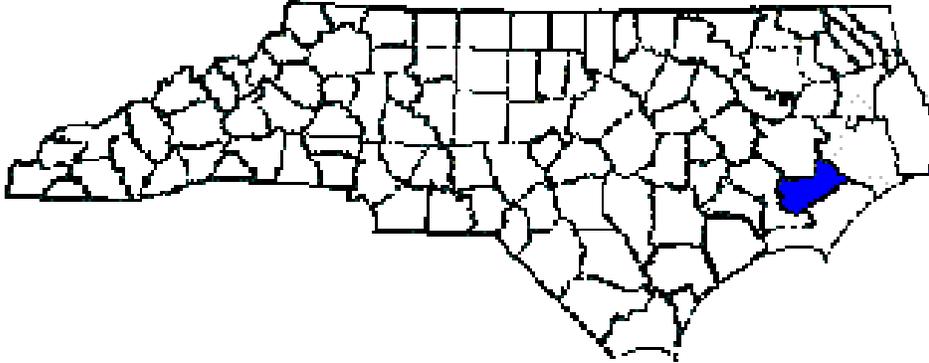


ANNUAL REPORT FOR 2011



**Three Swamp Mitigation Sites
Pamlico County
TIP No. R-2539A&B**



Prepared by:
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December 2011

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SUMMARY

The following summarizes the monitoring activities that have occurred in the past year at the Three Swamp Mitigation Sites. The three sites are located at the Upper Broad, Deep Run and Goose Creek stream crossings and are adjacent to NC 55 in Pamlico County. The sites were constructed to provide compensatory mitigation to offset impacts for T.I.P.'s R-2539A and R-2539B. The 2011-year represents the fifth year of hydrology and vegetation monitoring following construction. The sites must demonstrate hydrologic and vegetation success for a minimum of five years or until deemed successful.

In March 2007, groundwater monitoring gauges were installed to monitor hydrology on the sites. Three groundwater gauges were positioned within the restoration areas, with one gauge located at each of the stream crossings. This report utilizes rainfall data provided by the N.C. State Climate Office.

Hydrologic success criteria are based on the approved mitigation plan and require that the site demonstrate saturation or inundation within 12 inches of the soil surface for a consecutive 12.5% of the growing season during years of normal rainfall. The 2011-year represents the fifth year of hydrologic monitoring for the Three Swamp Mitigation Sites. All three groundwater gauges met the criteria for the 2011 monitoring period.

The 2011 vegetation monitoring of the sites revealed an average tree density of 456 trees per acre. This average is well above the minimum success criteria of 260 trees per acre.

Based on the results from the fifth year of monitoring, NCDOT proposes to discontinue all monitoring activities at the Three Swamp Mitigation Sites.

1.0 INTRODUCTION

1.1 Project Description

The Three Swamp Mitigation Sites consists of approximately 4.23 acres of riverine wetland restoration and 11.99 acres of riverine wetland enhancement. These sites were constructed to provide compensatory mitigation to offset wetland impacts for T.I.P. projects R-2539A and R-2539B. The sites are located immediately adjacent to the roadway project at the Upper Broad Creek, Deep Run Creek and Goose Creek crossings in Pamlico County.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetation monitoring must be conducted for a minimum of five consecutive years or until the site is deemed successful. Success criteria are based on federal guidelines for wetland mitigation. These guidelines stipulate criteria for both hydrologic conditions and vegetation survival.

Activities in 2011 reflect the fifth year of monitoring following the restoration efforts. Included in this report are analyses of hydrologic and vegetation monitoring results, as well as local climate conditions throughout the growing season, and site photographs.

1.3 Project History

January 2007	Sites Constructed
February and April 2007	Sites Planted
March – December 2007	Hydrologic Monitoring (Year 1)
July 2007	Vegetation Monitoring (Year 1)
March – December 2008	Hydrologic Monitoring (Year 2)
August 2008	Vegetation Monitoring (Year 2)
March – December 2009	Hydrologic Monitoring (Year 3)
June 2009	Vegetation Monitoring (Year 3)
March - December 2010	Hydrologic Monitoring (Year 4)
June 2010	Vegetation Monitoring (Year 4)
March – December 2011	Hydrologic Monitoring (Year 5)
June 2011	Vegetation Monitoring (Year 5)

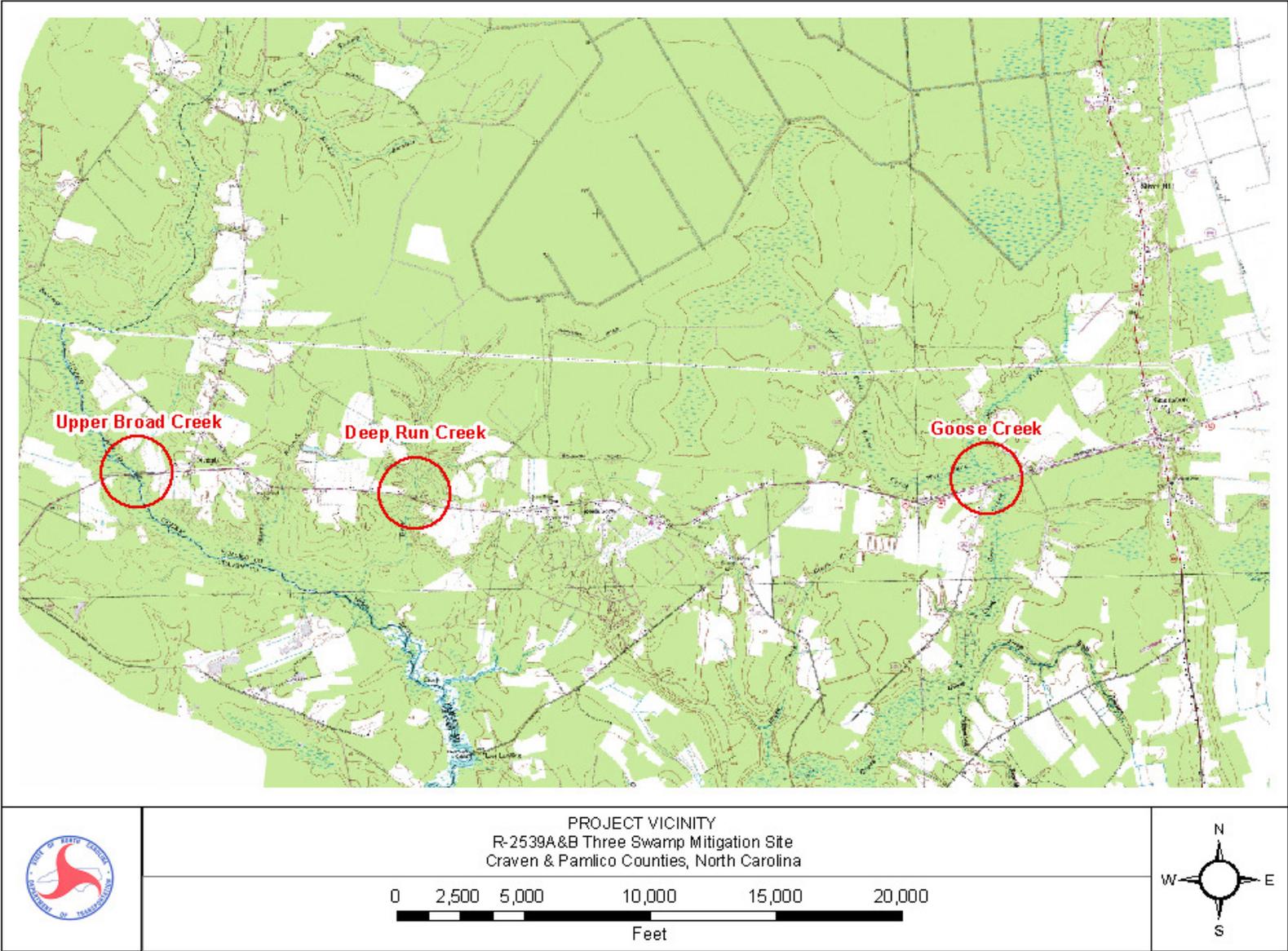
1.4 Debit Ledger

Table 1. Three Swamp Mitigation Sites Debit Ledger

Three Swamp			TIP DEBIT
Wetland Type	As-Built Quantity	Acres Remaining	R-2539B
Riverine Wetland Restoration	4.23	2.84	1.39
Riverine Wetland Enhancement	11.99	11.99	

Note: Debit ledger information up to date as of November 21, 2011.

Figure 1. Site Location Map



2.0 HYDROLOGY

2.1 Success Criteria

The hydrologic success criteria established for the Three Swamp Mitigation Sites, as stipulated in the approved mitigation plan, require that the site demonstrate saturation or inundation within 12 inches of the soil surface for a consecutive 12.5% of the growing season during years of normal rainfall.

The growing season in Pamlico County begins on March 17 and ends November 15. The dates correspond to a 50% probability that air temperature will drop to 28°F after March 17 and before November 15; thus, the growing season is 244 days. Local climate must represent normal conditions for the area.

2.2 Hydrologic Description

Three groundwater monitoring gauges were installed within the restoration areas of the three sites (Figure 2, 3, and 4) in March 2007. Rainfall data is supplied by the NC State Climate Office from an official weather station in New Bern to assist in comparison of the rainfall data to groundwater recharge. The groundwater gauges record water levels on a daily basis. Monitoring data for 2011 represents the fifth year of hydrologic monitoring for the sites.

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 244-day growing season (March 17 – November 15). Table 1 provides the 2011 hydrologic results; Figure 2, Figure 3, and Figure 4 are a graphical representation of these results. Appendix A includes graphs of the data recorded at each groundwater gauge. Daily rainfall events recorded at the official weather station in Trenton are included on each of the groundwater gauge plots.

Table 2. Hydrologic Monitoring Results

Monitoring Gauge	Actual %	Dates of Success
S-GW1	33.2	Mar 17-May 17, Aug 27-Nov 15
S-GW2	36.1	Mar 17-May 20; June 28-Aug 10 Aug 20-Nov 15
S-GW3	33.2	Mar 17-May 15, Aug 27-Nov 15

Table 3. Hydrologic Monitoring Results (2007-2011)

Monitoring Gauge	2007 Results	2008 Results	2009 Results	2010 Results	2011 Results
S-GW1	26.0	29.1	43.9	20.9	33.2
S-GW 2	8.0	34.0	46.7	30.3	36.1
S-GW 3	24.0	100.00	100.0	20.1	33.2
Climate Conditions	Below Average Rainfall	Below Average Rainfall	Average Rainfall	Avg./Below Average Rainfall	Avg./Below Average Rainfall

2.3.2 Climatic Data

Figure 5 is a comparison of the 2011 monthly rainfall to the historical precipitation (collected between 1979 and 2011) for Trenton, North Carolina. This comparison gives an indication of how 2011 relates to historical data in terms of climate conditions. The NC State Climate Office provided all local rainfall information.

For the 2011-year; the months of March, April, May, June and July recorded below average rainfall. The months of January, February, September, October and November recorded average rainfall, while August recorded above average rainfall due to Hurricane Irene. Overall, 2011 experienced an average to below average rainfall year.

2.4 Conclusions

The 2011-year represents the fifth year of hydrologic monitoring for the Three Swamp Mitigation Sites. All three groundwater gauges met the criteria for the 2011 monitoring period.

NCDOT proposes to discontinue hydrologic monitoring at the Three Swamp Mitigation Sites.

Figure 2. Monitoring Gauge Location Map

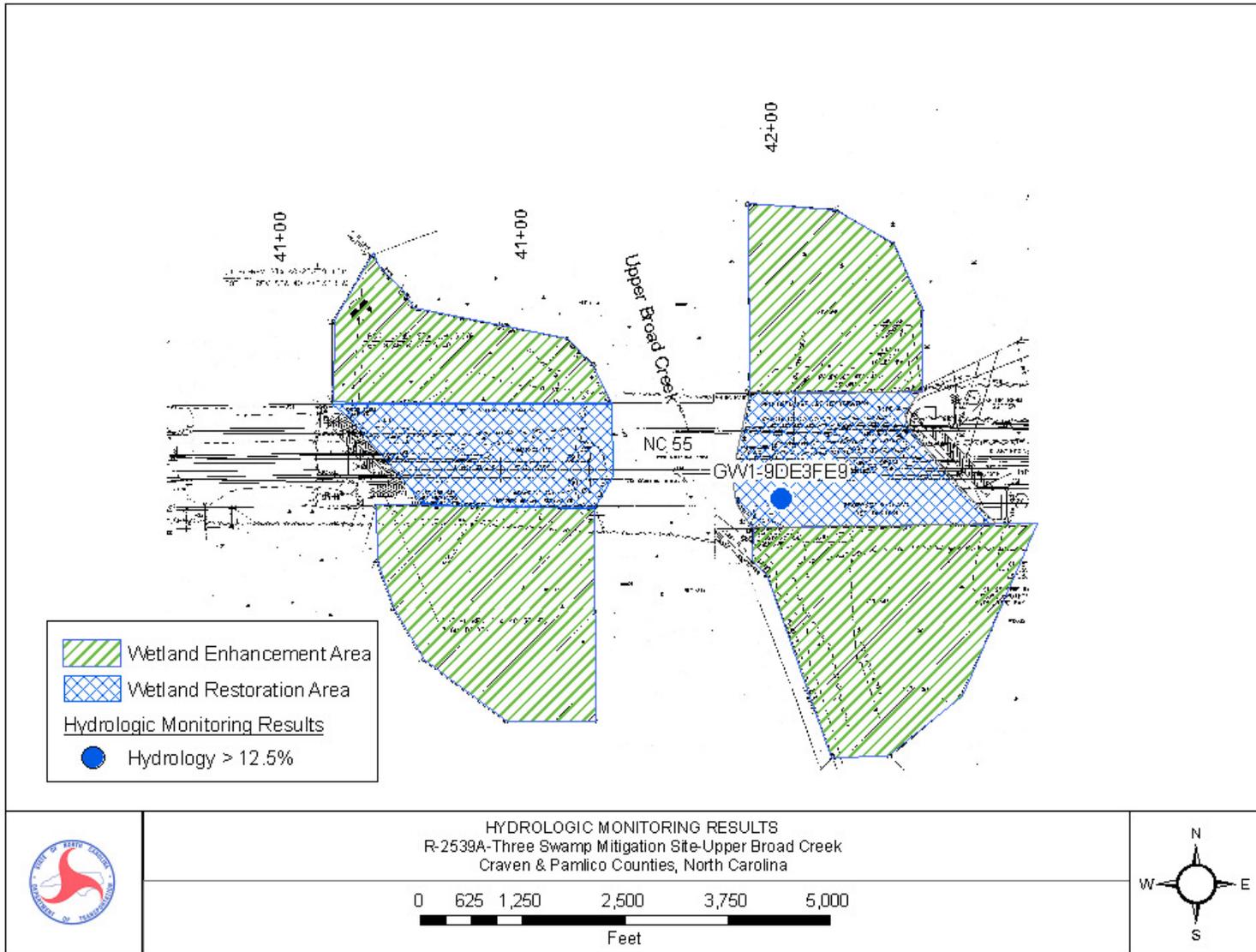


Figure 3. Monitoring Gauge Location Map

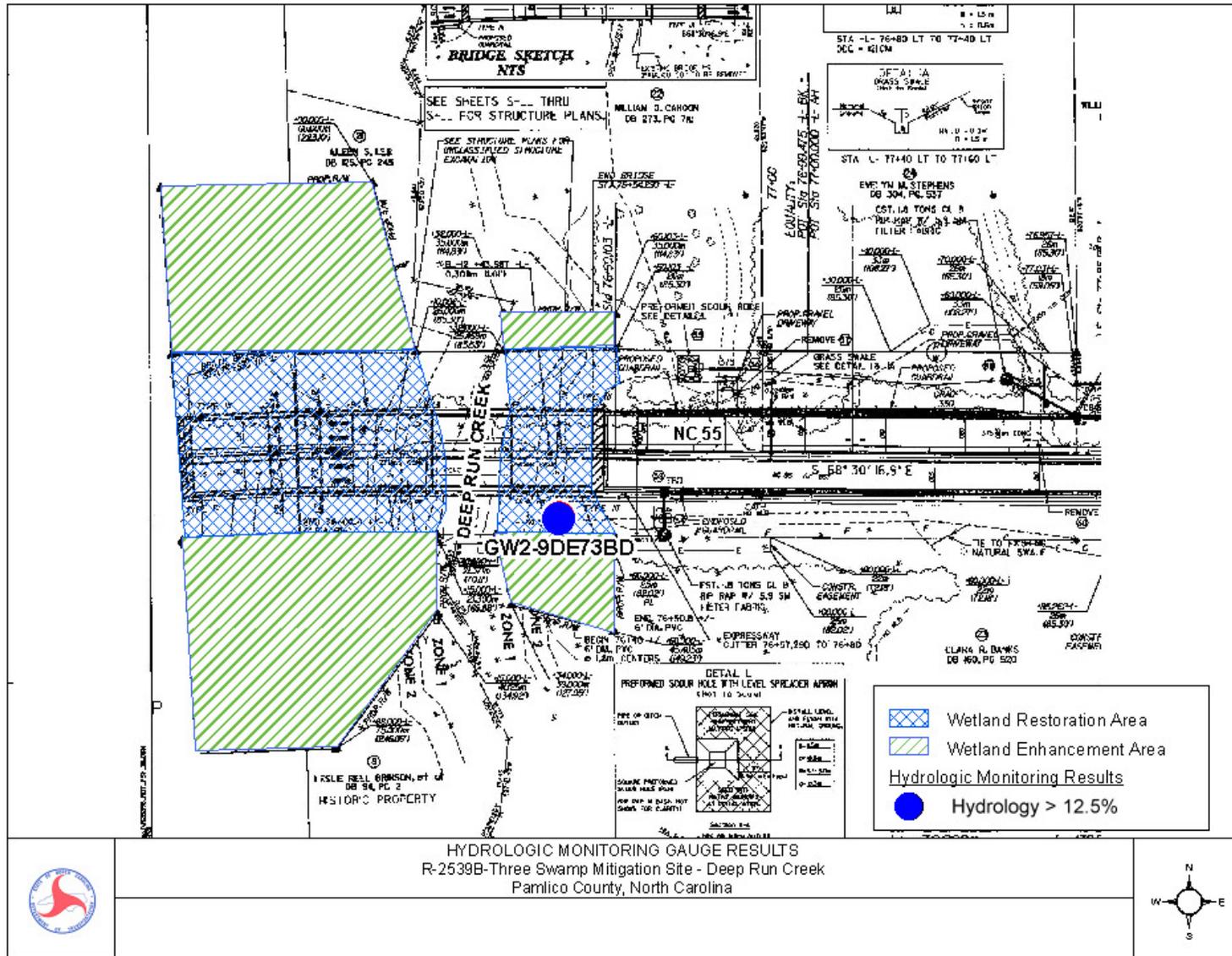


Figure 4. Monitoring Gauge Location Map

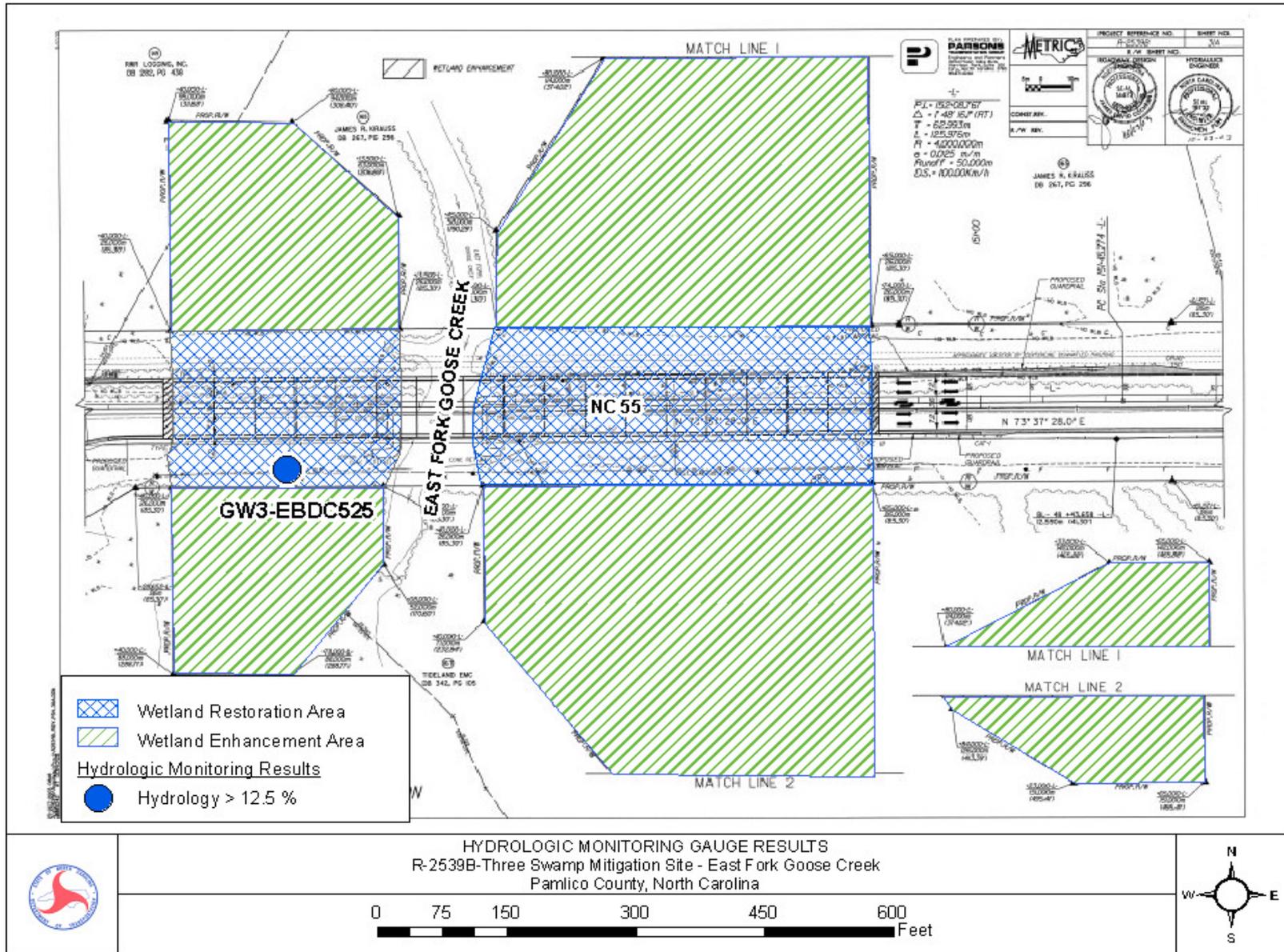
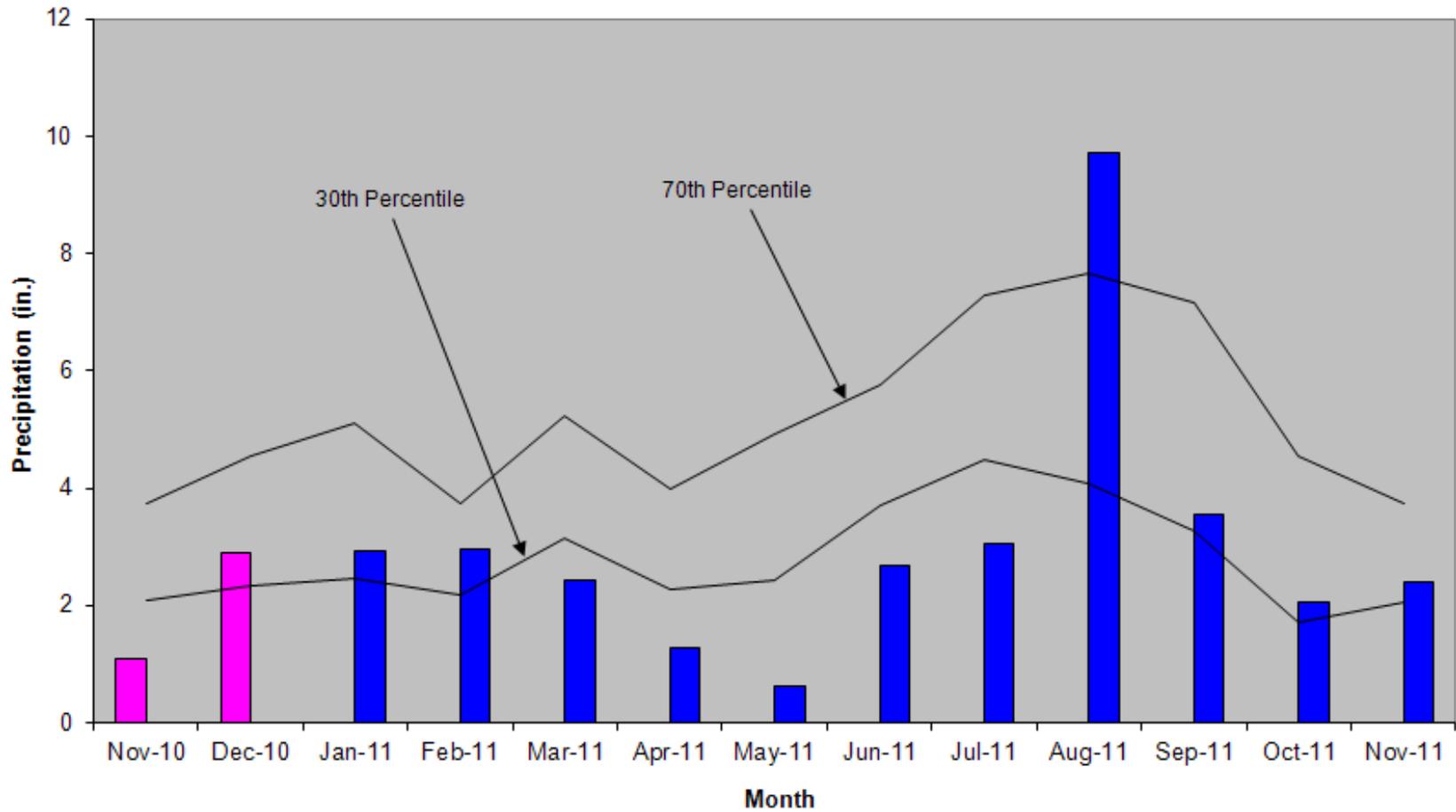


Figure 5. 30-70 Percentile Graph

Three Swamp
30-70 Graph
Trenton, NC



2010 Rainfall 2011 Rainfall 30 Percentile 70 Percentile

3.0 VEGETATION: THREE SWAMP MITIGATION SITES (YEAR 5 MONITORING)

3.1 Success Criteria

Success Criteria states that NCDOT shall plant 680 stems/acre of the approved planting list. Vegetation success shall be measured by survivability over a 5-year monitoring period. Survivability will be based on 320 stems/acre after 3 years and 260 stems after 5 years. A survey of vegetation during the growing season shall be conducted annually over the 5-year monitoring period, and submitted to the Regulatory Agencies. If the surviving vegetation densities are below the required thresholds after the 5-year monitoring period the site may still be declared successful, at the discretion and written approval from the Regulatory Agencies.

3.2 Description of Species

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

Nyssa sylvatica var. *biflora*, Swamp Blackgum

Taxodium distichum, Baldcypress

Fraxinus pennsylvanica, Green Ash

Nyssa aquatica, Water Tupelo

Liriodendron tulipifera, Tulip Poplar

3.3 Results of Vegetation Monitoring

Table 4. Vegetative Monitoring Results

Plot #	Swamp Blackgum	Baldcypress	Green Ash	Water Tupelo	Tulip Poplar	Total (5 year)	Total (at planting)	Density (Trees/Acre)
Plot 1 (Upper Broad Creek)	5	17	22	2		46	46	680
Plot 2 (Deep Run Creek)		15	4	2	2	23	52	301
Plot 3 (Goose Creek)	5	22	9	7	1	44	77	389
Average Density (Trees/Acre)								456

Site Notes: Other vegetation noted: *Juncus* sp., baccharis, woolgrass, cattail, red maple, wax myrtle, sweetgum, and various grasses. The power line right-of-way adjacent to the Upper Broad Creek site had been mowed previously to this monitoring evaluation. The seedlings in this area had begun to re-sprout. See Photo 4 under the Upper Broad Creek photos.

3.4 Conclusions

There were three vegetation monitoring plots established throughout the 4.23 acres of riverine wetland restoration. The 2011 vegetation monitoring of the sites revealed an average tree density of 456 trees per acre. This average is well above the minimum success criteria of 260 trees per acre.

NCDOT proposes to discontinue vegetation monitoring at the Three Swamp Mitigation Sites.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The 2011-year represents the fifth year of hydrologic monitoring for the Three Swamp Mitigation Sites. All three groundwater gauges met the criteria for the 2011 monitoring period.

The 2011 vegetation monitoring of the sites revealed an average tree density of 456 trees per acre. This average is well above the minimum success criteria of 260 trees per acre.

NCDOT proposes to discontinue all monitoring activities at the Three Swamp Mitigation Sites.

APPENDIX A
GAUGE DATA GRAPHS

APPENDIX B

PHOTO AND VEGETATION PLOT LOCATIONS, SITE PHOTOS

R-2539A Upper Broad Creek



Photo 1



Photo 2



Photo 3



Photo 4

June 2011

R-2539B Deep Run Creek



Photo 1



Photo 2



Photo 3



Photo 4

June 2011

R-2539B Goose Creek



Photo 1



Photo 2



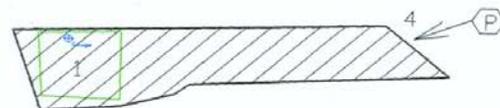
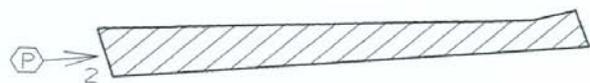
Photo 3



Photo 4

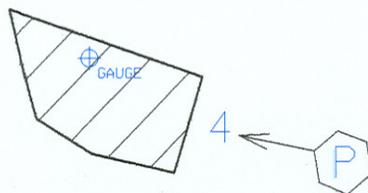
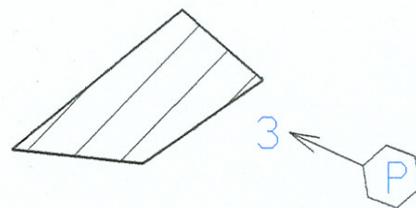
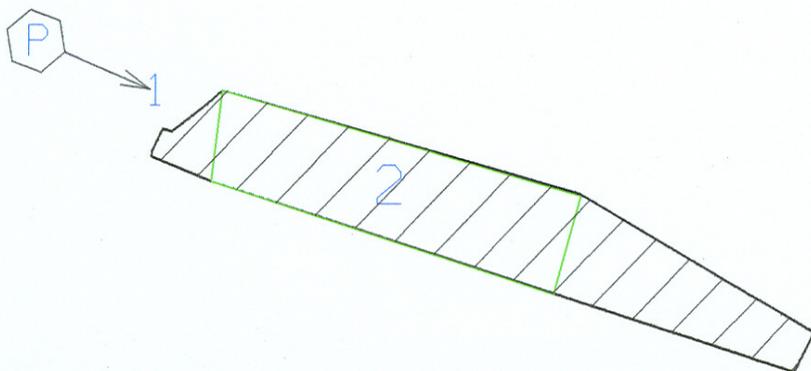
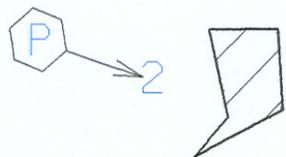
June 2011

R-2539A - Upper Broad Creek
NC 55 Craven and Pamlico Counties



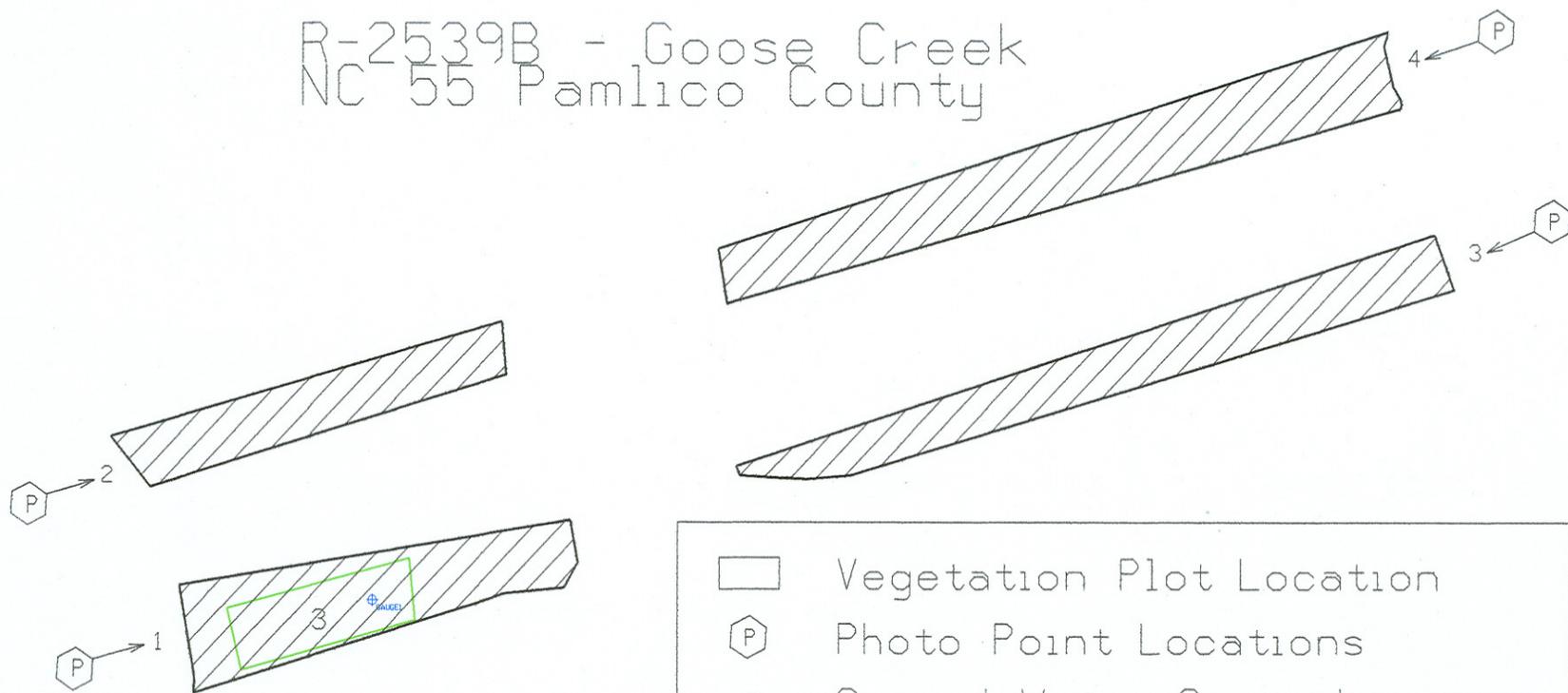
-  Vegetation Plot Location
-  Photo Point Locations
-  Ground Water Gauge Location
-  Planting Area

R-2539B - Deep Run Creek
NC 55 Pamlico County



	Vegetation Plot Location
	Photo Point Locations
	Ground Water Gauge Location
	Planting Area

R-2539B - Goose Creek
NC 55 Pamlico County



- | | |
|--|-----------------------------|
|  | Vegetation Plot Location |
|  | Photo Point Locations |
|  | Ground Water Gauge Location |
|  | Planting Area |