#### Developing a Nutrient Management Strategy for Southwest Florida Tidal Creeks

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## Partners



#### Multiple Project Goals

Grantor (EPA Wetlands Program Development Grant)
Accelerate research on wetlands

National Estuary Programs/Stakeholders
Develop management level nutrient targets and thresholds for tidal creeks

FDEP/ EPA Standards
Inform regulatory criteria for tidal creeks

### Florida Numeric Nutrient Criteria

Hierarchy 1: (Site-specific)	Level II Water Quality-Based Effluent Limitations, Nutrient Total Maximum Daily Loads, Site Specific Alternative Criteria, Reasonable Assurance Plans, and Estuary-specific Criteria	
Hierarchy 2: Lakes/Springs	Stressor-Response Relationships (lakes & springs)	
Hierarchy 3: Streams	Reference-based thresholds (streams) combined with biological data (flora and fauna)	ect Goal
Hierarchy 4: Narrative wetla	Ditches/canals used for water conveyance, inds, non-perennial streams, tidally fluctuating areas, and South Florida flowing waters	Proje



# Creek Classification and Selection (16 creeks sampled)

#### Creek Classification and Selection Based On Watershed Characteristics Only











#### **Chlorophyll a and Dissolved Oxygen**





Log Chlorophyll (ug/l)

#### Stressor Response Analysis

Nutrients -> Chla – Linear regression, GLMM, Decision Tree Analysis

- Chla -> DO GLMM, Decision Tree, Quantile Regression
- DO -> Fish Linear, Logistic regression, Species specific LC50
- Fish indices Diversity indices, CPUE, length frequency index, Biomass

Landscape effects – GIS based

### **Review of Findings**

- \* Tidal creeks are critical habitat for estuarine dependent fish.
- \* The water quality was characteristic of wetland environments.
- Existing DO and Chlorophyll criteria not reliable indicator of "impairment" in southwest Florida tidal creeks.
- \* Observed nutrient levels have not yet resulted in highly eutrophic or dystrophic conditions in sampled creeks.

### The Reference–Based Approach

Setting Targets and Thresholds in the Absence of an Observed Adverse Effect

#### Stewardship Management Regulatory





### Relationship to "Assimilative Capacity"

#### Nutrients and Fish Diversity Indices





### The Eutrophication Paradigm

#### Comparative Evaluation of Fishery Response to Nutrients



Source: Redrawn from Caddy 1993.

Distribution of Total Nitrogen by Creek



Annual Geometric Average Total Nitrogen (mg/l)



### **Benefits of Management Strategy**

- Includes stewardship, management and regulatory components.
- \* Based on observed, locally derived data.
- Includes nutrients, not just assumptions about DO/Chla and nutrients.
- Provides early detection mechanism with associated management responses.
- \* Provides a mechanism to further NEP CCMP goals.
- Encourages more science as basis for improving site-specific targets.

#### **Current/Future Efforts**

- \* Supplemental Grant to follow up ("One County, One Creek").
- \* Investigate interaction between source water, wetland vegetation, organic decomposition, and nutrients.
- \* Use data from larger tidal rivers to inform Stewardship.
- \* Develop additional indices morphology habitat.

# Thanks!

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