ANNUAL REPORT FOR 2004

Sawmill Mitigation Site
Craven County
Project No. 8.1170801
TIP No. B-2531WM

Office of Natural Environment & Roadside Environmental Unit
North Carolina Department of Transportation
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SUMMARY

The following report summarizes the monitoring activities that have occurred in the 2004-year at the Sawmill Mitigation Site. The 2004-year represents the second year of hydrology and vegetation monitoring following construction. The site must demonstrate hydrologic and vegetation 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 US17 Neuse River Bridge in New Bern.

In May 2003, surface water and groundwater gauges were installed to monitor hydrology on the site. Three separate gauge sets, each with one surface and one groundwater gauge, were positioned on the mitigation site. There are also two reference gauge sets that were installed prior to construction. One reference set is located offsite and the other set is located directly adjacent to the constructed site, within the preservation area.

Hydrologic success criteria are based on the approved mitigation plan and require that the site demonstrate hydrologic frequency, duration, and depth consistent within 10% of the hydrology of the reference areas. The three groundwater restoration gauges were compared to the two existing reference gauges. For the gauge data provided, one of the three-groundwater restoration gauges indicated that saturation levels were similar to those of the reference gauges and met the 10% success criteria. However, all three groundwater gauges met the 12.5% optimum saturation period (wetland criteria). Also, the three surface water gauges indicated inundation patterns similar to that of the reference gauges.

Vegetation monitoring in the hardwood area yielded 576 trees per acre. This average is above the minimum success criteria of 320 trees per acre. For the marsh grass area, the target species and scale values were 100% and 4.35, respectively. Supplemental planting of swamp blackgum was performed in January 2004. This supplemental planting increased the counts in each plot.

Based on the results from the second year of monitoring, NCDOT will continue to monitor vegetation and hydrology at the Sawmill Mitigation Site.

1.0 INTRODUCTION

1.1 Project Description

The Sawmill Mitigation Site serves (entirely) as mitigation for the US17 Neuse River Bridge in New Bern (Figure 1). Situated adjacent to the new bridge alignment, the 4.07-acre site includes both preservation and restoration of brackish tidal marsh as well as tidal cypress-gum swamp. Reference areas, both onsite and offsite, are utilized to provide reference data for restoration monitoring.

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. Vegetation success criteria are based on the National Marine Fisheries Service guidelines. Hydrologic success criteria are based on the approved mitigation plan and require that the site demonstrate hydrologic frequency, duration, and depth consistent within 10% of the hydrology of the reference areas. Included in this report are analyses of hydrologic and vegetation-monitoring results, discussions of local climate conditions throughout the growing season, and site photographs.

1.3 Project History

2002	Reference Gauges Installed
March 2003	Site Constructed
April 2003	Site Planted
May 2003	Monitoring Gauges Installed
May-November 2003	Hydrologic Monitoring (Year 1)
July 2003	Hardwood Vegetation Monitoring (1 yr.)
July 2003	Marsh Vegetation Monitoring (1 yr.)
March-November 2004	Hydrologic Monitoring (Year 2)
June 2004	Hardwood Vegetation Monitoring (2 yr.)
June 2004	Marsh Vegetation Monitoring (2 yr.)

Figure 1. Site Location Map

2.0 HYDROLOGY

2.1 Success Criteria

The hydrologic success criteria established for the Sawmill Mitigation Site, as stipulated in the approved mitigation plan and subsequent revisions, require that the site demonstrate hydrologic frequency, duration, and depth consistent within 10% of the hydrology of the reference areas. The site-specific criteria vary from current federal guidelines that require a site to be inundated or saturated (within 12" of the surface) by surface or groundwater for a consecutive 12.5% of the growing season.

The growing season in Craven County begins on March 18 and ends November 14. The dates correspond to a 50% probability that air temperature will drop to 28° after March 18 and before November 14[1]; thus, the growing season is 240 days. Local climate must represent average conditions for the area.

2.2 Hydrologic Description

Wind-driven tides are the primary hydrologic input at/on the Sawmill Site; therefore, three sets of gauges were installed within the site's restoration area (Figure 2) in May 2003. Each set includes one surface gauge and one groundwater-monitoring gauge. There are also two reference gauge sets that were installed prior to construction. One reference set is located offsite and the other set is located directly adjacent to the constructed site, within the preservation area. No rain gauge is located on the site, so rainfall data (supplied by the NC State Climate Office) from an official weather station in New Bern is used to supplement the site data. The surface gauges record surface water levels every three hours, while the groundwater gauges record water levels on a daily basis. Monitoring data for 2004 represents the second year of hydrologic monitoring for the site.

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

The maximum number of consecutive days that saturation occurred within 12 inches of the ground surface was determined for each groundwater-monitoring gauge. This number was converted into a percentage of the 240-day growing season (March 18 – November 14). Table 1 provides the 2004 hydrologic results; Figure 3 is a graphical representation of these results. Appendix A includes graphs of the data recorded at each groundwater and surface water gauge. Daily rainfall events recorded at the official weather station in New Bern are included on each of the groundwater gauge plots.

[1] Soil Conservation Service, Soil Survey of Craven County, North Carolina, 1989.

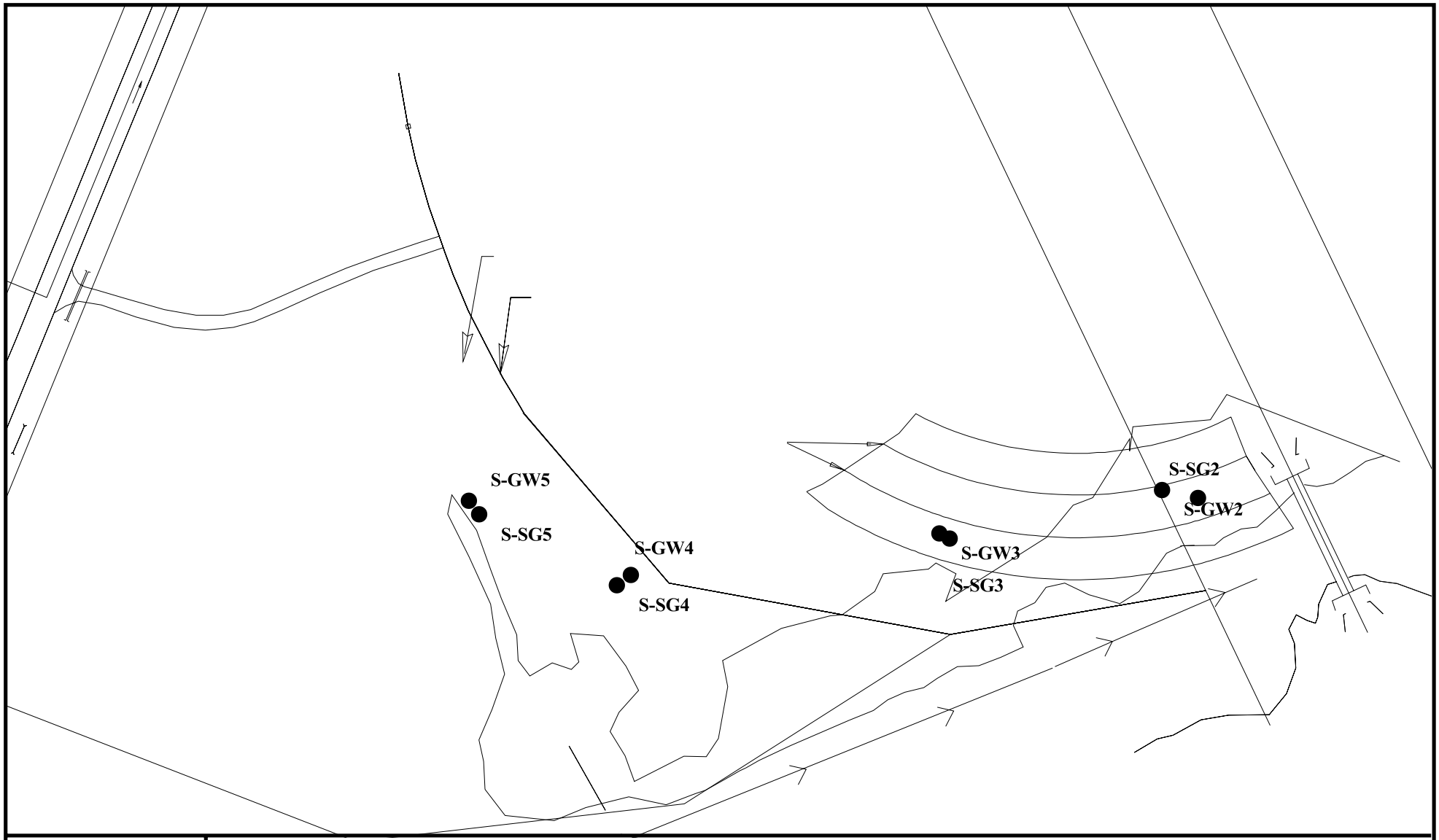


Figure 2. Gauge Location Map

Not to Scale

Table 1. 2004 Hydrologic Monitoring Results

Monitoring Gauge	Within 10%	Actual %	Success Dates
S-GW1 (REF)	✕	94.2	April 1-Nov 12
S-GW2 (REF)	✕	100	March 18-Nov 12
S-GW3*		42.9	July 18-Nov 12
S-GW4*	✕	100	March 18-Nov 12
S-GW5*		50	March 18-July 15

Shaded gauges are reference gauges.
* Gauges were installed May 16, 2003.

2.3.2 Climatic Data

Figure 4 is a comparison of the 2004 monthly rainfall to the historical precipitation (collected between 1973 and 2004) for New Bern, North Carolina. This comparison gives an indication of how 2004 relates to historical data in terms of climate conditions. The NC State Climate Office provided all local rainfall information.

This graph is used to indicate the general precipitation conditions for the surrounding area. The data obtained for the 2004-year indicates above average precipitation for December (03'), August and September. Below average precipitation was reported for November (03'), January, March, July, and October. The months of February, April, May, June, and November experienced average precipitation. Overall, the 2004-year exhibited an average rainfall year.

2.4 Conclusions

The 2004-year represents the second year of hydrologic monitoring for the Sawmill Mitigation Site. The three groundwater restoration gauges were compared to the two existing reference gauges. One groundwater reference gauge and one restoration gauge recorded saturation for 100% of the growing season, while the second reference gauge recorded saturation for 94.2%. The remaining two-restoration gauges recorded saturation for 49.2% and 50%. For the gauge data provided, one of the three-groundwater restoration gauges indicated that saturation levels met the 10% success criteria. However, all three groundwater gauges met the 12.5 % optimum wetland criteria. Also, the three surface water gauges indicated inundation patterns similar to that of the reference gauges. The 2004 data was collected during a year of average rainfall.

NCDOT will continue to monitor the Sawmill Mitigation Site for hydrology.

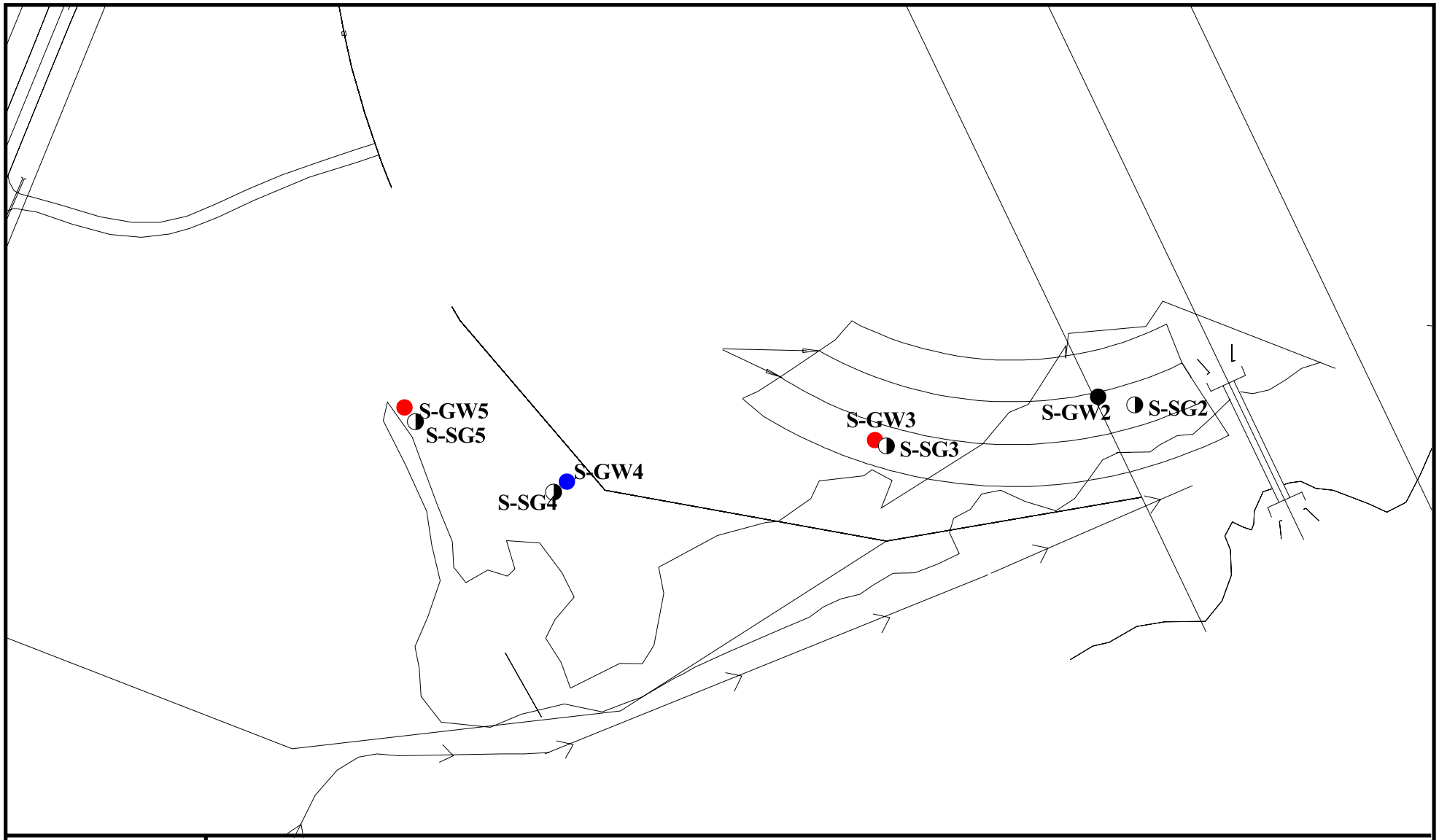


Figure 3. 2004 Hydrologic Monitoring Gauge Results

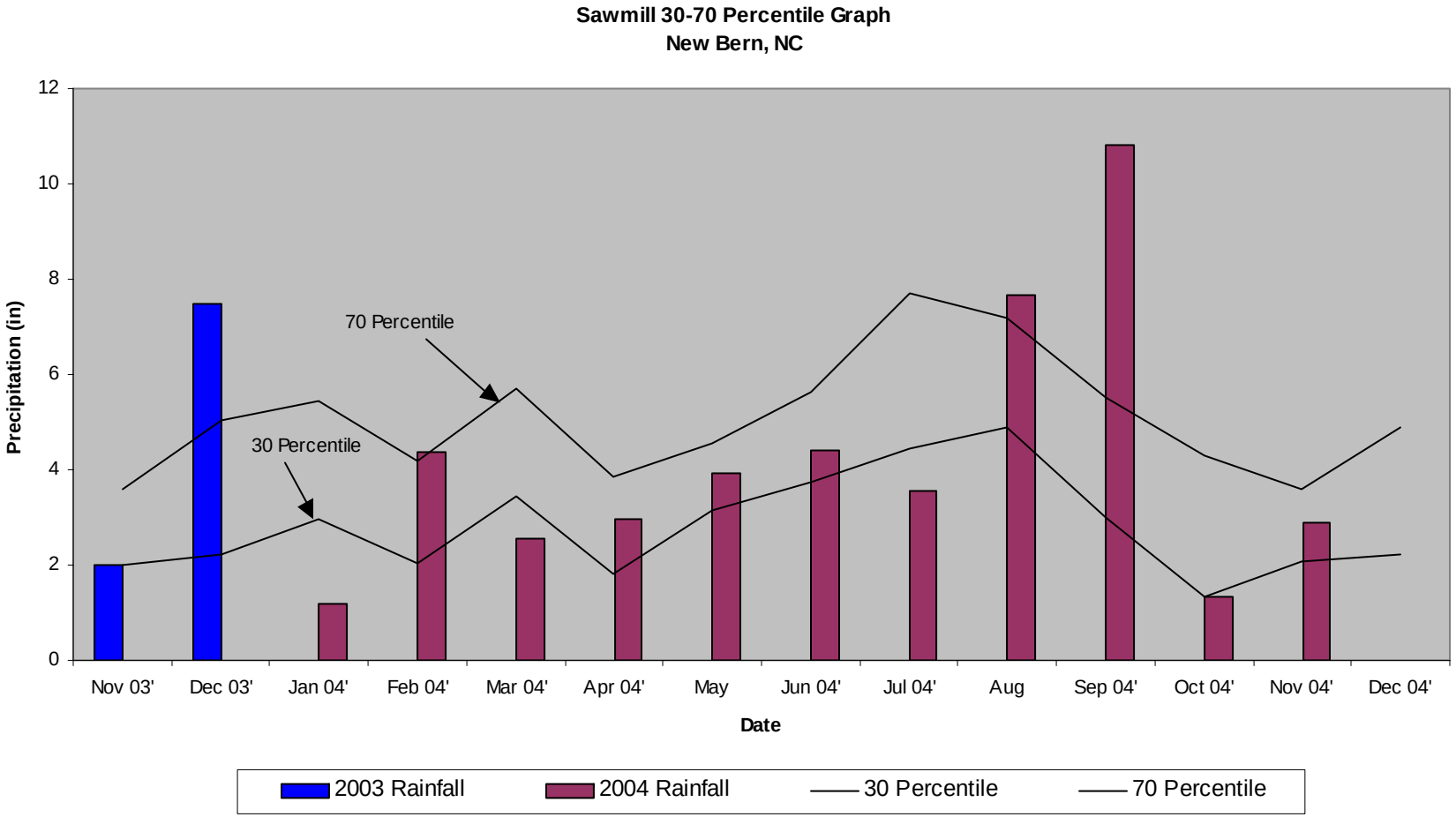
Hydrology Results

- Reference Gauge
- Hydrology Within 10%
- Hydrology Outside of 10% Criteria
- Rain Gauge
- Surface Gauge

N

Not to Scale

Figure 4. 30-70 Percentile Graph, New Bern, NC



3.0 VEGETATION: SAWMILL MITIGATION SITE (YEAR 2 MONITORING)

3.1A Success Criteria (Bottomland Hardwood Area)

The success criteria state that at least 320 stems per acre must survive after the completion of the third growing season and 240 stems per acre after the fifth growing season. If desired vegetation has not been established, NCDOT will notify the appropriate agencies and will implement corrective measures.

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 toward the final count of plots. The vegetation component of the wetland site will be deemed successful if the following criteria are met:

1. 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.

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

3.2 Description of Species

The following tree species were planted in the Wetland Restoration Area:

Taxodium distichum, Baldcypress
Fraxinus pennsylvanica, Green Ash
Quercus lyrata, Overcup Oak
Nyssa aquatica, Water Tupelo
Nyssa sylvatica var. *biflora*, Swamp Blackgum

The following marsh grass species was planted in the Marsh Grass Area:

Spartina cynosuroides, Big Cordgrass

3.3 Results of Vegetation Monitoring

Plot #	Baldcypress	Green Ash	Overcup Oak	Swamp Blackgum	Water Tupelo	Total (2 year)	Total (at planting)	Density (Trees/Acre
1	9	7		6	19	41	48	581
2	21	9	3	7	2	42	50	571
Average Density (Trees/Acre)								576

Site Notes:
No standing water on site at the time of monitoring.
Other species noted: Overcup oaks were noted around the perimeter of plot 1. Heavy cattails and black willow noted on site.

Plot #	Scale Factor	Big Cordgrass	Frequency
1	5.0		
2	4.0		
3	4.0		
4	4.0		
5	5.0		
6	4.0		
7	5.0		
8	4.0		
9	4.0		
10	4.0		
11	4.0		
12	4.0		
13	4.0		
14	5.0		
15	5.0		
16	4.0		
17	4.0		
18	5.0		
19	5.0		
20	4.0		
Frequency (Percentage of Plots w/ Desired Species)			100%
Sum Scale Value			87
Total Number of Plots			20
Vegetative Cover (Scale Value)			4.35

Site Notes: The following species were also noted in the monitoring plots. The number of plots the species were found in is following the species in parentheses (i.e. black willow was noted in 4 plots): black willow (4), *Juncus* sp., (9), *Aster* sp. (2), fescue (1), bermuda grass (1), *Pluchea* sp. (4), fennel (5), *Scripus* sp. (6), morning glory (1).

3.4A Conclusions

There were two hardwood vegetation-monitoring plots established throughout the 2.4-acre planting area. Swamp blackgum was supplemental planted throughout the site in January 2004; therefore, the planting counts increased for each plot. The 2004 vegetation monitoring of the site revealed an average tree density of 576 trees per acre. This average is above the minimum success criteria of 320 trees per acre.

3.4B Conclusions

- Percent Frequency of Target Species (planted species) **100%**
  Frequency of 70% required.

- Vegetative Cover Scale Value **4.35**
  Scale Value of 5 required for year 5.

Of the 4.07 acres, approximately 0.78 acres involved marsh grass planting. There were twenty (20) random plots established throughout the planting area. These plots were located with GPS. Based upon the percent frequency and the scale value, the marsh grass area is on track for the second year of monitoring.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The three groundwater restoration gauges were compared to the two existing reference gauges. For the gauge data provided, one of the three-groundwater restoration gauges indicated similar saturation levels and met the 10% success criteria. However, all three groundwater gauges met the 12.5% optimum wetland criteria. Also, the three surface water gauges indicated inundation patterns similar to that of the reference gauges.

Vegetation monitoring in the hardwood area yielded 576 trees per acre. This average is above the minimum success criteria of 320 trees per acre. Supplemental planting of swamp blackgum in January 2004 increased the counts in each plot. For the marsh grass area, the target species and scale values were 100% and 4.35, respectively.

NCDOT will continue to monitor the Sawmill Mitigation Site for vegetation and hydrology.

APPENDIX A

GAUGE DATA GRAPHS

APPENDIX B

SITE PHOTOGRAPHS

Sawmill

Photo 1

Photo 2

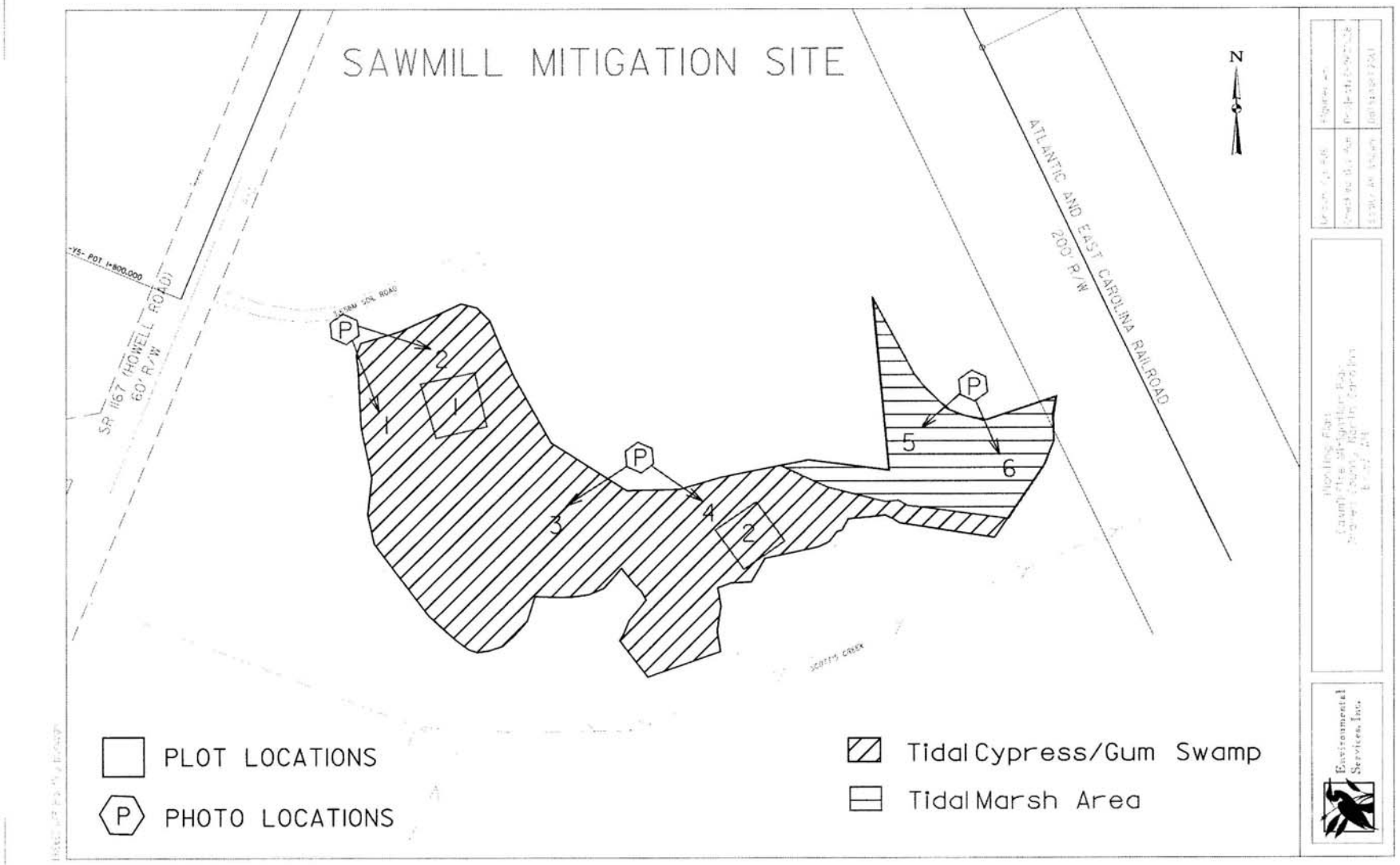
Photo 3

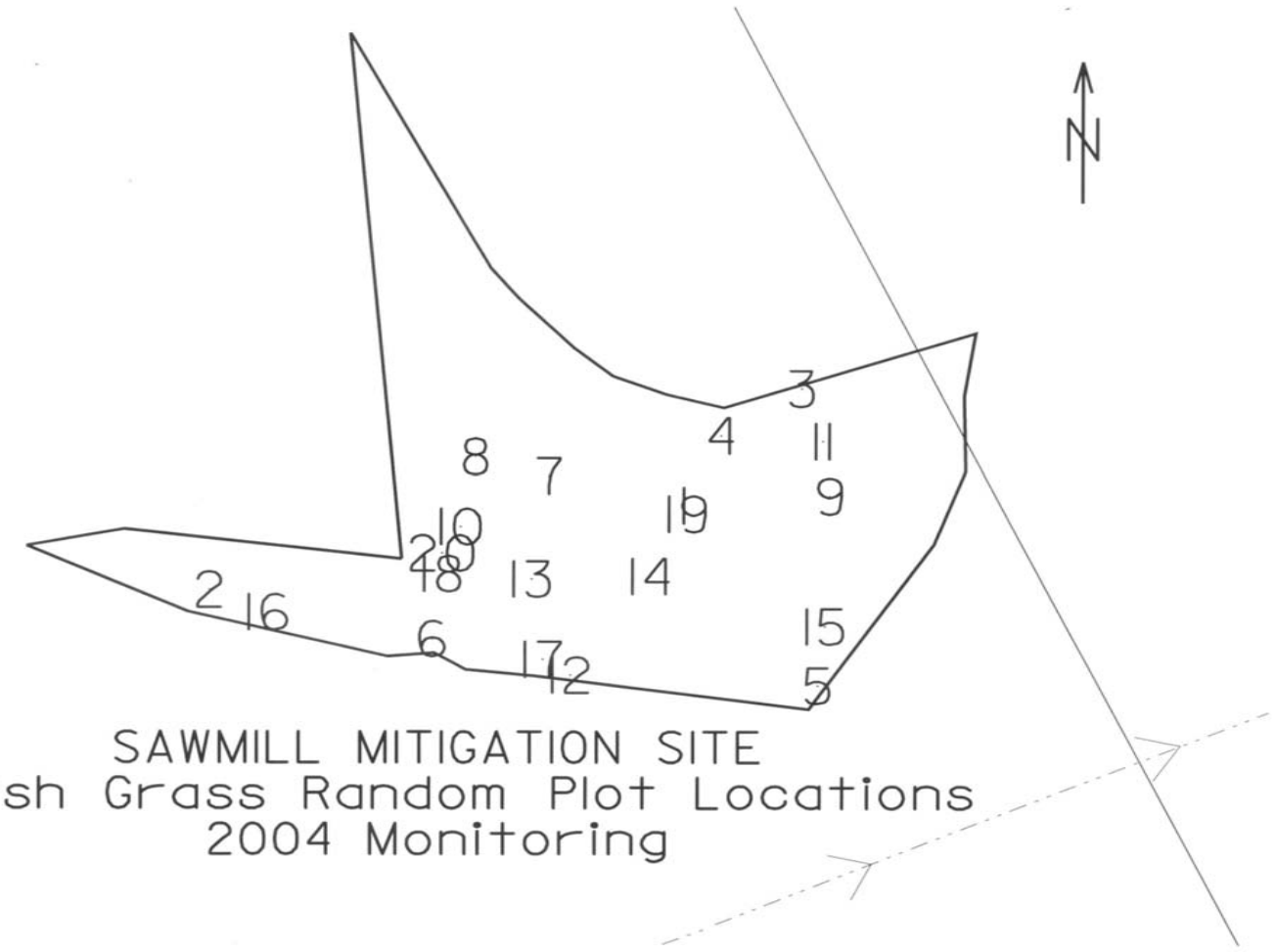
Photo 4

Photo 5

Photo 6

2004


SAWMILL MITIGATION SITE
N
ATLANTIC AND EAST CAROLINA RAILROAD
200' R/W
SR 1167 (HOWELL ROAD)
60' R/W
FARM DRIVE ROAD
SCOTTS CREEK
P
1
2
3
4
5
6
PLOT LOCATIONS
PHOTO LOCATIONS
Tidal Cypress/Gum Swamp
Tidal Marsh Area
Environmental Services, Inc.



SAWMILL MITIGATION SITE
Marsh Grass Random Plot Locations
2004 Monitoring