

**Hammocks Beach Shoreline Stabilization and  
Wetland Restoration Project  
Hammocks Beach State Park  
Swansboro, Onslow County, North Carolina**

*2005 Annual Monitoring Report  
Year 5 of 5*



NCEEP Project Number: .00040  
BLWI Project Number: 050033  
NCDENR contract: D05056S

Original Design  
Firm:

BLUE: Land, Water, Infrastructure, PA  
1271 Old US Highway #1 South  
Southern Pines, NC 28387

Submitted to:

NCDENR Ecosystem Enhancement Program  
1652 Mail Service Center  
Raleigh, NC 27699

Prepared by:

BLUE: Land, Water, Infrastructure, PA  
1271 Old US Highway #1 South  
Southern Pines, NC 28387

17 February 2006



**BLUE** Land  
Water  
Infrastructure

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1. Vegetative Problem Area Photos
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3. Site Photos

## I. Executive Summary

The Hammocks Beach shoreline stabilization and wetland restoration project is located at the Hammocks Beach State Park, in Onslow County, near Swansboro, N.C. It is at the site of the old visitor's center, near where the canoes and kayaks launch. The project was a co-operative effort between the State Parks of North Carolina, the NC Coastal Federation and the NC Ecosystem Enhancement Program (formally the NC Wetlands Restoration Program). The project demonstrated the use of a rock sill and provided for the restoration of 0.3 acres of regularly flooded salt marsh, *Spartina alterniflora* and *Spartina patens*. The site was planted in the year 2000. This report represents the fifth year of vegetative monitoring. The project was not designed to meet any specific mitigation requirements.

With no specific monitoring criteria to meet for either vegetation or hydrology, success is determined by vegetative growth and regular flooding of the vegetative zones. Growth in the marsh appears to be good. Stem counts of the *Spartina alterniflora* have doubled since the previous report. Height and % cover of both species are comparable. Observed hydrology is in accordance to maintaining the vegetation and is similar to the adjacent natural stands.

Problems areas are few. There is some presence of *Typha sp.* and *Phragmites australis* which could be controlled with spraying. Most impacts of vegetative loss are in the shrub/scrub zone during repairs to the bulkhead.

## II. Project Background

### a. Location and Setting

The project is located at Hammocks Beach State Park near Swansboro, NC. It is at the site of the old visitor's center, near where the canoes and kayaks launch.

Directions from Raleigh: Take I-40 East to Exit 373 – NC24/NC903 East. Follow NC 24 through Jacksonville to Swansboro. Before reaching downtown Swansboro, turn right onto Hammocks Beach Road (SR1511). Near the end of the road turn right into the park entrance. Take the first left into the old visitor's center and maintenance area. The restoration areas are located on either side of the dock and boat ramp. (Figure 1. Vicinity Map)

### b. Structure and Objectives

The Hammocks Beach Shoreline Stabilization and Wetland Restoration Project involved the installation of innovative shoreline stabilization measures and the associated restoration of salt marsh and a shrub/scrub buffer. The project was a co-operative effort between the State Parks of North Carolina, the NC Coastal Federation and the NC Ecosystem Enhancement Program (formally the NC Wetlands Restoration Program). Portion of a failing bulkhead was removed, a rock sill was placed along the shoreline and the marsh was established on the regarded site. The site doubles as a restoration area and as a demonstration of alternative shoreline stabilization techniques. Design of the rock sill was by the Coastal Federation with funding from the NC Clean Water Management Trust Fund. The project implementation was not necessary to meet any mitigation needs.

Table I. Project Structure Table	
Project Number and Name 050033 Hammocks Beach Wetland	
Area	Acreage
Marsh – Ramp & Restroom Sides	0.3

Table II. Project Objectives Table			
Project Number and Name 050033 Hammocks Beach Wetland			
Area	Objectives	Acreage	Comment
Marsh – Both Sides	Restoration	0.3	Provided habitat and vegetative zone.

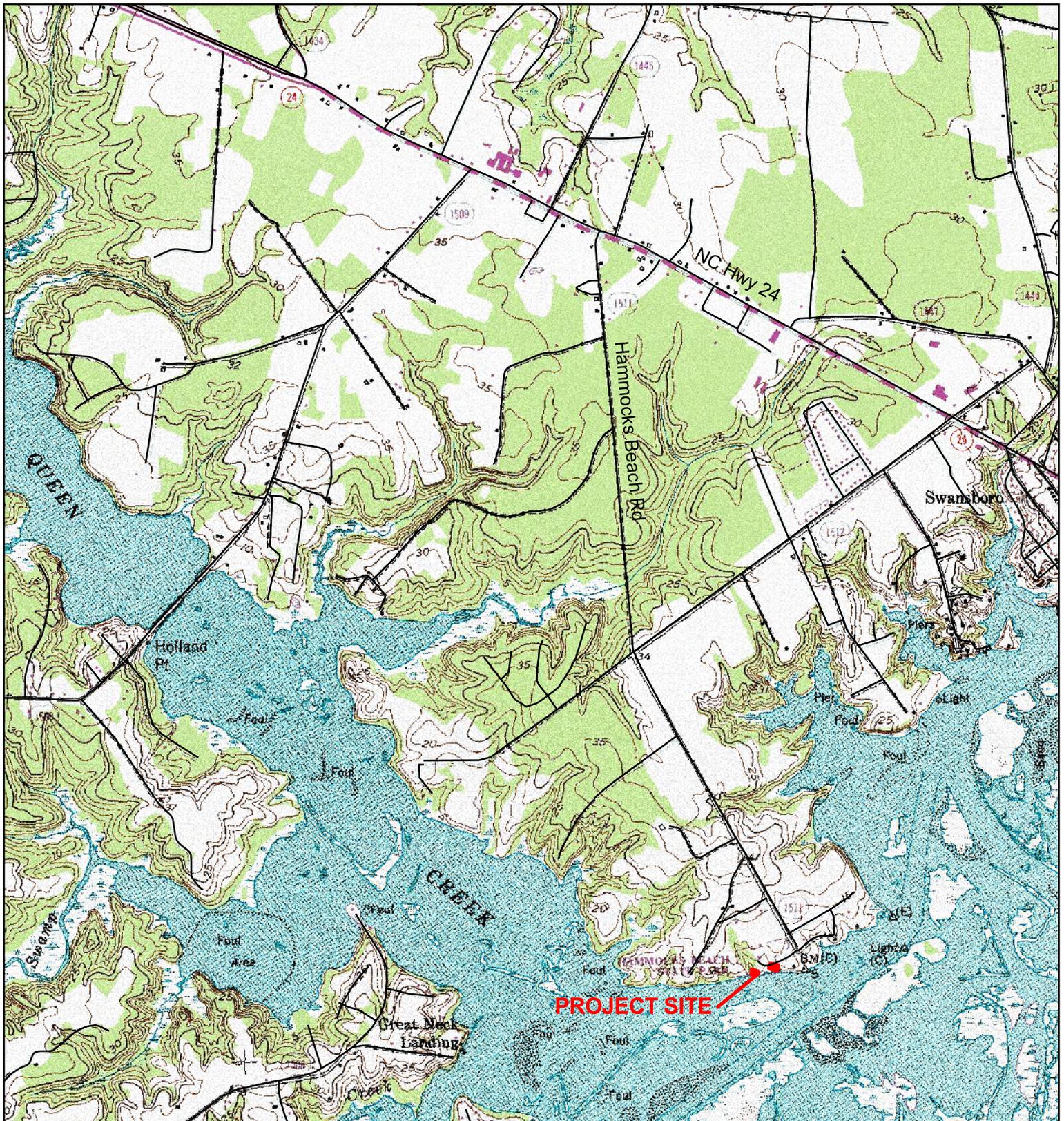


Figure 1. Vicinity Map  
 Hammocks Beach Shoreline Stabilization  
 and Wetland Restoration Project

Hammocks Beach State Park, Onslow County, NC  
 2005 Annual Monitoring - Year 5 of 5

EEP Project Number: .00040  
 BLWI Project Number: 050033



**BLUE** Land  
 Water  
 Infrastructure

2000 0 2000 Feet



Scale: 1" = 2000' November 2005



**c. Project History and Background**

Construction for this project was initiated in the summer of 2000 at the Hammocks Beach State Park. The marsh restoration project was implemented in conjunction with a NC Coastal Federation demonstration project. The purpose of the project was to demonstrate the use of a rock sill to replace a failing bulkhead and to show how once lost habitat can be restored with marsh restoration. The NC Ecosystem Enhancement Program (formerly the NC Wetlands Restoration Program) provided the design and implementation monies only for the marsh restoration portion of the project.

Table III. Project Activity and Reporting History		
Project Number and Name: 050033 Hammocks Beach Wetland		
Activity or Report	Calendar Year of Completion or Planned Completion	Actual Completion Date
Restoration Plan (plan set)	2000	7/12/2000
Mitigation Plan	none	none
Construction	2000	8/2000
Temporary S&E mix applied to entire project area	2000	8/2000
As-Built Report	none	none
Permanent seed mix applied to wetland areas	none	none
Marsh plantings	2000	8/18/2000
Reflectors installed	2000	12/6/2000
Containerized and B&B plantings for wetland buffer areas	2001	4/3/2001
Initial - Year 1 Monitoring (S&EC)	2001	11/27/2001
Year 2 Monitoring (S&EC)	2002	11/27/2002
Year 3 Monitoring (NCSU Water Quality Group)	2003	10/1/2003
Year 4 Monitoring (NCSU Water Quality Group)	2004	10/18/2004
Year 5 Monitoring (BLWI)	2005	9/20/2005

Table IV. Project Contact Table	
Project Number and Name: 050033 Hammocks Beach Wetland	
<b>Designer</b>	<b>BLUE: Land, Water, Infrastructure, PA</b> 1271 Old US Highway #1 South Southern Pines, NC 28387
Primary project design POC	Thomas S. Blue, PE, PLS (910) 692-6461 ext. 7
<b>Secondary Designer</b>	<b>North Carolina Coastal Federation</b> 3609 Hwy 24 (Ocean), Newport, NC 28570
Project design POC	Todd Miller (252) 393-8185
<b>Property Contact</b>	<b>Hammocks Beach State Park</b> 1572 Hammocks Beach Road, Swansboro, NC 28584
Park POC	Sam Bland (910) 326-4881
<b>Construction Contractor (Stone Sill)</b>	<b>Chadwick Construction</b> 327 Steamship Lane, Newport, NC 28570
Construction contractor POC	Ronnie Chadwick (252) 728-4504
<b>Construction Contractor (Bulkhead Demolition &amp; Grading)</b>	<b>Williams Construction Company</b> 1236 Piney Green Road, Jacksonville, NC 28546
Construction contractor POC	John M Williams / Keith P Williams (910) 346-4036
<b>Planting Contractor</b>	<b>Cedar Point Nursery &amp; Garden Center</b> 100 Commercial Court, Swansboro, NC 28584
Planting contractor POC	volunteers (252) 393-8185
Seeding Contractor	none
Temporary Seed Mix Sources	Waters Ace Hardware, Swansboro, NC
Nursery Stock Suppliers	Campbell's Greenhouse, Raleigh, NC (marsh plants) Cedar Point Nursery & Garden Center, Swansboro, NC (container plants)
<b>Monitoring Performers</b>	<b>BLUE: Land, Water, Infrastructure, PA</b> 1271 Old US Highway #1 South Southern Pines, NC 28387
Monitoring POC	Larry Hobbs (919) 306-2410

Table V. Project Background Table	
Project Number and Name: 050033 Hammocks Beach Wetland	
Project county	Onslow
Drainage area	n/a
Drainage impervious cover estimate (%)	n/a
Stream order	n/a
Physiographic region	coastal plain
Ecoregion	Carolinian Barrier Islands and Coastal Marshes (63G)
Rosgen classification of as-built	n/a
Cowardin classification	Intertidal persistent emergent wetland, regularly flooded
Dominant soil types	Wando fine sands
Reference site ID	Adjacent marsh to the west of restoration area
USGS HUC (project and reference)	3020106
NCDWQ subbasin (project and reference)	03-05-01
NCDWQ classification (project and reference)	SA HQW (Intracoastal Waterway)
Any portion of the project area 303d listed?	No
Any upstream portion 303d listed?	No
Reasons for 303d listing or stressor	n/a
% of project easement fenced	none

**d. Monitoring Plan View (see Figure 2)**

A total of seven 1m X 1m plots were monitored in the restored marsh area, five in the *Spartina alterniflora* and two in the *Spartina patens*. Height, stem counts and % cover were recorded in each plot.

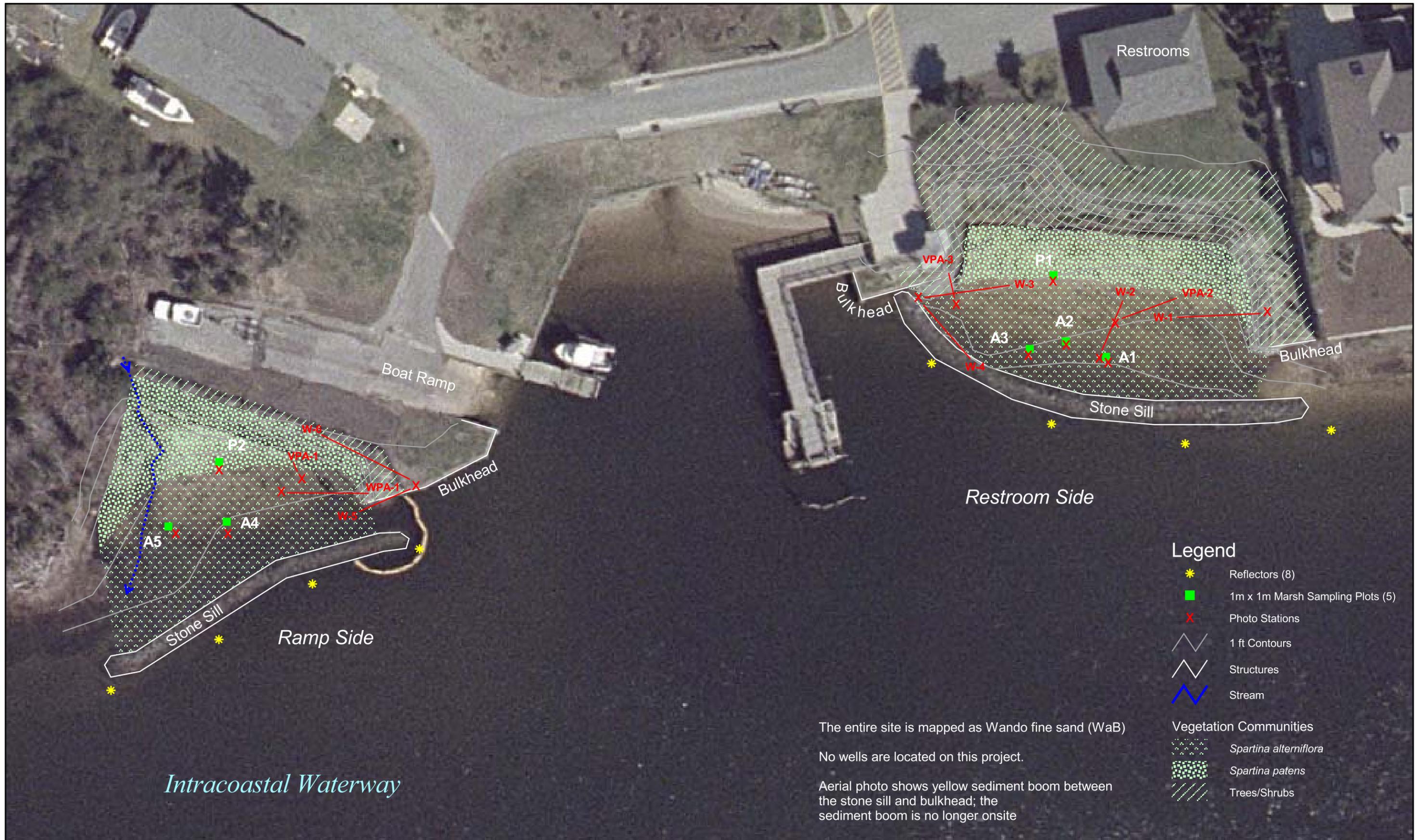


Figure 2. Monitoring Plan View  
 Hammocks Beach Shoreline Stabilization and Wetland Restoration Project  
 Hammocks Beach State Park, Onslow County, NC  
 2005 Annual Monitoring - Year 5 of 5



Scale: 1" = 30'  
 November 2005

EEP Project Number: .00040  
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### III. Project Condition and Monitoring Results

#### a. Vegetation Assessment

The marsh vegetation, planted on 2 foot centers have survived, spread and is doing well. There are no bare areas within the planted zone and growth, cover and stem count are comparable to informal comparisons with the adjacent natural marsh.

##### i. Soil Data

Table VI. Preliminary Soil Data					
Project Name and Number: 050033 Hammocks Beach Wetland					
Series	Max Depth (in)	% Clay on Surface	K	T	OM %
Wando (WaB)	85	1	0.10	5	<1

##### ii. Vegetative Problem Areas

Table VII. Vegetative Problem Areas			
Project Number and Name: 050033 Hammocks Beach Wetland			
Feature/Issue	Area	Probable Cause	Photo #
Volunteer Species	Ramp Side	<i>Scirpus</i> prolific within upper marsh area	VPA-1
	Restroom Side	Minor amount of <i>Typha</i> and <i>Phragmites</i> located in marsh	VPA-2
Vegetation Removal	Shrubs-Restroom Side	A few shrubs removed due to bulkhead construction	VPA-3
Vegetation Damage	Shrubs-Ramp Side	Minor shrub damage likely due to bulkhead construction equip.	VPA-4
Wetland Impact	Ramp Side	Fill placed in small area at the end of the bulkhead	VPA-4

##### iii. Vegetative Problem Area Plan View (see Figure 3)

The plan view shows the location of the noted problems.

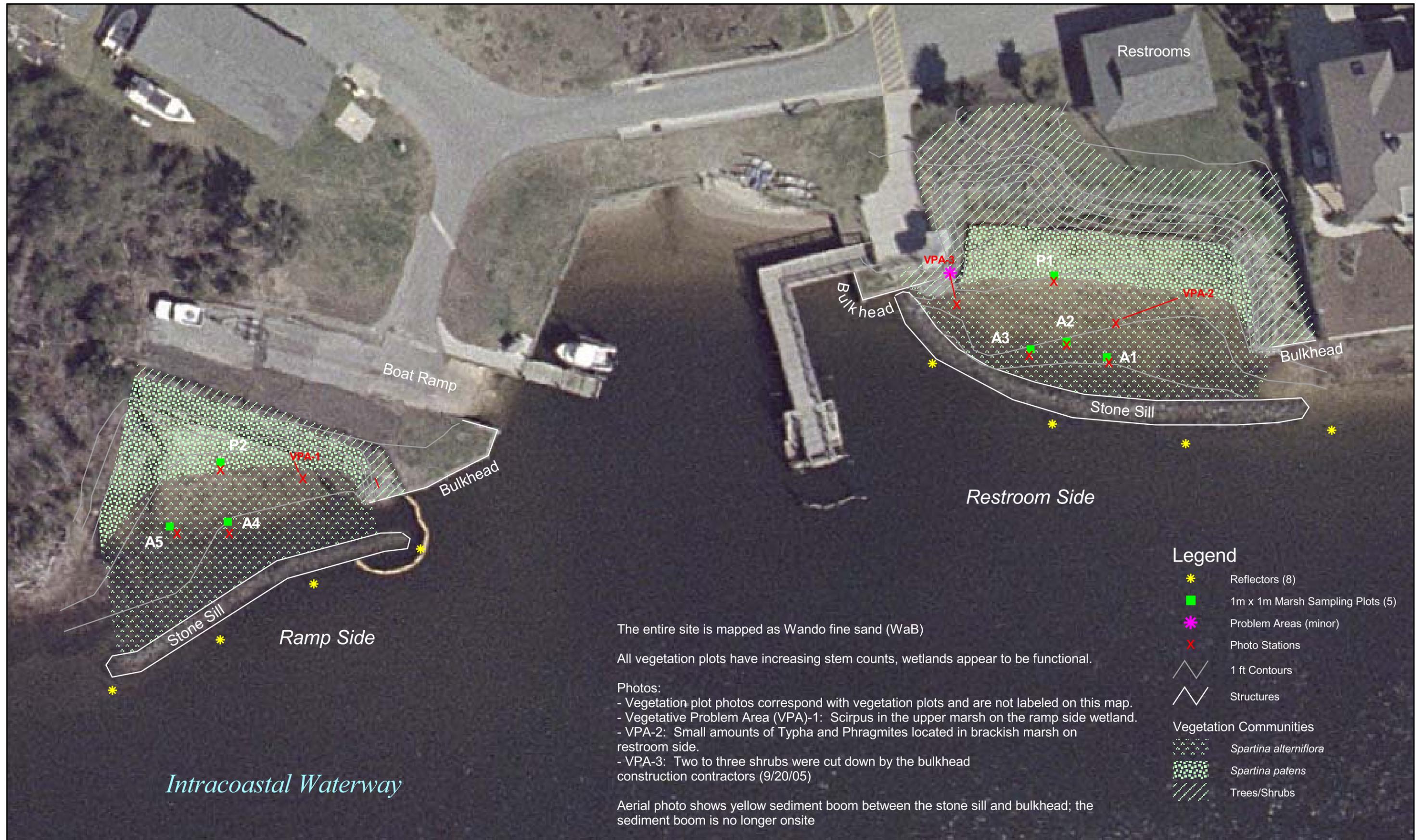


Figure 3. Vegetative Problem Area Plan View  
 Hammocks Beach Shoreline Stabilization and Wetland Restoration Project  
 Hammocks Beach State Park, Onslow County, NC  
 2005 Annual Monitoring - Year 5 of 5



#### iv. Stem Counts

Marsh vegetation was assessed in five *Spartina alterniflora* 1m X 1m plots and in two *Spartina patens* 1m X 1m plots (Exhibit 8). Methodology from previous monitoring visits was followed. Stem counts, height and % cover were made in the *Spartina alterniflora*. Stems were not counted in the *S. patens* plots, only height and % cover. Opposite corners of each vegetation plot were marked with half inch metal conduit and coordinates were obtained via GPS.

Monitoring results show that the planted marsh is doing well. Both species are surviving with minimal invasion from non-planted species. *Scirpus americanus*, *Aster sp.* and *Limonium sp.* are present in the transition zone, but this is a common occurrence within natural marshes. The range for the number of stems counted in the *S. alterniflora* plots doubled from 2004 to 2005. Recorded heights and % cover of both species are comparable to the previous years.

Small patches of *Typha sp.* and *Phragmites australis* were noted on the east/restroom side. An application of a herbicide may be necessary if these areas increase in size.

Except for those shrubs removed during recent bulkhead repair, there is good growth and survival of the planted species.

Table VIII. Stem Counts (Marsh Transects)				
Project Number and Name: 050033 Hammocks Beach Wetland				
Transect 1 – East – Restroom Side				
Species	Plot	Count	Height (m)	Cover%
<i>Spartina alterniflora</i>	A1	423	0.5-0.9	65
	A2	295	0.6-1.1	40
	A3	303	0.5-1.0	55
<i>Spartina patens</i>	P1	n/a	0.9-1.2	90
Transect 2 – West – Ramp Side				
Species	Plot	Count	Height (m)	Cover%
<i>Spartina alterniflora</i>	A4	317	0.7-1.5	45
	A5	274	0.7-1.2	45
<i>Spartina patens</i>	P2	n/a	0.9-1.1	85

Table IX. Vegetation Trends				
Project Number and Name: 050033 Hammocks Beach Wetland				
<i>Lower Salt Marsh (S. alterniflora) Data Range</i>				
Monitoring Year	Firm	Stem Count	Height (m)	Cover %
2001/2002	S&EC	48-61	not available	not available
2003	NCSU	98-149	0.75-2.5	40-70
2004	NCSU	113-165	0.3-1	30-70
2005	BLWI	274-423	0.5-1.5	40-65
<i>Upper Salt (S. patens) Marsh Data Range</i>				
Monitoring Year	Firm	Stem Count	Height (m)	Cover %
2001/2002	S&EC	not available	not available	not available
2003	NCSU	n/a	0.75-1.5	100
2004	NCSU	n/a	0.75-1.5	100
2005	BLWI	n/a	0.9-1.2	85-90

No vegetative success criteria was established, therefore the performance of the site can only be evaluated by comparison with previous data. As previously reported, both species appear to be growing well. No remedial action is needed for this site.

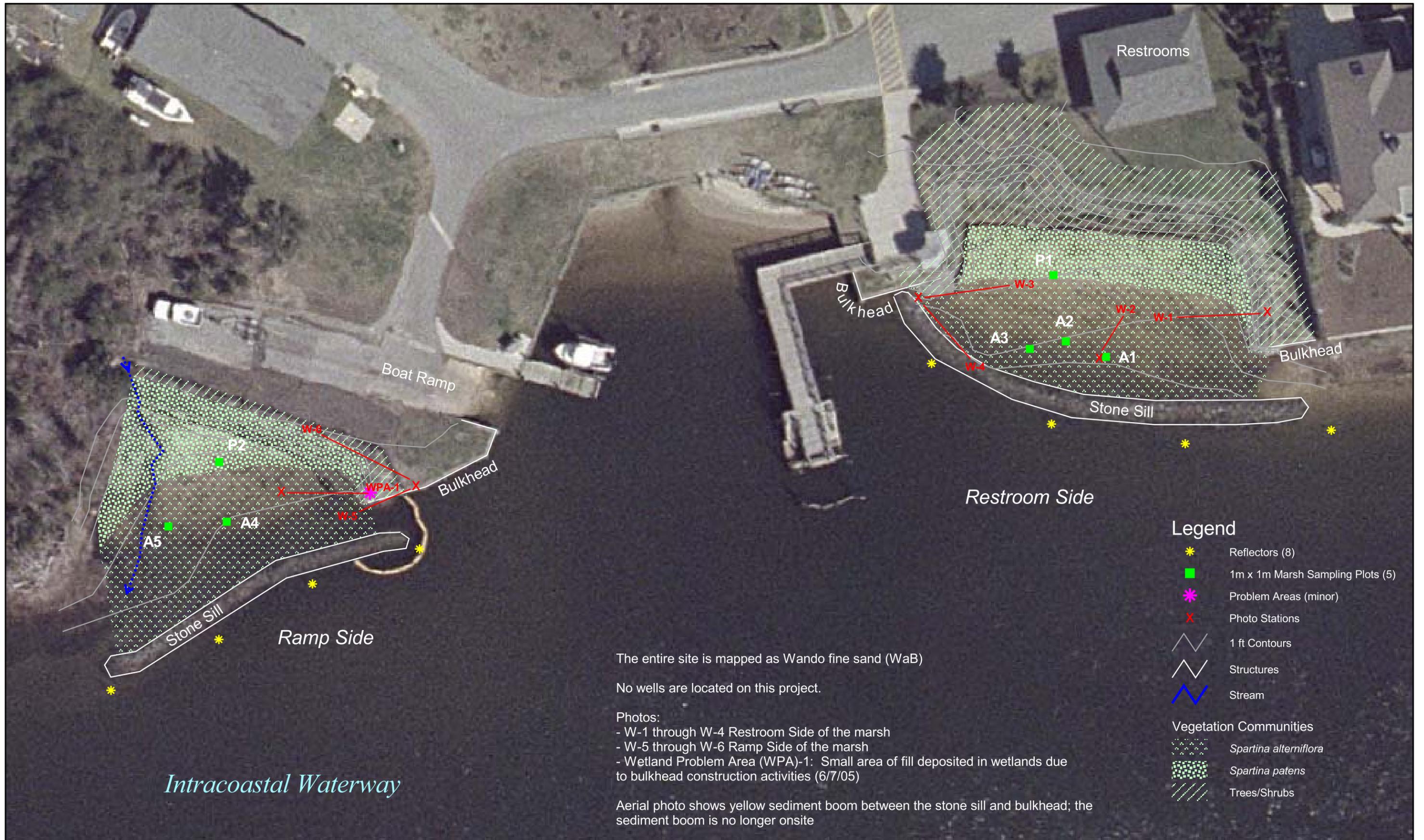
**v. Vegetation Plot Photos (see Appendix A)**

**b. Wetland Assessment and Recommendations**

**i. Wetland Problem Areas Plan View (see Figure 4)**

**c. Wetland Criteria Attainment**

There are no wells present on the Hammocks Beach project. The salt marsh appears to exhibit appropriate hydrology to support the targeted marsh grass species.



The entire site is mapped as Wando fine sand (WaB)

No wells are located on this project.

Photos:

- W-1 through W-4 Restroom Side of the marsh
- W-5 through W-6 Ramp Side of the marsh
- Wetland Problem Area (WPA)-1: Small area of fill deposited in wetlands due to bulkhead construction activities (6/7/05)

Aerial photo shows yellow sediment boom between the stone sill and bulkhead; the sediment boom is no longer onsite

*Intracoastal Waterway*

**Legend**

- \* Reflectors (8)
- 1m x 1m Marsh Sampling Plots (5)
- \* Problem Areas (minor)
- X Photo Stations
- ~ 1 ft Contours
- ▭ Structures
- ~ Stream
- Vegetation Communities**
- ▨ *Spartina alterniflora*
- ▨ *Spartina patens*
- ▨ Trees/Shrubs



Figure 4. Wetland Problem Area Plan View  
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Scale: 1" = 30'  
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#### **IV. Methodology Section**

Methodology from previous monitoring visits was followed to enable data comparison between monitoring years. Exact replication of monitoring plots was not possible due to the previous removal of the PVC plot boundary markers.

#### **V. References**

NCSU Water Quality Group. "Hammocks Beach Shoreline Stabilization and Wetland Restoration Project, 2003 Annual Monitoring Report." North Carolina State University, Biological and Agricultural Engineering, WRRI, March 2004.

NCSU Water Quality Group. "Hammocks Beach Shoreline Stabilization and Wetland Restoration Project, 2004 Annual Monitoring Report." North Carolina State University, Biological and Agricultural Engineering, WRRI, December 2004.

BLUE: Land, Water, Infrastructure. Hammocks Beach Shoreline Stabilization and Wetland Restoration Project in-house planning and design files.

## **APPENDIX A**

### **Photos**

## Vegetative Problem Area Photos

VPA-1 *Scirpus americanus*



VPA-2 Invasive species – *Typha* and *Phragmites*



VPA-3 Shrubs removed during bulkhead replacement



VPA-4 Fill in wetland during bulkhead replacement



## Vegetation Monitoring Plot Photos

**Plot 1 *S. alterniflora***



**Plot 2 *S. alterniflora***



**Plot 3 *S. alterniflora***



**Plot 4 *S. alterniflora***



**Plot 5 *S. alterniflora***



**Plot 1 *S. patens***



**Plot 2 *S.patens***



**Site photos**

**W-1**



**W-2**



**W-3**



**W-4**



**W-5**



**W-6**

