Freedom Park (Little Sugar Creek) Monitoring Report Year 6 (2010)

Mecklenburg County, North Carolina

USGS HUC: 03050103

Project ID No. 141

Prepared for:

NCDENR-Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, North Carolina 27699-1652

Submitted November 2010
Revised March 2011

Executive Summary

The Freedom Park Stream Restoration project falls within USGS hydrologic unit **03050103**. The project stream lies within an urban setting of the City of Charlotte that is comprised predominantly of residential and commercial uses. Prior to restoration work, the project stream (Little Sugar Creek) had been destabilized through historic channelization and dredging. Also, prior to restoration work, the channel consisted of a concrete lining.

HDR Engineering designed the restoration plans and restoration was completed in 2003. Baker Engineering prepared maintenance plans and Fluvial Solutions completed the maintenance construction in early 2008. The maintenance was in response to some areas of localized instability that had developed in this large, flashy, urban system. KHA had previously completed 5 years worth of geomorphic monitoring that is documented in the 2009 monitoring report and, other than these localized areas of instability, the documented data indicated general stability of the channel. Floodplain vegetation is generally performing well, but streambank vegetation has had difficulty establishing in some areas of prior scour (~6% of the channel banks), although vegetation is continuing to advance. The maintenance also included supplemental planting in the winter/spring 2008-2009 with some additional supplements of woody stems and live stakes scheduled for winter 2010/2011 in order to address several remaining pockets of low stem density. During the late growing season of 2010, KHA assessed six (6) vegetation plots for the Year 6 monitoring. The mean planted stem density equaled 479 stems per acre, exceeding the success criteria. Steel bollards with signage were cemented into the ground to demarcate the easement boundary and support long term stewardship. The project is planned to be offered for regulatory closure in fall 2011.

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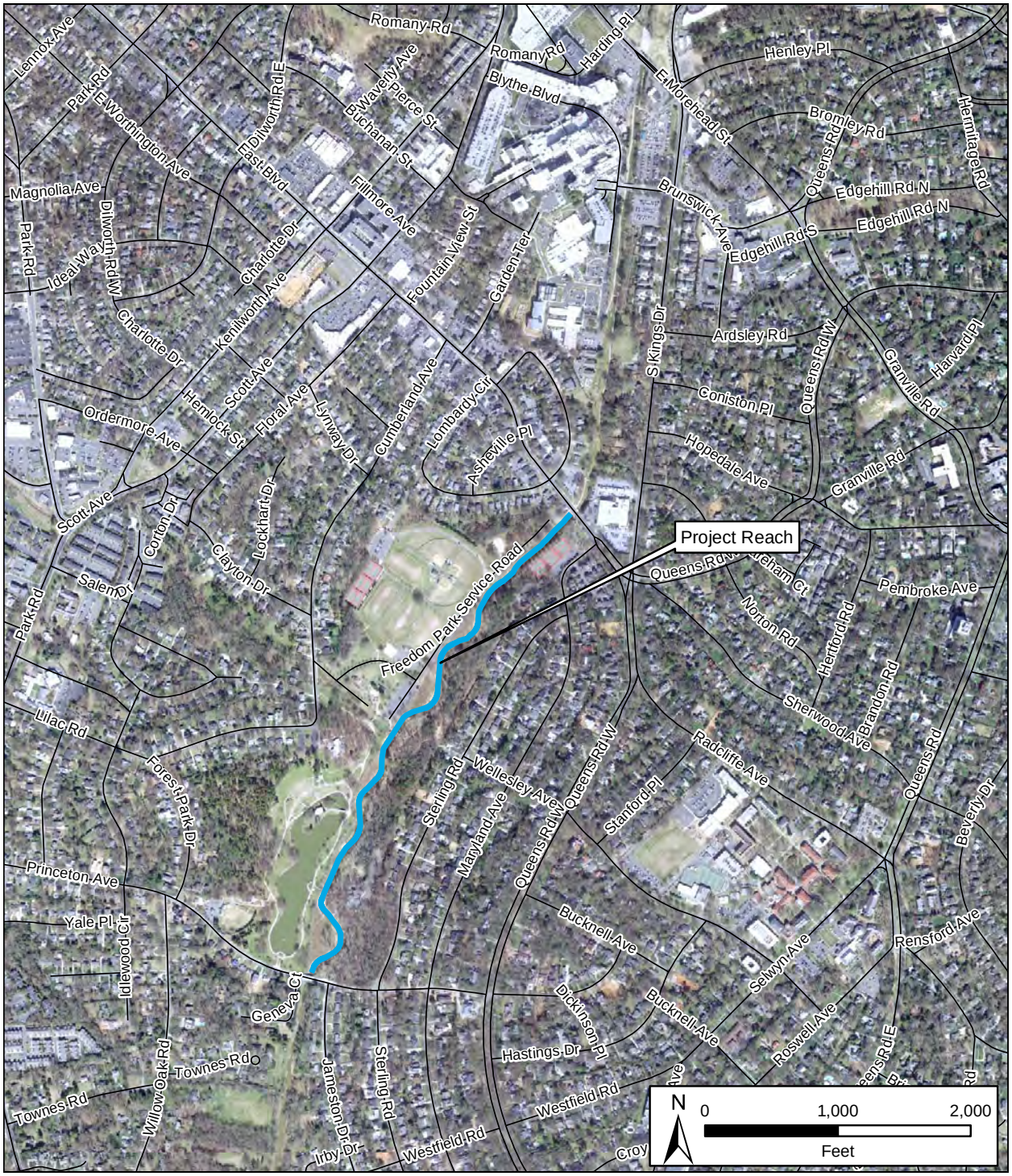

Title	Project Setting

Prepared For:	**Project**	Freedom Park (Little Sugar Creek) Stream Restoration Monitoring Year 6 – 2010 Mecklenburg County, North Carolina	
Ecosystem Enhancement Program	**Date**	**Project Number**	**Figure**
	11/15/10	141	1

Kimley-Horn and Associates, Inc.

Title	Current Conditions Plan View Upper (2007 Aerial)		
Prepared For: Ecosystem Enhancement Program	**Project**	Freedom Park (Little Sugar Creek) Stream Restoration Monitoring Year 6 – 2010 Mecklenburg County, North Carolina	
	Date	**Project Number**	**Figure**
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Kimley-Horn and Associates, Inc.

Title	Current Conditions Plan View Middle (2007 Aerial)		
Prepared For: Ecosystem Enhancement Program	**Project**	Freedom Park (Little Sugar Creek) Stream Restoration Monitoring Year 6 – 2010 Mecklenburg County, North Carolina	
	Date	**Project Number**	**Figure**
	11/15/10	141	3

Kimley-Horn and Associates, Inc.

Title	Current Conditions Plan View Lower (2007 Aerial)		
Prepared For: Ecosystem Enhancement Program	**Project**	Freedom Park (Little Sugar Creek) Stream Restoration Monitoring Year 6 – 2010 Mecklenburg County, North Carolina	
	Date	**Project Number**	**Figure**
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PROJECT TABLES

Table I. Project Restoration Components Little Sugar Creek Stream Restoration Site (EEP Project #141)											
Project Segment or Reach ID	**Existing Feet / Acres**	**Type**	**Approach**	**Footage or Acreage**		**Mitigation Ratio**	**Mitigation Units**	**Stationing**			**Comment**
Main	4,200	R	P2 / P3	4,425	lf	1:1	4,425	0+00.0	-	44+50.0	
Mitigation Unit Summaries											
Stream (lf)	**Riparian Wetland (Ac.)**		**Non-Riparian Wetland (Ac.)**			**Total Wetland (Ac.)**		**Buffer (Ac.)**			**Comment**
4,425	- -		- -			- -		- -			

R = Restoration
EI = Enhancement
EII = Enhancement
S = Stabilization

P1 = Priority I
P2 = Priority II
P3 = Priority III
SS = Stream Bank stabilization

Table II. Project Activity and Reporting History Little Sugar Creek Stream Restoration Site (EEP Project #141)				
Activity or Report	**Scheduled Completion**	**Data Collection Complete**	**Actual Completion or Delivery**	**Comments**
Restoration Plan			Oct-02	
Final Design – 90%				
Construction	2003		Sept-03	
Temporary S&E mix applied to entire project area	2003		Sept-03	
Permanent seed mix applied	2003		Sept-03	
Containerized and B&B plantings for reach/segments 1&2	2004		June-04	
Mitigation Plan / As-built (Year 0 Monitoring –	2004		Spring 04	Performed by NCSU
Year 1 monitoring	2005	Oct-05	Nov-05	Performed by SEC, PA
Year 2 Monitoring	2006	Oct-06	Jan-07	Performed by KHA, Inc.
Year 3 Monitoring	2007	Nov-07	Feb-08	Performed by KHA, Inc.
Repair	2008		Winter-08	Plans prepared Baker Engineer, Construction performed by Fluvial Solutions
Year 4 Monitoring	2008	Oct-08	May-09	Performed by KHA, Inc.
Year 5 Monitoring	2009	Sept-09	November-09	Performed by KHA, Inc.
Year 6 Monitoring	2010	Sept-10	November-10	Performed by KHA, Inc.

Table III. Project Contact Table Little Sugar Creek Stream Restoration Site (EEP Project #141)		
Designer	128 South Tryon St., Suite 1400	
HDR Engineering, Inc. of the Carolinas	Charlotte, NC 28202	
Primary Designer POC		
Construction Contractor	5100 North I-85, Suite 7	
SEI Environmental	Charlotte, NC 28206	
Primary Contractor POC		
Planting Contractor		
Planting contractor POC		
Seeding Contractor		
Planting contractor POC		
Seed Mix Sources		
Nursery Stock Suppliers		
Monitoring Performers	PO Box 33068	
Kimley-Horn and Associates	Raleigh, NC 27636	
Stream Monitoring POC	Daren Pait	(919) 677-2000
Vegetation Monitoring POC	Daren Pait	(919) 677-2000

Table IV. Project Background Table Little Sugar Creek Stream Restoration Site (EEP Project #141)	
Project County	Mecklenburg
Drainage Area	13.6 square miles
Drainage impervious cover estimate (%)	75%
Stream Order	3
Physiographic Region	Piedmont
Ecoregion	Charlotte Belt
Rosgen Classification of As-built	C4
Cowardin Classification	N/A
Dominant soil types	Cecil, Monacan
Reference site ID	N/A
USGS HUC for Project and Reference	03050103
NCDWQ Sub-basin for Project and Reference	03-08-34
NCDWQ classification for Project and Reference	C
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor	No
% of project easement fenced	0%

APPENDIX A
VEGETATION MONITORING DATA

Table I. Vegetative Metadata
Little Sugar Creek Stream Restoration Site (EEP Project #141)

Report Prepared By	Joshua Allen
Date Prepared	11/9/2010 12:04
database name	141_Freedom Park.mdb
database location	K:\RAL_Environmental\011795 Freedom Park Monitoring FPARK\FPARK VEGETATION
computer name	DD83075
file size	62599168
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.
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	141
project Name	Freedom Park
Description	Riparian Buffer Restoration
River Basin	
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	0

Table II. Vegetation Vigor by Species

Little Sugar Creek Stream Restoration Site (EEP Project #141)

	Species	4	3	2	1	0	Missing
	Alnus serrulata			1			
	Betula nigra	13	2				
	Cornus amomum	5	2				
	Fraxinus pennsylvanica	8		1			
	Quercus falcata	2					1
	Quercus michauxii	1					
	Quercus phellos	3					
	Salix nigra	4	4	1			1
	Sambucus canadensis			6			
	Morus rubra	4					
	Platanus occidentalis	3			1		
	Populus deltoides	3					2
	Acer rubrum			1			
	Unknown	6					
TOT:	14	52	8	10	1		4

Table III. Vegetation Damage by Species
Little Sugar Creek Stream Restoration Site (EEP Project #141)

	Species	All Damage Categories	(no damage)	Diseased	Flood
	Acer rubrum	1	1		
	Alnus serrulata	1			1
	Betula nigra	15	15		
	Cornus amomum	7	7		
	Fraxinus pennsylvanica	9	9		
	Morus rubra	4	4		
	Platanus occidentalis	4	3	1	
	Populus deltoides	5	5		
	Quercus falcata	3	3		
	Quercus michauxii	1	1		
	Quercus phellos	3	3		
	Salix nigra	10	5		5
	Sambucus canadensis	6	6		
	Unknown	6	6		
TOT:	14	75	68	1	6

Table IV. Vegetation Damage by Plot
Little Sugar Creek Stream Restoration Site (EEP Project #141)

	plot	All Damage Categories	(no damage)	Diseased	Flood
	141-01-0001-year:4	6	6		
	141-01-0002-year:4	23	17		6
	141-01-0003-year:4	18	18		
	141-01-0004-year:4	11	11		
	141-01-0005-year:4	15	15		
	141-01-0006-year:4	2	1	1	
TOT:	6	75	68	1	6

Table V. Stem Count by Plot and Species
Little Sugar Creek Stream Restoration Site (EEP Project #141)

	Species	Total Planted Stems	# plots	avg# stems	plot 141-01-0001-year:4	plot 141-01-0002-year:4	plot 141-01-0003-year:4	plot 141-01-0004-year:4	plot 141-01-0005-year:4	plot 141-01-0006-year:4
	Acer rubrum	1	1	1						1
	Alnus serrulata	1	1	1		1				
	Betula nigra	15	4	3.75	3	4	6		2	
	Cornus amomum	7	1	7		7				
	Fraxinus pennsylvanica	9	2	4.5				7	2	
	Morus rubra	4	2	2			1		3	
	Platanus occidentalis	4	4	1	1		1		1	1
	Populus deltoides	3	1	3		3				
	Quercus falcata	2	2	1				1	1	
	Quercus michauxii	1	1	1			1			
	Quercus phellos	3	3	1	1			1	1	
	Salix nigra	9	3	3	1	6	2			
	Sambucus canadensis	6	1	6			6			
	Unknown	6	3	2			1	1	4	
TOT:	14	71	14		6	21	18	10	14	2

Table VI. Vegetative Problem Areas
Little Sugar Creek Stream Restoration Site (EEP Project #141)

Feature/Issue	Station # / Range	Probable Cause	Photo #
		2010	
Bare Bank	--	--	
Bare Bench	--	--	
Bare Floodplain	--	--	
Invasive/Exotic Populations	--	--	
		2009	
Bare Bank	--	--	
Bare Bench	--	--	
Bare Floodplain	--	--	
Invasive/Exotic Populations	--	--	
		2008	
Bare Bank	520 - 700 (Right Bank)	Excessive bank stresses during yearly flooding events	VP1
	520 - 700 (Left Bank)	Excessive bank stresses during yearly flooding events	
	1,690 - 1,750 (Left Bank)	Excessive bank stresses during yearly flooding events	VP2
	2,030 - 2,110 (Left Bank)	Excessive bank stresses during yearly flooding events	
	2,220 - 2,330 (Right Bank)	Excessive bank stresses during yearly flooding events	
	2,220 - 2,330 (Left Bank)	Excessive bank stresses during yearly flooding events or invasive treatment	
Bare Bench	--	--	
Bare Flood Plain	1,070 - 1,250 (Right Floodplain)	Cleared for staging area for channel maintenance	VP3
	4,000 - 4,250 (Right Floodplain)	Cleared for staging area for channel maintenance	
Invasive/Exotic Populations	--	--	
		2007	
Bare Bank	100 - 350 (Right Bank)	Excessive bank stresses during yearly flooding events	
	400 - 700 (Right Bank)	Excessive bank stresses during yearly flooding events	
	750 - 775 (Right Bank)	Excessive bank stresses during yearly flooding events	
	800 - 850 (Right Bank)	Excessive bank stresses during yearly flooding events	
	930 - 950 (Right Bank)	Excessive bank stresses during yearly flooding events	
	1,690 - 1,750 (Left Bank)	Excessive bank stresses during yearly flooding events or invasive treatment	
	2,070 - 2,130 (Right Bank)	Excessive bank stresses during yearly flooding events or invasive treatment	
	2,250 - 2,600 (Left Bank)	Excessive bank stresses during yearly flooding events	
	2,280 - 2,335 (Right Bank)	Excessive bank stresses during yearly flooding events or invasive treatment	
	2,600 - 2,700 (Left Bank)	Excessive bank stresses during yearly flooding events or invasive treatment	
	3,010 - 3,070 (Left Bank)	Excessive bank stresses during yearly flooding events or invasive treatment	
	3,120 - 3,190 (Right Bank)	Excessive bank stresses during yearly flooding events or invasive treatment	
Bare Bench	--	--	
Bare Flood Plain	1,250 - 1,580 (Left Floodplain)	Cleared area exhibiting sucessional growth including invasives from local sources	
	2,065 - 2,200 (Left Bank)	Excessive bank stresses during yearly flooding events or invasive treatment	
Invasive/Exotic Populations	1,250 - 1,580 (Left Floodplain)	Cleared area exhibiting sucessional growth including invasives from local sources	
		2006	
Bare Bank	410 - 1,140 (Both Banks)	Excessive bank stresses during yearly flooding events	
	1,690 - 1,750 (Left Bank)		
	2,065 - 2,350 (Both Banks)		
Bare Bench	--	--	
Bare Flood Plain	1,250 - 1,580 (Left Floodplain)	Cleared area exhibiting sucessional growth	
Invasive/Exotic Populations	35 - 1,030 (Both Banks)	Local source colonization after bank scour	
	1,240 - 1,860 (Left Bank)		
	1,250 - 1,580 (Left Floodplain)	Cleared area exhibiting sucessional growth including invasives from local sources	
	1,950 - 2,190 (Left Bank)		
	2,210 - 2,380 (Right Bank)		
	2,680 - 3,065 (Left Bank)		
	2,690 - 3,555 (Right Bank)		
	3,555 - 3,790 (Left Bank)		
		2005	
Bare Bank	2,100 - 2,175	Overbank flow / Compacted soils	
	2,560 - 2,735	Overbank flow / Compacted soils	
		2004	
General	2,500 - 2,800	Left bank has poor herbaceous success	
	3,100 - 3,200	Left bank has poor herbaceous success	
	3,400 - 3,500	Right bank has poor herbaceous success	
	3,700 - 4,479	Both banks have poor herbaceous success	
	Throughout	Poor hardwood tree and live stake establishment	

Table VII. Planted and Total Stem Counts
Little Sugar Creek Stream Restoration Site (EEP Project #141)

			Current Plot Data (MY4 2010)																			Annual Means																	
			141-01-0001			141-01-0002			141-01-0003			141-01-0004			141-01-0005			141-01-0006			MY4 (2010)			MY3 (2009)			MY2 (2008)			MY1 (2007)			MY0 (2006)					
Scientific Name	Common Name	Species Type	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T	P-LS	P-all	T			
Acer negundo	boxelder	Tree																												1	22			1	27			
Acer rubrum	red maple	Tree																	1	1		1	1		1	1		1	1		4	5			4	5			
Alnus serrulata	hazel alder	Shrub Tree				1	1	1													1	1	1	1	1	1	1	1	1	1	1	1	1	1	4			
Betula nigra	river birch	Tree		3	3		4	4	6	6	6				2	2	2				8	15	15	8	15	15	8	12	17	8	15	166	8	16	140			
Celtis laevigata	sugarberry	Shrub Tree																																	1			
Cercis canadensis	eastern redbud	Shrub Tree																																	2			
Cornus amomum	silky dogwood	Shrub				7	7	7													7	7	7	7	7	7	7	7	9	7	7	23	7	7	10			
Elaeagnus angustifolia	Russian olive	Shrub																																	1			
Fraxinus pennsylvanica	green ash	Tree											7	7		2	2					9	9		9	9		9	41		16	130		16	122			
Juniperus virginiana	eastern redcedar	Tree																											1									
Lagerstroemia indica	crapemyrtle	Shrub Tree																														1						
Liquidambar styraciflua	sweetgum	Tree																											12			49			22			
Liriodendron tulipifera	tuliptree	Tree																											1					1	1			
Morus rubra	red mulberry	Tree							1	1	1					3	3				1	4	4	1	4	4	1	4	5	1	4	14	1	4	11			
Pinus taeda	loblolly pine	Tree																														1						
Platanus occidentalis	American sycamore	Tree		1	1				1	1	1					1	1		1	1	1	4	4	1	4	4	1	4	6	1	4	6	1	4	5			
Populus deltoides	eastern cottonwood	Tree					3	3														3	3		4	4		5	7		5	16		7	31			
Quercus falcata	southern red oak	Tree											1	1		1	1					2	2		3	3		3	3		3	4		3	3			
Quercus michauxii	swamp chestnut oak	Tree								1	1											1	1		1	1		1	1		5	5		5	6			
Quercus phellos	willow oak	Tree		1	1								1	1		1	1					3	3		3	3		3	3		3	3		3	3			
Robinia pseudoacacia	black locust	Tree																																	2			
Salix nigra	black willow	Tree		1	1	6	6	6	2	2	2										8	9	9	9	10	10	9	9	9	9	10	25	9	10	10			
Sambucus canadensis	Common Elderberry	Shrub Tree							6	6	6										6	6	6	6	6	6	6	6	9	4	4	8	6	6	11			
Unknown		unknown							1	1	1		1	1		4	4				1	6	6	1	6	6	1	6	6		5	9	1	6	11			
		Stem count	0	6	6	14	21	21	17	18	18	0	10	10	2	14	14	0	2	2	33	71	71	34	74	74	34	71	132	31	87	488	34	94	428			
		size (ares)	1			1			1			1			1			1			6			6			6			6			6					
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.15			0.15			0.15			0.15			0.15					
		Species count	0	4	4	3	5	5	6	7	7	0	4	4	1	7	7	0	2	2	8	14	14	8	14	14	8	14	17	7	15	18	8	16	21			
		Stems per ACRE	0	242.811	242.81	566.56	849.84	849.84	687.9656	728.434	728.434	0	404.686	404.686	80.937	566.56	566.56	0	80.937	80.937	222.577	478.88	478.878	229.322	499.112	499.112	229.322	478.878	890.31	209.088	586.794	3291.443	229.3218638	634.0075058	2886.758			

VQ1: Vegetation Quad 1
Taken: 2005

VQ1: Vegetation Quad 1
Taken: 10/19/2006

VQ1: Vegetation Quad 1
Taken: 10/16/2007

VQ1: Vegetation Quad 1
Taken: 11/03/2008

VQ1: Vegetation Quad 1
Taken: 2009

VQ1: Vegetation Quad 1
Taken: 2010

VQ2: Vegetation Quad 2
Taken: 2005

VQ2: Vegetation Quad 2
Taken: 10/19/2006

VQ2: Vegetation Quad 2
Taken: 10/16/2007

VQ2: Vegetation Quad 2
Taken: 11/03/2008

VQ2: Vegetation Quad 2
Taken: 2009

VQ2: Vegetation Quad 2
Taken: 2010

VQ3: Vegetation Quad 3
Taken: 2005

VQ3: Vegetation Quad 3
Taken: 10/19/2006

VQ3: Vegetation Quad 3
Taken: 10/16/2007

VQ3: Vegetation Quad 3
Taken: 11/03/2008

VQ3: Vegetation Quad 3
Taken: 2009

VQ3: Vegetation Quad 3
Taken: 2010

VQ4: Vegetation Quad 4
Taken: 2005

VQ4: Vegetation Quad 4
Taken: 10/19/2006

VQ4: Vegetation Quad 4
Taken: 10/16/2007

VQ4: Vegetation Quad 4
Taken: 11/03/2008

VQ4: Vegetation Quad 4
Taken: 2009

VQ4: Vegetation Quad 4
Taken: 2010

VQ5: Vegetation Quad 5
Taken: 10/19/2006

VQ5: Vegetation Quad 5
Taken: 10/16/2007

VQ5: Vegetation Quad 5
Taken: 11/03/2008

VQ5: Vegetation Quad 5
Taken: 2009

VQ5: Vegetation Quad 5
Taken: 2010

VQ6: Vegetation Quad 6
Taken: 10/19/2006

VQ6: Vegetation Quad 6
Taken: 10/16/2007

VQ6: Vegetation Quad 6
Taken: 11/03/2008

VQ6: Vegetation Quad 6
Taken: 2009

VQ6: Vegetation Quad 6
Taken: 2010