



# Cape Romain NWR Resource Characterization

## A framework for assessing ecological function and societal values



### *NOAA mission*

*"...to describe and predict changes in the Earth's environment, and conserve and wisely manage the Nation's coastal and marine resources."*

### *National Ocean Service mission*

*"...to be the Nation's principal advocate for coastal and ocean stewardship through partnerships at all levels. To support and provide the science, information, management, and leadership necessary to balance the environmental and economic well-being of the Nation's coastal resources and communities."*

### *CCEHBR mission*

*"...to provide scientific information required to resolve coastal ecosystem health issues associated with the agency goals of NOS"*

### *U.S. Fish and Wildlife Service mission*

*"...working with others, to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people."*

### *National Wildlife Refuge System mission*

*"...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."*

### *Cape Romain NWR objectives:*

*Provide habitat for waterfowl, shorebirds, wading birds, and resident species*

*Provide habitat and management of endangered and threatened species*

*Provide protection of Class I Wilderness Area*

*Provide environmental education and recreation for the public*

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NOAA National Ocean Service

Center for Coastal Environmental Health and Biomolecular Research

Charleston, SC

July 9, 2002



# Cape Romain NWR Resource Characterization

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### Characterizing the Coastal Landscape

Historical

Ecological

Socio-cultural

Baseline water quality conditions

Issue Identification

Desired Endpoints

#### Literature review

- Hard clam / oyster surveys
- Salt marsh / benthic community
- Beach erosion / redirection
- Air and water quality
- Trace elements
- Plant and animal inventories
- Inshore fisheries

#### Socio-cultural study

- Demography
- Technology
- Economics
- Political & Social Institutions
- Aesthetics & Behavior
- Information

# *Literature Review and Recommendations*



Laura Kracker

Center for Coastal Environmental Health and Biomolecular Research  
National Ocean Service  
National Oceanic and Atmospheric Administration

in cooperation with

Cape Romain National Wildlife Refuge  
US Fish and Wildlife Service

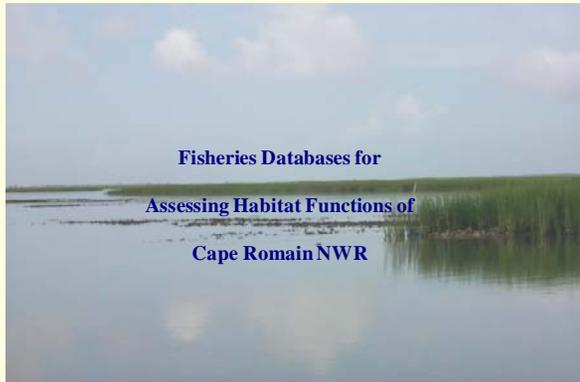


May 2000

## Characterization focus:

- utilize a GIS framework
- assess the abundance and diversity of fish using CRNWR
- delineate additional data layers, such as intertidal habitats
- continue inventories of plant and animal species dependent on the Refuge
- monitor physical and chemical environmental parameters
- further define potential risks to the Refuge and preparation of responses to likely impacts

# *Fisheries Databases for Assessing Habitat Functions of Cape Romain NWR*



Jill Jennings

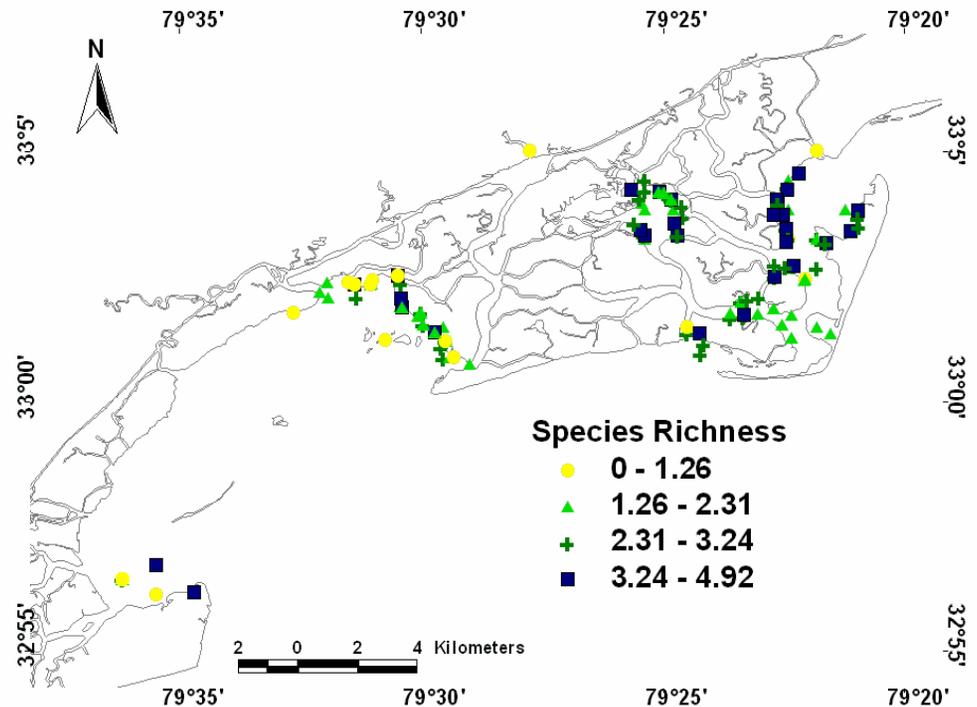
Laura Kracker

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National Ocean Service  
National Oceanic and Atmospheric Administration

in cooperation with

Cape Romain National Wildlife Refuge  
US Fish and Wildlife Service

December 2000



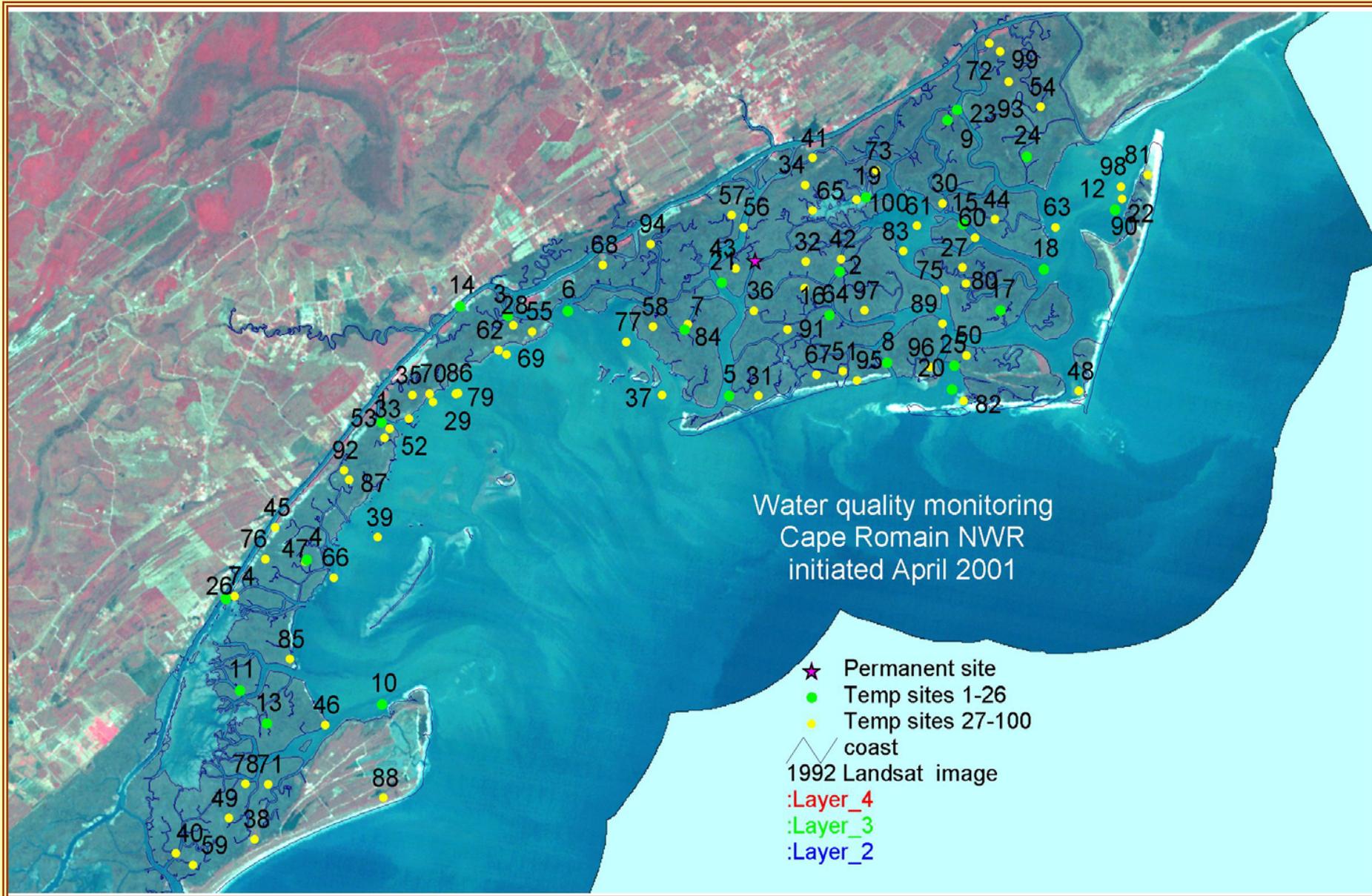
# *Ecological Characterization of Cape Romain NWR Water Quality and Socio-economic Considerations*



The Ecological Characterization of Cape Romain  
National Wildlife Refuge  
with  
Socio-economic Considerations

Yearly Progress Report  
Prepared by  
NOAA's Coastal Center for Environment Health and  
Biomolecular Research  
National Ocean Service  
National Oceanic and Atmospheric Administration  
Charleston, SC  
April 29, 2002

# Water Quality Monitoring at Cape Romain NWR

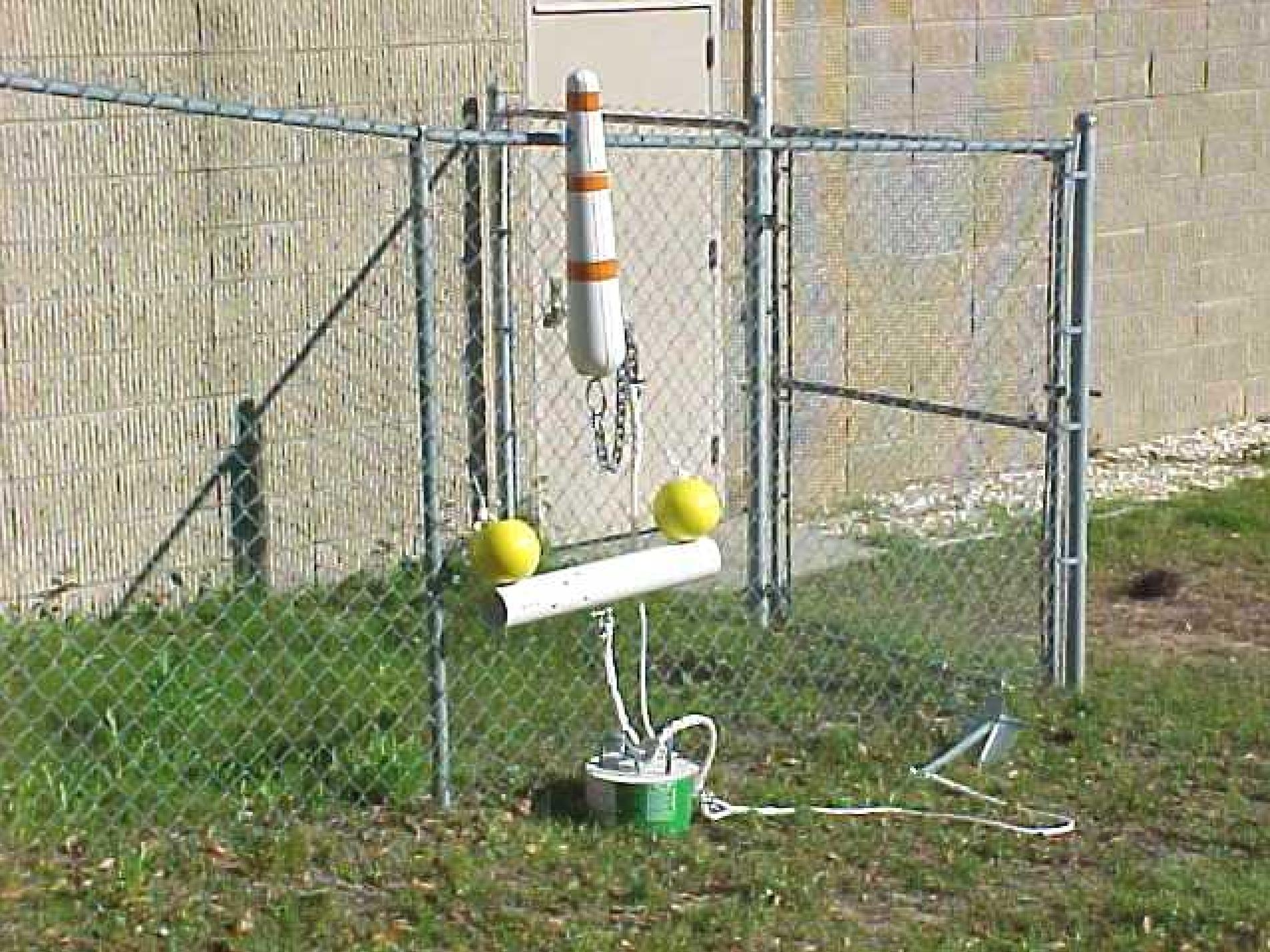




NDAA-F

COAST-LIVE









Temporary Site No. 14  
In the Intracoastal Waterway  
Across from Bull Hall Camp Ground  
N33.03666° W79.56177°



Looking north



Looking towards Bull Hall boat ramp

Temporary Site No. 25  
Key Inlet just off Lighthouse Island  
N33.01886° W79.40212°

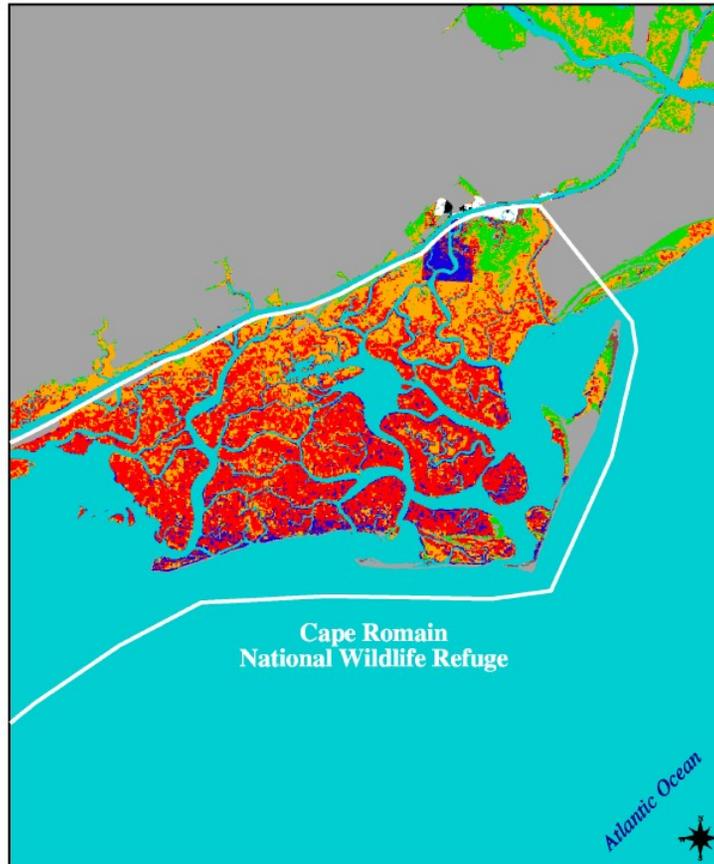


Looking north towards a small creek

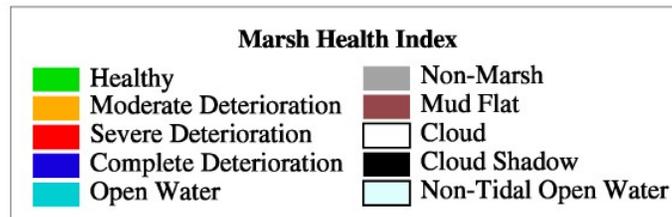


Looking towards Cape Romain Lighthouse

# Marsh Health Index At Cape Romain NWR, South Carolina



2 0 2 4 6 Miles

















MISS GEORGIA







Temporary Site No. 29  
In Bulls Bay approximately 1.3 miles from the mouth of Graham Creek  
(bearing 97°)

N 33.00274°      W 079.56059°



Looking towards Bull Island



Looking towards ICW

# Cape Romain NWR Salinity (ppt) June 26, 2002



30.70  
30.72  
30.72

29.29  
29.41  
29.60

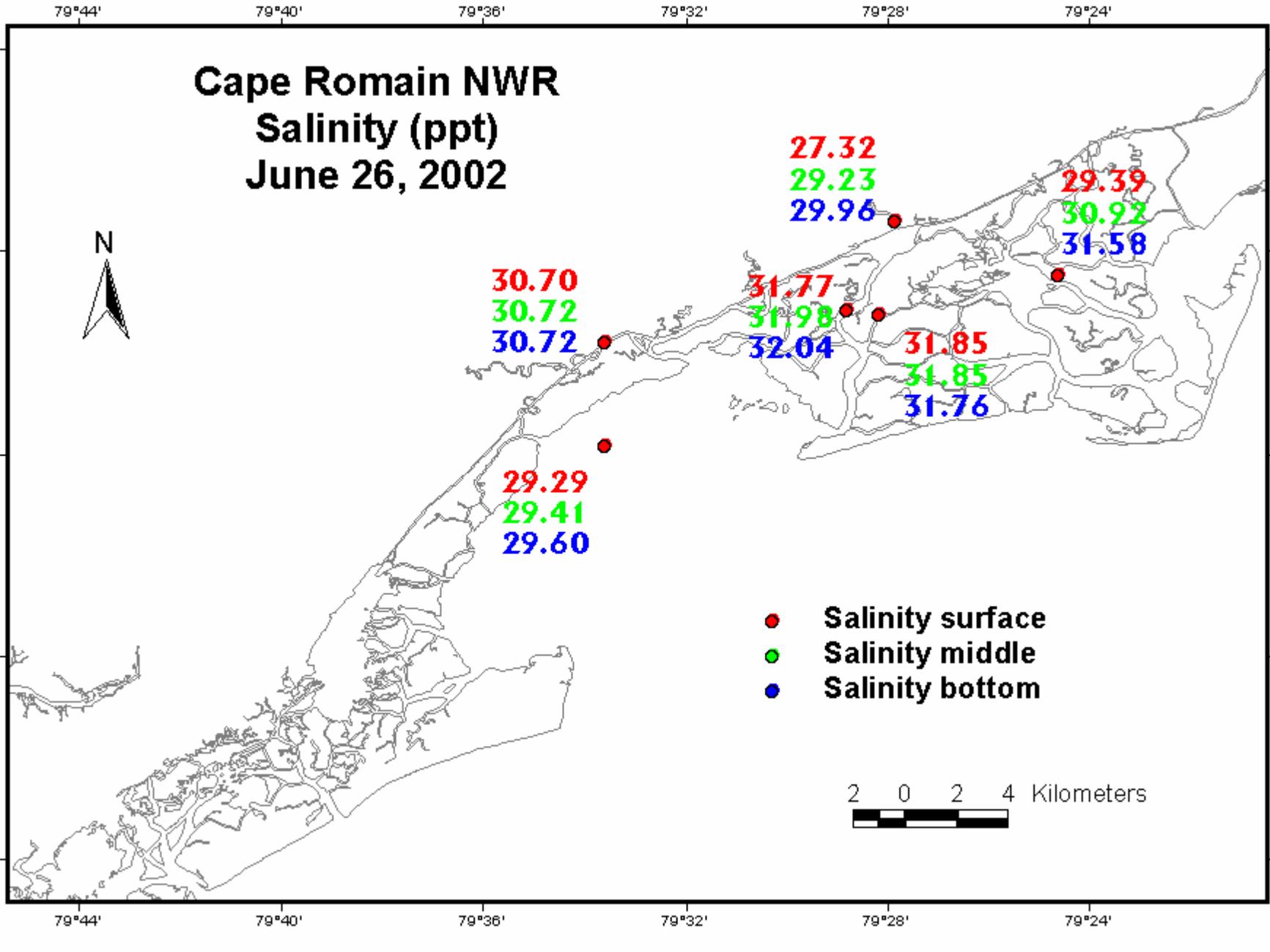
31.77  
31.98  
32.04

27.32  
29.23  
29.96

31.85  
31.85  
31.76

29.39  
30.92  
31.58

- Salinity surface
- Salinity middle
- Salinity bottom



# Cape Romain NWR DO (mg/L) June 26, 2002



- DO surface
- DO middle
- DO bottom



6.10  
6.02  
5.85

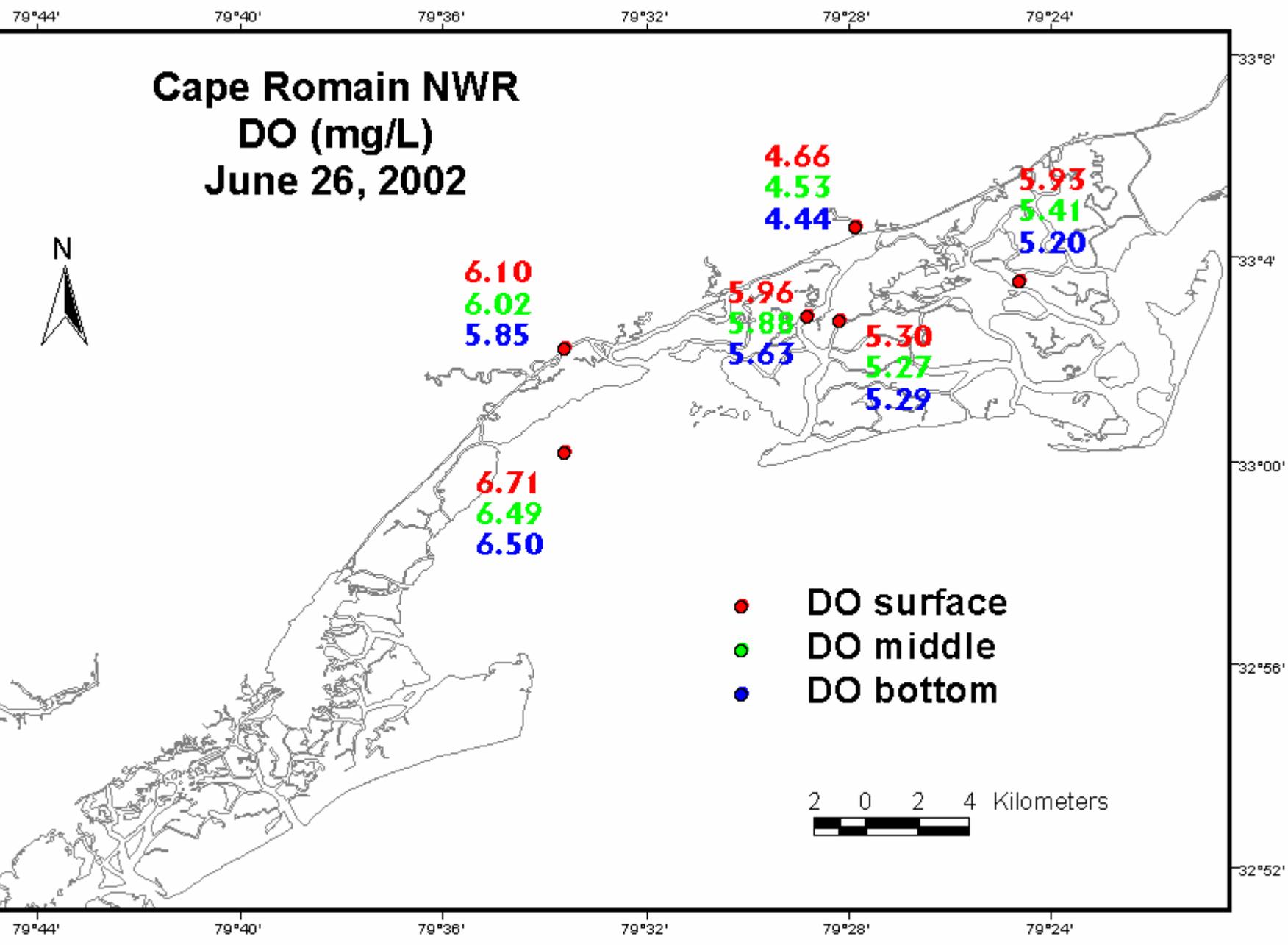
6.71  
6.49  
6.50

5.96  
5.88  
5.63

4.66  
4.53  
4.44

5.30  
5.27  
5.29

5.93  
5.41  
5.20



# Cape Romain NWR

## pH

### June 26, 2002



- pH surface
- pH middle
- pH bottom



7.84  
7.88  
7.86

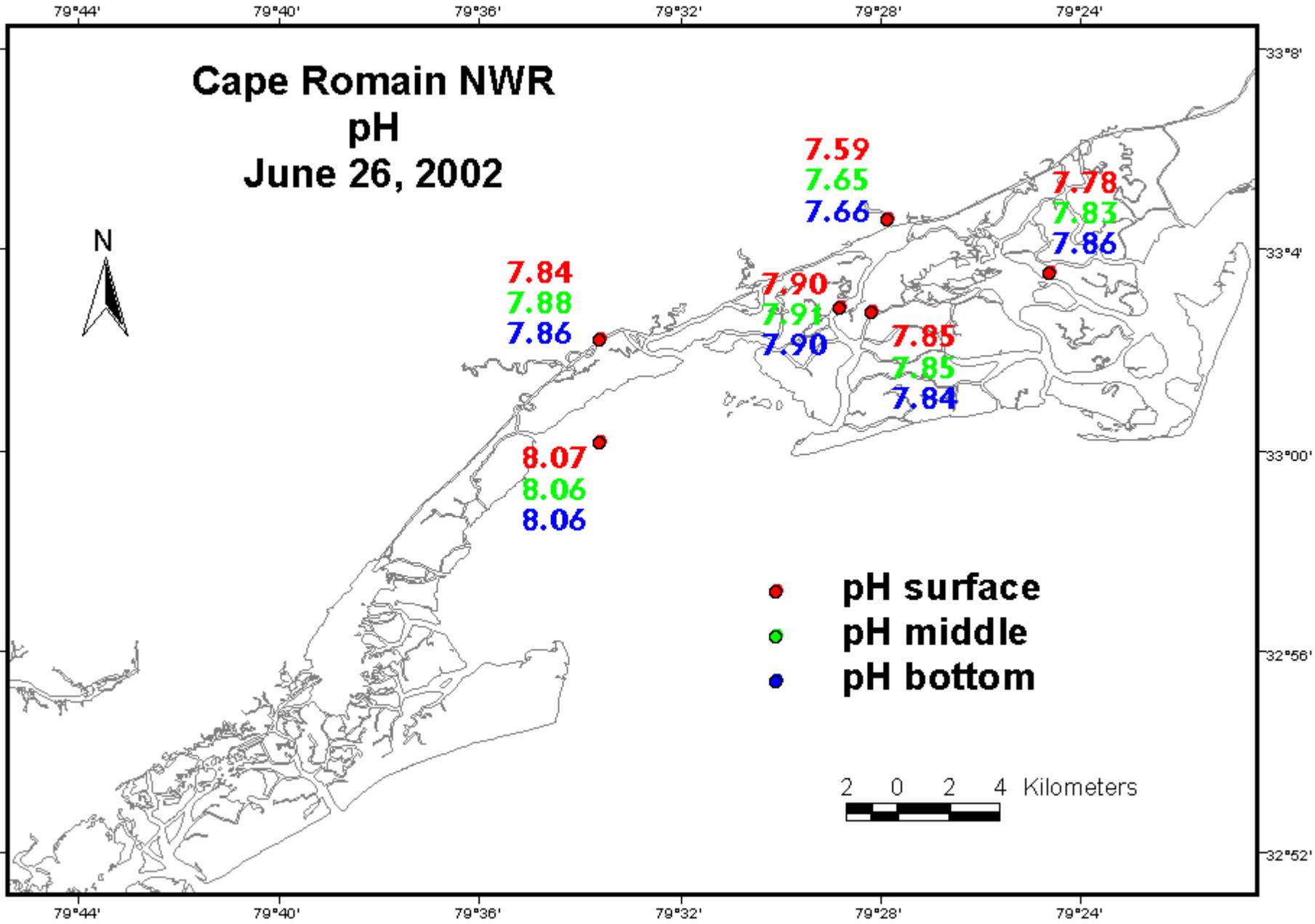
8.07  
8.06  
8.06

7.90  
7.91  
7.90

7.59  
7.65  
7.66

7.85  
7.85  
7.84

7.78  
7.83  
7.86



# Cape Romain NWR Temperature (C) June 26, 2002



- Temperature surface
- Temperature middle
- Temperature bottom



27.29  
27.23  
27.12

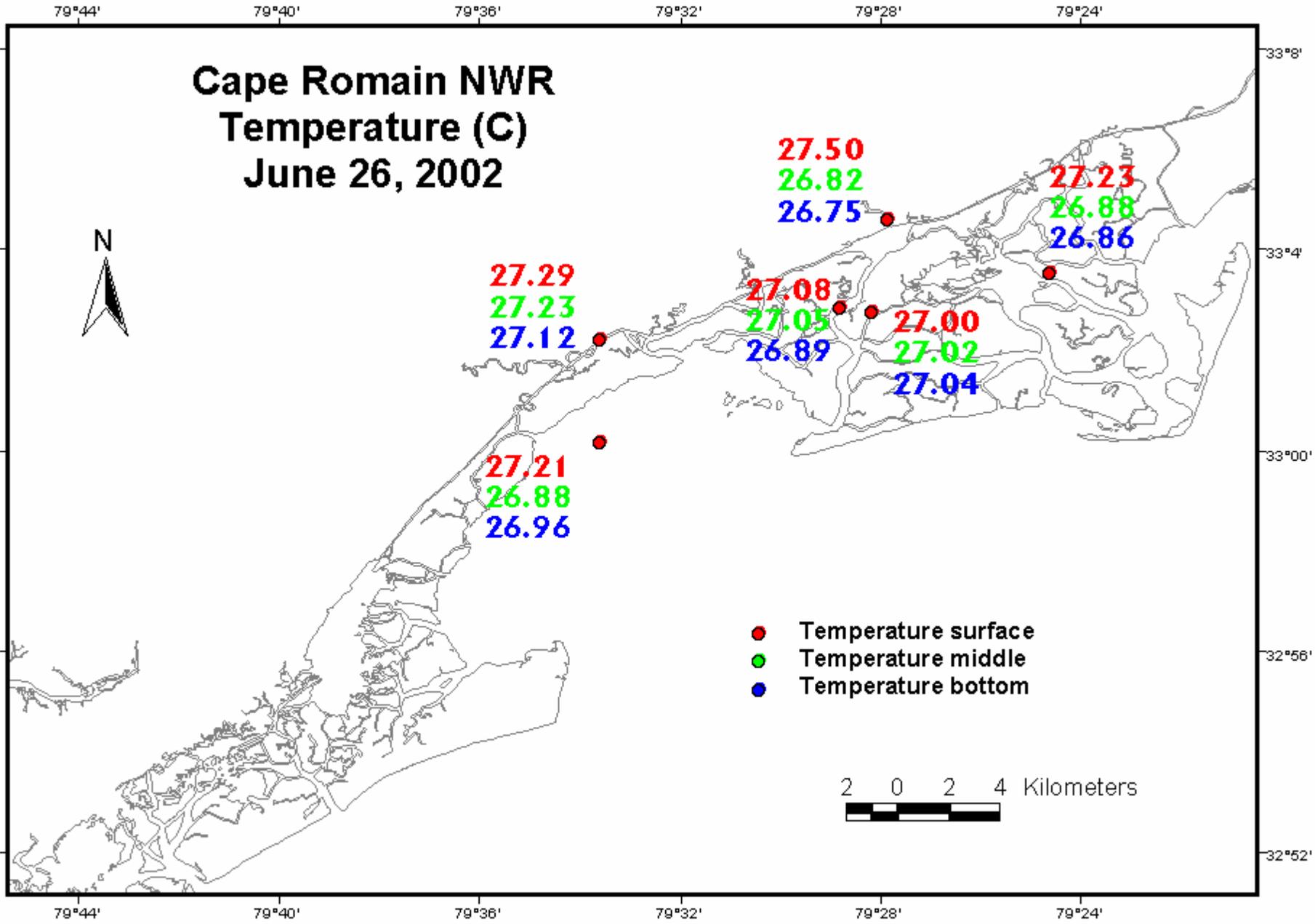
27.21  
26.88  
26.96

27.08  
27.05  
26.89

27.50  
26.82  
26.75

27.00  
27.02  
27.04

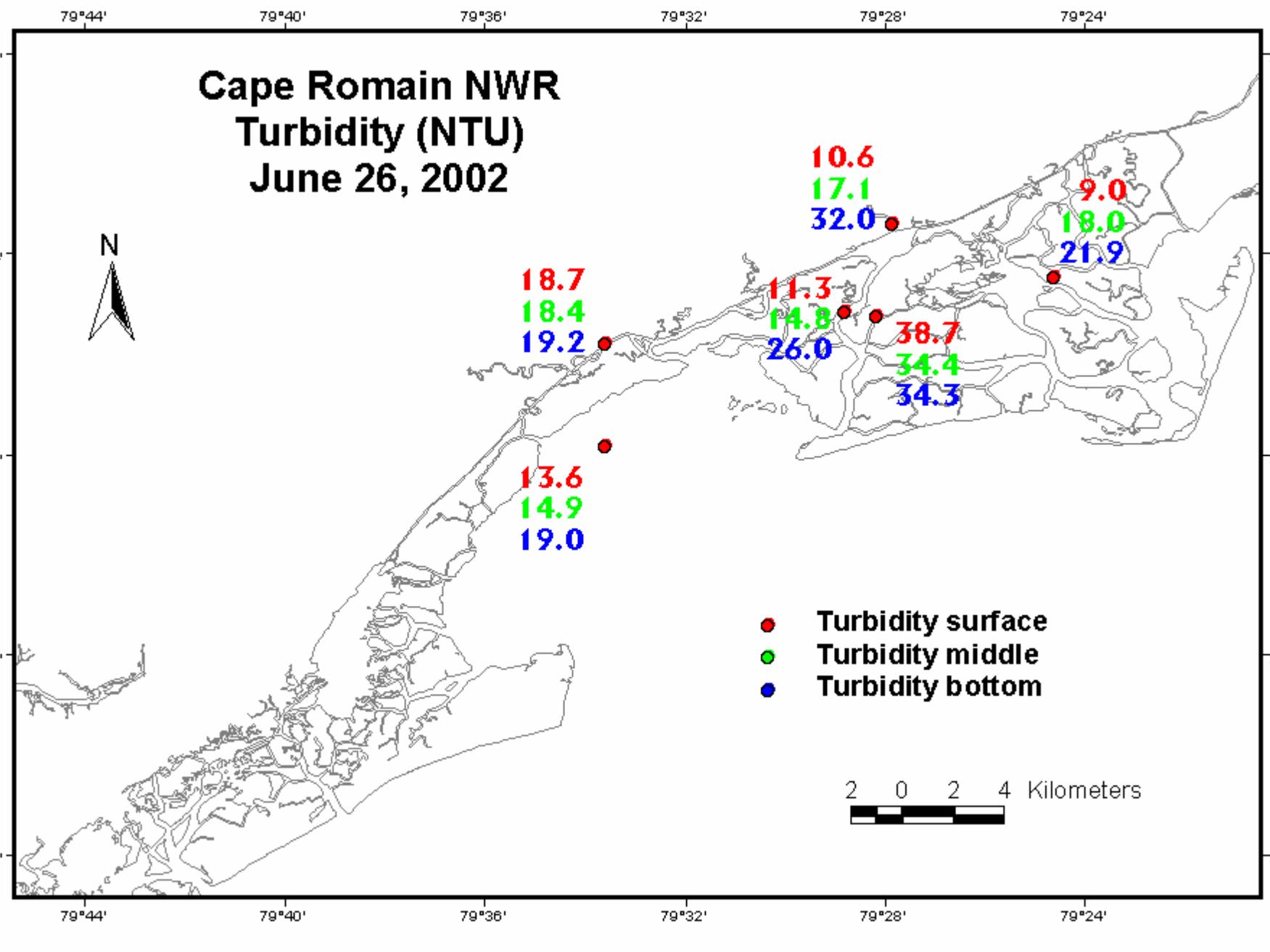
27.23  
26.88  
26.86



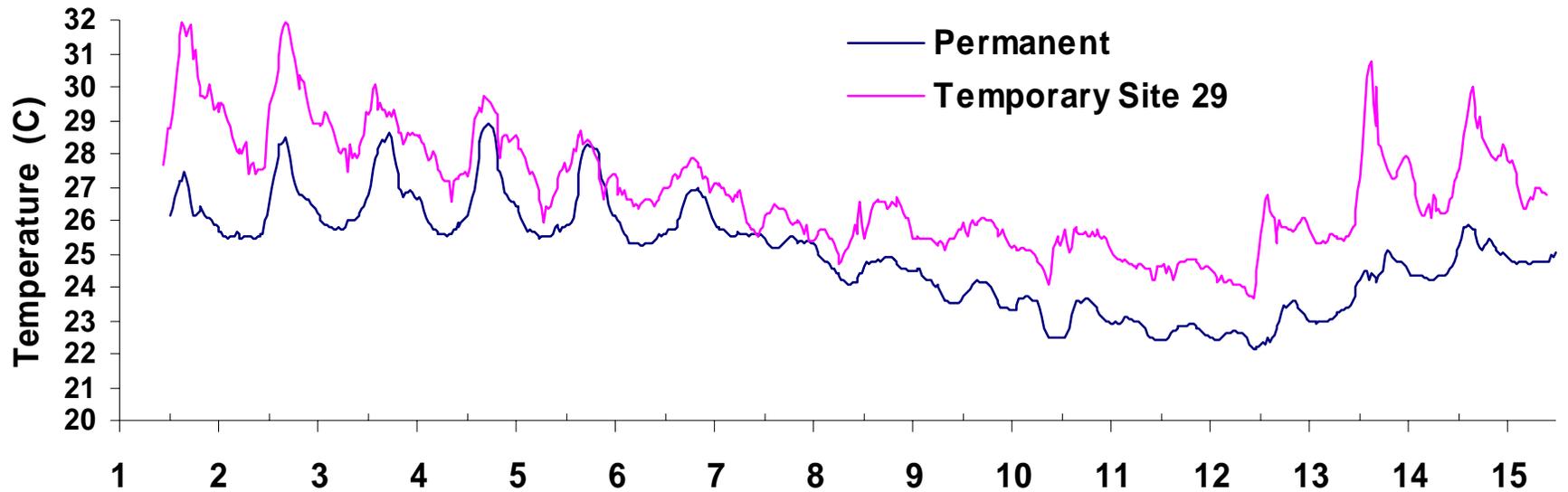
# Cape Romain NWR Turbidity (NTU) June 26, 2002



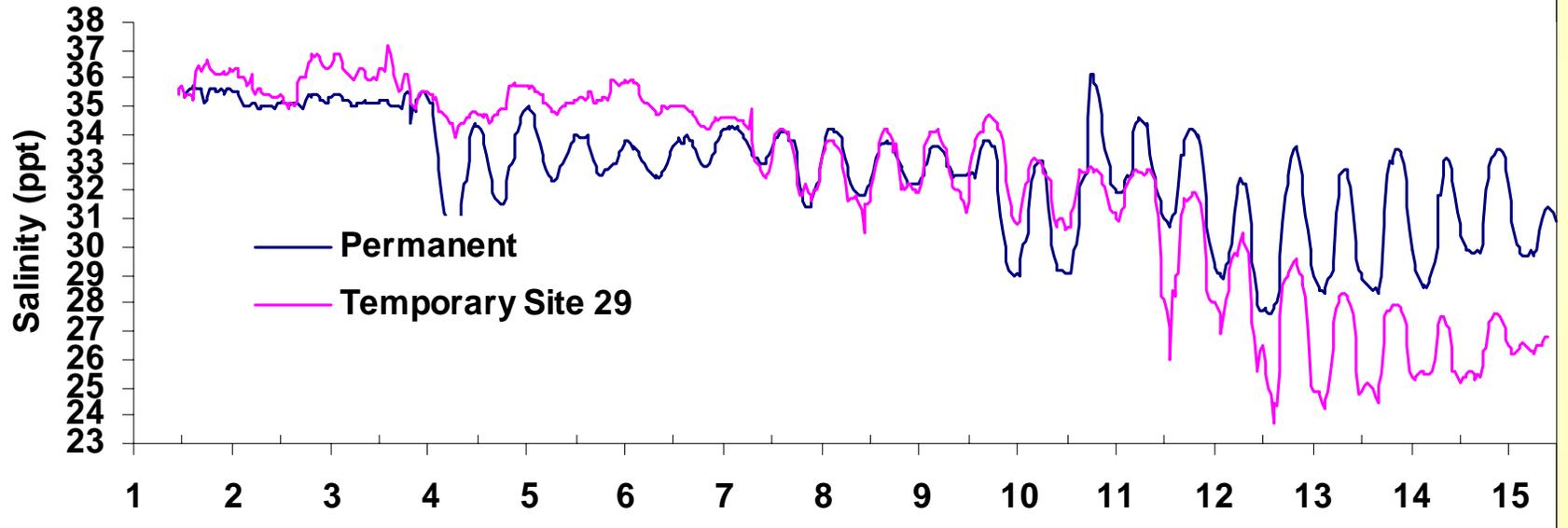
- Turbidity surface
- Turbidity middle
- Turbidity bottom



## Temperature (06/12/02 - 06/26/02)



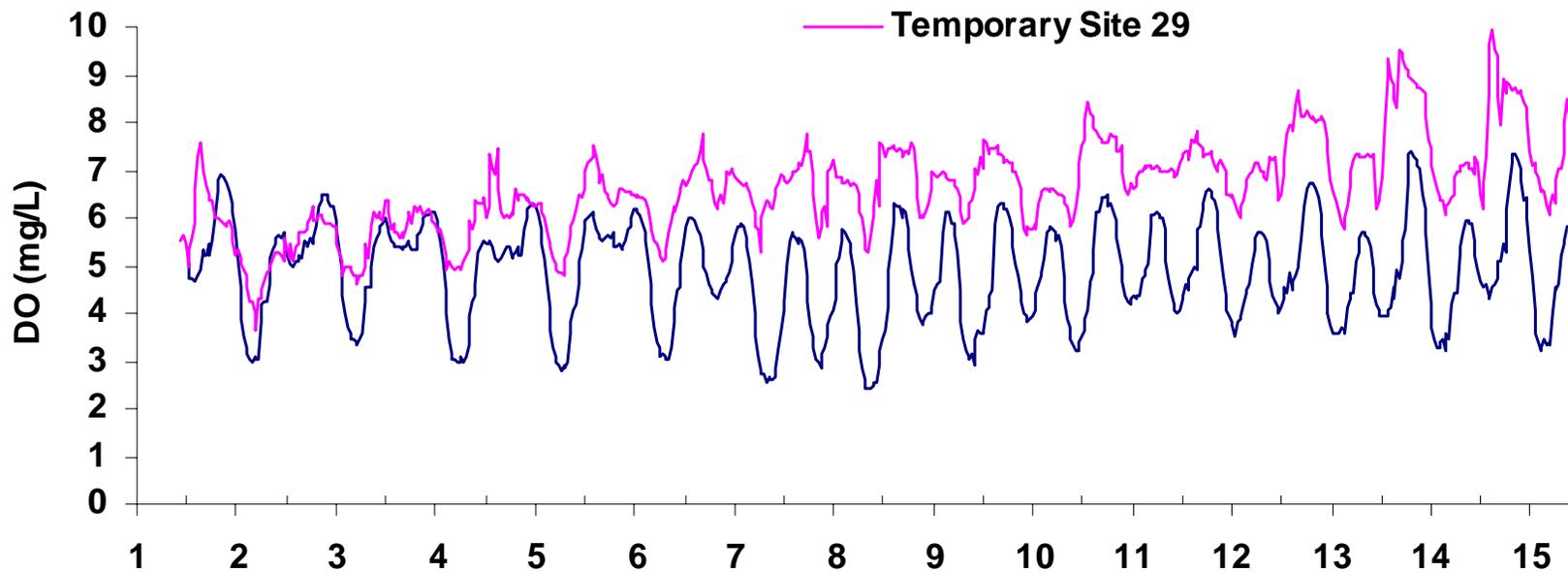
# Salinity (06/12/02 - 06/26/02)



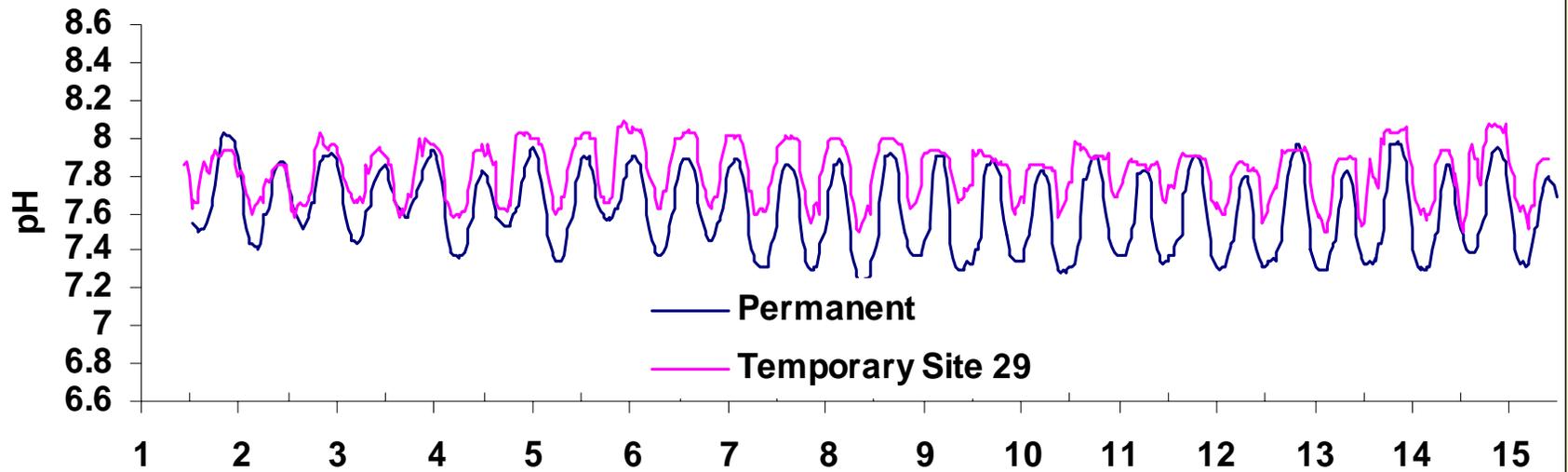
# DO (06/12/02 - 06/26/02)

— Permanent

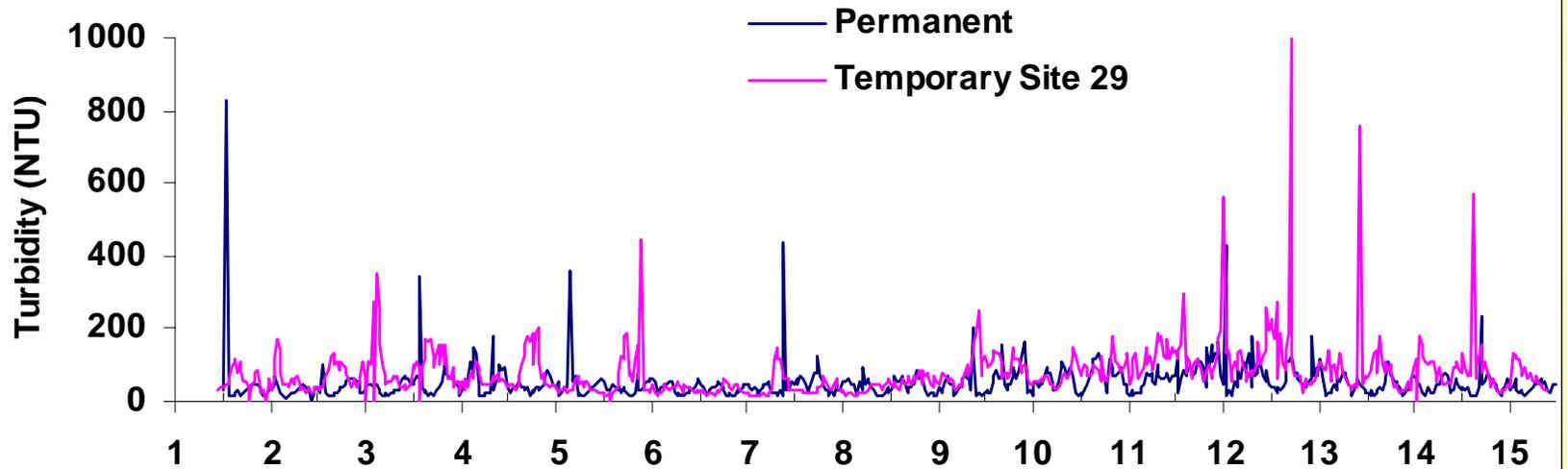
— Temporary Site 29



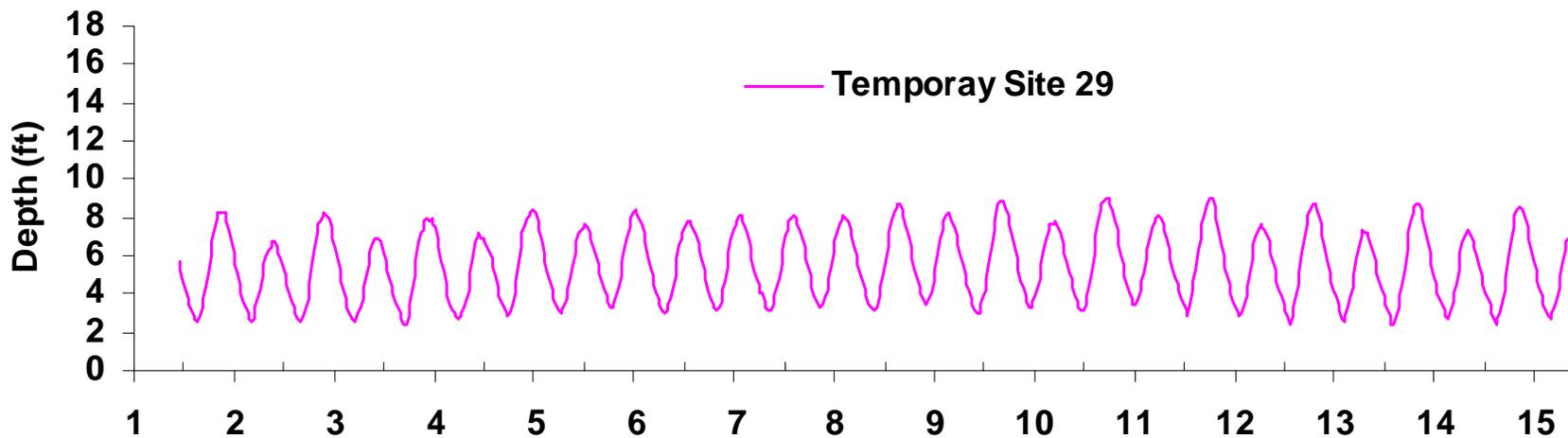
# pH (06/12/02 - 06/26/02)



## Turbidity (06/12/02 - 06/26/02)



# Depth (06/12/02 - 06/26/02)



# Permanent site summary statistics

## April 2001 to April 2002

| Permanent Site Summary Statistics |               |          |          |         |         |          |                |
|-----------------------------------|---------------|----------|----------|---------|---------|----------|----------------|
| Permanent site                    | SpCond(mS/cm) | Sal(ppt) | DOsat%   | DOmg/L  | pH      | TempC    | Turbidity(NTU) |
| acceptable range                  | 0 to 100      | 0 to 70  | 0 to 500 | 0 to 50 | 2 to 14 | -5 to 45 | 0 to 1000      |
| Median                            | 51.88         | 34.07    | 88.70    | 6.41    | 7.80    | 20.62    | 23.50          |
| Min                               | 38.67         | 24.66    | 14.50    | 0.96    | 6.93    | 5.47     | 0.40           |
| Max                               | 65.17         | 43.89    | 116.10   | 10.20   | 8.55    | 32.32    | 997.10         |
| Average                           | 51.892        | 34.111   | 85.912   | 6.442   | 7.781   | 20.797   | 33.460         |
| Std Dev                           | 3.656         | 2.645    | 15.526   | 1.650   | 0.262   | 6.326    | 46.197         |
| Skewness                          | 0.791         | 0.763    | -0.740   | -0.058  | -0.046  | -0.226   | 9.687          |

| Permanent Site Summary Statistics (values calibrated out of range removed)* |               |          |          |         |         |
|---|---------------|----------|----------|---------|---------|
| Temporary sites   | SpCond(mS/cm) | Sal(ppt) | DOsat%   | DOmg/L  | pH      |
| acceptable range  | 0 to 100      | 0 to 70  | 0 to 500 | 0 to 50 | 2 to 14 |
| Median  | 51.61         | 33.89    | 87.60    | 6.27    | 7.77    |
| Min   | 38.67         | 24.66    | 14.50    | 0.96    | 6.93    |
| Max   | 57.95         | 38.72    | 115.90   | 10.20   | 8.53    |
| Average   | 51.236        | 33.636   | 84.752   | 6.286   | 7.753   |
| Std Dev   | 2.767         | 2.015    | 15.381   | 1.594   | 0.241   |
| Skewness  | -0.545        | -0.496   | -0.719   | -0.014  | -0.332  |

# Temporary sites combined summary statistics

## April 2001 to April 2002

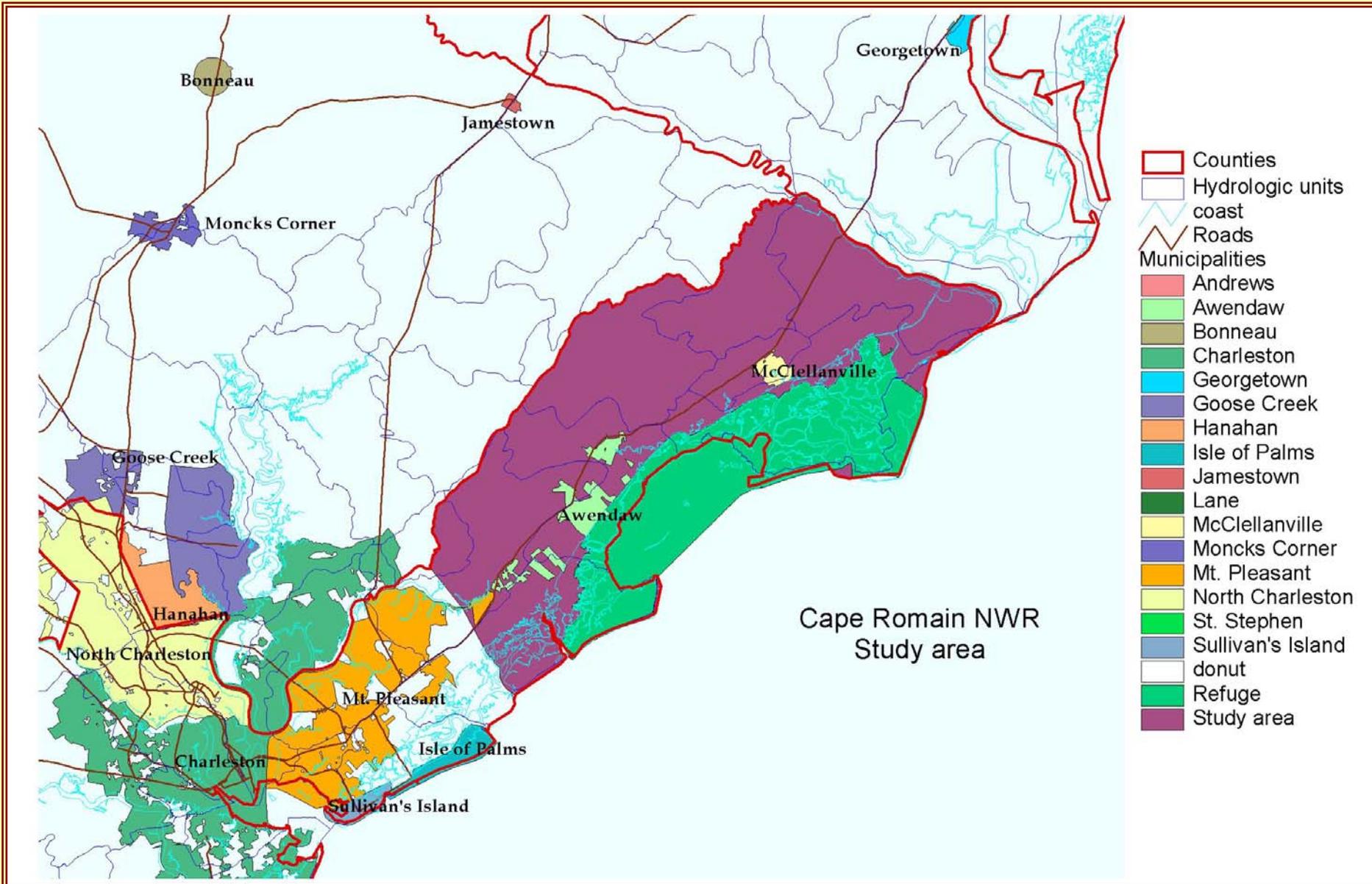
| Temporary Sites Combined Summary Statistics                                  |               |          |          |         |         |          |                |                  |
|--|---------------|----------|----------|---------|---------|----------|----------------|------------------|
| Temporary Sites Summary Statistics   |               |          |          |         |         |          |                |                  |
| Temporary sites  | SpCond(mS/cm) | Sal(ppt) | DOsat%   | DOmg/L  | pH      | TempC    | Turbidity(NTU) | Depth (ft)       |
| acceptable range   | 0 to 100      | 0 to 70  | 0 to 500 | 0 to 50 | 2 to 14 | -5 to 45 | 0 to 1000      | 0 to 20 targeted |
| Median   | 52.34         | 34.41    | 89.30    | 6.44    | 7.82    | 21.60    | 25.9           | 7.610            |
| Min  | 39.76         | 25.35    | 6.90     | 0.45    | 2.62    | 6.35     | 0.0            | 0.335            |
| Max  | 68.47         | 46.29    | 500.00   | 32.91   | 9.48    | 32.26    | 961.2          | 27.093           |
| Average  | 52.479        | 34.545   | 89.526   | 6.574   | 7.718   | 21.371   | 37.934         | 8.552            |
| Std Dev  | 3.930         | 2.873    | 29.760   | 2.236   | 0.594   | 6.261    | 48.695         | 4.757            |
| Skewness   | 1.968         | 1.947    | 3.025    | 1.751   | -5.444  | -0.339   | 6.449          | 1.501            |
| Temporary Sites Summary Statistics (values calibrated out of range removed)* |               |          |          |         |         |          |                |                  |
| Temporary sites  | SpCond(mS/cm) | Sal(ppt) | DOsat%   | DOmg/L  | pH      |          |                |                  |
| acceptable range   | 0 to 100      | 0 to 70  | 0 to 500 | 0 to 50 | 2 to 14 |          |                |                  |
| Median   | 51.78         | 34.01    | 90.20    | 6.42    | 7.81    |          |                |                  |
| Min  | 39.76         | 25.35    | 6.90     | 0.45    | 2.62    |          |                |                  |
| Max  | 57.00         | 37.92    | 500.00   | 32.91   | 9.48    |          |                |                  |
| Average  | 51.581        | 33.887   | 90.167   | 6.574   | 7.751   |          |                |                  |
| Std Dev  | 2.423         | 1.779    | 30.461   | 2.284   | 0.427   |          |                |                  |
| Skewness   | -0.555        | -0.495   | 2.978    | 1.746   | -6.725  |          |                |                  |



# Sociocultural Profile and Sense of Place

- GOAL: To identify and define the ways in which communities around Cape Romain NWR value and use the resources of the Refuge

# Cape Romain NWR Socio-cultural Study Area



# Objectives

- How are resources used?
- What are the conflicts between uses of the Refuge and management goals?
- What social and economic regional trends will affect resiliency and health of the Refuge and quality of life of local communities?
- What are local economic priorities and attitudes to land-use planning?
- How do local residents feel about non-local use of resources?

# **Socioeconomic & Cultural Issues**



**Around Valuation of Cape Romain NWR**

# **Issues Identified in Developing Socioeconomic and Cultural Characterization of Use and Valuation of CRNWR Resources**

- **Land-use change and impacts of unchecked/unplanned development**
- **Property rights**
- **Impacts of racial and cultural diversity on use and valuation of Refuge resources**
- **Commercial uses of Refuge resources:**
  - Fishing (to include oystering, crabbing, shrimping, clamming, and clam mariculture)**
  - Nature tourism**
- **Conflicts about use of resources**
- **Health of Refuge resources, e.g. water quality**
- **Sources of stress to benthic, intertidal, and marsh habitats and species attributable to specific use, e.g. recreational boating**
- **Continued viability of local commercial fishing industry**
- **Continued quality of life for McClellanville in the face of changes in home ownership, e.g., retirees, second home owners**
- **Lack of local services and alternative employment opportunities for residents in communities around Cape Romain NWR**

# **Analysis of Socioeconomic and Cultural Processes**



# Processes

- Demography
- Technology
- Economics
- Political & Social Institutions
- Aesthetics & Behavior
- Information

# Gullah/Geechee Sea Island Coalition

- Depict the culture, heritage and history, and social dynamics of African American communities adjacent to Cape Romain NWR to determine the impact of the Refuge on the cultural resources of the area and on their patterns and ways of living

# Direction for Further Research

- Identify an ecologically appropriate, socially relevant set of surrogate indicators that reflect the dynamics of stressors to the Refuge and the economic value of certain resource goods or services with the purpose of assisting NWR managers to make conservation, preservation, and restoration decisions.

# A framework for assessing ecological function and societal values at Cape Romain NWR

