

FIRST ANNUAL MONITORING REPORT – 2006 GROWING SEASON

Moccasin Creek Riparian Buffer Restoration (EEP Contract: 005015)



December 2006

Submitted to:



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Introduction and Background

On 27 June 2005 the NC Ecosystem Enhancement Program awarded Greene Environmental Services a contract to restore 20.2 acres of riparian buffer along un-named tributaries to Moccasin Creek in southeastern Johnston County, NC (Figure 1). The project area is approximately 2.75 miles south of Princeton along Moccasin Creek's western bank. The unnamed tributary that the buffer surrounds confluences Moccasin Creek immediately to the southeast of the restoration site, approximately 7.5 stream miles north of its confluence with the Neuse River (Figure 1). The entire project lies on the Danny Kornegay Farm in USGS Hydrologic Unit 03020201160010. Hay fields and cattle pastures adjacent to the buffers receive liquid hog waste from the farm and typically have 65 cow/calf pairs rotating between fields.

The Moccasin Creek Riparian Buffer Restoration Plan was implemented in February 2006 with site preparation and the planting of approximately 9,700 bare root hardwood saplings of 6 species and 2,000 bald cypress saplings.

Planted woody stem density, cross-sectional area, and height monitoring was conducted during September 2006 inside 17 100 square meter quadrats, pursuant to EEP's August 2006 Level 1 and Level 2 methodologies. The monitoring results, management activities to date, identified problem areas, and planned management activities are presented below. Because the project had been planted prior to the EEP vegetation methodology, the *total planted* numbers presented below are the sum of total live stems observed and total dead stems observed.

Results

During the October 2006 monitoring, 230 planted woody stems were recorded within the 17 10x10 meter quadrats (four in tracts A, B, and D, and five in Tract C; Figure 2). Planted stem density for all plots averaged 547.54 stems per acre (171 percent of the required 320 stems per acre). Four hundred and ninety-six *volunteer* woody stems (all native species) were observed in the same 17 monitoring plots. Total native woody stem density averaged 1,189 per acre (372 percent above the required density). Planted woody stem success averaged 88 percent (Table 1).

When averaged separately, all tracts' live planted woody stem density also exceed the required 320 stems per acre (Tract A, 12.25 average = 495.76/acre (155%); Tract B, 13.5 average = 546.35/acre (171%); Tract C, 12 average = 485.64/acre (152%); Tract D, 16.75 average = 677.87/acre (212%)).

The first annual monitoring data indicate that *Liriodendron tulipifera* is the most abundant planted tree species (33 percent relative density among planted species). *Taxodium distichum* is a close second (31 percent relative density among planted species).

Liquidambar styraciflua is the dominant species, when all native species are considered in all monitoring plots (63.6 percent relative density). *L. tulipifera* and *T. distichum* are the second and third most dominant (10.6 and 9.9 percent relative density, respectively).

Maintenance (completed and planned) and Qualitative Observations

No herbicide application or other invasive management technique was used in the Moccasin Creek project following initial site preparation and planting or during the first growing season.

Planted woody stem mortality was observed in a few locations, but the quantitative data accurately reflect that overall planted woody stem success was high after the first growing season. Almost all planted woody stem mortality resulted from having *L. tulipifera* planted in the very wet portions of tracts

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B and C (Photo PA1). Limited mortality, and less vigor was also observed in portions of tracts A, B, and C where rhizomatous grass density was extremely high (Photo PA 2) (Figure 2). While not a problem causing any observed mortality during the first growing season, invasive annuals, biennials, and short lived perennials (e.g. *Conyza Canadensis*, *Eupatorium capillofolium*, *Ambrosia trifida*, and *Phytolacca americana*) have colonized several locations throughout the site.

To address the observed mortality in the wet areas, approximately 1000 bare root water tolerant seedlings (*T. distichum*, *Nyssa sylvantica*, *N. aquatica*, and *N. biflora*) will be planted during January and/or February 2006. Approximately 500 woody stems of species less tolerant of hydric soil (*L. tulipifera* and *F. pensylvanica*) will be planted in the mesic areas with significant mortality. The site will be reevaluated in the early 2006 growing season to identify areas with serious weed encroachment. Weedy areas will be evaluated individually for the appropriate treatment.

Because the dense rhizomatous grasses appear to be reducing planted stem vigor, maintenance teams will manually trim (using machetes and string trimmers) rings around the planted stems during June and July. If any areas are determined to need herbicide application, the application crews will be closely observed and managed by the designer, to avoid overspray that could cause additional mortality.

Table 1. Summary Data - Vegetation Monitoring Year 1 - 2006 - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

Species	Relative Density	Relative Density (all)	Total Live Stc	Total Dead	Total Planted	Survival (%)	A1	A2	A3	A4	B1	B2	B3	B4
Planted Stems														
<i>Fraxinus pennsylvanica</i>	21	6.6	48	1	49	98		7	1		4		6	11
<i>Liriodendron tulipifera</i>	33	10.6	77	31	108	71	9			13		5		
<i>Nyssa sylvantica</i>	4	1.4	10	2	12	83								
<i>Platanus occidentalis</i>	10	3.2	23	2	25	92				3	11			
<i>Taxodium distichum</i>	31	9.9	72	3	75	96		7	9		2		11	4
Total Planted Stems/Plot			230				9	14	10	16	17	5	17	15
Total Planted Stems/Acre/Plot							364	567	405	648	688	202	688	607
Total Planted Stems/Plot (average - all plots)			14											
Total Planted Stems/Acre (average - all plots)			548											
Total Stems/Acre (all plots - planted + volunteer)							364	3,602	405	728	688	324	688	728
Total Stems/Acre (average - all plots - planted + volunteer)			1,728											
Volunteer Stems														
<i>Baccharis halimifolia</i>		3.3	24											
<i>Carya</i> sp.		0.1	1											
<i>Diosporus virginiana</i>		0.8	6											
<i>Liquidambar styraciflua</i>		63.6	462					75		2		3		3
<i>Nyssa sylvantica</i>		0.3	2											
<i>Ulmus americana</i>		0.1	1											
Total/plot			496					75		2		3		3
Volunteers/ acre/ plot			1,189					3,035		81		121		121

Table 1. Summary Data - Vegetation Monitoring Year 1 - 2006 - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

Species	C1	C2	C3	C4	C5	D1	D2	D3	D4
Planted Stems									
<i>Fraxinus pennsylvanica</i>		2	2		4	9	1	1	
<i>Liriodendron tulipifera</i>	14	5			4	8	8	11	
<i>Nyssa sylvantica</i>				10					
<i>Platanus occidentalis</i>	3					2	3	1	
<i>Taxodium distichum</i>		1	10		5		6	2	15
Total Planted Stems/Plot	17	8	12	10	13	19	18	15	15
Total Planted Stems/Acre/Plot	688	324	486	405	526	769	728	607	607
Total Planted Stems/Plot (average - all plots)									
Total Planted Stems/Acre (average - all plots)									
Total Stems/Acre (all plots - planted + volunteer)	688	445	607	526	648	2,509	13,922	1,133	1,376
Total Stems/Acre (average - all plots - planted + volunteer)									
Volunteer Stems									
<i>Baccharis halimifolia</i>		2					21		1
<i>Carya sp.</i>						1			
<i>Diosporus virginiana</i>		1					5		
<i>Liquidambar styraciflua</i>			3	1	3	42	300	13	17
<i>Nyssa sylvantica</i>				1					1
<i>Ulmus americana</i>				1					
Total/plot		3	3	3	3	43	326	13	19
Volunteers/ acre/ plot		121	121	121	121	1,740	13,193	526	769

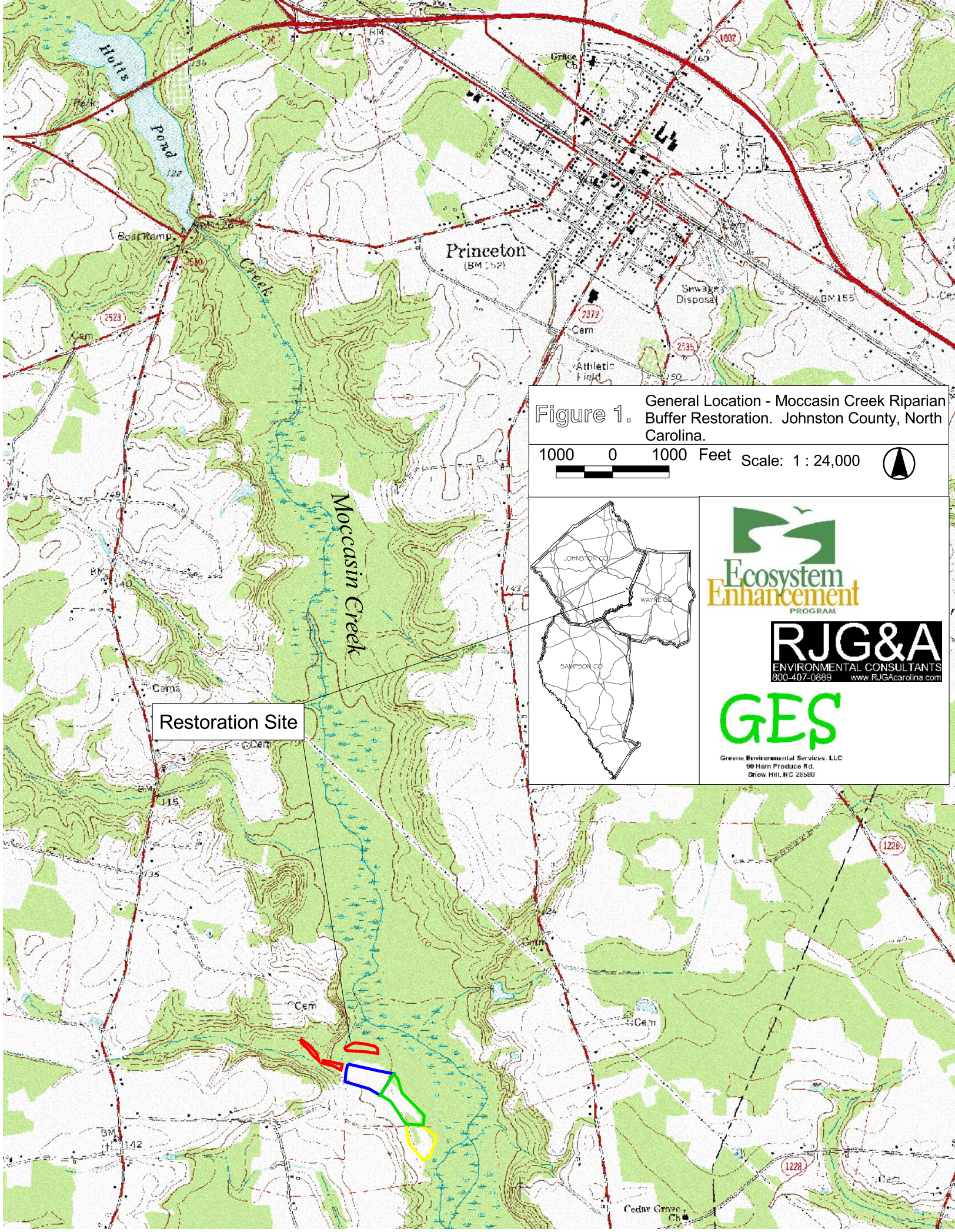

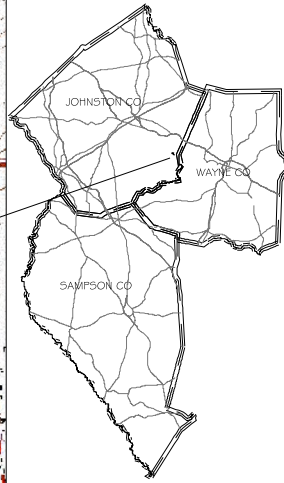


Figure 1. General Location - Moccasin Creek Riparian Buffer Restoration. Johnston County, North Carolina.

1000 0 1000 Feet Scale: 1 : 24,000 



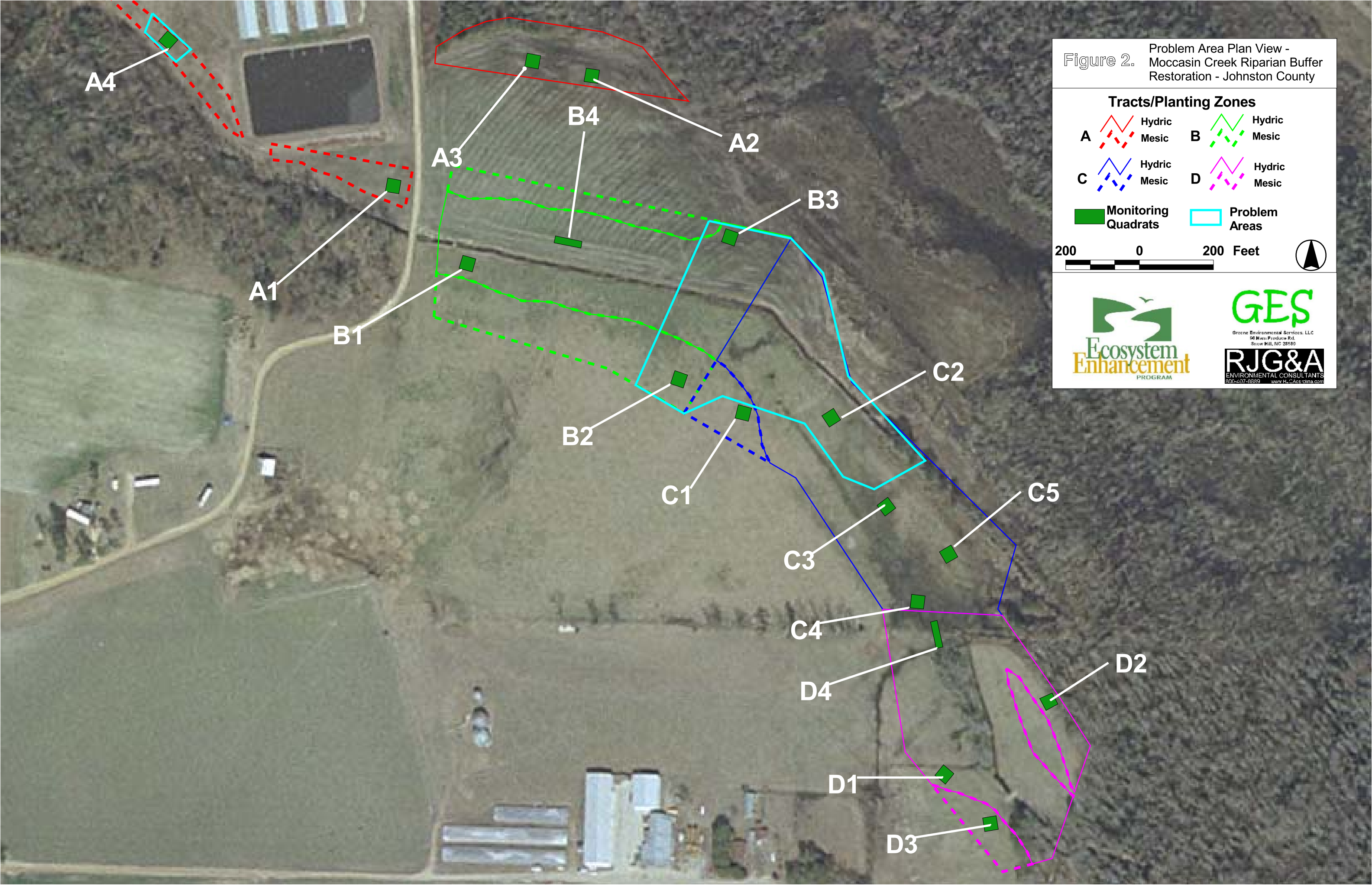
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Restoration Site


Figure 2. Problem Area Plan View - Moccasin Creek Riparian Buffer Restoration - Johnston County




Tracts/Planting Zones


A	 Hydric Mesic	B	 Hydric Mesic
C	 Hydric Mesic	D	 Hydric Mesic

Monitoring Quadrats  **Problem Areas** 


200 0 200 Feet 



**Ecosystem
Enhancement**
PROGRAM



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Problem Area Representative Photographs - Year 1 - 2006 - Moccasin Creek Buffer Restoration



PA 1 Soil too wet for mesic species



PA 2 Dense rhizomatous grass

Vegetation Monitoring Plot Photographs - Year 1 - 2006 - Moccasin Creek Buffer Restoration



Plot A1



Plot A2



Plot A3



Plot A4

Vegetation Monitoring Plot Photographs - Year 1 - 2006 - Moccasin Creek Buffer Restoration



Plot B1



Plot B2



Plot B3



Plot B4

Vegetation Monitoring Plot Photographs - Year 1 - 2006 - Moccasin Creek Buffer Restoration



Plot C1



Plot C2



Plot C3



Plot C4

Vegetation Monitoring Plot Photographs - Year 1 - 2006 - Moccasin Creek Buffer Restoration



Plot C5



Plot D1



Plot D2

Vegetation Monitoring Plot Photographs - Year 1 - 2006 - Moccasin Creek Buffer Restoration



Plot D3



Plot D4

Raw Data -Planted Woody Stems A1- Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Liriodendron tulipifera	R	0.9	0.1	11	77	4	Insects
Liriodendron tulipifera	R	1.1	2.1			0	
Liriodendron tulipifera	R	1.0	5.4	5	37	2	
Liriodendron tulipifera	R	1.0	7.9			0	
Liriodendron tulipifera	R	1.2	9.3			0	
Liriodendron tulipifera	R	3.7	8.6			0	
Liriodendron tulipifera	R	3.5	7.0			0	
Liriodendron tulipifera	R	4.0	4.7	5	37	2	
Liriodendron tulipifera	R	3.7	2.7	9	46	2	
Liriodendron tulipifera	R	3.4	0.6			0	
Liriodendron tulipifera	R	6.9	1.0	7	31	2	Animal
Liriodendron tulipifera	R	9.8	0.5	5	36	2	
Liriodendron tulipifera	R	9.8	2.9	8	56	2	
Liriodendron tulipifera	R	6.8	3.4	3	29	2	
Liriodendron tulipifera	R	7.1	5.8			0	
Liriodendron tulipifera	R	7.1	8.3	4	31	2	
Liriodendron tulipifera	R	9.8	5.8			0	
Liriodendron tulipifera	R	9.9	7.4			0	
Liriodendron tulipifera	R	9.9	9.8			0	
Liriodendron tulipifera	R	3.7	8.4			0	
Liriodendron tulipifera	R	0.8	6.9			0	

Raw Data A2-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Fraxinus pennsylvanica	R	0.7	0.3	7	65.84	3	
Fraxinus pennsylvanica	R	2.7	0.3	6.8	55.14	3	
Fraxinus pennsylvanica	R	4.8	0.3	9.7	76.2	3	
Fraxinus pennsylvanica	R	6.7	0.5	4.4	55.78	2	
Fraxinus pennsylvanica	R	8.9	0.3	5.5	64.01	3	
Fraxinus pennsylvanica	R	4.7	6.0	10.4	80.77	3	
Fraxinus pennsylvanica	R	7.4	6.2	8	70.1	3	
Taxodium distichum	R	8.4	3.1	7.2	59.44	3	
Taxodium distichum	R	5.4	3.0	5.3	57.91	3	
Taxodium distichum	R	2.9	3.2	7.2	49.38	3	
Taxodium distichum	R	0.4	3.1	9.9	82.3	3	
Taxodium distichum	R	2.2	6.1	6.7	68.28	3	Deer
Taxodium distichum	R	7.6	9.2			0	
Taxodium distichum	R	4.6	8.7	10.4	92.96	3	
Taxodium distichum	R	2.1	9.0	3.2	42.67	3	sprout

Raw Data A3-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Fraxinus pennsylvanica	R	8.5	3.8	7.9	62.48	2	
Fraxinus pennsylvanica	R	8.7	7.3	5.5	70.1		Insects
Taxodium distichum	R	1.5	1.2	8	74.68	3	
Taxodium distichum	R	4.1	1.1	7.7	67.06	3	
Taxodium distichum	R	6.7	1.1	8.8	89.92	3	
Taxodium distichum	R	9.6	1.3	12.8	109.73	3	
Taxodium distichum	R	5.3	3.9	10.7	71.63	3	Deer
Taxodium distichum	R	4.0	4.1	7.8	65.53	3	Deer
Taxodium distichum	R	0.6	7.3	10	96.01	3	
Taxodium distichum	R	3.6	7.1	8.7	73.15	3	
Taxodium distichum	R	6.4	7.4	7.4	76.2	3	Deer

Raw Data A4-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Liriodendron tulipifera	R	3.3	1.0			0	
Liriodendron tulipifera	R	5.2	0.9	8	41	2	
Liriodendron tulipifera	R	7.4	0.4	8	1	2	Insects
Liriodendron tulipifera	R	9.2	0.7	6	58	2	Insects
Liriodendron tulipifera	R	8.3	3.6	0		0	
Liriodendron tulipifera	R	6.6	3.5	7	56	2	Insects
Liriodendron tulipifera	R	3.8	5.1	11	43		
Liriodendron tulipifera	R	2.9	3.9	8	54	2	Insects
Liriodendron tulipifera	R	0.9	4.0	5	49	1	Insects
Liriodendron tulipifera	R	1.0	0.8			0	
Liriodendron tulipifera	R	9.8	6.2	7	58	2	
Liriodendron tulipifera	R	9.5	9.6	9	63	2	
Liriodendron tulipifera	R	7.4	9.4	9	52	3	
Liriodendron tulipifera	R	6.0	9.5	11	53	3	
Liriodendron tulipifera	R	4.0	9.4	8	57	3	
Liriodendron tulipifera	R	2.0	9.4	11	56	3	
Liriodendron tulipifera	R	0.4	9.5	6	53	2	
Platanus occidentalis	R	2.4	6.6			0	
Platanus occidentalis	R	4.7	6.5	14	96	3	
Platanus occidentalis	R	6.0	6.8	18	113	3	
Platanus occidentalis	R	8.5	6.4	16	97	3	

Raw Data B1-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Fraxinus pennsylvanica	R	2.9	1.4	14	88	3	Insects
Fraxinus pennsylvanica	R	8.5	7.3	11	85	3	Insects
Fraxinus pennsylvanica	R	5.0	7.2	9	73	3	Insects
Fraxinus pennsylvanica	R	1.0	6.7	8	89	3	Insects
Platanus occidentalis	R	0.6	0.3	14	86	3	Insects
Platanus occidentalis	R	5.1	1.3	14	1.06	3	Insects
Platanus occidentalis	R	7.2	1.7	5	62	2	Insects
Platanus occidentalis	R	2.7	3.5	8	63	2	animal
Platanus occidentalis	R	0.7	3.3	7	67	2	Insects
Platanus occidentalis	R	4.7	3.6	14	88	2	Insects
Platanus occidentalis	R	6.6	3.9	12	88	2	Insects
Platanus occidentalis	R	8.3	4.0	8	84	2	Insects
Platanus occidentalis	R	0.1	4.3	11	89	2	Insects
Platanus occidentalis	R	8.7	10.0	7	56	3	Insects
Platanus occidentalis	R	5.8	10.0	7	71	2	Insects
Taxodium distichum	R	7.0	7.1	9	97	3	Animal
Taxodium distichum	R	3.3	6.9	15	81	3	Animal

Raw Data B2-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Liriodendron tulipifera	R	3.7	1.1			0	
Liriodendron tulipifera	R	5.7	0.9	9	50	2	Animal
Liriodendron tulipifera	R	7.0	0.6	9	56	2	Insects
Liriodendron tulipifera	R	9.8	0.4			0	Animal
Liriodendron tulipifera	R	8.1	4.0			0	
Liriodendron tulipifera	R	6.6	3.9	9	67	2	
Liriodendron tulipifera	R	3.3	4.8	5	51	1	
Liriodendron tulipifera	R	1.4	5.2	4	44	1	
Liriodendron tulipifera	R	1.4	1.4			0	
Liriodendron tulipifera	R	4.5	7.5			0	
Liriodendron tulipifera	R	7.4	7.0			0	
Liriodendron tulipifera	R	9.2	6.7			0	
Liriodendron tulipifera	R	5.9	10.0			0	
Liriodendron tulipifera	R	4.9	4.3			0	

Raw Data B3-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Fraxinus pennsylvanica	R	0.2	0.1	4	72.54	2	
Fraxinus pennsylvanica	R	8.8	3.9	10	67.67	3	
Fraxinus pennsylvanica	R	5.2	9.6	7	70.1	2	
Fraxinus pennsylvanica	R	2.3	9.4	12	75.59	3	
Fraxinus pennsylvanica	R	1.2	34.0	7	26.82	2	
Fraxinus pennsylvanica	R	3.7	4.0	10	45.11	2	Insects
Taxodium distichum	R	2.8	0.2	11	76.2	3	
Taxodium distichum	R	8.2	0.6	14	85.34	3	
Taxodium distichum	R	7.7	0.8	15	75.59	3	
Taxodium distichum	R	9.8	0.9	12	85.34	3	
Taxodium distichum	R	6.2	3.6	15	88.39	3	
Taxodium distichum	R	8.0	6.5	12	74.98	3	
Taxodium distichum	R	7.3	9.8	10	71.32	3	
Taxodium distichum	R	9.6	9.3	15	43.14	3	
Taxodium distichum	R	5.8	6.6	7	54.86	3	
Taxodium distichum	R	3.2	6.6	11	80.47	3	
Taxodium distichum	R	0.4	7.0	10	72.54	3	

Raw Data B4-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Fraxinus pennsylvanica	R	3.0	0.2	9.2	76.2	2	Insects
Fraxinus pennsylvanica	R	14.9	0.3	6.6	67.06	3	Insects
Fraxinus pennsylvanica	R	17.0	0.2	4.8	62.48	3	
Fraxinus pennsylvanica	R	17.8	2.5	6.2	60.96	3	
Fraxinus pennsylvanica	R	15.5	3.3	10	79.25	3	
Fraxinus pennsylvanica	R	13.2	3.5	6.8	64.01	3	
Fraxinus pennsylvanica	R	10.1	3.5	6.7	71.02	4	
Fraxinus pennsylvanica	R	7.5	3.3	8	74.68	3	
Fraxinus pennsylvanica	R	5.6	3.2	10.4	79.25	3	
Fraxinus pennsylvanica	R	2.6	2.4	7.3	73.15	3	
Fraxinus pennsylvanica	R	0.1	3.3	7.5	55.47	3	sprout
Taxodium distichum	R	0.4	0.3	10.2	70.1	3	
Taxodium distichum	R	5.2	0.3	9	89.61	3	
Taxodium distichum	R	7.5	1.0	7.7	73.15	3	
Taxodium distichum	R	19.4	0.1	8.3	7.1	3	

Raw Data C1-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Liriodendron tulipifera	R	3.3	1.0			0	
Liriodendron tulipifera	R	5.2	0.9	8	41	2	Insects
Liriodendron tulipifera	R	7.4	0.9	8	61	2	Insects
Liriodendron tulipifera	R	9.2	0.7	6	58	2	Insects
Liriodendron tulipifera	R	8.3	3.6			0	
Liriodendron tulipifera	R	6.6	3.5	7	56	2	Insects
Liriodendron tulipifera	R	3.8	5.1	11	43	2	Insects
Liriodendron tulipifera	R	2.9	3.9	8	54	2	Insects
Liriodendron tulipifera	R	0.9	4.0	5	49	1	Insects
Liriodendron tulipifera	R	1.0	0.8			0	Insects
Liriodendron tulipifera	R	9.8	6.2	7	58	2	
Liriodendron tulipifera	R	9.5	9.6	9	63	2	
Liriodendron tulipifera	R	7.4	9.4	9	52	3	
Liriodendron tulipifera	R	6.0	9.5	11	53	3	
Liriodendron tulipifera	R	4.0	9.4	8	57	3	
Liriodendron tulipifera	R	2.0	9.4	11	56	3	
Liriodendron tulipifera	R	0.4	9.5	6	53	2	
Platanus occidentalis	R	2.4	6.6			0	Insects
Platanus occidentalis	R	4.1	6.8	14	96	3	
Platanus occidentalis	R	6.0	6.8	18	113	3	
Platanus occidentalis	R	8.5	6.4	16	97	3	

Raw Data C2-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Fraxinus pennsylvanica	R	1.1	9.0	7	35	2	
Fraxinus pennsylvanica	R	4.3	4.4	7	81	2	
Liriodendron tulipifera	R	2.2	0.2			0	
Liriodendron tulipifera	R	1.7	4.0	7	22	1	Wet
Liriodendron tulipifera	R	4.5	0.5			0	
Liriodendron tulipifera	R	6.8	7.7			0	
Liriodendron tulipifera	R	7.5	4.4	7	57	2	
Liriodendron tulipifera	R	7.1	0.8	7	41	2	
Liriodendron tulipifera	R	9.6	0.7	3	19	1	
Liriodendron tulipifera	R	9.9	4.2	9	62	2	
Liriodendron tulipifera	R	3.8	7.2			0	
Taxodium distichum	R	9.3	7.7	12	94	3	

Raw Data C3-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Fraxinus pennsylvanica	R	6.3	0.4			0	
Fraxinus pennsylvanica	R	7.0	4.3	9	66	2	
Fraxinus pennsylvanica	R	9.1	3.9	8	69	2	
Taxodium distichum	R	1.1	0.5	13	75	3	
Taxodium distichum	R	2.1	3.6	9	68	3	
Taxodium distichum	R	4.6	3.8	13	82	3	
Taxodium distichum	R	9.8	6.7	11	85	3	
Taxodium distichum	R	9.1	9.8	18	92	4	
Taxodium distichum	R	6.9	9.8	9	66	3	
Taxodium distichum	R	5.6	6.5	10	78	3	
Taxodium distichum	R	3.0	6.3	7	57	3	
Taxodium distichum	R	0.5	6.5	10	78	3	
Taxodium distichum	R	1.0	9.5			0	
Taxodium distichum	R	3.8	9.8	10	74	3	

Raw Data C4-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Nyssa sylvatica	R	0.7	2.4			0	
Nyssa sylvatica	R	7.4	0.1	6	44.5	3	
Nyssa sylvatica	R	1.2	0.9	6	44.2	3	cow
Nyssa sylvatica	R	4.7	2.4	9	84.73	2	cow
Nyssa sylvatica	R	2.4	4.7	13	85.04	3	Insects
Nyssa sylvatica	R	6.3	5.1	20	128.02	3	Insects
Nyssa sylvatica	R	0.9	2.3	15	73.15	2	cow
Nyssa sylvatica	R	0.8	6.4	9	60.96	1	cow
Nyssa sylvatica	R	3.9	6.2	17	91.44	3	cow
Nyssa sylvatica	R	7.8	6.6	8	95.4	3	cow
Nyssa sylvatica	R	2.9	9.9			0	
Nyssa sylvatica	R	0.4	9.3	7	56.39	2	Animal
Taxodium distichum	R	2.0	0.3			0	

Raw Data C5-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Fraxinus pennsylvanica	R	5.6	1.1	7	70.1	3	Insects
Fraxinus pennsylvanica	R	8.3	2.3	8	79.25	2	Deer
Fraxinus pennsylvanica	R	2.7	9.6	5	45.72	3	
Fraxinus pennsylvanica	R	0.7	8.6	7	78.64	3	Insects
Liriodendron tulipifera	R	2.9	0.1	5	50.29	3	
Liriodendron tulipifera	R	9.1	5.7	5	57.3	3	Insects
Liriodendron tulipifera	R	6.5	4.5	4	78.33	3	
Liriodendron tulipifera	R	3.9	4.2	6	74.07	3	
Taxodium distichum	R	1.0	3.0	12	115.82	4	
Taxodium distichum	R	1.6	6.0	10	83.52	3	
Taxodium distichum	R	3.6	7.0	8	74.68	3	
Taxodium distichum	R	6.4	7.8	10	96.62	3	
Taxodium distichum	R	9.3	8.9	9	75.59	3	

Raw Data D1-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Fraxinus pennsylvanica	R	4.3	1.0	9	70.1	3	
Fraxinus pennsylvanica	R	9.3	2.5	9	59.74	3	wasp nest
Fraxinus pennsylvanica	R	7.4	3.0	9	59.13	3	
Fraxinus pennsylvanica	R	5.4	3.2	7	68.88	3	
Fraxinus pennsylvanica	R	3.3	3.5	7	56.08	3	
Fraxinus pennsylvanica	R	1.4	3.8	8	65.84	3	
Fraxinus pennsylvanica	R	5.2	5.2	9	49.38	3	
Fraxinus pennsylvanica	R	6.8	5.7	10	59.13	3	
Fraxinus pennsylvanica	R	9.4	5.8	8	64.01	3	
Liriodendron tulipifera	R	1.9	1.0	11	39.01	3	
Liriodendron tulipifera	R	6.3	0.5	9	48.16	3	
Liriodendron tulipifera	R	7.7	0.6	12	62.18	3	
Liriodendron tulipifera	R	9.7	0.5	9	66.45	3	
Liriodendron tulipifera	R	1.0	6.7	7	44.5	2	Insects
Liriodendron tulipifera	R	3.1	6.1	10	48.77	3	
Liriodendron tulipifera	R	8.2	8.2	11	63.4	3	
Liriodendron tulipifera	R	2.0	8.8	8	51.82	3	
Platanus occidentalis	R	6.2	8.4	20	110.34	3	
Platanus occidentalis	R	4.0	8.6	8	48.77	3	

Raw Data D2-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Fraxinus pennsylvanica	R	5.9	2.0	10	45.11	2	
Liriodendron tulipifera	R	9.0	1.4	7	56.08	3	
Liriodendron tulipifera	R	7.3	1.9	6	51.82	3	
Liriodendron tulipifera	R	1.7	5.6	5	40.84	3	
Liriodendron tulipifera	R	3.4	5.2	9	44.5	3	
Liriodendron tulipifera	R	5.4	4.9	6	47.55	3	
Liriodendron tulipifera	R	7.7	4.9	5	24.38	3	Insects
Liriodendron tulipifera	R	9.4	4.2	8	50.6	3	
Liriodendron tulipifera	R	7.6	9.5	14	73.15	3	Insects
Platanus occidentalis	R	4.2	2.2	10	74.98	3	Insects
Platanus occidentalis	R	2.6	2.4	9	81.69	3	
Platanus occidentalis	R	0.9	2.8	10	76.2	3	
Platanus occidentalis	R	5.3	10.0	14	110.34		
Taxodium distichum	R	2.2	0.2	6	49.99	3	
Taxodium distichum	R	7.8	7.1	7	40.23	3	
Taxodium distichum	R	5.6	7.6	10	63.4	3	
Taxodium distichum	R	3.4	7.7	8	45.11	3	
Taxodium distichum	R	1.6	8.6	7	68.58	3	
Taxodium distichum	R	9.6	9.1	8	87.17	3	

Raw Data D3-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Fraxinus pennsylvanica	R	0.9	0.4	7	76.2	3	
Liriodendron tulipifera	R	6.2	1.5	8	73.15	3	
Liriodendron tulipifera	R	7.8	1.8	7	67.06	3	
Liriodendron tulipifera	R	9.1	2.9	10	60.96	3	
Liriodendron tulipifera	R	1.4	4.4	6	59.44	3	
Liriodendron tulipifera	R	3.3	5.3	12	111.86	4	
Liriodendron tulipifera	R	5.0	6.7	10	45.72	3	Rodents
Liriodendron tulipifera	R	1.8	6.9	9	77.72	3	
Liriodendron tulipifera	R	3.4	8.0	11	105.16	4	
Liriodendron tulipifera	R	1.2	9.7	10	98.45	4	
Liriodendron tulipifera	R	6.9	9.9	12	68.88	3	
Liriodendron tulipifera	R	9.0	8.7	12	73.15	3	
Platanus occidentalis	R	8.1	5.3	10	89.92	3	
Taxodium distichum	R	2.8	1.9	8	73.15	3	Rodents
Taxodium distichum	R	6.3	4.1	15	89	3	

Raw Data D4-Planted Woody Stems - Moccasin Creek Riparian Buffer Restoration - Johnston County, NC

SCIENTIFIC_NAME	stem Source	stemX	stemY	dgh	Height	stem Health	stem Comment
Taxodium distichum	R	0.8	0.5	13	75.59	3	
Taxodium distichum	R	3.5	0.6	14	97.54	3	
Taxodium distichum	R	2.5	4.4	21	128.93	4	
Taxodium distichum	R	5.2	4.1	16	92.96	3	
Taxodium distichum	R	6.4	0.8	14	103.63	3	
Taxodium distichum	R	7.3	3.8	15	89.31	3	
Taxodium distichum	R	9.1	1.6	11	89.31	3	
Taxodium distichum	R	10.4	4.2	10	65.84	3	
Taxodium distichum	R	11.7	1.1	18	113.69	3	
Taxodium distichum	R	12.8	4.2	15	111.25	3	
Taxodium distichum	R	14.2	1.8	16	99.67	3	
Taxodium distichum	R	16.1	4.4	18	121.92	3	
Taxodium distichum	R	16.8	0.9	15	119.79	4	
Taxodium distichum	R	19.2	5.0	7	76.2	2	
Taxodium distichum	R	19.5	0.9	17	126.49	3	

