National Estuarine Research Reserve System

Promoting stewardship of the Nation’s estuaries through science and education using a system of protected areas.
Protected for:

- Long-term research and monitoring
- Education
- Resource Stewardship
A network of 26 reserves in 21 states and territories
National Programs

- Graduate Research Fellowship Program
- Coastal Training Program
- Partnership with the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET)
- System-wide Monitoring Program
System-wide Monitoring Program

- Identify and track short-term variability and long-term changes in the integrity and biodiversity of representative estuarine ecosystems and coastal watersheds for the purposes of contributing to effective national, regional and site specific coastal zone management.
System-wide Monitoring Program

- Abiotic Monitoring
- Biotic Monitoring
- Land Use, Habitat Mapping and Change
Initial Deployment Coverage

Enhanced Deployment Coverage

“Estuarine Gradients”

• Salinity
• Land-use
• Habitat
• Vertical

Reference

Non-point source influenced
Abiotic Monitoring

Water quality variables:
- Temperature
- Conductivity
- Dissolved oxygen
- Turbidity
- Water level
- pH

Nutrients: Orthophosphate, Ammonium, Nitrate, Nitrite, Chlorophyll a
YSI 6600 EDS

pH

Chla

NTU

DO

Temp/Cond.
SWMP: Nutrient and Chla Monitoring Program

- **Monthly grab sampling program**
  to quantify the spatial and temporal variability of selected nutrients and Chla along the salinity gradient in the York River

- **Diel sampling program**
  to quantify the short-term (tidal) variability of selected nutrients and Chla in a tidal marsh creek system

**Measured Parameters**

- **Tier I (required)**
  NH4, NO3, NO2, PO4, Chla

- **Tier II (optional)**
  Si, TN, TP, TDN, TDP, TOC, DOC, TSS
Abiotic Monitoring

Weather variables:
- Temperature
- Wind speed and direction
- Relative humidity
- Barometric pressure
- Rainfall
- Photosynthetically Active Radiation
Centralized Data Management Office

- Oversees the management, documentation and publication of data on the Internet.
- Provides:
  - QA/QC
  - Training, data management strategies and protocols.
  - Internet access to data http://cdmo.baruch.sc.edu
SWMP Syntheses
Abiotic Monitoring Syntheses

- Characterize water quality conditions at sites.
- Determine the frequency, duration, and periodicity of water quality variables.
- Compare water quality variables among NERR systems and regions.
- Determine impacts of storm events.
Frequency of occurrence and duration of hypoxia at NERR sites, 1995-2000

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Duration of Hypoxia in West Coast Reserves
Impacts of Storms

- Bertha
- Fran
- Josephine

Graph showing mean daily salinity (ppt) from January 1, 1996, to December 31, 1996, with data points for niwol and noczi.
Conclusions

- Hypoxic events are generally of short duration
- Most hypoxic events occurred in summer (warm water)
- Hypoxia was most frequently observed at sites in lower latitude having warm water temperature
- Reserves in the Gulf of Mexico and Caribbean had the highest occurrence of hypoxia >24 h duration
- With a few exceptions for salinity, changes to water quality parameters during the passage of tropical storms were abrupt and short-lived.
SWMP Data Uses and Links to Other Programs

Local

South Slough restoration of Winchester tidelands. SWMP data used to measure DO following dike removal.

Regional

Chesapeake Reserves expanding with EPA funds – Linking with Chesapeake Bay monitoring (e.g., Eyes on the Bay)

Rookery Bay: Provides baseline data for South Florida Restoration efforts.
Interface Model for Links Between Watershed, Estuary, and Nearshore Ocean Elements

- Nutrient Dynamics
- Sediment Flux
- Larval Transport

ANTHROPOGENIC STRESSORS
- i.e. Habitat Loss, Bacterial Loading, Exotic Species
South Slough
Estuarine Gradient

MARINE / BAY
Boathouse

MARINE
DOMINATED
Charleston

MESOHALINE
Valino Island

RIVERINE
Winchester Creek

Pacific Ocean
Coos Bay
South Slough NERR
South Slough Reserve – Winchester
Tidelands Restoration: Dike Removal and Experimental Correction for Subsidence

Before

After
York River Water Quality Fixed Station Monitoring Program

Habitats:
- Tidal Freshwater Marsh
- Mesohaline Marsh
- Sand Flats
- Eelgrass Beds

- NOAA/NERRS – year round
- Seasonal – April - November
Henderson Creek Basin (14,385 hectares) (35,545 acres)

Blackwater River Basin (6,812 hectares) (16,834 acres)

Faka Union Bay Basin (57,800 hectares) (142,825 acres)

Fakahatchee Bay Basin (48,305 hectares) (119,363 acres)
Future Phases

Biotic Monitoring

- Submerged aquatic vegetation (seagrasses, algae) and emergent vegetation (marsh plants)

Land use/cover and Habitat Change

- Measure long-term changes in estuarine ecosystems by conducting change analyses of upland and subtidal communities.