

**THIRD ANNUAL MONITORING REPORT – 2008 GROWING SEASON**

**Moccasin Creek Riparian Buffer Restoration (EEP Contract: 005015)**



**December 2008**

**Submitted to:**



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**Submitted for:**



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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 six species and 2,000 bald cypress saplings.

Planted woody stem density, location, diameter, and height monitoring was conducted during December 2008 inside 17, 100 square meter quadrats, pursuant to the 2006 CVS-EEP protocol for monitoring vegetation. The monitoring results, management activities to date, identified problem areas, and planned management activities are presented below.

## **Results**

During the December 2008 monitoring, 227 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 540 stems per acre (169 percent of the required 320 stems per acre). A total of 270 natural woody stems (all native species) were observed in the same 17 monitoring plots. Total native woody stem density (planted and natural) averaged 1157 per acre (261 percent above the required density). Planted woody stem success averaged 71 percent (Table 1).

When averaged separately, all tracts' live planted woody stem density also exceed the required 320 stems per acre (Tract A, 11.50 average = 465/acre (145%); Tract B, 14.25 average = 577/acre (180%); Tract C, 12.60 average = 510/acre (159%); Tract D, 14.75 average = 597/acre (187%)).

The third annual monitoring data indicate that *Fraxinus pennsylvanica* is the most abundant planted tree species (35 percent relative density among planted species). *Taxodium distichum* is second (28 percent relative density among planted species), and *Liriodendron tulipifera* is third (21 percent relative density among planted species).

*Liquidambar styraciflua* is the dominant species, when all native species are considered in all monitoring plots (39.6 percent relative density).

**Maintenance (completed and planned) and Qualitative Observations**

The quantitative data demonstrate that overall planted woody stem success was high during the third growing season.

In January 2008, remedial planting was completed in areas that had experienced higher mortality rates. As of December 2008, these bare root seedlings appear to be doing well.

No herbicide application or other invasive management technique has been used in the Moccasin Creek project following initial site preparation and planting. Although areas of dense rhizomatous grasses have colonized several locations throughout the site, they do not appear to be reducing planted stem vigor. These areas will be monitored to determine if trimming or herbicide application is necessary to promote seedling survival. Additionally, planted stem vigor continues to lag behind in the portion of Tract A closest to the road (Figure 2). No remedial action is recommended for either of these problems at this time.





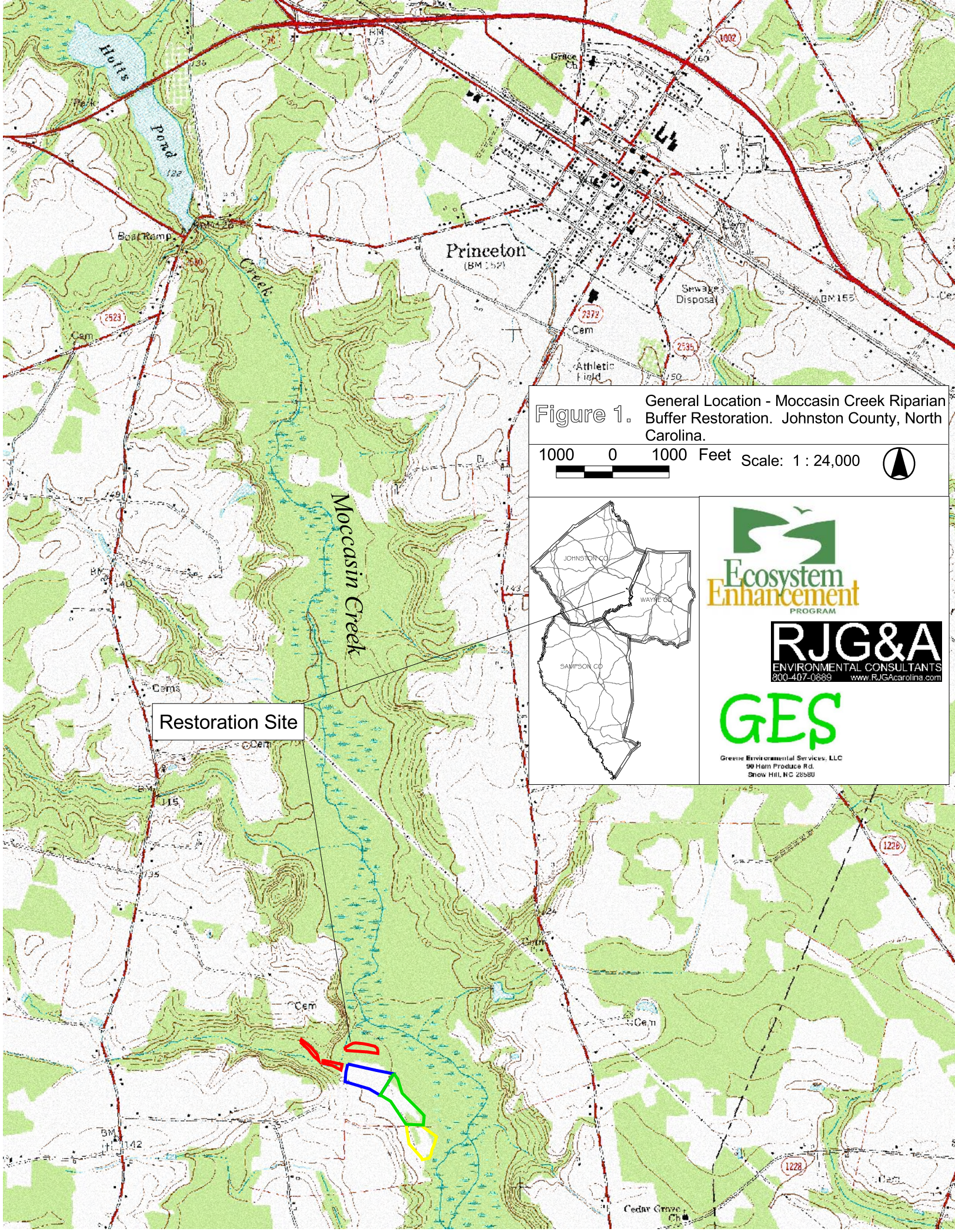

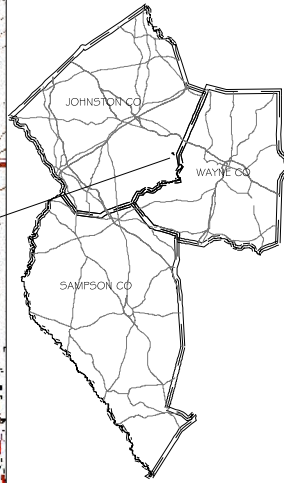


Figure 1. General Location - Moccasin Creek Riparian Buffer Restoration. Johnston County, North Carolina.

1000 0 1000 Feet Scale: 1 : 24,000 



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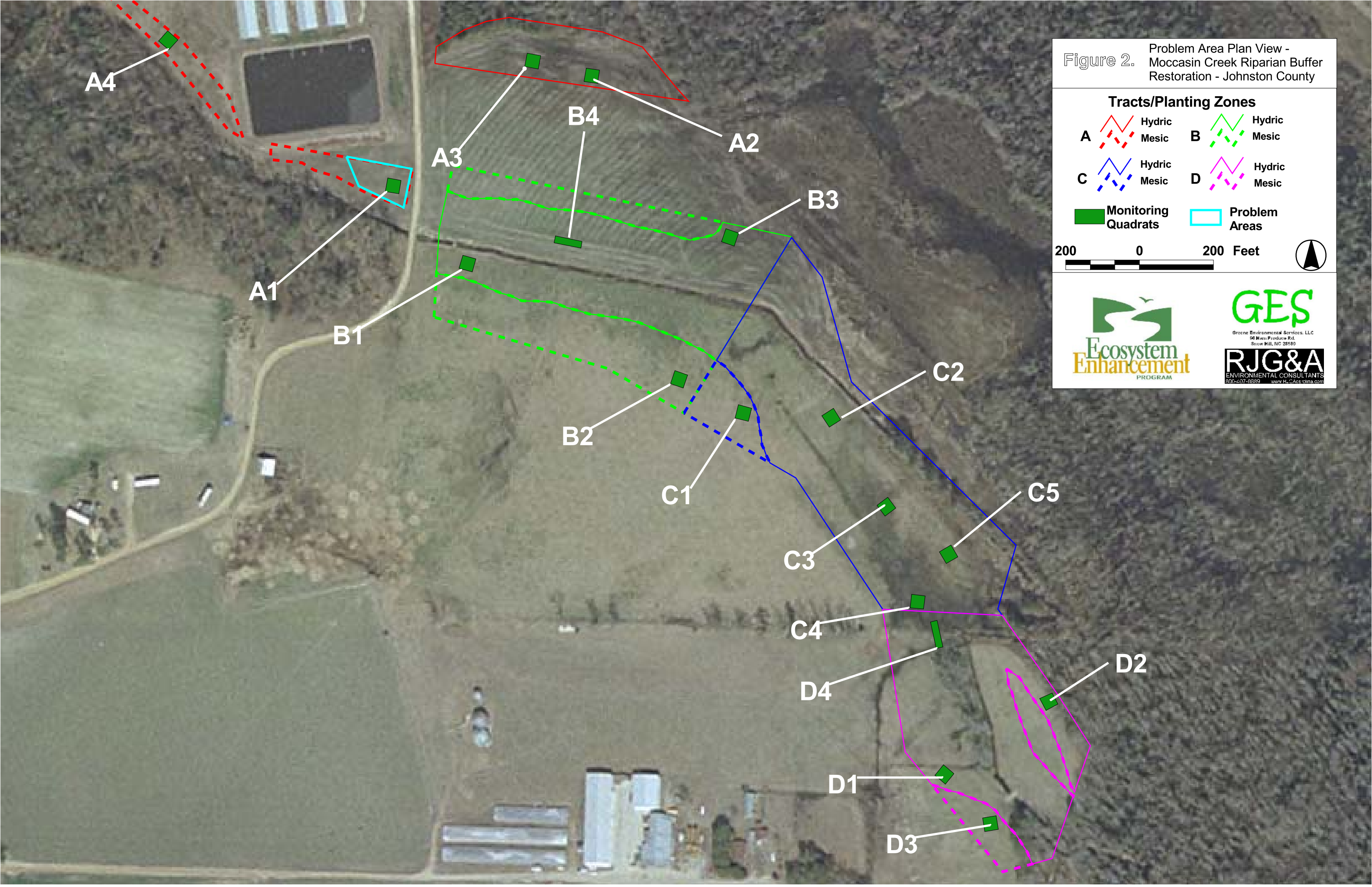


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Restoration Site






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




**Tracts/Planting Zones**


<b>A</b>	 Hydric Mesic	<b>B</b>	 Hydric Mesic
<b>C</b>	 Hydric Mesic	<b>D</b>	 Hydric Mesic

**Monitoring Quadrats**  **Problem Areas** 


200 0 200 Feet 



**Ecosystem  
Enhancement  
PROGRAM**



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**Vegetation Monitoring Plot Photographs - Year 3 - 2008 - Moccasin Creek Riparian Buffer Restoration**



**Plot A-1**



**Plot A-2**



**Plot A-3**



**Plot A-4**



**Vegetation Monitoring Plot Photographs - Year 3 - 2008 - Moccasin Creek Riparian Buffer Restoration**



**Plot B-1**



**Plot B-2**



**Plot B-3**



**Plot B-4**



**Vegetation Monitoring Plot Photographs - Year 3 - 2008 - Moccasin Creek Riparian Buffer Restoration**



**Plot C-1**



**Plot C-2**



**Plot C-3**



**Plot C-4**



**Vegetation Monitoring Plot Photographs - Year 3 - 2008 - Moccasin Creek Riparian Buffer Restoration**



**Plot C-5**



**Plot D-1**



**Plot D-2**



**Plot D-3**



**Vegetation Monitoring Plot Photographs - Year 3 - 2008 - Moccasin Creek Riparian Buffer Restoration**



**Plot D-4**

Raw Data - Planted Woody Stems - All Plots - Moccasin Creek Riparian Buffer Restoration - MY3 (2008)

SCIENTIFIC_NAME	plot	stemSource	stemX	stemY	dgh	Height	DBH	stemHealth
<b>Plot A1</b>								
Liriodendron tulipifera var. tulipifera	A1	R	0.9	0.1				Missing
Liriodendron tulipifera var. tulipifera	A1	R	1.1	2.1				Missing
Liriodendron tulipifera var. tulipifera	A1	R	1.0	5.0				Missing
Liriodendron tulipifera var. tulipifera	A1	R	1.0	7.9				Missing
Liriodendron tulipifera var. tulipifera	A1	R	1.2	9.3				Missing
Liriodendron tulipifera var. tulipifera	A1	R	3.7	8.6				Missing
Liriodendron tulipifera var. tulipifera	A1	R	3.5	7.0				Missing
Liriodendron tulipifera var. tulipifera	A1	R	4.0	5.0				Missing
Liriodendron tulipifera var. tulipifera	A1	R	3.7	2.7				Missing
Liriodendron tulipifera var. tulipifera	A1	R	3.4	0.6				0
Liriodendron tulipifera var. tulipifera	A1	R	6.9	1.0	36	210	1	4
Liriodendron tulipifera var. tulipifera	A1	R	9.8	0.5	45	283	1.9	4
Liriodendron tulipifera var. tulipifera	A1	R	9.8	2.9				Missing
Liriodendron tulipifera var. tulipifera	A1	R	6.8	3.4	18	133		4
Liriodendron tulipifera var. tulipifera	A1	R	7.1	5.8				Missing
Liriodendron tulipifera var. tulipifera	A1	R	7.1	8.3				Missing
Liriodendron tulipifera var. tulipifera	A1	R	9.8	5.1				Missing
Liriodendron tulipifera var. tulipifera	A1	R	9.9	7.4				Missing
Liriodendron tulipifera var. tulipifera	A1	R	9.9	9.8	20	138		4
Liriodendron tulipifera var. tulipifera	A1	R	3.7	8.4				Missing
Liriodendron tulipifera var. tulipifera	A1	R	0.8	6.9				Missing
Quercus michauxii	A1		0.9	6.3	5	50		4
Quercus michauxii	A1		3.4	6.2	9	54		4
Quercus michauxii	A1		6.1	6.5	10	104		4
Liriodendron tulipifera var. tulipifera	A1		6.9	9.8	39	237	1.5	4
Liriodendron tulipifera var. tulipifera	A1		4.4	9.7	8	65		4
Quercus michauxii	A1		4.4	9.7	2	19		4
<b>Plot A2</b>								
Fraxinus pennsylvanica	A2	R	0.7	0.3	9	72		4
Fraxinus pennsylvanica	A2	R	2.7	0.3	12	89		4
Fraxinus pennsylvanica	A2	R	4.8	0.3	17	117		4
Fraxinus pennsylvanica	A2	R	6.7	0.5	9	83		4
Fraxinus pennsylvanica	A2	R	8.9	0.3	18	92		4
Taxodium distichum	A2	R	8.4	3.1	23	135		4
Taxodium distichum	A2	R	5.4	3.0	9	92		4



Raw Data - Planted Woody Stems - All Plots - Moccasin Creek Riparian Buffer Restoration - MY3 (2008)

SCIENTIFIC_NAME	plot	stemSource	stemX	stemY	dgh	Height	DBH	stemHealth
Taxodium distichum	A2	R	2.9	3.2				Missing
Taxodium distichum	A2	R	0.4	3.1	22	139	0.2	4
Taxodium distichum	A2	R	2.2	6.1	16	113		4
Fraxinus pennsylvanica	A2	R	4.7	6.0	23	108		4
Fraxinus pennsylvanica	A2	R	7.4	6.2	18	136		4
Taxodium distichum	A2	R	7.6	9.2				Missing
Taxodium distichum	A2	R	4.6	8.7				Missing
Taxodium distichum	A2	R	2.1	9.0				Missing
<b>Plot A3</b>								
Taxodium distichum	A3	R	1.5	1.2				Missing
Taxodium distichum	A3	R	4.1	1.1	11	129		4
Taxodium distichum	A3	R	6.7	1.1	36	182	0.9	4
Taxodium distichum	A3	R	9.6	1.3	42	182	1.3	4
Fraxinus pennsylvanica	A3	R	8.4	3.9	9	70		4
Taxodium distichum	A3	R	5.6	4.4	37	184	0.8	4
Taxodium distichum	A3	R	3.3	4.4	27	162	0.2	4
Taxodium distichum	A3	R	0.6	7.3	31	165	0.3	4
Taxodium distichum	A3	R	3.6	7.1	36	171	0.7	4
Taxodium distichum	A3	R	6.4	7.4	44	172	0.8	4
Fraxinus pennsylvanica	A3	R	8.7	7.3	27	172	0.7	4
Taxodium distichum	A3		6.5	5.4				Missing
Liriodendron tulipifera	A3		1.5	5.2				Missing
Liriodendron tulipifera	A3		4.6	6.2	14	79		4
<b>Plot A4</b>								
Liriodendron tulipifera	A4		0.5	2.1	27	127		4
Liriodendron tulipifera	A4		0.5	4.8	14	102		4
Liriodendron tulipifera	A4		0.5	7.3	11	84		4
Platanus occidentalis	A4		0.5	4.7				Missing
Platanus occidentalis	A4		6.4	3.4	44	315	2.3	4
Platanus occidentalis	A4		3.9	0.7	34	295	1.7	4
Platanus occidentalis	A4		6.6	0.6		500	5.1	4
Platanus occidentalis	A4		6.2	6.2	51	400	2.8	4
Platanus occidentalis	A4		6.0	8.4	26	245	1.3	4
Liriodendron tulipifera	A4		9.3	9.4	38	257	1.5	4
Liriodendron tulipifera	A4		9.4	9.9				Missing
Platanus occidentalis	A4		3.8	3.6	42	278	1.8	4

Raw Data - Planted Woody Stems - All Plots - Moccasin Creek Riparian Buffer Restoration - MY3 (2008)

SCIENTIFIC_NAME	plot	stemSource	stemX	stemY	dgh	Height	DBH	stemHealth
Fraxinus pennsylvanica	A4		8.3	3.6				Missing
Platanus occidentalis	A4		9.3	2.4	47	375	3	4
Platanus occidentalis	A4		8.9	4.5	38	359	2.2	4
Platanus occidentalis	A4		3.7	7.8				Missing
Platanus occidentalis	A4		1.4	7.8				Missing
Platanus occidentalis	A4		3.6	5.9				Missing
Platanus occidentalis	A4		0.7	9.7	47	299	3.7	4
Liriodendron tulipifera	A4		9.4	6.8	26	218	1.2	4
<b>Plot B1</b>								
Platanus occidentalis var. occidentalis	B1	R	0.6	0.3		500	5	4
Fraxinus pennsylvanica	B1	R	2.9	1.4		285	2.2	4
Platanus occidentalis var. occidentalis	B1	R	5.1	1.3		500	5.5	4
Platanus occidentalis var. occidentalis	B1	R	7.2	1.7		282	1.7	4
Platanus occidentalis var. occidentalis	B1	R	2.7	3.5				Missing
Platanus occidentalis var. occidentalis	B1	R	3.9	9.9		355	3.3	4
Platanus occidentalis var. occidentalis	B1	R	4.7	3.6		450	5.3	4
Platanus occidentalis var. occidentalis	B1	R	6.6	3.9		450	4.4	4
Platanus occidentalis var. occidentalis	B1	R	8.3	4.0		400	3.4	4
Platanus occidentalis var. occidentalis	B1	R	0.1	4.3		390	3.2	4
Fraxinus pennsylvanica	B1	R	8.5	7.3	38	195	0.9	4
Platanus occidentalis var. occidentalis	B1	R	8.7	10.0				Missing
Taxodium distichum	B1	R	7.0	7.1				Missing
Fraxinus pennsylvanica	B1	R	5.0	7.2		250	1.3	4
Taxodium distichum	B1	R	3.3	6.9				0
Fraxinus pennsylvanica	B1	R	1.0	6.7		275	2.8	4
Platanus occidentalis var. occidentalis	B1	R	5.8	10.0		268	1.8	4
Platanus occidentalis var. occidentalis	B1		3.9	9.8		144	1.6	4
<b>Plot B2</b>								
Liriodendron tulipifera var. tulipifera	B2	R	3.7	1.1				Missing
Liriodendron tulipifera var. tulipifera	B2	R	5.7	0.9				Missing
Liriodendron tulipifera var. tulipifera	B2		7.0	0.6	10	82		4
Liriodendron tulipifera var. tulipifera	B2	R	9.8	0.4				Missing
Liriodendron tulipifera var. tulipifera	B2	R	8.1	4.0				Missing
Liriodendron tulipifera var. tulipifera	B2	R	6.6	3.9	8	78		4
Liriodendron tulipifera var. tulipifera	B2	R	3.3	4.8				Missing
Liriodendron tulipifera var. tulipifera	B2	R	1.4	5.2				Missing



Raw Data - Planted Woody Stems - All Plots - Moccasin Creek Riparian Buffer Restoration - MY3 (2008)

SCIENTIFIC_NAME	plot	stemSource	stemX	stemY	dgh	Height	DBH	stemHealth
Liriodendron tulipifera var. tulipifera	B2	R	1.4	1.4				Missing
Liriodendron tulipifera var. tulipifera	B2	R	4.5	7.5				Missing
Liriodendron tulipifera var. tulipifera	B2	R	7.4	7.0				Missing
Liriodendron tulipifera var. tulipifera	B2	R	9.2	6.7				Missing
Liriodendron tulipifera var. tulipifera	B2	R	5.9	10.0				Missing
Liriodendron tulipifera var. tulipifera	B2	R	4.9	4.3				Missing
Fraxinus pennsylvanica	B2		1.6	7.7	38	177	0.7	4
Fraxinus pennsylvanica	B2		2.9	9.9	23	150	0.5	4
Taxodium distichum	B2		9.8	0.4	23	130		4
Fraxinus pennsylvanica	B2		3.3	4.8	25	187	0.8	4
Fraxinus pennsylvanica	B2		1.4	5.2	36	177	0.8	4
Taxodium distichum	B2		1.4	1.4	15	115		4
Fraxinus pennsylvanica	B2		4.5	7.5	46	183	0.9	4
Fraxinus pennsylvanica	B2		7.4	7.0	25	115		4
Fraxinus pennsylvanica	B2		9.2	6.7	37	162	0.7	4
Fraxinus pennsylvanica	B2		5.9	10.0	14	80		4
Fraxinus pennsylvanica	B2		4.9	4.3	32	157	0.7	4
Taxodium distichum	B2		8.5	9.3	7	29		4
<b>Plot B3</b>								
Fraxinus pennsylvanica	B3	R	0.2	0.1	27	142	0.4	4
Taxodium distichum	B3	R	2.8	0.2	35	155	0.4	4
Taxodium distichum	B3	R	8.2	0.8	49	158	0.8	4
Taxodium distichum	B3	R	7.7	0.5	54	177	1.1	4
Taxodium distichum	B3	R	9.8	0.9	43	195	1	4
Fraxinus pennsylvanica	B3	R	8.8	3.9	11	104		4
Taxodium distichum	B3	R	6.2	3.6	53	178	1	4
Taxodium distichum	B3	R	8.0	6.5	41	168	0.8	4
Taxodium distichum	B3	R	7.3	9.8	39	171	0.6	4
Taxodium distichum	B3	R	9.6	9.3	47	205	1.1	4
Fraxinus pennsylvanica	B3	R	5.2	9.6	13	114		4
Taxodium distichum	B3	R	5.8	6.6	32	150	0.2	4
Taxodium distichum	B3	R	3.2	6.6	54	178	0.8	4
Fraxinus pennsylvanica	B3	R	2.3	9.4	23	122		4
Taxodium distichum	B3	R	0.4	7.0	44	189	0.8	4
Fraxinus pennsylvanica	B3	R	1.2	3.4	13	144	0.7	4
Fraxinus pennsylvanica	B3	R	3.7	4.0	32	142	0.4	4

## Raw Data - Planted Woody Stems - All Plots - Moccasin Creek Riparian Buffer Restoration - MY3 (2008)

SCIENTIFIC_NAME	plot	stemSource	stemX	stemY	dgh	Height	DBH	stemHealth
<b>Plot B4</b>								
Taxodium distichum	B4	R	0.4	0.3	20	142	0.3	4
Fraxinus pennsylvanica	B4	R	3.0	0.2	15	102		4
Taxodium distichum	B4	R	5.2	0.3	42	183	1.1	4
Taxodium distichum	B4	R	7.5	1.0	44	201	1.3	4
Fraxinus pennsylvanica	B4	R	14.9	0.3	19	134		4
Fraxinus pennsylvanica	B4	R	17.0	0.2		232	1.4	4
Taxodium distichum	B4	R	19.4	0.1	122	176	0.5	4
Fraxinus pennsylvanica	B4	R	17.8	3.5				Missing
Fraxinus pennsylvanica	B4	R	15.5	3.3	22	151	0.6	4
Fraxinus pennsylvanica	B4	R	13.2	3.5	6	37		4
Fraxinus pennsylvanica	B4	R	10.1	3.5				Missing
Fraxinus pennsylvanica	B4	R	7.5	3.3				Missing
Fraxinus pennsylvanica	B4	R	5.6	3.2	14	83		4
Fraxinus pennsylvanica	B4	R	2.6	2.4	9	92		4
Fraxinus pennsylvanica	B4	R	0.1	3.3				Missing
Taxodium distichum	B4		10.0	0.8	30	165	0.3	4
<b>Plot C1</b>								
Liriodendron tulipifera	C1	R	3.3	1.0				Missing
Liriodendron tulipifera	C1	R	5.2	0.9				Missing
Liriodendron tulipifera	C1	R	7.4	0.9				0
Liriodendron tulipifera	C1	R	9.2	0.7				Missing
Liriodendron tulipifera	C1	R	8.3	3.6				Missing
Liriodendron tulipifera	C1	R	6.6	3.5	3	23		4
Liriodendron tulipifera	C1	R	3.8	5.1				Missing
Liriodendron tulipifera	C1	R	2.9	3.9				0
Liriodendron tulipifera	C1	R	0.9	4.0				Missing
Liriodendron tulipifera	C1	R	1.0	0.8				Missing
Platanus occidentalis	C1	R	2.4	6.6				Missing
Platanus occidentalis	C1	R	4.1	6.8	7	85		4
Platanus occidentalis	C1	R	6.0	6.8		245	1.4	4
Platanus occidentalis	C1	R	8.5	6.4		242	1.7	4
Liriodendron tulipifera	C1	R	9.8	6.2				Missing
Liriodendron tulipifera	C1	R	9.5	9.6	9	76		4
Liriodendron tulipifera	C1	R	7.4	9.4	19	118		4
Liriodendron tulipifera	C1	R	6.0	9.5	13	101		4



Raw Data - Planted Woody Stems - All Plots - Moccasin Creek Riparian Buffer Restoration - MY3 (2008)

SCIENTIFIC_NAME	plot	stemSource	stemX	stemY	dgh	Height	DBH	stemHealth
Liriodendron tulipifera	C1	R	4.0	9.4	2	16		4
Liriodendron tulipifera	C1	R	2.0	9.4				Missing
Liriodendron tulipifera	C1	R	0.4	9.5		8		4
Fraxinus pennsylvanica	C1		3.3	1.0	25	78		4
Fraxinus pennsylvanica	C1		9.2	0.7	18	130		4
Fraxinus pennsylvanica	C1		8.3	3.6	21	90		4
Fraxinus pennsylvanica	C1		0.9	4.0	7	70		4
Fraxinus pennsylvanica	C1		1.0	0.8	17	100		4
Fraxinus pennsylvanica	C1		2.4	6.6	9	62		4
<b>Plot C2</b>								
Liriodendron tulipifera var. tulipifera	C2	R	2.2	0.2				Missing
Liriodendron tulipifera var. tulipifera	C2	R	1.7	4.0				Missing
Fraxinus pennsylvanica	C2	R	1.1	9.0				Missing
Liriodendron tulipifera var. tulipifera	C2	R	4.5	0.5				Missing
Fraxinus pennsylvanica	C2	R	4.3	4.4	18	130		4
Liriodendron tulipifera var. tulipifera	C2	R	6.8	7.7				Missing
Liriodendron tulipifera var. tulipifera	C2	R	7.5	4.4	15	115		4
Liriodendron tulipifera var. tulipifera	C2	R	7.1	0.8				Missing
Liriodendron tulipifera var. tulipifera	C2	R	9.6	0.7				Missing
Liriodendron tulipifera var. tulipifera	C2	R	9.9	4.2				Missing
Taxodium distichum	C2	R	9.3	7.7	65	215	2.2	4
Liriodendron tulipifera var. tulipifera	C2	R	3.8	7.2				Missing
Fraxinus pennsylvanica	C2		9.9	4.2	36	212	1.1	4
Fraxinus pennsylvanica	C2		6.8	7.7		257	1.3	4
Fraxinus pennsylvanica	C2		3.8	7.2		275	2.9	4
Fraxinus pennsylvanica	C2		0.8	2.7		270	2.5	4
Fraxinus pennsylvanica	C2		1.2	6.7		284	2.2	4
Fraxinus pennsylvanica	C2		1.6	6.8		235	1.6	4
Fraxinus pennsylvanica	C2		3.6	3.8		255	1.5	4
Fraxinus pennsylvanica	C2		5.8	4.3				0
Fraxinus pennsylvanica	C2		7.8	1.7		275		4
<b>Plot C3</b>								
Taxodium distichum	C3	R	1.1	0.5	72	210	1.4	4
Taxodium distichum	C3	R	2.1	3.6	74	232	2.2	4
Taxodium distichum	C3	R	4.6	3.8		245	2.7	4
Fraxinus pennsylvanica	C3	R	6.3	0.4				Missing

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SCIENTIFIC_NAME	plot	stemSource	stemX	stemY	dgh	Height	DBH	stemHealth
Fraxinus pennsylvanica	C3	R	7.0	4.3				Missing
Fraxinus pennsylvanica	C3	R	9.1	3.9	20	117		4
Taxodium distichum	C3	R	9.8	6.7	61	215	1.7	4
Taxodium distichum	C3	R	9.1	9.8		304	3.6	4
Taxodium distichum	C3	R	6.9	9.8		289	1.3	4
Taxodium distichum	C3	R	5.6	6.5	54	204	1.4	4
Taxodium distichum	C3	R	3.0	6.3	36	168		4
Taxodium distichum	C3	R	0.5	6.5		242	2.5	4
Taxodium distichum	C3	R	1.0	9.5				Missing
Taxodium distichum	C3	R	3.8	9.8		230	2.1	4
<b>Plot C4</b>								
Nyssa sylvatica	C4	R	0.7	2.4				Missing
Nyssa sylvatica	C4	R	7.4	0.1				Missing
Taxodium distichum	C4	R	2.0	0.3				Missing
Nyssa sylvatica	C4	R	1.2	0.9				Missing
Nyssa sylvatica	C4	R	4.7	2.4	19	124		4
Nyssa sylvatica	C4	R	2.4	4.7				Missing
Nyssa sylvatica	C4	R	6.3	5.1	45	245	1.2	4
Nyssa sylvatica	C4	R	0.9	2.3				Missing
Nyssa sylvatica	C4	R	0.8	6.4				Missing
Nyssa sylvatica	C4	R	2.0	7.3	3	12.5		4
Nyssa sylvatica	C4	R	7.8	6.6	43	205	0.6	4
Nyssa sylvatica	C4	R	2.9	9.9				Missing
Nyssa sylvatica	C4	R	0.4	9.3				Missing
Fraxinus pennsylvanica	C4		9.8	9.9	33	188	1	4
Fraxinus pennsylvanica	C4		7.4	9.3	45	175	0.6	4
Fraxinus pennsylvanica	C4		4.8	10.0	31	200	1	4
Fraxinus pennsylvanica	C4		3.6	7.3	36	172	0.7	4
Fraxinus pennsylvanica	C4		9.8	5.4	37	255	1.2	4
Fraxinus pennsylvanica	C4		9.0	3.7	46	260	1.5	4
Fraxinus pennsylvanica	C4		8.9	3.5	45	185	0.8	4
Fraxinus pennsylvanica	C4		6.7	2.4		365	2.3	4
Fraxinus pennsylvanica	C4		5.8	0.2	29	225	1	4
Fraxinus pennsylvanica	C4		6.3	1.0	32	222	0.9	4



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SCIENTIFIC_NAME	plot	stemSource	stemX	stemY	dgh	Height	DBH	stemHealth
<b>Plot C5</b>								
Liriodendron tulipifera var. tulipifera	C5	R	2.9	0.1		225	1.5	4
Fraxinus pennsylvanica	C5	R	5.6	1.1	24	145	0.6	4
Fraxinus pennsylvanica	C5	R	8.3	2.3	14	112		4
Liriodendron tulipifera var. tulipifera	C5	R	9.1	5.7	25	151	0.7	4
Liriodendron tulipifera var. tulipifera	C5	R	6.5	4.5	27	152	0.5	4
Liriodendron tulipifera var. tulipifera	C5	R	3.9	4.2		235	1.3	4
Taxodium distichum	C5	R	1.0	3.0		268	2.9	4
Taxodium distichum	C5	R	1.6	6.0		188	1.2	4
Taxodium distichum	C5	R	3.6	7.0	31	161	0.5	4
Taxodium distichum	C5	R	6.4	7.8		245	2	4
Taxodium distichum	C5	R	9.3	8.9	32	145	0.3	4
Fraxinus pennsylvanica	C5	R	2.7	9.6	14	98		4
Fraxinus pennsylvanica	C5	R	0.7	8.6	18	135		4
<b>Plot D1</b>								
Fraxinus pennsylvanica	D1	R	4.3	1.0	15	88		4
Liriodendron tulipifera var. tulipifera	D1	R	1.9	1.0	18	71		4
Liriodendron tulipifera var. tulipifera	D1	R	6.3	0.5				Missing
Liriodendron tulipifera var. tulipifera	D1	R	7.7	0.6	28	162	0.6	4
Liriodendron tulipifera var. tulipifera	D1	R	9.7	0.5	27	156	0.4	4
Fraxinus pennsylvanica	D1	R	9.3	2.5				Missing
Fraxinus pennsylvanica	D1	R	7.4	3.0	19	135		4
Fraxinus pennsylvanica	D1	R	5.4	3.2	12	93		4
Fraxinus pennsylvanica	D1	R	3.3	3.5	12	107		4
Fraxinus pennsylvanica	D1	R	1.4	3.8	21	115		4
Liriodendron tulipifera var. tulipifera	D1	R	1.0	6.7				Missing
Liriodendron tulipifera var. tulipifera	D1	R	3.1	6.1	13	86		4
Fraxinus pennsylvanica	D1	R	5.2	5.2	18	156	0.5	4
Fraxinus pennsylvanica	D1	R	6.8	5.7	21	152	0.4	4
Fraxinus pennsylvanica	D1	R	9.4	5.8	24	146	0.3	4
Liriodendron tulipifera var. tulipifera	D1	R	8.2	8.2	29	201	1	4
Platanus occidentalis var. occidentalis	D1	R	6.2	8.4		288	2.4	4
Platanus occidentalis var. occidentalis	D1	R	4.0	8.6	22	155	0.5	4
Liriodendron tulipifera var. tulipifera	D1	R	2.0	8.8	16	95		4
Fraxinus pennsylvanica	D1	R	5.0	1.0	11	63		4

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SCIENTIFIC_NAME	plot	stemSource	stemX	stemY	dgh	Height	DBH	stemHealth
<b>Plot D2</b>								
Taxodium distichum	D2	R	2.2	0.2	7	68		4
Liriodendron tulipifera var. tulipifera	D2	R	9.0	1.4	10	79		4
Liriodendron tulipifera var. tulipifera	D2	R	7.3	1.9	7	65		4
Fraxinus pennsylvanica	D2	R	5.9	2.0	6	33		4
Platanus occidentalis var. occidentalis	D2	R	4.2	2.2	20	195	0.8	4
Platanus occidentalis var. occidentalis	D2	R	2.6	2.4	14	136		4
Platanus occidentalis var. occidentalis	D2	R	0.9	2.8	17	180	0.5	4
Liriodendron tulipifera var. tulipifera	D2	R	1.7	5.6	9	64		4
Liriodendron tulipifera var. tulipifera	D2	R	3.4	5.2	15	97		4
Liriodendron tulipifera var. tulipifera	D2	R	5.4	4.9	13	91		4
Liriodendron tulipifera var. tulipifera	D2	R	7.7	4.9	6	41		4
Liriodendron tulipifera var. tulipifera	D2	R	9.4	4.2	15	109		4
Taxodium distichum	D2	R	7.8	7.1	8	77		4
Taxodium distichum	D2	R	5.6	7.6	11	72		4
Taxodium distichum	D2	R	3.4	7.7	7	42		4
Taxodium distichum	D2	R	1.6	8.6	7	56		4
Liriodendron tulipifera var. tulipifera	D2	R	7.6	9.5	5	60		4
Taxodium distichum	D2	R	9.6	9.1				Missing
Platanus occidentalis var. occidentalis	D2	R	5.3	10.0	5	49		4
<b>Plot D3</b>								
Fraxinus pennsylvanica	D3	R	0.9	0.4	16	121		4
Taxodium distichum	D3	R	2.8	1.9	21	115		4
Liriodendron tulipifera var. tulipifera	D3	R	6.2	1.5	30	155	0.6	4
Liriodendron tulipifera var. tulipifera	D3	R	7.8	1.8				0
Liriodendron tulipifera var. tulipifera	D3	R	9.1	2.9	16	122		4
Platanus occidentalis var. occidentalis	D3	R	8.4	5.3	27	195	1.1	4
Taxodium distichum	D3	R	6.3	4.1				Missing
Liriodendron tulipifera var. tulipifera	D3	R	1.4	4.4	11	82		4
Liriodendron tulipifera var. tulipifera	D3	R	3.3	5.3		310	3.1	4
Liriodendron tulipifera var. tulipifera	D3	R	5.0	6.7	27	193	1	4
Liriodendron tulipifera var. tulipifera	D3	R	1.8	6.9		240	1.6	4
Liriodendron tulipifera var. tulipifera	D3	R	3.4	8.0		265	1.9	4
Liriodendron tulipifera var. tulipifera	D3	R	1.2	9.7	25	205	0.7	2
Liriodendron tulipifera var. tulipifera	D3	R	6.9	9.9				Missing
Liriodendron tulipifera var. tulipifera	D3	R	9.0	8.7	30	179	0.9	4

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SCIENTIFIC_NAME	plot	stemSource	stemX	stemY	dgh	Height	DBH	stemHealth
Liriodendron tulipifera var. tulipifera	D3		4.0	0.2				0
Platanus occidentalis var. occidentalis	D3		0.5	4.8				Missing
Fraxinus pennsylvanica	D3		7.0	9.9	10	68		4
Fraxinus pennsylvanica	D3		6.7	8.0	25	135		4
Fraxinus pennsylvanica	D3		5.5	8.5	13	110		4
<b>Plot D4</b>								
Taxodium distichum	D4	R	0.8	0.5				0
Taxodium distichum	D4	R	3.5	0.6	75	247	3.5	4
Taxodium distichum	D4	R	2.5	4.4		255	2.4	4
Taxodium distichum	D4	R	5.2	4.1	63	225	2.1	4
Taxodium distichum	D4	R	6.4	0.8		279	3.7	4
Taxodium distichum	D4	R	7.3	3.8	67	235	2.2	4
Taxodium distichum	D4	R	9.1	1.6	65	242	2.2	4
Taxodium distichum	D4	R	10.4	4.2	29	151	0.2	4
Taxodium distichum	D4	R	11.7	1.1	31	135		4
Taxodium distichum	D4	R	12.8	4.2				0
Taxodium distichum	D4	R	14.2	1.8				0
Taxodium distichum	D4	R	16.1	4.4	30	153	0.4	4
Taxodium distichum	D4	R	16.8	0.9				0
Taxodium distichum	D4	R	19.2	5.0				Missing
Taxodium distichum	D4	R	19.5	0.9		285	3	4
Fraxinus pennsylvanica	D4		19.5	4.1				Missing





