

# Eutrophication Assessment on Waites Island

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### Hypothesis

- The water quality on Waites Island is high due to its placement on an uninhabited area
- The lack of human impact should keep the eutrophication level low

### Eutrophication

- Nutrient Loading (nitrogen and phosphorus)
  - Fertilizers
  - Feces
    - Humans
    - Pets
    - Livestock (horses)
    - Wildlife
- Stimulates Algal Growth (chlorophyll and turbidity)
- Algae and their Consumers Die
- Organic Matter Decays (TSS, VSS, color)
  - Aerobic Respiration by Heterotrophic Bacteria
- Dissolved Oxygen Deficits (dissolved oxygen)
  - Hypoxia
  - Anoxia

### SUMMARY OF EUTROPHICATION CRITERIA

Analytes	Estuary*	Rivers*		South Carolina Lakes Class FW
		Ecoregion XII	Ecoregion XIV	
Phosphorus (ppm P)	0.01	0.04	0.031	0.06
Nitrogen (ppm N)	0.1	0.9	0.7	1.5
Chlorophyll <i>a</i> (ppb)	5	0.4	3.8	40
Turbidity (NTU)	NA	1.9	3	50

\*in draft form: Ambient Water Quality Criteria Recommendations from US EPA's Office of Water

Ecoregion XII: Southeastern coastal plain of FLA, GA, MISS, ALA

Ecoregion XIV: SC, NC, VA, MD, DE, NJ, NY, CT, RI, MA, NH, ME

\*\* in draft form from: National Estuarine Eutrophication Assessment: Effects of Nutrient Enrichment in the Nation's Estuaries (Bricker et al. 1999) from NOAA

South Carolina: R.61-68 Water Classification and Standards approved 2001

- Conductivity / Total Dissolved Solids
  - Water sources
    - Rain water
    - Groundwater
- pH and alkalinity
  - Acid is byproduct of aerobic respiration
  - Acid consumes natural buffers (alkalinity)
- Conclusions
  - All sites have impairments in chlorophyll, turbidity and dissolved oxygen relative to US EPA and SC Water Quality Criteria
  - Two sites have phosphorus impairments
  - One site has nitrogen impairment (relative to NOAA estuarine criteria)
  - Three of four sites have impairments in fecal coliform levels, two of these had nutrient impairments
  - One site has impairments in pH and alkalinity (sensitive to acid rain impacts)
- Draft eutrophication water quality criteria need revisions to accommodate blackwater swamp ecosystems
- If these creeks are viewed as being impaired, then they have the potential to "contaminate" the coastal ocean

## Experimental Design

- Sample three creeks that drain an undeveloped area
- Collect water five times through the summer after recent rainfalls
- Sampled approximately every other week



Chigger Springs  
Artesian Spring?



## Hydrolab

- Conductivity
  - US EPA Method 120.1
- Temperature
  - US EPA Method 170.1
- Dissolved Oxygen
  - US EPA Method 360.1

## Methods

- pH
  - US EPA 150.1: Electrode
- Alkalinity
  - US EPA 310.1: Titration
- Turbidity
  - US EPA Method 180.1: Nephelometry
- Chlorophyll
  - Standard Methods 10200 H: Fluorometry
- Color
  - US EPA Method 110.2: Absorption at 445 nm
- Fecal Coliforms
  - Standard Methods 9221 E.2: Most Probable Number
- Total Suspended Solids and Volatile Suspended Solids
  - US EPA Method 160.3: Gravimetry
- Nutrients
  - US EPA Method 300.1: Ion Chromatography



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