ANNUAL MONITORING REPORT
NORWOOD GAINEY

RIPARIAN BUFFER RESTORATION AND WETLAND ENHANCEMENT
WAYNE COUNTY, NORTH CAROLINA
(EEP Project Number 628)

Monitoring Year 3 of 5 (2009)

Submitted to:
North Carolina Department of Environment and Natural Resources
Ecosystem Enhancement Program
Raleigh, North Carolina

Ecosystem Enhancement PROGRAM

January 2010

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Ecosystem Enhancement PROGRAM

January 2010

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1.0 EXECUTIVE SUMMARY

The Norwood Gainey Riparian Buffer Restoration Site (Site) is located within the United States Geological Survey Hydrologic Unit 03020202 (North Carolina Division of Water Quality subbasin 03-04-05) of the Neuse River Basin. The Site includes 58.4 acres located approximately 5 miles south of Goldsboro, North Carolina in Wayne County. A total of 21.6 acres of riparian buffer restoration (13,660 linear feet of agricultural ditch with a 50-foot buffer to each side) and 5.4 acres of wetland enhancement are located within the Site. The Site is currently managed by the North Carolina Ecosystem Enhancement Program. This report summarizes data for year 3 (2009) monitoring.

The primary goals and objectives of the project included the following.

1. Restore forested riparian buffers adjacent to Site agricultural ditches that convey surface runoff toward Bouge Swamp and ultimately into the Neuse River.
2. Restore ecological functions within the Site to improve water quality, reduce the amount of sediment and pollutants entering the system, and provide landscape continuity.
3. Establish native wetland trees and shrubs within existing jurisdictional wetlands thereby enhancing wetland function, vegetative structure, and wildlife habitat.
4. Provide a variety of habitats from open water to uplands to greatly increase future habitat and food sources for wildlife.

An average density of 320 stems per acre of Character Tree Species must be surviving after five monitoring years in accordance with North Carolina Division of Water Quality Administrative Code 15A NCAC 02B.0242 (*Neuse River Basin, Mitigation Program for Protection and Maintenance of Existing Riparian Buffers*) (NCDWQ 2007). Stem counts will be based on an average of the evaluated vegetation plots. Based on the number of stems counted, average densities were measured at 293 planted stems per acre surviving in year 3 (2009). The dominant species identified at the Site were planted stems of silky dogwood (*Cornus amomum*), persimmon (*Diospyros virginiana*), swamp chestnut oak (*Quercus michauxii*), and sycamore (*Platanus occidentalis*). Only four of the eight individual vegetation plots met success criteria when counting only planted stems; however, when adding naturally recruited stems, primarily loblolly pine (*Pinus taeda*) establishing from an adjacent seed source, all individual plots met success criteria and the overall density of planted and naturally recruited stems was measured at 1088 planted stems per acre. Therefore, all plots are considered successful for year 3 (2009) monitoring.

In accordance with federal guidelines for wetland mitigation, success criteria for wetland groundwater hydrology at the Site require inundation or saturation within 12 inches of the ground surface for a consecutive period of 12.5 percent of the growing season or approximately 30 consecutive days (the growing season in Wayne County begins March 17 and ends November 14 [243 days]). Groundwater hydrology occurred within 12 inches of the soil surface for greater than 12.5 percent of the growing season in years 2-3 (2008-2009) of monitoring. Gauge 2 was broken prior to the start of the year 3 (2009) growing season and no data could be retrieved; however, based on field observations and the tendency for Gauge 2 to be wetter than Gauge 1, this gauge should be considered successful. The gauge will be replaced prior to the year 4 (2010) monitoring season.

In summary, the Site is stable, and vegetation and groundwater hydrology were successful for the year 3 (2009) growing season. Summary information and data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in tables and figures within this report's appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation and restoration plan documents

available on EEPs website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

2.0 METHODOLOGY

2.1 Vegetation Assessment

Following planting, 45 vegetation plots (18 plots within riparian buffer restoration areas 50 feet from the ditches, 7 plots within the wetland enhancement area, and 20 within herbaceous riparian buffer areas greater than 50 feet from the ditches) were established within the Site as depicted on Figure 2 (Current Conditions Plan View) in Appendix A. The plots are 10 meters square and are located randomly within the Site. All 45 plots were monitored in year 1 (2007); no vegetation monitoring occurred in year 2 (2008). In year 3 (2009), 8 plots within riparian restoration areas 50 feet from the ditches were monitored in mid-December 2009 using the *CVS-EEP Protocol for Recording Vegetation, Version 4.0* (Lee et al. 2006) (http://cvs.bio.unc.edu/methods.htm); results are included in Appendix C. The taxonomic standard for vegetation used for this document was *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas* (Weakley 2007).

2.2 Wetland Assessment

Two groundwater monitoring gauges were downloaded at the end of the year 3 (2009) growing season. The graphs of groundwater hydrology and precipitation for years 2-3 (2008-2009) are included in Appendix D.

3.0 REFERENCES

Lee, Michael T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation, Version 4.0. (online). Available: http://cvs.bio.unc.edu/methods.htm.

North Carolina Division of Water Quality (NCDWQ). 2007. Redbook, Surface Waters and Wetlands Standards. North Carolina Department of Environment and Natural Resources, Division of Water Quality. Raleigh, North Carolina.

Weakley, Alan S. 2007. Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas (online). Available: http://www.herbarium.unc.edu/WeakleysFlora.pdf [February 1, 2008]. University of North Carolina Herbarium, North Carolina Botanical Garden, University of North Carolina, Chapel Hill, North Carolina.

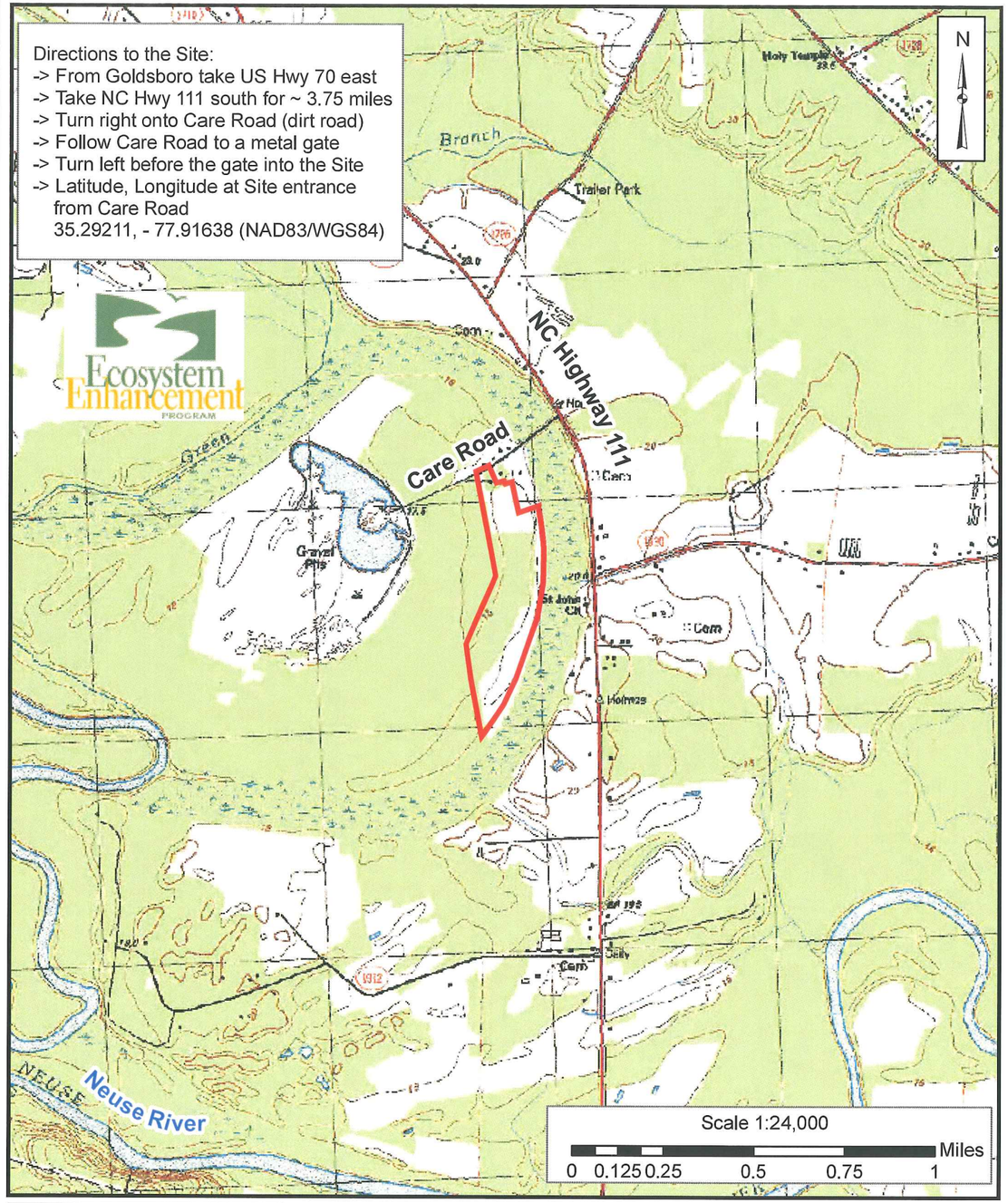
APPENDIX A

FIGURES AND PLAN VIEWS

Figure 1. Site Location

Figure 2. Monitoring Plan View

Directions to the Site:
-> From Goldsboro take US Hwy 70 east
-> Take NC Hwy 111 south for ~ 3.75 miles
-> Turn right onto Care Road (dirt road)
-> Follow Care Road to a metal gate
-> Turn left before the gate into the Site
-> Latitude, Longitude at Site entrance from Care Road
35.29211, - 77.91638 (NAD83/WGS84)



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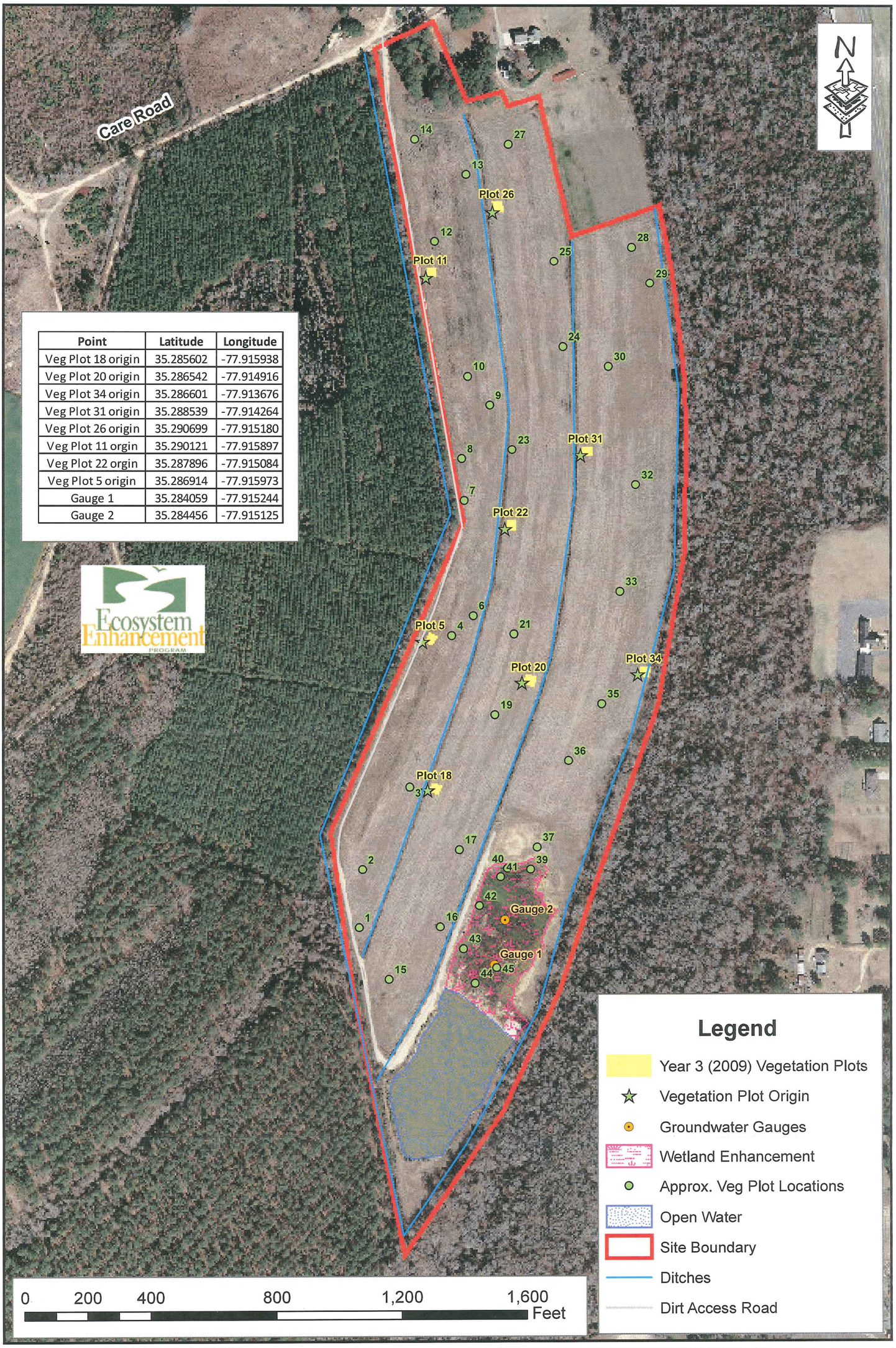
SITE LOCATION
NORWOOD GAINEY RESTORATION SITE
Wayne County, North Carolina

Dwn. by.	FIGURE
CLF	1
Date: Dec 2009	
Project: 08-001	



Point	Latitude	Longitude
Veg Plot 18 origin	35.285602	-77.915938
Veg Plot 20 origin	35.286542	-77.914916
Veg Plot 34 origin	35.286601	-77.913676
Veg Plot 31 origin	35.288539	-77.914264
Veg Plot 26 origin	35.290699	-77.915180
Veg Plot 11 orgin	35.290121	-77.915897
Veg Plot 22 orgin	35.287896	-77.915084
Veg Plot 5 origin	35.286914	-77.915973
Gauge 1	35.284059	-77.915244
Gauge 2	35.284456	-77.915125

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MONITORING PLAN VIEW
NORWOOD GAINEY RESTORATION SITE
Wayne County, North Carolina

Dwn. by: CLF
Date: Jan 2010
Project: 08-001

FIGURE
2

APPENDIX B

GENERAL PROJECT TABLES

Table 1. Project Restoration Components

Table 2. Project Activity and Reporting History

Table 3. Project Contacts Table

Table 4. Project Background Table

Table 1. Project Restoration Components
Norwood Gainey Riparian Buffer Restoration (EEP Project Number 628)

Project Segment or Reach ID	Existing Acreage	Mitigation Type	Approach	Acreage (Linear Footage)	Mitigation Ratio	Mitigation Units	Comment
Zone 1 Riparian Buffer	0	Restoration	--	14.0 (13,660.0)	3:1	4.7	--
Zone 2 Riparian Buffer	0	Restoration	--	7.6 (11,990.0.0)	1.5:1	5.1	--
Herbaceous Riparian Buffer (Beyond Zones 1&2)	0	Restoration	--	26.2	--	--	--
Wetland Enhancement	5.4	Enhancement	--	5.4	2:1	2.7	--
Open Water	2.3	Preservation	--	2.3	--	--	--

Mitigation Unit Summations

Stream	Riparian Wetland	Nonriparian Wetland	Total Wetland	Zone 1 Riparian Buffer	Zone 2 Riparian Buffer
0	2.7	0	2.7	4.7	5.1

Table 2. Project Activity and Reporting History
Norwood Gainey Riparian Buffer Restoration (EEP Project Number 628)

Activity or Report	Data Collection Completion	Actual Completion or Delivery
Restoration Plan	---	March 2006
Temporary S&E Seed Mix Applied	---	November 2006
Planting/Permanent Seed Mix Applied	---	November 2006
Mitigation Plan/As-built Report (Year 0 Monitoring – baseline)	---	February 2007
Year 1 Monitoring (2007)	October 2007	November 2007
Year 2 Monitoring (2008)	---	---
Year 3 Monitoring (2009)	December 2009	January 2010
Year 4 Monitoring (2010)	---	---
Year 5 Monitoring (2011)	---	---

Table 3. Project Contacts Table **Norwood Gainey Riparian Buffer Restoration (EEP Project Number 628)**		
Designer Primary project design POC	K O & Associates, P.C. R. Kevin Williams, PE email: ko@koassociates.com	5121 Kingdom Way., Suite 100 Raleigh, North Carolina 27607 Phone: (919) 851-6066
Planting Contractor Planting contractor POC	Carolina Silvics J. Dwight Mckinney, Jr., RF Email: info@carolinasilvics.com	908 Indian Trail Road Edenton, North Carolina 27932 Phone: (252) 482-8491
Seeding Contractor Seeding contractor POC	Seal Brothers Contracting Brian Seal	PO Box 86 Dobson, NC 27017 Phone: (336)786-2263
Nursery Stock Suppliers	NC Division of Forest Resources and International Paper	
Year 1 (2007) Monitoring Performers Wetland and Vegetation POC	Environmental Services, Inc. Jeff Harbour Email: jharbour@esinc.cc	524 S. New Hope Road Raleigh, North Carolina 27610 Phone: (919) 212-1760
Year 3 (2009) Monitoring Performers Wetland and Vegetation POC	Axiom Environmental, Inc. Grant Lewis Email: glewis@axiomenvironmental.org	20 Enterprise Street, Suite 7 Raleigh, North Carolina 27607 Phone: (919) 215-1693

Table 4. Project Background Table **Norwood Gainey Riparian Buffer Restoration (EEP Project Number 628)**	
Project County	Wayne County
Drainage Area	67 Acres
Drainage impervious cover estimate (%)	0%
Physiographic Region	Coastal Plain
Ecoregion	65p; Southeastern Floodplans and Low Terraces
Cowardin Classification	PUB; PEM
Dominant Soil Types	Leaf loam, Lumbee sandy loam, Dragston loamy sand
Reference Site ID	Bouge Swamp (project study area's eastern boundary)
USGS HUC for Project and Reference	03020202
NCDWQ Subbasin for Project and Reference	03-04-05
NCDWQ Classification for Project and Reference	C, NSW
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor	Not Applicable
% of project easement fenced	0%

APPENDIX C

VEGETATION ASSESSMENT DATA

Table 5. Vegetation Plot Mitigation Success Summary

Vegetation Monitoring Plot Photos

CVS Summary Data Tables

Table 6. Vegetation Metadata Table

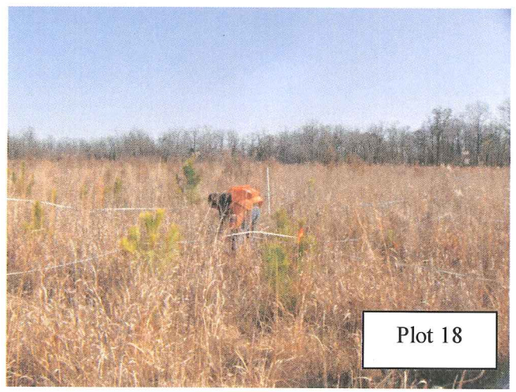
Table 7. Total and Planted Stems by Plot and Species

Table 5. Vegetation Plot Mitigation Success Summary Table
Norwood Gainey Riparian Buffer Restoration Site (EEP Project Number 628)

Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
5	Yes	100%
11	Yes	
18	Yes	
20	Yes	
22	Yes	
26	Yes	
31	Yes	
34	Yes	

Vegetation Monitoring Photographs

Taken December 2009



Vegetation Monitoring Photographs
Taken December 2009
(continued)

Table 6. Vegetation Metadata Table
Norwood Gainey Restoration Site (EEP Project Number 628)

Report Prepared By	Corri Faquin
Date Prepared	12/22/2009 11:29
database name	Axiom-2009-A.mdb
database location	C:\Axiom\Business\CVS Database
computer name	CORRILAPTOP
file size	60260352
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
ALL Stems by Plot and spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	628
project Name	Norwood Gainey Site (G)
Description	Buffer restoration
River Basin	Neuse
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	8

Table 7. Total and Planted Stems by Plot and Species
Norwood Gainey Restoration Site (EEP Project Number 628)

		Current Data (MY3 2009)																Annual Totals 8 Buffer Plots (Plots 5, 11, 18, 20, 22, 26, 31, 34)								Annual Totals 7 Wetland Enhancement Area Plots (Plots 39-45)							
		5		11		18		20		22		26		31		34		Current Mean MY3 (2009)		MY2 (2008)		MY1 (2007)		Asbuilt		Current Mean MY3 (2009)		MY2 (2008)		MY1 (2007)		Asbuilt	
Species	CommonName	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total stems	Planted stems	Total stems	Planted stems	Total stems	Planted stems	Total stems	Planted stems	Total stems	Planted stems	Total stems	Planted stems	Total stems	Planted stems	Total stems	Planted stems
Acer rubrum	red maple	1									1					1			2	These plots were not measure for year 2 (2008) monitoring.				These plots were not measure for year 0 (asbuilt) monitoring.				These plots were not measure for year 3 (2009) monitoring.				These plots were not measure for year 0 (asbuilt) monitoring.	
Baccharis halimifolia	eastern baccharis			2							1	3							5													
Betula nigra	river birch									1		2	2					3	3			3	3							17	17		
Cephalanthus occidentalis	common buttonbush																													6	6		
Cornus amomum	silky dogwood	2	2	3	3					1						2	2	8	8			5	5										
Cornus florida	flowering dogwood	1	1															1	1			4	4										
Diospyros virginiana	common persimmon	1				2	2	4	4					3	3	3	3	12	13			23	23										
Rraxinus pennsylvanica	green ash																													25	25		
Juglans nigra	black walnut					1		1	1									1	2			9	9										
Magnolia virginiana	sweetbay magnolia																													33	33		
Morus rubra	red mulberry							3	3									3	3			5	5										
Pinus taeda	loblolly pine	8		53		16				7		56		7		2			149														
Platanus occidentalis	American sycamore							2	2			4	4	1	1	2	2	9	9			12	12										
Prunus serotina	black cherry	1	1	1	1					1	1	1	1					4	4			6	6										
Quercus michauxii	swamp chestnut oak					7	7									1	1	8	8			8	8										
Quercus nigra	water oak											3	3	2	2	1	1	6	6			5	5										
Quercus pagoda	cherrybark oak	1	1													1	1	2	2														
Rhus copallinum	flameleaf sumac																																
Ulmus	elm											1							1														
Unknown	unknown					1	1											1	1			1	1										
Plot area (acres)		0.0247		0.0247		0.0247		0.0247		0.0247		0.0247		0.0247		0.0247																	
Species Count		7	4	4	2	5	3	4	4	4	3	7	4	4	3	8	6	12	16			11	11							4	4		
Stem Count		15	5	59	4	27	10	10	10	10	3	70	10	13	6	13	10	58	217			81	81							81	81		
Stems per acre		607	202	2389	162	1093	405	405	405	405	121	2834	405	526	243	526	405	294	1098			410	410							468	468		

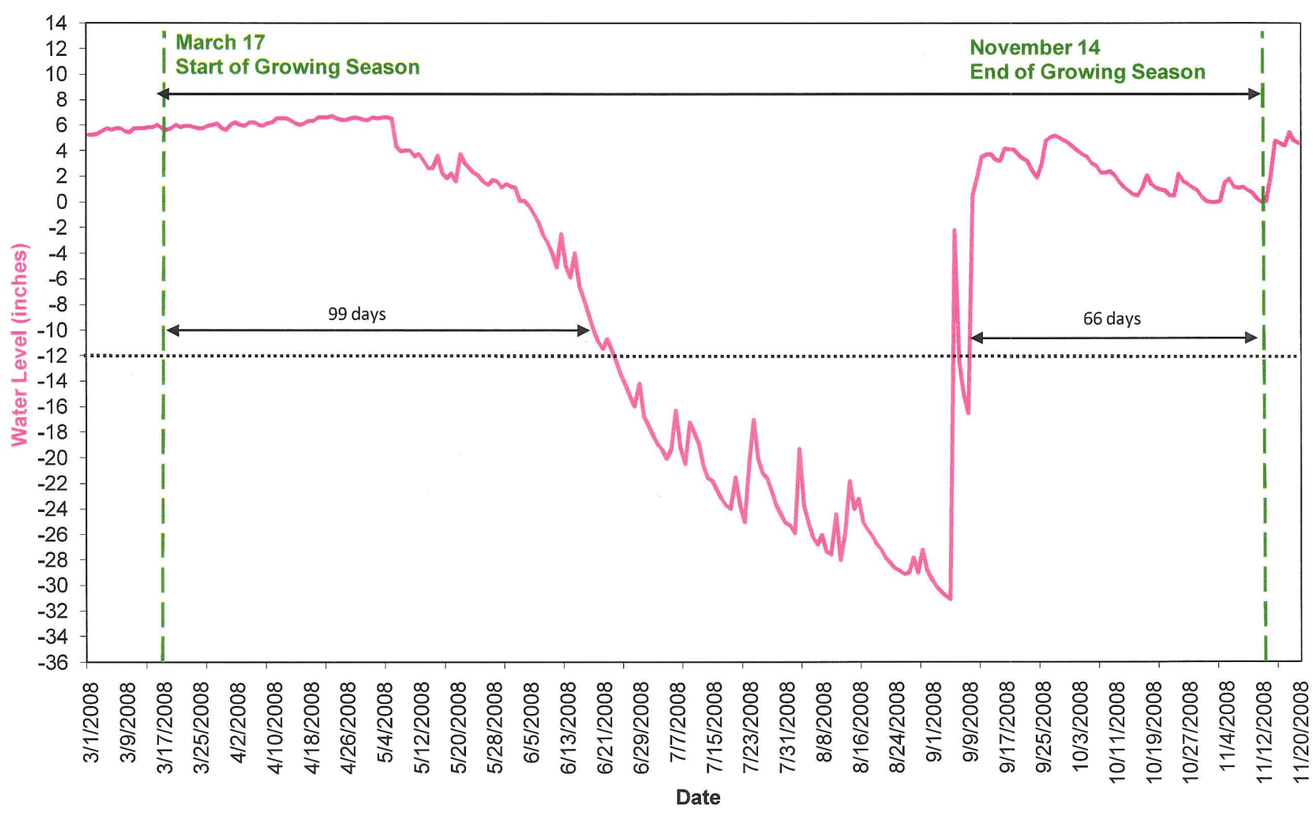
APPENDIX D

WETLAND DATA

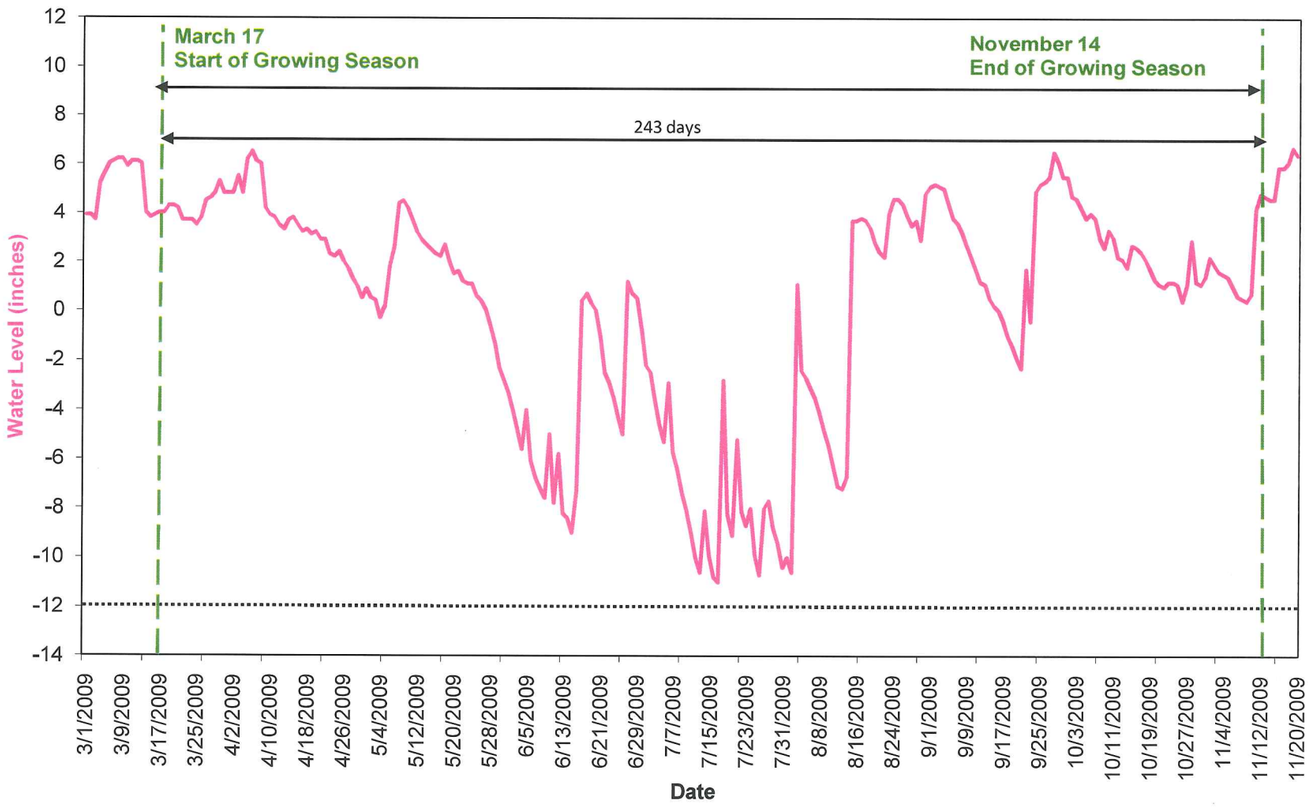
2008-2009 (Years 2-3) Groundwater Gauge Graphs

Table 8. Wetland Hydrology Criteria Attainment

Norwood Gainey GW1
Year 2 (2008 Gauge Data)



Norwood Gainey GW1
Year 3 (2009 Gauge Data)



Norwood Gainey GW2
Year 2 (2008 Gauge Data)

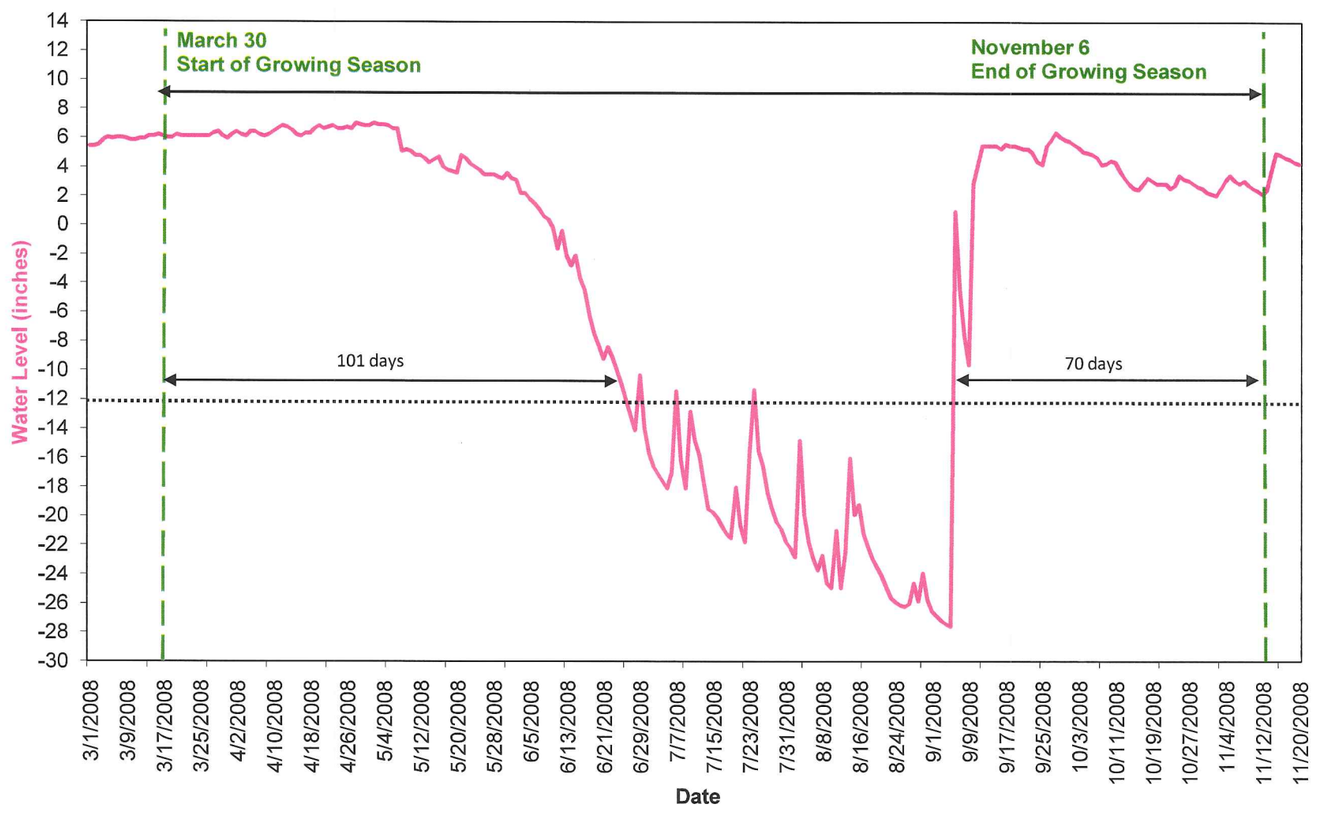


Table 8. Wetland Hydrology Criteria Attainment Summary
Norwood Gainey Riparian Buffer Restoration Site (EEP Project Number 628)

Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)				
	Year 1 (2007)	Year 2 (2008)	Year 3 (2009)	Year 4 (2010)	Year 5 (2011)
1	Yes/92 days (37.9%)	Yes/99 days (40.7%)	Yes/243 days (100%)		
2	Yes/103 days (42.4%)	Yes/101 days (41.6%)	Yes*		

* Gauge 2 was broken prior to the start of the year 3 (2009) growing season and no data could be retrieved; however, based on field observations and the tendency for Gauge 2 to be wetter than Gauge 1 this gauge should be considered successful. This gauge was inundated for the majority of the growing season. The gauge will be replaced prior to the year 4 (2010) monitoring season.