

**Third Annual Monitoring Report – 2005 Growing Season
Moye Farm Riparian Buffer Restoration Project – Phase 1**

P.O.# EP4045003 Contract AW0311-2

December 2005

**Submitted to:
Jeff Jurek
North Carolina Ecosystem Enhancement Program
2728 Capital Blvd., Suite 1H 103
Raleigh, NC 27604**

**Submitted by:
Greene Environmental Services, LLC
90 Ham Produce Road
Snow Hill, NC 28580
(252)747-8200**

Introduction and Background

In October 2002 the NC Wetlands Restoration Program (now the Ecosystem Enhancement Program) awarded Greene Environmental Services a contract to restore 37.1 acres of riparian buffer along an unnamed tributary to Contentnea Creek in southeastern Greene County, NC (Figure 1). The Moye Farm Riparian Buffer Restoration Plan (GES, 2003) was implemented in 2003 with site preparation, the planting of approximately 17,000 saplings of 18 species, and the establishment of permanent vegetation monitoring transects in accordance with the Plan.

Woody stem density monitoring was conducted in December 2003 along four 100 meter long permanent transects using the point-center-quarter method and in four co-located 0.25 acre permanent plots using total counts, as detailed in the Restoration Plan. The first year's woody stem density along the four 100-meter transects indicated an average density of 803 woody stems per acre of 15 species for the entire project. Plot data indicated 663 stems per acre in 2003. The second annual vegetation monitoring, conducted during November and December 2004, indicated 763 stems per acre along the transects and 741 stems per acre in the plots (Table 1).

Results and Trends

The third annual woody stem density monitoring was conducted in October 2005, also using the methodology detailed in the Restoration Plan. Density along the transects averaged 1,150 stems per acre; plot data averaged 1,111 stems per acre. **Both methods indicate that the project has exceeded its success criterion of 320 live woody stems per acre by more than two-fold for the third consecutive year.** This year's data are more than three times this minimum.

Permanent transect data indicate *Liquidambar styraciflua* is the most abundant tree species recorded in 2005 (18.75 percent relative density). *Fraxinus pensylvanica* (12.50 percent), *Quercus phellos* (11.88 percent), and *Q. pagagodaefolia* (10.63 percent) were the most dense species. Average sapling height along all transects was 92.78 centimeters (3.04 feet). *F. pensylvanica* had the greatest average height in the restoration area (231.64 cm (7.6 feet)), followed closely by *Acer rubra* (137.5 cm (4.51 feet)). The four species with greater than ten percent relative density averaged 166.12 centimeters (5.44 feet) in height (Table 2).

Based on transect data, woody stem density increased by 27 percent overall from 2004. This increase in density was probably due to a combination of *L. styraciflua* root sprouting in Tracts B and D. Average height increased by 11 percent (82.10 cm (2.69 feet) in 2004 and 92.78 cm (3.04 feet) in 2005).

The point centered quarter method used at each permanent plot takes four samples at 10 random points along the 100-meter transect. This method is used to measure absolute density throughout the sampling area. Relative density and dominance throughout the restoration area are not necessarily defined by a single year's data.

Maintenance (completed and planned) and Anecdotal Observations

The Phase 1 restoration project is maturing and no negatively impacted areas were observed (qualitatively or quantitatively). As a result no additional silt fences, rip-rap, or other erosion control materials were installed during 2005. Similarly, no container stock or bare root seedlings were installed anywhere within the Phase 1 area. Erosion control measures and remedial plantings installed during 2004 seemed to have been effective. Spot application of herbicide (Roundup) was done in selected areas in May 2005. In a few areas where weedy vegetation was too robust to respond to the herbicide application, selective manual weed removal was done using machetes and gasoline-powered string trimmers.

Greene Environmental Services, LLC
90 Ham Produce Road, Snow Hill, NC 28580 (252) 747-8200

Like in 2004, browsing evidence was observed in all tracts. Deer prints were observed in the soil near many trees with obvious branch tip browsing. While damage to branch tips may have affected overall height, it did not seem to result in mortality. Rodent browsing at the base of the trees' main stems seemed to decrease since 2004. No serious browsing impacts were observed and no trees were observed to have been killed from browsing.

Overall, all tracts seem to be maturing nicely. The trees nearest to the streams and in the wetter pockets are beginning to dominate the weedy thickets. An immature canopy is anticipated by the end of the 2006 growing season in some areas. As the monitoring data indicate, sapling survival is high and no remedial planting will therefore be necessary.

Table 1. Woody stem density and trends - Moye Farm Riparian Buffer Restoration Project - Phase 3, December 2005.

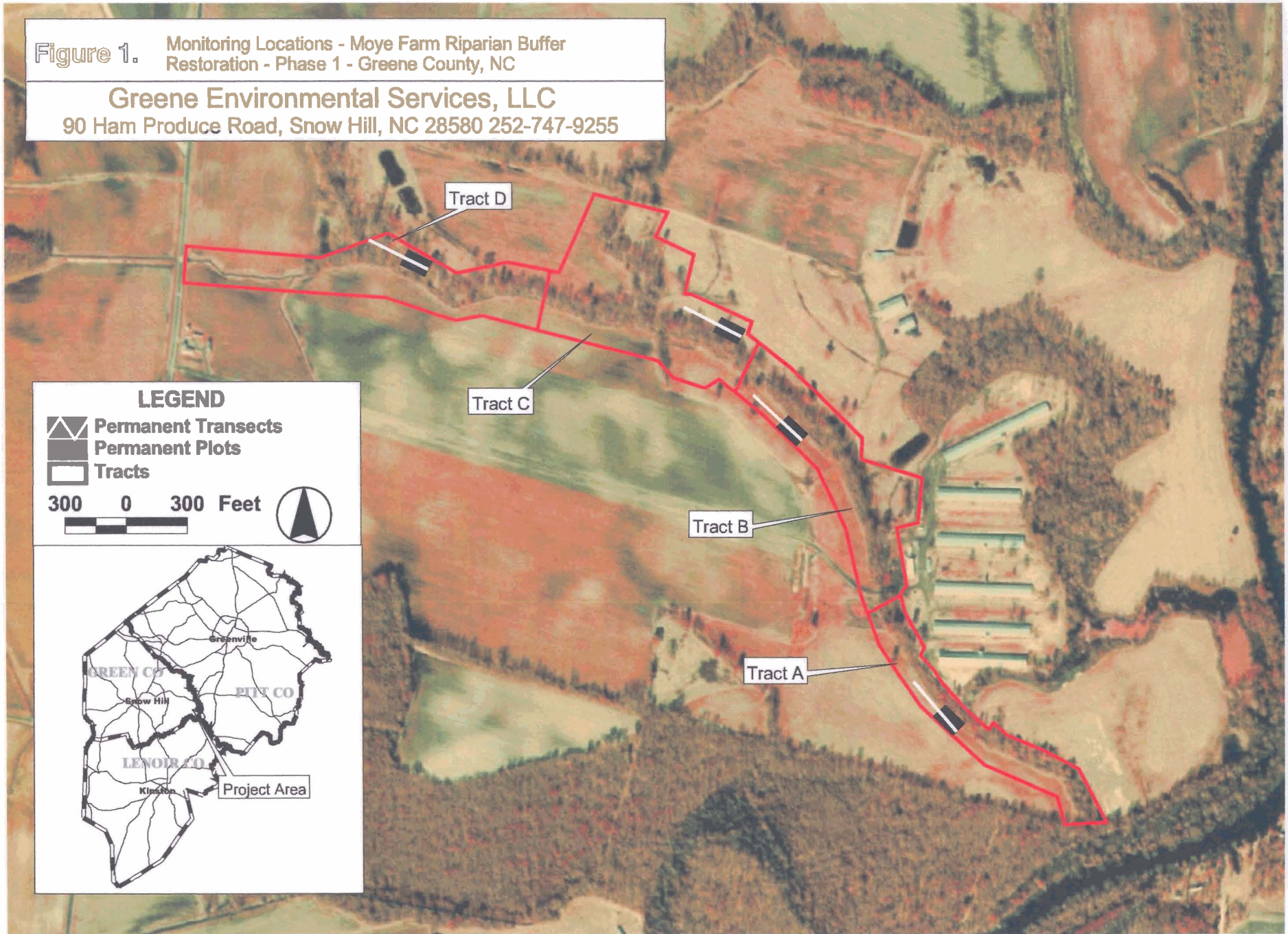
Tract	-----0.25 acre plot-----						permanent transects		
	number live stems			live stems/acre			average live stems/acre		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
A	187	229	249	748	916	996	629	644	749
B	150	155	229	600	620	916	829	844	948
C	145	146	117	580	580	628	858	705	877
D	181	212	476	724	848	1904	904	961	1,556
Average (all tracts)	166	185	278	663	741	1,111	803	764	1,150

Table 2. Relative density and average height of woody stems from permanent transects - Moye Farm Riparian Buffer Restoration Project - Phase 1, December 2005.

Species	Total (Tract)				Total (All Tracts)	Relative Density (%)	Average Height	
	A	B	C	D			cm	ft
<i>Celtis laeviagata</i>	1				1	0.63	54.10	1.77
<i>Liquidambar styraciflua</i>	3	7	2	18	30	18.75	97.53	3.20
<i>Prunus serotina</i>		1			1	0.63	11.05	0.36
<i>Quercus acutissima</i>	2	2	6	1	11	6.88	182.92	6.00
<i>Quercus falcata</i>	1				1	0.63	51.81	1.70
<i>Quercus lyrata</i>				6	6	3.75	36.79	1.21
<i>Quercus rubra</i>			9	2	11	6.88	52.58	1.73
<i>Quercus phellos</i>	4	1	7	7	19	11.88	161.02	5.28
Total	40	40	40	40	160	100.00	92.78	3.04
Average Stems/acre	719	948	1,377	1,556	1,150			

Figure 1. Monitoring Locations - Moye Farm Riparian Buffer Restoration - Phase 1 - Greene County, NC

Greene Environmental Services, LLC
90 Ham Produce Road, Snow Hill, NC 28580 252-747-9255



Permanent Transect Photographs - Moye Farm Riparian Buffer Restoration Project Phase 1



Tract A 2004



Tract A 2005



Tract B 2004



Tract B 2005

Permanent Transect Photographs - Moye Farm Riparian Buffer Restoration Project Phase 1



Tract C 2004



Tract C 2005



Tract D 2004



Tract D 2005