ANNUAL REPORT FOR 2005

Smith Creek Mitigation Site

New Hanover County

Project No. 8.2250109

TIP No. U-92 A/B

Prepared By:
Natural Environment Unit & Roadside Environmental Unit
North Carolina Department of Transportation
December 2005

TABLE OF CONTENTS

SUMMARY 1

1.0 INTRODUCTION 2
1.1 Project Description 2
1.2 Purpose 2
1.3 Project History 2

2.0 HYDROLOGY 5
2.1 Success Criteria 5
2.2 Hydrologic Description 5
2.3 Results of Hydrologic Monitoring 5
2.4 Conclusions 5

3.0 VEGETATION 6
3.1A Success Criteria (Bald Cypress Area) 6
3.1B Success Criteria (Marsh Grass Area) 6
3.2A&B Description of Planted Areas 7
3.3A Results of Vegetation Monitoring (Bald Cypress Area) 7
3.3B Results of Vegetation Monitoring (Marsh Grass Area) 8
3.4A Conclusions (Bald Cypress Area) 12
3.4B Conclusions (Marsh Grass Area) 12

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS 12

FIGURES

Figure 1. Vicinity Map 3
Figure 2. Site Location Map 4

APPENDICES

Appendix A Site Photos & Plot and Photo Locations Map

SUMMARY

The following report summarizes the monitoring activities that have occurred in 2005 at the Smith Creek Mitigation Site. The 2005-year represents the second year of hydrology and vegetation monitoring following construction. The site must demonstrate success for a minimum of five years or until the site is deemed successful. The site was constructed to serve as mitigation for impacts associated with the construction of U92-A/B for the Smith Creek Parkway.

A tidal gauge was installed at the Bridge Maintenance site in July 2000 and was used as a reference for the Smith Creek, Wastewater Treatment, and County Sites. Tidal data was collected from July 2000 to July 2004. These sites were graded to elevations based on this tidal data.

Hydrologic monitoring utilizes four surface water gauges located on the adjacent County Mitigation Site and a reference gauge located on the Bridge Maintenance Mitigation Site. These gauges monitor the tidal regime to confirm the site's flooding period.

An onsite agency meeting was held in July 2004. At this time, it was agreed to remove the surface water gauge at the Bridge Maintenance Site since there was sufficient past tidal data. The available tidal data for the Bridge Maintenance gauge revealed inundation for 25.6% from February to July (2004). The four surface water gauges at the County Site were compared to the reference gauge. Three of the four surface gauges indicated that the site was inundated 100% of the growing season (hourly readings), while one gauge revealed 94.8%. For the gauge data provided, all four surface water gauges satisfied the inundation criteria determined by the reference gauge.

Vegetation monitoring of the baldcypress area revealed an average tree density of 87 trees per acre. This average is above the minimum success criteria of 50 trees per acre. For the marsh grass area, the target species and scale values were 75.0% and 4.2, respectively. These results are on schedule for the second year of monitoring. Due to on-going construction of the Smith Creek Site, it was not planted in its entirety in 2004. The remainder of the site has now been built with planting completed in May 2005.

During the July 2004 onsite agency meeting, it was agreed that NCDOT could propose to remove the four surface water gauges at the County Site if there was successful tidal data during the 2004-monitoring season. During the 2004 annual monitoring meeting on May 5, 2005, it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005 and no hydrologic data has been presented in this report.

1.0 INTRODUCTION

1.1 Project Description

The Smith Creek Mitigation Site is located in New Hanover County, adjacent to Bridge Maintenance and the U-92B project in Wilmington (Figure 1). Totaling 27.7 acres in size, the site provides tidal swamp forest creation mitigation for a portion of the wetland impacts associated with U-92A/B (Figure 2).

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetation monitoring must be conducted for a minimum of five years or until the site is deemed successful. The following report describes the results of both hydrologic and vegetation monitoring for the 2005-year (the second year of monitoring).

1.3 Project History

February 2003	3-Gallon Baldcypress Planted (Phase I)
April 2003	Marsh Grass Planted (Phase I)
February 2004	3-Gallon Baldcypress Planted (Phase II)
April 2004	Marsh Grass Planted (Phase II)
March-November 2004	Hydrology Monitoring (1 yr.)
September 2004	Vegetation Monitoring (1 yr.)
March 2005	3 Gallon Baldcypress Planted (Final)
May 2005	Marsh Grass Planted (Final)
September 2005	Vegetation Monitoring (2 yr.)

Figure 1. Vicinity Map

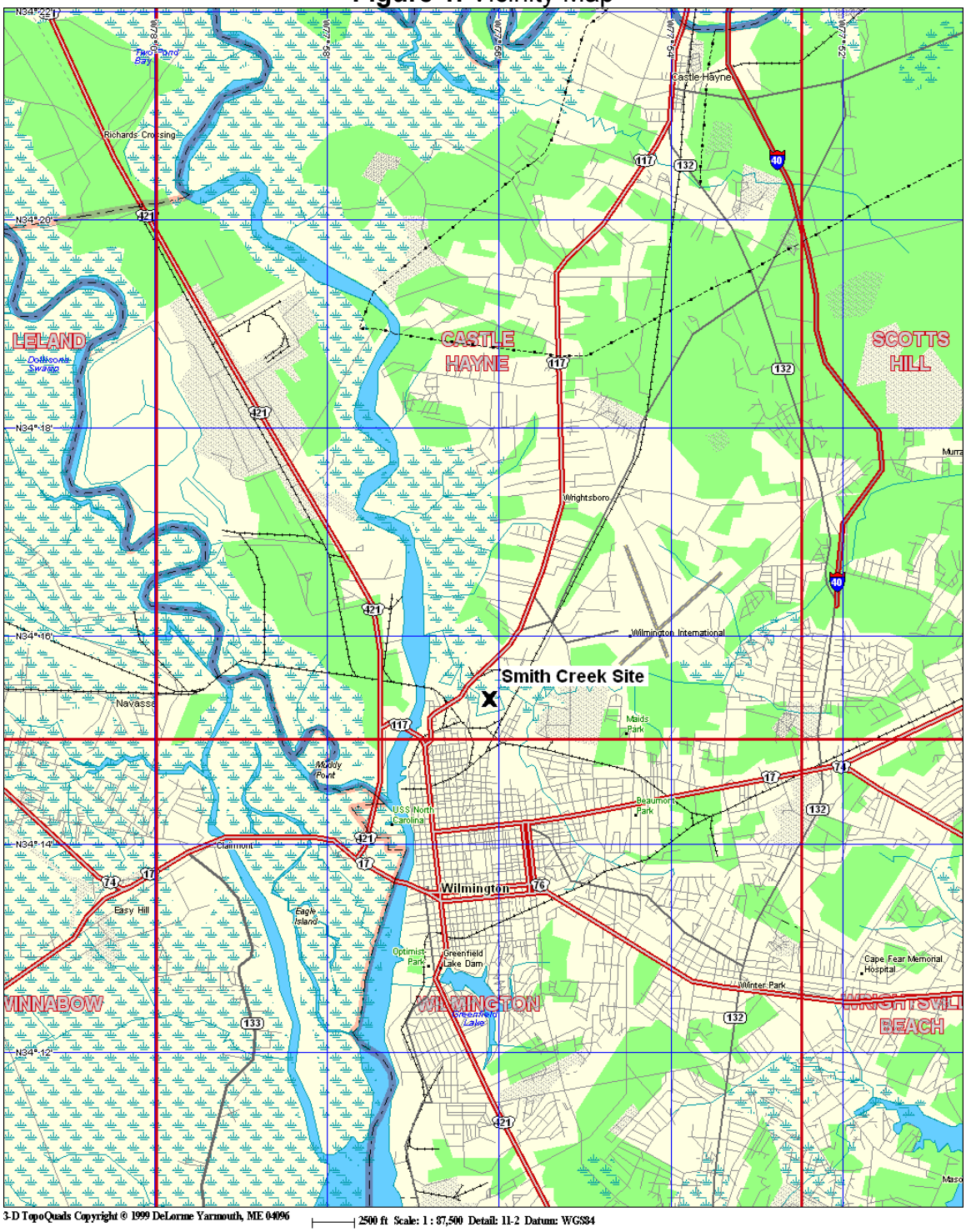
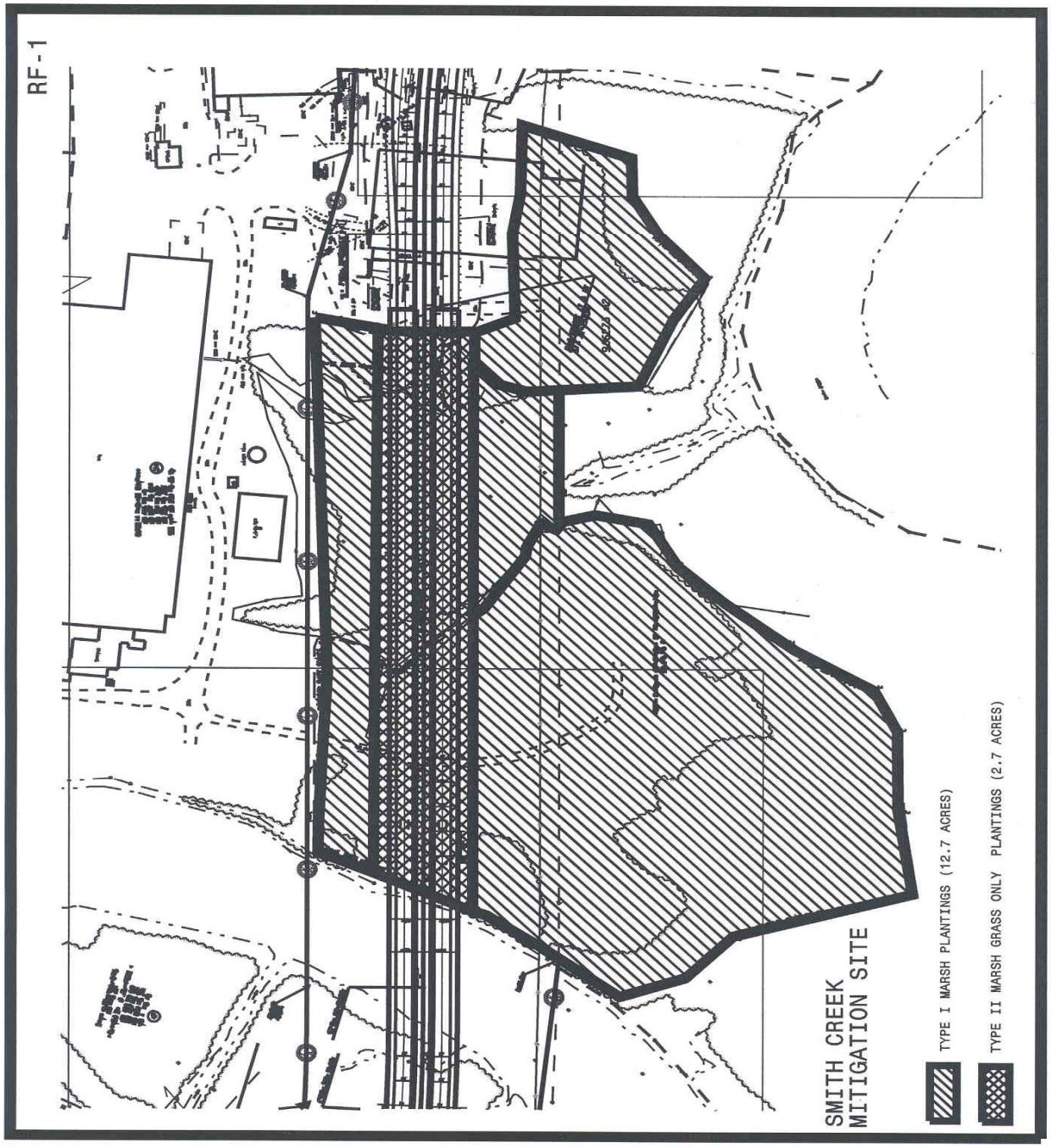


Figure 2. Site Location Map



2.0 HYDROLOGY

2.1 Success Criteria

Hydrology monitoring for the Smith Creek Mitigation Site is conducted at the adjacent County Mitigation Site. Data from an offsite tidal gauge located at the adjacent Bridge Maintenance Site (collected 02-27-04 through 07-14-04) was used as a baseline to estimate the percentage of time that the site should remain flooded, at specific elevations. A target elevation of 2.5 feet above mean sea level was selected for the Smith Creek Mitigation Site. Using the baseline data and the proposed elevation, the Smith Creek Site will be considered hydrologically successful if the adjacent County Site is inundated for 25.6% of the growing season, from February 27 to November 26 (271 days).

2.2 Hydrologic Description

The County Mitigation Site was equipped with four surface water gauges that were installed in December 2003. Since the site is a tide-driven system, groundwater and rain gauges were not installed. During the 2004 annual monitoring meeting on May 5, 2005, it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005 and no hydrologic data has been presented in this report.

2.3 Results of Hydrologic Monitoring

Hydrology monitoring has been discontinued at the County Mitigation Site.

2.4 Conclusions

During the 2004 annual monitoring meeting on May 5, 2005, it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005 and no hydrologic data has been presented in this report.

3.0. VEGETATION: U-92 SMITH CREEK MITIGATION SITE (YEAR 2 MONITORING)

3.1A Success Criteria (Baldcypress Area)

Two 100' x 100' plots have been set and will be counted as part of the vegetation monitoring for the site.

The site will be considered a success for the baldcypress if there are 50 five-year old trees per acre after the end of the fifth growing season….changes in the hydrology of Smith Creek have caused the decline in natural baldcypress populations, and it is uncertain if the planted baldcypress trees will survive. If the baldcypress survivorship declines to below the success criteria, then the Department of Transportation will consult with the Corps of Engineers to determine appropriate action.

Establishment of cypress trees over the restoration area of the Smith Creek Site is proposed, although there is evidence that they may not survive because of increases in salinity, tidal amplitude, and sea level (Hackney and Yelverton, 1990). Consequently, if cypress mortality occurs and the area develops into an emergent marsh community, the vegetational success criteria will be based on emergent marsh vegetation.

3.1B Success Criteria (Marsh Grass Area)

The vegetative marsh success of the wetland site will be determined in accordance with NMFS Guidelines. Monitoring plots found to be located within the open water channel will not be evaluated, and will not count to the final count of plots. The vegetation component of the wetland site will be deemed successful if the following criteria are met.

At year five, the average of all plots should have a scale value of 5 (75% vegetative cover) consisting of wetland herbaceous species, not including any invasive species.

A minimum of 70% of the plots shall contain the target (planted) species.

3.2A & B Description of Planted Areas

The following plant communities were planted throughout the Smith Creek site:

Approximately 15.4 acres

Spartina cynosuroides, Big Cordgrass

Cladium jamaicense, Sawgrass

Taxodium distichum, Baldcypress

3.3A Results of Vegetation Monitoring (Baldcypress Area)

Plot #	Baldcypress (Year 2)	Total (at planting)	Density (trees/acre)
1	27	27	108
2	18	30	65
AVG. DENSITY			87

3.3B Results of Vegetation Monitoring (Marsh Grass Area)

ZONE	Plot #	Scale Factor	*S. cynosuroides*	*C. jamaicense*	Frequency	Notes
1	1	5.0	✓	✓	✓	
	2	5.0				
	3	3.0				
	4	5.0	✓		✓	
	5	5.0				
	6	5.0				
	7	4.0				
	8	3.0		✓	✓	
	9	5.0	✓	✓	✓	
	10	5.0		✓	✓	
	11	5.0		✓	✓	
	12	4.0	✓		✓	
	13	3.0				
	14	4.0		✓	✓	
	15	5.0	✓		✓	
	16	5.0		✓	✓	
	17	5.0	✓	✓	✓	
	18	4.0	✓		✓	
	19	5.0		✓	✓	
	20	5.0		✓	✓	
	21	4.0		✓	✓	
	22	5.0	✓	✓	✓	
	23	0.0				Bare Ground
	24	5.0				
	25	4.0		✓	✓	
	26	3.0		✓	✓	
	27	5.0				
	28	5.0	✓		✓	
	29	2.0		✓	✓	
	30	3.0				
	31	5.0		✓	✓	
	32	5.0				
	33	3.0	✓	✓	✓	
	34	3.0	✓		✓	
	35	4.0	✓		✓	
	36					Open Water
	37	5.0				
	38	4.0		✓	✓	
	39	5.0		✓	✓	
	40	5.0		✓	✓	
	41	5.0				
	42	5.0		✓	✓	
	43	3.0				
	44	4.0				

ZONE	Plot #	Scale Factor	*S. cynosuroides*	*C. jamaicense*	Frequency	Notes
	45	2.0				
	46	4.0	✓		✓	
	47	3.0	✓		✓	
	48	5.0	✓		✓	
	49	4.0				
	50	3.0	✓		✓	
	51	5.0				
	52	2.0				
	53	0.0				100% Phragmites
	54	3.0				
	55	5.0	✓	✓	✓	
	56	5.0	✓		✓	
	57	5.0	✓	✓	✓	
	58	5.0	✓	✓	✓	
	59	4.0	✓		✓	
	60	2.0				
	61	4.0				
	62	0.0				100% Phragmites
	63	5.0		✓	✓	
	64	5.0	✓	✓	✓	
	65	4.0		✓	✓	
	66	5.0				
	67	5.0	✓	✓	✓	
	68					Open Water
	69	4.0				
	70	3.0	✓		✓	
	71	5.0		✓	✓	
	72	5.0		✓	✓	
	73	3.0		✓	✓	
	74	5.0				
	75	5.0		✓	✓	
	76	4.0		✓	✓	
	77	4.0				
	78	4.0				
	79	3.0				
	80	1.0				
	81	3.0	✓		✓	
	82	5.0	✓		✓	
	83	3.0	✓	✓	✓	
	84	5.0		✓	✓	
	85	5.0	✓	✓	✓	
	86	5.0		✓	✓	
	87	5.0	✓		✓	
	88	5.0	✓		✓	
	89	3.0				
	90	5.0	✓	✓	✓	

ZONE	Plot #	Scale Factor	*S. cynosuroides*	*C. jamaicense*	Frequency	Notes
	91	5.0				
	92	4.0	✓		✓	
	93	4.0		✓	✓	
	94	5.0		✓	✓	
	95	5.0				
	96	5.0	✓	✓	✓	
	97	4.0	✓		✓	
	98	5.0		✓	✓	
	99	5.0				
	100	5.0	✓		✓	
	101	5.0		✓	✓	
	102	0.0				100% Phragmites
	103	5.0		✓	✓	
	104	4.0		✓	✓	
	105	3.0	✓	✓	✓	
	106	2.0		✓	✓	
	107	5.0				
	108	3.0				
	109	4.0		✓	✓	
	110	5.0	✓	✓	✓	
	111					Open Water
	112	5.0		✓	✓	
	113	5.0	✓	✓	✓	
	114	5.0		✓	✓	
	115	4.0				
	116	4.0		✓	✓	
	117					Open Water
	118	5.0	✓	✓	✓	
	119	3.0	✓		✓	
	120	5.0				
	121	5.0		✓	✓	
	122	5.0		✓	✓	
	123	4.0		✓	✓	
	124	3.0		✓	✓	
	125	4.0		✓	✓	
	126	5.0	✓	✓	✓	
	127	3.0		✓	✓	
	128	5.0	✓		✓	
	129	5.0	✓		✓	
	130	5.0		✓	✓	
	131	4.0	✓		✓	
	132	5.0		✓	✓	
	133	5.0		✓	✓	
	134	4.0		✓	✓	
	135	4.0		✓	✓	
	136	5.0		✓	✓	
	137	4.0		✓	✓	
	138	5.0		✓	✓	
	139	5.0		✓	✓	
	140	5.0		✓	✓	

ZONE	Plot #	Scale Factor	*S. cynosuroides*	*C. jamaicense*	Frequency	Notes
	141	5.0	✓		✓	
	142	5.0		✓	✓	
	143	4.0		✓	✓	
	144	5.0		✓	✓	
	145	5.0		✓	✓	
	146	5.0	✓	✓	✓	
	147	5.0		✓	✓	
	148	4.0	✓		✓	
	149	4.0		✓	✓	
	150	5.0		✓	✓	
	151	5.0		✓	✓	
	152	4.0		✓	✓	
	153	5.0		✓	✓	
	154	4.0				
	155	5.0		✓	✓	
	156	3.0		✓	✓	
	157	3.0		✓	✓	
	158	2.0				
	159	4.0	✓	✓	✓	
	160	4.0		✓	✓	
	161	5.0	✓	✓	✓	
	162	4.0		✓	✓	
	163	4.0				
	164	5.0		✓	✓	
	165	5.0		✓	✓	
	166	3.0		✓	✓	
	167	4.0		✓	✓	
	168	5.0		✓	✓	
	169	4.0				
	170	4.0		✓	✓	
	171	5.0		✓	✓	
	172	5.0	✓	✓	✓	
	173	5.0		✓	✓	
	174	5.0		✓	✓	
	175	5.0		✓	✓	
	176	4.0		✓	✓	
	177	4.0		✓	✓	
	178	5.0		✓	✓	
	179	5.0		✓	✓	
	180	5.0	✓	✓	✓	
Frequency (Percentage of Plots with Desired Species)			28.9%	59.6%	75.0%	
Sum Scale Value					743	
Total Number of Plots Counted					176	
Vegetative Cover (Scale Value)					4.2	

Site Notes: The following species were also noted in the monitoring plots. The percentage of plots the species was found in is following the species in parentheses (i.e. 110% of the plots contain cattails.)

cattails (110), phragmites (27), *Echinochloa walteri* (46), *Sagittaria* sp. (25), *Juncus* sp. (2), woolgrass (4), *Hypericum* sp. (25), *Pluchea* sp. (32), sycamore (1), *Aster* sp. (3), black willow (2), goldenrod (2), *Baccharis halimifolia* (1), *Scirpus* sp. (5) and smartweed (35).

3.4A Conclusions (Baldcypress Area)

Baldcypress trees were planted on 20' centers throughout the approximately 15.4 acre site. Two 100' x 100' plots were established in the planting area. The vegetation monitoring of the planted area revealed an average of 87 baldcypress trees per acre.

3.4B Conclusions (Marsh Grass Area)

- Percent Frequency of Target Species (Big Cordgrass and Sawgrass) **75%**

  Frequency of 70% required.

- Vegetative Cover Scale Value **4.2**

  Scale Value of 5 required for year 5.

Approximately 15.4 acres of this site involved marsh grass plantings. Due to the construction of the Smith Creek Mitigation Site there were only 120 random plots taking during the first year of monitoring. The final phase of marsh grass plantings was planted in May 2005. All 180 random plots were taken for the second monitoring year. Vegetative coverage is on track to meet the success criteria for year 5.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

An onsite agency meeting was held in July 2004. At this time, it was agreed to remove the surface water gauge at the Bridge Maintenance Site since there was sufficient past tidal data. The available tidal data for the Bridge Maintenance gauge revealed inundation for 25.6% from February to July (2004). The four surface water gauges at the County Site were compared to the reference gauge. Three of the four surface gauges indicated that the site was inundated 100% of the growing season (hourly readings), while one gauge revealed 94.8%. For the gauge data provided, all four surface water gauges satisfied the inundation criteria determined by the reference gauge.

Baldcypress trees were planted on 20' centers throughout the approximately 15.4-acre site. Vegetation monitoring of the baldcypress area revealed an average tree density of 87 trees per acre. This average is above the minimum success criteria of 50 trees per acre. Approximately 15.4-acre of this site involved marsh grass plantings. For the marsh grass area, the target species and scale values were 75% and 4.2, respectively; the marsh grass area is on track for the second year of monitoring.

During the 2004 annual monitoring meeting on May 5, 2005, it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005 and no hydrologic data has been presented in this report.

APPENDIX A

SITE PHOTOS

&

PHOTO AND PLOT LOCATIONS

Smith Creek

Photo 1

Photo 2

Photo 3

Photo 4

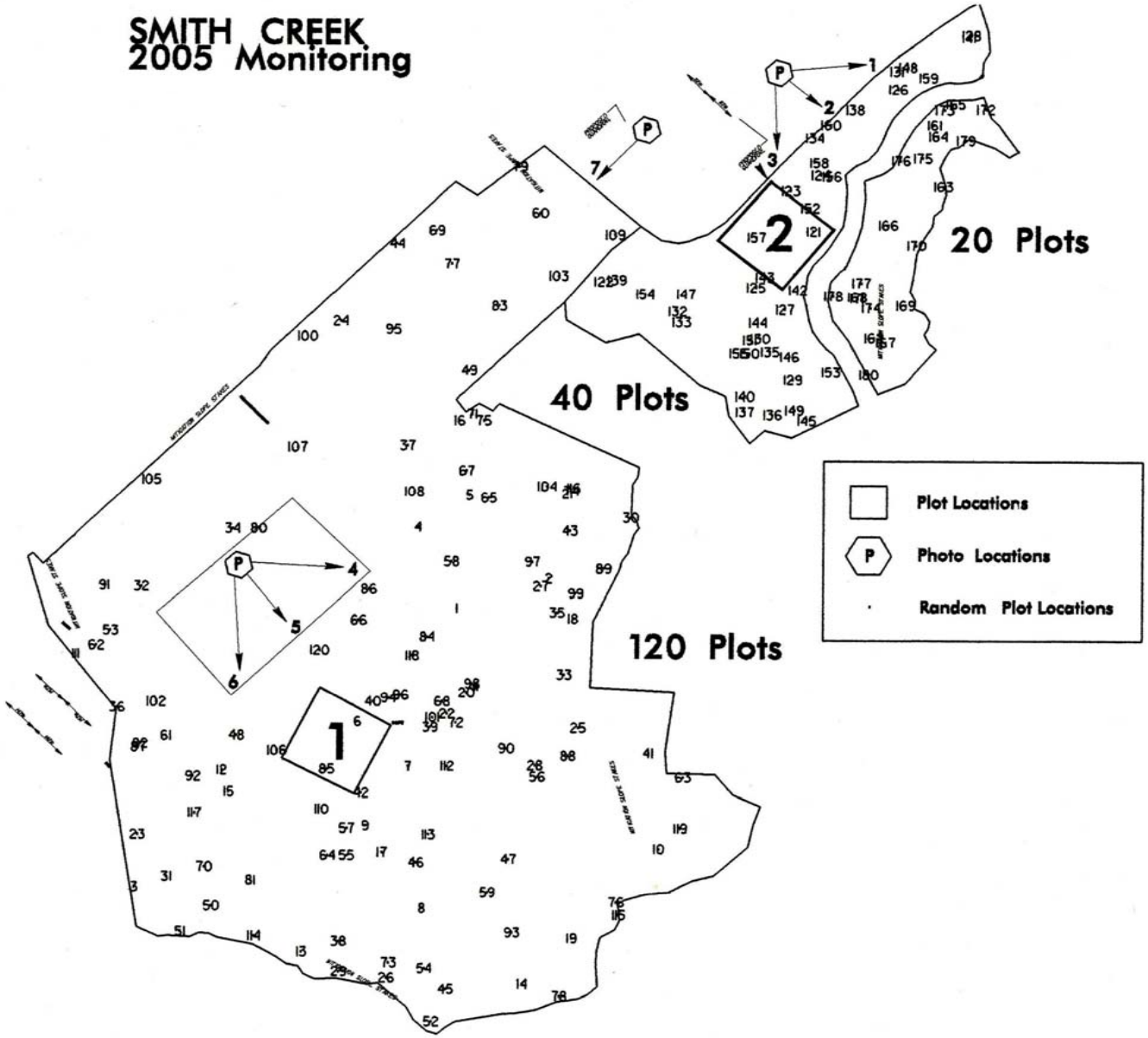
Photo 5

Photo 6

September 2005

Smith Creek

Photo 7

September 2005

SMITH CREEK
2005 Monitoring