Fifth Annual Monitoring Report – 2007 Growing Season
Moye Farm Riparian Buffer Restoration Project – Phase 1

P.O.# EP4045003 Contract AW0311-2

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Submitted to:

Ecosystem Enhancement Program

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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 began 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 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.

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. The third annual vegetation monitoring, conducted during October 2005, indicated 1,150 woody stems per acre along the transects and 1,111 woody stems per acre in the plots. The fourth annual vegetation monitoring occurred in October 2006 and resulted in 1,206 woody stems per acre along the transects and 1,143 woody stems per acre in the plots (Table 1).

Results and Trends

The fifth annual woody stem density monitoring was conducted in October 2007, also using the methodology detailed in the Restoration Plan. Density along the transects averaged 946 stems per acre; plot data averaged 1,147 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 fifth consecutive year.** This year's data are almost three times this minimum density (295%).

Permanent transect data indicate that *Quercus falcata* is the most abundant tree species recorded in 2007 (18.1 percent relative density), followed by *Quercus laurifolia* and *Liquidambar styraciflua* (both 14.4 percent), *Q. phellos* (13.1 percent), and *Fraxinus pennsylvanica* (9.4 percent). Average sapling height along all transects was 220 centimeters (7.2 feet). The tallest individual observed was a *Q. phellos*, which has a height of 780 cm (25.6 feet). *Q. nigra* had the greatest average height in the restoration area (407 cm (13.4 feet)), followed by *Q. acutissima* (330 cm (10.8 feet)), and *Q. phellos* (297 cm (9.7 feet)) (Table 2).

Based on transect data, overall woody stem density decreased by 21.6 percent from 2006. Although, both tracts B and C had large decreases in densities, tracts A and D experienced small increases in woody stem density. Average DDH/DBH in 2007 (6.7 mm) increased by 69.4 percent from 2006 (22 mm). Average height was 82.1 cm in 2004, 92.8 cm in 2005, 183.9 cm in 2006, and 220 cm in 2007.

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 2007. 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 2006. 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.

Although, browsing evidence was observed in all tracts, it was much less prevalent than in the two previous years. This may be due to a much smaller number of very small trees. Again, 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 has began to form in some areas. As the monitoring data indicate, sapling survival is high and no remedial planting, or other action will therefore be necessary.

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Table 1. Woody stem density and trends - 2007 - Moye Farm Riparian Buffer Restoration Project - Phase 1.

Tract	----------0.25 acre plot---------- number live stems					---------- live stems/acre					permanent transects average live stems/acre				
	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
A	187	229	249	152	164	748	916	996	607	656	621	544	719	639	942
B	150	155	229	233	347	600	620	916	931	1388	829	844	948	1,256	741
C	145	145	157	177	186	580	580	628	708	744	858	705	1377	1,897	946
D	181	212	476	582	450	724	848	1904	2327	1800	904	961	1556	1,293	1,319
Average (all tracts)	**166**	**185**	**278**	**286**	**287**	**663**	**741**	**1,111**	**1,143**	**1,147**	**803**	**764**	**1,150**	**1,206**	**946**

Table 2. Relative density and average height of woody stems from permanent transects - Moye Farm Riparian Buffer Restoration Project Phase 1, October 2007.

Species	Total (Tract)				Total	Relative Density	Height	DDH/DBH
	A	B	C	D	(All Tracts)	(%)	cm	mm
Acer rubrum	3	0	3	0	6	3.8	71	8
Fraxinus pennsylvania	0	5	8	2	15	9.4	262	27
Liquidambar styraciflua	1	6	1	15	23	14.4	275	30
Liriodendron tulipifera	1	0	1	0	2	1.3	155	17
Prunus serotina	1	0	0	0	1	0.6	141	2
Quercus acutissima	5	2	4	0	11	6.9	330	44
Quercus falcata	9	5	13	2	29	18.1	256	19
Quercus laurifolia	6	12	5	0	23	14.4	239	22
Quercus lyrata	0	4	0	0	4	2.5	148	12
Quercus michauxii	6	0	0	5	11	6.9	152	20
Quercus nigra	0	0	0	5	5	3.1	407	39
Quercus phellos	4	4	4	9	21	13.1	297	37
Quercus rubra	4	2	0	2	8	5.0	214	26
Taxodium distichum	0	0	1	0	1	0.6	140	2
Total	**40**	**40**	**40**	**40**	**160**	**100.0**		
Average Stems/acre	**942**	**741**	**946**	**1,319**	**946**	**Average**	**220**	**22**

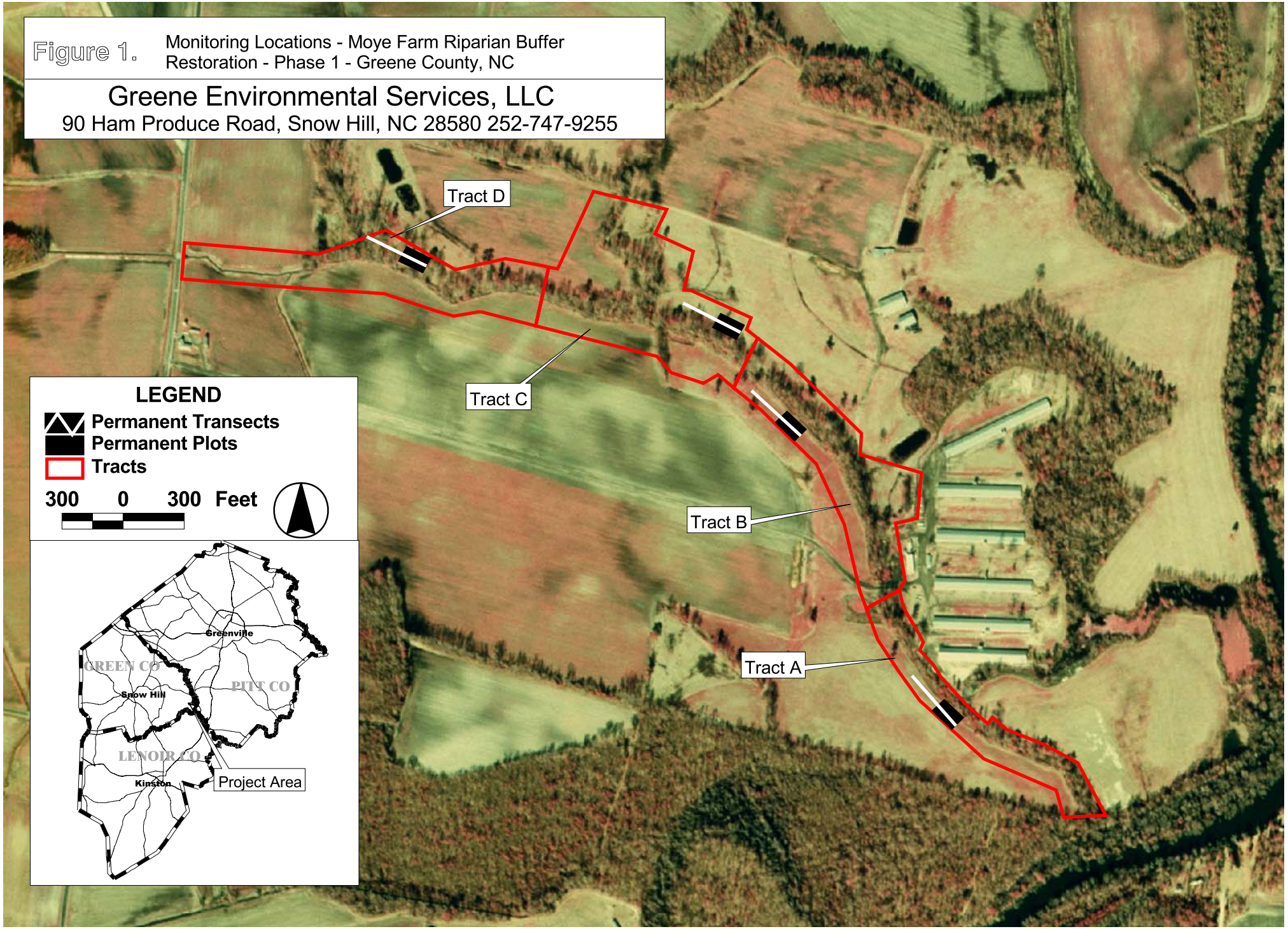
Figure 1.
Monitoring Locations - Moye Farm Riparian Buffer Restoration - Phase 1 - Greene County, NC
Greene Environmental Services, LLC
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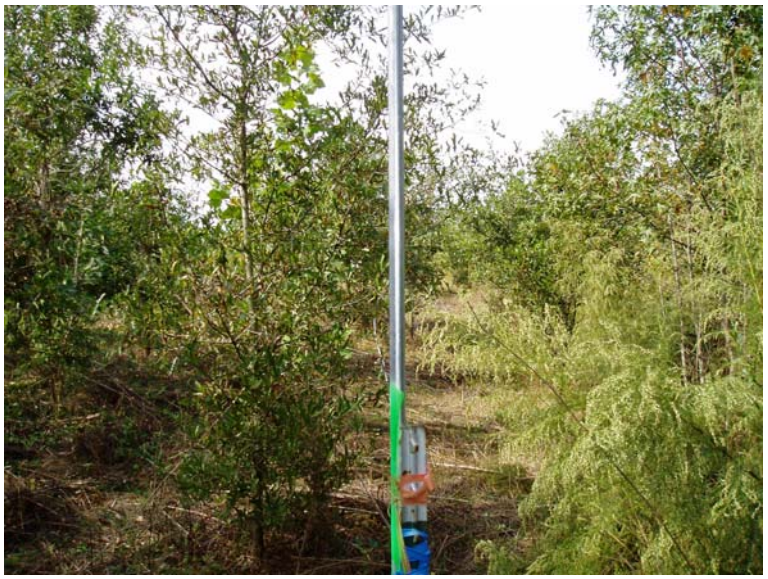
Tract D
Tract C
Tract B
Tract A
LEGEND
Permanent Transects
Permanent Plots
Tracts
300 0 300 Feet
Greenville
GREEN CO
PITT CO
Snow Hill
LENOIR CO
Kinston
Project Area

Permanent Transect Photographs - 2007 - Moye Farm Riparian Buffer Restoration Project Phase 1

Tract A 2006

Tract A 2007

Tract B 2006



Tract B 2007

Permanent Transect Photographs - 2007 - Moye Farm Riparian Buffer Restoration Project Phase 1

Tract C 2006

Tract C 2007

Tract D 2006

Tract D 2007