

**ANNUAL MONITORING REPORT**  
**YEAR 4 (2013)**  
**VICKI'S THICKET RIPARIAN BUFFER MITIGATION SITE**  
**CRAVEN COUNTY, NORTH CAROLINA**  
**(EEP Contract No. 002283)**  
**[DWQ Reference No. 10-0652]**



**Prepared for:**

**NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES**  
**ECOSYSTEM ENHANCEMENT PROGRAM**  
**RALEIGH, NORTH CAROLINA**



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**November 2013**

## EXECUTIVE SUMMARY

Restoration Systems, LLC has completed riparian buffer restoration at the Vicki's Thicket Riparian Buffer Mitigation Site (hereafter referred to as the "Site") through the North Carolina Ecosystem Enhancement Program (NCEEP) Full Delivery Process (RFP 16-001383) to provide 28.38 Riparian Buffer Mitigation Units. The Site is located approximately 3.5 miles southeast of Dover in Craven County. The Site is located in United States Geological Survey Hydrologic Unit and Targeted Local Watershed 03020202080010 (North Carolina Division of Water Quality Subbasin 03-04-08) of the Neuse River Basin. Site streams drain to Core Creek (Stream Index 27-90), which is included on the draft 2008 303(d) list for impaired biological integrity and low dissolved oxygen resulting from agricultural crop production.

Prior to construction, the Site was characterized by ditched agricultural land used for row crop production. Land use practices including the maintenance and removal of vegetation, regular plowing, and use of agricultural chemicals had resulted in degraded water quality.

The goals and objectives of this project focused on improving local water quality, enhancing flood attenuation, and restoring aquatic and riparian habitat. These goals were accomplished by the following.

1. Removing nonpoint sources of pollution associated with agriculture production by a) ceasing the application of agricultural herbicides, pesticides, fertilizers, and other agricultural materials into and adjacent to Site ditches and open waterways and b) providing a vegetative buffer adjacent to ditches and waterways to treat surface runoff that may be laden with sediment and/or agricultural pollutants.
2. Reducing sedimentation/siltation within on-Site and downstream receiving waters by a) increasing retention time for surface waters entering and leaving the Site, b) reducing erosion associated with vegetation maintenance and agricultural plowing to Site ditches, and c) planting a forested vegetative buffer adjacent to Site ditches and waterways.
3. Promoting floodwater attenuation by ripping compacted soils and revegetating the Site to increase frictional resistance on floodwaters crossing the Site.
4. Providing terrestrial wildlife habitat including a forested riparian corridor within an area that was previously cleared and highly dissected by agricultural land use.

This project was constructed in late winter/early spring 2010. Site restoration resulted in 28.38 Riparian Buffer Mitigation Units. As a whole, the densities of vegetation plots across the Site were above the required 320 stems per acre with an average of 617 planted stems per acre counting towards riparian buffer success in the Fourth Monitoring Year (2013). In addition, each individual plot met success criteria based on planted stems alone counting toward riparian buffer success with the exception of Plot 18, which was two stems shy. However, this plot had numerous natural recruits of red maple (*Acer rubrum*).

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## 1.0 INTRODUCTION

### 1.1 Location and Setting

Restoration Systems, LLC has completed riparian buffer restoration at the Vicki's Thicket Riparian Buffer Mitigation Site (hereafter referred to as the "Site") through the North Carolina Ecosystem Enhancement Program (NCEEP) Full Delivery Process (RFP 16-001383) to provide 28.38 Riparian Buffer Mitigation Units. The Site is located approximately 3.5 miles southeast of Dover in Craven County (Figure 1, Appendix A). The Site is located in United States Geological Survey Hydrologic Unit and Targeted Local Watershed 03020202080010 (North Carolina Division of Water Quality Subbasin 03-04-08) of the Neuse River Basin (USGS 1974).

Directions to the Site from Kinston, North Carolina:

- Take 70 East for approximately 8 miles
- Take the Dover exit and follow Old 70/Wilson Street for approximately 4.3 miles east
- Turn right over the railroad tracks to wire gate.
- Site coordinates:
  - Latitude 35.18812°N, Longitude 77.38613°W (NAD83/WGS84)

### 1.2 Project Goals and Objectives

The goals and objectives of this project focused on improving local water quality, enhancing flood attenuation, and restoring aquatic and riparian habitat. These goals were accomplished by the following.

1. Removing nonpoint sources of pollution associated with agriculture production by a) ceasing the application of agricultural herbicides, pesticides, fertilizers, and other agricultural materials into and adjacent to Site ditches and open waterways and b) providing a vegetative buffer adjacent to ditches and waterways to treat surface runoff that may be laden with sediment and/or agricultural pollutants.
2. Reducing sedimentation/siltation within on-Site and downstream receiving waters by a) increasing retention time for surface waters entering and leaving the Site, b) reducing erosion associated with vegetation maintenance and agricultural plowing to Site ditches, and c) planting a forested vegetative buffer adjacent to Site ditches and waterways.
3. Promoting floodwater attenuation by ripping compacted soils and revegetating the Site to increase frictional resistance on floodwaters crossing the Site.
4. Providing terrestrial wildlife habitat including a forested riparian corridor within an area that was previously cleared and highly dissected by agricultural land use.

### 1.3 Project Structure, Restoration Type, and Approach

Prior to construction, the Site was characterized by ditched agricultural land used for row crop production. Land use practices including the maintenance and removal of vegetation, regular plowing, and use of agricultural chemicals had resulted in degraded water quality.

As constructed, Site activities restored historic riparian buffer functions by planting the entire 31.35-acre Site with native riparian vegetation. This resulted in 28.38 Riparian Buffer Mitigation Units (Table 1, Appendix B and Figure 2, Appendix A). Riparian Buffer Mitigation Units were verified by North Carolina Division of Water Quality (NCDWQ) representative Lia Myott Gilleski during a field visit conducted on June 17, 2010. A copy of the verification letter is included in Appendix D. Approximately 2.97 acres of the Site exist outside of the 200-foot buffer area. These areas were planted; however, the area is not eligible to provide credit. The target natural community consisted of a Coastal Plain Bottomland

Hardwood Forest (Schafale and Weakley 1990). Table 5 (Appendix C) outlines woody species planted within the Site. Completed project activities, reporting history, completion dates, project contacts, and background information are summarized in Tables 2-4 (Appendix B).

## **2.0 MONITORING PLAN**

Monitoring of Site restoration efforts will be performed for vegetation components of the Site for five years or until success criteria are fulfilled. After planting was completed, an initial evaluation was performed to verify planting methods were successful and to determine initial species composition and density. Twenty-one sample vegetation plots (10-meter by 10-meter) were installed within the Site as per guidelines established in *CVS-EEP Protocol for Recording Vegetation, Version 4.0* (Lee et al. 2006). In each sample plot, vegetation parameters to be monitored include species composition and species density. Visual observations of the percent cover of shrub and herbaceous species will also be documented by photograph.

### **2.1 Vegetation Success Criteria**

Characteristic Tree Species include woody tree and shrub species planted at the Site (Table 5, Appendix C) or outlined for the appropriate plant community in Schafale and Weakley (1990). An average density of 320 stems per acre of Characteristic Tree Species must be surviving after year 5 monitoring.

### **2.2 Maintenance and Contingency**

In the event that success criteria are not fulfilled, a mechanism for contingency will be implemented. If vegetation success criteria are not achieved based on average density calculations from combined plots over the entire restoration area, supplemental planting may be performed with tree species approved by regulatory agencies. Supplemental planting will be performed as needed until achievement of vegetation success criteria.

### **2.3 Vegetation Sampling Results and Comparison to Success Criteria**

Quantitative sampling of vegetation was conducted in October 2013. Results are provided in Appendix C. Vegetation success criteria for year 4 (320 stems per acre) were exceeded for the 2013 annual monitoring year with an average density of 617 planted stems per acre counting towards riparian buffer success across the Site. Average densities of planted stems went up in year 2 in several plots including Plots 1, 3-12, and 17. During year 1, browse by deer and rodents on young planted stems was abundant throughout the Site. Several stems within these plots were not counted, or counted as missing in year 1; however, many survived and were doing well in years 2-4. In addition, several stems that were thought to be dead during year 1 monitoring resprouted from the base and were counted during years 2-4 monitoring. Deer browse was prevalent again during year 4 monitoring.

## **3.0 CONCLUSIONS**

As a whole, the densities of vegetation plots across the Site were above the required 320 stems per acre with an average of 617 planted stems per acre counting towards riparian buffer success in the Fourth Monitoring Year (2013). In addition, each individual plot met success criteria based on planted stems alone counting toward riparian buffer success with the exception of Plot 18, which was two stems shy. However, this plot had numerous natural recruits of red maple (*Acer rubrum*). The following table summarized planted stem data throughout the monitoring period.

**Summary of Planted Stem Vegetation Plot Results**

Plot	Planted Stems/Acre				
	Year 1 (2010)	Year 2 (2011)	Year 3 (2012)	Year 4 (2013)	Year 5 (2014)
1	647	688	648	648	
2	728	607	648	648	
3	809	769	769	769	
4	809	810	810	769	
5	931	810	769	769	
6	890	810	810	850	
7	971	891	891	891	
8	526	445	445	445	
9	486	526	486	486	
10	769	688	769	648	
11	688	607	648	526	
12	971	1012	931	891	
13	850	769	769	648	
14	1093	810	769	688	
15	728	567	567	567	
16	526	486	486	486	
17	647	607	607	607	
18	445	324	243	243	
19	647	526	486	486	
20	526	405	364	364	
21	607	526	486	526	
<b>Average Plots 1-21</b>	<b>728</b>	<b>651</b>	<b>638</b>	<b>617</b>	

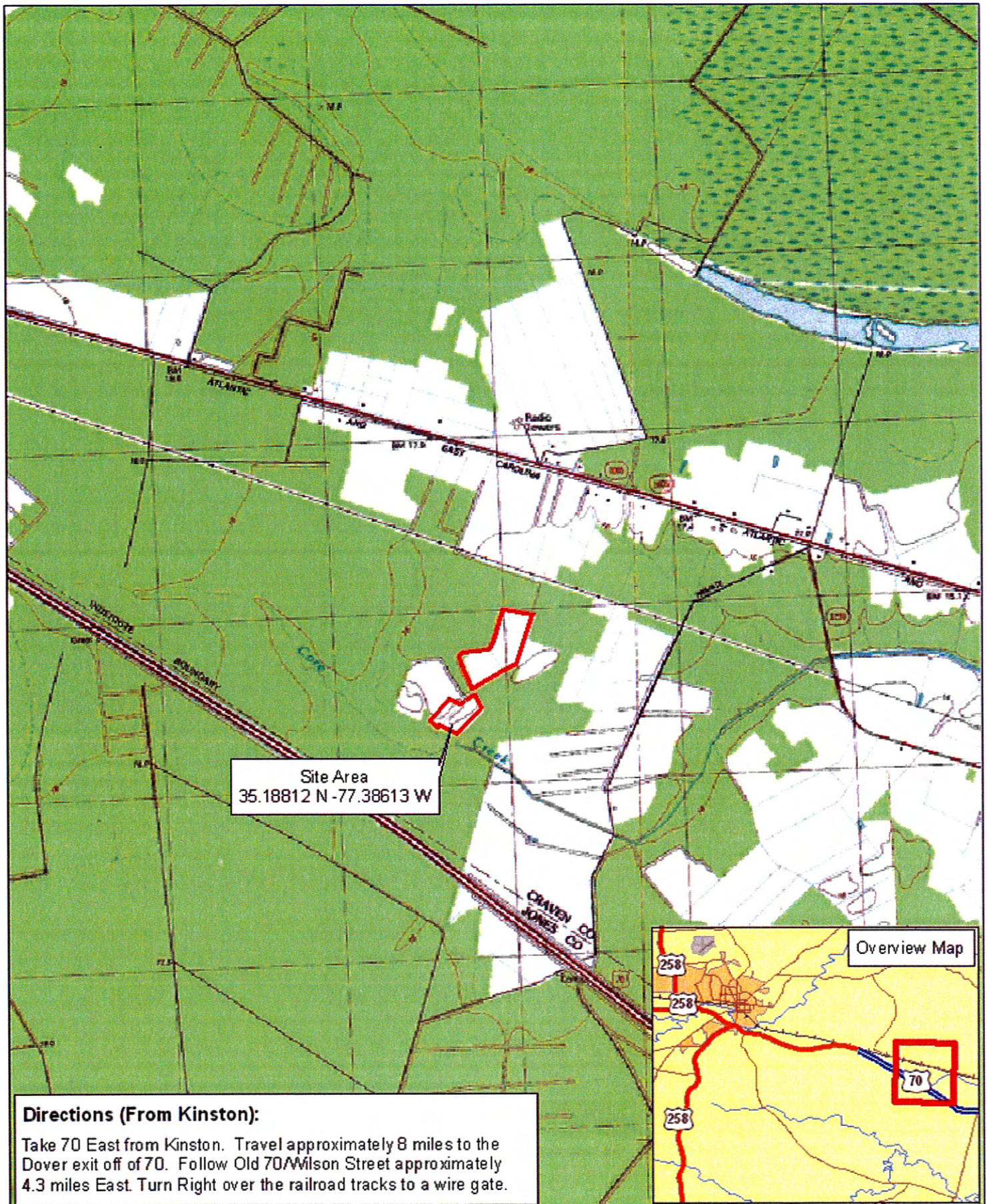
#### 4.0 REFERENCES

- Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2006. CVS-EEP Protocol for Recording Vegetation. Version 4.0. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, North Carolina.
- 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.
- North Carolina Division of Water Quality (NCDWQ). 2008a. Draft North Carolina Water Quality Assessment and Impaired Waters List (2008 Integrated 305(b) and 303(d) Report) (online). Available: <http://h2o.enr.state.nc.us/tmdl/documents/B.Draft2008303dList.pdf> [November 10, 2008]. North Carolina Department of Environment and Natural Resources, Raleigh, North Carolina.
- North Carolina Division of Water Quality (NCDWQ). 2008b. Draft Basinwide Planning Program: Neuse River Basinwide Water Quality Plan-June 2008. North Carolina Department of Environment and Natural Resources, Division of Water Quality. Raleigh, North Carolina.
- Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, North Carolina Department of Environment, Health, and Natural Resources. Raleigh, North Carolina.
- United States Geological Survey (USGS). 1974. Hydrologic Unit Map - 1974. State of North Carolina.

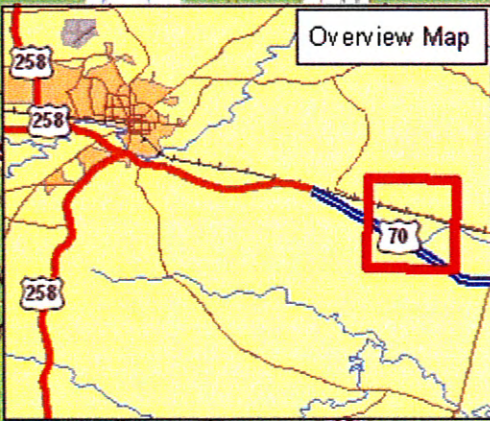
**Appendix A.  
Figures**

**Figure 1. Site Location**  
**Figure 2. Monitoring Plan View**





Site Area  
35.18812 N -77.38613 W



**Directions (From Kinston):**

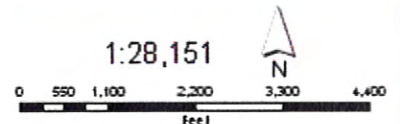
Take 70 East from Kinston. Travel approximately 8 miles to the Dover exit off of 70. Follow Old 70/Wilson Street approximately 4.3 miles East. Turn Right over the railroad tracks to a wire gate.



**Restoration Systems, LLC**  
1101 Haynes St. Suite 211  
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tel: 919.755.9490

**Figure 1:**  
Site  
Location

**Vicki's Thicket Riparian Buffer  
Mitigation Site  
Craven County, NC**







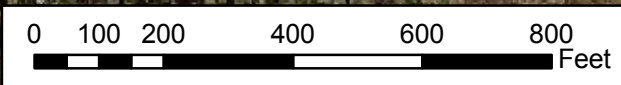

Vegetation Plot Origin	Latitude	Longitude
1	35.194114	-77.381605
2	35.194226	-77.382686
3	35.193868	-77.383055
4	35.193610	-77.381874
5	35.193109	-77.382151
6	35.193327	-77.383165
7	35.192750	-77.383479
8	35.192128	-77.383342
9	35.192039	-77.382527
10	35.191877	-77.385477
11	35.191960	-77.384934
12	35.191755	-77.384082
13	35.191196	-77.384493
14	35.190875	-77.385155
15	35.189302	-77.386666
16	35.188837	-77.387174
17	35.189610	-77.385044
18	35.188995	-77.385595
19	35.188563	-77.386124
20	35.188814	-77.386423
21	35.189307	-77.386086



**Vicki's Thicket  
28:38 Riparian Buffer Mitigation Units**

**Legend**

- Site Boundary/Planted Area = 31.35 acres
- Planted, No Credit Areas = 2.97 acres
- Vegetation Plots
- Vegetation Plot Origins

20 Enterprise Street  
Suite 7  
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(919) 215-1693

MONITORING PLAN VIEW  
VICKI'S THICKET  
RIPARIAN BUFFER MITIGATION SITE  
Craven County, North Carolina

Dwn. by:	CLF
Date:	Aug 2010
Project:	10-001

FIGURE  
**2**

**Appendix B.  
General Tables**

**Table 1. Site Restoration Structures and Objectives**

**Table 2. Project Activity and Reporting History**

**Table 3. Project Contacts Table**

**Table 4. Project Attributes Table**

**Table 1. Site Restoration Structures and Objectives**

<b>Component Summation</b>	
<b>Restoration Level</b>	Riparian buffer mitigation was completed by planting the entire 31.35-acre Site with native forest vegetation; credit was received for 28.38 acres of the Site.
Riparian Buffer Restoration	
<b>28.38 Buffer Mitigation Units</b>	

**Table 2. Project Activity and Reporting History**

<b>Activity or Report</b>	<b>Data Collection Complete</b>	<b>Completion or Delivery</b>
Final Restoration Plan	--	July 2010
Site Planting	--	Late winter/early spring 2010
Mitigation Plan	April 2010	August 2010
Year 1 Monitoring	September 2010	October 2010
Year 2 Monitoring	August 2011	August 2011
Year 3 Monitoring	June 2012	June 2012
Year 4 Monitoring	October 2013	November 2013

**Table 3. Project Contacts Table**

<b>Designer</b>	Restoration Systems, LLC 1101 Haynes Street, Suite 211 Raleigh, North Carolina 27604 (919) 755-9490
<b>Planting Contractor</b>	Carolina Silvics 908 Indian Trail Road Edenton, North Carolina 27932 Dwight McKinney (252) 482-8491
<b>Monitoring Performer</b>	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, North Carolina 27603 Grant Lewis (919) 215-1693

**Table 4. Project Attribute Table**

Project County	Craven County, North Carolina
Physiographic Region	Coastal Plain
Ecoregion	Carolina Flatwoods and Mid-Atlantic Floodplains/Low Terrace
Project River Basin	Neuse
USGS 14-digit HUC	03020202080010
NCDWQ Subbasin	03-04-08
Within EEP Watershed Plan Extent?	Yes-Targeted Local Watershed
WRC Class	Warm
% of project easement fenced	0 %
Beaver activity observed during design phase	No

**Appendix C.  
Vegetation Data**

**Table 5. Planted Woody Species  
Vegetation Survey Data Tables  
Vegetation Monitoring Plot Photographs**

**Table 5. Planted Woody Vegetation**

Species	Quantity
American elm ( <i>Ulmus americana</i> )	4500
Black gum ( <i>Nyssa sylvatica</i> )	1500
Elderberry ( <i>Sambucus canadensis</i> )	1500
Loblolly pine ( <i>Pinus taeda</i> )	4500
Northern red oak ( <i>Quercus rubra</i> )	3000
River birch ( <i>Betula nigra</i> )	1500
Sugarberry ( <i>Celtis laevigata</i> )	1500
Swamp chestnut oak ( <i>Quercus michauxii</i> )	4500
Sycamore ( <i>Platanus occidentalis</i> )	3000
Willow oak ( <i>Quercus phellos</i> )	4500
<b>TOTAL</b>	<b>30,000</b>

**CVS Database Output**

**Living planted stems, excluding live stakes, per acre: Negative (red) numbers indicate the project failed to reach requirements in a particular year.**

Project Code	Project Name	River Basin	Year 1	Year 2	Year 3	Year 4
VT	Vickies Thicket	Neuse	728.43	790.10	759.27	<b>716.87</b>

**Total stems, including planted stems of all kinds (including live stakes) and natural/volunteer stems:**

Project Code	Project Name	River Basin	Year 1	Year 2	Year 3	Year 4
VT	Vickies Thicket	Neuse	1111.921981	2133.271461	2333.687208	<b>2223.843962</b>

**Vigor**

Vigor	Count	Percent
	1	0.2
0	11	2.7
1	8	2
2	26	6.4
3	144	35.6
4	194	48
Missing	21	5.2

**Damage**

Damage	Count	Percent Of Stems
(no damage)	303	74.8
Deer	75	18.5
Insects	22	5.4
Unknown	4	1
Human Trampled	1	0.2

### Vigor by Species

Species	CommonName	4	3	2	1	0	Missing	Unknown
<i>Betula nigra</i>	river birch	13	14	1			1	
<i>Celtis laevigata</i>	sugarberry		12	1				
<i>Nyssa sylvatica</i>	blackgum		5	4	3	4	4	
<i>Pinus taeda</i>	loblolly pine	48	1	1				
<i>Quercus michauxii</i>	swamp chestnut oak	40	18			1		
<i>Quercus nigra</i>	water oak		1					
<i>Quercus phellos</i>	willow oak	42	22	1	1		3	
<i>Sambucus canadensis</i>	Common Elderberry			2		1	8	
<i>Quercus</i>	oak		1	1				
<i>Quercus rubra</i>	northern red oak		13	4	4	4	3	
<i>Magnolia virginiana</i>	sweetbay	3	1			1	1	
<i>Nyssa</i>	tupelo		1	1				
<i>Platanus occidentalis</i>	American sycamore	40	4					
<i>Ulmus</i>	elm		1					
<i>Ulmus americana</i>	American elm	8	50	10			1	
<b>15</b>	<b>15</b>	<b>194</b>	<b>144</b>	<b>26</b>	<b>8</b>	<b>11</b>	<b>21</b>	

### Damage by Species

Species	CommonName	Count of Damage Categories	(no damage)	Deer	Human Trampled	Insects	Unknown
<i>Betula nigra</i>	river birch	13	16	11		2	
<i>Celtis laevigata</i>	sugarberry	10	3	9	1		
<i>Magnolia virginiana</i>	sweetbay	0	6				
<i>Nyssa</i>	tupelo	0	2				
<i>Nyssa sylvatica</i>	blackgum	4	16	3			1
<i>Pinus taeda</i>	loblolly pine	1	50				1
<i>Platanus occidentalis</i>	American sycamore	16	28			16	
<i>Quercus</i>	oak	1	1	1			
<i>Quercus michauxii</i>	swamp chestnut oak	5	54	4		1	
<i>Quercus nigra</i>	water oak	1		1			
<i>Quercus phellos</i>	willow oak	10	59	8		2	
<i>Quercus rubra</i>	northern red oak	5	23	3		1	1
<i>Sambucus canadensis</i>	Common Elderberry	1	10				1
<i>Ulmus</i>	elm	1		1			
<i>Ulmus americana</i>	American elm	34	35	34			
<b>15</b>	<b>15</b>	<b>102</b>	<b>303</b>	<b>75</b>	<b>1</b>	<b>22</b>	<b>4</b>

### Damage by Plot

plot	Count of Damage Categories	(no damage)	Deer	Human Trampled	Insects	Unknown	(other damage)
1	6	12	6				6
2	15	3	14		1		15
3	9	14	9				9
4	6	16	5		1		6
5	2	25	2				2
6	7	20	3		4		7
7	12	14	8		3	1	12
8	1	15	1				1
9	2	13	2				2
10	8	15	6		2		8
11	0	20					0
12	3	28	2	1			3
13	3	17	1		2		3
14	7	19	2		3	2	7
15	5	9	4		1		5
16	3	10	3				3
17	2	15	2				2
18	1	7	1				1
19	3	10	1		2		3
20	0	13					0
21	7	8	3		3	1	7
<b>21</b>	<b>102</b>	<b>303</b>	<b>75</b>	<b>1</b>	<b>22</b>	<b>4</b>	<b>102</b>



**Plot Information**

Plot	Plot Level	Year	Planted Living Stems	Planted Living Stems EXCLUDING Live Stakes	Dead/Missing Stems	Natural (Volunteer) Stems	Total Living Stems	Total Living Stems EXCLUDING Live Stakes	Planted Living Stems per ACRE	Planted Living Stems EXCLUDING Live Stakes PER ACRE	Natural (Volunteer) Stems PER ACRE	Total Living Stems PER ACRE	Total Living Stems EXCLUDING Live Stakes PER ACRE	# species
1	2	4	17	17	1	3	20	20	688	688	121	809	809	5
2	2	4	17	17	1	11	28	28	688	688	445	1133	1133	6
3	2	4	23	23	0	21	44	44	931	931	850	1781	1781	7
4	2	4	20	20	2	16	36	36	809	809	647	1457	1457	7
5	2	4	25	25	1	15	40	40	1012	1012	607	1619	1619	6
6	2	4	26	26	1	10	36	36	1052	1052	405	1457	1457	7
7	2	4	26	26	0	28	54	54	1052	1052	1133	2185	2185	8
8	2	4	15	15	1	43	58	58	607	607	1740	2347	2347	5
9	2	4	13	13	2	45	58	58	526	526	1821	2347	2347	6
10	2	4	19	19	4	80	99	99	769	769	3237	4006	4006	9
11	2	4	17	17	3	58	75	75	688	688	2347	3035	3035	5
12	2	4	27	27	4	0	27	27	1093	1093	0	1093	1093	9
13	2	4	17	17	3	37	54	54	688	688	1497	2185	2185	6
14	2	4	23	23	3	120	143	143	931	931	4856	5787	5787	9
15	2	4	14	14	0	37	51	51	567	567	1497	2064	2064	4
16	2	4	12	12	1	21	33	33	486	486	850	1335	1335	4
17	2	4	16	16	1	58	74	74	647	647	2347	2995	2995	6
18	2	4	7	7	1	54	61	61	283	283	2185	2469	2469	4
19	2	4	13	13	0	48	61	61	526	526	1942	2469	2469	4
20	2	4	10	10	3	40	50	50	405	405	1619	2023	2023	5
21	2	4	15	15	0	37	52	52	607	607	1497	2104	2104	6

Vicki's Thicket 2013 (Year 4) Total Planted Stems (No Livestakes) by Plot and Species

Type	Species	CommonName	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
tree	<i>Betula nigra</i>	river birch			3	1	1		3		2	2				3	4	3			2	1	3	
tree	<i>Celtis laevigata</i>	sugarberry			3	1		1	3					1					1				3	
tree	<i>Magnolia virginiana</i>	sweetbay							1				1	1								1		
tree	<i>Nyssa</i>	tupelo														1			1					
tree	<i>Nyssa sylvatica</i>	blackgum		1		1				1	1	1	2	2		1			2					
tree	<i>Pinus taeda</i>	loblolly pine	1	1	4	1	6	5	4	4	1	3	4	5	1	6				1	1	1	1	
tree	<i>Platanus occidentalis</i>	American sycamore		1				5	3			2	1	4	2	1	3	4	2	2	7	1	6	
tree	<i>Quercus</i>	oak		1								1												
tree	<i>Quercus michauxii</i>	swamp chestnut oak	3	3	3	5	5	1	5	4	1	2	9	6	8	3								
tree	<i>Quercus nigra</i>	water oak			1																			
tree	<i>Quercus phellos</i>	willow oak	3				4	6		4	3	5		1	4	5	6	3	9	3	3	6	1	
tree	<i>Quercus rubra</i>	northern red oak	2		2	2	1	1	2					4	1	2	1	2		1				
shrub	<i>Sambucus canadensis</i>	Common Elderberry																	1				1	
tree	<i>Ulmus</i>	elm										1												
tree	<i>Ulmus americana</i>	American elm	8	10	7	9	8	7	5	2	5	2		3	1	1								
<b>Totals</b>			<b>Stem count</b>	17	17	23	20	25	26	26	15	13	19	17	27	17	23	14	12	16	7	13	10	15
<b>Totals</b>			<b>Species count</b>	5	6	7	7	6	7	8	5	6	9	5	9	6	9	4	4	6	4	4	5	6
<b>Totals</b>			<b>Stems per ACRE</b>	688	688	931	810	1012	1053	1053	607	526	769	688	1093	688	931	567	486	648	283	526	405	607
<b>Riparian Buffer Success Criteria</b>			<b>Stem count</b>	16	16	19	19	19	21	22	11	12	16	13	22	16	17	14	12	15	6	12	9	13
<b>Riparian Buffer Success Criteria</b>			<b>Species count</b>	4	5	6	6	5	6	7	4	5	8	4	8	5	8	4	4	5	3	3	4	4
<b>Riparian Buffer Success Criteria</b>			<b>Stems per ACRE</b>	648	648	769	769	769	850	891	445	486	648	526	891	648	688	567	486	607	243	486	364	526

\***Bolded** hardwood tree species are counted toward riparian buffer success criteria.

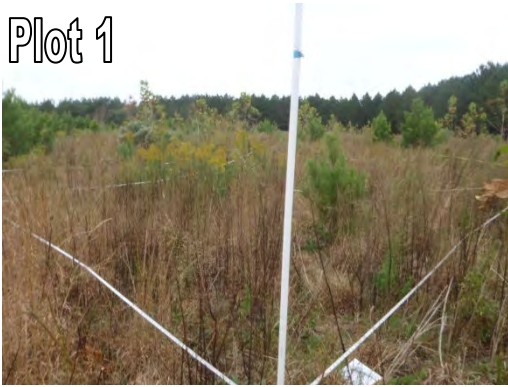
Vicki's Thicket 2013 (Year 4) Total Stems (Planted and Natural Recruits) by Plot and Species

Type	Species	CommonName	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		
tree	<b>Acer rubrum</b>	red maple			5	4					3	3	3			20	4	7	6	6	2	16	6		
shrub	Baccharis halimifolia	eastern baccharis		6	10	6		5	12	16	26	1	4		13	2	11	3		3	13	9	9		
tree	<b>Betula nigra</b>	river birch			3	1	1		3		2	2				3	4	3			2	1	3		
tree	<b>Carpinus caroliniana</b>	American hornbeam							1																
tree	<b>Celtis laevigata</b>	sugarberry			3	1		1	3					1						1			3		
shrub	Ilex opaca	American holly								1							2						4		
tree	<b>Liquidambar styraciflua</b>	sweetgum		1			1	2	2	6	3	52	37			15			2	1	1	3	1		
tree	<b>Magnolia virginiana</b>	sweetbay			2				1				1	1		1						1			
tree	<b>Nyssa</b>	tupelo														1			1						
tree	<b>Nyssa sylvatica</b>	blackgum		1		1				1	1	4	2	2	1	1				2					
tree	Pinus taeda	loblolly pine	4	5	8	5	9	8	17	24	13	27	18	5	25	89	20	11	50	45	33	13	18		
tree	<b>Platanus occidentalis</b>	American sycamore		1				5	3			2	1	4	2	1	3	4	2	2	7	1	6		
tree	<b>Quercus</b>	oak		1								1													
tree	<b>Quercus michauxii</b>	swamp chestnut oak	3	3	3	5	5	1	5	4	1	2	9	7	8	3									
tree	<b>Quercus nigra</b>	water oak			1																				
tree	<b>Quercus phellos</b>	willow oak	3				4	6		4	3	5		1	4	5	6	3	9	3	3	6	1		
tree	<b>Quercus rubra</b>	northern red oak	2		2	2	1	1	2				1	5	3	2	1	2		1					
shrub	Rhus copallinum	flameleaf sumac				2	11				1														
shrub	Sambucus canadensis	Common Elderberry																	2				1		
tree	<b>Ulmus</b>	elm										1													
tree	<b>Ulmus americana</b>	American elm	8	10	7	9	8	7	5	2	5	2		3	1	1									
<b>Totals</b>			<b>Stem count</b>	20	28	44	36	40	36	54	58	58	102	76	29	57	144	51	33	75	61	61	50	52	
			<b>Species count</b>	5	8	10	10	8	9	11	8	10	12	9	9	9	8	13	8	7	9	7	7	8	10
			<b>Stems per ACRE</b>	810	1134	1781	1457	1619	1457	2186	2348	2348	4130	3077	1174	2308	5830	2065	1336	3036	2470	2470	2024	2105	
<b>Riparian Buffer Success Criteria</b>			<b>Stem count</b>	16	17	26	23	20	23	25	17	18	74	54	24	19	53	18	19	23	13	15	28	20	
			<b>Species count</b>	4	6	8	7	6	7	9	5	7	10	7	8	6	11	5	5	7	5	5	6	6	
			<b>Stems per ACRE</b>	648	688	1053	931	810	931	1012	688	729	2996	2186	972	769	2146	729	769	931	526	607	1134	810	

\***Bolded** hardwood tree species are counted toward riparian buffer success criteria.

**Vickies Thicket  
Year 4 (2013)  
Vegetation Monitoring Plot Photos  
Taken October 2013**

**Plot 1**



**Plot 2**



**Plot 3**



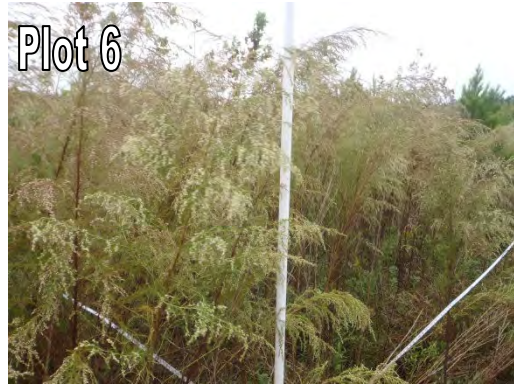
**Plot 4**



**Plot 5**



**Plot 6**



**Plot 7**



**Plot 8**



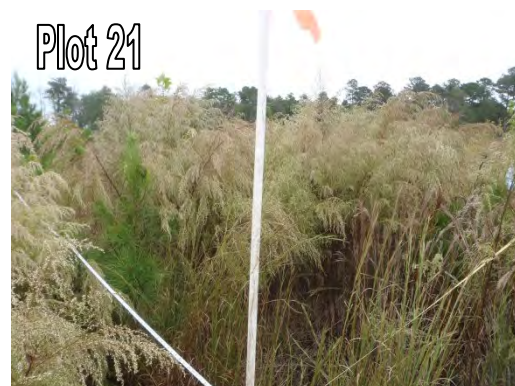


**Vickies Thicket  
Year 4 (2013)  
Vegetation Monitoring Plot Photos  
Taken October 2013  
(continued)**





**Vickies Thicket  
Year 4 (2013)  
Vegetation Monitoring Plot Photos  
Taken October 2013  
(continued)**



**Appendix D.**  
**NCDWQ Verification Letter**



North Carolina Department of Environment and Natural Resources

Division of Water Quality  
Coleen H. Sullins  
Director

Beverly Eaves Perdue  
Governor

Dee Freeman  
Secretary

August 13, 2010

Craven County  
DWQ #: 10-0652

Mr. Tim Baumgartner  
EEP Full Delivery Section  
1652 Mail Service Center  
Raleigh, NC 27604

Re: Vicki's Thicket Preliminary Restoration Approval

Dear Mr. Baumgartner:

The Division of Water Quality received a final restoration plan for the Vicki's Thicket Riparian Buffer Mitigation Site on August 10, 2010. On June 17, 2010, Lia Myott Gilleski conducted a site visit to the above referenced site. By copy of this correspondence, DWQ approves the concept presented in the restoration plan and that it is expected to produce 28.38 acres of nutrient offset credit for Neuse 03020202. The As-built report will provide a more accurate credit accounting.

Please copy DWQ with the As-built report and yearly monitoring reports, referencing the EEP Contract number (and DWQ number if applicable).

Please feel free to contact Lia Myott Gilleski at (919) 733-1786 if you have any questions regarding this correspondence.

Sincerely,

Ian McMillan, Acting Supervisor  
401 Oversight/Express Review Program

Cc (w/out encl.) File Copy (Lia M. Gilleski)  
Chris Pullinger – DWQ WaRO  
John Huisman – DWQ Nonpoint Source Planning Unit  
Cyndi Karoly – DWQ Wetlands and Stormwater Branch