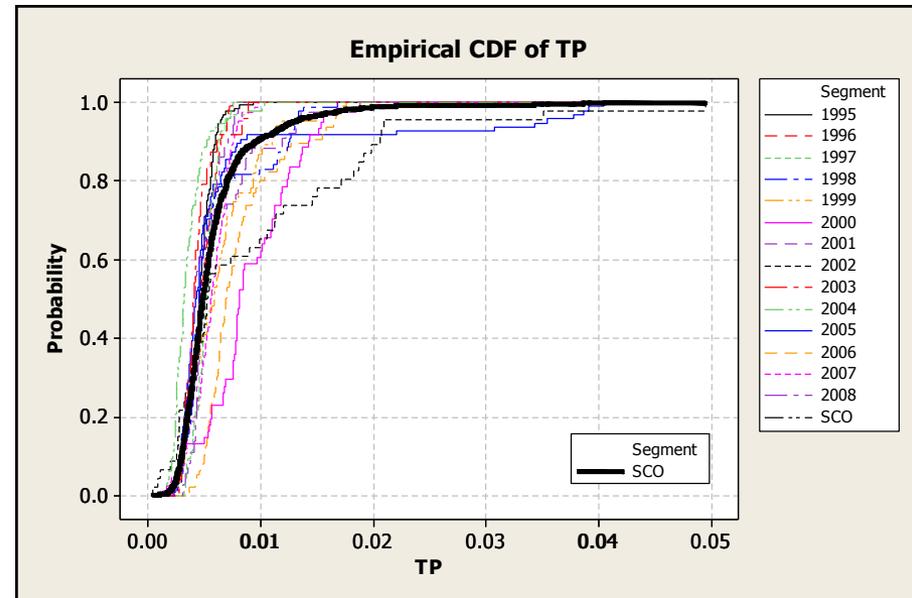
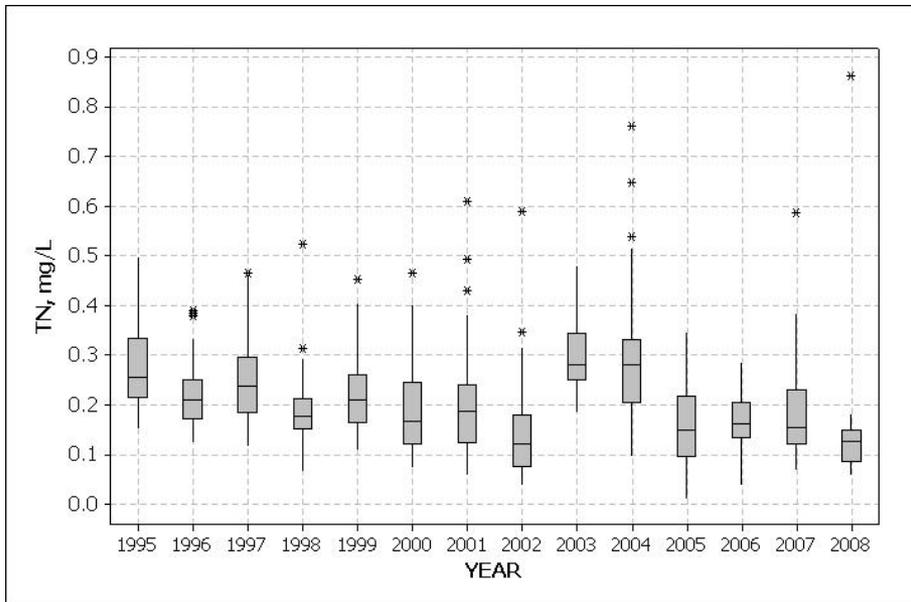
- National Park Service (NPS)
- Florida International University-Southeast Environmental Research Center (FIU-SERC), National Oceanic and Atmospheric Administration (NOAA)

Marine Waters: Approaches and Data Sources

- **Reference Approach** –TN, TP, chl-a
 - Historical reference approach: Maintain current conditions (defined over a long-term record)
 - Water quality data sources:
 - Scientific literature and collaborators:
 - NPS
 - FIU-SERC, NOAA

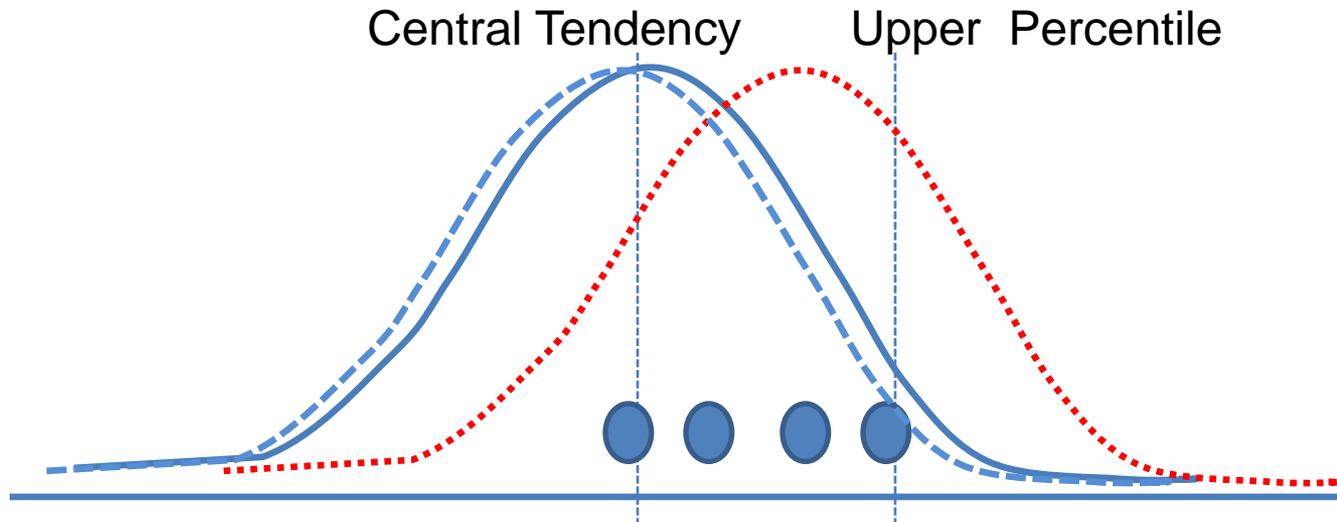
Marine Waters: Approaches

- Historical reference approach (long-term conditions)
- Example: Criteria expressed as two numbers: central tendency and upper percentile of a long-term distribution
 - Protect against shifts of the central tendency in WQ and rare, high magnitude events



Marine Waters: Approaches

Example: Binomial Test



Key Technical Issues

- Complex hydrology, altered habitats and geology in South Florida
 - Classification
 - Aquatic life support → Endpoints

Charge Questions

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?

Charge Questions

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 binomial 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?