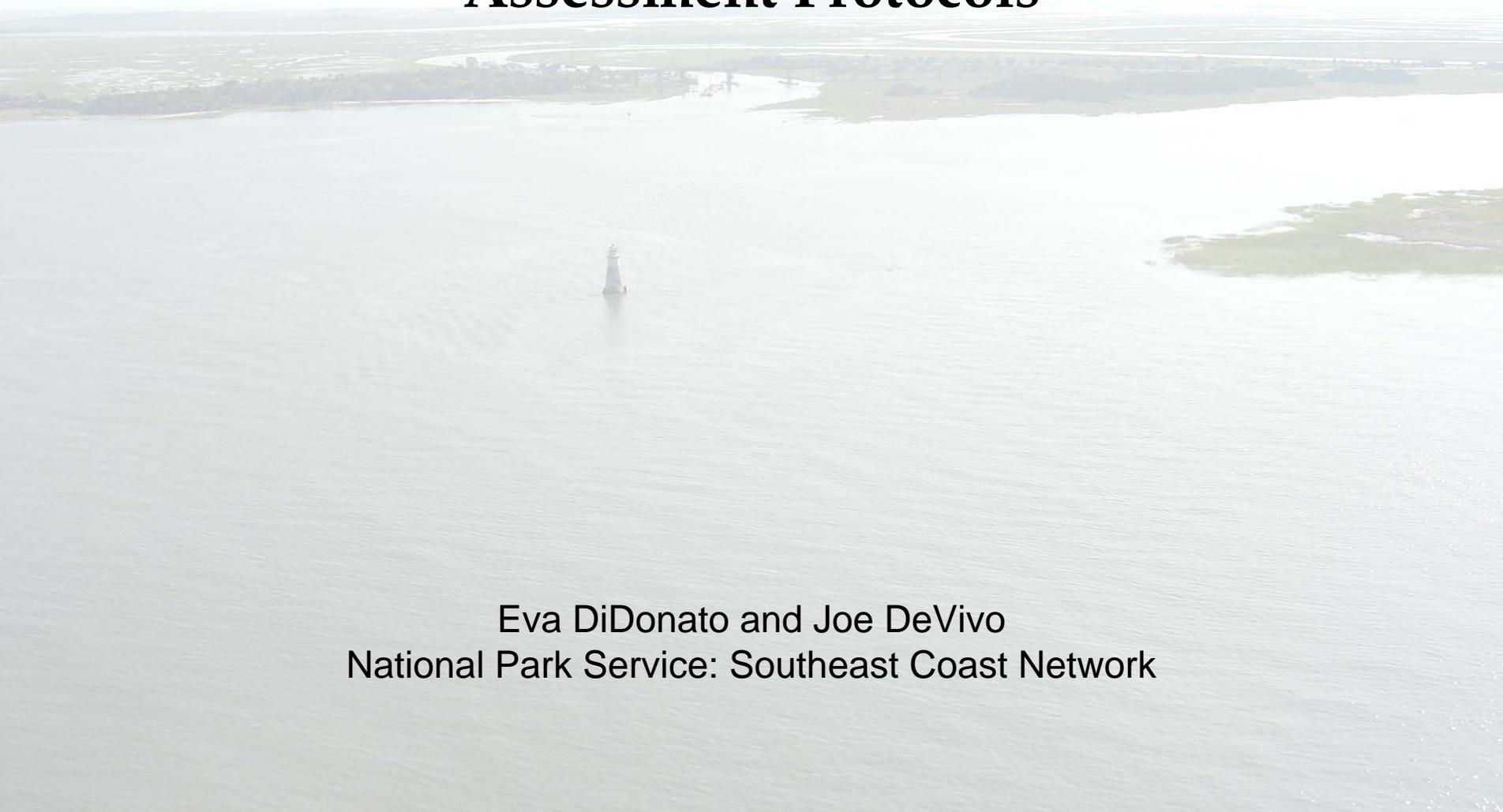


Assessing the Health of National Park Service Southeast Coastal Waters Using the United States Environmental Protection Agency's National Coastal Assessment Protocols

An aerial photograph of a coastal waterway, likely a bay or inlet. The water is a light, hazy blue-grey color. In the center of the water, there is a small, white, conical lighthouse. The surrounding land is green and appears to be a mix of marshland and forest. The sky is overcast and grey.

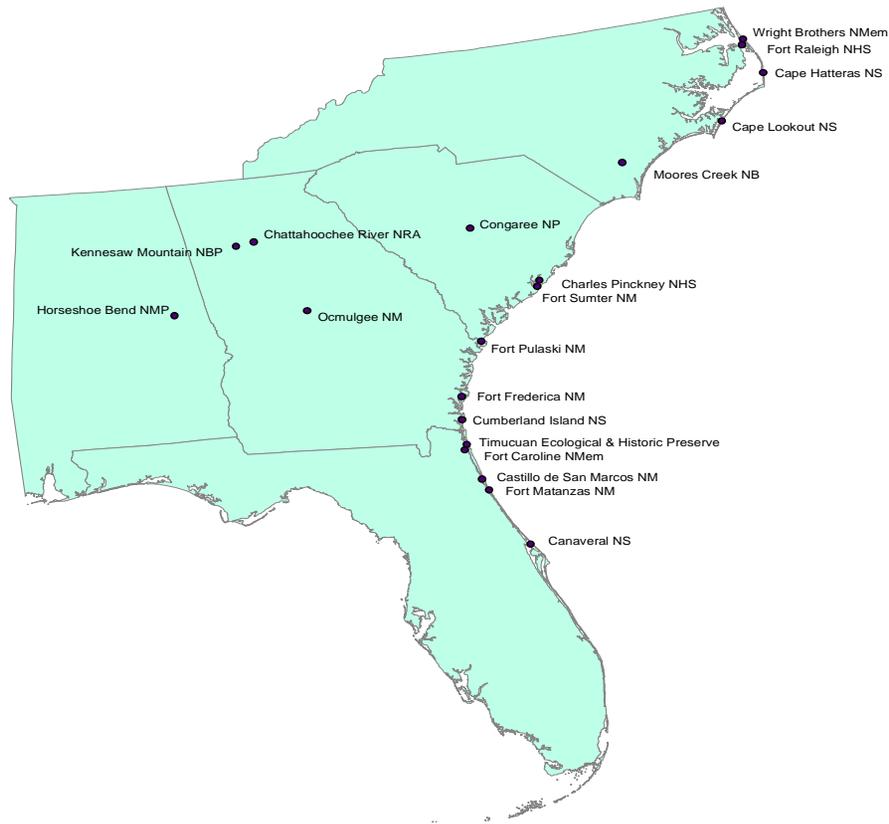
Eva DiDonato and Joe DeVivo
National Park Service: Southeast Coast Network

National Park Service



Southeast Coast Network

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Coastal Water Quality Monitoring it all started with...

- **Watershed Condition Assessments funded by the National Park Service, Water Resources Division (Completed November '04 - May '06)**
- **Scoping Meeting (June, 2005)**

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Key Conclusions:

- Need a combination of continuous monitoring of management driven sites and area-wide condition assessments.
- Don't re-invent the wheel! Protocols, costs, data management already figured out.
- Collaboration isn't happening as much as it could be.
- Parameter recommendations based on regional expertise.
- Management relevance of the data varies from park to park. Defined through the Coastal Watershed Condition Assessments.



Protocol:

Probabilistic Surveys – Following Protocols Developed by the US Environmental Protection Agency.

30 Randomly selected stations (5-year rotating basis)

- Hydrographic Profile (pH, DO, Temperature, Salinity)
- Secchi Depth
- Total Dissolved Nitrogen
- Total Dissolved Phosphorus
- Chlorophyll a
- *Sediment Chemistry, Total Organic Carbon & Grain Size

* Sediments sampled every 10 years



National Coastal Assessment *Probability Survey Designs*

- Estimate extent and condition of resource
- Characterize trends in extent and condition of resource
- Represent spatial patterns

...with known certainty!

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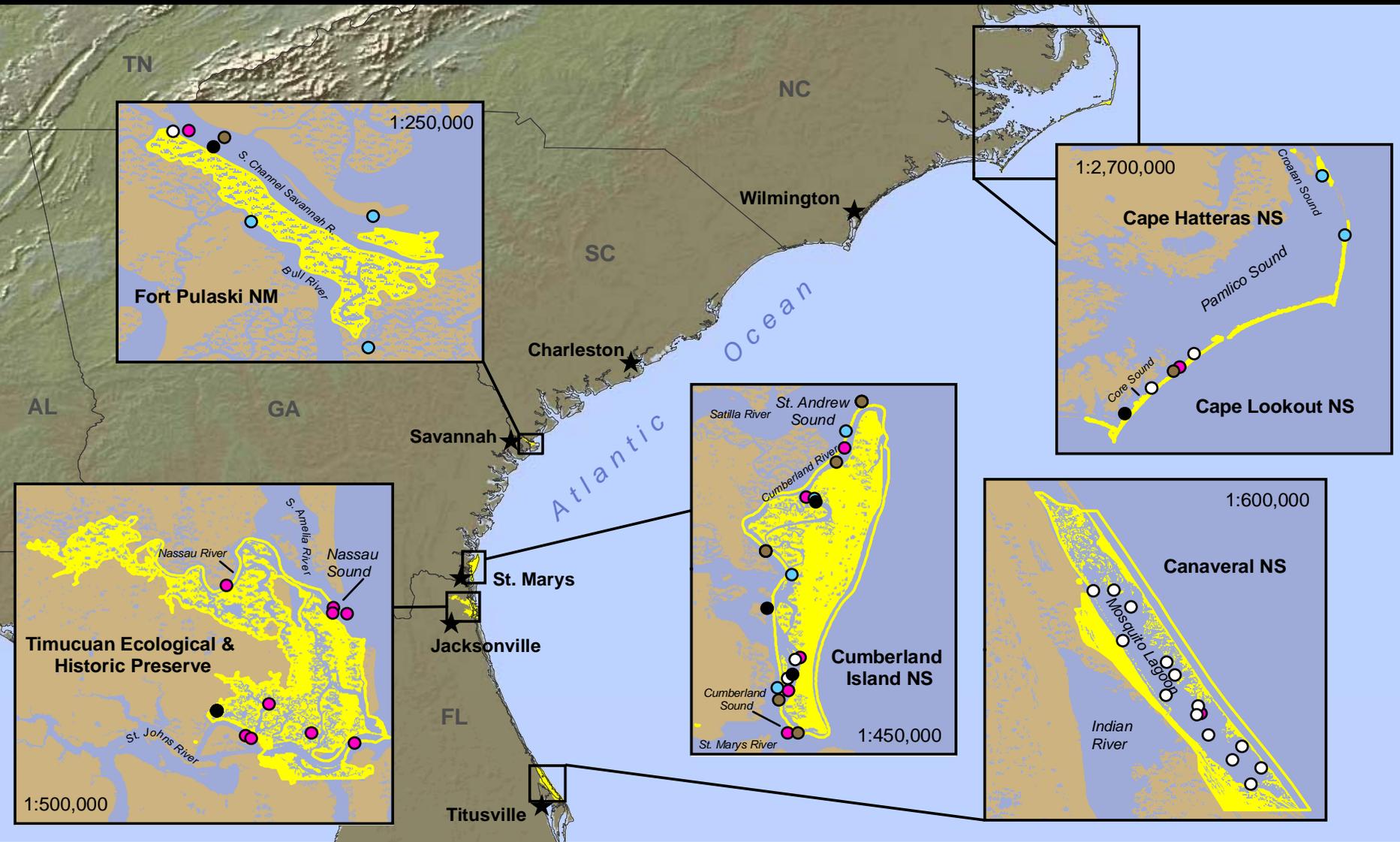
Monitoring Objectives

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- Determine the status, trends and spatial variability of selected parameters and overall water quality in park estuaries.
- Determine the extent to which water quality changes over time.
- Identify problem areas and areas needing protection.
- Determine the extent to which clean water projects and programs are effective in meeting stated goals.

Southeast Coast Network Water Quality Assessment

Southeast Coast Network
National Park Service
U.S. Department of the Interior



Overview Map: 0 50 100 200 Kilometers

Coordinate System: GCS WGS 1984
Scale: 1: 5,600,000



Year Sampled

- 2000
- 2002
- 2004
- 2001
- 2003

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	Good	Fair	Poor
Chl a	< 5 $\mu\text{g/L}$	5-20 $\mu\text{g/L}$	> 20 $\mu\text{g/L}$
DO	> 5 mg/L	2-5 mg/L	< 2 mg/L
DIP	< 0.01 mg/L	0.01-0.05 mg/L	> 0.05 mg/L
DIN	< 0.1 mg/L	0.1-0.5 mg/L	> 0.5 mg/L
Clarity*	> 20%	10-20%	< 10%

Ecological Condition Ranking for Sites in the Southeast

*Water Clarity is Defined as the % surface light at 1m depth

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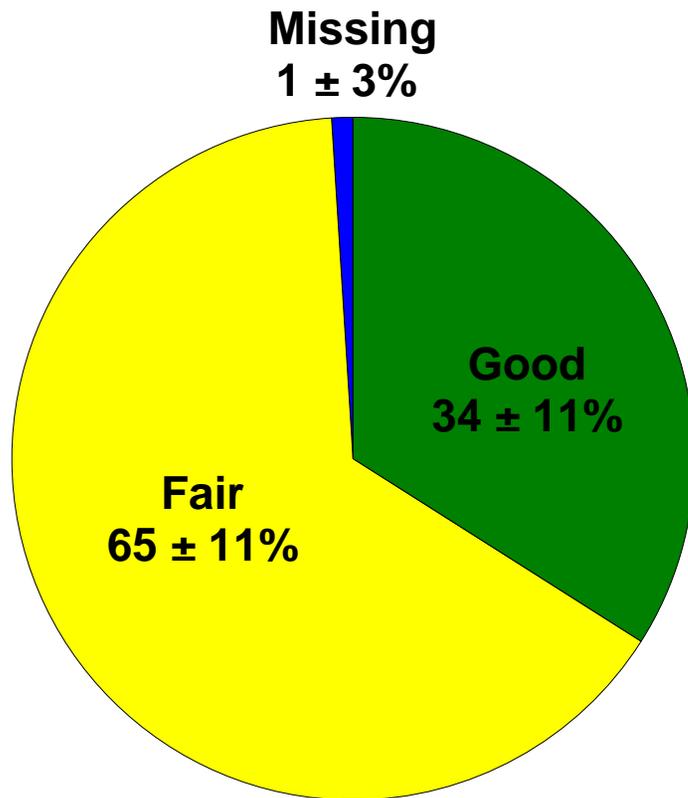


Network rankings of water quality parameters

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	Summary Good	Summary Fair	Summary Poor
% Sites Poor	< 10%	10-20 %	> 20%
% Sites Fair and Poor	< 50%	> 50%	

Water Quality Index with Ranking Criteria



Why 'FAIR'???

Is that good enough???



Water Quality Index Comparison Results

	IN	OUT
GOOD	34%	18%
FAIR	65%	65%
POOR	0%	16%
MISSING	1%	1%
# of STATIONS	68	495

- Statistical Difference between Inside and Outside of the Parks

(Chi-squared test - 2x2 Contingency Table)

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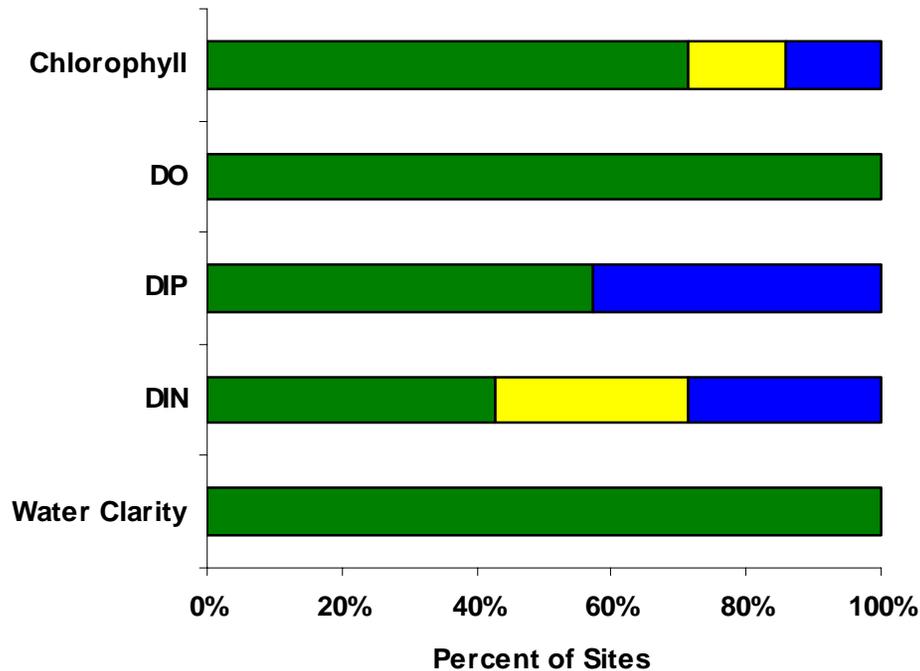


Understanding Park Management Issues...





Cape Lookout & Cape Hatteras National Seashores



Issues of Concern:

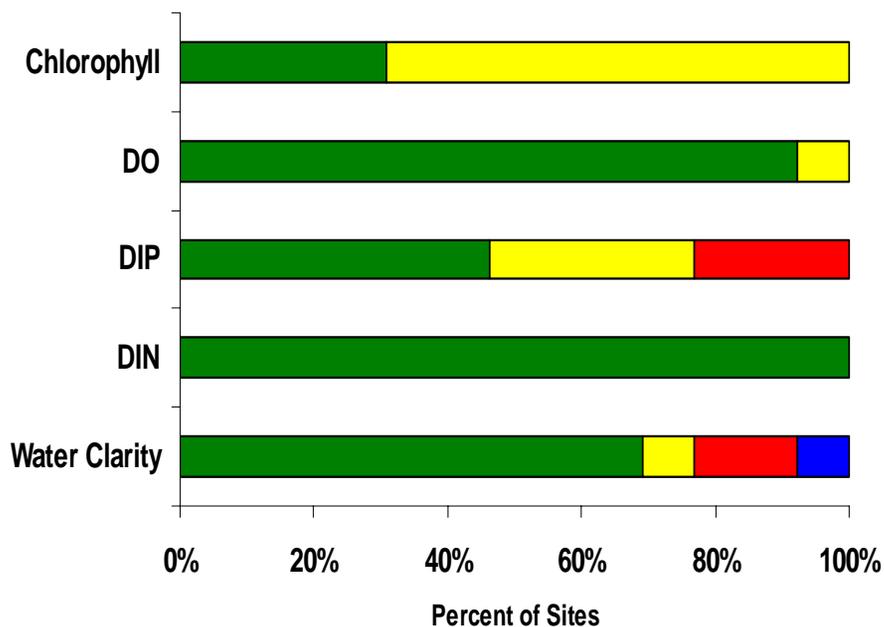
- Coastal Development
- Water Withdrawals
- Dredging

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Timucuan Ecologic and Historic Preserve



Issues of Concern:

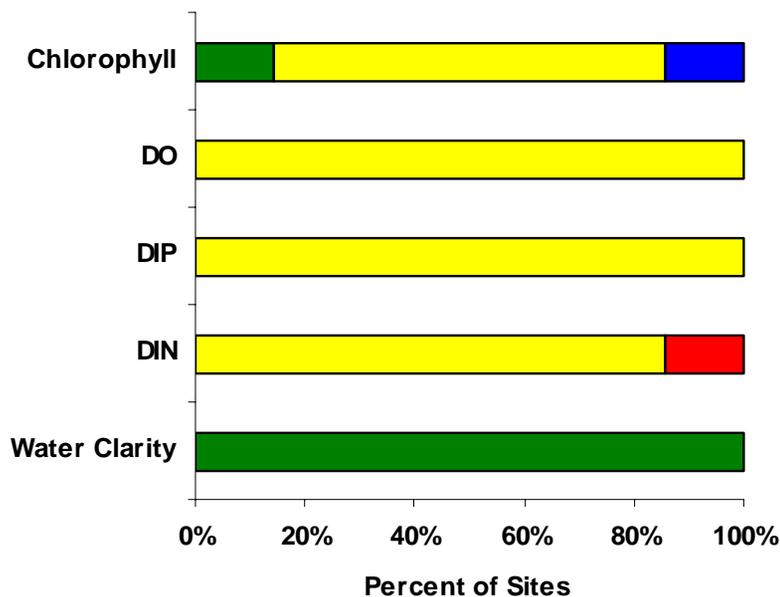
- Landfills
- Boating Activities
- Agricultural Runoff
- Leaking Septic Systems
- Atmospheric Deposition
- Coastal Development

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Fort Pulaski National Monument

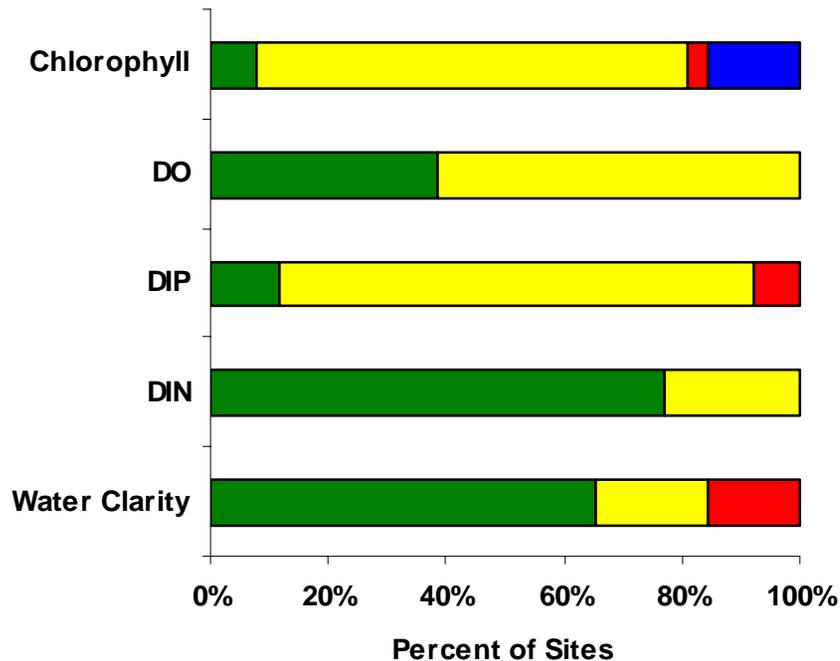


Issues of Concern:

- Anthropogenic Alterations
- Pulp and Paper Mills
- Fertilizer
- Erosion
- Atmospheric Deposition



Cumberland Island National Seashore



Issues of Concern:

- Coastal Development
- Animal Waste
- Fertilizer
- Failing Septic Systems
- Atmospheric Deposition

National Park Service

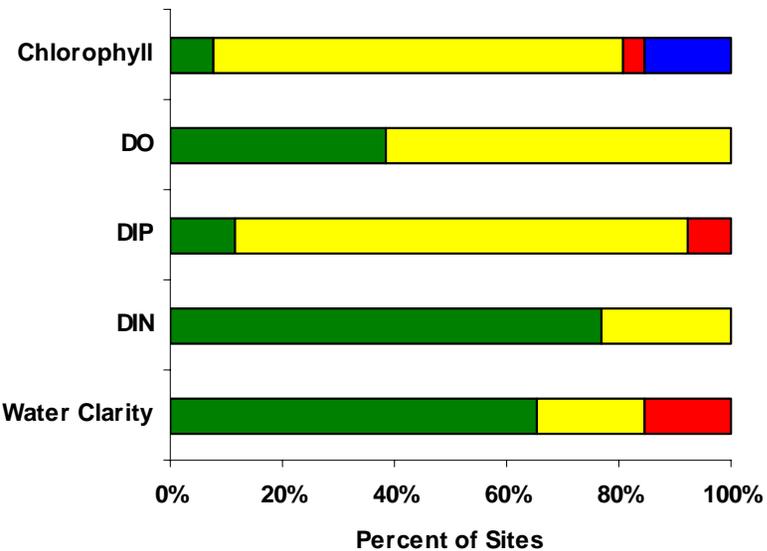


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Cumberland Island National Seashore

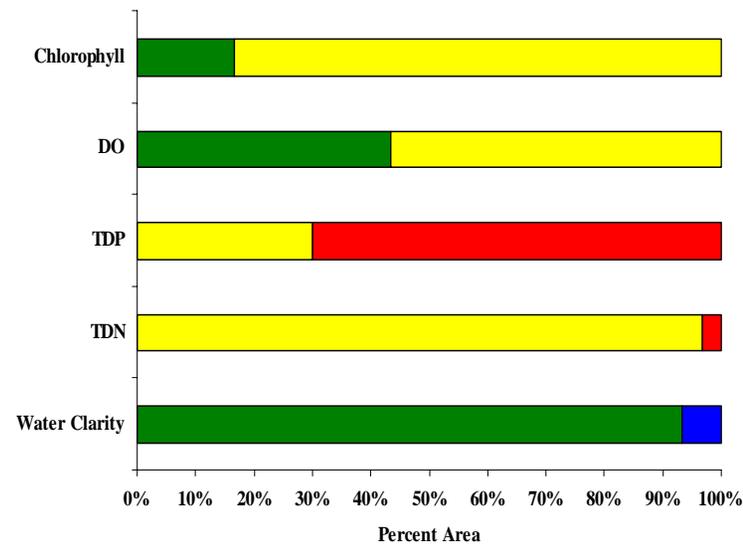
NCA Survey Results

2000 - 2004 (19 Stations)



SECN Survey Results

2007 (30 stations)

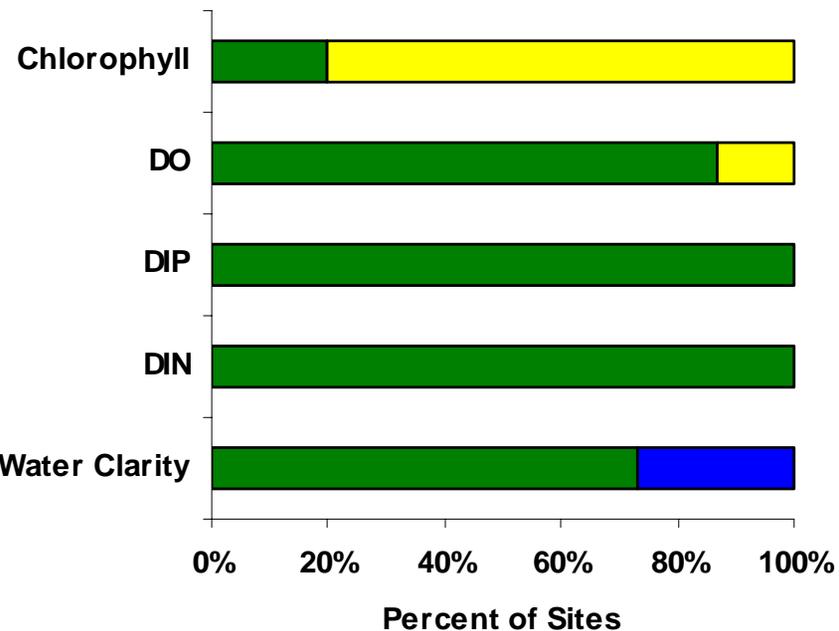


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Canaveral National Seashore



Issues of Concern:

Report not Available



Field Sampling

- Five Year Rotation for Water Quality

CESU Agreement with the University of Georgia Marine Extension

- Ten Year Rotation for Sediment Quality

Laboratory Analysis Contract in Place with GPL Laboratories

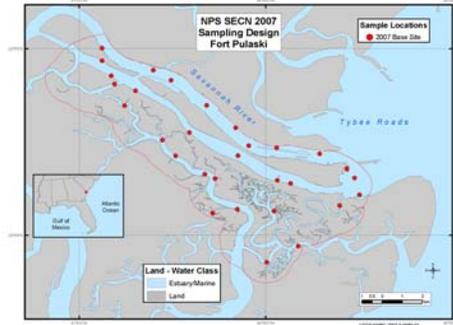
Cumberland Island National Seashore

Survey July 2007



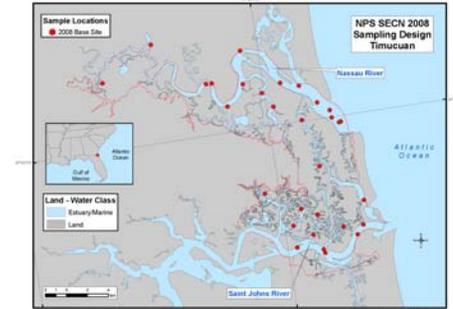
Fort Pulaski National Monument

Survey August 2007



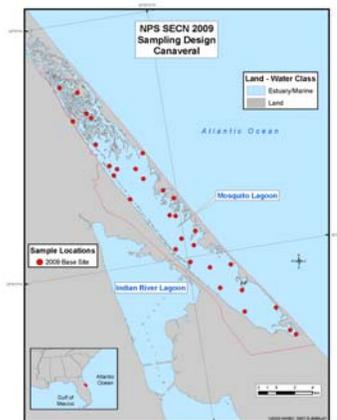
Timucuan Ecological and Historic Preserve

Survey Scheduled for 2008



Canaveral National Seashore

Survey Scheduled for 2009



Cape Hatteras and Cape Lookout National Seashores

Survey Scheduled for 2010



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Partners:

Overall - United States Environmental Protection Agency, NOAA Hollings Marine Laboratory, South Carolina DNR, South Carolina Sea Grant, National Estuarine Research Reserves

CAHA - National Estuarine Program (*potential*)

CALO - North Carolina National Estuarine Research Reserve, National Estuarine Program

FOPU - University of Georgia (*potential*), Georgia DNR (*potential*), National Estuarine Research Reserve (*potential*), Skidaway Institute of Oceanography (*potential*)

CUIS - CUIS staff, University of Georgia (*potential*), Georgia DNR (*potential*), National Estuarine Research Reserve (*potential*)

TIMU - TIMU staff, Florida Department of Environmental Protection/Office of Coastal and Aquatic Managed Areas, City of Jacksonville, The Nature Conservancy, St. John River Water Management District (*potential*), University of Florida (*potential*)

CANA - CANA staff/volunteers, Indian River Lagoon National Estuarine Program, Volusia County, St. John River Water Management District, The Nature Conservancy, Florida Department of Environmental Protection/Office of Coastal and Aquatic Managed Areas (*potential*), DYNAMAC (*potential*), USGS (*potential*)



Questions???