

**Neuse River Riparian Buffer Restoration Project
Annual Monitoring Report
Year 1**

24.4-acre "McCotter/Raines Farm"

Contract #: AWO3011-3

Prepared for:
North Carolina Wetlands Restoration Program
Raleigh, NC

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I. INTRODUCTION

Under contract with the NC Wetland Restoration Program (WRP), Land Management Group, Inc. (LMG) initiated the restoration of 24.4 acres of riparian buffer habitat in February 2003. The project area is part of the “McCotter/Raines Farm”, located approximately 5.5 miles northwest of Trenton (refer to Figure 1) in Jones County, NC. The site is bordered to the north by State Route (SR) 1317 and to the south by Beaver Creek (refer to Figure 2). Beaver Creek is a second-order tributary of the Trent River located within subbasin NEU-11 of the lower Neuse River Basin (USGS Cataloging Unit 03020204).

The restoration project is intended to provide suitable, high-quality riparian buffer restoration as compensatory mitigation for riparian buffer impacts authorized through the North Carolina Division of Water Quality (NC DWQ). The objective of the project is to restore riparian buffer vegetation and diffuse flow conditions to help reduce non-point source discharge of contaminants into adjacent water bodies. The restoration project has resulted in the removal of agricultural fields adjacent to Beaver Creek and surface-water ditches contiguous with the creek. In doing so, the restoration project helps to reduce non-point source loading of nitrogen (N) into surface waters while increasing the nutrient removal capacity of the adjacent land. The following monitoring report summarizes conditions related to restoration site development.

II. PRE-PROJECT CONDITIONS

The 24.4-acre riparian buffer restoration area represents a portion of a larger 211-acre tract (“McCotter/Raines Farm”) actively farmed for the production of soybean and cotton. Prior to restoration activities, land use practices (including herbicide, pesticide, and fertilizer application) served as potential contributors to decreased water quality of adjacent surface waters within the project area. Application of nitrogen-rich fertilizer represented the most significant non-point source of nitrogen. Woody vegetation adjacent to ditches was either absent or sparse (less than 100 stems per acre that are > 5 inches diameter at breast height). As a result, surface waters were subject to direct run-off from adjacent agricultural fields with little or no nutrient

filtration/transformation. Photographs documenting pre-project conditions are provided in Appendix A.

III. LAND ACQUISITION AND PROTECTION

LMG arranged for the execution of the conservation easement deed to ensure the protection of the riparian buffer restoration area in perpetuity. The easement prohibits any activities (e.g. timbering, farming, building, etc.) that would alter the environmental state of the restoration project. Post-restoration management will be consistent with allowable activities as identified in the Neuse Buffer Rule (15A NCAC 02B.0233). The conservation easement deed was conveyed to the North Carolina Cooperative Extension Service Foundation (NCCESF). The NCCESF is organized and functions under the auspices of the North Carolina Agricultural Foundation, Inc. The North Carolina Agricultural Foundation, Inc. is a non-profit, charitable and educational corporation as defined in the Internal Revenue Service code 501(c)3.

In addition to the 24.4-acre project area, 10.6 acres of wooded land adjacent to Beaver Creek (located immediately adjacent to the project area) have been donated to NCCESF. This additional land was incorporated into the conservation easement and will be protected under the terms and conditions conveyed with the deed. Two 20-ft access easements have also been granted by the property owner to allow for suitable access to the project site.

IV. SUMMARY OF RESTORATION ACTIVITIES

Restoration activities included minor grading and planting within the 24.4-acre project area (refer to Figure 3 for a plan view of restoration activities completed at the site). Areas of higher topographic relief and incised ditch banks were graded to 3:1 slopes to provide more stable areas for planting. Much of the field area was plowed and disked prior to planting to reduce compaction and to enhance microtopography. Removal of drain tiles and installation of check dams help to promote diffuse flow conditions. Restoration activities have reduced peak discharge rates to promote enhanced nutrient uptake and exchange.

The riparian buffer was planted with characteristic tree species including river birch (*Betula nigra*), American sycamore (*Platanus occidentalis*), southern red oak (*Quercus falcata*), and green ash (*Fraxinus pennsylvanica*). Bare-root seedlings were planted at a density of 600 trees per acre. The outer 50 feet of the proposed buffer areas were planted with characteristic shrub species including wax myrtle (*Myrica cerifera*), American beautyberry (*Callicarpa americana*), elderberry (*Sambucus canadensis*), and winged sumac (*Rhus copallina*). Shrubs were planted at a density of 1200 plants per acre. The planted species list for the riparian buffer restoration area is detailed in Table 1.

Species were selectively planted in areas corresponding to changes in micro-elevation and soil texture. For instance, white oak (adapted for relatively low moisture requirements) was planted in slightly higher topographic areas. Conversely, river birch and green ash were planted in lower landscape positions and finer soils – conditions suitable for these species' relatively high moisture requirements. These same considerations were used to plant shrub species in appropriate locations within the shrub planting zone. All species selected for the restoration project naturally occur on the site within undisturbed riparian buffer areas. These species are considered to be well-suited for site-specific conditions (including soil characteristics and moisture regimes). In addition, each of these species is listed within WRP's "Guidelines for Riparian Buffer Restoration" as appropriate species for use in riparian buffer restoration projects.

V. MONITORING PLAN & SUCCESS CRITERIA

Based upon standard mitigation site monitoring requirements, annual monitoring will be conducted at the end of each growing season over a period of five years. Twelve (12) 0.10-acre permanent plots corresponding to a total of 1.2 acres (equivalent to 5% of the restoration area) were established subsequent to site planting. The locations of the monitoring plots are depicted in Figure 3. Monitoring includes the identification and enumeration of individuals (including shrubs and trees, planted or volunteer) occurring within each plot. All tree and shrub species within the plots are identified, flagged, and recorded on field data sheets during each monitoring event. Site planting is to be deemed successful if survivorship of plantings and volunteers of desirable species¹ meets or exceeds 75% across the plots monitored. For the purpose of calculating percent

¹ Desirable species are considered as noninvasive species characteristic of riparian habitats.

survivorship, red maple (*Acer rubrum*) and sweet gum (*Liquidambar styraciflua*) are excluded from the recorded plot density.

Monitoring reports will be submitted annually to the WRP (by January 1 of each year). These reports will include results of vegetative monitoring and photographic documentation of site conditions.

VI. RESULTS

A total of 1,373 stems (planted and volunteer shrubs/trees) were observed within the twelve 0.10-acre plots. Of the total observed, 987 stems (total excluding red maple and sweet gum) were counted toward the success criteria (corresponding to 822.5 stems/acre). Mean percent survivorship (excluding red maple and sweet gum) for the site was 116% (ranging between 32% in Plot 11 and 294% in Plot 6). Of the species planted, American sycamore (*Platanus occidentalis*) was the most abundant tree observed within the twelve monitoring plots. Refer to Table 2 for a summary of results related to species abundance and plot survivorship. In addition, individual plot data sheets are provided in Appendix B.

VII. CONCLUSION

Restoration activities have demonstrated to be successful at the 24.4-acre project site through the first year of annual monitoring. While few plots exhibit relatively low percent survivorship, the majority of plots well exceed the 75% survivorship criteria. In addition, the observed density (822.5 stems/acre) indicates that the site is progressing well toward a maturity density of 320 stems/acre (considered the target density five years post-planting).

Reversion of agricultural land to wooded riparian buffer will decrease non-point source nutrient loading and concurrently increase nutrient filtration/uptake. Establishment of tree and shrub vegetative cover will continue to promote diffuse flow and increase the N removal capacity of the restored buffer area. By doing so, the proposed project effectively mitigates for authorized loss of riparian buffers within the Neuse River Basin.

TABLE 1: PLANTED SPECIES¹ – NEUSE RIVER RIPARIAN BUFFER PROJECT, McCOTTER/RAINES FARM

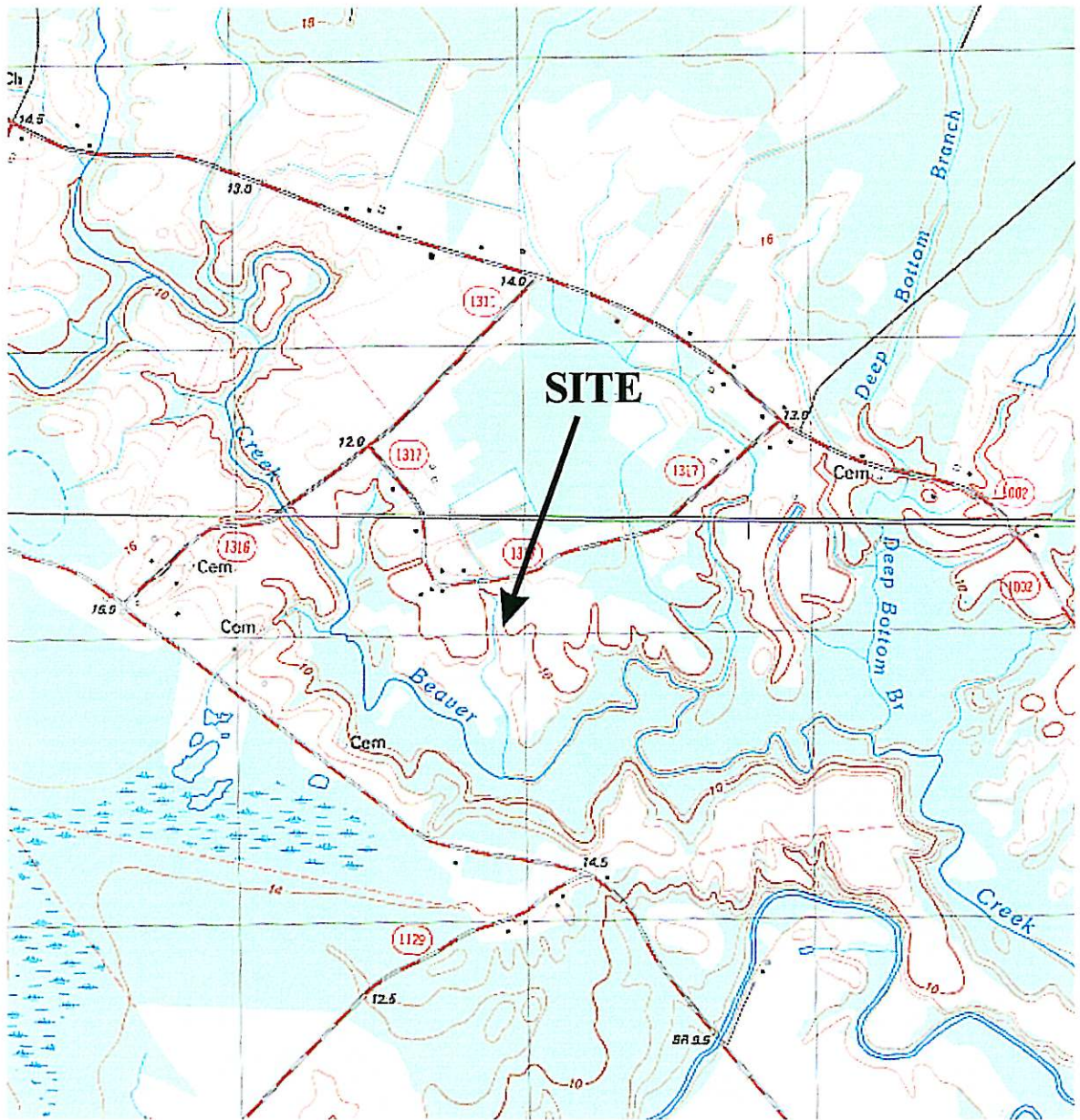
Buffer Zone	Zone 1 –Trees	Zone 2 - Shrubs	TOTAL
Stem Density:	600/acre	1200/acre	
Area (acres):	(18.3)	(6.1)	(24.4)
SPECIES	# planted (% of total)	# planted (% of total)	#planted
River Birch (<i>Betula nigra</i>)	2800 (25)		2,800
Sycamore (<i>Platanus occidentalis</i>)	1,100 (10)		1,100
Southern Red Oak (<i>Quercus falcata</i>)	1,500 (13)		3,500
White Oak (<i>Quercus alba</i>)	2,500 (23)		2,500
Cherrybark Oak (<i>Quercus falcata</i>)	1,500 (13)		1,100
Persimmon (<i>Diospyros virginiana</i>)	500 (4)		500
Tulip Poplar (<i>Liriodendron tulipifera</i>)	200 (2)		200
Green Ash (<i>Fraxinus pennsylvanica</i>)	1,100 (10)		1,100
Wax Myrtle (<i>Myrica cerifera</i>)		3,000 (41)	3,000
American Beautyberry (<i>Callicarpa canadensis</i>)		2,424 (33)	2,424
Elderberry (<i>Sambucus canadensis</i>)		1,062 (14)	1,062
Winged Sumac (<i>Rhus copallina</i>)		850 (12)	850
Possumhaw		14 (0.2)	14
TOTAL TREES/SHRUBS	11,200	7,350	18,550

¹Seedlings planted February 2003.

**TABLE 2. ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS
NEUSE RIVER RIPARIAN BUFFER SITE (McCOTTER/RAINES FARM)**

SPECIES	PLOT 1	PLOT 2	PLOT 3	PLOT 4	PLOT 5	PLOT 6	PLOT 7	PLOT 8	PLOT 9	PLOT 10	PLOT 11	PLOT 12	TOTAL
Sycamore		24			68	76	22	23	8	29	1	4	255
Red Maple	7	10	50	2	89	20	50	3	5		1	3	240
Sweet Gum	4	9	5	1	27	54	10		2		6	28	146
Southern Red Oak	12	37	14	3	20	56				1			143
Green Ash			30	65	38	1	3					4	141
Wax Myrtle			5			9	48	5				47	114
Tulip Poplar		6	2		6	17	24	10		12			77
River Birch	6	4	16		1	9	14		22	1			73
Amer. Beautyberry	12	10						1		17			40
Persimmon	9					14	9						32
Elderberry	3			2				16		2		7	30
Water Oak	12	10											22
White Oak											17		17
Unidentified		2	3			2	2	1					10
Willow Oak	3	1				5							9
Black Willow	7	1											8
Winged Sumac	1	1				1						2	5
Cherry Bark Oak					2	1							3
Chokeberry						3							3
Possumhaw							1						2
American Elm			1										1
Sweet Pepperbush											1		1
Eastern False Willow									1				1
TOTAL	76	115	127	73	251	268	183	59	38	62	26	95	1373
Total Counted forward Success	65	96	72	70	135	194	123	56	31	62	19	64	987
Planted Density	75	66	66	60	60	66	100	78	60	84	60	108	74
Percent Survivorship	87	145	109	117	225	294	123	72	52	74	32	60	116

FIGURES



Phillips Crossroads Quadrangle

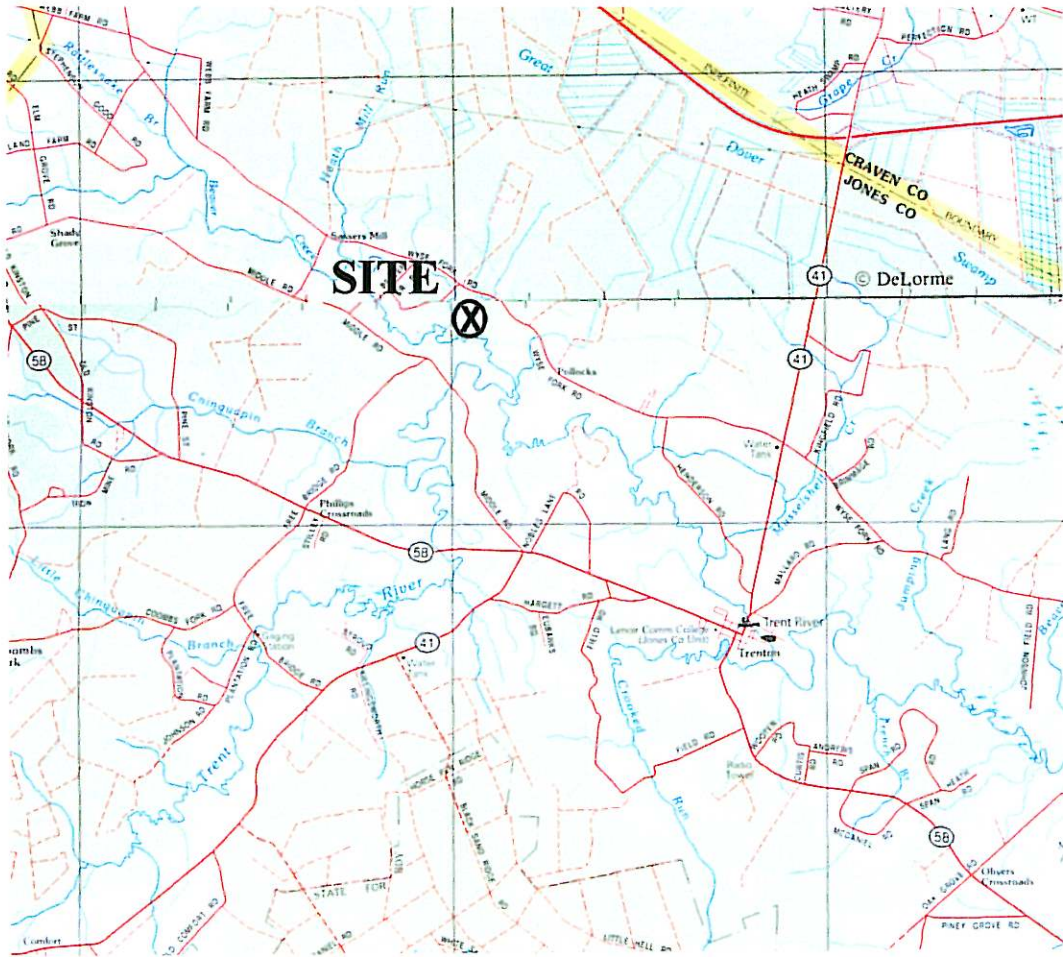


SCALE 1" = 2000'

Neuse River Riparian Buffer
Restoration Project
Jones County, NC
(Contract Number AW03011-3)

Land Management Group, Inc.
Environmental Consultants
Wilmington, N.C.

Figure 2. USGS Topographic
Quadrangle
McCotter/Raines Farm

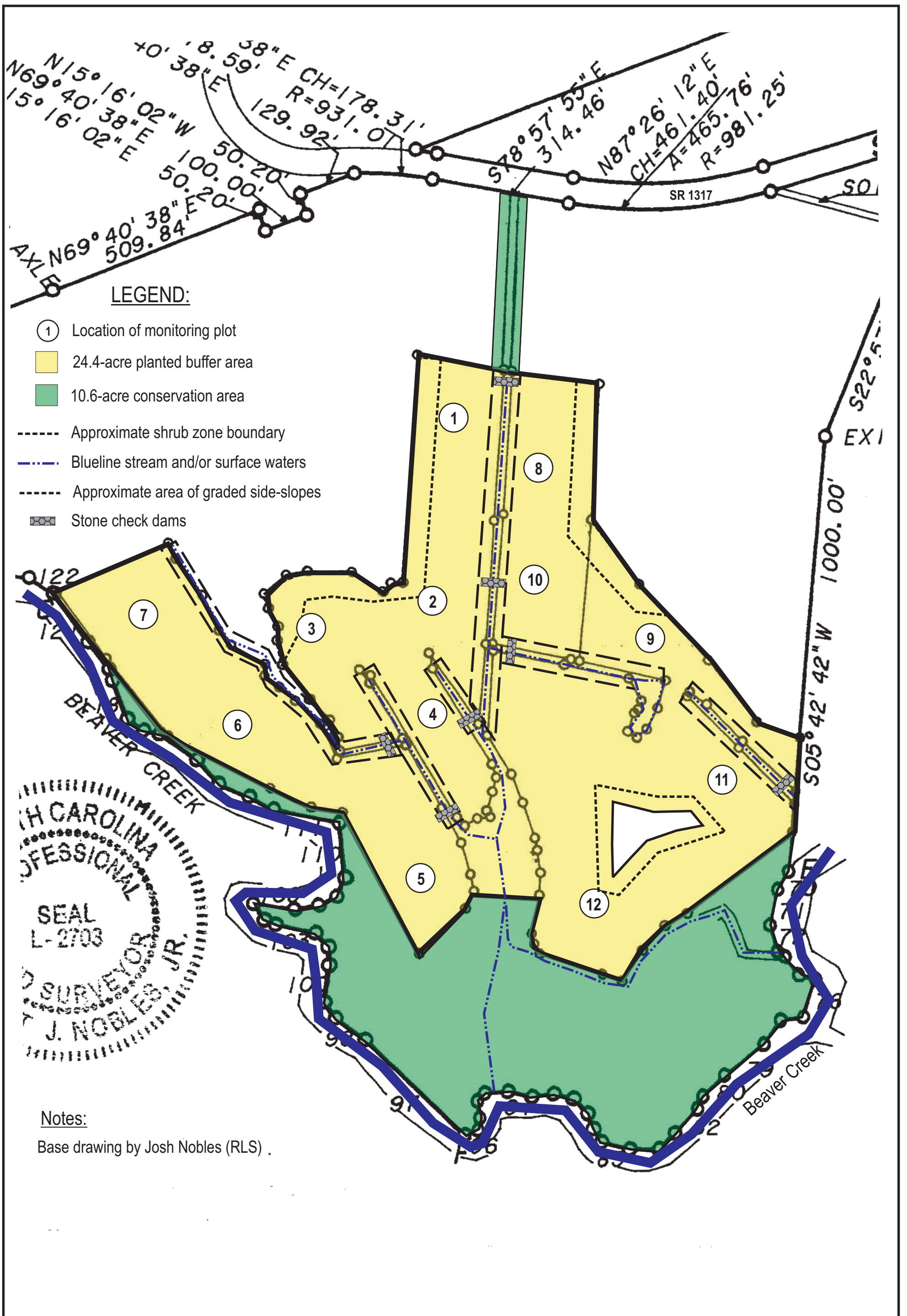


SCALE 1" = 2.4 miles

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Figure 1. Site Vicinity Map
McCotter/Raines Farm



APPENDIX A.
SITE PHOTOGRAPHS

↓ Installation of check dam during project construction (February 2003)



↓ View of site preparation prior to planting



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Site Photographs
McCotter/Raines Farm

↓ Site planting (February 2003)



↓ Vegetation monitoring within Plot 10 (October 2003)



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Site Photographs
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↓ View facing northwest in Plot 3



↓ View facing southeast in Plot 5



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View of planted river birch within vegetation plot



← Green ash tree approximately 6 feet tall within vegetation monitoring plot (Plot 3)

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Site Photographs
McCotter/Raines Farm

APPENDIX B.
PLOT DATA SHEETS

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 1

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Water Oak	SA	11	<2ft.	Volunteer	11
Water Oak	SA	1	2ft	Volunteer	1
Elderberry	SH	3	<2ft.	Planted	3
Winged Sumac	SH	1	<2ft.	Planted	1
Red Maple	SA	7	<2ft.	Volunteer	0
Southern Red Oak	SA	12	<2ft.	Planted	12
Amer. Beautyberry	SH	11	<2ft.	Planted	11
Amer. Beautyberry	SH	1	2ft	Planted	1
Willow Oak	SA	3	<2ft.	Volunteer	3
Black Willow	SA	2	<2ft.	Volunteer	2
Black Willow	SA	1	3ft	Volunteer	1
Black Willow	SA	4	2ft	Volunteer	4
Persimmon	SA	3	<2ft.	Planted	3
Persimmon	SA	4	2ft	Planted	4
Persimmon	SA	1	2.5ft	Planted	1
Persimmon	SA	1	3.5ft	Planted	1
River Birch	SA	6	<2ft.	Planted	6
Sweet Gum	SA	4	<2ft.	Volunteer	0
	TOTAL SHRUBS	16		OBSERVED DENSITY (PER PLOT)	65
	TOTAL TREES OF PLANTED SPECIES	26		PLANTED DENSITY (PER PLOT)	75
	TOTAL TREES OF VOLUNTEER SPECIES	33		PERCENT SURVIVORSHIP	87
	TOTAL INDIVIDUALS	76			

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 2

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Water Oak	SA	10	<2ft	Volunteer	10
Winged Sumac	SH	1	<2ft	Planted	1
Red Maple	SA	10	<2ft	Volunteer	0
Southern Red Oak	SA	36	<2ft	Planted	36
Southern Red Oak	SA	1	2ft	Planted	1
Amer. Beautyberry	SH	10	<2ft	Planted	10
Willow Oak	SA	1	<2ft	Volunteer	1
Black Willow	SA	1	<2ft	Volunteer	1
River Birch	SA	4	<2ft	Planted	4
Sweet Gum	SA	9	<2ft	Volunteer	0
Sycamore	SA	24	<2ft	Planted	24
Tulip poplar	SA	2	3ft	Volunteer	2
Tulip poplar	SA	3	2ft	Volunteer	3
Tulip poplar	SA	1	2.5ft	Volunteer	1
unidentified	SA	2	<2ft	Volunteer	2
	TOTAL SHRUBS	11		OBSERVED DENSITY (PER PLOT)	96
	TOTAL TREES OF PLANTED SPECIES	55		PLANTED DENSITY (PER PLOT)	66
	TOTAL TREES OF VOLUNTEER SPECIES	39		PERCENT SURVIVORSHIP	145
	TOTAL INDIVIDUALS	115			

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 3

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Green Ash	SA	3	<2ft	Planted	3
Green Ash	SA	3	2.5ft	Planted	3
Green Ash	SA	5	3ft	Planted	5
Green Ash	SA	4	3.5ft	Planted	4
Green Ash	SA	3	4ft	Planted	3
Green Ash	SA	4	4.5ft	Planted	4
Green Ash	SA	5	5ft	Planted	5
Green Ash	SA	1	5.5ft	Planted	1
Green Ash	SA	2	6ft	Planted	2
So. Red Oak	SA	2	<2ft	Planted	2
So. Red Oak	SA	4	2.5ft	Planted	4
So. Red Oak	SA	6	2ft	Planted	6
So. Red Oak	SA	2	3ft	Planted	2
Sweet Gum	SA	5	<2ft	Volunteer	0
American Elm	SA	1	<2ft	Volunteer	1
Possum Haw	SH	1	<2ft	Planted	1
Unidentified	SA	3	<2ft	Volunteer	3
River Birch	SA	16	<2ft	Planted	16
Wax Myrtle	SH	2	2ft	Planted	2
Wax Myrtle	SH	1	3ft	Planted	1
Wax Myrtle	SH	2	3.5	Planted	2
Red Maple	SA	>50	<6ft	Volunteer	0
Tulip Poplar	SA	1	<2ft	Volunteer	1
Tulip Poplar	SA	1	2.5ft	Volunteer	1
	TOTAL SHRUBS	6		OBSERVED DENSITY (PER PLOT)	72
	TOTAL TREES OF PLANTED SPECIES	60		PLANTED DENSITY (PER PLOT)	66
	TOTAL TREES OF VOLUNTEER SPECIES	61		PERCENT SURVIVORSHIP	109
	TOTAL INDIVIDUALS	127			

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 4

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Green Ash	SA	13	<2ft	Planted	13
Green Ash	SA	22	2ft	Planted	22
Green Ash	SA	14	2.5ft	Planted	14
Green Ash	SA	12	3ft	Planted	12
Green Ash	SA	2	3.5ft	Planted	2
Green Ash	SA	2	4ft	Planted	2
So. Red Oak	SA	3	<2ft	Planted	3
Elderberry	SH	2	2ft	Planted	2
Sweet Gum	SA	1	<2ft	Volunteer	0
Red Maple	SA	2	<2ft	Volunteer	0
	TOTAL SHRUBS	2		OBSERVED DENSITY (PER PLOT)	70
	TOTAL TREES OF PLANTED SPECIES	68		PLANTED DENSITY (PER PLOT)	60
	TOTAL TREES OF VOLUNTEER SPECIES	3		PERCENT SURVIVORSHIP	117
	TOTAL INDIVIDUALS	73			

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 5

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
So. Red Oak	SA	9	<2ft	Planted	9
So. Red Oak	SA	9	2ft	Planted	9
So. Red Oak	SA	1	3ft	Planted	1
So. Red Oak	SA	1	4ft	Planted	1
River Birch	SA	1	<2ft	Planted	1
Sycamore	SA	68	<2ft	Planted	68
Red Maple	SA	89	<2ft	Volunteer	0
Cherry Bark Oak	SA	2	<2ft	Planted	2
Green Ash	SA	6	<2ft	Planted	6
Green Ash	SA	11	2ft	Planted	11
Green Ash	SA	8	2.5ft	Planted	8
Green Ash	SA	7	3ft	Planted	7
Green Ash	SA	5	3.5ft	Planted	5
Green Ash	SA	1	4ft	Planted	1
Sweet Gum	SA	27	<2ft	Volunteer	0
Tulip Poplar	SA	6	<2ft	Volunteer	6
	TOTAL SHRUBS	0		OBSERVED DENSITY (PER PLOT)	135
	TOTAL TREES OF PLANTED SPECIES	129		PLANTED DENSITY (PER PLOT)	60
	TOTAL TREES OF VOLUNTEER SPECIES	122		PERCENT SURVIVORSHIP	225
	TOTAL INDIVIDUALS	251			

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 6

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Sycamore	SA	55	<2ft	Planted	55
Sycamore	SA	9	2ft	Planted	9
Sycamore	SA	1	2.5ft	Planted	1
Sycamore	SA	2	3ft	Planted	2
Sycamore	SA	5	4ft	Planted	5
Sycamore	SA	1	5ft	Planted	1
Sycamore	SA	3	6ft	Planted	3
Persimmon	SA	6	<2ft	Planted	6
Persimmon	SA	2	2ft	Planted	2
Persimmon	SA	3	2.5ft	Planted	3
Persimmon	SA	2	3ft	Planted	2
Persimmon	SA	1	3.5ft	Planted	1
So. Red Oak	SA	32	<2ft	Planted	32
So. Red Oak	SA	20	2ft	Planted	20
So. Red Oak	SA	3	2.5ft	Planted	3
So. Red Oak	SA	1	3ft	Planted	1
Sweet Gum	SA	>50	<2ft	Volunteer	0
Sweet Gum	SA	4	2ft	Volunteer	0
River Birch	SA	1	<2ft	Planted	1
River Birch	SA	5	2ft	Planted	5
River Birch	SA	1	2.5ft	Planted	1
River Birch	SA	2	3ft	Planted	2
Willow Oak	SA	5	<2ft	Volunteer	5
Tulip Poplar	SA	17	<2ft	Volunteer	17
Cherry Bark Oak	SA	1	<2ft	Planted	1
Wax Myrtle	SH	1	<2ft	Planted	1
Wax Myrtle	SH	3	2ft	Planted	3
Wax Myrtle	SH	1	2.5ft	Planted	1
Wax Myrtle	SH	2	3ft	Planted	2
Wax Myrtle	SH	2	3.5ft	Planted	2
Unidentified	SH	2	2ft	Volunteer	2
Winged Sumac	SH	1	2ft	Planted	1
Red Maple	SA	20	<2ft	Volunteer	0
Chokeberry	SA	3	<2ft	Volunteer	3
Green Ash	SA	1	<2ft	Planted	1

	TOTAL SHRUBS	10		OBSERVED DENSITY (PER PLOT)	194
	TOTAL TREES OF PLANTED SPECIES	157		PLANTED DENSITY (PER PLOT)	66
	TOTAL TREES OF VOLUNTEER SPECIES	101		PERCENT SURVIVORSHIP	294
	TOTAL INDIVIDUALS	268			

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 7

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
River Birch	SA	3	2ft	Planted	3
River Birch	SA	3	2.5ft	Planted	3
River Birch	SA	3	3ft	Planted	3
River Birch	SA	5	3.5ft	Planted	5
Wax Myrtle	SA	5	<2ft	Planted	5
Wax Myrtle	SH	10	2.5ft	Planted	10
Wax Myrtle	SH	6	3ft	Planted	6
Wax Myrtle	SH	22	2ft	Planted	22
Wax Myrtle	SH	4	3.5ft	Planted	4
Wax Myrtle	SH	1	5ft	Planted	1
Tulip Poplar	SA	24	<2ft	Volunteer	24
Sycamore	SA	9	<2ft	Planted	9
Sycamore	SA	1	2.5ft	Planted	1
Sycamore	SA	8	3ft	Planted	8
Sycamore	SA	1	3.5	Planted	1
Sycamore	SA	2	4ft	Planted	2
Sycamore	SA	1	5ft	Planted	1
Sweet Gum	SA	8	<2ft	Volunteer	0
Sweet Gum	SA	2	2ft	Volunteer	0
Persimmon	SA	2	<2ft	Planted	2
Persimmon	SA	1	2ft	Planted	1
Persimmon	SA	5	3ft	Planted	5
Persimmon	SA	1	4ft	Planted	1
Unidentified	SA	2	<2ft	Volunteer	2
Green Ash	SA	3	<2ft	Planted	3
Possum Haw	SH	1	<2ft	Planted	1
Red Maple	SA	>50	<2ft	Volunteer	0
	TOTAL SHRUBS	49		OBSERVED DENSITY(PER PLOT)	123
	TOTAL TREES OF PLANTED SPECIES	48		PLANTED DENSITY (PER PLOT)	100
	TOTAL TREES OF VOLUNTEER SPECIES	86		PERCENT SURVIVORSHIP	123
	TOTAL INDIVIDUALS	183			

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 8

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Sycamore	SA	11	<2ft	Planted	11
Sycamore	SA	5	2ft	Planted	5
Sycamore	SA	7	2.5ft	Planted	7
Elderberry	SA	16	<2ft	Planted	16
Tulip Poplar	SA	3	<2ft	Volunteer	3
Tulip Poplar	SA	2	2ft	Volunteer	2
Tulip Poplar	SA	3	2.5ft	Volunteer	3
Tulip Poplar	SA	2	3ft	Volunteer	2
Wax Myrtle	SA	2	2ft	Planted	2
Wax Myrtle	SA	1	2.5ft	Planted	1
Wax Myrtle	SA	2	3ft	Planted	2
Red Maple	SA	3	<2ft	Volunteer	0
Am. Beautyberry	SA	1	<2ft	Planted	1
Unidentified	SA	1	<2ft	Volunteer	1
	TOTAL SHRUBS	22		OBSERVED DENSITY (PER PLOT)	56
	TOTAL TREES OF PLANTED SPECIES	24		PLANTED DENSITY (PER PLOT)	78
	TOTAL TREES OF VOLUNTEER SPECIES	14		PERCENT SURVIVORSHIP	72
	TOTAL INDIVIDUALS	59			

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 9

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
River Birch	SA	12	<2ft	Planted	12
River Birch	SA	3	2ft	Planted	3
River Birch	SA	4	2.5ft	Planted	4
River Birch	SA	1	3ft	Planted	1
River Birch	SA	2	3.5ft	Planted	2
Sweet Gum	SA	2	<2ft	Volunteer	0
Red Maple	SA	5	<2ft	Volunteer	0
Sycamore	SA	6	<2ft	Planted	6
Sycamore	SA	2	2ft	Planted	2
Eastern False Willow	SH	1	<2ft	Volunteer	1
	TOTAL SHRUBS	1		OBSERVED DENSITY(PER PLOT)	31
	TOTAL TREES OF PLANTED SPECIES	30		PLANTED DENSITY (PER PLOT)	60
	TOTAL TREES OF VOLUNTEER SPECIES	7		PERCENT SURVIVORSHIP	52
	TOTAL INDIVIDUALS	38			

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 10

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Sycamore	SA	26	<2ft	Planted	26
Sycamore	SA	3	2ft	Planted	3
Tulip Poplar	SA	9	<2ft	Volunteer	9
Tulip Poplar	SA	2	2ft	Volunteer	2
Tulip Poplar	SA	1	2.5ft	Volunteer	1
Elderberry	SH	2	<2ft	Planted	2
Amer. Beautyberry	SH	17	<2ft	Planted	17
So. Red Oak	SA	1	<2ft	Planted	1
River Birch	SA	1	<2ft	Planted	1
	TOTAL SHRUBS	19		OBSERVED DENSITY (PER PLOT)	62
	TOTAL TREES OF PLANTED SPECIES	31		PLANTED DENSITY (PER PLOT)	84
	TOTAL TREES OF VOLUNTEER SPECIES	12		PERCENT SURVIVORSHIP	74
	TOTAL INDIVIDUALS	62			

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 11

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
White Oak	SA	15	<2ft	Planted	15
White Oak	SA	2	2.5ft	Planted	2
Sweet Gum	SA	6	<2ft	Volunteer	0
Red Maple	SA	1	<2ft	Volunteer	0
Sycamore	SA	1	<2ft	Planted	1
Sweet Pepper Bush	SH	1	2ft	Volunteer	1
	TOTAL SHRUBS	1		OBSERVED DENSITY(PER PLOT)	19
	TOTAL TREES OF PLANTED SPECIES	18		PLANTED DENSITY (PER PLOT)	60
	TOTAL TREES OF VOLUNTEER SPECIES	7		PERCENT SURVIVORSHIP	32
	TOTAL INDIVIDUALS	26			

**NEUSE RIVER RIPARIAN BUFFER SITE
ANNUAL MONITORING DATA SHEET - VEGETATION PLOTS**

PLOT#: 12

SPECIES	STRATUM (T, SA, or SH)	Number of Individuals	HEIGHT	Planted vs. Volunteer Species	Number of Individuals Counted toward Success Criteria
Wax Myrtle	SH	12	<2ft	Planted	12
Wax Myrtle	SH	8	2ft	Planted	8
Wax Myrtle	SH	15	2.5ft	Planted	15
Wax Myrtle	SH	10	3ft	Planted	10
Wax Myrtle	SH	2	3.5ft	Planted	2
Elderberry	SH	6	<2ft	Planted	6
Elderberry	SH	1	2.5ft	Planted	1
Sweet gum	SH	28	<2ft	Volunteer	0
Winged Sumac	SH	1	<2ft	Planted	1
Winged Sumac	SH	1	2ft	Planted	1
Red Maple	SA	3	<2ft	Volunteer	0
Green Ash	SA	4	<2ft	Planted	4
Sycamore	SA	4	<2ft	Planted	4
	TOTAL SHRUBS	56		OBSERVED DENSITY(PER PLOT)	64
	TOTAL TREES OF PLANTED SPECIES	8		PLANTED DENSITY (PER PLOT)	108
	TOTAL TREES OF VOLUNTEER SPECIES	31		PERCENT SURVIVORSHIP	60
	TOTAL INDIVIDUALS	95			