

**Silas Creek
Stream Restoration
NCEEP Project Number: 00335
Monitoring Year 7
2011 Final Report**

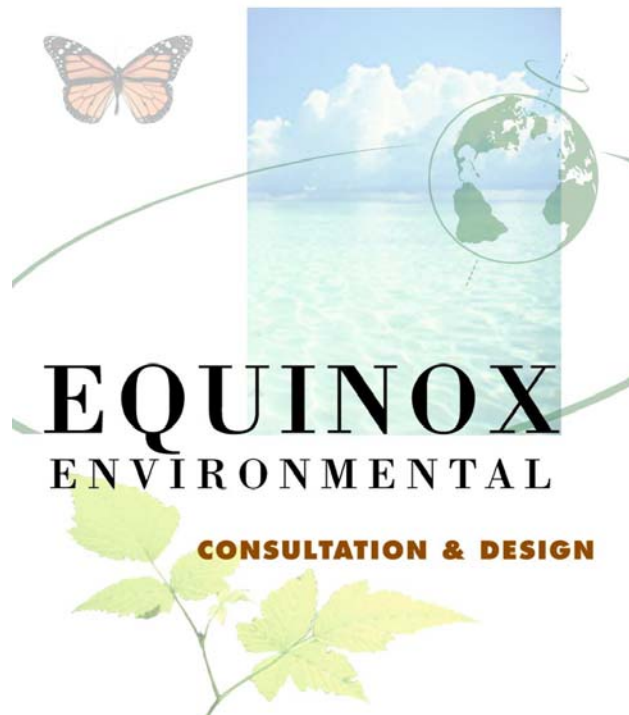


**Submitted to
North Carolina Ecosystem Enhancement Program
North Carolina Department of Environment and Natural Resources
December 2011**



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Silas Creek Stream Restoration 2011 Monitoring Report (MY 7)

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1.0 EXECUTIVE SUMMARY / PROJECT ABSTRACT

The goals and objectives stated in the Silas Creek Mitigation Report (NCEEP 2002) are as follows:

- Restore 4,715 linear feet of channel dimension, pattern, and profile to the extent possible considering project constraints, watershed characteristics, and data from reference reaches in similar watersheds;
- Improve floodplain functionality by matching floodplain elevation with bankfull stage therefore increasing watershed attenuation and reducing peak flows;
- Establish native floodplain vegetation which will allow treatment of diffuse storm flow and nutrient uptake while establishing part of a wildlife corridor in the watershed;
- Improve the natural aesthetics of the stream corridor; and
- Improve the water quality in the Silas Creek watershed by reducing bank erosion, increasing nutrient storage and uptake, and increasing the dissolved oxygen of the system.

The project was monitored from 2004 to 2008 for hydrology, geomorphology, and vegetative success and overall the project reaches have demonstrated morphological stability with 95% of the mainstem and 99% of the tributary respectively, but the invasive plant community has been particularly abundant and aggressive at this site. The extent of invasive climbing vines required treatment to be able to properly assess the vegetation and any supplemental planting needs. Treatment began in 2010 with a follow up treatment in 2011. Given the completion of morphological monitoring in 2008/2009, the monitoring in 2010 and 2011 was limited to vegetation plot data collection. The MY7 vegetation plot data indicate that the project does not meet the established criterion for planted stem density, which is a minimum survival of 260 planted stems per acre at the end of the five-year monitoring period. Examining only those stems assumed to have been planted, the MY7 vegetation plot data indicate that 2 of the 5 plots meet the established MY5 criterion of 260 planted stems per acre with a third at approximately 240 stems per acre. The resulting average stem density for planted stems in MY7 is approximately 197 stems per acre. However, natural woody stem recruitment is high and contributes to a high overall stem density for the site. When planted and natural stems are combined, the average density is 1,006 stems per acre. Although there are locally high densities of sweet gum, the site generally exhibits good diversity with the number of woody species ranging between 6 and 12 per plot and an overall site total of 20 native tree/shrub species.

Problems with woody vegetation in MY7 again consist of damage from climbing, non-native invasive vegetation and some unavoidable collateral effects to non-target species as a result of the treatment that was integrated. However, the size of the native trees is substantial (see vegetation plot photos in Appendix B) and as indicated, the invasives population was comprised predominantly of vine species with Tree of Heaven being the other invasive of consequence. The aforementioned treatments of the invasive plants have been effective in terms of suppressing the vine species and it is expected that the native trees and shrubs will recover and fully dominate over the next 2 growing seasons. To ensure this, EEP is evaluating the site and expects to provide one final invasives treatment and now that the vine species have been removed, identify any areas that may benefit from supplemental planting in 2012.

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation and restoration plan documents available on EEP's website. All raw data supporting tables and figures in the appendices is available from EEP upon request.

2.0 Methodology

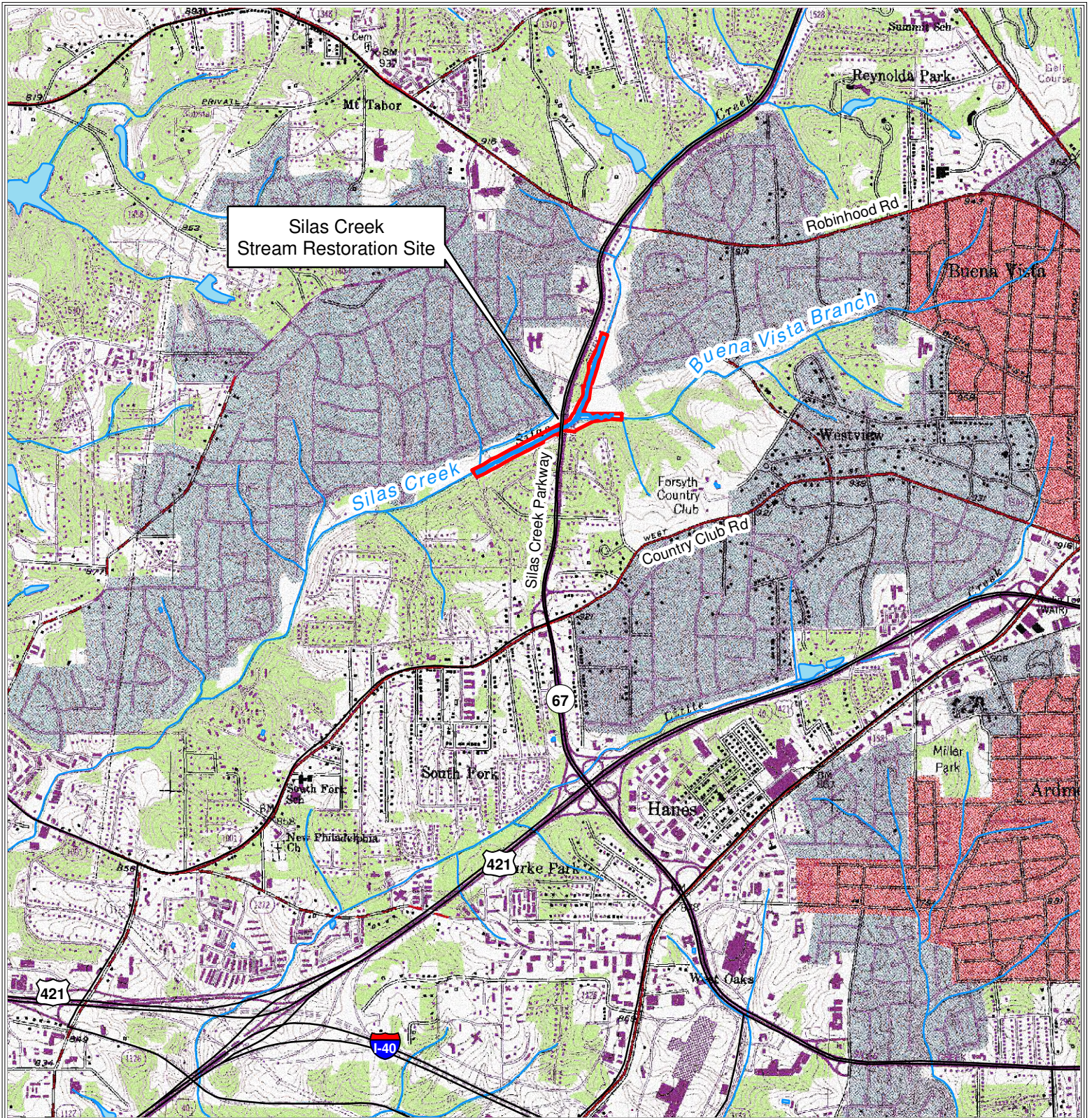
Vegetation monitoring data were collected following the standard CVS-EEP Protocol for Recording Vegetation, Level II (Lee et al. 2008).

3.0 References

Lee, M.T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation. Version 4.2.

NCEEP (North Carolina Ecosystem Enhancement Program). November 2002. Silas Creek Restoration Project Winston-Salem, North Carolina. Mitigation Report. Raleigh, NC.

Appendix A
Project Vicinity Map and Background Tables



Silas Creek Stream Restoration Site

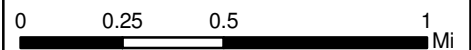


Figure 1 - Vicinity Map

Silas Creek
Stream Restoration Site
Project No. 00335

Forsyth County, North Carolina

Directions: From Raleigh, proceed west on I-40 towards Winston- Salem. Take Exit 188 onto I-40/US421 South towards Winston-Salem. Take the Silas Creek Parkway/NC-67 west exit. The project site is located in Shaffner Park, just north of Country Club Road. Reach 1, Reach 2, and Buena Vista Branch are located east of Silas Creek Parkway. Reach 3 is west of Silas Creek Parkway.



7.5 Minute Series Winston-Salem
Quadrangle

Table 1a. Project Components Silas Creek / Project No. 00335									
Project Component or Reach ID	Existing Feet	Restoration Level	Approach	Footage*	Stationing**	Mitigation Ratio	Mitigation Units	BMP Elements	Comment
Silas Creek - Reach 1	999 lf	EI	P3	999 lf	10+00 - 19+50	1.5	666	N/A	Cut new floodplain, restoration of incised channel
Silas Creek - Reach 2	897 lf	EI	P3	897 lf	19+50 - 29+50	1.5	598	N/A	Cut new floodplain, restoration of incised channel
Silas Creek - Reach 3	1,771 lf	EI	P3	1,771 lf	29+50 - 49+00	1.5	1,181	N/A	Cut new floodplain, restoration of incised channel
Buena Vista Branch	782 lf	R	P2 & P3	782 lf	10+00 - 19+00	1.0	782	N/A	Change dimension, pattern, and profile

N/A - Item does not apply.

*Linear footage is derived from October 2003 As-Built survey.

**Stationing is derived from the 2003 As-Built Plan/Monitoring Plan View Sheets

R = Restoration

EI = Enhancement

P2 = Priority 2

P3 = Priority 3

Table 1b. Component Summations Silas Creek / Project No. 00335							
Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	782						
Enhancement							
Enhancement I	3,667						
Enhancement II							
Creation							
Preservation							
HQ Preservation							
		0	0				
Totals	4,449	0.0		0.0	0.0	0.0	BMP Count
MU Totals	3,227	0.0		0.0	0.0	0.0	0

Non-Applicable

- Item unknown.

**Table 2. Project Activity and Reporting History
Silas Creek / Project No. 00335**

Elapsed Time Since Grading Complete: 8 yrs 6 months

Elapsed Time Since Planting Complete: 8 yrs 3 months

Number of Reporting Years: 7

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Restoration Plan	-	-
Final Design - Construction Plans	-	-
Construction	N/A	Fall 2003
Live Stakes and Bare Root Trees Planted	N/A	Jan-04
Mitigation Plan / As-built (Year 0 Monitoring - Baseline)	Fall 2003	Fall 2003
Year 1 Monitoring	Oct-04	Feb-05
Year 2 Monitoring	Sep-05	Apr-06
Year 3 Monitoring	Oct-06	Dec-06
Year 4 Monitoring	Aug-07	Sep-07
Year 5 Monitoring	Apr-09	Jun-09
Year 6 Monitoring	Sep-10	Apr-11
Year 7 Monitoring	Sep-11	Dec-11

- Information unavailable.

N/A - Item does not apply.

Table 3. Project Contacts Silas Creek / Project No. 00335	
Designer Primary Project Design POC	Buck Engineering / Michael Baker Corp. 1152 Executive Circle, Suite 100 Cary, NC 27511 Will Harmon 919-463-5488
Construction Contractor Construction Contractor POC	North State Environmental 2889 Lowery Street Winston-Salem, NC 27101 Darryl Westmoreland 336-725-2010
Survey Contractor Survey Contractor POC	Unknown Unknown
Planting Contractor Planting Contractor POC	North State Environmental 2889 Lowery Street Winston-Salem, NC 27101 Darryl Westmoreland 336-725-2010
Seeding Contractor Planting Contractor POC	Unknown Unknown
Seed Mix Sources	Unknown
Nursery Stock Suppliers	Unknown
Monitoring Performers (Y1) - 2004	Buck Engineering / Michael Baker Corp. 1152 Executive Circle, Suite 100 Cary, NC 27511
Stream Monitoring POC	Will Harmon 919-463-5488
Vegetation Monitoring POC	
Monitoring Performers (Y2) - 2005	EcoLogic Associates, P.C. 4321-A South Elm-Eugene Street Greensboro, NC 27406
Stream Monitoring POC	Kyle Hoover 336-355-1108
Vegetation Monitoring POC	Moni Bates 336-355-1108
Monitoring Performers (Y3) - 2006	URS Corporation – North Carolina 1600 Perimeter Park Drive, Suite 400 Morrisville, NC 27560
Stream Monitoring POC	Kathleen McKeithan 919-461-1597
Vegetation Monitoring POC	
Monitoring Performers (Y4) - 2007	URS Corporation – North Carolina 1600 Perimeter Park Drive, Suite 400 Morrisville, NC 27560
Stream Monitoring POC	Kathleen McKeithan 919-461-1597
Vegetation Monitoring POC	
Monitoring Performers (Y5) - 2008	URS Corporation – North Carolina 1600 Perimeter Park Drive, Suite 400 Morrisville, NC 27560
Stream Monitoring POC	Kathleen McKeithan 919-461-1597
Vegetation Monitoring POC	
Monitoring Performers (Y6) - 2010	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Vegetation Monitoring POC	Win Taylor (828) 253-6856
Monitoring Performers (Y7) - 2011	Equinox Environmental Consultation & Design, Inc. 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Vegetation Monitoring POC	Win Taylor (828) 253-6856

Unknown - Information was unknown at time of report submittal.

Table 4. Project Attributes		
Silas Creek / Project No. 00335		
Project County	Forsyth	
Physiographic Region	Piedmont	
Ecoregion	Northern Inner Piedmont (45b)	
Project River Basin	Yadkin	
USGS HUC for Project (14 digit)	3040101170040	
NCDWQ Sub-Basin for Project	03-07-04	
Within Extent of EEP Watershed Plan	Yadkin-Pee Dee River Basin Watershed Restoration Plan	
WRC Class (Warm, Cool, Cold)	Warm	
% of Project Easement Fenced or Demarcated	0%	
Beaver Activity Observed During Design Phase	-	
Restoration Component Attributes		
	Silas Creek	Buena Vista Branch
Drainage Area (sq.mi.)	7.2	1.4
Stream Order	Third	First
Restored Length (feet)	3,667	782
Perennial or Intermittent	Perennial	Perennial
Watershed Type	Urban	
Watershed LULC Distribution	-	-
Watershed Impervious Cover	>25%	
NCDWQ AU / Index Number	12-94-10	
NCDWQ Classification	C	
303d Listed	No	
Upstream of 303d Listed Segment	No	
Reasons for 303d Listing or Stressor	N/A	
Total Acreage of Easement	15.29	
Total Vegetated Acreage within Easement	-	
Total Planted Acreage as Part of Restoration	-	
Rosgen Classification of Pre-Existing	B4c	E4
Rosgen Classification of As-Built	B4c	E4
Valley Type	-	-
Valley Slope	-	-
Valley Side Slope Range	-	-
Valley Toe Slope Range	-	-
Cowardin Classification	N/A	
Trout Waters Designation	No	
Species of Concern, Endangered, Etc.	No	
Dominant Soil Series and Characteristics		
Series	Wehadkee, Chewacla, Urban land	
Depth	-	
Clay%	-	
K	-	
T	-	

- Information unavailable.

N/A - Item does not apply.

Appendix B

Vegetation Plot Data

Figure 2. Vegetation Plot Current Condition Plan View



Legend

- - - Easement Boundary
- - - Stream Reach

Vegetation Plots

- Criteria Met
- Criteria Not Met


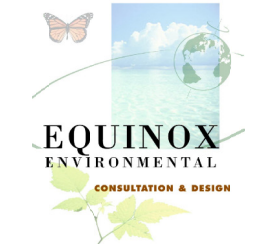
Prepared for	Project: Silas Creek	Notes: 1) Base Map Data Provided by NCEEP	Prepared by
	Year 7 Monitoring Forsyth County, North Carolina	2) 2010 Aerial Photo 3) Locations & orientation depicted for vegetation plots are approximate.	
	Sheet 1 of 1		
	Date	Project Number	
	November 2011	NCEEP # 00335	

Table 5. CVS Vegetation Plot Metadata Silas Creek / Project No. 00335	
Report Prepared By	William O Carson
Date Prepared	10/28/2011 11:37
Database Name	Equinox-2011-A-SilasCk-MY7.mdb
Database Location	Z:\ES\NRI&M\EEP Monitoring\Silas Creek\SC-MY7-2011\Data\Veg
Computer Name	D16TNK71
File Size	38289408
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, Planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, Total Stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and Spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY-----	
Project Code	335
Project Name	Silas Creek
Description	Stream Restoration
River Basin	Yadkin
Length(ft)	
Stream-to-Edge Width (ft)	
Area (sq m)	
Required Plots (calculated)	
Sampled Plots	5

Table 6. Planted and Total Stem Counts (Species by Plot with Annual Means)																													
Silas Creek / Project No. 00335																													
Scientific Name	Common Name	Species Type	Current Plot Data (MY7 2011)															Annual Means											
			E335-01-0003			E335-01-0006			E335-01-0008			E335-01-0010			E335-01-0014			MY7 (2011)			MY6 (2010)			MY5 (2008)			MY4 (2007)		
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer	Maple																												
Acer floridanum	Southern sugar maple	Tree																											
Acer negundo	Boxelder	Tree																											
Alnus serulata	Hazel alder	Shrub Tree	1	1	1																								
Asimina triloba	Pawpaw	Shrub Tree																											
Betula nigra	River birch	Tree																											
Carya	Hickory sp.	Tree																											
Carya alba	Mockernut hickory	Tree																											
Carya ovata	Shagbark hickory	Tree																											
Cercis canadensis	Eastern redbud	Shrub Tree																											
Comus amomum	Silky dogwood	Shrub																											
Fraxinus pennsylvanica	Green ash	Tree																											
Juglans nigra	Black walnut	Tree																											
Juniperus virginiana var. virginiana	Eastern redcedar	Tree																											
Lindera benzoin	Northern spicebush	Shrub Tree																											
Liquidambar styraciflua	Sweetgum	Tree																											
Liriodendron tulipifera	Tuliptree	Tree																											
Morella cerifera	Wax myrtle	Shrub Tree																											
Myrica	Sweetgale	Shrub																											
Nyssa sylvatica	Blackgum	Tree																											
Ostrya virginiana	Hophornbeam	Shrub Tree																											
Platanus occidentalis var. occidentalis	Sycamore, Plane-tree	Tree	3	3	3	2	2	2	5	5	5	2	2	5	2	2	2	14	14	17	14	14	14	16	17	17	17		
Prunus	Plum	Shrub Tree																											
Prunus serotina var. serotina	Black cherry	Shrub Tree																											
Quercus alba	White oak	Tree																											
Quercus phellos	Willow oak	Tree																											
Rhus copallinum var. copallinum	Flameleaf sumac	Shrub Tree																											
Rhus glabra	Smooth sumac	Shrub Tree																											
Sambucus canadensis	Common elderberry	Shrub Tree																											
	Stem count		4	4	56	3	3	56	9	9	13	12	12	22	6	6	27	34	34	174	40	40	175.1	71	71	71	4		
	size (ares)		1			1			1			1			1			7			7			7			1		
	size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.17			0.17			0.17			0.02		
	Species count		2	2	6	2	2	10	4	4	6	3	3	7	4	4	12	8	8	20	9	9	21	12	12	12	2		
	Stems per ACRE		161.9	161.9	2266	121.4	121.4	2266	364.2	364.2	526.1	485.6	485.6	890.3	242.8	242.8	1093	196.6	196.6	1006	231.2	231.2	1012	410.5	410.5	410.5	161.9		



Vegetation Monitoring Plot 3
Monitoring Year 7 – September 22, 2011



Vegetation Monitoring Plot 6
Monitoring Year 7 – September 22, 2011



Vegetation Monitoring Plot 8
Monitoring Year 7 – September 21, 2011



Vegetation Monitoring Plot 10
Monitoring Year 7 – September 22, 2011



Vegetation Monitoring Plot 14
Monitoring Year 7 – September 22, 2011