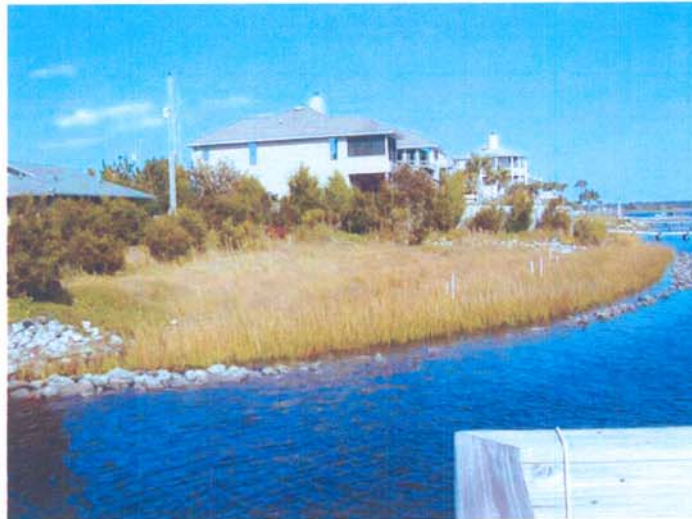


Hammocks Beach Shoreline Stabilization and  
Wetland Restoration Project  
Hammocks Beach State Park  
Swansboro, Onslow County, North Carolina

2003 Annual Monitoring Report



Prepared for: NCDEHNR/Ecosystem Enhancement Program  
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March 2004



**NC STATE UNIVERSITY**

**Hammocks Beach Shoreline Stabilization and Wetland Restoration Site  
Fall 2003 Monitoring Summary**

A wetland restoration project was funded through the North Carolina Wetlands Restoration Program (NCWRP). The goals of the project are to:

- 1) Restore spawning habitat for estuarine fish species.
- 2) Increase delivery of detritus to estuarine food web.
- 3) Provide buffer between developed areas of park and estuarine waters.
- 4) Provide demonstration of alternative to bulkhead construction for shoreline stabilization.

This is the 2nd year of the 5-year monitoring plan for the completed Hammocks Beach Site.

Table 1. Background Information

<b>Project Name</b>	<b>Hammocks Beach Shoreline Stabilization and Wetland Restoration</b>
<b>Designer's Name</b>	BLUE: Land, Water, Infrastructure, PA 1271 Old Highway #1 South Southern Pines, NC
<b>Contractor's Name</b>	Chadwick Construction Onslow County, NC
<b>Directions to Project Site</b>	The site is located at Hammocks Beach State Park. Turn onto Hammocks Beach Road off NC-17 near Swansboro, NC.
<b>Drainage Area</b>	Not applicable
<b>USGS Hydro Unit</b>	03020106
<b>NCDWQ Subbasin</b>	03-05-01
<b>Project Size</b>	0.3 acres brackish marsh and transitional freshwater wetland restoration
<b>Restoration Approach</b>	Remove deteriorating bulkheads. Mass earthwork, grading of wetland areas Construction of stone sills.
<b>Date of Completion</b>	August 2000
<b>Monitoring Dates</b>	November 2001, November 2003

**Results Summary**

The site was found to be stable, ecologic communities developing, and vegetation healthy. The stone sills appeared stable, and no evidence of erosion was found. Marsh areas have developed well. Transitional wetland and buffer areas also exhibited substantial development. Further development of communities at the site is expected and it appears that the goals of the site are being met. Recommendations for the site include:

- 1) Continued monitoring of invasive and undesirable vegetation.
- 2) Removal of any remaining silt fences.
- 3) Re-marking of reflectors.
- 4) Possible maintenance of invasive vegetation if competition appears to limit site development.

Table 2. Monitoring Results Table

<b>Hammocks Beach Shoreline Stabilization and Wetland Restoration</b>				
Hammocks Beach State Park, Onslow County, NC				
Fall 2003 Monitoring Data				
10/1/2003				
<b>Marsh Transect Data</b>				
<b>Transect 1 - East Side - Restroom Area</b>				
<b>Species</b>	<b>Plot No.</b>	<b>Count</b>	<b>Height (m)</b>	<b>Cover (%)</b>
<i>Spartina Alterniflora</i>	1	98	0.75-1.5	40
	2	143	2-2.5	40
	3	149	2-2.5	50
Other	1	25	0.75-1	1-2
	2	13	0.75-1	1-2
	3	0	na	0
<i>Spartina Patens</i>	4	na	0.75-1	100
<b>Transect 2 - West Side - Ramp Area</b>				
<b>Species</b>	<b>Plot No.</b>	<b>Count</b>	<b>Height (m)</b>	<b>Cover (%)</b>
<i>Spartina Alterniflora</i>	1	120	0.75-1.25	55
	2	144	0.75-1.25	70
Other	1	9	0.75-1	1
	2	0	na	0
<i>Spartina Patens</i>	3	na	1.25-1.5	100

## TABLE OF CONTENTS

Fall 2003 Monitoring Summary .....	i
TABLE OF CONTENTS .....	iii
LIST OF TABLES.....	iii
LIST OF FIGURES .....	iii
LIST OF PHOTOGRAPHS.....	iii
1.0 BACKGROUND DATA .....	1
1.1 Introduction.....	1
1.2 Goals and Objectives .....	1
1.3 Design and Construction Background .....	1
1.4 Monitoring Background.....	1
1.5 Current Monitoring.....	3
2.0 MONITORING PLAN AND RESULTS .....	4
2.1 Vegetation Monitoring Set up .....	4
2.2 Vegetation Monitoring Results.....	4
2.2.1 <i>Brackish Marsh</i> .....	4
2.2.2 <i>Other Vegetation Observations</i> .....	4
2.4 Results Discussion .....	7
3.0 PHOTOGRAPHS .....	8

## LIST OF TABLES

Table 1. Background Information.....	i
Table 2. Monitoring Results Table .....	ii
Table 3. Vegetation Plots.....	4

## LIST OF FIGURES

Figure 1. Location Map .....	2
Figure 2. Monitoring Locations Map.....	5

## LIST OF PHOTOGRAPHS

Photo 1. Picnic Shelter side. Lower marsh.....	8
Photo 2. Boat ramp side marsh.....	9
Photo 3. Picnic Shelter side. Upper marsh .....	10
Photo 4. Picnic Shelter side. Marsh overview.....	11
Photo 5. Stem count plot. Lower marsh.....	12

## **1.0 BACKGROUND DATA**

### **1.1 Introduction**

The Hammocks Beach Shoreline Stabilization and Wetland Restoration Project involved the installation of innovative shoreline stabilization measures and the associated restoration of brackish marsh and transitional freshwater wetland buffer. The site doubles as a restoration area and as a demonstration of alternative shoreline stabilization techniques. The site is located at Hammocks Beach State Park near Swansboro, North Carolina.

### **1.2 Goals and Objectives**

The primary goals of the project as stated on the NCWRP website are:

- 1) Restore spawning habitat for estuarine fish species.
- 2) Increase delivery of detritus to estuarine food web.
- 3) Provide buffer between developed areas of park and estuarine waters.
- 4) Provide demonstration of alternative to bulkhead construction for shoreline stabilization.

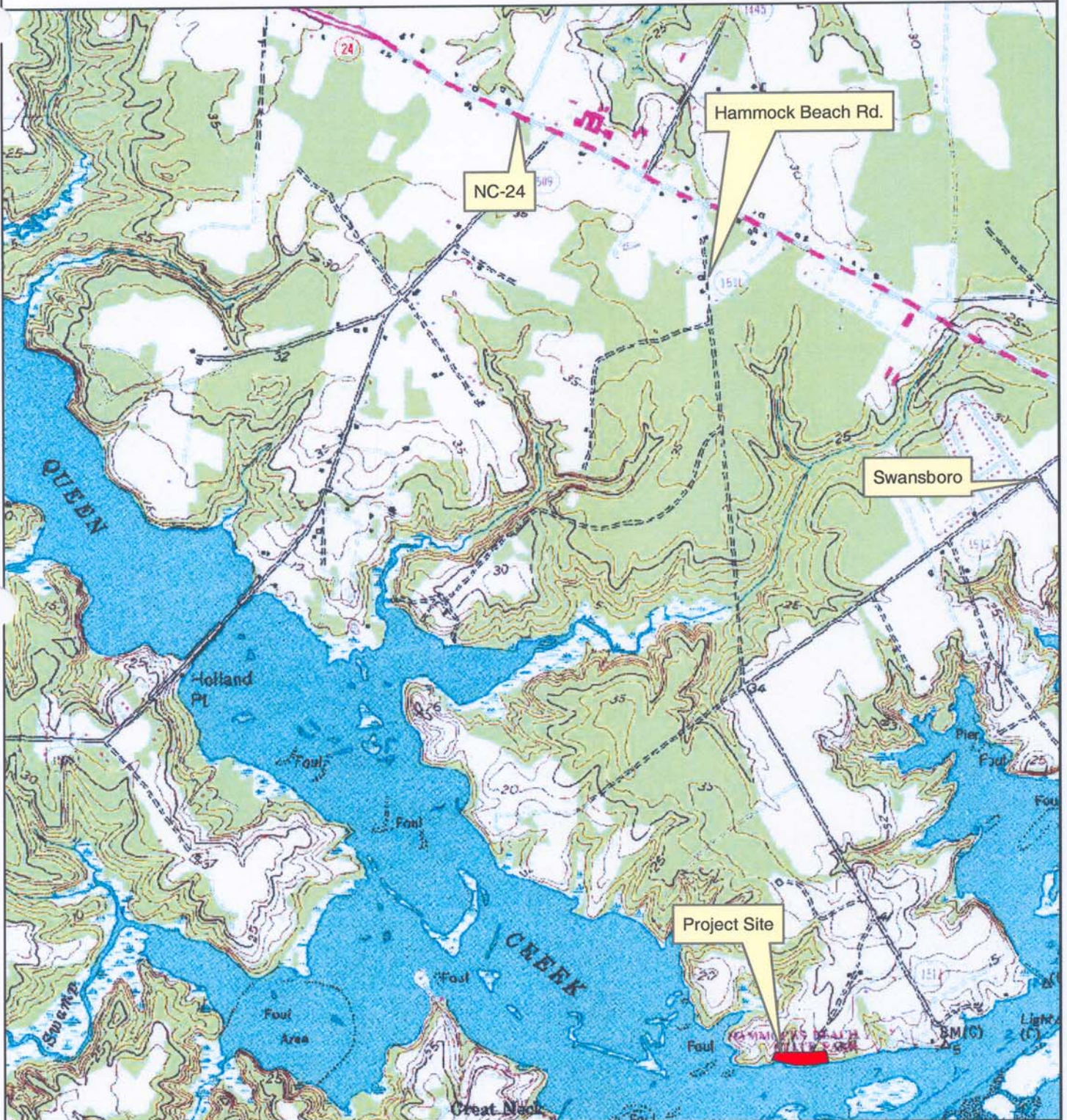
### **1.3 Design and Construction Background**

Design and construction oversight services for this project were provided by Blue: Land, Water, Infrastructure, PA (BLWI). The site is located at the old parking lot and facilities for the park. There are two separate areas at the site. One of the areas is located adjacent to the picnic shelter and the other adjacent to the boat ramp area. Construction at the site began in early summer of 2000 and planting of the site was completed near the end of the same summer. Construction activities included the removal of two failing bulkheads, the installation of two stone sills/shoreline protection features, grading, and restoration of marsh areas. The primary wetland community types that were planted included brackish marsh and a salt shrub fringe. Brackish marsh areas were planted primarily with *Spartina alterniflora* (Smooth Cordgrass) and *Spartina patens* (Saltmeadow Cordgrass). Other communities included a variety of native plantings appropriate for design elevation and water chemistry conditions.

### **1.4 Monitoring Background**

Two monitoring reports were provided for this project. Both monitoring visits were completed by Soil and Environmental Consultants, PA (S&EC). S&EC's monitoring focused on vegetative survival and involved stem counts and separation of stems into two height categories. Five plots (0.5m<sup>2</sup>) were randomly located at both the restored and reference sites. Seed heads were also counted in the plots. The first monitoring visit was completed on November 27, 2001 and the second on November 27, 2002. The reports provided the ranges of stem counts and the raw data from the visits. Stem counts in the restored site ranged from 48-61 stems per plot. Counts in the reference site ranged from 53-93 stems per plot. S&EC staff indicated they expected increased recruitment and seed production over time at the site.

# Location Map



Hammocks Beach  
Shoreline Stabilization  
Wetlands Restoration



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### **1.5 Current Monitoring**

NCSU staff made our initial monitoring visit on October 1, 2003. Our staff planned to implement a revised monitoring procedure developed based on the document "Draft Vegetation Monitoring Plan for NCWRP Riparian Buffer and Wetland Restoration Projects" provided by the North Carolina Wetlands Restoration Program. The new vegetation monitoring plan involves belted transects in the marsh areas and observations of community development in the fringe areas. Photographs and observations will also be a part of the new monitoring agenda. The full monitoring plan is explained in detail in this report.

## 2.0 MONITORING PLAN AND RESULTS

### 2.1 Vegetation Monitoring Set up

As described in the “Draft Vegetation Monitoring Plan for NCWRP Riparian Buffer and Wetland Restoration Projects” document, belted transects were set up for recording vegetation density and survivability in the marsh areas. Due to the small size of this site, it was determined to set up random 1 meter x 1 meter plots at various intervals throughout the marsh. A total of five plots were set up in the lower marsh areas (*Spartina alterniflora*) and two plots were set up in the upper marsh areas (*Spartina patens*).

Other vegetative communities at the site were found to be too small to justify additional plots. However, our staff visited each area to make observations on the health and development of those communities. The attached Vegetation Monitoring map shows the locations of the vegetation transects and plots.

Table 3. Vegetation Plots

<i>Community Type</i>	<i>Setup</i>	<i>Plots</i>	<i>Size (sq. meters)</i>
Brackish Marsh (lower)	Transects	5	1m
Brackish Marsh (upper)	Transects	2	1m

### 2.2 Vegetation Monitoring Results

#### 2.2.1 Brackish Marsh

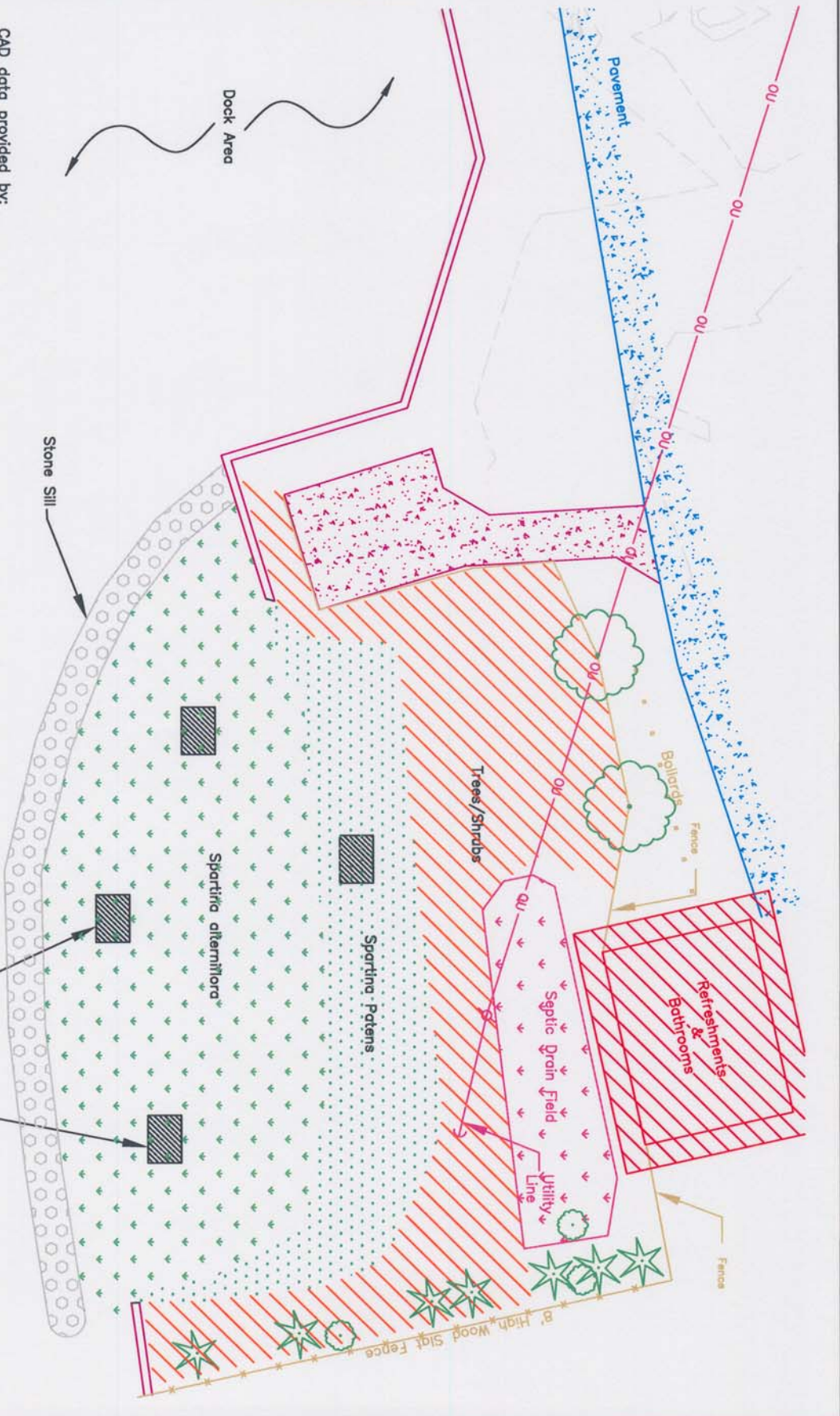
Vegetation plots in the lower marsh areas revealed a healthy stand of *Spartina alterniflora* (Smooth Cordgrass). Several other volunteer plant species were found in the plots including Olneg’s three square and Glaswort. Total stem counts for *S. alterniflora* ranged from 98 to 149 stems for an average of 130 stems/plot. This results in an impressive increase in plant density when compared to the original planting density of 2.5 stems/plot. Olneg’s three square and other volunteers ranged from 0-25 stems/plot with an average of 10 stems/plot. The plots show a population comprised of an average of 92% of the planted species and 8% volunteer species. *S. alterniflora* ranged from 2-3.5 feet tall, with a few stems rising to 5 feet. covered between 40-70% of the surface area of the plots with an average of 50% coverage. Olneg’s three square comprised about 1% coverage in the plots where it was found.

Upper marsh plots revealed extremely dense stands of *Spartina patens* (Saltmeadow Cordgrass). The number of stems in each plot were too numerous to count. Vegetation in these plots covered 100% of the ground surface beneath them. *S. patens* stems ranged from 2-4 feet in height. Several volunteer species were observed in upper marsh areas. Species such as cattails, morning glory, pennywort, and some juncus were found.

#### 2.2.2 Other Vegetation Observations

Transitional wetland/buffer areas were planted with *Ilex vomitoria* (Youpon Holly), *Quercus virginiana* (Live Oak), *Ilex glabra* (Inkberry), and *Myrica cerifera* (Wax Myrtle). These trees and shrubs were found to be growing well and very few of the planted species were not found to be alive. Wax Myrtle is showing robust growth and has propogated around the site in several places. The fringe area on the boat ramp side is healthy, but has only exhibited moderate growth





CAD data provided by:

**BLUE** Land  
Water  
Infrastructure, Inc.

1271 Old Highway #1 South  
Southern Pines, NC 28387

# Monitoring Locations Map

East Side - Restroom Area  
Hammocks Beach  
Shoreline Stabilization and Wetlands Restoration Project



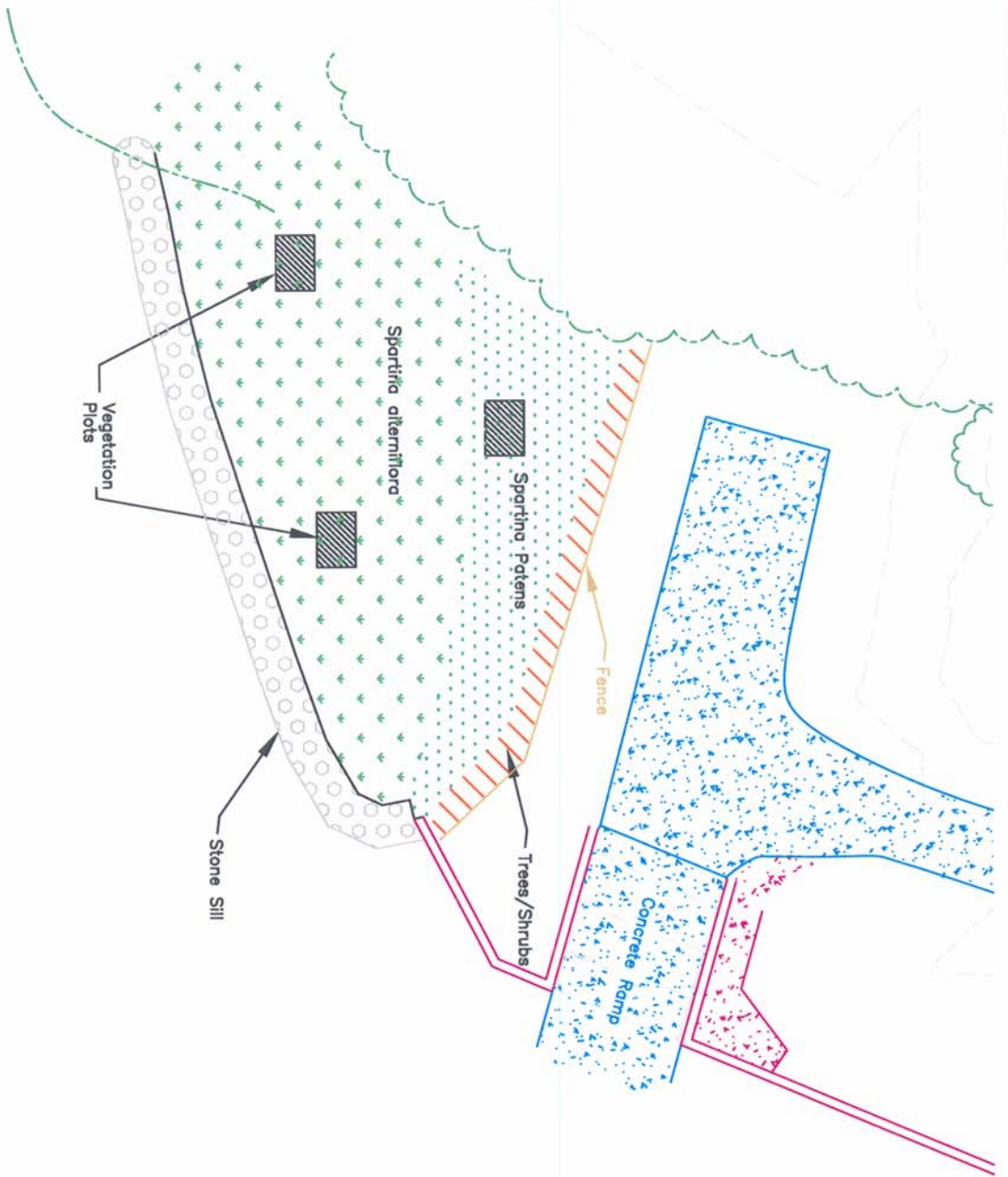
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# Monitoring Locations Map

West Side — Ramp Area  
Hammocks Beach  
Shoreline Stabilization and Wetlands Restoration Project



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## 2.4 Results Discussion

Vegetation survivability and coverage is exceeding the success criteria at this site. It is expected that the lower marsh will continue to develop. Freshwater inputs to the site from the surrounding parking lots seems sufficient to support the intrusion of some freshwater species in the upper marsh. It appears a substantial population of *S. alterniflora* has developed and will continue to be stable, however, the area may need to be watched if population encroachment is undesirable. The continued spread of wax myrtle in the upper portions of the site may create a competitive situation for the other, larger tree species. It may be necessary to manage the wax myrtles if a more diverse tree population is desired. The stone sills/shoreline protection structures appear stable and no problems with movement or subsidence were found. The installed reflectors appear solid, however, the reflective tape has faded. The tape may need replacement or other markings should be added if boat traffic is anticipated.

### 3.0 PHOTOGRAPHS



Photo 1. Picnic Shelter side. Lower marsh.



Photo 2. Boat ramp side marsh.



Photo 3. Picnic Shelter side. Upper marsh



Photo 4. Picnic Shelter side. Marsh overview.



Photo 5. Stem count plot. Lower marsh.