



Vegetation Community Monitoring at Horseshoe Bend National Military Park, 2011

Natural Resource Data Series NPS/SECN/NRDS—2014/704



ON THE COVER

Carolina lily (*Lilium michauxii*) at Horseshoe Bend National Military Park.
Photograph by: Sarah C. Heath, SECN Botanist.

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Executive Summary

In 2009, the National Park Service (NPS) Southeast Coast Network (SECN) Inventory and Monitoring Network began collecting vegetation community data as part of the NPS Vital Signs monitoring program. Information collected under this Vital Sign will be used to help managers make better-informed decisions by understanding trends and variability related to plant species, frequency of occurrence, percent cover, diversity, and distribution in the groundcover, shrub, and canopy strata.

Within each stratum, vegetation communities were sampled using hybrid methods following the North Carolina Vegetation Survey nested-subplot design (Peet et al. 1998) within a circular plot similar to the Forest Inventory and Analysis protocol (Bechtold and Patterson 2005). This report summarizes vegetation community data collected at Horseshoe Bend National Military Park in 2011.

- Data were collected at 21 sampling locations at the Park from 8/2/2011 through 8/18/2011.
- Monitoring efforts resulted in the addition of 19 species, subspecies, or varieties to the Park's species list, including Japanese stiltgrass (*Microstegium vimineum*), an invasive exotic of significant management concern.
- Absolute canopy cover across the Park was approximately 86.49%.
- Muscadine grape (*Vitis rotundifolia*), *Smilax* spp., Virginia creeper (*Parthenocissus quinquefolia*), and cat greenbriar (*Smilax glauca*) were the most frequently occurring species in the groundcover stratum.
- Sweetgum (*Liquidambar styraciflua*) had the highest absolute and relative cover in the shrub stratum, while red maple (*Acer rubrum*) had the second highest absolute and relative cover in the shrub stratum.
- Muscadine grape (*Vitis rotundifolia*) had the highest absolute cover, while common greenbriar (*Smilax rotundifolia*) had the second highest cover cover in the groundcover stratum.
- Sweetgum (*Liquidambar styraciflua*) and red maple (*Acer rubrum*) were the most frequently occurring species in the shrub stratum.
- Leaf litter was the most frequently occurring ground condition at the Park, and also had the highest relative and absolute cover of any ground condition.
- Longleaf pine (*Pinus palustris*) had the largest average diameter at breast height (DBH) of any canopy species at the Park where more than two individuals were measured.
- Blue ridge blueberry (*Vaccinium pallidum*) had the highest estimated seedling density at the Park.

The full dataset, and associated metadata, can be acquired from the data store at <http://irma.nps.gov>

List of Terms

Absolute cover: The total amount of ground surface that is covered by each species or group. This metric describes the amount of cover that each species or group represents in a stratum and is expressed as a percentage that can exceed 100% due to overlap. This metric is calculated as the total cover of each species or group divided by the total possible cover for a plot.

Canopy species: Woody species known to occur in the midstory or overstory of the canopy, or shrub species that grow greater than or equal to four centimeters DBH and are measureable at breast height (1.4 m).

Canopy stratum: The structural zone above 1.1 meters (i.e., elbow height of a typical observer per densiometer instructions), which consists of all live and dead plant material that affects the amount of light penetrating to the ground. This includes individual elements whose cover is also potentially measured and accounted for in the shrub- or groundcover-stratum measurements but exceeds 1.1 meters in height, is detected by the densiometer, and contributes to canopy cover. This stratum can also be referred to as the midstory, overstory, or sub-canopy.

Cover: The vertical projection of the outermost extent of a species, or the extent of the shadow cast by the species if the sun were directly overhead. Cover is also known as foliar cover.

DBH: Diameter at breast height, or 1.4 meters above the ground surface.

Frequency: The number of times a species or group is detected in a plot, expressed as a percentage. This provides information on the regularity with which a species or group is encountered.

Groundcover stratum: The structural zone that consists of all non-woody species (i.e., forbs and graminoids) and all woody species (i.e., shrubs and trees) with a DBH of less than four centimeters and seedlings 30 centimeters or less in height.

Relative cover: The cover of each species or group as a function of all other plant species that occurred in a plot. This metric describes the percentage of cover that each species represents out of the total vegetative cover in a stratum, is expressed as a percentage, and always sums to 100%. Relative cover is calculated as the total cover of each species or group divided by the sum of the cover of all other species that occur in a plot.

Seedlings: Woody dicotyledonous plants less than 30 centimeters in height.

Shrub stratum: All woody species greater than 30 centimeters in height with a DBH of less than four centimeters.

Stratum: A structural size category of vegetation at a site. These are the canopy, shrub, and groundcover layers.

Introduction

Overview

Vegetation communities are the primary drivers of a range of ecological processes and are integral to the proper function of park ecosystems. Moreover, vegetation communities integrate the biological and physical environment. They serve as the foundation for food webs and wildlife habitat for many species, and function as a carbon sink, produce oxygen, cycle nutrients and energy through an ecosystem. Additionally, plants influence the local climate, improve water quality, and moderate flooding and erosion. Determining trends in vegetation communities is vital to understanding the ecological processes occurring at a site and identifying stressors and their impacts.

Vegetation communities are dynamic with constant changes in composition, cover, distribution, and structure in response to natural or anthropogenic stressors. Disturbance is the primary stressor and regulating mechanism of Southeast Coast Network (SECN) vegetation communities. The timing, type, and extent of a disturbance generally evoke a distinguishable response in the species composition, diversity, and structure of the landscape (Foster et al. 1998; Turner et al. 1990). The primary natural disturbance processes in SECN parks are fire and weather (e.g., hurricanes and drought). Anthropogenic influences include fire suppression, landscape fragmentation, altered hydrology, and non-native species introduction.

The SECN parks host a diverse assemblage of vegetation communities. Approximately 180 vegetation associations (i.e., fine-resolution floristic description), as defined by the National Vegetation and Classification System (FGDC 2008), occur in the SECN. These include sparsely vegetated primary dune communities, late successional old-growth bottomland hardwood forest communities, and highly diverse herbaceous-dominated mesic pine savannah communities.

Given the widespread anthropogenic influences in SECN parks and the importance of vegetation communities, quantifying trends in vegetation cover, frequency, diversity, and distribution is a high priority (DeVivo et al. 2008). An evaluation of trends in these metrics provides a measure for assessing the ecological integrity and sustainability in southeastern systems and identifying the need for specific management activities on our park lands. The National Park Service Omnibus Management Act of 1998, and other reinforcing policies and regulations, require park managers “to establish baseline information and to provide information on the long-term trends in the condition of National Park System resources” (Title II, Sec. 204). The vegetation community monitoring data summarized herein is a tool to assist park managers in fulfilling this mandate.

This report summarizes vegetation community Vital Signs monitoring data collected at Horseshoe Bend National Military Park (HOBE) in August, 2011.

Monitoring Objectives

To characterize the effects of landscape and local ecosystem drivers on vegetation communities, the SECN monitors several components of community structure, function, and composition. Each component illustrates community change dynamics, and data from the following five monitoring objectives are presented:

1. Determine trends in plant species richness and diversity in the groundcover, shrub, and canopy strata.
2. Determine trends in the percent cover of vegetation in the groundcover, shrub, and canopy strata.
3. Determine trends in the frequency of species in the groundcover stratum.
4. Determine trends in the diameter at breast height (DBH) of canopy species.
5. Determine trends in woody species seedling counts in the groundcover stratum.

Methods

Study Area

Horseshoe Bend National Military Park consists of 826 hectares (2,040 ac) situated near the southern end of the Piedmont Plateau (Figure 1). It contains low rolling hills, which reach elevations from 183 to 217 meters (600–711 ft) above sea level. Park lands were extensively cultivated from 1832 until the establishment of the Park in 1959, and are in various stages of ecological succession. The land has undergone some minor changes in the intervening 175 years since the battle. In many places, pines have displaced the climax hardwoods that existed in 1814. The vegetation has been altered by human settlement, logging, and by the introduction of non-native species. The timbered lands once used for agriculture have reverted to forests or remained as open fields. The forest type is mesic beech-oak-hickory with some loblolly pine. Drier areas and ridge tops are dominated by loblolly pine, with scattered longleaf pine along the northern third of the Park. The condition of wildlife species was basically unknown upon acquisition of the Park, and was later realized that feral dogs and cats had extirpated many species. Enforcement of resource laws concerning flora and fauna has allowed a diversity of wildlife species to re-establish throughout the Park. The Park not only contains many species of plants endemic to the Piedmont region, but also species associated with the Southeastern and Southern Coastal Plains.

The hydrologic regime of the Tallapoosa River, 5.6 kilometers (3.5 mi) of which are within the HOBE boundary, is dam-controlled upstream of the Park by Alabama Power Company. The release schedule is determined by hydroelectric needs and bears no relationship to natural flows, more resembling a “trickle or torrent” that affects both natural resources and the cultural landscape. The U.S. Fish and Wildlife Service is currently seeking to accelerate reauthorization of the dam in order to negotiate a flow regime less detrimental to river ecology.

HOBE has 453 known vascular plant species, subspecies, and varieties.

Sampling Design

To allow for park-wide inference, the Park’s administrative boundary was used as the sampling frame, in which 30 permanent spatially-balanced random sampling locations were selected for monitoring vegetation, landbird, and vocal anuran communities. Sampling locations were selected using the Reversed Randomized Quadrant-Recursive Raster (RRQRR) algorithm (Figure2; Theobald et al. 2007 as presented in Byrne et al. 2013). All sampling locations occur within naturally-vegetated areas suitable for co-located Vital Signs monitoring efforts (Byrne et al. 2013).

Vegetation communities were monitored at HOBE from 8/2/2011 through 8/18/2011.

Horseshoe Bend National Military Park

Southeast Coast Network
National Park Service
U.S. Department of the Interior

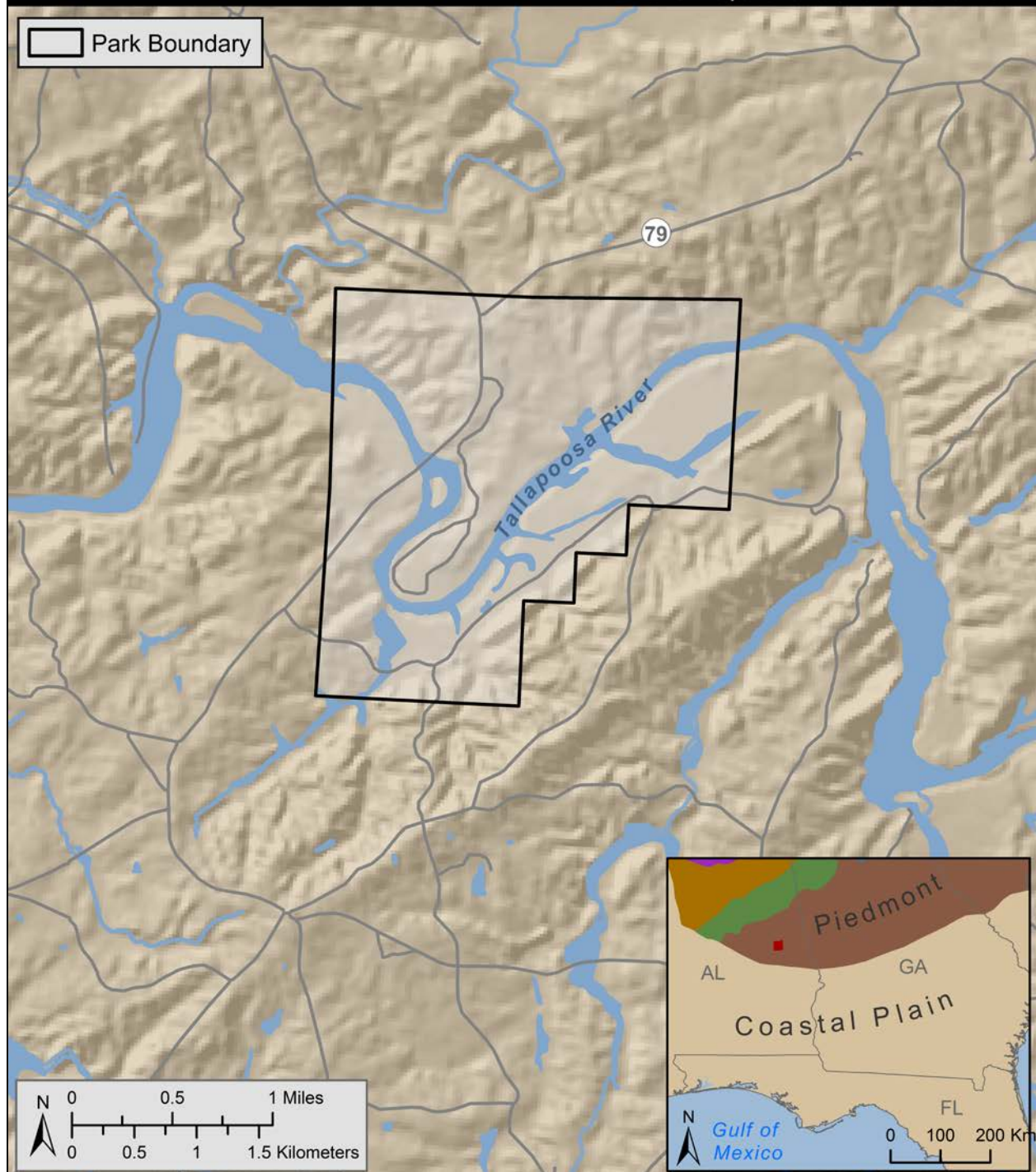


Figure 1. Location of Horseshoe Bend National Military Park, AL.

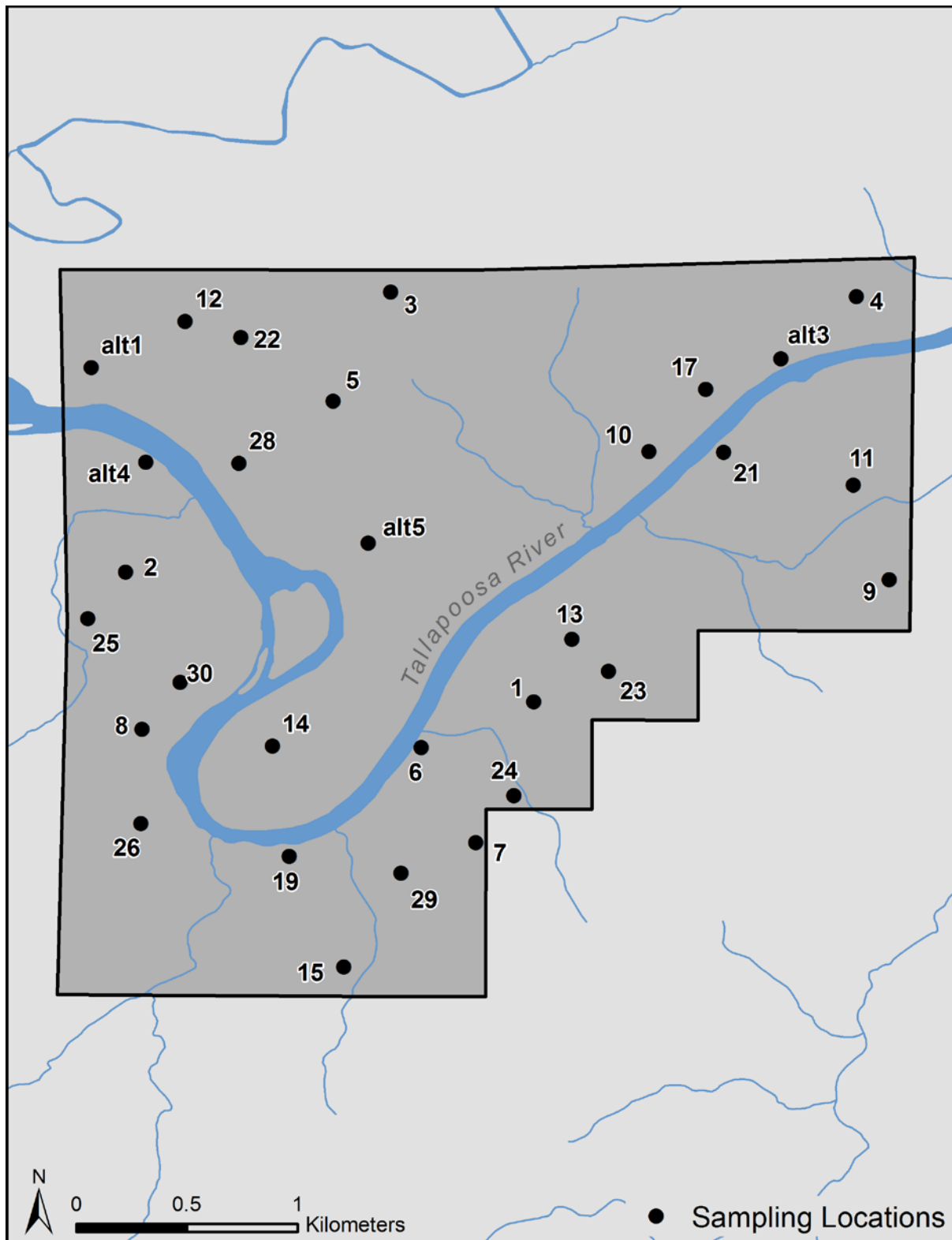


Figure 2. Spatially-balanced random sampling locations at Horseshoe Bend National Military Park, 2011.

Sampling Methodology

Vegetation community measures were divided into three strata based on height, canopy, shrub, and groundcover. Within each stratum, vegetation communities were sampled using hybrid methods following the North Carolina Vegetation Survey nested-subplot design (Peet et al. 1998) within a circular plot similar to the Forest Inventory and Analysis protocol (Bechtold and Patterson 2005).

The plot layout consisted of a circular plot with a radius of 15 meter within each 0.5-hectare sampling location. Subplots were systematically placed along six transects that radiated out from the center point at azimuths of 0°/360°, 60°, 120°, 180°, 240°, and 300° (Figure 3). To avoid overlap, subplots originated four meters from the plot array (i.e., 0.5-ha grid) center point and extended away from the center point. Canopy cover, shrub cover, DBH, canopy species seedling frequency, and herbaceous cover data were collected in the nested subplots within each plot. Canopy cover was measured from the center point of the 0.5-hectare sampling location. Shrub coverage was measured in two 2- by 4-meter shrub plots along each transect. Shrub plots were further subdivided into 2- by 2-meter subplots to improve cover estimation accuracy and precision (solid gray shading; Figure 3). Shrub and herbaceous cover is estimated in one of eight coverage classes (Table 1). Groundcover coverage, groundcover nested frequency, and seedling frequency were measured in two 1- by 1-meter groundcover plots (solid black shading; Figure 3) along each transect. Canopy species DBH was measured in three sections, each representing 1/3 of the total circular plot (hashed gray shading; Figure 3). A comprehensive species list was also compiled for all species occurring in the 0.5-hectare sampling location. See Byrne and Corbett 2012; Byrne, Corbett, and Smrekar 2013; Corbett and Byrne 2012a; Corbett and Byrne 2012b; and Corbett 2013 for detailed field methods.

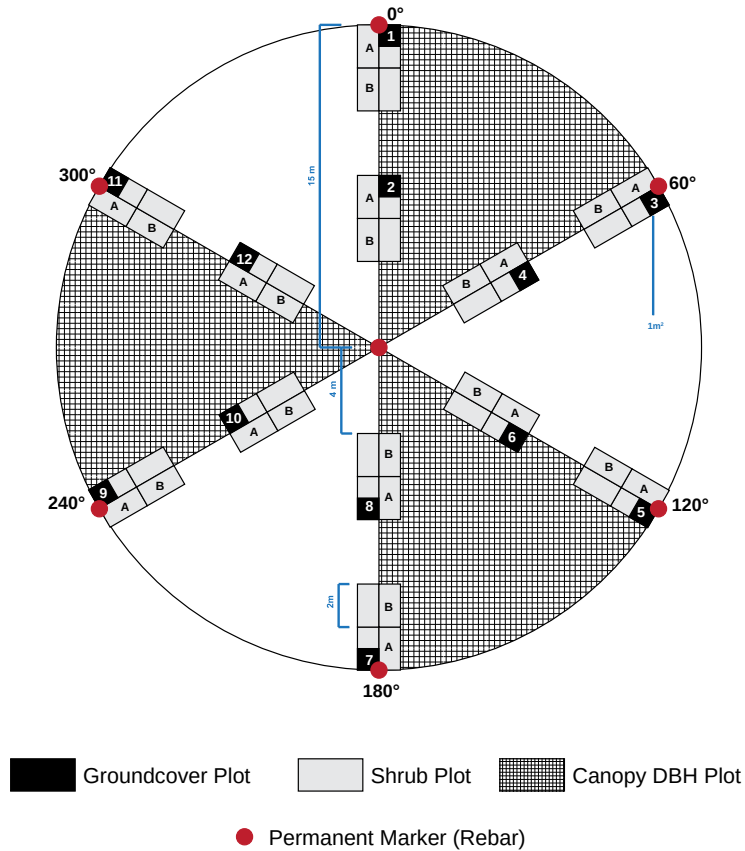


Figure 3. Southeast Coast Network vegetation community monitoring plot and subplot layout identifying the juxtaposition of canopy cover, canopy diameter, shrub, and groundcover plots within a circular array. Although not depicted, the above array is positioned at the center point of each 0.5-hectare sampling location.

Table 1. Cover estimation coverage class, percent cover range, and value used for analyses.

Coverage Class	Percent Cover Range	Value Used for Analyses
0	0%	0.0
1	Trace (<1%)	0.5
2	1-5%	2.5
3	5-25%	15.0
4	25-50%	37.5
5	50-75%	62.5
6	75-95%	85.0
7	95-100%	97.5

Findings

We detected 172 species, subspecies, and varieties during this monitoring effort (Appendix A), including 19 species, subspecies, and varieties not previously known to occur at the Park (Table 2). We detected 37 occurrences with uncertain taxonomic affinity (Appendix A) that were identified only to genus, family, or a higher taxonomic level.

Highlights by monitoring objective include:

Plant species richness and diversity in the groundcover, shrub, and canopy strata.

- Nineteen species new to the Park species list were detected, including one invasive exotic species (Table 2).

Percent cover of vegetation in the groundcover, shrub, and canopy strata.

- Absolute canopy cover was showed little variability across all sampling locations ($\bar{x}$ = 86.49%, SD = 7.60; Table 3).
- Sweetgum (*Liquidambar styraciflua*) was the most frequently occurring shrub species (f = 80.00) and had the highest relative cover of all shrub species ($\bar{x}$ = 13.15%, SD = 14.39; Table 4).
- Red maple (*Acer rubrum*) was the second most frequently occurring shrub species (f = 73.33) and had the second highest relative cover ($\bar{x}$ = 10.47%, SD = 14.81; Table 4).
- Sweetgum also had the highest absolute cover in the shrub stratum ($\bar{x}$ = 3.27%, SD = 3.65; Table 5). Red maple had the second highest absolute cover ($\bar{x}$ = 2.43%, SD = 3.90) in the shrub stratum (Table 5).
- Muscadine grape (*Vitis rotundifolia*) had the highest relative cover in the groundcover stratum ($\bar{x}$ = 8.96%, SD = 7.76), followed by Verbesina sp.; ($\bar{x}$ = 2.09%, SD = 7.05; Table 6).
- Muscadine grape had the highest absolute cover ($\bar{x}$ = 31.32%, SD = 20.88), while common greenbriar had the second highest cover ($\bar{x}$ = 5.45%, SD = 12.33; Table 7).
- Leaf litter was the most common ground condition, with a relative cover of 94.42% (SD 3.00; Table 6) and an absolute cover of 95.17% (SD 4.37; Table 7).

Frequency of species in the groundcover stratum.

- Muscadine grape (*Vitis rotundifolia*; f = 96.67), *Smilax* spp. (f = 76.67), Virginia creeper (*Parthenocissus quinifolia*; f = 73.33), and cat greenbriar (*Smilax glauca*; f = 73.33) were the most frequently occurring species in the groundcover stratum, respectively (Table 6).
- Leaf litter was the most frequently occurring ground condition at the Park (f = 100; Table 6).

DBH of canopy species.

- The largest tree detected on average where more than one individual was measured was longleaf pine (*Pinus palustris*; $\bar{x}$ = 38.15 cm, SD = 0.35; Table 8).

Woody species seedling counts in the groundcover stratum.

- Blue ridge blueberry (*Vaccinium pallidum*) had the highest estimated seedling density at the Park (2.00/m², SD=3.15; Table 9).
- Chinese privet (*Ligustrum sinense*) seedlings were estimated at 0.60/m² (SD= .57; Table 9).

Table 2. New vascular plant species, subspecies, or varieties found at Horseshoe Bend National Military Park, 2011.

Order	Family	Scientific Name	Non-Native
Asterales	Asteraceae	<i>Acer saccharum</i>	
Asterales	Asteraceae	<i>Pityopsis graminifolia</i>	
Asterales	Asteraceae	<i>Prenanthes</i> sp.	
Dipsacales	Adoxaceae	<i>Viburnum nudum</i>	
Dipsacales	Adoxaceae	<i>Viburnum rufidulum</i>	
Ericales	Primulaceae	<i>Lysimachia quadrifolia</i>	
Fabales	Fabaceae	<i>Clitoria mariana</i>	
Gentianales	Apocynaceae	<i>Apocyanum cannabinum</i>	
Malpighiales	Euphorbiaceae	<i>Acalypha gracilens</i>	
Malpighiales	Passifloraceae	<i>Passiflora lutea</i>	
Poales	Cyperaceae	<i>Dulichium arundinaceum</i>	
Poales	Cyperaceae	<i>Scleria triglomerata</i>	
Poales	Poaceae	<i>Microstegium vimineum</i>	X
Poales	Poaceae	<i>Saccharum giganteum</i>	
Rosales	Rosaceae	<i>Amelanchier arborea</i>	
Rosales	Rosaceae	<i>Rubus argutus</i>	
Rosales	Rosaceae	<i>Rubus cuneifolius</i>	
Saxifragales	Saxifragaceae	<i>Heuchera</i> sp.	
Solanales	Convolvulaceae	<i>Dichondra carolinensis</i>	

Table 3. Average canopy cover for vegetation monitoring macroplots at Horseshoe Bend National Military Park, 2011. Average canopy cover is based on data pooled across observers at each sampling location.

Sampling Location	Average	Standard Deviation
HOBE-1	83.50	0.66
HOBE-2	88.25	1.39
HOBE-3	48.58	3.25
HOBE-4	91.50	0.50
HOBE-5	84.42	1.51
HOBE-6	80.67	1.04
HOBE-7	88.08	1.89
HOBE-8	87.33	0.52
HOBE-9	86.92	0.80
HOBE-10	87.75	0.50
HOBE-11	88.50	1.00
HOBE-12	84.67	0.29
HOBE-13	83.92	1.28
HOBE-14	90.33	0.58
HOBE-15	84.83	2.25
HOBE-17	87.50	0.50
HOBE-19	91.25	0.50
HOBE-21	84.50	1.89
HOBE-22	89.33	1.51
HOBE-23	87.83	0.29
HOBE-24	88.67	0.76
HOBE-25	91.83	0.63
HOBE-26	90.33	0.80
HOBE-28	90.83	0.76
HOBE-29	86.33	2.90
HOBE-30	88.75	0.90
HOBE-alt1	84.25	1.09
HOBE-alt3	90.83	1.01
HOBE-alt4	86.33	0.38
HOBE-alt5	90.75	0.87
Park Average	86.29	7.60

Table 4. Percentage of vegetation cover (relative cover) and frequency (Freq) of occurrence of shrub species in vegetation monitoring sampling locations at Horseshoe Bend National Military Park, 2011. Relative cover is averaged across shrub plots at each sampling location, and park-wide calculations are averaged (Avg) across all sampling locations with standard deviation (SD).

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
Cicer negundo	6.67	0.35	1.55						2.21												8.25												
Cicer rubrum	73.33	10.47	14.81	3.86		17.19	0.45	33.45			40.74	0.51	2.47	4.41	3.12	0.97	15.31	14.40	8.88			9.85	57.87	5.42	33.30	8.49	1.37	9.47	34.43			8.18	
Cicer accharum	23.33	1.60	3.90				4.67			8.39							15.31										0.11			0.28	11.38		7.81
Ciesculus pavia	3.33	0.11	0.58																								3.18						
Cismina arviliflora	36.67	1.50	3.15				1.34	14.08					8.23		7.28		0.73	0.95					3.05	1.55					1.72		2.96	2.97	
Cillicarpa mericana	20.00	0.79	1.95	6.00				1.76								5.80											6.90		0.35		2.82		
Carpinus caroliniana	40.00	6.23	15.85	77.27		5.56	1.34		2.21	8.39			0.41	40.71					10.36						15.48				5.55	18.34	1.37		
Carya alba	33.33	1.49	3.47				2.89			4.20					3.12		1.46					16.25			1.55	0.10			9.82	2.22		3.19	
Carya glabra	30.00	2.39	8.54			0.76							2.88	9.99	0.97							46.25			4.64			1.37		1.94	2.82		
Catalpa ignonioides	3.33	0.21	1.13																	6.18													
Cercis canadensis	13.33	0.96	3.88				20.47																		0.15		6.37			1.94			
Cornus florida	50.00	3.07	4.43			5.31	1.34			0.70			10.29	5.64			8.75			7.72	7.22	1.25	1.79		6.97	16.45	3.18		12.27		3.29		
Cornus nemina	3.33	0.36	1.97																	10.81													
Crataegus sp.	3.33	0.01	0.07				0.38																										
Diospyros virginiana	43.33	1.86	3.96	0.43	2.78	16.69	1.34			4.20			13.17	0.18	0.52	6.77		4.75							0.99		1.18					2.73	
Elaeagnus randifolia	36.67	2.47	4.82					1.76		4.20		13.76					5.10						6.60	0.77	19.82		3.53	10.52			0.23	7.81	
Eriogonum pennsylvanica	3.33	0.09	0.47						2.57																								
Eubryopsis diptera	16.67	3.20	10.28										20.16				5.10			0.51	19.59											50.57	
Eucalyptus virginiana	6.67	0.66	2.51					10.56																9.14									
Eurychorda opaca	10.00	0.28	1.10		2.38					5.59										0.51													
Eunipiperus virginiana	10.00	0.10	0.35										0.41				0.73						1.79										
Eucommia fruticosa	23.33	5.36	18.08	1.29					90.81				8.64	2.47						11.33	43.30											2.96	
Eugenia fruticulosa	80.00	13.15	14.39	10.72	10.79	15.30	16.24	14.08	2.21		9.88	20.49	9.47	8.67	59.31	33.08			13.31	23.69	7.22		19.10		25.54	6.05	51.49	2.35	6.31	3.33		19.13	6.69
Eriodendron albidiflora	40.00	2.45	4.50		8.33	17.95	6.90						4.94	2.64	6.24				0.30	13.90		2.50	2.09					7.36	0.28				
Eugenia virginiana	6.67	0.74	4.00										21.92										0.30										

Table 4. (Continued.)

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5	
Nyssa sylvatica	46.67	4.09	8.79	0.43	7.53		4.90			4.20	25.93	15.80			0.52		10.93	39.56	1.48			3.75	1.79				3.72						2.23	
Ostrya virginiana	33.33	5.72	14.30				1.34				8.64			11.98			10.93		9.27								6.37			1.67	61.34	9.11	50.93	
Oxydendrum arboreum	53.33	7.81	14.50		60.67		19.80	1.76		36.36	11.11					0.19		4.75	20.71				14.63	3.55		0.99	0.11	3.57	15.43	38.31			2.23	
Pinus echinata	3.33	0.05	0.25																									1.37						
Pinus taeda	10.00	0.58	2.80			0.13																						15.29	2.10					
Prunus serotina	13.33	0.22	0.80			2.78							0.41	0.04												3.47								
Quercus alba	36.67	1.30	2.24					5.28							3.12	6.77	0.87		6.18			5.37		0.77			5.88	2.10	0.28			2.23		
Quercus falcata	40.00	3.02	6.43			3.29	1.56	1.76		18.88				5.29			0.73		11.83			15.00			26.32		1.76	2.10	1.94					
Quercus laurifolia	6.67	0.12	0.57																									3.14	0.35					
Quercus nigra	30.00	1.24	2.89		0.40	0.13	1.56						9.47	11.46								4.18					1.18	2.45			6.38			
Quercus prinus	3.33	0.34	1.85																				10.15											
Quercus rubra	13.33	0.30	0.95															4.75				1.79		0.77					1.67					
Quercus stellata	23.33	0.81	2.18			0.76	0.22							1.06											5.42		3.72	10.19	2.88					
Rhododendron canescens	10.00	1.08	3.85																				3.05		18.33			10.87						
Rhus copallinum	10.00	0.65	2.45			10.37													8.88									0.39						
Sassafras albidum	10.00	0.03	0.09					0.35																				0.20		0.28				
Staphylea trifolia	3.33	0.12	0.66																	3.60														
Tilia americana var. heterophylla	3.33	0.05	0.25																													1.37		
Ulmus alata	6.67	0.17	0.71				1.56								3.64																			
Vaccinium arboreum	46.67	3.88	7.47		4.76			1.76			3.70	7.65			3.12			4.75	24.26			7.50	10.45	3.05	4.64			33.52	5.26	1.94				
Vaccinium elliotii	63.33	6.79	10.27		2.38	2.53	12.11			4.90		19.88	9.05	5.46		45.45	23.32			6.28	14.43		25.07	3.05		0.50	6.37	11.37	0.35	2.22			8.92	
Vaccinium pallidum	20.00	1.72	5.37					13.38										26.11				7.50	1.79	0.51				2.35						
Viburnum nudum	6.67	0.05	0.21			0.88										0.73																		

Table 5. Percentage of area covered (absolute cover) and frequency of occurrence of shrub species sampled in vegetation monitoring sampling locations at Horseshoe Bend National Military Park, 2011. Absolute cover is averaged across shrub plots at each sampling location, and park-wide calculations are averaged across all sampling locations. [Freq – Frequency; Avg – Average; SD – Standard Deviation].

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5	
icer negundo	6.67	0.05	0.19						0.63												0.83													
icer rubrum	73.33	2.43	3.90	0.94		14.17	0.21	1.98			3.44	0.10	0.63	2.60	0.63	0.10	2.19	1.90	0.63				3.44	11.88	0.73	7.00	1.67	0.73	2.81	12.92			2.29	
icer accharum	23.33	0.35	0.80				2.19			1.25							2.19										0.02			0.10	2.52		2.19	
iesculus pavia	3.33	0.02	0.11																								0.63							
imina arvilflora	36.67	0.30	0.54				0.63	0.83					2.08		1.46		0.10	0.13						0.63	0.21					0.65		1.35	0.83	
allicarpa mericana	20.00	0.14	0.38	1.46				0.10							0.63												1.35		0.10		0.63			
arpinus aroliniana	40.00	1.99	5.45	18.77		4.58	0.63		0.63	1.25			0.10	24.06					0.73						2.08					2.08	4.06	0.63		
arya alba	33.33	0.32	0.66				1.35			0.63					0.63		0.21					1.35			0.21	0.02			2.92	0.83		1.46		
arya glabra	30.00	0.33	0.79			0.63							0.73		2.00	0.10						3.85		0.63				0.73		0.73	0.63			
atalpa ignonioides	3.33	0.04	0.23																	1.25														
ercis anadensis	13.33	0.39	1.76				9.58																		0.02		1.25			0.73				
ornus florida	50.00	0.82	1.30			4.38	0.63			0.10			2.60	3.33			1.25			1.56	0.73	0.10	0.63		0.94	3.46	0.63		3.65		0.73			
ornus semina	3.33	0.07	0.40																	2.19														
rataegus sp.	3.33	0.01	0.06			0.31																												
iospyros irginiana	43.33	0.76	2.54	0.10	0.73	13.75	0.63			0.63			3.33	0.10	0.10	0.73		0.63							0.21		0.63					1.25		
agus randifolia	36.67	0.57	1.12					0.10		0.63		2.81				0.73							1.35	0.10	4.17		1.88	3.13			0.10	2.19		
raxinus ennsylvanica	3.33	0.02	0.13						0.73																									
talesia diptera	16.67	1.03	4.29									5.10				0.73			0.10	1.98												23.13		
lamamelis irginiana	6.67	0.08	0.36					0.63																1.88										
ex opaca	10.00	0.05	0.19		0.63					0.83										0.10														
uniperus irginiana	10.00	0.03	0.12										0.10				0.10						0.63											
igustrum inense	23.33	1.26	4.73	0.31					25.73				2.19	1.46						2.29	4.38											1.35		
iquidambar tyraciflua	80.00	3.27	3.65	2.60	2.83	12.60	7.60	0.83	0.63		0.83	4.19	2.40	5.13	11.88	3.56			0.94	4.79	0.73		6.67		3.44	1.27	10.10	1.25	1.88	1.25		8.75	1.88	
iriodendron ilipifera	40.00	1.01	2.77		2.19	14.79	3.23						1.25	1.56	1.25				0.02	2.81		0.21	0.73					2.19	0.10					
fagnolia irginiana	6.67	0.15	0.82								4.48											0.10												

Table 5. (Continued.)

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5	
Nyssa sylvatica	46.67	0.66	1.22	0.10	1.98		2.29			0.63	2.19	3.23			0.10		1.56	5.21	0.10			0.31	0.63				0.73						0.63	
Ostrya virginiana	33.33	1.53	3.69				0.63				0.73			7.08			1.56			1.88							1.25			0.63	13.58	4.17	14.27	
Oxydendrum arboreum	53.33	2.04	4.18		15.94		9.27	0.10		5.42	0.94					0.02		0.63	1.46				5.10	0.73		0.21	0.02	1.90	4.58	14.38			0.63	
Pinus echinata	3.33	0.02	0.13																									0.73						
Pinus taeda	10.00	0.30	1.48			0.10																						8.13	0.63					
Prunus serotina	13.33	0.10	0.43			2.29							0.10	0.02												0.73								
Quercus alba	36.67	0.32	0.69					0.31							0.63	0.73	0.13			1.25			1.88		0.10			3.13	0.63	0.10			0.63	
Quercus falcata	40.00	0.58	1.05			2.71	0.73	0.10		2.81				3.13			0.10		0.83			1.25		3.54				0.94	0.63	0.73				
Quercus laurifolia	6.67	0.06	0.30																									1.67	0.10					
Quercus nigra	30.00	0.53	1.38		0.10	0.10	0.73						2.40	6.77									1.46					0.63	0.73				2.92	
Quercus prinus	3.33	0.07	0.38																					2.08										
Quercus rubra	13.33	0.07	0.19															0.63					0.63		0.10					0.63				
Quercus stellata	23.33	0.30	1.00			0.63	0.10							0.63											0.73		0.73	5.42	0.85					
Rhododendron canescens	10.00	0.26	0.90																				0.63		3.85				3.23					
Rhus copallinum	10.00	0.31	1.56			8.54													0.63									0.21						
Sassafras albidum	10.00	0.01	0.03					0.02																				0.10		0.10				
Staphylea trifolia	3.33	0.02	0.13																	0.73														
Tilia americana var. heterophylla	3.33	0.02	0.11																														0.63	
Ulmus alata	6.67	0.05	0.18				0.73								0.73																			
Vaccinium arboreum	46.67	1.06	3.26		1.25			0.10			0.31	1.56			0.63			0.63	1.71			0.63	3.65	0.63	0.63			17.81	1.56	0.73				
Vaccinium elliotii	63.33	1.66	2.26		0.63	2.08	5.67			0.73		4.06	2.29	3.23		4.90	3.33			1.27	1.46		8.75	0.63		0.10	1.25	6.04	0.10	0.83			2.50	
Vaccinium pallidum	20.00	0.23	0.68					0.79										3.44				0.63	0.63	0.10				1.25						
Viburnum nudum	6.67	0.03	0.13			0.73										0.10																		

Table 6. Percentage of vegetation cover (relative cover) and frequency of occurrence of groundcover species in vegetation monitoring sampling locations at Horseshoe Bend National Military Park, 2011. Relative cover is averaged across groundcover plots at each sampling location, and park-wide calculations are averaged across all sampling locations. [Freq – Frequency; Avg – Average; SD – Standard Deviation].

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
<i>Acer negundo</i>	10.00	0.11	0.50						0.21												2.71												0.25
<i>Acer rubrum</i>	46.67	0.38	0.82	0.04			0.21	1.25		0.63	0.25		0.21					1.25					0.04	0.25		1.13		0.04	3.17	2.96			0.13
<i>Acer saccharum</i>	13.33	0.02	0.05														0.04			0.21							0.21						0.04
<i>Amelanchier arborea</i>	3.33	0.01	0.04																							0.21							
<i>Andropogon virginicus</i>	3.33	0.06	0.30																									1.67					
<i>Arisaema triphyllum</i>	6.67	0.01	0.05																						0.25	0.04							
<i>Aristolochia serpentaria</i>	10.00	0.01	0.05												0.08												0.25				0.00		
<i>Arundinaria gigantea</i>	20.00	1.38	3.79				2.71		8.33												7.50									3.33	18.13	1.25	
<i>Asimina parviflora</i>	6.67	0.01	0.05																						0.21							0.21	
<i>Asimina triloba</i>	6.67	0.05	0.23					1.25			0.21																						
<i>Asplenium platyneuron</i>	16.67	0.06	0.23										0.21	0.04		0.21				0.21											1.25		
<i>Asteraceae</i>	3.33	0.01	0.04																							0.21							
<i>Bignonia capreolata</i>	13.33	0.06	0.23	0.21					0.21												0.04	1.25											
<i>Boehmeria cylindrica</i>	3.33	0.05	0.27						1.46																								
<i>Botrychium biternatum</i>	16.67	0.06	0.14											0.25		0.42				0.25	0.42												
<i>Botrychium dissectum</i>	10.00	0.04	0.12																													0.46	
<i>Botrychium virginianum</i>	6.67	0.03	0.15										0.83							0.08													
<i>Callicarpa americana</i>	3.33	0.01	0.04											0.21																			
<i>Campsis radicans</i>	16.67	0.03	0.07										0.21		0.04					0.21											0.21	0.21	
<i>Carex</i> sp.	6.67	0.21	0.93																		5.00											1.25	
<i>Carpinus caroliniana</i>	16.67	0.05	0.12	0.21									0.42														0.21		0.42				0.21
<i>Carya alba</i>	36.67	0.18	0.40		0.21						0.04				0.54		0.42		0.21		0.25	0.21				0.21			0.21	1.67		1.46	
<i>Carya glabra</i>	20.00	0.17	0.54												1.25				0.21			2.71				0.21	0.21					0.63	
<i>Centrosema virginianum</i>	6.67	0.05	0.23											1.25															0.21				

Table 6. (Continued.)

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5	
<i>Cercis canadensis</i>	6.67	0.06	0.24																								0.42			1.25				
<i>Chasmanthium latifolium</i>	6.67	0.09	0.34						1.25																						1.46			
<i>Chasmanthium sessiliflorum</i>	20.00	1.56	4.41			20.42							7.08	3.13		12.29														2.50			1.25	
<i>Chimaphila maculata</i>	6.67	0.00	0.01													0.04	0.04																	
<i>Chionanthus virginicus</i>	6.67	0.05	0.23																					1.25						0.21				
<i>Clitoria mariana</i>	3.33	0.01	0.04										0.21																					
<i>Cocculus carolinus</i>	6.67	0.01	0.05																		0.21												0.21	
<i>Cornus florida</i>	43.33	0.20	0.50	0.04			1.88	0.04		0.04			0.25		0.04				0.08			1.46	0.04		1.67	0.25		0.25		0.04				
<i>Cuscuta</i> sp.	3.33	0.00	0.01			0.04																												
Cyperaceae	13.33	0.03	0.08	0.25			0.21														0.21												0.21	
<i>Decumaria barbara</i>	6.67	0.05	0.23				1.25																										0.21	
<i>Desmodium</i> sp.	6.67	0.10	0.46			2.50																						0.42						
<i>Dioscorea villosa</i>	6.67	0.01	0.04										0.21			0.04																		
<i>Diospyros virginiana</i>	16.67	0.11	0.34			1.25							1.46								0.21		0.21	0.21										
<i>Elephantopus tomentosus</i>	10.00	0.08	0.34				0.21							1.88													0.25							
<i>Epifagus virginiana</i>	3.33	0.01	0.04									0.21																						
<i>Euonymus americanus</i>	6.67	0.05	0.23																						0.21								1.25	
<i>Eupatorium fistulosum</i>	3.33	0.01	0.04																												0.21			
<i>Euphorbia</i> sp.	13.33	0.04	0.10							0.42																		0.25	0.21	0.25				
Fabaceae	6.67	0.05	0.23			1.25												0.21																
<i>Fagus grandifolia</i>	6.67	0.04	0.23					1.25																			0.04							
Filicopsida	3.33	0.01	0.04					0.21																										
<i>Fraxinus pennsylvanica</i>	10.00	0.03	0.10						0.21												0.46												0.21	
<i>Galium aparine</i>	3.33	0.04	0.23				1.25																											
<i>Galium</i> sp.	6.67	0.01	0.04				0.21																										0.04	
<i>Gelsemium sempervirens</i>	53.33	1.43	2.42		2.50	9.79	4.38				2.17	0.21		1.46	6.46	0.04	0.21		0.21	0.63			1.46				5.63	4.38	0.83		2.71			

Table 6. (Continued.)

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
Goodyera pubescens	3.33	0.01	0.04																						0.21								
Halesia diptera	3.33	0.01	0.04										0.21																				
Hexastylis arifolia	20.00	0.10	0.24					0.21																0.46		0.71	0.67		0.21			0.88	
Ipomoea sp.	13.33	0.19	0.91				0.21		5.00																		0.21				0.21		
Lamiaceae	3.33	0.01	0.04																							0.21							
Lespedeza cuneata	6.67	0.26	1.23			6.67										1.25																	
Ligustrum sinense	20.00	0.32	0.81						2.96				1.71	0.42						1.67	2.71											0.04	
Liliopsida	3.33	0.01	0.05																													0.29	
Liquidambar styraciflua	26.67	0.10	0.32		1.29								0.04		0.04		0.04			0.04			0.04		0.21				1.25				
Liriodendron tulipifera	6.67	0.00	0.01	0.04			0.04																										
Lonicera japonica	36.67	1.12	2.16	1.25		5.04	5.00		3.17				0.67	5.63			0.04		0.21	0.46	7.71										4.38		
Magnoliopsida	26.67	0.22	0.95					0.21		0.04									0.04		5.21					0.21	0.25	0.42				0.29	
Microstegium vimineum	16.67	1.83	8.75				0.21		0.83				4.83							1.25	47.92												
Mitchella repens	26.67	0.23	0.58					0.21		0.92		0.21				1.25								0.21	1.08				2.75		0.21		
Nyssa sylvatica	36.67	0.09	0.27	0.04	1.46					0.21		0.04			0.04		0.21	0.21					0.42						0.04		0.04	0.04	
Ostrya virginiana	16.67	0.11	0.35											1.46			0.29										0.04		0.21			1.25	
Oxalis corniculata	3.33	0.00	0.01			0.04																											
Oxalis stricta	3.33	0.00	0.01																													0.04	
Oxydendrum arboreum	6.67	0.06	0.27																									0.21	1.46				
Panicum sp.	50.00	0.61	1.22	0.21	0.21	1.46	0.21	0.21	1.25	0.21			0.21						0.21		0.21				0.42	1.71	4.58			4.17	2.92		
Parthenocissus quinquefolia	73.33	0.75	1.45	0.29		1.92	5.71		0.83	0.21	0.04		0.83	5.88	0.08	0.50	0.46		0.25	1.17	1.46				0.25	0.04	0.50		0.04	0.21	0.29	1.04	0.42
Pinus echinata	3.33	0.00	0.01					0.04																									
Pinus sp.	6.67	0.01	0.05													0.04												0.25					
Pinus taeda	20.00	0.06	0.21		0.04	0.21														0.04	0.04					0.33			1.08				
Poaceae	50.00	0.34	0.61	0.21			0.63	0.21		0.21					0.21		0.25			0.21			0.42		0.25	0.42	1.67	1.67		2.50	1.25		0.21
Polystichum acrostichoides	36.67	1.56	3.01			1.25	3.96	6.46		3.33			12.71	5.63		0.21											1.46		1.25	7.92		2.50	
Prenanthes sp.	10.00	0.02	0.05								0.21																0.04			0.21			
Prunus	30.00	0.04	0.07						0.21				0.21			0.21			0.04				0.21	0.04	0.04						0.04	0.08	

Table 6. (Continued.)

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5	
<i>serotina</i>																																		
<i>Prunus</i> sp.	3.33	0.01	0.04														0.21																	
<i>Quercus alba</i>	23.33	0.06	0.11					0.21		0.21								0.42							0.21	0.25	0.25						0.21	
<i>Quercus falcata</i>	33.33	0.18	0.38			1.25				0.21	1.67				0.42		0.21		0.21			0.42			0.25	0.21		0.42						
<i>Quercus laurifolia</i>	3.33	0.01	0.07																									0.38						
<i>Quercus nigra</i>	46.67	0.21	0.47	0.04	0.21		0.21		0.21			0.04	0.29	1.50			0.04		0.04	0.42		2.13		0.04				0.63				0.46		
<i>Quercus prinus</i>	3.33	0.06	0.30																				1.67											
<i>Quercus rubra</i>	3.33	0.04	0.23																							1.25								
<i>Quercus</i> sp.	20.00	0.05	0.11	0.25						0.25								0.42									0.21			0.21			0.29	
<i>Quercus stellata</i>	10.00	0.10	0.49								0.21													0.21				2.71						
<i>Rhus copallinum</i>	3.33	0.01	0.04			0.21																												
<i>Rubus argutus</i>	3.33	0.63	3.46			18.96																												
<i>Rubus cuneifolius</i>	3.33	0.01	0.04																	0.21														
<i>Rubus</i> sp.	13.33	0.18	0.57	1.25			0.25		2.71					1.25																				
<i>Sanicula canadensis</i>	20.00	0.04	0.08			0.25	0.21		0.21	0.21			0.04						0.21															
<i>Sassafras albidum</i>	36.67	0.09	0.17	0.04	0.04				0.21		0.38		0.04	0.21										0.63	0.21		0.21		0.46		0.42			
<i>Scleria triglomerata</i>	36.67	0.71	1.67					0.04	2.50		0.21				0.42									2.50	1.71	1.67		0.21	8.33	2.50		1.25		
<i>Smilax bona-nox</i>	6.67	0.05	0.23				0.21							1.25																				
<i>Smilax glauca</i>	73.33	0.38	0.52	0.21	2.13	0.42			0.21	0.71	0.08		0.21		1.46	0.21		0.50	0.42	0.21		0.08	0.96	0.21	0.04		0.25	0.88	0.29	1.54	0.21		0.25	
<i>Smilax rotundifolia</i>	33.33	1.38	4.55	7.75	1.25	1.46			24.17	0.21		1.25					1.25		1.25		1.25									1.67	1.25			
<i>Smilax</i> sp.	76.67	0.70	1.10		1.25	0.21	0.42	1.04			0.08	0.33	0.67	1.54		2.79	0.83		1.38	0.21	5.42			0.67	0.67	0.29	0.08	0.13	0.67	0.42	0.25	1.71	0.04	
<i>Thalictrum thalictroides</i>	3.33	0.01	0.04																							0.21								
<i>Toxicodendron radicans</i>	43.33	0.53	1.01			1.25	0.42		3.96					1.46	1.71		0.08			3.17	1.50			0.25	0.04		0.08			0.21	1.75			
<i>Uvularia</i> sp.	3.33	0.04	0.23				1.25																											
<i>Vaccinium arboreum</i>	10.00	0.05	0.27		1.46						0.08											0.04												
<i>Vaccinium elliotii</i>	13.33	0.03	0.07											0.21				0.21										0.21					0.21	
<i>Vaccinium pallidum</i>	26.67	1.17	3.29					14.58			0.42						10.46	0.42				1.25	5.21		1.25			1.46						

Table 6. (Continued.)

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
Verbesina sp.	13.33	2.09	7.05			2.50			32.29					5.83							22.08												
Viola sp.	13.33	0.02	0.05			0.04	0.04												0.21											0.21			
Vitis rotundifolia	96.67	8.96	7.76	6.46	13.13	30.83	5.21	13.33	2.71	8.17	0.21	0.67	15.04	19.42	20.83	13.83	0.21	19.38	4.63	5.63		21.67	9.21	1.71	11.46	2.75	6.92	0.21	2.50	3.79	9.58	11.67	7.54
Yucca filamentosa	3.33	0.10	0.57											3.13																			
Bare Ground	76.67	2.99	3.73	18.13	8.33		3.33		4.38	0.21	3.13		6.67	6.25	1.25	0.21	3.96	2.50	1.25	3.13	4.17	0.21	1.25	1.46		3.33			1.25	4.17	4.38	6.67	
Exposed Rock	23.33	0.66	2.15			3.13				0.21									0.21			3.75					1.25		0.21		11.04		
Leaf Litter/Duff	100.00	94.42	3.00	86.46	89.58	96.46	95.42	97.50	95.42	93.33	96.46	95.42	88.33	93.33	96.46	95.42	94.38	95.42	95.42	95.42	94.38	94.38	96.46	95.42	97.50	95.42	96.46	97.50	95.42	94.38	87.29	90.42	97.50
Tree Base	33.33	0.83	1.74							5.63			7.08	2.50		1.25		0.21	3.13				1.25			0.21		1.25			2.50		
Upland Non-Vascular/ Lichen	40.00	0.39	0.69	0.21	0.21		1.67			0.21		2.50	1.25			1.46	0.21					1.88	0.42					0.42	1.25				

Table 7. Percentage of area covered (absolute cover) and frequency of occurrence by groundcover species sampled in vegetation monitoring sampling locations at Horseshoe Bend National Military Park, 2011. Absolute cover is averaged across groundcover plots at each sampling location, and park-wide calculations are averaged across all sampling locations. [Freq – Frequency; Avg – Average; SD – Standard Deviation].

pecies	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
icer negundo	10.00	0.10	0.44						0.22												2.39												0.52
icer rubrum	46.67	1.78	3.61	0.22			0.57	3.07		3.41	5.83		0.39					3.88					0.22	3.59		7.94		0.29	16.81	6.59			0.60
icer accharum	13.33	0.11	0.32													0.92				1.24							1.01						0.20
melanchier rborea	3.33	0.05	0.27																							1.47							
ndropogon irginicus	3.33	0.39	2.14																									11.73					
risaema iphyllum	6.67	0.05	0.23																					1.22	0.29								
ristolochia erpentaria	10.00	0.05	0.23											0.33													1.21				0.00		
rundinaria igantea	20.00	2.64	7.36				7.43		8.76												6.63										12.99	37.44	6.01
isimina arviflora	6.67	0.05	0.20																						1.02							0.43	
isimina triloba	6.67	0.26	1.03					3.07			4.85																						
isplenium latyneuron	16.67	0.24	0.91										0.39	0.06		0.60					1.24										4.87		
isteraceae	3.33	0.01	0.03																								0.18						
ignonia apreolata	13.33	0.09	0.28	1.11					0.22												0.25	1.11											
ioehmeria ylindrica	3.33	0.05	0.28						1.53																								
iotrychium iternatum	16.67	0.15	0.38										0.38		1.19					1.49	0.37											0.95	
iotrychium irginianum	6.67	0.07	0.30										1.58								0.50												
callicarpa mericana	3.33	0.01	0.06											0.32																			
campsis adicans	16.67	0.10	0.28										0.32		0.12					1.24											0.81	0.43	
carex sp.	6.67	0.23	0.92																		4.42											2.58	
carpinus aroliniana	16.67	0.20	0.51	1.11									0.79														1.01		2.21				1.00
carya alba	36.67	0.85	1.86		0.83						0.97				2.13		9.17		2.09		0.22	0.71				1.47			1.11	3.71		3.01	
carya glabra	20.00	0.59	1.78													3.58				1.24		9.18				1.47	1.01					1.29	
centrosema irginianum	6.67	0.20	0.91											4.91																1.11			
cercis anadensis	6.67	0.16	0.62																								2.01			2.78			

Table 7. (Continued.)

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
<i>Chasmanthium latifolium</i>	6.67	0.23	1.06						1.31																						5.68		
<i>Chasmanthium sessiliflorum</i>	20.00	2.79	7.49			18.70							13.43	4.74		35.24														5.57		6.01	
<i>Chimaphila maculata</i>	6.67	0.03	0.17													0.12	0.92																
<i>Chionanthus virginicus</i>	6.67	0.61	3.28																				17.96							0.46			
<i>Clitoria mariana</i>	3.33	0.01	0.07										0.39																				
<i>Cocculus carolinus</i>	6.67	0.02	0.08																		0.18											0.43	
<i>Cornus florida</i>	43.33	0.91	2.42	0.22			5.14	0.10		0.23			0.47		0.16				0.84			4.94		0.60		11.76	1.21		1.33		0.16		
<i>Cuscuta</i> sp.	3.33	0.00	0.01			0.04																											
Cyperaceae	13.33	0.10	0.31	1.33			0.57														0.18											1.00	
<i>Decumaria barbara</i>	6.67	0.15	0.65				3.43																									1.00	
<i>Desmodium</i> sp.	6.67	0.17	0.67			2.29																						2.93					
<i>Dioscorea villosa</i>	6.67	0.02	0.07										0.39			0.12																	
<i>Diospyros virginiana</i>	16.67	0.29	0.77			1.14							2.76								0.71		2.99	1.02									
<i>Elephantopus tomentosus</i>	10.00	0.15	0.56			0.57								2.84													1.21						
<i>Epifagus virginiana</i>	3.33	0.25	1.38									7.58																					
<i>Euonymus americanus</i>	6.67	0.23	1.11																					1.02								6.01	
<i>Eupatorium fistulosum</i>	3.33	0.03	0.15																													0.81	
<i>Euphorbia</i> sp.	13.33	0.19	0.55							2.27																		1.76	1.11	0.56			
Fabaceae	6.67	0.11	0.43			1.14													2.09														
<i>Fagus grandifolia</i>	6.67	0.11	0.56					3.07																			0.20						
Filicopsida	3.33	0.02	0.09					0.51																									
<i>Fraxinus pennsylvanica</i>	10.00	0.05	0.20						0.22												0.41											1.00	
<i>Galium aparine</i>	3.33	0.11	0.63				3.43																										
<i>Galium</i> sp.	6.67	0.03	0.11				0.57																									0.20	
<i>Gelsemium sempervirens</i>	53.33	4.77	8.54		9.93	8.97	12.00			11.82	4.85		2.76	9.79	0.16	0.60		0.65	6.28			4.94						39.59	23.23	1.86		5.59	
<i>Goodyera</i>	3.33	0.03	0.19																						1.02								

Table 7. (Continued.)

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
<i>pubescens</i>																																	
<i>Halesia diptera</i>	3.33	0.01	0.07										0.39																				
<i>Hexastylis arifolia</i>	20.00	0.67	1.70					0.51															6.59		5.00	3.22			0.46			4.21	
<i>Ipomoea</i> sp.	13.33	0.24	0.97				0.57		5.26																	1.01					0.43		
<i>Lamiaceae</i>	3.33	0.05	0.27																						1.47								
<i>Lespedeza cuneata</i>	6.67	0.32	1.27			6.10										3.58																	
<i>Ligustrum sinense</i>	20.00	0.65	1.97						3.11				3.24	0.63						9.95	2.39											0.20	
<i>Liliopsida</i>	3.33	0.05	0.26																													1.40	
<i>Liquidambar styraciflua</i>	26.67	0.37	1.07		5.13								0.08		0.16		0.92			0.25			0.22		1.47				2.78				
<i>Liriodendron tulipifera</i>	6.67	0.01	0.04	0.22			0.11																										
<i>Lonicera japonica</i>	36.67	1.99	3.53	6.65		4.62	13.71		3.33				1.26	8.53			0.92		2.09	2.74	6.82											9.04	
<i>Magnoliopsida</i>	26.67	0.43	1.02					0.51		0.23									0.42		4.61				1.47	1.21	2.93					1.40	
<i>Microstegium vimineum</i>	16.67	2.01	7.91				0.57		0.88				9.16							7.46	42.37												
<i>Mitchella repens</i>	26.67	1.07	2.17					0.51		5.00		7.58				3.58							2.99	5.31					6.12			1.00	
<i>Nyssa sylvatica</i>	36.67	0.61	1.40	0.22	5.79					1.14		1.52			0.16		4.59		2.09				2.24						0.22		0.16	0.20	
<i>Ostrya virginiana</i>	16.67	0.51	1.61										2.21			6.42										0.20			0.46			6.01	
<i>Oxalis corniculata</i>	3.33	0.00	0.01				0.04																										
<i>Oxalis stricta</i>	3.33	0.01	0.03																													0.16	
<i>Oxydendrum arboreum</i>	6.67	0.31	1.43																									1.47	7.74				
<i>Panicum</i> sp.	50.00	2.21	4.98	1.11	0.83	1.34	0.57	0.51	1.31	1.14			0.39						2.09		0.18				2.04	12.06	22.13			9.28	11.36		
<i>Parthenocissus quinquefolia</i>	73.33	2.17	3.59	1.55		1.76	15.66		0.88	1.14	0.97		1.58	8.91	0.33	1.43	10.09		2.51	6.97	1.29				1.22	0.29	2.41		0.22	0.46	1.14	2.15	2.00
<i>Pinus echinata</i>	3.33	0.00	0.02					0.10																									
<i>Pinus</i> sp.	6.67	0.06	0.32													0.12												1.76					
<i>Pinus taeda</i>	20.00	0.18	0.60		0.17	0.19														0.25	0.04					2.35				2.41			
<i>Poaceae</i>	50.00	1.66	2.81	1.11			1.71	0.51		1.14					0.82		5.50			1.24			2.24		1.22	2.94	8.05	11.73		5.57	4.87	1.00	
<i>Polystichum acrostichoides</i>	36.67	4.09	6.95			1.14	10.86	15.85		18.18			24.09	8.53		0.60											7.04		6.64	17.63		12.02	
<i>Prenanthes</i> sp.	10.00	0.18	0.89								4.85																0.20			0.46			
<i>Prunus serotina</i>	30.00	0.13	0.26						0.22				0.39			0.60			0.42				1.12	0.60	0.20						0.09	0.40	

Table 7. (Continued.)

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
<i>Prunus</i> sp.	3.33	0.15	0.84														4.59																
<i>Quercus alba</i>	23.33	0.26	0.52					0.51		1.14								1.29							1.02	1.76	1.21						1.00
<i>Quercus falcata</i>	33.33	1.88	7.06			1.14				1.14	38.83				1.64		4.59		2.09			1.41			1.22	1.47		2.93					
<i>Quercus laurifolia</i>	3.33	0.09	0.48																									2.64					
<i>Quercus nigra</i>	46.67	0.79	2.15	0.22	0.83		0.57		0.22			1.52	0.55	2.27			0.92			0.25	0.37		11.41		0.20				3.32			0.95	
<i>Quercus prinus</i>	3.33	0.80	4.37																					23.95									
<i>Quercus rubra</i>	3.33	0.29	1.61																							8.82							
<i>Quercus</i> sp.	20.00	0.34	0.86	1.33						1.36								4.18									1.01				0.81		1.40
<i>Quercus stellata</i>	10.00	0.68	2.74								4.85														1.02				14.38				
<i>Rhus copallinum</i>	3.33	0.01	0.03			0.19																											
<i>Rubus argutus</i>	3.33	0.58	3.17			17.36																											
<i>Rubus cuneifolius</i>	3.33	0.01	0.03																		0.18												
<i>Rubus</i> sp.	13.33	0.40	1.33	6.65			0.69		2.85					1.90																			
<i>Sanicula canadensis</i>	20.00	0.12	0.31			0.23	0.57		0.22	1.14			0.08							1.24													
<i>Sassafras albidum</i>	36.67	0.59	1.68	0.22	0.17				0.22		8.74		0.08	0.32											3.06	1.47		1.47		1.02		0.86	
<i>Scleria triglomerata</i>	36.67	2.57	4.81					0.10	2.63		4.85				1.64										12.24	12.06	8.05		1.11	18.55	9.74		6.01
<i>Smilax bonanox</i>	6.67	0.10	0.44				0.57						2.37																				
<i>Smilax glauca</i>	73.33	1.75	2.24	1.11	8.44	0.38			0.22	3.86	1.94		0.39		5.73	0.60		1.55	4.18	1.24		0.28	5.15	2.99	0.20		1.21	6.16	1.55	3.43	0.81		1.20
<i>Smilax rotundifolia</i>	33.33	5.45	12.33	41.24	4.97	1.34			25.42	1.14		45.45					27.52			7.46											6.49	2.58	
<i>Smilax</i> sp.	76.67	3.27	4.62		4.97	0.19	1.14	2.56			1.94	12.12	1.26	2.34		8.00	18.35		13.81	1.24	4.79			9.58	3.27	2.06	0.40	0.88	3.54	0.93	0.97	3.53	0.20
<i>Thalictrum thalictroides</i>	3.33	0.05	0.27																							1.47							
<i>Toxicodendron radicans</i>	43.33	1.36	3.55			1.14	1.14		4.16				2.76	2.59		0.24				18.91	1.33			3.59	0.20		0.40			0.81	3.61		
<i>Uvularia</i> sp.	3.33	0.11	0.63				3.43																										
<i>Vaccinium arboreum</i>	10.00	0.26	1.10		5.79						1.94											0.14											
<i>Vaccinium elliotii</i>	13.33	0.15	0.46									0.32						2.09										1.11				1.00	
<i>Vaccinium pallidum</i>	26.67	4.36	9.86					35.79			9.71						32.47	4.18				4.24	27.96		6.12			10.26					

Table 7. (Continued.)

Species	Freq	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
Verbesina sp.	13.33	2.15	7.14			2.29			33.96					8.84							19.53												
Viola sp.	13.33	0.09	0.39			0.04	0.11												2.09											0.46			
Vitis rotundifolia	96.67	31.32	20.88	34.37	52.15	28.23	14.29	32.72	2.85	44.55	4.85	24.24	28.52	29.44	81.83	39.67	4.59	60.16	46.44	33.58		73.45	49.44	24.55	56.12	19.41	33.40	1.47	13.27	8.44	37.34	24.10	36.27
Yucca filamentosa	3.33	0.16	0.87											4.74																			
Ground Condition																																	
Bare Ground	76.67	2.96	3.61	17.30	8.49		3.32		4.38	0.21	3.14		6.45	6.12	1.28	0.21	4.02	2.55	1.25	3.17	4.23	0.21	1.26	1.48		3.38			1.26	4.23	4.26	6.69	
Exposed Rock	23.33	0.65	2.11			3.14				0.21									0.21			3.81					1.28		0.21		10.75		
Leaf Litter/Duff	100.00	95.17	4.37	82.50	91.30	96.86	95.02	100.00	95.62	93.72	96.86	97.45	85.48	91.43	98.72	97.03	95.77	97.24	95.42	96.83	95.77	95.97	96.86	96.83	100.00	96.62	98.51	99.57	96.02	95.77	84.99	90.79	100.00
Tree Base	33.33	0.83	1.72							5.65			6.85	2.45	1.27		0.21	3.13						1.27			0.21		1.26		2.51		
Upland Non-Vascular Lichen	40.00	0.39	0.70	0.20	0.21		1.66			0.21		2.55	1.21		1.48	0.21							1.88	0.42				0.43	1.26				

Table 8. Average canopy species size, measured as diameter (cm) at breast height (DBH) for species sampled in vegetation monitoring macroplots at Horseshoe Bend National Military Park, 2011. Numbers in parentheses indicate the number of individual trees measured within each plot. DBH measurements are averaged across DBH plots at each sampling location, and park-wide calculations are averaged across all sampling locations. [Avg – Average; SD – Standard Deviation].

Species	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
Acer glabrum	13.90	10.14						13.50 (4)												14.30 (1)												
Acer rubrum	9.96	4.00	9.24 (5)			18.80 (1)			14.26 (5)		9.20 (8)	13.50 (1)	7.47 (10)		6.60 (4)	9.90 (1)		7.00 (1)	10.20 (1)		11.75 (2)	14.30 (1)	11.20 (1)		6.34 (5)		5.10 (1)	7.58 (8)		6.63 (3)	10.28 (4)	
Fetula nigra	18.25	19.73	18.25 (2)																													
Larix laricina	8.89	1.81	5.26 (11)										6.50 (2)															17.90 (1)		11.37 (3)	4.70 (1)	7.60 (3)
Larix laricina	18.65	5.96	13.90 (3)			5.25 (2)	24.10 (2)			13.08 (4)							20.37 (3)			21.15 (2)	12.20 (2)		19.27 (9)	25.70 (1)	20.40 (2)		4.40 (1)		44.00 (1)			
Larix laricina	10.15	0.21												10.15 (2)																		
Castanea pumila	6.40	2.55				6.40 (2)																										
Catalpa bignonioides	23.10	2.97						33.90 (2)												12.30 (1)												
Cercis canadensis	6.30					8.40 (1)										4.20 (1)																
Cornus florida	9.68	3.57	6.95 (2)	11.13 (3)		10.80 (4)			10.23 (7)	12.60 (1)		6.40 (2)	6.54 (5)	11.70 (3)	12.43 (3)	7.90 (7)	7.78 (5)			6.60 (3)	12.90 (4)	7.90 (5)	11.70 (1)	11.52 (6)	9.10 (2)	10.80 (4)	7.23 (3)	8.92 (5)		10.51 (7)	12.85 (2)	8.15 (2)
Quercus virginiana	5.10																										5.10 (1)					
Agave randifolia	11.62	6.80		10.20 (2)		11.15 (2)				13.43 (4)					11.23 (7)	7.60 (2)					23.00 (1)	10.75 (2)	11.75 (6)	21.20 (2)	8.73 (3)	4.20 (1)		10.83 (6)			7.00 (1)	
Raxinus ennsylvanica	8.90	1.13	9.30 (2)					6.50 (1)											7.95 (4)						10.80 (1)							
Lalesia carolina	5.19	0.70																													5.19 (7)	
Lamamelis virginiana	4.40																							4.40 (1)								
Uglans nigra	24.80	5.11						24.80 (3)																								
Uniperus virginiana	10.26			8.00 (1)						11.80 (1)													9.10 (1)	9.30 (1)				13.10 (1)				
Liquidambar styraciflua	14.57	6.54	9.77 (3)	20.10 (2)	4.50 (2)	20.20 (6)	15.61 (9)		20.23 (3)	17.63 (3)	16.88 (9)	20.29 (8)	10.34 (14)	13.88 (9)	14.44 (14)	21.92 (9)		13.65 (2)	6.25 (6)	25.60 (1)		9.61 (19)		17.76 (9)	5.00 (1)	7.97 (12)	12.10 (4)	11.07 (15)	21.51 (12)		13.34 (14)	
Iriodendron ilipifera	22.73	9.63	33.75 (4)	12.20 (3)	9.23 (7)	41.35 (2)			12.26 (7)	13.20 (1)	38.90 (1)	18.24 (8)			19.37 (3)	48.00 (1)		22.83 (3)	12.78 (9)	21.03 (4)	36.00 (1)			27.90 (1)	28.90 (2)	16.57 (6)		9.27 (6)	15.80 (1)		16.98 (4)	
Lorus rubra	12.85											9.70 (1)								21.70 (1)	10.30 (1)										9.70 (1)	
Lyssa ylvatica	7.69	2.37	10.16 (5)			8.80 (6)			4.20 (1)	6.77 (3)	6.29 (8)			15.90 (1)		6.20 (1)	6.72 (5)				7.55 (2)	9.70 (1)			7.83 (3)	5.93 (3)	7.00 (1)			4.60 (1)		
Lstrya virginiana	8.82	3.89				7.00 (1)							9.15 (2)			6.43 (3)			7.50 (1)					18.80 (1)				4.50 (1)		8.33 (11)		8.81 (9)
Lxydendrum rboreum	13.12	4.80		15.74 (5)		9.95 (4)	15.25 (2)		9.06 (15)	16.38 (4)				18.50 (2)			18.95 (2)	12.88 (5)			15.70 (1)	8.23 (15)	13.85 (4)		11.88 (8)		10.89 (8)	10.08 (6)			9.50 (4)	
Pinus chinata	18.28	3.76				17.40 (1)		33.50 (1)						11.60 (1)	29.30 (1)	25.60 (1)					11.90 (2)	19.10 (3)	15.25 (2)				12.89 (8)	6.30 (1)				

Table 8. (Continued.)

Species	Avg	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5	
<i>Pinus palustris</i>	38.15	0.35							44.30 (1)	38.60 (1)											31.55 (2)												
<i>Pinus taeda</i>	37.17	14.02		36.34 (10)	43.10 (5)				50.50 (2)	25.58 (8)	29.97 (3)		28.98 (5)		47.33 (4)	21.20 (1)		38.53 (9)			19.10 (1)	37.60 (2)	37.75 (2)				9.83 (23)	37.48 (6)	58.50 (1)		63.30 (1)	46.88 (5)	
<i>Prunus serotina</i>	14.73	4.36																					14.70 (1)									14.77 (3)	
<i>Quercus alba</i>	17.76	9.09					21.63 (3)		10.90 (2)	26.10 (2)							13.95 (6)				17.65 (2)	13.60 (2)	5.40 (1)	31.20 (4)	21.65 (2)	7.40 (1)		30.50 (1)				13.13 (4)	
<i>Quercus falcata</i>	21.81	13.48		4.10 (1)		20.30 (1)				34.40 (2)	32.70 (1)			46.00 (2)			29.55 (2)	10.10 (1)					9.03 (4)	34.20 (3)		7.10 (1)						12.40 (1)	
<i>Quercus laurifolia</i>	14.92	10.42									33.55 (2)		13.90 (1)		7.93 (3)												4.30 (1)						
<i>Quercus marilandica</i>	21.30																										21.30 (1)						
<i>Quercus nigra</i>	17.11	9.76	16.91 (7)			23.93 (3)					16.40 (2)	16.53 (6)			13.02 (6)	18.22 (6)			30.05 (2)	25.98 (5)		11.44 (5)		10.15 (2)			6.80 (3)	19.07 (3)	16.00 (1)		14.43 (9)	17.70 (1)	
<i>Quercus prinus</i>	23.46	16.47															11.20 (1)						35.73 (4)										
<i>Quercus rubra</i>	23.74	11.59					13.80 (1)										29.47 (3)				23.35 (2)		39.20 (1)	22.70 (1)	14.30 (1)							23.35 (2)	
<i>Quercus shumardii</i>	22.40																												22.40 (1)				
<i>Quercus stellata</i>	24.40	8.41		32.90 (1)							30.75 (2)							6.50 (1)			9.30 (1)				34.30 (1)		20.70 (1)				36.35 (2)		
<i>Sassafras albidum</i>	5.30			5.30 (1)																													
<i>Tilia americana</i> var. <i>heterophylla</i>	8.60	6.22																														8.60 (2)	
<i>Ulmus alata</i>	10.72	8.63				10.72 (13)																											
<i>Ulmus rubra</i>	9.10		9.10 (1)																														
<i>Vaccinium arboreum</i>	5.36	0.95		4.50 (1)						6.15 (2)						4.83 (3)					4.60 (1)	7.11 (7)	5.10 (6)				5.97 (15)				4.60 (2)		
<i>Acer negundo</i> (dead)	4.70							4.70 (1)																									
<i>Acer rubrum</i> (dead)	6.47	1.91									7.00 (1)							5.90 (1)				4.50 (1)					6.40 (2)	9.50 (2)				5.50 (1)	
<i>Betula nigra</i> (dead)	32.53	7.56	32.53 (3)																														
<i>Carpinus caroliniana</i> (dead)	7.30																														7.30 (1)		
<i>Carya alba</i> (dead)	17.30																						17.30 (1)										
<i>Catalpa bignonioides</i> (dead)	12.00							12.00 (1)																									

Table 8. (Continued.)[illegible]

Table 9. Seedling frequency for canopy and shrub species in vegetation monitoring macroplots at Horseshoe Bend National Military Park, 2011. Seedling frequency is averaged across groundcover plots at each sampling location, and park-wide calculations are averaged across all sampling locations. [SD – Standard Deviation].

pecies	Total Seedlings	Seedlings Per m ²	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
icer egundo	11	0.31	0.32						0.08												0.67												0.17
icer rubrum	66	0.39	0.43	0.08			0.08	0.08		0.92	0.42		0.17					0.17					0.08	0.17		1.42		0.08	1.00	0.58			0.25
icer accharum	6	0.13	0.05													0.08				0.17							0.17						0.08
melanchier rborea	2	0.17																								0.17							
simina arvilflora	2	0.08	0.00																						0.08								0.08
simina iloba	4	0.17	0.00					0.17			0.17																						
callicarpa mericana	1	0.08												0.08																			
carpinus caroliniana	13	0.22	0.07	0.25									0.33														0.17		0.17				0.17
carya alba	22	0.17	0.11		0.08						0.08				0.42		0.17		0.08		0.17	0.08				0.17			0.08	0.25		0.25	
carya glabra	20	0.14	0.08												0.08					0.08		0.25				0.08	0.08					0.25	
cercis canadensis	4	0.17	0.12																								0.25			0.08			
chionanthus virginicus	2	0.08	0.00																					0.08						0.08			
cornus florida	39	0.25	0.24	0.08			0.75	0.08		0.08			0.17		0.08				0.17			0.33		0.08		0.75	0.17		0.33		0.17		
diostyros virginiana	10	0.17	0.12			0.25							0.33									0.08		0.08	0.08								
duonymus mericanus	7	0.29	0.18																						0.17								0.42
agus randifolia	3	0.13	0.06					0.17																			0.08						
raxinus ennsylvanica	10	0.28	0.34						0.08												0.67												0.08
talesia lptera	1	0.08											0.08																				
igustrum inense	43	0.60	0.57						1.67				0.67	0.17						0.42	0.58												0.08
iquidambar tyraciflua	11	0.11	0.04		0.17								0.08		0.08		0.08			0.17			0.08			0.17			0.08				
iriodendron ilipifera	2	0.08	0.00	0.08			0.08																										
tagnoliopsida	1	0.08																								0.08							
lyssa ylvatica	17	0.13	0.10	0.08	0.17					0.08		0.08			0.08		0.08		0.17				0.42						0.08		0.08		0.08

Table 9. (Continued.)

Species	Total Seedlings	Seedlings Per m²	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	19	21	22	23	24	25	26	28	29	30	Alt1	Alt3	Alt4	Alt5
<i>Ostrya virginiana</i>	12	0.20	0.13											0.33			0.33										0.08			0.08			0.17
<i>Oxydendrum arboreum</i>	7	0.29	0.29																									0.08	0.50				
<i>Pinus echinata</i>	1	0.08						0.08																									
<i>Pinus</i> sp.	3	0.13	0.06													0.08													0.17				
<i>Pinus taeda</i>	22	0.31	0.40		0.08	0.08														0.08	0.08					0.42				1.08			
<i>Prunus serotina</i>	13	0.12	0.06						0.08				0.08			0.08			0.08				0.17	0.08	0.17							0.08	0.25
<i>Prunus</i> sp.	2	0.17															0.17																
<i>Quercus alba</i>	10	0.12	0.04					0.08		0.08								0.17							0.08	0.17	0.17						0.08
<i>Quercus falcata</i>	24	0.20	0.10			0.25				0.25	0.42			0.17		0.08		0.17			0.17			0.25	0.08		0.17						
<i>Quercus laurifolia</i>	8	0.67																										0.67					
<i>Quercus nigra</i>	38	0.23	0.19	0.08	0.08		0.25		0.08			0.08	0.25	0.50		0.08			0.08	0.17		0.67		0.08					0.50			0.25	
<i>Quercus prinus</i>	5	0.42																					0.42										
<i>Quercus rubra</i>	1	0.08																							0.08								
<i>Quercus</i> sp.	14	0.19	0.09	0.25						0.17									0.17								0.08				0.17		0.33
<i>Quercus stellata</i>	8	0.22	0.17								0.17													0.08					0.42				
<i>Rhus copallinum</i>	1	0.08				0.08																											
<i>Sassafras albidum</i>	24	0.18	0.14	0.08	0.08				0.08		0.42		0.08	0.08											0.33	0.17		0.08		0.42		0.17	
<i>Vaccinium arboreum</i>	8	0.22	0.13		0.33						0.25											0.08											
<i>Vaccinium elliotii</i>	4	0.08	0.00										0.08					0.08											0.08				0.08
<i>Vaccinium pallidum</i>	192	2.00	3.15					9.08			0.17							4.17	0.33			0.42	0.67		0.42			0.75					

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Appendix A. Plant species known to occur at HOBE.

Table A-1. Vascular plant species known to occur at Horseshoe Bend National Military Park (NPSpecies 2011) and species detected during 2011 monitoring efforts.

Order	Family	Scientific Name	NPSpecies	This Study
Alismatales	Alismataceae	<i>Sagittaria latifolia</i>	X	
Alismatales	Araceae	<i>Arisaema dracontium</i>	X	
Alismatales	Araceae	<i>Arisaema triphyllum</i>	X	
Alismatales	Araceae	<i>Peltandra virginica</i>	X	
Apiales	Apiaceae	<i>Chaerophyllum tainturieri</i>	X	
Apiales	Apiaceae	<i>Cicuta maculata</i>	X	
Apiales	Apiaceae	<i>Cryptotaenia canadensis</i>	X	
Apiales	Apiaceae	<i>Cyclospermum leptophyllum</i>	X	
Apiales	Apiaceae	<i>Daucus carota</i>	X	
Apiales	Apiaceae	<i>Daucus pusillus</i>	X	
Apiales	Apiaceae	<i>Eryngium prostratum</i>	X	
Apiales	Apiaceae	<i>Eryngium yuccifolium</i>	X	
Apiales	Apiaceae	<i>Sanicula canadensis</i>	X	X
Apiales	Apiaceae	<i>Sanicula smallii</i>	X	
Apiales	Apiaceae	<i>Thaspium</i> sp.	X	
Apiales	Araliaceae	<i>Aralia spinosa</i>	X	
Apiales	Araliaceae	<i>Hydrocotyle verticillata</i>	X	
Aquifoliales	Aquifoliaceae	<i>Ilex decidua</i>	X	
Aquifoliales	Aquifoliaceae	<i>Ilex opaca</i>	X	X
Aquifoliales	Aquifoliaceae	<i>Ilex vomitoria</i>	X	X
Asparagales	Amaryllidaceae	<i>Allium canadense</i>	X	
Asparagales	Amaryllidaceae	<i>Hymenocallis caroliniana</i>	X	
Asparagales	Amaryllidaceae	<i>Nothoscordum bivalve</i>	X	
Asparagales	Amaryllidaceae	<i>Zephyranthes atamasca</i>	X	
Asparagales	Asparagaceae	<i>Manfreda virginica</i>	X	
Asparagales	Asparagaceae	<i>Polygonatum biflorum</i>	X	X
Asparagales	Asparagaceae	<i>Smilacina racemosa</i>	X	
Asparagales	Asparagaceae	<i>Yucca filamentosa</i>	X	X
Asparagales	Hypoxidaceae	<i>Hypoxis hirsuta</i>	X	X
Asparagales	Iridaceae	<i>Iris cristata</i>	X	
Asparagales	Iridaceae	<i>Iris verna</i>	X	
Asparagales	Iridaceae	<i>Sisyrinchium fuscatum</i>	X	
Asparagales	Iridaceae	<i>Sisyrinchium mucronatum</i>	X	
Asparagales	Orchidaceae	<i>Goodyera pubescens</i>	X	X
Asparagales	Orchidaceae	<i>Habenaria flava</i>	X	
Asparagales	Orchidaceae	<i>Malaxis unifolia</i>	X	
Asparagales	Orchidaceae	<i>Platanthera clavellata</i>	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Asparagales	Orchidaceae	<i>Platanthera cristata</i>	X	
Asparagales	Orchidaceae	<i>Spiranthes cernua</i>	X	
Asparagales	Orchidaceae	<i>Tipularia discolor</i>	X	
Asterales	Asteraceae	<i>Acer saccharum</i>		X
Asterales	Asteraceae	<i>Acer</i> sp.	X	X
Asterales	Asteraceae	<i>Achillea millefolium</i>	X	
Asterales	Asteraceae	<i>Ambrosia artemisiifolia</i>	X	
Asterales	Asteraceae	<i>Antennaria plantaginifolia</i>	X	
Asterales	Asteraceae	<i>Aster lateriflorus</i>	X	
Asterales	Asteraceae	<i>Aster pilosus</i>	X	
Asterales	Asteraceae	<i>Bidens</i> sp.	X	
Asterales	Asteraceae	<i>Carduus spinosissimus</i>	X	
Asterales	Asteraceae	<i>Cirsium discolor</i>	X	
Asterales	Asteraceae	<i>Conoclinium coelestinum</i>	X	
Asterales	Asteraceae	<i>Coreopsis auriculata</i>	X	
Asterales	Asteraceae	<i>Coreopsis major</i>	X	
Asterales	Asteraceae	<i>Elephantopus carolinianus</i>	X	
Asterales	Asteraceae	<i>Elephantopus tomentosus</i>	X	X
Asterales	Asteraceae	<i>Erechtites hieraciifolia</i>	X	
Asterales	Asteraceae	<i>Erigeron annuus</i>	X	
Asterales	Asteraceae	<i>Erigeron canadensis</i>	X	
Asterales	Asteraceae	<i>Erigeron philadelphicus</i>	X	
Asterales	Asteraceae	<i>Erigeron strigosus</i>	X	
Asterales	Asteraceae	<i>Eupatorium capillifolium</i>	X	X
Asterales	Asteraceae	<i>Eupatorium fistulosum</i>	X	X
Asterales	Asteraceae	<i>Eupatorium glaucescens</i>	X	
Asterales	Asteraceae	<i>Eupatorium purpureum</i>	X	
Asterales	Asteraceae	<i>Eupatorium rugosum</i>	X	
Asterales	Asteraceae	<i>Eupatorium serotinum</i>	X	
Asterales	Asteraceae	<i>Eupatorium</i> sp.	X	X
Asterales	Asteraceae	<i>Gamochaeta purpurea</i>	X	
Asterales	Asteraceae	<i>Gnaphalium obtusifolium</i>	X	
Asterales	Asteraceae	<i>Helenium amarum</i>	X	
Asterales	Asteraceae	<i>Helianthus angustifolius</i>	X	
Asterales	Asteraceae	<i>Helianthus tuberosus</i>	X	
Asterales	Asteraceae	<i>Heterotheca graminifolia</i>	X	
Asterales	Asteraceae	<i>Hieracium gronovii</i>	X	
Asterales	Asteraceae	<i>Hieracium venosum</i>	X	
Asterales	Asteraceae	<i>Krigia dandelion</i>	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Asterales	Asteraceae	<i>Lactuca</i> sp.	X	
Asterales	Asteraceae	<i>Liatris squarrosa</i>	X	
Asterales	Asteraceae	<i>Mikania scandens</i>	X	X
Asterales	Asteraceae	<i>Packera anonyma</i>	X	
Asterales	Asteraceae	<i>Packera glabella</i>	X	
Asterales	Asteraceae	<i>Pityopsis graminifolia</i>		X
Asterales	Asteraceae	<i>Pluchea camphorata</i>	X	
Asterales	Asteraceae	<i>Prenanthes</i> sp.		X
Asterales	Asteraceae	<i>Pyrrhopappus carolinianus</i>	X	
Asterales	Asteraceae	<i>Rudbeckia fulgida</i>	X	
Asterales	Asteraceae	<i>Rudbeckia hirta</i>	X	
Asterales	Asteraceae	<i>Rudbeckia laciniata</i>	X	
Asterales	Asteraceae	<i>Silphium asteriscus</i>	X	
Asterales	Asteraceae	<i>Silphium compositum</i>	X	
Asterales	Asteraceae	<i>Silphium dentatum</i>	X	
Asterales	Asteraceae	<i>Smallanthus uvedalius</i>	X	
Asterales	Asteraceae	<i>Solidago caesia</i>	X	
Asterales	Asteraceae	<i>Solidago nemoralis</i>	X	
Asterales	Asteraceae	<i>Solidago rugosa</i>	X	
Asterales	Asteraceae	<i>Solidago</i> sp.	X	X
Asterales	Asteraceae	<i>Sonchus</i> sp.	X	
Asterales	Asteraceae	<i>Symphyotrichum divaricatum</i>	X	
Asterales	Asteraceae	<i>Symphyotrichum racemosum</i>	X	
Asterales	Asteraceae	<i>Taraxacum officinale</i>	X	
Asterales	Asteraceae	unknown Asteraceae	X	X
Asterales	Asteraceae	<i>Verbesina alternifolia</i>	X	
Asterales	Asteraceae	<i>Verbesina occidentalis</i>	X	
Asterales	Asteraceae	<i>Verbesina</i> sp.	X	X
Asterales	Asteraceae	<i>Verbesina virginica</i>	X	
Asterales	Asteraceae	<i>Vernonia altissima</i>	X	
Asterales	Campanulaceae	<i>Lobelia cardinalis</i>	X	
Asterales	Campanulaceae	<i>Lobelia puberula</i>	X	
Asterales	Campanulaceae	<i>Specularia perfoliata</i>	X	
Boraginales	Boraginaceae	<i>Heliotropium indicum</i>	X	
Brassicales	Brassicaceae	<i>Lepidium virginicum</i>	X	
Caryophyllales	Amaranthaceae	<i>Amaranthus</i> sp.	X	
Caryophyllales	Cactaceae	<i>Opuntia ficus-indica</i>	X	
Caryophyllales	Caryophyllaceae	<i>Cerastium glomeratum</i>	X	
Caryophyllales	Caryophyllaceae	<i>Silene stellata</i>	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Caryophyllales	Caryophyllaceae	<i>Silene virginica</i>	X	
Caryophyllales	Caryophyllaceae	<i>Stellaria</i> sp.	X	
Caryophyllales	Caryophyllaceae	unknown Caryophyllaceae	X	X
Caryophyllales	Phytolaccaceae	<i>Phytolacca americana</i>	X	X
Caryophyllales	Polygonaceae	<i>Polygonum caespitosum</i> var. <i>longisetum</i>	X	
Caryophyllales	Polygonaceae	<i>Polygonum coccineum</i>	X	
Caryophyllales	Polygonaceae	<i>Polygonum punctatum</i>	X	
Caryophyllales	Polygonaceae	<i>Polygonum</i> sp.	X	X
Caryophyllales	Polygonaceae	<i>Polygonum virginianum</i>	X	
Caryophyllales	Polygonaceae	<i>Rumex acetosella</i>	X	
Caryophyllales	Polygonaceae	<i>Rumex crispus</i>	X	
Celastrales	Celastraceae	<i>Euonymus americana</i>	X	X
Commelinales	Commelinaceae	<i>Commelina erecta</i>	X	
Commelinales	Commelinaceae	<i>Commelina virginica</i>	X	
Commelinales	Commelinaceae	<i>Tradescantia ohiensis</i>	X	X
Commelinales	Commelinaceae	<i>Tradescantia virginiana</i>	X	
Commelinales	Pontederiaceae	<i>Pontederia cordata</i>	X	
Cornales	Cornaceae	<i>Cornus amomum</i>	X	
Cornales	Cornaceae	<i>Cornus florida</i>	X	X
Cornales	Cornaceae	<i>Cornus foemina</i>	X	X
Cornales	Hydrangeaceae	<i>Decumaria barbara</i>	X	X
Cornales	Hydrangeaceae	<i>Hydrangea arborescens</i>	X	
Cornales	Hydrangeaceae	<i>Hydrangea quercifolia</i>	X	X
Cornales	Hydrangeaceae	<i>Philadelphus inodorus</i>	X	
Cornales	Nyssaceae	<i>Nyssa sylvatica</i>	X	X
Crossosomatales	Staphyleaceae	<i>Staphylea trifolia</i>	X	X
Cucurbitales	Cucurbitaceae	<i>Melothria pendula</i>	X	X
Cucurbitales	Cucurbitaceae	<i>Sicyos angulatus</i>	X	
Cupressales	Cupressaceae	<i>Juniperus virginiana</i>	X	X
Dioscoreales	Dioscoreaceae	<i>Dioscorea oppositifolia</i>	X	
Dioscoreales	Dioscoreaceae	<i>Dioscorea villosa</i>	X	X
Dipsacales	Adoxaceae	<i>Sambucus canadensis</i>	X	
Dipsacales	Adoxaceae	<i>Viburnum nudum</i>		X
Dipsacales	Adoxaceae	<i>Viburnum rufidulum</i>		X
Dipsacales	Adoxaceae	<i>Viburnum</i> sp.	X	
Dipsacales	Caprifoliaceae	<i>Lonicera japonica</i>	X	X
Dipsacales	Caprifoliaceae	<i>Lonicera sempervirens</i>	X	
Dipsacales	Valerianaceae	<i>Valerianella radiata</i>	X	
Ericales	Balsaminaceae	<i>Impatiens capensis</i>	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Ericales	Diapensiaceae	<i>Galax urceolata</i>	X	
Ericales	Ebenaceae	<i>Diospyros virginiana</i>	X	X
Ericales	Ericaceae	<i>Chimaphila maculata</i>	X	
Ericales	Ericaceae	<i>Gaylussacia dumosa</i>	X	
Ericales	Ericaceae	<i>Kalmia latifolia</i>	X	
Ericales	Ericaceae	<i>Oxydendrum arboreum</i>	X	X
Ericales	Ericaceae	<i>Rhododendron canescens</i>	X	X
Ericales	Ericaceae	<i>Vaccinium arboreum</i>	X	X
Ericales	Ericaceae	<i>Vaccinium elliotii</i>	X	X
Ericales	Ericaceae	<i>Vaccinium pallidum</i>	X	X
Ericales	Ericaceae	<i>Vaccinium stamineum</i>	X	
Ericales	Polemoniaceae	<i>Phlox</i> sp.	X	
Ericales	Polemoniaceae	<i>Phlox amoena</i>	X	
Ericales	Polemoniaceae	<i>Phlox divaricata</i>	X	
Ericales	Primulaceae	<i>Lysimachia ciliata</i>	X	
Ericales	Primulaceae	<i>Lysimachia quadrifolia</i>		X
Ericales	Styracaceae	<i>Halesia carolina</i>	X	X
Ericales	Styracaceae	<i>Halesia diptera</i>	X	X
Ericales	Styracaceae	<i>Styrax americanus</i>	X	
Fabales	Fabaceae	<i>Albizia julibrissin</i>	X	X
Fabales	Fabaceae	<i>Amorpha fruticosa</i>	X	X
Fabales	Fabaceae	<i>Amphicarpaea bracteata</i>	X	
Fabales	Fabaceae	<i>Apios americana</i>	X	
Fabales	Fabaceae	<i>Cassia fasciculata</i>	X	
Fabales	Fabaceae	<i>Cassia nictitans</i>	X	
Fabales	Fabaceae	<i>Centrosema virginianum</i>	X	X
Fabales	Fabaceae	<i>Cercis canadensis</i>	X	X
Fabales	Fabaceae	<i>Clitoria mariana</i>		X
Fabales	Fabaceae	<i>Coronilla varia</i>	X	
Fabales	Fabaceae	<i>Desmodium lineatum</i>	X	
Fabales	Fabaceae	<i>Desmodium nudiflorum</i>	X	
Fabales	Fabaceae	<i>Desmodium</i> sp.	X	X
Fabales	Fabaceae	<i>Desmodium tenuifolium</i>	X	
Fabales	Fabaceae	<i>Gleditsia triacanthos</i>	X	
Fabales	Fabaceae	<i>Lespedeza cuneata</i>	X	X
Fabales	Fabaceae	<i>Lespedeza procumbens</i>	X	
Fabales	Fabaceae	<i>Lespedeza repens</i>	X	
Fabales	Fabaceae	<i>Mimosa microphylla</i>	X	
Fabales	Fabaceae	<i>Psoralea psoralioides</i>	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Fabales	Fabaceae	<i>Pueraria lobata</i>	X	
Fabales	Fabaceae	<i>Stylosanthes biflora</i>	X	
Fabales	Fabaceae	<i>Tephrosia virginiana</i>	X	
Fabales	Fabaceae	<i>Trifolium campestre</i>	X	
Fabales	Fabaceae	<i>Trifolium repens</i>	X	
Fabales	Fabaceae	unknown Fabaceae	X	X
Fabales	Fabaceae	<i>Vicia</i> sp.	X	X
Fabales	Polygalaceae	<i>Polygala curtissii</i>	X	
Fabales	Polygalaceae	<i>Polygala grandiflora</i>	X	
Fagales	Betulaceae	<i>Alnus serrulata</i>	X	
Fagales	Betulaceae	<i>Betula nigra</i>	X	X
Fagales	Betulaceae	<i>Carpinus caroliniana</i>	X	X
Fagales	Betulaceae	<i>Ostrya virginiana</i>	X	X
Fagales	Fagaceae	<i>Castanea pumila</i>	X	X
Fagales	Fagaceae	<i>Fagus grandifolia</i>	X	X
Fagales	Fagaceae	<i>Quercus alba</i>	X	X
Fagales	Fagaceae	<i>Quercus austrina</i>	X	
Fagales	Fagaceae	<i>Quercus falcata</i>	X	X
Fagales	Fagaceae	<i>Quercus laurifolia</i>	X	X
Fagales	Fagaceae	<i>Quercus marilandica</i>	X	X
Fagales	Fagaceae	<i>Quercus michauxii</i>	X	
Fagales	Fagaceae	<i>Quercus nigra</i>	X	X
Fagales	Fagaceae	<i>Quercus phellos</i>	X	
Fagales	Fagaceae	<i>Quercus prinus</i>	X	X
Fagales	Fagaceae	<i>Quercus rubra</i>	X	X
Fagales	Fagaceae	<i>Quercus</i> sp.	X	X
Fagales	Fagaceae	<i>Quercus stellata</i>	X	X
Fagales	Fagaceae	<i>Quercus velutina</i>	X	X
Fagales	Juglandaceae	<i>Carya alba</i>	X	X
Fagales	Juglandaceae	<i>Carya carolinae-septentrionalis</i>	X	X
Fagales	Juglandaceae	<i>Carya cordiformis</i>	X	
Fagales	Juglandaceae	<i>Carya glabra</i>	X	
Fagales	Juglandaceae	<i>Carya illinoensis</i>	X	
Fagales	Juglandaceae	<i>Juglans cinerea</i>	X	
Fagales	Juglandaceae	<i>Juglans nigra</i>	X	X
Fagales	Myricaceae	<i>Morella cerifera</i>	X	
Gentianales	Apocynaceae	<i>Apocyanum cannabinum</i>		X
Gentianales	Apocynaceae	<i>Asclepias quadrifolia</i>	X	
Gentianales	Apocynaceae	<i>Asclepias tuberosa</i>	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Gentianales	Apocynaceae	<i>Cynanchum laeve</i>	X	
Gentianales	Apocynaceae	<i>Gonolobus suberosa</i>	X	X
Gentianales	Apocynaceae	<i>unknown Apocynaceae</i>	X	X
Gentianales	Gelsemiaceae	<i>Gelsemium sempervirens</i>	X	X
Gentianales	Gentianaceae	<i>Sabatia angularis</i>	X	
Gentianales	Loganiaceae	<i>Spigelia marilandica</i>	X	
Gentianales	Rubiaceae	<i>Cephalanthus occidentalis</i>	X	X
Gentianales	Rubiaceae	<i>Diodia teres</i>	X	
Gentianales	Rubiaceae	<i>Diodia virginiana</i>	X	
Gentianales	Rubiaceae	<i>Galium aparine</i>	X	X
Gentianales	Rubiaceae	<i>Galium</i> sp.	X	
Gentianales	Rubiaceae	<i>Houstonia caerulea</i>	X	
Gentianales	Rubiaceae	<i>Houstonia longifolia</i>	X	
Gentianales	Rubiaceae	<i>Houstonia purpurea</i>	X	
Gentianales	Rubiaceae	<i>Mitchella repens</i>	X	X
Geraniales	Geraniaceae	<i>Geranium maculatum</i>	X	
Lamiales	Acanthaceae	<i>Justicia americana</i>	X	
Lamiales	Acanthaceae	<i>Ruellia caroliniensis</i>	X	
Lamiales	Bignoniaceae	<i>Bignonia capreolata</i>	X	X
Lamiales	Bignoniaceae	<i>Campsis radicans</i>	X	X
Lamiales	Bignoniaceae	<i>Catalpa bignonioides</i>	X	X
Lamiales	Bignoniaceae	<i>Catalpa speciosa</i>	X	
Lamiales	Lamiaceae	<i>Callicarpa americana</i>	X	X
Lamiales	Lamiaceae	<i>Collinsonia canadensis</i>	X	
Lamiales	Lamiaceae	<i>Collinsonia serotina</i>	X	
Lamiales	Lamiaceae	<i>Dracocephalum virginianum</i>	X	
Lamiales	Lamiaceae	<i>Glecoma hederacea</i>	X	
Lamiales	Lamiaceae	<i>Lamium amplexicaule</i>	X	
Lamiales	Lamiaceae	<i>Lycopus virginicus</i>	X	
Lamiales	Lamiaceae	<i>Monarda bradburiana</i>	X	
Lamiales	Lamiaceae	<i>Monarda punctata</i>	X	
Lamiales	Lamiaceae	<i>Prunella vulgaris</i>	X	
Lamiales	Lamiaceae	<i>Pycnanthemum incanum</i>	X	
Lamiales	Lamiaceae	<i>Salvia lyrata</i>	X	
Lamiales	Lamiaceae	<i>Salvia urticifolia</i>	X	
Lamiales	Lamiaceae	<i>Scutellaria integrifolia</i>	X	
Lamiales	Lamiaceae	<i>Scutellaria lateriflora</i>	X	
Lamiales	Lamiaceae	<i>Teucrium canadense</i>	X	
Lamiales	Lamiaceae	<i>unknown Lamiaceae</i>	X	X

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Lamiales	Oleaceae	<i>Chionanthus virginicus</i>	X	X
Lamiales	Oleaceae	<i>Fraxinus pennsylvanica</i>	X	X
Lamiales	Oleaceae	<i>Ligustrum sinense</i>	X	X
Lamiales	Orobanchaceae	<i>Agalinis fasciculata</i>	X	
Lamiales	Orobanchaceae	<i>Aureolaria flava</i>	X	
Lamiales	Orobanchaceae	<i>Aureolaria virginica</i>	X	
Lamiales	Orobanchaceae	<i>Epifagus virginiana</i>	X	X
Lamiales	Orobanchaceae	<i>Pedicularis canadensis</i>	X	
Lamiales	Phrymaceae	<i>Mimulus alatus</i>	X	
Lamiales	Phrymaceae	<i>Mimulus ringens</i>	X	
Lamiales	Plantaginaceae	<i>Nuttallanthus canadensis</i>	X	
Lamiales	Plantaginaceae	<i>Penstemon canescens</i>	X	
Lamiales	Plantaginaceae	<i>Penstemon laevigatus</i>	X	
Lamiales	Plantaginaceae	<i>Plantago aristata</i>	X	
Lamiales	Plantaginaceae	<i>Plantago lanceolata</i>	X	
Lamiales	Plantaginaceae	<i>Plantago rugelii</i>	X	
Lamiales	Plantaginaceae	<i>Plantago virginica</i>	X	
Lamiales	Plantaginaceae	<i>Veronica</i> sp.	X	
Lamiales	Scrophulariaceae	<i>Scrophularia marilandica</i>	X	
Lamiales	Scrophulariaceae	<i>Verbascum thapsus</i>	X	
Lamiales	Tetrachondraceae	<i>Polypremum procumbens</i>	X	
Lamiales	Verbenaceae	<i>Verbena bonariensis</i>	X	
Lamiales	Verbenaceae	<i>Verbena</i> sp.	X	
Laurales	Lauraceae	<i>Sassafras albidum</i>	X	X
Liliales	Colchicaceae	<i>Uvularia perfoliata</i>	X	X
Liliales	Colchicaceae	<i>Uvularia sessilifolia</i>	X	
Liliales	Colchicaceae	<i>Uvularia</i> sp.	X	X
Liliales	Liliaceae	<i>Lilium michauxii</i>	X	X
Liliales	Liliaceae	<i>Medeola virginiana</i>	X	
Liliales	Liliaceae	unknown <i>Liliaceae</i>	X	X
Liliales	Melanthiaceae	<i>Amianthium muscitoxicum</i>	X	
Liliales	Melanthiaceae	<i>Stenanthium gramineum</i>	X	
Liliales	Melanthiaceae	<i>Trillium catesbaei</i>	X	
Liliales	Melanthiaceae	<i>Trillium cuneatum</i>	X	
Liliales	Melanthiaceae	<i>Trillium</i> sp.	X	X
Liliales	Melanthiaceae	<i>Trillium underwoodii</i>	X	
Liliales	Smilacaceae	<i>Smilax</i> sp.	X	
Liliales	Smilacaceae	<i>Smilax bona-nox</i>	X	X
Liliales	Smilacaceae	<i>Smilax glauca</i>	X	X

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Liliales	Smilacaceae	<i>Smilax rotundifolia</i>	X	X
Liliales	Smilacaceae	<i>Smilax smallii</i>	X	
Liliales	Smilacaceae	<i>Smilax</i> sp.	X	X
Lycopodiales	Lycopodiaceae	<i>Lycopodium digitatum</i>	X	
Magnoliales	Annonaceae	<i>Asimina parviflora</i>	X	X
Magnoliales	Magnoliaceae	<i>Liriodendron tulipifera</i>	X	X
Magnoliales	Magnoliaceae	<i>Magnolia acuminata</i>	X	
Magnoliales	Magnoliaceae	<i>Magnolia grandiflora</i>	X	
Magnoliales	Magnoliaceae	<i>Magnolia virginiana</i>	X	X
Malpighiales	Euphorbiaceae	<i>Acalypha gracilens</i>		X
Malpighiales	Euphorbiaceae	<i>Cnidoscolus stimulosus</i>	X	
Malpighiales	Euphorbiaceae	<i>Euphorbia corollata</i>	X	
Malpighiales	Euphorbiaceae	<i>Euphorbia</i> sp.	X	X
Malpighiales	Euphorbiaceae	unknown Euphorbiaceae	X	X
Malpighiales	Hypericaceae	<i>Hypericum drummondii</i>	X	
Malpighiales	Hypericaceae	<i>Hypericum frondosum</i>	X	
Malpighiales	Hypericaceae	<i>Hypericum gentianoides</i>	X	
Malpighiales	Hypericaceae	<i>Hypericum hypericoides</i>	X	X
Malpighiales	Hypericaceae	<i>Hypericum mutilum</i>	X	
Malpighiales	Hypericaceae	<i>Hypericum punctatum</i>	X	
Malpighiales	Passifloraceae	<i>Passiflora incarnata</i>	X	
Malpighiales	Passifloraceae	<i>Passiflora lutea</i>		X
Malpighiales	Podostemaceae	<i>Podostemum ceratophyllum</i>	X	
Malpighiales	Salicaceae	<i>Populus deltoides</i>	X	
Malpighiales	Salicaceae	<i>Salix nigra</i>	X	
Malpighiales	Violaceae	<i>Viola pedata</i>	X	
Malpighiales	Violaceae	<i>Viola</i> sp.	X	X
Malpighiales	Violaceae	<i>Viola tripartita</i> var. <i>glaberrima</i>	X	
Malvales	Cistaceae	<i>Lechea racemulosa</i>	X	
Malvales	Malvaceae	<i>Hibiscus moscheutos</i>	X	
Malvales	Malvaceae	<i>Tilia americana</i> var. <i>heterophylla</i>	X	X
Myrtales	Melastomataceae	<i>Rhexia mariana</i>	X	
Myrtales	Melastomataceae	<i>Rhexia virginica</i>	X	
Myrtales	Onagraceae	<i>Ludwigia palustris</i>	X	
Myrtales	Onagraceae	<i>Ludwigia</i> sp.	X	X
Myrtales	Onagraceae	<i>Oenothera biennis</i>	X	
Myrtales	Onagraceae	<i>Oenothera speciosa</i>	X	
N/A	N/A	unknown Filicopsida (division)	X	X
N/A	N/A	unknown Magnoliopsida (division)	X	X

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
N/A	N/A	<i>unknown Plantae (kingdom)</i>	X	X
Nymphaeales	Cabombaceae	<i>Brasenia schreberi</i>	X	
Ophioglossales	Ophioglossaceae	<i>Botrychium biternatum</i>	X	X
Ophioglossales	Ophioglossaceae	<i>Botrychium virginianum</i>	X	X
Osmundales	Osmundaceae	<i>Osmunda cinnamomea</i>	X	X
Osmundales	Osmundaceae	<i>Osmunda regalis</i>	X	
Oxalidales	Oxalidaceae	<i>Oxalis grandis</i>	X	
Oxalidales	Oxalidaceae	<i>Oxalis stricta</i>	X	X
Oxalidales	Oxalidaceae	<i>Oxalis violacea</i>	X	
Pinales	Pinaceae	<i>Pinus echinata</i>	X	X
Pinales	Pinaceae	<i>Pinus palustris</i>	X	X
Pinales	Pinaceae	<i>Pinus</i> sp.	X	X
Pinales	Pinaceae	<i>Pinus taeda</i>	X	X
Piperales	Aristolochiaceae	<i>Aristolochia tomentosa</i>	X	
Piperales	Aristolochiaceae	<i>Hexastylis arifolia</i>	X	X
Piperales	Saururaceae	<i>Saururus cernuus</i>	X	
Poales	Bromeliaceae	<i>Tillandsia usneoides</i>	X	
Poales	Cyperaceae	<i>Carex festucacea</i>	X	
Poales	Cyperaceae	<i>Carex granularis</i>	X	
Poales	Cyperaceae	<i>Carex intumescens</i>	X	
Poales	Cyperaceae	<i>Carex leptalea</i>	X	
Poales	Cyperaceae	<i>Carex lurida</i>	X	
Poales	Cyperaceae	<i>Carex</i> sp.	X	X
Poales	Cyperaceae	<i>Carex vulpinoidea</i>	X	
Poales	Cyperaceae	<i>Cyperus echinatus</i>	X	
Poales	Cyperaceae	<i>Cyperus refractus</i>	X	
Poales	Cyperaceae	<i>Cyperus strigosus</i>	X	
Poales	Cyperaceae	<i>Dulichium arundinaceum</i>		X
Poales	Cyperaceae	<i>Eleocharis obtusa</i>	X	
Poales	Cyperaceae	<i>Schoenoplectus purshianus</i>	X	
Poales	Cyperaceae	<i>Scirpus cyperinus</i>	X	
Poales	Cyperaceae	<i>Scleria triglomerata</i>		X
Poales	Cyperaceae	<i>unknown Cyperaceae</i>	X	X
Poales	Juncaceae	<i>Juncus coriaceous</i>	X	
Poales	Juncaceae	<i>Juncus effusus</i>	X	
Poales	Juncaceae	<i>Juncus</i> sp.	X	X
Poales	Juncaceae	<i>Juncus validus</i>	X	
Poales	Juncaceae	<i>Luzula multiflora</i>	X	
Poales	Poaceae	<i>Andropogon virginicus</i>	X	X

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Poales	Poaceae	<i>Aristida</i> sp.	X	
Poales	Poaceae	<i>Arundinaria gigantea</i>	X	X
Poales	Poaceae	<i>Chasmanthium latifolium</i>	X	X
Poales	Poaceae	<i>Chasmanthium sessiliflorum</i>	X	X
Poales	Poaceae	<i>Cynodon dactylon</i>	X	
Poales	Poaceae	<i>Dichanthelium boscii</i>	X	
Poales	Poaceae	<i>Dichanthelium commutatum</i>	X	
Poales	Poaceae	<i>Digitaria</i> sp.	X	
Poales	Poaceae	<i>Eleusine indica</i>	X	
Poales	Poaceae	<i>Elymus virginicus</i>	X	
Poales	Poaceae	<i>Eragrostis capillaris</i>	X	
Poales	Poaceae	<i>Erianthus</i> sp.	X	
Poales	Poaceae	<i>Melica mutica</i>	X	
Poales	Poaceae	<i>Microstegium vimineum</i>		X
Poales	Poaceae	<i>Panicum</i> sp.	X	X
Poales	Poaceae	<i>Paspalum dilatatum</i>	X	
Poales	Poaceae	<i>Paspalum notatum</i> var. <i>saurae</i>	X	
Poales	Poaceae	<i>Piptochaetium avenaceum</i>	X	
Poales	Poaceae	<i>Poa sylvestris</i>	X	
Poales	Poaceae	<i>Saccharum giganteum</i>		X
Poales	Poaceae	<i>Sorghum halepense</i>	X	
Poales	Poaceae	<i>Sporobolus poiretii</i>	X	
Poales	Poaceae	<i>Tridens flavus</i>	X	
Poales	Poaceae	unknown Poaceae	X	X
Poales	Typhaceae	<i>Sparganium americanum</i>	X	
Poales	Typhaceae	<i>Typha latifolia</i>	X	
Polypodiales	Aspleniaceae	<i>Asplenium platyneuron</i>	X	X
Polypodiales	Blechnaceae	<i>Woodwardia areolata</i>	X	X
Polypodiales	Dennstaedtiaceae	<i>Pteridium aquilinum</i>	X	X
Polypodiales	Dryopteridaceae	<i>Polystichum acrostichoides</i>	X	X
Polypodiales	Onocleaceae	<i>Onoclea sensibilis</i>	X	X
Polypodiales	Polypodiaceae	<i>Pleopeltis polypodioides</i>	X	
Polypodiales	Pteridaceae	<i>Cheilanthes lanosa</i>	X	
Polypodiales	Thelypteridaceae	<i>Phegopteris hexagonoptera</i>	X	
Polypodiales	Thelypteridaceae	<i>Thelypteris noveboracensis</i>	X	
Polypodiales	Woodsiaceae	<i>Athyrium asplenioides</i>	X	
Proteales	Platanaceae	<i>Platanus occidentalis</i>	X	X
Ranunculales	Berberidaceae	<i>Podophyllum peltatum</i>	X	
Ranunculales	Menispermaceae	<i>Calycocarpum lyonii</i>	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Ranunculales	Menispermaceae	<i>Cocculus carolinus</i>	X	X
Ranunculales	Papaveraceae	<i>Sanguinaria canadensis</i>	X	
Ranunculales	Ranunculaceae	<i>Anemone</i> sp.	X	
Ranunculales	Ranunculaceae	<i>Cimicifuga racemosa</i>	X	X
Ranunculales	Ranunculaceae	<i>Clematis glaucophylla</i>	X	
Ranunculales	Ranunculaceae	<i>Clematis virginiana</i>	X	
Ranunculales	Ranunculaceae	<i>Hepatica acutiloba</i>	X	X
Ranunculales	Ranunculaceae	<i>Hepatica americana</i>	X	
Ranunculales	Ranunculaceae	<i>Ranunculus hispidus</i>	X	
Ranunculales	Ranunculaceae	<i>Ranunculus recurvatus</i>	X	
Ranunculales	Ranunculaceae	<i>Thalictrum revolutum</i>	X	
Ranunculales	Ranunculaceae	<i>Thalictrum thalictroides</i>	X	X
Ranunculales	Ranunculaceae	<i>Xanthorhiza simplicissima</i>	X	
Rosales	Cannabaceae	<i>Celtis occidentalis</i>	X	X
Rosales	Moraceae	<i>Morus rubra</i>	X	X
Rosales	Rhamnaceae	<i>Ceanothus americanus</i>	X	
Rosales	Rosaceae	<i>Agrimonia parviflora</i>	X	
Rosales	Rosaceae	<i>Agrimonia pubescens</i>	X	
Rosales	Rosaceae	<i>Amelanchier arborea</i>		X
Rosales	Rosaceae	<i>Crataegus</i> sp.	X	X
Rosales	Rosaceae	<i>Crataegus spathulata</i>	X	
Rosales	Rosaceae	<i>Crataegus uniflora</i>	X	
Rosales	Rosaceae	<i>Duchesnea indica</i>	X	
Rosales	Rosaceae	<i>Fragaria virginiana</i>	X	
Rosales	Rosaceae	<i>Geum canadense</i>	X	
Rosales	Rosaceae	<i>Malus angustifolia</i>	X	
Rosales	Rosaceae	<i>Porteranthus stipulatus</i>	X	
Rosales	Rosaceae	<i>Potentilla canadensis</i>	X	
Rosales	Rosaceae	<i>Potentilla simplex</i>	X	
Rosales	Rosaceae	<i>Prunus americana</i>	X	X
Rosales	Rosaceae	<i>Prunus angustifolia</i>	X	
Rosales	Rosaceae	<i>Prunus mexicana</i>	X	
Rosales	Rosaceae	<i>Prunus serotina</i>	X	X
Rosales	Rosaceae	<i>Prunus</i> sp.	X	X
Rosales	Rosaceae	<i>Prunus umbellata</i>	X	
Rosales	Rosaceae	<i>Rubus argutus</i>		X
Rosales	Rosaceae	<i>Rubus cuneifolius</i>		X
Rosales	Rosaceae	<i>Rubus</i> sp.	X	X
Rosales	Ulmaceae	<i>Ulmus alata</i>	X	X

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Rosales	Ulmaceae	<i>Ulmus americana</i>	X	
Rosales	Ulmaceae	<i>Ulmus rubra</i>	X	X
Rosales	Urticaceae	<i>Boehmeria cylindrica</i>	X	X
Rosales	Urticaceae	<i>Laportea canadensis</i>	X	X
Santalales	Santalaceae	<i>Phoradendron leucarpum</i>	X	
Sapindales	Anacardiaceae	<i>Rhus copallina</i>	X	X
Sapindales	Anacardiaceae	<i>Rhus glabra</i>	X	
Sapindales	Anacardiaceae	<i>Rhus hirta</i>	X	
Sapindales	Anacardiaceae	<i>Toxicodendron pubescens</i>	X	
Sapindales	Anacardiaceae	<i>Toxicodendron radicans</i>	X	X
Sapindales	Meliaceae	<i>Melia azedarach</i>	X	
Sapindales	Sapindaceae	<i>Acer negundo</i>	X	X
Sapindales	Sapindaceae	<i>Acer rubrum</i>	X	X
Sapindales	Sapindaceae	<i>Acer saccharinum</i>	X	
Sapindales	Sapindaceae	<i>Acer saccharinum</i> var. <i>floridanum</i>	X	
Sapindales	Sapindaceae	<i>Aesculus pavia</i>	X	X
Saxifragales	Altingiaceae	<i>Liquidambar styraciflua</i>	X	X
Saxifragales	Hamamelidaceae	<i>Hamamelis virginiana</i>	X	X
Saxifragales	Iteaceae	<i>Itea virginica</i>	X	
Saxifragales	Penthoraceae	<i>Penthorum sedoides</i>	X	
Saxifragales	Saxifragaceae	<i>Heuchera</i> sp.		X
Saxifragales	Saxifragaceae	<i>Tiarella cordifolia</i>	X	
Selaginellales	Selaginellaceae	<i>Selaginella apoda</i>	X	
Solanales	Convolvulaceae	<i>Cuscuta compacta</i>	X	
Solanales	Convolvulaceae	<i>Cuscuta gronovii</i>	X	
Solanales	Convolvulaceae	<i>Cuscuta</i> sp.	X	X
Solanales	Convolvulaceae	<i>Dichondra carolinensis</i>		X
Solanales	Convolvulaceae	<i>Ipomoea hederacea</i>	X	
Solanales	Convolvulaceae	<i>Ipomoea pandurata</i>	X	
Solanales	Convolvulaceae	<i>Ipomoea</i> sp.	X	X
Solanales	Solanaceae	<i>Physalis angulata</i>	X	
Solanales	Solanaceae	<i>Solanum carolinense</i>	X	X
Vitales	Vitaceae	<i>Parthenocissus quinquefolia</i>	X	X
Vitales	Vitaceae	<i>Vitis baileyana</i>	X	
Vitales	Vitaceae	<i>Vitis rotundifolia</i>	X	X

Appendix B. Plant species detected in sampling locations.

Table B-1. Vascular plant species detected at each sampling location across all strata at Horseshoe Bend National Military Park, 2011.

Species	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	017	019	021	022	023	024	025	026	028	029	030	alt01	alt03	alt04	alt05	
<i>Acalypha gracilens</i>																													X		
<i>Acer negundo</i>						X											X	X											X	X	
<i>Acer rubrum</i>	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X
<i>Acer saccharum</i>				X			X						X	X			X	X							X			X	X	X	X
<i>Acer</i> sp.						X																									
<i>Aesculus pavia</i>																								X							
<i>Albizia julibrissin</i>			X																												
<i>Amelanchier arborea</i>							X														X		X								
<i>Amorpha fruticosa</i>																													X		
<i>Andropogon virginicus</i>			X																							X					
Apocynaceae																													X		
<i>Apocynum cannabinum</i>												X																			
<i>Aralia spinosa</i>			X																												
<i>Arisaema triphyllum</i>				X			X								X							X	X					X			
<i>Aristolochia serpentaria</i>							X					X						X							X		X	X			
<i>Arundinaria gigantea</i>	X			X		X											X	X										X	X	X	
<i>Asimina parviflora</i>		X		X	X		X	X		X	X	X		X	X						X	X	X	X		X	X	X	X	X	
<i>Asimina triloba</i>					X			X																							
<i>Asplenium platyneuron</i>				X						X	X		X	X			X				X			X				X	X		
Asteraceae			X															X													
<i>Betula nigra</i>	X					X																							X		
<i>Bignonia capreolata</i>	X			X		X			X								X	X									X				
<i>Boehmeria cylindrica</i>	X					X												X													
<i>Botrychium biternatum</i>	X										X		X				X	X											X		
<i>Botrychium</i> sp.				X																											
<i>Botrychium virginianum</i>										X							X														
<i>Callicarpa americana</i>	X	X			X					X	X	X	X			X						X		X		X		X		X	
<i>Campsis radicans</i>						X					X		X				X											X	X	X	
<i>Carex</i> sp.																		X												X	
<i>Carpinus caroliniana</i>	X		X	X		X	X	X		X	X					X				X		X		X		X	X	X	X	X	X
<i>Carya alba</i>	X	X		X	X		X	X			X	X		X	X	X		X	X		X	X	X			X	X	X	X		
<i>Carya carolinae-septentrionalis</i>																							X								
<i>Carya glabra</i>			X	X		X				X		X	X	X			X	X	X			X	X	X	X	X		X	X	X	
Caryophyllaceae																													X		
<i>Castanea pumila</i>				X																											
<i>Catalpa bignonioides</i>						X											X	X													
<i>Celtis occidentalis</i>										X								X													
<i>Centrosema virginianum</i>							X			X		X		X						X						X		X			
<i>Cephalanthus occidentalis</i>																		X													

Table B-1. (Continued.)

Species	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	017	019	021	022	023	024	025	026	028	029	030	alt01	alt03	alt04	alt05
<i>Cercis canadensis</i>				X										X			X					X		X			X			X
<i>Chasmanthium latifolium</i>						X			X									X										X		
<i>Chasmanthium sessiliflorum</i>		X	X	X						X	X		X													X	X	X	X	
<i>Chimaphila maculata</i>					X		X		X		X	X	X	X	X														X	
<i>Chionanthus virginicus</i>																					X					X				
<i>Cimicifuga racemosa</i>																													X	
<i>Clitoria mariana</i>										X																				
<i>Cocculus carolinus</i>										X								X										X	X	
<i>Cornus florida</i>	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Cornus foemina</i>																	X													
<i>Crataegus</i> sp.			X	X							X			X																
<i>Croton</i> sp.																X					X									
<i>Cuscuta</i> sp.			X																											
Cyperaceae	X			X										X				X											X	
<i>Decumaria barbara</i>				X																									X	
<i>Desmodium</i> sp.			X								X											X		X	X		X			
<i>Dichondra carolinensis</i>																					X									
<i>Dioscorea villosa</i>										X			X									X							X	
<i>Diospyros virginiana</i>	X	X	X	X		X	X			X	X	X	X		X		X		X	X	X	X	X		X			X	X	
<i>Dulichium arundinaceum</i>	X																													
<i>Elephantopus tomentosus</i>				X						X	X					X					X			X		X	X		X	
<i>Epifagus virginiana</i>							X																							
<i>Euonymus americanus</i>			X																			X							X	
<i>Eupatorium capillifolium</i>																		X												
<i>Eupatorium fistulosum</i>			X																								X			
<i>Eupatorium</i> sp.																X		X							X					
<i>Euphorbia</i> sp.							X					X													X	X	X	X		
Fabaceae			X							X	X					X														
<i>Fagus grandifolia</i>		X			X		X		X				X	X	X				X	X	X	X	X	X	X	X			X	X
Filicopsida	X				X	X											X		X				X				X		X	
<i>Fraxinus pennsylvanica</i>	X			X		X					X						X	X				X						X	X	
<i>Galium aparine</i>				X																										
<i>Galium</i> sp.				X																									X	
<i>Gelsemium sempervirens</i>		X	X	X	X		X	X	X	X	X	X	X		X	X			X	X					X	X	X	X	X	
<i>Gonolobus suberosa</i>				X		X				X	X																	X		
<i>Goodyera pubescens</i>				X									X									X								
<i>Halesia carolina</i>																		X											X	

Table B-1. (Continued.)

Species	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	017	019	021	022	023	024	025	026	028	029	030	alt01	alt03	alt04	alt05
<i>Ostrya virginiana</i>	X			X				X			X			X			X					X		X		X	X	X	X	X
<i>Oxalis corniculata</i>			X																											
<i>Oxalis stricta</i>			X																					X				X		
<i>Oxydendrum arboreum</i>		X		X	X		X	X	X			X	X		X	X			X	X	X	X	X	X	X	X	X			X
<i>Panicum</i> sp.	X	X	X	X	X	X	X			X		X	X	X		X		X	X		X	X	X	X			X	X		X
<i>Parthenocissus quinquefolia</i>	X		X	X	X	X	X	X		X	X	X	X	X		X	X	X				X	X	X		X	X	X	X	X
<i>Passiflora lutea</i>				X			X																							X
<i>Phytolacca americana</i>																		X										X		
<i>Pinus echinata</i>					X		X					X	X	X					X	X	X				X	X	X	X		
<i>Pinus palustris</i>							X	X				X				X			X						X					
<i>Pinus</i> sp.													X												X					
<i>Pinus taeda</i>	X	X	X	X			X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Pityopsis graminifolia</i>			X																											
<i>Plantae</i>	X	X		X	X	X									X									X	X					
<i>Platanus occidentalis</i>	X					X				X								X											X	
<i>Poaceae</i>	X		X	X	X	X	X					X		X		X	X			X	X	X	X	X	X	X	X	X		X
<i>Polygonatum biflorum</i>					X																		X							X
<i>Polygonum</i> sp.						X												X											X	
<i>Polystichum acrostichoides</i>	X	X	X	X	X	X	X		X	X	X	X	X			X	X	X			X	X		X	X	X	X		X	X
<i>Prenanthes</i> sp.				X				X				X				X								X			X			X
<i>Prunus americana</i>																														X
<i>Prunus serotina</i>		X	X	X		X				X	X	X	X			X	X	X		X	X	X	X					X	X	X
<i>Prunus</i> sp.														X																
<i>Pteridium aquilinum</i>								X				X											X							X
<i>Quercus alba</i>		X			X		X	X				X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X
<i>Quercus falcata</i>		X	X	X	X		X	X		X	X	X	X	X	X	X			X			X	X	X	X	X	X	X	X	X
<i>Quercus laurifolia</i>									X		X		X													X	X			
<i>Quercus marilandica</i>																									X					
<i>Quercus nigra</i>	X	X	X	X		X	X		X	X	X		X	X			X	X		X		X			X	X	X	X	X	X
<i>Quercus prinus</i>															X						X					X	X	X	X	X
<i>Quercus rubra</i>					X			X							X				X	X	X	X	X	X			X			X
<i>Quercus</i> sp.	X				X		X		X								X			X		X		X			X			X
<i>Quercus stellata</i>	X	X	X	X	X			X			X	X				X			X		X	X	X	X	X	X	X	X	X	X
<i>Quercus velutina</i>																							X				X			
<i>Rhododendron canescens</i>																					X		X			X				
<i>Rhus copallinum</i>			X													X										X				
<i>Rubus argutus</i>			X																											

Table B-1. (Continued.)

Species	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	017	019	021	022	023	024	025	026	028	029	030	alt01	alt03	alt04	alt05
<i>Rubus cuneifolius</i>			X															X											X	
<i>Rubus</i> sp.	X			X		X					X																			
<i>Saccharum giganteum</i>			X							X	X					X						X						X		
<i>Sanicula canadensis</i>			X	X		X	X			X							X						X						X	
<i>Sassafras albidum</i>	X	X			X	X	X	X		X	X	X										X	X	X	X		X	X	X	
<i>Scleria triglomerata</i>					X	X		X				X				X						X	X	X		X	X	X	X	
<i>Smilax bona-nox</i>				X						X	X																	X		
<i>Smilax glauca</i>	X	X	X			X	X	X		X	X	X	X		X	X	X		X	X	X	X		X	X	X	X	X	X	
<i>Smilax rotundifolia</i>	X	X	X	X	X	X	X		X				X	X			X	X				X			X		X	X	X	
<i>Smilax</i> sp.		X	X	X	X			X	X	X	X		X	X		X	X	X			X	X	X	X	X	X	X	X	X	
<i>Solanum carolinense</i>																		X												
<i>Solidago</i> sp.	X		X			X												X			X									
<i>Staphylea trifolia</i>				X													X													
<i>Thalictrum thalictroides</i>																							X							
<i>Tilia americana</i> var . <i>heterophylla</i>																				X							X			
<i>Toxicodendron radicans</i>			X	X		X	X	X		X	X		X			X	X	X			X	X	X	X			X	X	X	
<i>Tradescantia ohiensis</i>																											X			
<i>Trillium</i> sp.																	X													
<i>Ulmus alata</i>				X								X						X					X							
<i>Ulmus rubra</i>	X																													
<i>Uvularia perfoliata</i>																						X								
<i>Uvularia</i> sp.				X																										
<i>Vaccinium arboreum</i>		X			X		X	X	X			X		X	X	X			X	X	X	X	X		X	X	X	X		
<i>Vaccinium elliotii</i>	X	X	X	X	X		X		X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X		X	X
<i>Vaccinium pallidum</i>					X			X				X			X	X			X	X	X	X	X		X					
<i>Verbesina</i> sp.			X			X				X	X			X			X	X						X				X		
<i>Viburnum nudum</i>			X											X							X				X					
<i>Viburnum rufidulum</i>																							X						X	
<i>Vicia</i> sp.																									X					
<i>Viola</i> sp.			X	X												X							X				X		X	
<i>Vitis rotundifolia</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
<i>Woodwardia areolata</i>													X				X													

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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National Park Service
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