Wilson Bay (Sturgeon City) Wetland Restoration
Phase II
Jacksonville, Onslow County, North Carolina

2005 Annual Monitoring Report
Year 2 of 5

NCEEP Project Number: .00091
BLWI Project Number: 050039
NCDENR contract: D05056S

Prepared for:	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
Original Design Firm:	BLUE: Land, Water, Infrastructure, PA 1271 Old US Highway #1 South Southern Pines, NC 28387

17 February 2006

Ecosystem Enhancement PROGRAM

BLUE Land Water Infrastructure

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I. **Executive Summary**

The Wilson Bay (Sturgeon City) Wetland Restoration Phase II is located at Sturgeon City in Jacksonville, NC. It is adjacent to Thompson School Creek where it meets Wilson Bay and Sturgeon City Park. The project was a cooperative effort between the City of Jacksonville and the NC Ecosystem Enhancement Program (formally the NC Wetlands Restoration Program).

This project was implemented because of success earned by the Wilson Bay Wetland Restoration Phase I, and was constructed in conjunction with the Sturgeon City Environmental Park and boardwalk system. Like the Phase I Restoration, this project also removed trash laden fill material from a former wetland area and restored approximately 2.50 acres of brackish marsh. *Spartina cynosuroides* and *Spartina patens* were planted in three adjacent areas, each one supported with a tidal creek..

As construction was completed, the site was prepared and planted in phases,. Both species were planted on 2' by 2' centers. Marsh grass plantings began in August 2003 and completed by June 2004. This report provides information for the second growing season since planting, but this is only the first formal monitoring report. The project was not designed to meet any specific mitigation requirements. There were no specific success criteria established for the project. The monitoring requirements for the site include looking at the vegetative and hydrologic trends. Vegetative success is based on year to year comparisons of stem counts, heights and % cover. Hydrologic success is based whether the site is being flooded enough to support the marsh vegetation. Four Infinity surface water wells have been installed within the project area. They were problematic and yielded no usable data. There were no groundwater monitoring wells, rain gauges or creek tidal gauges installed. The site appears to be growing well and spreading. Through visual observation, regarding plant growth and survival, it can be surmised that the site is being flooded enough to support the brackish species.

Volunteer native vegetation has been noted at the site. At this time, it does not present a threat to the planted area and is not considered to be an issue. In an area of high stormwater runoff, a zone of *Typha sp.* is competing with the growth and spread of *Spartina cynosuroides*. The City of Jacksonville plans to construct a stormwater wetland to offset these problems. Construction of the stormwater wetland is scheduled to begin in March 2006. The area will be replanted with *Spartina cynosuroides* upon completion.

I. Project background

A. Location and Setting

The project is located at Sturgeon City in Jacksonville, NC. It is adjacent to Sturgeon City Park at the inactive municipal wastewater treatment plant.

Directions from Raleigh: Take I-40 East to Exit 373 - NC24/NC903 East. Follow NC 24 to Jacksonville. In Jacksonville, veer right onto Old Bridge Street to cross the New River. Turn right onto Court Street. The inactive municipal wastewater treatment plant is at the end of Court Street. Take a left into the inactive plant. The project area is adjacent to Wilson Bay at the far end of the property from the entrance. (Figure 1. Vicinity Map)

B. Structure and Objectives

The Wilson Bay (Sturgeon City) Wetland Restoration Phase II involved removal of trash laden fill material from a former wetland area, grading of the site to desired elevations, and planting the area with appropriate vegetation, *Spartina cynosuroides* and *Spartina patens*. Combined with the implementation of the environmental park, the primary goals of the project were to: 1) reduce nutrient and stormwater inputs to estuarine waters; 2) stabilize the shoreline through restoration of native vegetation; 3) improve the natural aesthetics with estuarine marsh; 4) enhance wildlife habitat; and 5) educate visitors about the importance of coastal wetlands. The project was a cooperative effort between the City of Jacksonville and the NC Ecosystem Enhancement Program (formally the NC Wetlands Restoration Program). The project implementation was not required to meet any mitigation needs.

Table I. Project Structure Table
Project Number and Name: 050039 Sturgeon City Phase II

Area	Acreage
Brackish Marsh	2.50

Table II. Project Objectives Table
Project Number and Name: 050039 Sturgeon City Phase II

Area	Objectives	Acreage	Comment
Brackish Marsh	Restoration	2.50	

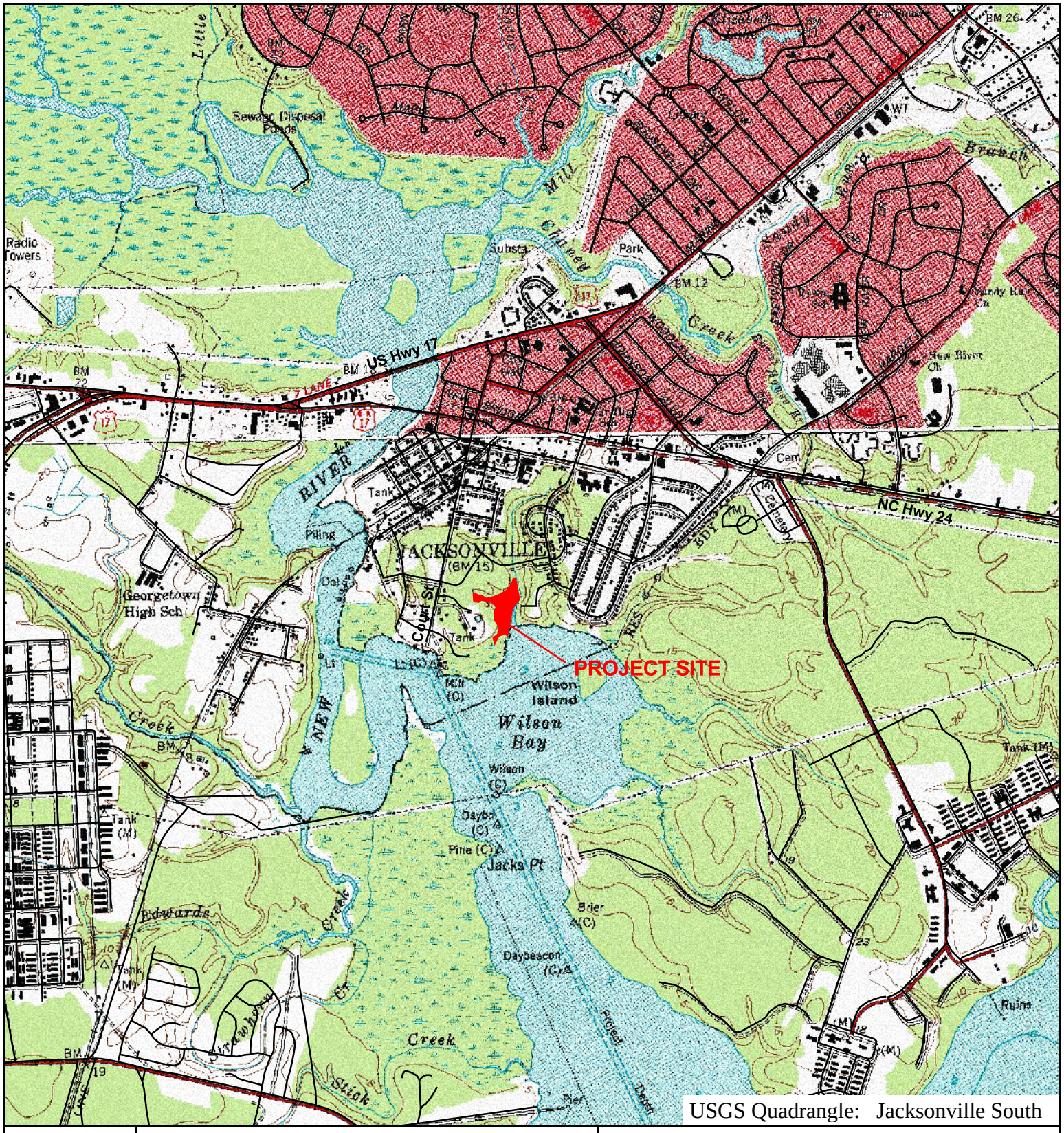

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Figure 1. Vicinity Map
Wilson Bay (Sturgeon City) Wetland Restoration Phase 2

Jacksonville, Onslow County, NC
2005 Annual Monitoring - Year 2 of 5

EEP Project Number: .00091
BLWI Project Number: 050039

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2000 0 2000 Feet

Scale: 1" = 2000' November 2005

C. **Project History**

Design and construction oversight services for this project were provided by BLUE: Land, Water, Infrastructure, PA (BLWI). The construction was undertaken by Trader Construction Company of New Bern, NC. The planting was undertaken by BLWI of Southern Pines, NC and volunteers from the City of Jacksonville. Construction at the site began in early June 2003. Planting of the site began in August 2003 and was completed by June 2004. Brackish Marsh was the primary representative vegetation type planted for this restoration effort.

Brackish marsh areas were planted with *Spartina cynosuroides* (Giant Cordgrass) and *Spartina patens* (Saltmeadow Cordgrass) on 2' by 2' centers. This equates to about 10, 890 plants/acre. The plants were grown in a greenhouse from seed collected the previous year from the Phase 1 marsh.

Table III. Project Activity and Reporting History
Project Number and Name: 050039 Sturgeon City Phase II

Activity or Report	Calendar Year of Completion or Planned Completion	Actual Completion Date
Restoration Plan (plan set)	2002	03/24/2003
Mitigation Plan	n/a	n/a
Construction	June 2003	October 2003
Temporary E&S mix applied	n/a	n/a
As-Built Report (map only)	2005	In progress
Permanent seed mix applied to wetland areas	n/a	n/a
Marsh plantings	August 2003	June 2004
Containerized and B&B plantings for wetland/buffer areas	n/a	n/a
Initial - Year 1 Monitoring (BLWI)	2004	10/12/2004
Year 2 Monitoring (BLWI)	2005	09/22/2005

Table IV. Project Contact Table Project Number and Name: 050039 Sturgeon City Phase II	
Project Designer	**BLUE: Land, Water, Infrastructure, PA** 1271 Old Highway 1, Southern Pines, NC 28387
Project designer POC	Thomas S. Blue PE PLS (910) 692-6461
Property Owner	**City of Jacksonville** PO Box 128, Jacksonville, NC 28541
Property owner POC	Glenn Hargett (910) 938-5200
Construction Contractor	**Trader Construction Company** 2500 Hwy 70 East, New Bern, NC 2856
Construction contractor POC	Carl Huddle (252) 633-2424
Planting Contractor	**BLUE: Land, Water, Infrastructure, PA** 1271 Old US Highway #1 South, Southern Pines, NC 28387
Planting contractor POC	Larry Hobbs (919) 306-2410 Thomas Blue (910) 692-6461
Seeding Contractor	n/a
Temporary Seed Mix Sources	n/a
Nursery Stock Suppliers	Campbell's Greenhouse, Raleigh, NC (marsh plants)
Monitoring Performers	**BLUE: Land, Water, Infrastructure, PA** 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: 050039 Sturgeon City Phase II	
Project county	Onslow
Drainage area	n/a
Drainage impervious cover estimate (%)	n/a
Stream order	n/a
Physiographic region	Coastal Plain
Ecoregion	63h Carolina Flatwoods
Rosgen classification of as-built	n/a
Cowardin classification	Intertidal persistant emergent wetland, irregularly flooded
Dominant soil types	Wando Fine Sand
Reference site ID	n/a
USGS HUC (project and reference)	03030001
NCDWQ subbasin (project and reference)	03-05-02
NCDWQ classification (project and reference)	SC HQW NSW (Wilson Bay)
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 fifteen (15) 1m x 1m marsh sampling plots were randomly set up to monitor the marsh. Four (4) plots were set up to monitor the *Spartina patens* area of the marsh, and eleven (11) plots were set up to monitor the *Spartina cynosuroides* area of the marsh. Vegetation height, stem counts, and percent cover was measured and recorded in the plots. Following the methodology of previous reports for Phase 1, no stem counts were made for the *Spartina patens*.

Gauge	Lat	Long
WL0041	34.741952912	77.430161702
WL0040	34.742549417	77.430075948
WL0047	34.742989961	77.430228503
WL0042	34.743559313	77.431256023

Plot	Lat	Long
c1	34.741975104	77.430130248
	34.741975215	77.430116558
c2	34.742025011	77.430274944
	34.742016196	77.430270731
c3	34.742030225	77.430124492
	34.742042992	77.430113375
c4	34.741941017	77.430187418
	34.741945842	77.430178554
p5	34.742242322	77.429873914
	34.742224705	77.429872813
c6	34.742864037	77.429735153
	34.742874999	77.429734910
c7	34.742628463	77.430043260
	34.742642091	77.430044722
c8	34.742400506	77.430011495
	34.742409799	77.430019458
c9	34.742715638	77.430045716
	34.742729018	77.430046943
c10	34.743331435	77.430016542
	34.743338812	77.430031985
c11	34.743340823	77.430327445
	34.743346236	77.430313037
c12	34.743573861	77.431098190
	34.743564528	77.431091108
p13	34.743460679	77.429662614
	34.743457087	77.429651184
p14	34.742232229	77.429816183
	34.742219856	77.429811911
p15	34.743396078	77.431060701
	34.743404808	77.431052946

Pactolus fine sand

Wando fine sand

Thompson School Creek

Sturgeon City Phase I

Sediment boom shown along eastern shoreline no longer present onsite

Legend

- Surface water Well
- 1m x 1m Marsh Sampling Plots C = s. cynosuroides, P = s. patens
- Photo Stations
- 1 ft Contours
- Phase II Easement Boundary
- Boardwalks
- Onslow County Soil Survey
- Tidal Creeks
- Existing Brackish Marsh

Source: USGS - Hurricane Isabel Damage Assessment and Recovery Effort - September 2003

Figure 2. Monitoring Plan View
Wilson Bay (Sturgeon City) Wetland Restoration Phase 2
Jacksonville, Onslow County, NC
2005 Annual Monitoring - Year 2 of 5

80 0 80 160 Feet

Scale: 1" = 80'
November 2005

EEP Project Number: .00091
BLWI Project Number: 050039

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III. Project Condition and Monitoring Results

A. Vegetation Assessment

1. Soil Data

Table VI. Preliminary Soil Data Project Number and Name: 050039 Sturgeon City Phase II					
Series	Max Depth (in)	Clay on Surface (%)	K	T	Organic Matter (%)
Wando (WaB)	85	1	0.1	5	<1
Pactolus (Pa)	72	2-12	0.1	5	0.5-2

2. Vegetative Problem Areas

At the most land ward branch of one of the brackish creeks, stormwater runoff from an adjacent road and parking lot has reduced the salinity in the brackish marsh to a point where *Typha latifolia* and *Typha angustifolia* can survive. These invasive species have taken hold in this area to a point where they are beginning to compete with the planted *Spartina cynosuroides*. The City of Jacksonville has completed plans and hired a contractor for the construction of a stormwater wetland to remedy this situation. Construction is scheduled for March 2006. The marsh grass will be replanted by the City of Jacksonville once the site is ready. Plantings should occur by May 2006.

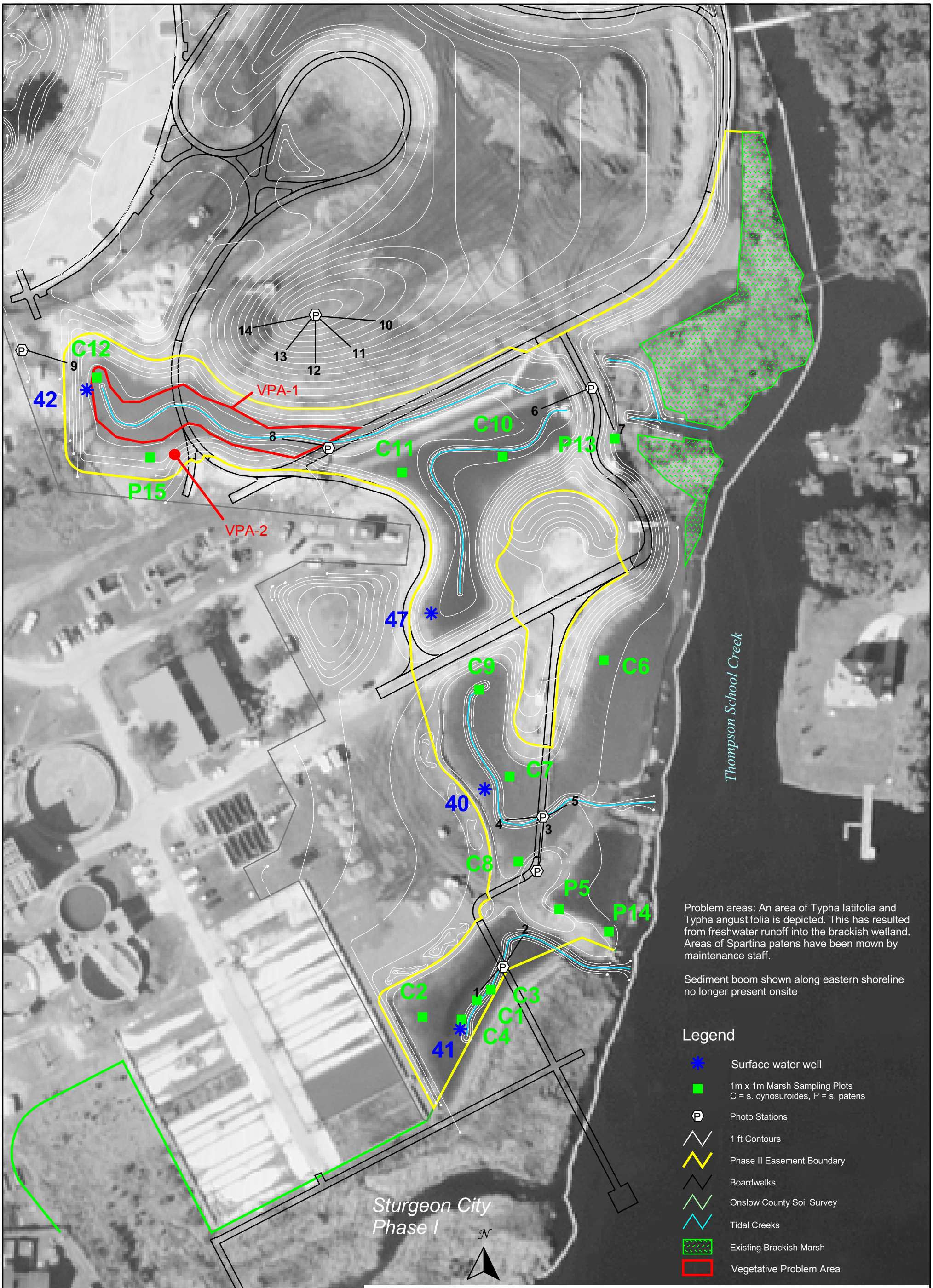
City of Jacksonville staff have consistently mown areas of *Spartina patens*, mainly along the walkways and adjacent to the boardwalks. This problem has been addressed with meetings/discussions with the maintenance staff on the importance of keeping the marsh grass. Survival has not been an issue, only plant growth and spread. The City of Jacksonville is also in the process of placing 'No Mowing' signs in the previously impacted areas.

Table VII. Vegetative Problem Areas Project Number and Name: 050039 Sturgeon City Phase II			
Feature/Issue	Area	Probable Cause	Photo #
Volunteer Species	7,200 sf	Fresh water runoff in brackish marsh	VPA-1
Vegetation Damage	200 sf	Maintenance staff have mowed S. patens	VPA-2

Vegetative Problem Area Photos (see Appendix A)

3. Problem Area Plan View (see Figure 3)

The plan view indicates the location of noted problems.



Source: USGS - Hurricane Isabel Damage Assessment and Recovery Effort - September 2003

Figure 3. Vegetative Problem Area Plan View
Wilson Bay (Sturgeon City) Wetland Restoration Phase 2
Jacksonville, Onslow County, NC
2005 Annual Monitoring - Year 2 of 5

80 0 80 160 Feet

Scale: 1" = 80'
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4. **Stem Counts**

Marsh vegetation was assessed in eleven (11) *Spartina cynosuroides* 1m x 1m plots and in four (4) Sp*artina patens* 1m x 1m plots (Table 8). Methodology from previous monitoring visits adjacent Sturgeon City Wetland Restoration Phase I were followed. Stems were not counted in the *Spartina patens* plots. The presence of the volunteer species are not considered a threat to the survival and growth of the planted species at this time. No remedial action needs to occur at this time.

Table VIII. Stem Counts (Marsh Plots)
Project Number and Name: 050038 Sturgeon City Phase II

Species	**Plot**	**Count**	**Height (cm)**	**% Cover**	**Notes**
Spartina cynosuroides	C1	77	132-285	45	*Scirpus* present
	C2	47	178-298	50	*Scirpus* present
	C3	47	137-249	45	*Scirpus* present
	C4	97	137-297	75	
	C6	58	117-283	50	*Scirpus, Aster* present
	C7	73	136-277	45	*Aster* present
	C8	61	258-327	60	*Baccharis* present
	C9	81	121-260	40	*Scirpus* present, 6.5" water
	C10	69	135-303	70	*Scirpus* present
	C11	78	140-259	60	*Scirpus, Aster* present
	C12	53	261-308	60	*Typha* present
Spartina Patens	P5	n/a	130-117	50	various herbs present
	P13	n/a	x	x	Impacted by mowing
	P14	n/a	120-123	50	Rattlebox present
	P15	n/a	45-52	40	*Aster* present

5. **Vegetative Trends**

Vegetation trends for this project have not yet been established and therefore cannot be reported at this time. It is recommended that plots be taken in the adjacent natural marsh for comparison with the planted marsh, while the site matures..

6. Vegetation Plot Photos (see Appendix A)

B. Wetland Assessment and Recommendations

1. Wetland Problem Areas

The plan view indicates the location of noted problems

Table IX. Wetland Problem Areas Project Number and Name: 050038 Sturgeon City Phase II			
Feature/Issue	Area	Probable Cause	Photo #
Surface water well malfunction (all)	Brackish marsh	Faulty equipment and/or cables	n/a

Wetland Problem Area Photos (see Appendix A)

2. Wetland Criteria Attainment

Four Infinity surface water wells were placed within the planted site. All were located within the *Spartina cynosuroides* zone between the 1 foot and 1.5 foot contours. The upper planting limit for *Spartina cynosuroides* is the 2 foot contour. Data retrieval from all of these wells proved problematic. Data exists between the periods of June - November 2005, but is considered unreliable. Elevations need to be verified and downloading issues need to be corrected this data can be provided. It may be necessary to replace all 4 of the wells.

There were no wells placed within the tidal creeks. Future reports should incorporate the tide gauge data collected by City of Jacksonville staff for Wilson Bay. The data would have to verified and surveyed before it could be used. Comparing this data with the as-built elevation for the tidal creeks and vegetative zones would support the surface water well data and show the frequency and degree of flooding within the project area.

3. Wetland Problem Area Plan View (see Figure 4)

IV. Methodology Section

Methodology from previous monitoring visits and from monitoring visits to the adjacent Sturgeon City Wetland Restoration Phase I was followed to enable data comparison between monitoring years and similar projects.

V. References

BLUE: Land, Water, Infrastructure. Wilson Bay / Sturgeon City Wetland Restoration Phase II, in-house planning and design files.

Wilson Bay Wetland Restoration Phase I Jacksonville, Onslow County, North Carolina 2004 Annual Monitoring Report, Biological and Agricultural Engineering, Water Resources Research Institute, North Carolina State University, Raleigh, NC 27695

Gauge	Lat	Long
WL0041	34.741952912	77.430161702
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WL0042	34.743559313	77.431256023

Pactolus fine sand

Wando fine sand

Thompson School Creek

Sturgeon City
Phase I

C12 C11 C10 P13 C9 C6 C7 C8 P5 P14 C2 C3 C1 C4 P15

42 (malfunctioning)

47 (malfunctioning)

40 (malfunctioning)

41 (malfunctioning)

Problem areas: An area of Typha latifolia and Typha angustifolia is depicted. This has resulted from freshwater runoff into the brackish wetland.

Sediment boom shown along eastern shoreline no longer present onsite

Legend

- Surface water well
- 1m x 1m Marsh Sampling Plots
  C = s. cynosuroides, P = s. patens
- Photo Stations
- 1 ft Contours
- Phase II Easement Boundary
- Boardwalks
- Onslow County Soil Survey
- Tidal Creeks
- Existing Brackish Marsh
- Wetland Problem Area

Source: USGS - Hurricane Isabel Damage Assessment and Recovery Effort - September 2003

Figure 4. Wetland Problem Area Plan View
Wilson Bay (Sturgeon City) Wetland Restoration Phase 2
Jacksonville, Onslow County, NC
2005 Annual Monitoring - Year 2 of 5

80 0 80 160 Feet

Scale: 1" = 80'
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Appendix A
Vegetative Photos

Vegetation Plot Photos

Plot C1

Plot C2

Plot C3

Plot C4

Plot C6

Plot C7

Plot C8

Plot C9

Plot C10

Plot C11

Plot C12

Plot P5

Plot P13

Plot P14

Plot P15

Vegetation Problem Area Photos

VPA-1 *Typha* sp. intrusion into brackish marsh

VPA-2 *Spartina patens* mowed by maintenance staff

Site photos

W-1

W-2

W-3

W-4

W-5

W-6

W-7

W-8

W-9

W-10

W-11

W-12

W-13

\W-14

Appendix B
Wetland Data

(no graphs)