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Natural Resource Stewardship and Science

Vegetation Community Monitoring at Cape Lookout National Seashore, 2012

Natural Resource Data Series NPS/SECN/NRDS—2014/723

ON THE COVER
Sun-kissed downy blossom of saltmarsh false foxglove (Agalinis maritima) at Cape Lookout National Seashore.
Photograph by: Sarah C. Heath, SECN Botanist.

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The Natural Resource Data Series is intended for the timely release of basic data sets and data summaries. Care has been taken to assure accuracy of raw data values, but a thorough analysis and interpretation of the data has not been completed. Consequently, the initial analyses of data in this report are provisional and subject to change.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data.

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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 Cape Lookout National Seashore in 2012.

- Data were collected at 30 sampling locations at the park from 6/16/2012 through 6/29/2012. An additional point was added at Portsmouth Island on the North Core, in a location requested by CALO Natural Resource staff (total of 30 sampling locations).
- Monitoring efforts resulted in the addition of 7 species, subspecies, or varieties to the park's species list.
- Absolute canopy cover across the Park was approximately 15.58%.
- Wax myrtle (*Morella cerifera*) had the highest absolute and relative cover in the shrub stratum, while seaside oxeye daisy (Borrichia frutescens) had the second highest relative cover and absolute cover in the shrub stratum.
- Wax myrtle was the most frequently occurring species in the shrub stratum.
- Sea oats (Uniola paniculata) had the highest relative cover, while sand cordgrass (*Spartina patens*) had the second highest relative cover in the groundcover stratum.
- Sand cordgrass had the highest absolute cover, while sea oats had the second highest absolute cover cover in the groundcover stratum.
- Beach pennywort (*Hydrocotyle bonariensis*) and sand cordgrass were the most frequently occurring species in the groundcover 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.
- Eastern redcedar (*Juniperus silcicola*) had the largest average diameter at breast height (DBH) of any canopy species at the park where more than two individuals were measured.
- Seaside oxeye daisy 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 Cape Lookout National Seashore (CALO) in August, 2012.

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

CALO, located along the southern end of the Outer Banks, is largely undeveloped and accessible only by boat. CALO is primarily composed of three barrier islands covering 90 km (56 mi) of the central coast of North Carolina (Figure 3). Most of the 11,430-ha (28,243-ac) Seashore consists of North and South Core Banks, a 71-km (44-mi) long barrier system oriented in a southwest to northeast direction and separated by Ophelia Inlet. CALO extends into the Atlantic Ocean from its southern end. The other barrier system within the Seashore, Shackleford Banks, extends westward from Cape Lookout.

Core Banks is a long, narrow expanse of low dunes and maritime grasslands, dominated by sea oats (*Uniola paniculata*), and extensive salt marsh cordgrass (*Spartina alterniflora* and *S. patens*) communities. Wax myrtle (*Morella cerifera*) dominated shrub communities border the grasslands in many areas, and a low coastal maritime hammock, commonly characterized by Virginia live oak (*Quercus virginiana*), occupies small areas that are slightly higher than the surrounding areas. The islands are generally about 0.9 to 1.8 m (3—6 ft) above sea level and 1 to 2 km (0.6—1.2 mi) wide. For the most part, these areas are open and treeless. The morphology of the northern end of Portsmouth Island differs from the remainder of the Seashore and is characterized by large sand flats, approximately 1 km (0.6 mi) in width, located between the berm and the dunes of a series of marsh-fringed islands. At Cape Lookout, continuous dunes characterize its southwest side, with several small freshwater marshes present in depressions between the dunes. Some small remnant slash pine (*Pinus elliottii*) plantations from the 1970s occur at the Seashore, however park managers do not plan removal or management of these areas as pine plantations. A long spit extends from the western tip of Cape Lookout, where a jetty built in the early 1900s has encouraged accretion in this direction. Unlike Core Banks, the bayside of Shackelford Banks does not consist consists of salt marsh cordgrass but rather low dunes on both sides of the island.

CALO is one of the few barrier islands where natural wind-, tide-, and wave-driven processes of erosion, accretion, and overwash still occur and create a very dynamic environment and vegetation communities. The most significant disturbance regime that affects the Seashore is storm activity (hurricanes and nor'easters). Sea level rise is also a potential threat. Because the Seashore consists of barrier islands with no road access, the influences of urban development are generally limited. Runoff from mainland sources adds nutrients, fecal coliforms, and contaminants to the waters adjacent to the Seashore. Park managers actively attempt to curb illegal off-trail use by off-road vehicles to prevent the adverse impacts this activity has on barrier island vegetation, dune formation, and natural barrier island processes. A managed feral horse herd occurs on Shackleford Banks and creates a grazing pressure to which the native plants did not evolve. Several plant species are part of the Seashore's eradication program, including common reed (*Phragmites australis*) (nativity of this species is debated), and the non-native Chinese wisteria (*Wisteria sinensis*). Kudzu (*Pueraria lobata*) is on the park's watch list for potential eradication. One federally-threatened species occurs at the Seashore, seabeach amaranth (*Amaranthus pumilus*).

CALO has 645 known vascular plant species, subspecies, and varieties (Table C-2).

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 CALO from 2/29/2012 through 3/16/2012.

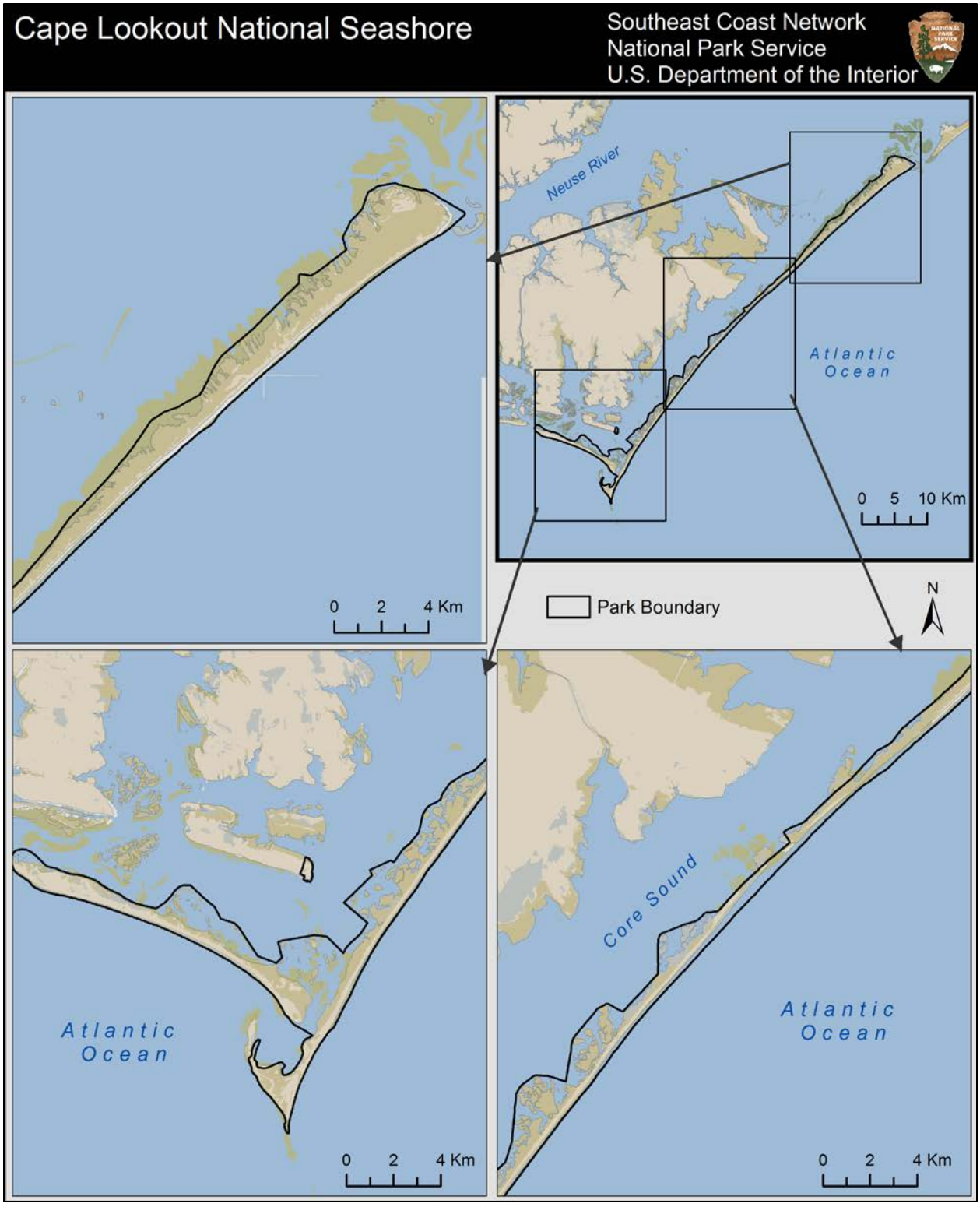

Figure 1. Location of Cape Lookout National Seashore, NC.

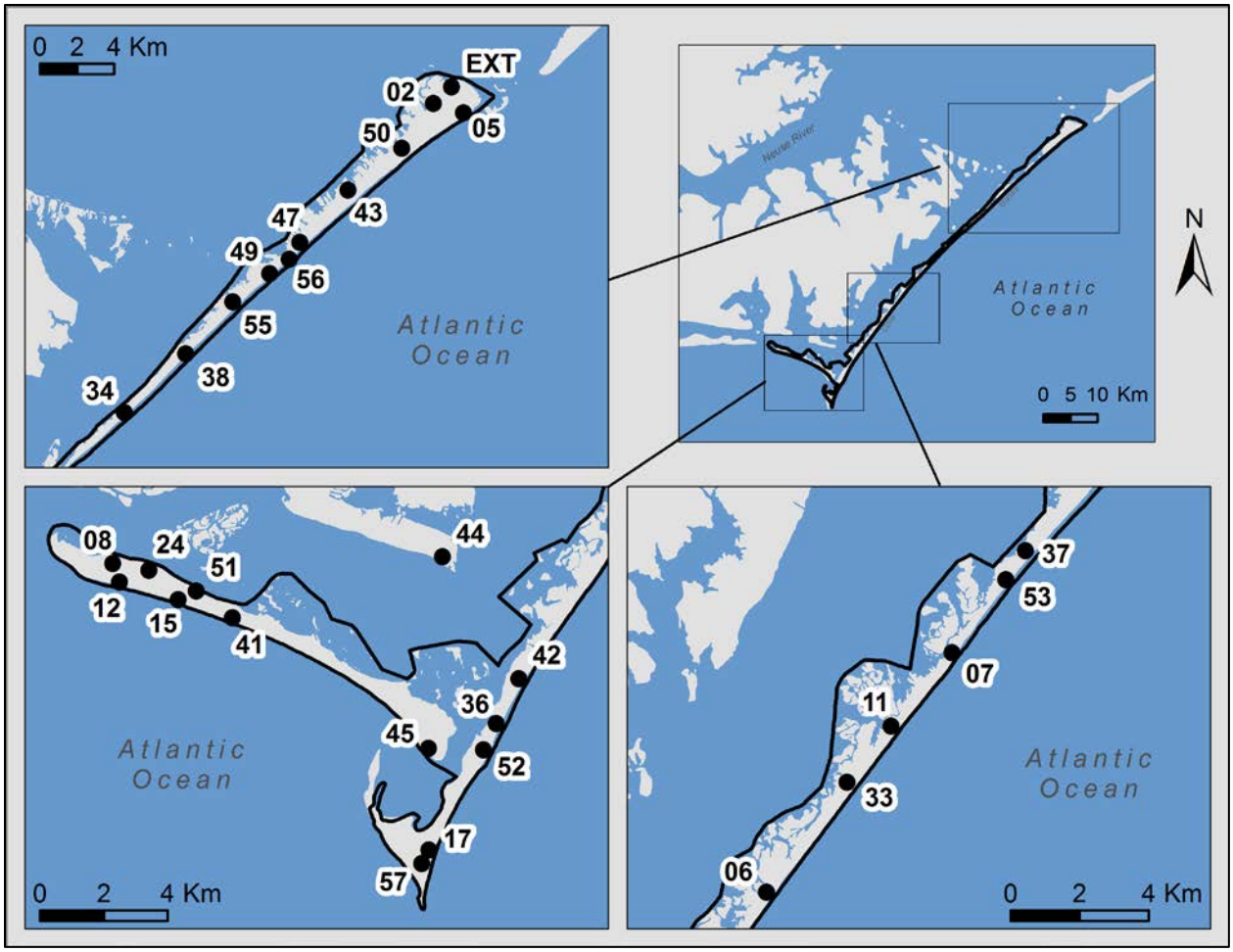

Figure 2. Spatially-balanced random sampling locations at Cape Lookout National Seashore, 2012.

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.

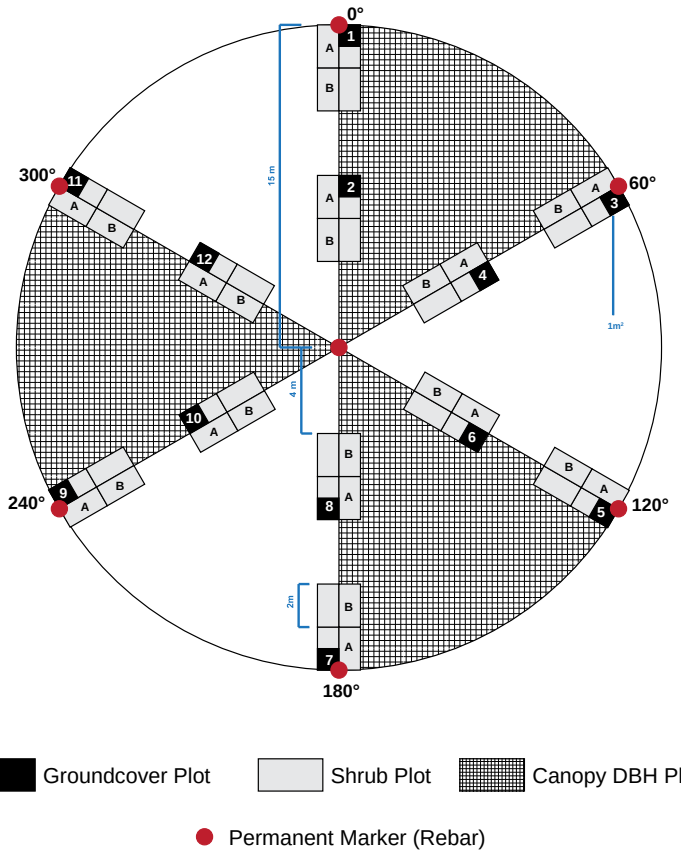

Figure 3. Southeast Coast Network vegetation community monitoring plot and subplot layout identifying the juxtaposition of canopy cover, canopy diameter, shrub, and groundcover plots within a circular array. Although not depicted, the above array is positioned at the center point of each 0.5-hectare 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 170 taxa during this monitoring effort (Appendix A), including 7 species, subspecies, and varieties not previously known to occur at the Park (Table 2). Of the taxa detected, we detected 30 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.

- Seven species new to the park species list were detected (Table 2).

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

- Absolute canopy cover was showed variability across all sampling locations ($\bar{x}$ = 15.58%, SD = 27.06; Table 3).
- Wax myrtle (*Morella cerifera*) were the most frequently occurring shrub species (f = 53.33).
- Wax myrtle and had the highest relative cover ($\bar{x}$ = 25.09%, SD = 30.00; Table 4) and absolute cover ($\bar{x}$ = 9.55%, SD = 11.38; Table 5) of all shrub species.
- Seaside oxeye daisy (Borrichia frutescens) had the second highest relative cover ($\bar{x}$ = 8.65%, SD = 20.24; Table 4) and the second highest absolute cover ($\bar{x}$ = 5.47%, SD = 12.02; Table 5) in the shrub stratum.
- Sea oats (*Uniola paniculata*) had the highest relative cover ($\bar{x}$ = 21.67%, SD = 30.98), while Sand cordgrass (*Spartina patens*) had the second highest relative cover ($\bar{x}$ = 15.56%, SD = 18.42; Table 6) in the groundcover stratum.
- Sand cordgrass had the highest absolute cover in the groundcover stratum ($\bar{x}$ = 16.72%, SD = 22.15), followed by sea oats; ($\bar{x}$ = 12.53%, SD = 18.93; Table 7).
- Leaf litter was the most common ground condition, with a relative cover of 88.30% (SD 32.25; Table 6) and an absolute cover of 58.75% (SD 32.59; Table 7).

Frequency of species in the groundcover stratum.

- Beach pennywort (Hydrocotyle bonariensis) (f =86.67) and sand cordgrass (f = 66.67) 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 = 96.67; Table 6).

DBH of canopy species.

- The largest tree detected on average where more than one individual was measured was eastern redcedar (*Juniperus silicicola*; $\bar{x}$ = 11.43 cm, SD = 7.26; Table 8).

Woody species seedling counts in the groundcover stratum.

- Seaside oxeye daisy had the highest estimated seedling density at the park (6.03/m2, SD=11.02; Table 9).

Table 2. New vascular plant species, subspecies, or varieties found at Cape Lookout National Seashore, 2012.

Order	Family	*Species*	Nativity
Fabales	Fabaceae	*Chamaechrista nictitans*	Native
Asterales	Asteraceae	*Conyza bonariensis*	Non-Native
Ranunculales	Berberidaceae	*Nandina domestica*	Non-Native
Pinales	Pinaceae	*Pinus elliottii*	Native
Lamiales	Plantaginaceae	*Plantago major*	Non-Native
Dipsacales	Adoxaceae	*Sambucus canadensis*	Native
Asterales	Campanulaceae	*Wahlenbergia marginata*	Non-Native

Table 3. Average canopy cover for vegetation monitoring macroplots at Cape Lookout National Seashore, 2012. Average canopy cover is based on data pooled across observers at each sampling location.

Sampling Location	Average	Standard Deviation
CALO002	0.00	0.00
CALO005	0.00	0.00
CALO006	0.00	0.00
CALO007	0.00	0.00
CALO008	0.00	0.00
CALO011	0.00	0.00
CALO012	0.00	0.00
CALO015	0.00	0.00
CALO017	45.17	4.04
CALO024	81.50	
CALO033	42.33	6.79
CALO034	0.00	0.00
CALO036	0.00	0.00
CALO037	0.00	0.00
CALO038	0.00	0.00
CALO041	0.00	0.00
CALO042	0.00	0.00
CALO043	6.58	3.45
CALO044	75.58	0.76
CALO045	0.00	0.00
CALO047	0.00	0.00
CALO049	0.00	0.00
CALO050	0.00	0.00
CALO051	85.08	1.66
CALO052	5.67	1.70
CALO053	0.00	0.00
CALO055	0.00	0.00
CALO056	0.00	0.00
CALO057	50.75	3.04
CALOEXT	74.67	0.88
Park Average	**15.58**	**27.06**

Table 4. Percentage of vegetation cover (relative cover) and frequency (Freq) of occurrence of shrub species in vegetation monitoring sampling locations at Cape Lookout National Seashore, 2012. 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	2	5	6	17	24	33	34	37	38	42	43	44	45	47	49	50	51	52	55	EXT
Baccharis angustifolia	20.00	3.32	8.85							18.16	15.85	10.19	2.71				10.15	42.49					
Baccharis halimifolia	26.67	2.38	9.17		0.67	4.65	8.00				1.73	1.88				50.00	0.62				3.93		
Borrichia frutescens	26.67	8.65	20.24							10.16	31.70	17.16		7.02			31.18	18.94	94.85		48.47		
Callicarpa americana	6.67	0.44	1.72					8.29												4.82			
Diospyros virginiana	3.33	0.05	0.25					1.36															
Ilex opaca	6.67	1.38	6.66					36.32												5.04			
Ilex vomitoria	33.33	6.93	13.68					13.28	46.03		6.92		34.84	13.75	1.67		9.13			48.43	9.32		24.50
Iva frutescens	30.00	4.85	13.10		4.70					50.59	14.99	52.28		6.16			2.46	8.36	5.15		0.87		
Juniperus silicicola	33.33	8.26	17.72	8.13			60.80	1.36		0.20			5.43	45.13	61.11					30.61	13.25		21.85
Kosteletzkya virginica	10.00	0.04	0.14					0.68		0.20		0.27											
Morella cerifera	53.33	25.09	30.00	91.88	94.63	95.35	22.80	16.69	50.84	20.70	28.82	18.23	57.01	27.94		50.00	46.46	30.20			15.43	44.99	40.73
Osmanthus americanus	6.67	0.21	0.88					4.43												2.02			
Persea borbonia	10.00	0.98	3.34																	3.03	8.73	16.26	1.32
Pinus elliottii	3.33	1.57	7.19				8.40															38.75	
Pinus taeda	10.00	1.06	3.94					1.70							18.61								11.59
Prunus caroliniana	6.67	0.03	0.12					0.11												0.67			
Quercus laurifolia	3.33	0.36	1.95					10.67															
Quercus nigra	3.33	0.06	0.31																	1.68			
Quercus virginiana	13.33	0.92	3.47					2.04	3.14						18.61					3.70			
Rosa palustris	3.33	0.08	0.44					2.38															
Vaccinium corymbosum	3.33	0.02	0.12					0.68															

Table 5. Percentage of area covered (absolute cover) and frequency of occurrence of shrub species sampled in vegetation monitoring sampling locations at Cape Lookout National Seashore, 2012. 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**	**2**	**5**	**6**	**17**	**24**	**33**	**34**	**37**	**38**	**42**	**43**	**44**	**45**	**47**	**49**	**50**	**51**	**52**	**55**	**EXT**
Baccharis angustifolia	20.00	2.07	5.55							9.69	11.46	3.96	0.63				10.31	25.94					
Baccharis halimifolia	26.67	0.31	0.68		0.10	0.83	2.08				1.25	0.73				0.83	0.63				2.81		
Borrichia frutescens	26.67	5.47	12.02							5.42	22.92	6.67		5.10			31.67	11.56	46.04		34.69		
Callicarpa americana	6.67	0.40	1.59					7.60												4.48			
Diospyros virginiana	3.33	0.04	0.23					1.25															
Ilex opaca	6.67	1.27	6.12					33.33												4.69			
Ilex vomitoria	33.33	4.50	9.56					12.19	22.92		5.00		8.02	10.00	0.63		9.27			45.00	6.67		15.42
Iva frutescens	30.00	2.47	6.25		0.73					26.98	10.83	20.31		4.48			2.50	5.10	2.50		0.63		
Juniperus silicicola	33.33	4.24	9.11	1.35			15.83	1.25		0.10			1.25	32.81	22.92					28.44	9.48		13.75
Kosteletzkya virginica	10.00	0.03	0.12					0.63		0.10		0.10											
Morella cerifera	53.33	9.55	11.38	15.31	14.69	17.08	5.94	15.31	25.31	11.04	20.83	7.08	13.13	20.31		0.83	47.19	18.44			11.04	17.29	25.63
Osmanthus americanus	6.67	0.20	0.81					4.06												1.88			
Persea borbonia	10.00	0.54	1.64																	2.81	6.25	6.25	0.83
Pinus elliottii	3.33	0.57	2.74				2.19															14.90	
Pinus taeda	10.00	0.53	1.82					1.56							6.98								7.29
Prunus caroliniana	6.67	0.02	0.12					0.10												0.63			
Quercus laurifolia	3.33	0.33	1.79					9.79															
Quercus nigra	3.33	0.05	0.29																	1.56			
Quercus virginiana	13.33	0.46	1.44					1.88	1.56						6.98					3.44			
Rosa palustris	3.33	0.07	0.40					2.19															
Vaccinium corymbosum	3.33	0.02	0.11					0.63															

Table 6. Percentage of vegetation cover (relative cover) and frequency of occurrence of groundcover species in vegetation monitoring sampling locations at Cape Lookout National Seashore, 2012. 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	Avg	SD	Freq	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	12	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Agalinis maritima	0.12	0.65	3.33																							3.58							
Ambrosia artemisiifolia	0.04	0.20	6.67			0.06																					1.10						
Ammophila breviligulata	0.01	0.05	3.33			0.30																											
Ampelopsis arborea	0.35	1.23	10.00										1.23	5.77			3.59																
Andropogon glomeratus	0.05	0.27	3.33																				1.48										
Asclepias sp.	0.01	0.03	3.33											0.16																			
Asplenium platyneuron	0.08	0.30	6.67										1.23														1.10						
Baccharis angustifolia	0.04	0.20	3.33																				1.11										
Baccharis halimifolia	0.02	0.06	6.67		0.16	0.30																											
Berchemia scandens	0.14	0.43	10.00										1.23							1.70							1.28						
Boehmeria cylindrica	0.04	0.23	3.33										1.23																				
Borrichia frutescens	1.04	3.49	16.67												0.98			3.20			0.51			9.78		16.70							
Cakile edentula	0.02	0.12	3.33																	0.68													
Callicarpa americana	0.08	0.45	3.33										2.47																				
Calystegia sepium	0.26	1.45	3.33																					7.94									
Centella asiatica	0.22	0.71	10.00									2.48	1.23												2.91								
Centrosema virginianum	0.03	0.17	3.33											0.94																			
Chamaesyce polygonifolia	0.18	0.58	13.33					2.99		0.76	0.20												0.37								0.95		
Chasmanthium laxum	0.16	0.62	6.67										2.47														2.38						
Cladium mariscus ssp. *jamaicense*	0.03	0.18	3.33												0.98																		
Commelina erecta	0.38	1.18	20.00					1.76		0.50	5.78			0.16		0.29			2.83												0.06		
Conyza canadensis	1.18	3.00	30.00	1.46		0.30		1.76		14.38		2.48				2.31				0.68			4.44								7.71		

Table 6. (Continued.)

Species	Avg	SD	Freq	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	12	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Croton punctatus	0.18	0.57	6.67							1.77	1.20								2.43														
Cynanchum angustifolium	2.99	4.23	43.33		3.07	7.44						0.83			12.23		12.11	9.06		5.43	3.30		6.65	9.78	10.08	2.39		7.49					
Cyperaceae	0.22	0.96	10.00	1.26									5.14			0.29																	
Diodia teres	0.19	1.02	3.33					5.57																									
Diodia virginiana	0.01	0.04	3.33										0.21																				
Distichlis spicata	0.01	0.03	3.33		0.16																												
Eleocharis sp.	0.04	0.24	3.33																				1.29										
Elephantopus tomentosus	0.09	0.49	3.33										2.67																				
Elymus virginicus	0.17	0.38	16.67												0.98		0.90	0.80						1.22				1.07					
Elymus virginicus var. *halophilus*	0.01	0.04	3.33	0.21																													
Eremochloa ophiuroides	1.31	4.93	6.67								6.18											25.75	7.39										
Eustachys petraea	0.38	1.28	10.00							1.51	1.20					2.03							6.65										
Fabaceae	0.37	1.26	10.00										1.23									5.42					4.40						
Filicopsida	0.04	0.23	3.33										1.23																				
Fimbristylis castanea	0.04	0.21	6.67												1.14										0.19								
Fimbristylis sp.	0.44	1.74	6.67		4.85																					8.35							
Gaillardia pulchella	0.50	1.88	10.00			5.35										8.97				0.68													
Galium hispidulum	0.08	0.45	3.33									2.48																					
Galium sp.	0.10	0.41	10.00										0.41									0.27					2.20						
Gnaphalium sp.	0.05	0.30	3.33																			1.63											
Heterotheca subaxillaris	0.58	2.35	13.33					0.35		1.31	2.59	0.41				12.73																		
Hydrocotyle bonariensis	11.20	12.16	86.67	3.97	9.37	21.42	16.55	12.01	60.67	7.57	13.35	27.27	1.23	20.12	1.47	5.21	8.52	6.66	17.41	22.06			9.24	3.46	10.47	0.40	3.48	3.21	22.67	14.53	9.78	3.91	
Ilex opaca	0.25	1.35	3.33										7.41																				
Ilex vomitoria	1.07	3.24	16.67										14.40		0.98						0.51						7.69						8.42
Ipomoea sagittata	0.96	2.96	20.00										1.23	2.81	0.16		12.56			1.36					10.66								

Table 6. (Continued.)

Species	Avg	SD	Freq	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	12	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Juncus megacephalus	0.25	1.04	10.00		5.49											1.74									0.19								
Juncus roemerianus	8.77	15.22	43.33	13.60	2.58							16.53		13.42	32.14		40.21	21.32		12.90			16.27	12.83	12.98	1.19		67.20					
Juniperus silicicola	0.05	0.21	10.00										0.21								0.25						1.10						
Kosteletzkya virginica	0.01	0.04	3.33																						0.19								
Lactuca canadensis	0.07	0.28	6.67	1.26										0.94																			
Lepidium virginicum	0.01	0.05	3.33													0.29																	
Lonicera japonica	0.23	0.91	6.67										2.47														4.40						
Magnoliopsida	0.07	0.33	6.67			1.78							0.21																				
Melica mutica	0.06	0.34	3.33											1.87																			
Melothria pendula	0.03	0.17	3.33											0.94																			
Mikania scandens	0.27	1.14	10.00		1.13							0.83						6.16															
Mitchella repens	0.29	1.22	6.67										6.38														2.20						
Morella cerifera	0.74	1.83	26.67	2.72		5.35							1.23							0.68	1.52			1.22	1.16								8.42
Muhlenbergia capillaris	0.20	1.11	3.33													6.08																	
Oenothera humifusa	0.87	1.80	33.33			2.08		0.29	0.56	1.01	0.60	2.48				4.22			7.29	0.68			1.29								5.63		
Opuntia humifusa	0.17	0.92	3.33							5.05																							
Opuntia sp.	0.12	0.62	3.33								3.39																0.18						
Osmanthus americanus	0.01	0.05	3.33																			0.27											
Panicum amarum	0.49	1.85	6.67						6.74																				7.81				
Panicum sp.	0.65	1.76	16.67										4.94											4.89	6.98		2.20						0.35
Parietaria floridana	0.03	0.17	3.33											0.94																			
Parthenocissus quinquefolia	2.13	4.60	30.00	1.26								5.79	4.12	1.87						8.14	10.15						20.51					10.06	2.11
Paspalum vaginatum	0.16	0.88	3.33																				4.81										
Persea borbonia	0.15	0.56	6.67																													1.96	2.46

Table 6. (Continued.)

Species	Avg	SD	Freq	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	12	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Persea palustris	0.04	0.23	3.33	1.26																													
Phragmites australis	0.20	0.81	6.67														1.94								4.07								
Phyla nodiflora	0.08	0.30	10.00												0.98					1.36			0.18									
Physalis viscosa	0.32	0.63	23.33	0.42						1.56	0.40			1.09	0.98		1.20		2.43		1.52											
Pinus elliottii	0.01	0.05	3.33																													0.28	
Plantago lanceolata	0.01	0.05	3.33																			0.27											
Poaceae	0.77	1.75	33.33	0.21									1.44				0.90	7.33		0.68		1.63	4.99	1.22	0.19		4.58						
Prunus serotina	0.01	0.05	3.33																			0.27											
Pteridium aquilinum	0.80	4.40	3.33																			24.12											
Ptilimnium capillaceum	0.11	0.46	10.00	2.51	0.48																						0.18						
Quercus nigra	0.05	0.30	3.33																			1.63											
Quercus virginiana	0.61	2.01	10.00										6.58									3.25					8.61						
Rhynchospora colorata	0.04	0.20	3.33																				1.11										
Rhynchospora latifolia	0.03	0.13	6.67										0.21							0.68													
Rhynchospora sp.	0.04	0.23	3.33										1.23																				
Rubus sp.	0.03	0.13	6.67																	0.68		0.27											
Rubus trivialis	0.91	1.94	26.67	8.16		5.35						2.48		0.94						0.68	3.05						3.30					3.35	
Sabatia sp.	0.16	0.56	10.00													2.03							0.37			2.39						
Sanicula canadensis	0.17	0.87	6.67										0.21														4.76						
Sarcocornia perennis	0.05	0.25	3.33																							1.39							
Schizachyrium littorale	0.19	0.64	10.00		0.97							2.48						2.40															
Schoenoplectus americanus	0.26	1.41	3.33	7.74																													
Scleria triglomerata	0.11	0.45	6.67										1.23														2.20						
Setaria parviflora	0.46	1.54	16.67		7.92										2.28			2.40		0.11				1.22									
Smilax auriculata	2.38	6.38	23.33	1.26										11.39			4.93			0.68	21.83						4.95						26.32

Table 6. (Continued.)

Species	Avg	SD	Freq	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	12	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Smilax bona-nox	2.26	6.26	26.67	1.26								2.48	2.47	16.22							3.05	30.35					3.48						8.42
Smilax laurifolia	0.04	0.23	3.33										1.23																				
Smilax rotundifolia	0.09	0.35	6.67																			1.63					1.10						
Smilax sp.	0.21	1.16	3.33										6.38																				
Solidago sempervirens	0.89	1.82	33.33		4.04	2.08								0.94		5.21				0.68			7.76	1.22	1.16	1.19					2.37		
Spartina patens	15.56	18.42	66.67	41.84	58.64	30.93	8.28		14.04			13.64		2.34	42.74		13.15	39.87		10.86	32.49		8.69	45.21	38.76	44.14		10.34	0.25		5.33		5.26
Spiranthes sp.	0.01	0.03	3.33		0.16																												
Sporobolus virginicus	0.89	3.41	13.33					4.10		1.77		2.48														18.29							
Strophostyles helvola	0.25	0.83	10.00			3.57								1.09						2.83													
Toxicodendron radicans	8.18	16.64	43.33	9.62								14.88	11.93	16.07	1.96			0.80		25.68	21.83	1.63					11.54	10.70				80.45	38.25
Typha domingensis	0.03	0.18	3.33		0.97																												
Uniola paniculata	21.67	30.98	43.33			13.68	75.17	71.18	17.98	62.82	52.99					48.61			67.61	0.11			15.90				1.10		69.27	85.47	68.17		
Vitis rotundifolia	0.10	0.37	6.67										1.23									1.63											
Ground Condition																																	
Bare Ground	33.68	35.53	73.33	18.01		72.75	91.63	64.21	91.57	55.83	63.00	7.33	8.11	16.29	2.26	61.74	1.15		94.10	27.11	15.27	12.08	39.63				9.57		91.08	87.71	71.81		8.26
Exposed Humus	5.50	12.29	26.67		16.84									11.53	24.15		14.42							14.77	15.77	59.56		7.87					
Leaf Litter/ Duff	58.75	32.59	96.67	49.08	83.16	12.20	8.37	35.79	8.43	44.17	37.00	92.67	88.92	72.18	73.58	34.01	84.42	100.00	5.90	72.89	84.73	87.92	60.37	85.23	84.23	40.44	90.43	92.13	8.92	12.29	28.19	98.17	86.57
Open Water	0.97	5.30	3.33	29.04																													
Tree Base	0.15	0.47	10.00										1.49																			1.83	1.24
Upland Non-Vascular/ Lichen	0.95	2.93	16.67	3.86		15.05							1.49			4.25																	3.93

Table 7. Percentage of area covered (absolute cover) and frequency of occurrence by groundcover species sampled in vegetation monitoring sampling locations at Cape Lookout National Seashore, 2012. 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].

Species	Avg	SD	Freq	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	42	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Agalinis maritima	0.13	0.68	3.33																							3.75							
Ambrosia artemisiifolia	0.04	0.23	6.67			0.04																					1.25						
Ammophila breviligulata	0.01	0.04	3.33			0.21																											
Ampelopsis arborea	0.47	1.66	10.00										1.25	7.71			5.00																
Andropogon glomeratus	0.06	0.30	3.33																				1.67										
Asclepias sp.	0.01	0.04	3.33											0.21																			
Asplenium platyneuron	0.08	0.32	6.67										1.25														1.25						
Baccharis angustifolia	0.04	0.23	3.33																				1.25										
Baccharis halimifolia	0.01	0.05	6.67		0.21	0.21																											
Berchemia scandens	0.19	0.65	10.00										1.25							3.13							1.46						
Boehmeria cylindrica	0.04	0.23	3.33										1.25																				
Borrichia frutescens	1.14	3.69	16.67												1.25			5.00			0.42			10.00		17.50							
Cakile edentula	0.04	0.23	3.33																	1.25													
Callicarpa americana	0.08	0.46	3.33										2.50																				
Calystegia sepium	0.27	1.48	3.33																					8.13									
Centella asiatica	0.19	0.64	10.00									1.25	1.25												3.13								
Centrosema virginianum	0.04	0.23	3.33											1.25																			
Chamaesyce polygonifolia	0.13	0.42	13.33					2.13		0.63	0.21												0.42								0.67		
Chasmanthium laxum	0.17	0.66	6.67										2.50														2.71						
Cladium mariscus ssp. *jamaicense*	0.04	0.23	3.33												1.25																		
Commelina erecta	0.32	1.14	20.00					1.25		0.42	6.04			0.21		0.21			1.46												0.04		
Conyza canadensis	0.98	2.47	30.00	1.46		0.21		1.25		11.88		1.25				1.67				1.25			5.00								5.42		

Table 7. (Continued.)

Species	Avg	SD	Freq	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	42	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Croton punctatus	0.13	0.40	6.67							1.46	1.25								1.25														
Cynanchum angustifolium	3.62	5.39	43.33		3.96	5.21						0.42			15.63		16.88	14.17		10.00	2.71		7.50	10.00	10.83	2.50		8.75					
Cyperaceae	0.22	0.97	10.00	1.25									5.21			0.21																	
Diodia teres	0.13	0.72	3.33					3.96																									
Diodia virginiana	0.01	0.04	3.33										0.21																				
Distichlis spicata	0.01	0.04	3.33		0.21																												
Eleocharis sp.	0.05	0.27	3.33																				1.46										
Elephantopus tomentosus	0.09	0.49	3.33										2.71																				
Elymus virginicus	0.21	0.47	16.67												1.25		1.25	1.25						1.25				1.25					
Elymus virginicus var. *halophilus*	0.01	0.04	3.33	0.21																													
Eremochloa ophiuroides	1.15	4.00	6.67								6.46											19.79	8.33										
Eustachys petraea	0.38	1.40	10.00							1.25	1.25					1.46							7.50										
Fabaceae	0.35	1.18	10.00										1.25									4.17					5.00						
Filicopsida	0.04	0.23	3.33										1.25																				
Fimbristylis castanea	0.06	0.27	6.67												1.46										0.21								
Fimbristylis sp.	0.50	1.93	6.67		6.25																					8.75							
Gaillardia pulchella	0.38	1.35	10.00			3.75										6.46				1.25													
Galium hispidulum	0.04	0.23	3.33									1.25																					
Galium sp.	0.10	0.46	10.00										0.42									0.21					2.50						
Gnaphalium sp.	0.04	0.23	3.33																			1.25											
Heterotheca subaxillaris	0.45	1.73	13.33					0.25		1.08	2.71	0.21				9.17																		
Hydrocotyle bonariensis	8.63	8.86	86.67	3.96	12.08	15.00	5.00	8.54	22.50	6.25	13.96	13.75	1.25	26.88	1.88	3.75	11.88	10.42	8.96	40.63			10.42	3.54	11.25	0.42	3.96	3.75	3.75	5.21	6.88	2.92	
Ilex opaca	0.25	1.37	3.33										7.50																				
Ilex vomitoria	1.00	3.14	16.67										14.58		1.25						0.42						8.75						5.00
Ipomoea sagittata	1.22	3.78	20.00										1.25	3.75	0.21		17.50			2.50					11.46								

Table 7. (Continued.)

Species	Avg	SD	Freq	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	42	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Juncus megacephalus	0.28	1.30	10.00		7.08											1.25									0.21								
Juncus roemerianus	10.75	19.02	43.33	13.54	3.33							8.33		17.92	41.04		56.04	33.33		23.75			18.33	13.13	13.96	1.25		78.54					
Juniperus silicicola	0.06	0.23	10.00										0.21								0.21						1.25						
Kosteletzkya virginica	0.01	0.04	3.33																						0.21								
Lactuca canadensis	0.08	0.32	6.67	1.25										1.25																			
Lepidium virginicum	0.01	0.04	3.33													0.21																	
Lonicera japonica	0.25	1.01	6.67										2.50														5.00						
Magnoliopsida	0.05	0.23	6.67			1.25							0.21																				
Melica mutica	0.08	0.46	3.33											2.50																			
Melothria pendula	0.04	0.23	3.33											1.25																			
Mikania scandens	0.38	1.77	10.00		1.46							0.42						9.63															
Mitchella repens	0.30	1.25	6.67										6.46														2.50						
Morella cerifera	0.59	1.23	26.67	2.71		3.75							1.25							1.25	1.25			1.25	1.25								5.00
Muhlenbergia capillaris	0.15	0.80	3.33													4.38																	
Oenothera humifusa	0.60	1.12	33.33			1.46		0.21	0.21	0.83	0.63	1.25				3.04			3.75	1.25			1.46								3.96		
Opuntia humifusa	0.14	0.76	3.33							4.17																							
Opuntia sp.	0.13	0.65	3.33								3.54																0.21						
Osmanthus americanus	0.01	0.04	3.33																			0.21											
Panicum amarum	0.13	0.51	6.67						2.50																				1.29				
Panicum sp.	0.67	1.85	16.67										5.00											5.00	7.50		2.50						0.21
Parietaria floridana	0.04	0.23	3.33											1.25																			
Parthenocissus quinquefolia	2.21	5.20	30.00	1.25								2.92	4.17	2.50						15.00	8.33						23.33					7.50	1.25
Paspalum vaginatum	0.18	0.99	3.33																				5.42										
Persea borbonia	0.10	0.37	6.67																													1.46	1.46

Table 7. (Continued.)

Species	Avg	SD	Freq	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	42	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Persea palustris	0.04	0.23	3.33	1.25																													
Phragmites australis	0.24	0.92	6.67														2.71								4.38								
Phyla nodiflora	0.13	0.50	10.00												1.25					2.50			0.21									
Physalis viscosa	0.30	0.55	23.33	0.42						1.29	0.42			1.46	1.25		1.67		1.25		1.25											
Pinus elliottii	0.01	0.04	3.33																													0.21	
Plantago lanceolata	0.01	0.04	3.33																			0.21											
Poaceae	0.97	2.42	33.33	0.21									1.46				1.25	11.46		1.25		1.25	5.63	1.25	0.21		5.21						
Prunus serotina	0.01	0.04	3.33																			0.21											
Pteridium aquilinum	0.62	3.39	3.33																			18.54											
Ptilimnium capillaceum	0.11	0.47	10.00	2.50	0.63																						0.21						
Quercus nigra	0.04	0.23	3.33																			1.25											
Quercus virginiana	0.63	2.15	10.00										6.67									2.50					9.79						
Rhynchospora colorata	0.04	0.23	3.33																				1.25										
Rhynchospora latifolia	0.05	0.23	6.67										0.21							1.25													
Rhynchospora sp.	0.04	0.23	3.33										1.25																				
Rubus sp.	0.05	0.23	6.67																	1.25		0.21											
Rubus trivialis	0.81	1.78	26.67	8.13		3.75						1.25		1.25						1.25	2.50						3.75					2.50	
Sabatia sp.	0.15	0.52	10.00													1.46							0.42			2.50						
Sanicula canadensis	0.19	0.99	6.67										0.21														5.42						
Sarcocornia perennis	0.05	0.27	3.33																							1.46							
Schizachyrium littorale	0.21	0.74	10.00		1.25							1.25						3.75															
Schoenoplectus americanus	0.26	1.41	3.33	7.71																													
Scleria triglomerata	0.13	0.50	6.67										1.25														2.50						
Setaria parviflora	0.61	2.01	16.67		10.21										2.92			3.75		0.21				1.25									
Smilax auriculata	2.13	5.06	23.33	1.25										15.21			6.88			1.25	17.92						5.63						15.63

Table 7. (Continued.)

Species	Avg	SD	Freq	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	42	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Smilax bona-nox	2.05	5.71	26.67	1.25								1.25	2.50	21.67							2.50	23.33					3.96						5.00
Smilax laurifolia	0.04	0.23	3.33										1.25																				
Smilax rotundifolia	0.08	0.32	6.67																			1.25					1.25						
Smilax sp.	0.22	1.18	3.33										6.46																				
Solidago sempervirens	0.90	1.91	33.33		5.21	1.46								1.25		3.75				1.25			8.75	1.25	1.25	1.25					1.67		
Spartina patens	16.72	22.15	66.67	41.67	75.63	21.67	2.50		5.21			6.88		3.13	54.58		18.33	62.33		20.00	26.67		9.79	46.25	41.67	46.25		12.08	0.04		3.75		3.13
Spiranthes sp.	0.01	0.04	3.33		0.21																												
Sporobolus virginicus	0.83	3.52	13.33					2.92		1.46		1.25														19.17							
Strophostyles helvola	0.31	1.06	10.00			2.50								1.46						5.21													
Toxicodendron radicans	7.64	14.40	43.33	9.58								7.50	12.08	21.46	2.50			1.25		47.29	17.92	1.25					13.13	12.50				60.00	22.71
Typha domingensis	0.04	0.23	3.33		1.25																												
Uniola paniculata	12.53	18.93	43.33			9.58	22.71	50.63	6.67	51.88	55.42					35.00			34.79	0.21			17.92				1.25		11.46	30.63	47.92		
Vitis rotundifolia	0.08	0.32	6.67										1.25									1.25											
Ground Condition																																	
Bare Ground	33.81	35.44	73.33	20.42		73.54	89.38	72.50	89.58	55.83	65.63	7.08	7.96	13.54	2.50	63.54	1.25		86.46	25.42	15.21	12.71	39.79				9.38		89.38	86.25	78.54		8.33
Exposed Humus	5.65	12.76	26.67		17.08									9.58	26.67		15.63							14.58	15.83	61.67		8.33					
Leaf Litter/Duff	58.98	32.25	96.67	55.63	84.38	12.33	8.17	40.42	8.25	44.17	38.54	89.58	87.29	60.00	81.25	35.00	91.46	96.46	5.42	68.33	84.38	92.50	60.63	84.17	84.58	41.88	88.54	97.50	8.75	12.08	30.83	89.58	87.29
Open Water	1.10	6.01	3.33	32.92																													
Tree Base	0.15	0.45	10.00										1.46																			1.67	1.25
Upland Non-Vascular/ Lichen	0.98	2.99	16.67	4.38		15.21							1.46			4.38																	3.96

Table 8. Average canopy species size, measured as diameter (cm) at breast height (DBH) for species sampled in vegetation monitoring macroplots at Cape Lookout National Seashore, 2012. 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].

Secies	Avg	SD	2	15	17	24	33	42	43	44	51	52	57	Ext
Baccharis halimifolia	4.90											4.90 (1)		
Carpinus caroliniana	5.62	1.28									5.62 (6)			
Ilex opaca	7.63	4.65				4.07 (3)					11.20 (2)			
Ilex vomitoria	6.24	4.63							4.67 (6)		11.14 (7)	4.65 (11)		4.50 (2)
Juniperus silicicola	11.43	7.26	5.57 (7)		9.34 (5)	21.72 (15)	10.00 (1)		8.42 (25)	9.19 (13)	12.83 (8)		16.95 (2)	8.87 (6)
Morella cerifera	5.62	1.37				5.79 (7)	5.62 (5)				6.80 (1)	4.10 (1)	5.78 (6)	
Osmanthus americanus	4.63	1.77				4.00 (1)					5.25 (2)			
Persea borbonia	5.94	1.78									6.00 (1)	5.90 (1)	5.92 (5)	
Pinus elliottii	9.39	6.88			7.05 (2)								11.73 (15)	
Pinus taeda	14.34	6.93								14.98 (25)				13.70 (42)
Quercus laurifolia	8.60	2.12				7.25 (2)				9.95 (2)				
Quercus virginiana	21.59	7.39				27.17 (10)					16.00 (17)			
Baccharis halimifolia (dead)	5.20	1.56			5.20 (2)									
Carpinus caroliniana (dead)	11.00										11.00 (1)			
Ilex vomitoria (dead)	5.20	0.52										5.20 (3)		
Juniperus silicicola (dead)	10.85	3.52	13.00 (1)			7.98 (10)		9.50 (1)			12.90 (1)			
Juniperus virginiana (dead)	10.80			10.80 (1)										
Morella cerifera (dead)	4.98	1.04			5.35 (6)								4.60 (1)	
Persea borbonia (dead)	5.24	1.21											5.24 (5)	
Pinus elliottii (dead)	18.87	12.00			21.26 (10)								16.47 (20)	
Pinus taeda (dead)	5.93	1.52								6.75 (2)				5.10 (2)
Quercus virginiana (dead)	12.80					14.60 (1)					11.00 (1)			

Table 9. Seedling frequency for canopy and shrub species in vegetation monitoring macroplots at Cape Lookout National Seashore, 2012. Seedling frequency is averaged across groundcover plots at each sampling location, and park-wide calculations are averaged across all sampling locations. [SD – Standard Deviation].

Species	Total Seedlings	Seedlings/ m2	SD	2	5	6	24	34	38	42	43	44	45	47	49	50	51	57	EXT
Baccharis angustifolia	1	0.08											0.08						
Baccharis halimifolia	2	0.08	0.00		0.08	0.08													
Borrichia frutescens	362	6.03	11.02					0.42	1.00		0.25			2.83		25.67			
Callicarpa americana	3	0.25					0.25												
Ilex opaca	13	1.08					1.08												
Ilex vomitoria	189	3.15	4.22				10.08	0.33			0.17						4.25		0.92
Juniperus silicicola	4	0.11	0.05				0.08				0.08						0.17		
Kosteletzkya virginica	3	0.25													0.25				
Morella cerifera	45	0.47	0.29	0.75		0.92	0.17			0.50	0.25			0.17	0.33				0.67
Osmanthus americanus	2	0.17										0.17							
Persea borbonia	6	0.25	0.12															0.17	0.33
Persea palustris	4	0.33		0.33															
Pinus elliottii	1	0.08																0.08	
Prunus serotina	1	0.08										0.08							
Quercus nigra	4	0.33										0.33							
Quercus virginiana	133	3.69	2.60				4.33					0.83					5.92		

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Appendix A. Plant species known to occur at CALO.

Table A-1. Vascular plant species known to occur at Cape Lookout National Seashore (NPSpecies 2012) and species detected during 2012 monitoring efforts.

Order	Family	Scientific Name	NPSpecies	This Study
Malpighiales	Euphorbiaceae	*Acalypha gracilens*	X	X
Sapindales	Sapindaceae	*Acer rubrum*	X	
Asterales	Asteraceae	*Achillea millefolium*	X	
Asterales	Asteraceae	*Achillea millefolium* ssp. *lanulosa*	X	
Acorales	Acoraceae	*Acorus americanus*	X	
Lamiales	Orobanchaceae	*Agalinis maritima*	X	X
Lamiales	Orobanchaceae	*Agalinis purpurea*	X	
Poales	Poaceae	*Agrostis stolonifera*	X	
Sapindales	Simaroubaceae	*Ailanthus altissima*	X	
Asparagales	Amaryllidaceae	*Allium canadense*	X	
Asparagales	Amaryllidaceae	*Allium vineale*	X	
Caryophyllales	Amaranthaceae	*Amaranthus cannabinus*	X	
Caryophyllales	Amaranthaceae	*Amaranthus hybridus*	X	
Caryophyllales	Amaranthaceae	*Amaranthus pumilus*	X	
Asterales	Asteraceae	*Ambrosia artemisiifolia*	X	X
Rosales	Rosaceae	*Amelanchier canadensis*	X	
Rosales	Rosaceae	*Amelanchier obovalis*	X	
Myrtales	Lythraceae	*Ammannia coccinea*	X	
Myrtales	Lythraceae	*Ammannia latifolia*	X	
Poales	Poaceae	*Ammophila breviligulata*	X	X
Asterales	Asteraceae	*Ampelaster carolinianus*	X	
Vitales	Vitaceae	*Ampelopsis arborea*	X	X
Poales	Poaceae	*Andropogon glomeratus*	X	X
Poales	Poaceae	*Andropogon glomeratus* var. *glomeratus*	X	
Poales	Poaceae	*Andropogon scoparius*	X	
Poales	Poaceae	*Andropogon virginicus*	X	
Poales	Poaceae	*Andropogon virginicus* var. *glaucopsis*	X	
Poales	Poaceae	*Andropogon virginicus* var. *virginicus*	X	
Caryophyllales	Caryophyllaceae	*Anychiastrum baldwinii*	X	
Fabales	Fabaceae	*Apios americana*	X	
Gentianales	Apocynaceae	*Apocynum cannabinum*	X	
Apiales	Araliaceae	*Aralia spinosa*	X	
Caryophyllales	Caryophyllaceae	*Arenaria lanuginosa*	X	
Caryophyllales	Caryophyllaceae	*Arenaria serpyllifolia*	X	
Poales	Poaceae	*Arthraxon hispidus* var. *cryptatherus*	X	
Gentianales	Apocynaceae	*Asclepias lanceolata*	X	
Gentianales	Apocynaceae	*Asclepias* sp.	X	X

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Magnoliales	Annonaceae	*Asimina parviflora*	X	X
Polypodiales	Aspleniaceae	*Asplenium platyneuron*	X	X
Polypodiales	Aspleniaceae	*Asplenium* X *ebenoides*	X	
Asterales	Asteraceae	*Aster* sp.	X	
Asterales	Asteraceae	*Aster subulatus* var. *subulatus*	X	
Caryophyllales	Amaranthaceae	*Atriplex cristata*	X	
Caryophyllales	Amaranthaceae	*Atriplex patula*	X	
Caryophyllales	Amaranthaceae	*Atriplex patula* ssp. *hastata*	X	
Caryophyllales	Amaranthaceae	*Atriplex patula* var. *hastata*	X	
Lamiales	Orobanchaceae	*Aureolaria flava*	X	
Lamiales	Orobanchaceae	*Aureolaria laevigata*	X	
Poales	Poaceae	*Axonopus fissifolius*	X	
Asterales	Asteraceae	*Baccharis angustifolia*	X	X
Asterales	Asteraceae	*Baccharis halimifolia*	X	X
Lamiales	Plantaginaceae	*Bacopa monnieri*	X	X
Rosales	Rhamnaceae	*Berchemia scandens*	X	X
Asterales	Asteraceae	*Bidens bipinnata*	X	
Asterales	Asteraceae	*Bidens laevis*	X	
Rosales	Urticaceae	*Boehmeria cylindrica*	X	X
Poales	Cyperaceae	*Bolboschoenus robustus*	X	
Asterales	Asteraceae	*Borrichia frutescens*	X	X
Poales	Poaceae	*Briza minor*	X	
Poales	Poaceae	*Bromus*	X	
Poales	Poaceae	*Bromus japonicus*	X	
Poales	Poaceae	*Bromus rigidus*	X	
Lamiales	Orobanchaceae	*Buchnera americana*	X	
Poales	Cyperaceae	*Bulbostylis capillaris*	X	
Poales	Cyperaceae	*Bulbostylis ciliatifolia*	X	
Poales	Cyperaceae	*Bulbostylis stenophylla*	X	
Brassicales	Brassicaceae	*Cakile edentula*	X	X
Brassicales	Brassicaceae	*Cakile harperi*	X	
Lamiales	Lamiaceae	*Callicarpa americana*	X	X
Solanales	Convolvulaceae	*Calystegia sepium*	X	X
Lamiales	Bignoniaceae	*Campsis radicans*	X	X
Zingiberales	Cannaceae	*Canna* X *generalis*	X	
Brassicales	Brassicaceae	*Cardamine hirsuta*	X	
Asterales	Asteraceae	*Carduus*	X	
Poales	Cyperaceae	*Carex alata*	X	
Poales	Cyperaceae	*Carex albolutescens*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Poales	Cyperaceae	*Carex nigromarginata*	X	
Poales	Cyperaceae	*Carex nigromarginata* var. *floridana*	X	
Poales	Cyperaceae	*Carex* sp.	X	X
Fagales	Betulaceae	*Carpinus caroliniana*	X	X
Fagales	Juglandaceae	*Carya glabra*	X	
Fabales	Fabaceae	*Cassia chamaecrista*	X	
Fabales	Fabaceae	*Cassia nictitans*	X	
Lamiales	Bignoniaceae	*Catalpa bignonioides*	X	
Rosales	Cannabaceae	*Celtis occidentalis*	X	
Poales	Poaceae	*Cenchrus longispinus*	X	
Poales	Poaceae	*Cenchrus* sp.	X	
Poales	Poaceae	*Cenchrus spinifex*	X	
Poales	Poaceae	*Cenchrus tribuloides*	X	X
Apiales	Apiaceae	*Centella asiatica*	X	X
Apiales	Apiaceae	*Centella erecta*	X	
Fabales	Fabaceae	*Centrosema virginianum*	X	X
Caryophyllales	Caryophyllaceae	*Cerastium glomeratum*	X	
Caryophyllales	Caryophyllaceae	*Cerastium* sp.	X	
Ceratophyllales	Ceratophyllaceae	*Ceratophyllum demersum*	X	
Fabales	Fabaceae	*Chamaecrista nictitans*		X
Malpighiales	Euphorbiaceae	*Chamaesyce maculata*	X	
Malpighiales	Euphorbiaceae	*Chamaesyce nutans*	X	
Malpighiales	Euphorbiaceae	*Chamaesyce polygonifolia*	X	X
Poales	Poaceae	*Chasmanthium laxum*	X	X
Caryophyllales	Amaranthaceae	*Chenopodium ambrosioides*	X	
Caryophyllales	Amaranthaceae	*Chenopodium botrys*	X	
Caryophyllales	Amaranthaceae	*Chenopodium glaucum*	X	
Caryophyllales	Amaranthaceae	*Chenopodium opulifolium*	X	
Asterales	Asteraceae	*Chrysopsis graminifolia*	X	
Apiales	Apiaceae	*Cicuta curtissii*	X	
Apiales	Apiaceae	*Cicuta maculata*	X	
Asterales	Asteraceae	*Cirsium horridulum*	X	X
Asterales	Asteraceae	*Cirsium* sp.	X	X
Asterales	Asteraceae	*Cirsium spinosissimum*	X	
Poales	Cyperaceae	*Cladium mariscus* ssp. *jamaicense*	X	X
Ranunculales	Ranunculaceae	*Clematis catesbyana*	X	
Ranunculales	Ranunculaceae	*Clematis ligusticifolia*	X	
Fabales	Fabaceae	*Clitoria mariana*	X	
Malpighiales	Euphorbiaceae	*Cnidoscolus stimulosus*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Commelinales	Commelinaceae	*Commelina angustifolia*	X	
Commelinales	Commelinaceae	*Commelina erecta*	X	X
Commelinales	Commelinaceae	*Commelina* sp.	X	
Asterales	Asteraceae	*Conyza bonariensis*		X
Asterales	Asteraceae	*Conyza canadensis*	X	X
Asterales	Asteraceae	*Conyza canadensis* var. *canadensis*	X	
Asterales	Asteraceae	*Conyza canadensis* var. *pusilla*	X	
Asparagales	Orchidaceae	*Corallorrhiza wisteriana*	X	
Asterales	Asteraceae	*Coreopsis*	X	
Asterales	Asteraceae	*Coreopsis gladiata*	X	
Asterales	Asteraceae	*Coreopsis lanceolata*	X	
Cornales	Cornaceae	*Cornus florida*	X	
Cornales	Cornaceae	*Cornus foemina*	X	X
Fabales	Fabaceae	*Crotalaria rotundifolia*	X	
Malpighiales	Euphorbiaceae	*Croton glandulosus*	X	
Malpighiales	Euphorbiaceae	*Croton glandulosus* var. *septentrionalis*	X	
Malpighiales	Euphorbiaceae	*Croton punctatus*	X	X
Cucurbitales	Cucurbitaceae	*Cucurbita pepo*	X	
Myrtales	Lythraceae	*Cuphea carthagenensis*	X	
Solanales	Convolvulaceae	*Cuscuta arvensis*	X	
Solanales	Convolvulaceae	*Cuscuta gronovii*	X	
Solanales	Convolvulaceae	*Cuscuta* sp.	X	X
Gentianales	Apocynaceae	*Cynanchum angustifolium*	X	X
Poales	Poaceae	*Cynodon dactylon*	X	X
Poales	Cyperaceae	*Cyperus bipartitus*	X	
Poales	Cyperaceae	*Cyperus croceus*	X	
Poales	Cyperaceae	*Cyperus cylindricus*	X	
Poales	Cyperaceae	*Cyperus filicinus*	X	
Poales	Cyperaceae	*Cyperus flavescens*	X	
Poales	Cyperaceae	*Cyperus haspan*	X	
Poales	Cyperaceae	*Cyperus odoratus*	X	
Poales	Cyperaceae	*Cyperus ovatus*	X	
Poales	Cyperaceae	*Cyperus polystachyos*	X	
Poales	Cyperaceae	*Cyperus polystachyos* var. *texensis*	X	
Poales	Cyperaceae	*Cyperus retrofractus*	X	
Poales	Cyperaceae	*Cyperus retrorsus*	X	
Poales	Cyperaceae	*Cyperus* sp.	X	X
Poales	Cyperaceae	*Cyperus strigosus*	X	
Poales	Cyperaceae	*Cyperus tetragonus*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Poales	Poaceae	*Dactylus glomerata*	X	
Solanales	Solanaceae	*Datura stramonium*	X	
Myrtales	Lythraceae	*Decodon verticillatus*	X	
Fabales	Fabaceae	*Desmodium paniculatum*	X	
Fabales	Fabaceae	*Desmodium perplexum*	X	
Fabales	Fabaceae	*Desmodium strictum*	X	
Poales	Poaceae	*Dichanthelium aciculare*	X	
Poales	Poaceae	*Dichanthelium acuminatum* var. *fasciculatum*	X	
Poales	Poaceae	*Dichanthelium commutatum*	X	
Poales	Poaceae	*Dichanthelium dichotomum* var. *dichotomum*	X	
Poales	Poaceae	*Dichanthelium latifolium*	X	
Poales	Poaceae	*Dichanthelium laxiflorum*	X	
Poales	Poaceae	*Dichanthelium sabulorum* var. *patulum*	X	
Poales	Poaceae	*Dichanthelium scabriusculum*	X	
Poales	Poaceae	*Dichanthelium scoparium*	X	
Poales	Poaceae	*Dichanthelium spretum*	X	
Solanales	Convolvulaceae	*Dichondra carolinensis*	X	
Poales	Poaceae	*Digitaria filiformis*	X	
Poales	Poaceae	*Digitaria sanguinalis*	X	
Gentianales	Rubiaceae	*Diodia teres*	X	X
Gentianales	Rubiaceae	*Diodia virginiana*	X	X
Ericales	Ebenaceae	*Diospyros virginiana*	X	
Poales	Poaceae	*Distichlis spicata*	X	X
Polypodiales	Thelypteridaceae	*Dryopteris thelypteris*	X	
Poales	Cyperaceae	*Dulichium arundinaceum*	X	
Poales	Poaceae	*Echinochloa crus-galli*	X	
Poales	Poaceae	*Echinochloa walteri*	X	
Asterales	Asteraceae	*Eclipta prostrata*	X	
Poales	Cyperaceae	*Eleocharis albida*	X	
Poales	Cyperaceae	*Eleocharis fallax*	X	
Poales	Cyperaceae	*Eleocharis flavescens*	X	
Poales	Cyperaceae	*Eleocharis microcarpa*	X	
Poales	Cyperaceae	*Eleocharis montevidensis*	X	
Poales	Cyperaceae	*Eleocharis ochreata*	X	
Poales	Cyperaceae	*Eleocharis olivacea*	X	
Poales	Cyperaceae	*Eleocharis robbinsii*	X	
Poales	Cyperaceae	*Eleocharis rostellata*	X	
Poales	Cyperaceae	*Eleocharis* sp.	X	X
Asterales	Asteraceae	*Elephantopus carolinianus*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Asterales	Asteraceae	*Elephantopus nudatus*	X	
Asterales	Asteraceae	*Elephantopus tomentosus*	X	X
Poales	Poaceae	*Eleusine indica*	X	
Poales	Poaceae	*Elymus* sp.	X	
Poales	Poaceae	*Elymus virginicus*	X	X
Poales	Poaceae	*Elymus virginicus* var. *halophilus*	X	X
Poales	Poaceae	*Eragrostis curvula*	X	
Poales	Poaceae	*Eragrostis elliottii*	X	
Poales	Poaceae	*Eragrostis pectinacea*	X	
Poales	Poaceae	*Eragrostis pilosa*	X	
Poales	Poaceae	*Eragrostis refracta*	X	
Poales	Poaceae	*Eragrostis* sp.	X	X
Poales	Poaceae	*Eragrostis spectabilis*	X	
Asterales	Asteraceae	*Erechtites hieraciifolia*	X	X
Poales	Poaceae	*Eremochloa ophiuroides*	X	X
Asterales	Asteraceae	*Erigeron annuus*	X	
Asterales	Asteraceae	*Erigeron canadensis*	X	
Asterales	Asteraceae	*Erigeron pusillus*	X	
Asterales	Asteraceae	*Erigeron quercifolius*	X	X
Asterales	Asteraceae	*Erigeron* sp.	X	
Celastrales	Celastraceae	*Euonymus patens*	X	
Asterales	Asteraceae	*Eupatorium anomalum*	X	
Asterales	Asteraceae	*Eupatorium aromaticum*	X	
Asterales	Asteraceae	*Eupatorium capillifolium*	X	X
Asterales	Asteraceae	*Eupatorium dubium*	X	
Asterales	Asteraceae	*Eupatorium hyssopifolium* var. *laciniatum*	X	
Asterales	Asteraceae	*Eupatorium leucolepis*	X	
Asterales	Asteraceae	*Eupatorium mohrii*	X	
Asterales	Asteraceae	*Eupatorium pilosum*	X	
Asterales	Asteraceae	*Eupatorium serotinum*	X	
Asterales	Asteraceae	*Eupatorium* sp.	X	X
Malpighiales	Euphorbiaceae	*Euphorbia*	X	
Poales	Poaceae	*Eustachys petraea*	X	X
Asterales	Asteraceae	*Euthamia minor*	X	
Asterales	Asteraceae	*Euthamia tenuifolia*	X	
Poales	Poaceae	*Festuca octoflora*	X	
Poales	Poaceae	*Festuca rubra*	X	
Rosales	Moraceae	*Ficus carica*	X	
Poales	Cyperaceae	*Fimbristylis autumnalis*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Poales	Cyperaceae	*Fimbristylis caroliniana*	X	
Poales	Cyperaceae	*Fimbristylis castanea*	X	X
Poales	Cyperaceae	*Fimbristylis dichotoma*	X	
Poales	Cyperaceae	*Fimbristylis* sp.	X	X
Poales	Cyperaceae	*Fimbristylis thermalis*	X	
Lamiales	Oleaceae	*Fraxinus caroliniana*	X	
Poales	Cyperaceae	*Fuirena breviseta*	X	
Poales	Cyperaceae	*Fuirena* sp.	X	
Poales	Cyperaceae	*Fuirena squarrosa*	X	
Asterales	Asteraceae	*Gaillardia pulchella*	X	X
Fabales	Fabaceae	*Galactia* sp.	X	
Fabales	Fabaceae	*Galactia volubilis*	X	
Gentianales	Rubiaceae	*Galium hispidulum*	X	X
Gentianales	Rubiaceae	*Galium obtusum*	X	
Gentianales	Rubiaceae	*Galium obtusum* ssp. *obtusum*	X	
Gentianales	Rubiaceae	*Galium pilosum*	X	
Gentianales	Rubiaceae	*Galium pilosum* var. *puncticulosum*	X	
Gentianales	Rubiaceae	*Galium* sp.	X	X
Gentianales	Rubiaceae	*Galium tinctorium*	X	
Asterales	Asteraceae	*Gamochaeta purpurea*	X	
Myrtales	Onagraceae	*Gaura angustifolia*	X	
Myrtales	Onagraceae	*Gaura biennis*	X	
Myrtales	Onagraceae	*Gaura mollis*	X	
Ericales	Ericaceae	*Gaylussacia dumosa*	X	
Gentianales	Gelsemiaceae	*Gelsemium sempervirens*	X	X
Geraniales	Geraniaceae	*Geranium carolinianum*	X	
Lamiales	Orobanchaceae	*Gerardia maritima*	X	
Asparagales	Iridaceae	*Gladiolus* X *gandavensis*	X	
Poales	Poaceae	*Glyceria acutiflora*	X	
Asterales	Asteraceae	*Gnaphalium obtusifolium*	X	
Asterales	Asteraceae	*Gnaphalium purpureum* var. *americanum*	X	
Asterales	Asteraceae	*Gnaphalium purpureum* var. *spathulatum*	X	
Asterales	Asteraceae	*Gnaphalium* sp.	X	X
Gentianales	Apocynaceae	*Gonolobus suberosa*	X	X
Lamiales	Plantaginaceae	*Gratiola virginiana*	X	
Saxifragales	Hamamelidaceae	*Hamamelis virginiana*	X	
Asterales	Asteraceae	*Helenium* sp.	X	
Malvales	Cistaceae	*Helianthemum corymbosum*	X	
Malvales	Cistaceae	*Helianthemum georgianum*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Boraginales	Boraginaceae	*Heliotropium curassavicum*	X	
Asterales	Asteraceae	*Heterotheca subaxillaris*	X	X
Malvales	Malvaceae	*Hibiscus moscheutos*	X	
Asterales	Asteraceae	*Hieracium*	X	
Asterales	Asteraceae	*Hieracium gronovii*	X	
Caryophyllales	Caryophyllaceae	*Holosteum umbellatum*	X	
Poales	Poaceae	*Hordeum pusillum*	X	
Apiales	Araliaceae	*Hydrocotyle bonariensis*	X	X
Apiales	Araliaceae	*Hydrocotyle umbellata*	X	
Apiales	Araliaceae	*Hydrocotyle verticillata*	X	
Malpighiales	Hypericaceae	*Hypericum crux-andreae*	X	
Malpighiales	Hypericaceae	*Hypericum gentianoides*	X	
Malpighiales	Hypericaceae	*Hypericum hypericoides*	X	
Malpighiales	Hypericaceae	*Hypericum mutilum*	X	
Malpighiales	Hypericaceae	*Hypericum perforatum*	X	
Malpighiales	Hypericaceae	*Hypericum* sp.	X	X
Asterales	Asteraceae	*Hypochaeris*	X	
Asparagales	Hypoxidaceae	*Hypoxis hirsuta*	X	
Aquifoliales	Aquifoliaceae	*Ilex cassine*	X	
Aquifoliales	Aquifoliaceae	*Ilex glabra*	X	
Aquifoliales	Aquifoliaceae	*Ilex opaca*	X	X
Aquifoliales	Aquifoliaceae	*Ilex vomitoria*	X	X
Solanales	Convolvulaceae	*Ipomoea batatas*	X	
Solanales	Convolvulaceae	*Ipomoea lacunosa*	X	
Solanales	Convolvulaceae	*Ipomoea pandurata*	X	
Solanales	Convolvulaceae	*Ipomoea sagittata*	X	X
Solanales	Convolvulaceae	*Ipomoea* sp.	X	
Caryophyllales	Amaranthaceae	*Iresine rhizomatosa*	X	
Asterales	Asteraceae	*Iva frutescens*	X	X
Asterales	Asteraceae	*Iva imbricata*	X	
Poales	Juncaceae	*Juncus biflorus*	X	
Poales	Juncaceae	*Juncus bufonius*	X	
Poales	Juncaceae	*Juncus canadensis*	X	
Poales	Juncaceae	*Juncus coriaceus*	X	
Poales	Juncaceae	*Juncus dichotomus*	X	
Poales	Juncaceae	*Juncus effusus*	X	
Poales	Juncaceae	*Juncus marginatus*	X	
Poales	Juncaceae	*Juncus megacephalus*	X	X
Poales	Juncaceae	*Juncus roemerianus*	X	X

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Poales	Juncaceae	*Juncus scirpoides*	X	
Poales	Juncaceae	*Juncus* sp.	X	X
Poales	Juncaceae	*Juncus tenuis*	X	
Cupressales	Cupressaceae	*Juniperus silicicola*	X	X
Cupressales	Cupressaceae	*Juniperus virginiana*	X	
Myrtales	Onagraceae	*Kneiffia arenicola*	X	
Malvales	Malvaceae	*Kosteletzkya virginica*	X	X
Asterales	Asteraceae	*Krigia virginica*	X	
Fabales	Fabaceae	*Kummerowia striata*	X	
Asterales	Asteraceae	*Lactuca canadensis*	X	X
Asterales	Asteraceae	*Lactuca graminifolia*	X	
Asterales	Asteraceae	*Lactuca* sp.	X	
Cucurbitales	Cucurbitaceae	*Lagenaria siceraria*	X	
Lamiales	Lamiaceae	*Lamium amplexicaule*	X	
Lamiales	Verbenaceae	*Lantana camara*	X	
Malvales	Cistaceae	*Lechea leggettii*	X	
Malvales	Cistaceae	*Lechea mucronata*	X	
Malvales	Cistaceae	*Lechea* sp.	X	
Brassicales	Brassicaceae	*Lepidium virginicum*	X	X
Fabales	Fabaceae	*Lespedeza cuneata*	X	X
Fabales	Fabaceae	*Lespedeza* sp.	X	
Fabales	Fabaceae	*Lespedeza virginica*	X	
Asterales	Asteraceae	*Leucanthemum vulgare*	X	
Asterales	Asteraceae	*Liatris graminifolia*	X	
Apiales	Apiaceae	*Lilaeopsis chinensis*	X	
Caryophyllales	Plumbaginaceae	*Limonium carolinianum*	X	
Malpighiales	Linaceae	*Linum floridanum* var. *floridanum*	X	
Malpighiales	Linaceae	*Linum medium*	X	
Malpighiales	Linaceae	*Linum medium* var. *medium*	X	
Malpighiales	Linaceae	*Linum* sp.	X	
Malpighiales	Linaceae	*Linum virginianum*	X	
Poales	Poaceae	*Lolium multiflorum*	X	
Poales	Poaceae	*Lolium perenne*	X	
Poales	Poaceae	*Lolium pratense*	X	
Dipsacales	Caprifoliaceae	*Lonicera japonica*	X	X
Dipsacales	Caprifoliaceae	*Lonicera sempervirens*	X	X
Myrtales	Onagraceae	*Ludwigia alata*	X	
Myrtales	Onagraceae	*Ludwigia maritima*	X	
Myrtales	Onagraceae	*Ludwigia microcarpa*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Myrtales	Onagraceae	*Ludwigia palustris*	X	
Myrtales	Onagraceae	*Ludwigia repens*	X	X
Myrtales	Onagraceae	*Ludwigia* sp.	X	X
Myrtales	Onagraceae	*Ludwigia virgata*	X	
Lamiales	Lamiaceae	*Lycopus virginicus*	X	
Ericales	Ericaceae	*Lyonia lucida*	X	
Myrtales	Lythraceae	*Lythrum lineare*	X	X
Rosales	Moraceae	*Maclura pomifera*	X	
Magnoliales	Magnoliaceae	*Magnolia grandiflora*	X	
Magnoliales	Magnoliaceae	*Magnolia virginiana*	X	
Lamiales	Lamiaceae	*Marrubium vulgare*	X	
Gentianales	Apocynaceae	*Matelea* sp.	X	
Gentianales	Apocynaceae	*Matelea suberosa*	X	
Sapindales	Meliaceae	*Melia azedarach*	X	
Poales	Poaceae	*Melica mutica*	X	X
Cucurbitales	Cucurbitaceae	*Melothria pendula*	X	X
Asterales	Asteraceae	*Mikania scandens*	X	X
Fabales	Fabaceae	*Mimosa microphylla*	X	
Gentianales	Rubiaceae	*Mitchella repens*	X	X
Gentianales	Loganiaceae	*Mitreola petiolata*	X	
Caryophyllales	Molluginaceae	*Mollugo verticillata*	X	
Lamiales	Lamiaceae	*Monarda punctata*	X	
Fagales	Myricaceae	*Morella caroliniensis*	X	
Fagales	Myricaceae	*Morella cerifera*	X	X
Rosales	Moraceae	*Morus rubra*	X	X
Poales	Poaceae	*Muhlenbergia capillaris*	X	X
Poales	Poaceae	*Muhlenbergia capillaris* var. *filipes*	X	
Ranunculales	Ranunculaceae	*Myosurus minimus*	X	
Fagales	Myricaceae	*Myrica gale*	X	
Saxifragales	Haloragaceae	*Myriophyllum verticillatum*	X	
Ranunculales	Berberidaceae	*Nandina domestica*		X
Asparagales	Amaryllidaceae	*Nothoscordum bivalve*	X	
Lamiales	Plantaginaceae	*Nuttallanthus canadensis*	X	
Cornales	Nyssaceae	*Nyssa ogeche*	X	
Cornales	Nyssaceae	*Nyssa sylvatica*	X	
Cornales	Nyssaceae	*Nyssa sylvatica* var. *biflora*	X	
Myrtales	Onagraceae	*Oenothera biennis*	X	X
Myrtales	Onagraceae	*Oenothera fruticosa*	X	
Myrtales	Onagraceae	*Oenothera humifusa*	X	X

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Myrtales	Onagraceae	*Oenothera laciniata*	X	
Myrtales	Onagraceae	*Oenothera parviflora*	X	
Gentianales	Rubiaceae	*Oldenlandia uniflora*	X	
Polypodiales	Onocleaceae	*Onoclea sensibilis*	X	
Ophioglossales	Ophioglossaceae	*Ophioglossum petiolatum*	X	
Poales	Poaceae	*Oplismenus hirtellus*	X	
Caryophyllales	Cactaceae	*Opuntia ficus-indica*	X	
Caryophyllales	Cactaceae	*Opuntia humifusa*	X	
Caryophyllales	Cactaceae	*Opuntia pusilla*	X	
Caryophyllales	Cactaceae	*Opuntia* sp.	X	X
Lamiales	Oleaceae	*Osmanthus americanus*	X	X
Osmundales	Osmundaceae	*Osmunda regalis*	X	X
Osmundales	Osmundaceae	*Osmunda regalis* var. *spectabilis*	X	
Oxalidales	Oxalidaceae	*Oxalis rubra*	X	
Oxalidales	Oxalidaceae	*Oxalis stricta*	X	
Oxalidales	Oxalidaceae	*Oxalis violacea*	X	
Poales	Poaceae	*Panicum acuminatum*	X	
Poales	Poaceae	*Panicum amarum*	X	X
Poales	Poaceae	*Panicum anceps*	X	
Poales	Poaceae	*Panicum dichotomiflorum*	X	
Poales	Poaceae	*Panicum lancearium*	X	
Poales	Poaceae	*Panicum longifolium*	X	
Poales	Poaceae	*Panicum portoricense* var. *portoricense*	X	
Poales	Poaceae	*Panicum rigidulum* var. *rigidulum*	X	
Poales	Poaceae	*Panicum* sp.	X	X
Poales	Poaceae	*Panicum sphaerocarpon*	X	
Poales	Poaceae	*Panicum verrucosum*	X	
Poales	Poaceae	*Panicum virgatum*	X	
Poales	Poaceae	*Panicum virgatum* var. *virgatum*	X	
Poales	Poaceae	*Parapholis incurva*	X	
Rosales	Urticaceae	*Parietaria floridana*	X	X
Rosales	Urticaceae	*Parietaria praetermissa*	X	
Caryophyllales	Caryophyllaceae	*Paronychia riparia*	X	
Vitales	Vitaceae	*Parthenocissus quinquefolia*	X	X
Poales	Poaceae	*Paspalum distichum*	X	
Poales	Poaceae	*Paspalum floridanum*	X	
Poales	Poaceae	*Paspalum laeve*	X	
Poales	Poaceae	*Paspalum notatum*	X	
Poales	Poaceae	*Paspalum setaceum*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Poales	Poaceae	*Paspalum* sp.	X	
Poales	Poaceae	*Paspalum urvillei*	X	
Poales	Poaceae	*Paspalum vaginatum*	X	X
Malpighiales	Passifloraceae	*Passiflora incarnata*	X	
Malpighiales	Passifloraceae	*Passiflora lutea*	X	X
Laurales	Lauraceae	*Persea borbonia*	X	X
Laurales	Lauraceae	*Persea palustris*	X	X
Solanales	Solanaceae	*Petunia* X *atkinsiana*	X	
Poales	Poaceae	*Phalaris caroliniana*	X	
Poales	Poaceae	*Phleum pratense*	X	
Ericales	Polemoniaceae	*Phlox drummondii*	X	
Santalales	Santalaceae	*Phoradendron leucarpum*	X	
Poales	Poaceae	*Phragmites australis*	X	X
Lamiales	Verbenaceae	*Phyla nodiflora*	X	X
Solanales	Solanaceae	*Physalis pubescens*	X	X
Solanales	Solanaceae	*Physalis viscosa*	X	
Solanales	Solanaceae	*Physalis viscosa* ssp. *maritima*	X	
Solanales	Solanaceae	*Physalis walteri*	X	
Caryophyllales	Phytolaccaceae	*Phytolacca americana*	X	X
Caryophyllales	Phytolaccaceae	*Phytolacca decandra*	X	
Rosales	Urticaceae	*Pilea fontana*	X	
Rosales	Urticaceae	*Pilea pumila*	X	
Pinales	Pinaceae	*Pinus elliiottii*		X
Pinales	Pinaceae	*Pinus taeda*	X	X
Poales	Poaceae	*Piptochaetium avenaceum*	X	
Lamiales	Plantaginaceae	*Plantago heterophylla*	X	
Lamiales	Plantaginaceae	*Plantago lanceolata*	X	
Lamiales	Plantaginaceae	*Plantago major*		X
Lamiales	Plantaginaceae	*Plantago virginica*	X	X
Asterales	Asteraceae	*Pluchea camphorata*	X	X
Asterales	Asteraceae	*Pluchea carolinensis*	X	
Asterales	Asteraceae	*Pluchea foetida*	X	
Asterales	Asteraceae	*Pluchea purpurascens*	X	
Asterales	Asteraceae	*Pluchea rosea*	X	
Asterales	Asteraceae	*Pluchea* sp.	X	
Poales	Poaceae	*Poa annua*	X	
Poales	Poaceae	*Poa pratensis*	X	
Fabales	Polygalaceae	*Polygala lutea*	X	
Fabales	Polygalaceae	*Polygala verticillata*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Caryophyllales	Polygonaceae	*Polygonum glaucum*	X	
Caryophyllales	Polygonaceae	*Polygonum lapathifolium*	X	
Caryophyllales	Polygonaceae	*Polygonum persicaria*	X	
Caryophyllales	Polygonaceae	*Polygonum punctatum*	X	
Caryophyllales	Polygonaceae	*Polygonum punctatum* var. *confertiflorum*	X	
Caryophyllales	Polygonaceae	*Polygonum setaceum*	X	
Caryophyllales	Polygonaceae	*Polygonum* sp.	X	X
Polypodiales	Polypodiaceae	*Polypodium polypodioides*	X	
Poales	Poaceae	*Polypogon monspeliensis*	X	
Lamiales	Tetrachondraceae	*Polypremum procumbens*	X	X
Polypodiales	Dryopteridaceae	*Polystichum acrostichoides*	X	
Malpighiales	Salicaceae	*Populus alba*	X	
Malpighiales	Salicaceae	*Populus* sp.	X	
Caryophyllales	Portulacaceae	*Portulaca oleracea*	X	
Rosales	Rosaceae	*Potentilla canadensis*	X	
Saxifragales	Haloragaceae	*Proserpinaca palustris*	X	
Saxifragales	Haloragaceae	*Proserpinaca pectinata*	X	
Rosales	Rosaceae	*Prunus angustifolia*	X	
Rosales	Rosaceae	*Prunus caroliniana*	X	X
Rosales	Rosaceae	*Prunus serotina*	X	X
Polypodiales	Dennstaedtiaceae	*Pteridium aquilinum*	X	X
Asterales	Asteraceae	*Pterocaulon virgatum*	X	
Apiales	Apiaceae	*Ptilimnium capillaceum*	X	X
Asterales	Asteraceae	*Pyrrhopappus carolinianus*	X	
Asterales	Asteraceae	*Pyrrhopappus* sp.	X	
Fagales	Fagaceae	*Quercus falcata*	X	
Fagales	Fagaceae	*Quercus laurifolia*	X	X
Fagales	Fagaceae	*Quercus nigra*	X	X
Fagales	Fagaceae	*Quercus phellos*	X	
Fagales	Fagaceae	*Quercus stellata*	X	
Fagales	Fagaceae	*Quercus virginiana*	X	X
Ranunculales	Ranunculaceae	*Ranunculus sceleratus*	X	
Brassicales	Brassicaceae	*Raphanus raphanistrum*	X	
Myrtales	Melastomataceae	*Rhexia mariana*	X	
Sapindales	Anacardiaceae	*Rhus copallina*	X	
Sapindales	Anacardiaceae	*Rhus copallinum*	X	
Poales	Cyperaceae	*Rhynchospora caduca*	X	
Poales	Cyperaceae	*Rhynchospora colorata*	X	X
Poales	Cyperaceae	*Rhynchospora glomerata*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Poales	Cyperaceae	*Rhynchospora latifolia*	X	X
Poales	Cyperaceae	*Rhynchospora odorata*	X	
Poales	Cyperaceae	*Rhynchospora* sp.	X	X
Malpighiales	Euphorbiaceae	*Ricinus communis*	X	
Fabales	Fabaceae	*Robinia pseudoacacia*	X	
Rosales	Rosaceae	*Rosa carolina*	X	
Rosales	Rosaceae	*Rosa multiflora*	X	
Rosales	Rosaceae	*Rosa palustris*	X	X
Rosales	Rosaceae	*Rubus allegheniensis*	X	
Rosales	Rosaceae	*Rubus cuneifolius*	X	
Rosales	Rosaceae	*Rubus persistens*	X	
Rosales	Rosaceae	*Rubus* sp.	X	X
Rosales	Rosaceae	*Rubus trivialis*	X	X
Asterales	Asteraceae	*Rudbeckia hirta*	X	
Asterales	Asteraceae	*Rudbeckia* sp.	X	
Caryophyllales	Polygonaceae	*Rumex crispus*	X	
Caryophyllales	Polygonaceae	*Rumex hastatulus*	X	
Alismatales	Ruppiaceae	*Ruppia maritima*	X	
Arecales	Arecaceae	*Sabal minor*	X	X
Gentianales	Gentianaceae	*Sabatia calycina*	X	
Gentianales	Gentianaceae	*Sabatia campanulata*	X	
Gentianales	Gentianaceae	*Sabatia* sp.	X	X
Gentianales	Gentianaceae	*Sabatia stellaris*	X	
Poales	Poaceae	*Saccharum giganteum*	X	X
Poales	Poaceae	*Sacciolepis striata*	X	
Caryophyllales	Caryophyllaceae	*Sagina decumbens*	X	
Alismatales	Alismataceae	*Sagittaria falcata*	X	
Alismatales	Alismataceae	*Sagittaria lancifolia*	X	
Alismatales	Alismataceae	*Sagittaria latifolia*	X	
Caryophyllales	Amaranthaceae	*Salicornia bigelovii*	X	
Caryophyllales	Amaranthaceae	*Salicornia maritima*	X	
Caryophyllales	Amaranthaceae	*Salicornia virginica*	X	
Malpighiales	Salicaceae	*Salix caroliniana*	X	
Malpighiales	Salicaceae	*Salix* sp.	X	
Caryophyllales	Amaranthaceae	*Salsola kali*	X	
Dipsacales	Adoxaceae	*Sambucus canadensis*		X
Ericales	Primulaceae	*Samolus floribundus*	X	
Ericales	Primulaceae	*Samolus parviflorus*	X	
Apiales	Apiaceae	*Sanicula canadensis*	X	X

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Caryophyllales	Amaranthaceae	*Sarcocornia perennis*	X	X
Laurales	Lauraceae	*Sassafras albidum*	X	X
Piperales	Saururaceae	*Saururus cernuus*	X	
Poales	Poaceae	*Schizachyrium littorale*	X	X
Poales	Poaceae	*Schizachyrium scoparium* var. *littorale*	X	
Poales	Cyperaceae	*Schoenoplectus americanus*	X	X
Poales	Cyperaceae	*Schoenoplectus tabernaemontani*	X	
Poales	Cyperaceae	*Scirpus acutus*	X	
Poales	Cyperaceae	*Scirpus americanus*	X	
Poales	Cyperaceae	*Scirpus* sp.	X	
Poales	Cyperaceae	*Scleria triglomerata*	X	X
Poales	Cyperaceae	*Scleria verticillata*	X	
Lamiales	Lamiaceae	*Scutellaria integrifolia*	X	
Asterales	Asteraceae	*Senecio vulgaris*	X	
Fabales	Fabaceae	*Sesbania punicea*	X	
Caryophyllales	Aizoaceae	*Sesuvium maritimum*	X	
Caryophyllales	Aizoaceae	*Sesuvium portulacastrum*	X	
Poales	Poaceae	*Setaria glauca*	X	
Poales	Poaceae	*Setaria magna*	X	X
Poales	Poaceae	*Setaria parviflora*	X	X
Malvales	Malvaceae	*Sida rhombifolia*	X	
Ericales	Sapotaceae	*Sideroxylon lycioides*	X	X
Ericales	Sapotaceae	*Sideroxylon tenax*	X	
Caryophyllales	Caryophyllaceae	*Silene antirrhina*	X	
Asparagales	Iridaceae	*Sisyrinchium atlanticum*	X	X
Asparagales	Iridaceae	*Sisyrinchium mucronatum*	X	
Asparagales	Iridaceae	*Sisyrinchium mucronatum* var. *atlanticum*	X	
Asparagales	Iridaceae	*Sisyrinchium rosulatum*	X	
Liliales	Smilacaceae	*Smilax auriculata*	X	X
Liliales	Smilacaceae	*Smilax bona-nox*	X	X
Liliales	Smilacaceae	*Smilax glauca*	X	X
Liliales	Smilacaceae	*Smilax laurifolia*	X	X
Liliales	Smilacaceae	*Smilax rotundifolia*	X	X
Liliales	Smilacaceae	*Smilax* sp.	X	X
Liliales	Smilacaceae	*Smilax tamnoides*	X	
Solanales	Solanaceae	*Solanum carolinense*	X	
Solanales	Solanaceae	*Solanum gracilius*	X	
Solanales	Solanaceae	*Solanum pseudogracile*	X	
Asterales	Asteraceae	*Solidago fistulosa*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Asterales	Asteraceae	*Solidago microcephala*	X	
Asterales	Asteraceae	*Solidago odora*	X	
Asterales	Asteraceae	*Solidago sempervirens*	X	X
Asterales	Asteraceae	*Solidago* sp.	X	
Asterales	Asteraceae	*Sonchus asper*	X	
Asterales	Asteraceae	*Sonchus oleraceus*	X	
Poales	Poaceae	*Sorghastrum elliottii*	X	
Poales	Typhaceae	*Sparganium androcladum*	X	
Poales	Poaceae	*Spartina alterniflora*	X	
Poales	Poaceae	*Spartina cynosuroides*	X	
Poales	Poaceae	*Spartina patens*	X	X
Asterales	Campanulaceae	*Specularia perfoliata*	X	
Caryophyllales	Caryophyllaceae	*Spergularia salina*	X	
Apiales	Apiaceae	*Spermolepis divaricata*	X	
Poales	Poaceae	*Sphenopholis obtusata*	X	
Poales	Poaceae	*Sphenopholis pensylvanica*	X	
Asparagales	Orchidaceae	*Spiranthes gracilis*	X	
Asparagales	Orchidaceae	*Spiranthes laciniata*	X	
Asparagales	Orchidaceae	*Spiranthes ovalis*	X	
Asparagales	Orchidaceae	*Spiranthes* sp.	X	X
Asparagales	Orchidaceae	*Spiranthes vernalis*	X	
Poales	Poaceae	*Sporobolus indicus*	X	
Poales	Poaceae	*Sporobolus poiretii*	X	
Poales	Poaceae	*Sporobolus virginicus*	X	X
Caryophyllales	Caryophyllaceae	*Stellaria media*	X	
Poales	Poaceae	*Stenotaphrum secundatum*	X	
Fabales	Fabaceae	*Strophostyles helvola*	X	X
Fabales	Fabaceae	*Strophostyles* sp.	X	
Fabales	Fabaceae	*Strophostyles umbellata*	X	
Caryophyllales	Amaranthaceae	*Suaeda linearis*	X	
Asterales	Asteraceae	*Symphyotrichum racemosum*	X	
Asterales	Asteraceae	*Symphyotrichum subulatum*	X	
Asterales	Asteraceae	*Symphyotrichum tenuifolium*	X	
Caryophyllales	Tamaricaceae	*Tamarix gallica*	X	
Asterales	Asteraceae	*Taraxacum officinale*	X	
Cupressales	Cupressaceae	*Taxodium distichum*	X	
Cupressales	Cupressaceae	*Taxodium* sp.	X	
Lamiales	Lamiaceae	*Teucrium canadense*	X	
Polypodiales	Thelypteridaceae	*Thelypteris palustris*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Malvales	Malvaceae	*Tilia michauxii*	X	
Poales	Bromeliaceae	*Tillandsia usneoides*	X	
Sapindales	Anacardiaceae	*Toxicodendron pubescens*	X	
Sapindales	Anacardiaceae	*Toxicodendron radicans*	X	X
Commelinales	Commelinaceae	*Tradescantia ohiensis*	X	
Malpighiales	Hypericaceae	*Triadenum virginicum*	X	
Lamiales	Lamiaceae	*Trichostema dichotomum*	X	
Poales	Poaceae	*Tridens flavus*	X	
Fabales	Fabaceae	*Trifolium aureum*	X	
Fabales	Fabaceae	*Trifolium dubium*	X	
Fabales	Fabaceae	*Trifolium repens*	X	
Alismatales	Juncaginaceae	*Triglochin striata*	X	
Asterales	Campanulaceae	*Triodanis perfoliata*	X	X
Poales	Poaceae	*Triplasis purpurea*	X	
Poales	Typhaceae	*Typha angustifolia*	X	
Poales	Typhaceae	*Typha domingensis*	X	X
Poales	Typhaceae	*Typha latifolia*	X	X
Poales	Typhaceae	*Typha* sp.	X	X
Poales	Poaceae	*Uniola paniculata*	X	X
Asterales	Asteraceae	*unknown Asteraceae*	X	X
Poales	Cyperaceae	*unknown Cyperaceae*	X	X
Fabales	Fabaceae	*unknown Fabaceae*	X	X
N/A	N/A	*unknown Filicopsida (division)*	X	X
N/A	N/A	*unknown Magnoliopsida (division)*	X	X
Poales	Poaceae	*unknown Poaceae*	X	X
Caryophyllales	Polygonaceae	*unknown Polygonaceae*	X	X
Lamiales	Lentibulariaceae	*Utricularia purpurea*	X	
Lamiales	Lentibulariaceae	*Utricularia subulata*	X	
Ericales	Ericaceae	*Vaccinium arboreum*	X	
Ericales	Ericaceae	*Vaccinium corymbosum*	X	X
Ericales	Ericaceae	*Vaccinium fuscatum*	X	
Ericales	Ericaceae	*Vaccinium myrsinites*	X	
Ericales	Ericaceae	*Vaccinium stamineum*	X	
Ericales	Ericaceae	*Vaccinium tenellum*	X	
Ericales	Ericaceae	*Vaccinium virgatum*	X	
Dipsacales	Valerianaceae	*Valerianella radiata*	X	
Lamiales	Scrophulariaceae	*Verbascum thapsus*	X	
Lamiales	Verbenaceae	*Verbena polystachya*	X	
Lamiales	Verbenaceae	*Verbena scabra*	X	

Table A-1. (Continued.)

Order	Family	Scientific Name	NPSpecies	This Study
Lamiales	Plantaginaceae	*Veronica arvensis*	X	
Lamiales	Plantaginaceae	*Veronica peregrina*	X	
Lamiales	Plantaginaceae	*Veronica* sp.	X	
Fabales	Fabaceae	*Vicia* sp.	X	
Malpighiales	Violaceae	*Viola primulifolia*	X	
Vitales	Vitaceae	*Vitis aestivalis*	X	X
Vitales	Vitaceae	*Vitis labrusca*	X	
Vitales	Vitaceae	*Vitis rotundifolia*	X	X
Poales	Poaceae	*Vulpia myuros*	X	
Poales	Poaceae	*Vulpia octoflora*	X	
Poales	Poaceae	*Vulpia sciurea*	X	
Asterales	Campanulaceae	*Wahlenbergia marginata*		X
Fabales	Fabaceae	*Wisteria* sp.	X	
Polypodiales	Blechnaceae	*Woodwardia virginica*	X	
Asterales	Asteraceae	*Xanthium* sp.	X	
Asterales	Asteraceae	*Xanthium strumarium*	X	X
Poales	Xyridaceae	*Xyris caroliniana*	X	
Asparagales	Asparagaceae	*Yucca aloifolia*	X	
Asparagales	Asparagaceae	*Yucca gloriosa*	X	
Sapindales	Rutaceae	*Zanthoxylum clava-herculis*	X	X
Alismatales	Zosteraceae	*Zostera marina*	X	

Appendix B. Plant species detected in sampling locations.

Table B-1. Vascular plant species detected at each sampling location across all strata at Cape Lookout National Seashore, 2012.

ScientificName	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	42	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Acalypha gracilens																								X						
Agalinis maritima																							X							
Ambrosia artemisiifolia			X																X					X						
Ammophila breviligulata	X		X																							X		X		
Ampelopsis arborea						X	X			X	X			X																
Andropogon glomeratus																				X										
Asclepias sp.										X	X																			
Asimina parviflora																			X											
Asplenium platyneuron										X														X						
Asteraceae											X								X											
Baccharis angustifolia		X										X		X	X		X			X	X	X	X							
Baccharis halimifolia		X	X			X	X	X	X		X			X	X		X	X		X	X			X	X	X		X		X
Bacopa monnieri		X																												X
Berchemia scandens										X							X							X						
Boehmeria cylindrica										X														X						
Borrichia frutescens		X				X					X	X		X	X		X	X		X	X	X	X		X					
Cakile edentula				X		X					X					X	X					X		X		X		X			
Callicarpa americana										X									X					X						
Calystegia sepium		X				X															X	X								
Campsis radicans										X																				
Carex sp.																														X
Carpinus caroliniana																								X						
Cenchrus tribuloides																											X			
Centella asiatica								X	X	X												X								X
Centrosema virginianum											X																			
Chamaecrista nictitans																			X											
Chamaesyce polygonifolia	X				X		X	X												X								X		
Chasmanthium laxum										X														X						
Cirsium horridulum				X																										
Cirsium sp.		X																												
Cladium mariscus ssp. *jamaicense*	X	X										X		X																
Commelina erecta			X	X	X	X	X	X			X		X			X				X		X		X		X		X		
Conyza bonariensis								X																X						
Conyza canadensis	X		X		X	X	X		X		X		X			X	X		X	X		X						X		
Cornus foemina										X																				
Croton punctatus							X	X								X								X				X		
Cuscuta sp.																												X		
Cynanchum angustifolium		X	X			X			X		X	X		X	X		X	X		X	X	X	X		X				X	
Cynodon dactylon																								X						

Table B-1. (Continued.)

ScientificName	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	42	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Cyperaceae	X					X				X	X		X							X									X
Cyperus sp.								X																X						
Diodia teres					X																									
Diodia virginiana									X	X																				
Diospyros virginiana										X																				
Distichlis spicata		X																												
Eleocharis sp.										X										X										
Elephantopus tomentosus										X														X						
Elymus virginicus		X									X	X		X	X						X	X	X	X	X	X				
Elymus virginicus var. *halophilus*	X																													
Eragrostis sp.			X																											
Erechtites hieraciifolia									X															X						
Eremochloa ophiuroides							X	X		X									X	X				X						
Erigeron quercifolius								X																						
Eupatorium capillifolium									X		X																			
Eupatorium sp.																								X						
Eustachys petraea	X		X				X	X	X				X							X										
Fabaceae										X									X					X						
Filicopsida										X																				
Fimbristylis castanea												X										X								
Fimbristylis sp.		X																		X	X		X							X
Gaillardia pulchella			X			X					X		X				X			X						X				
Galium hispidulum									X																					
Galium sp.									X	X					X				X					X					X	
Gelsemium sempervirens										X																				
Gnaphalium sp.																			X											
Gonolobus suberosa										X														X						
Heterotheca subaxillaris					X		X	X	X				X							X								X		
Hydrocotyle bonariensis	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
Hypericum gentianoides																														X
Hypericum hypericoides										X																				X
Hypericum sp.										X																				
Ilex opaca										X									X					X						
Ilex vomitoria	X					X				X	X	X		X			X	X	X		X			X	X					X
Ipomoea sagittata									X	X	X	X		X			X					X			X					
Iva frutescens	X	X		X							X	X		X	X		X	X			X	X	X		X	X	X			
Juncus megacephalus		X											X									X								

Table B-1. (Continued.)

ScientificName	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	42	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Juncus roemerianus	X	X				X		X	X		X	X	X	X	X		X	X		X	X	X	X		X	X				X
Juncus sp.								X		X																				X
Juniperus silicicola	X	X				X	X	X	X	X	X	X		X	X		X	X	X	X				X	X			X	X	X
Juniperus virginiana								X																						
Kosteletzkya virginica		X								X		X			X						X	X								
Lactuca canadensis	X										X																			
Lepidium virginicum	X					X			X				X			X		X						X						
Lespedeza cuneata																			X											
Lonicera japonica										X														X						
Lonicera sempervirens																			X					X						
Ludwigia repens										X										X										
Ludwigia sp.								X		X																				X
Lythrum salicaria														X																
Magnoliopsida		X	X							X			X																	
Melica mutica						X					X																			
Melothria pendula											X																			
Mikania scandens	X	X							X	X					X							X				X				X
Mitchella repens										X									X					X						
Morella cerifera	X	X	X	X		X		X	X	X	X	X		X	X		X	X		X	X	X		X	X	X		X	X	X
Morus rubra																								X						
Muhlenbergia capillaris													X																	
Nandina domestica																								X						
Oenothera biennis							X																							
Oenothera humifusa	X		X		X	X	X	X	X		X		X			X	X		X	X		X		X		X		X		
Opuntia humifusa							X																							
Opuntia sp.							X	X					X			X								X						X
Osmanthus americanus										X									X					X						
Osmunda regalis										X																				
Panicum amarum						X																				X	X			
Panicum hemitomon																						X								
Panicum sp.										X			X								X	X		X						X
Parietaria floridana											X																			
Parthenocissus quinquefolia	X			X					X	X	X		X				X	X						X					X	X
Paspalum vaginatum																				X										X
Passiflora lutea										X																				
Persea borbonia									X										X					X	X				X	X
Persea palustris	X																													

Table B-1. (Continued.)

ScientificName	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	42	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Phragmites australis														X								X								
Phyla nodiflora		X					X			X	X	X	X	X	X		X			X					X					
Physalis viscosa	X			X		X	X	X	X		X	X		X		X		X				X			X	X		X		
Phytolacca americana															X															
Pinus elliottii									X																				X	
Pinus taeda										X									X											X
Plantago lanceolata																			X											
Plantago major																														X
Plantago virginica									X																					
Pluchea camphorata										X																				
Poaceae	X									X	X			X	X		X		X	X	X	X		X	X					
Polygonaceae																								X						
Polygonum sp.										X																				
Polypremum procumbens																														X
Prunus caroliniana										X														X						
Prunus serotina																			X											
Pteridium aquilinum																			X											
Ptilimnium capillaceum	X	X								X														X						X
Quercus laurifolia										X									X											
Quercus nigra																			X					X						
Quercus virginiana										X	X								X					X						
Rhynchospora colorata																				X										
Rhynchospora latifolia		X						X		X							X					X								
Rhynchospora sp.										X																				
Rosa palustris										X																				
Rubus sp.																	X		X											
Rubus trivialis	X		X						X	X	X						X	X						X		X			X	
Sabal minor										X																				
Sabatia sp.	X	X	X				X	X				X	X							X			X					X		
Saccharum giganteum									X	X																				
Sambucus canadensis																			X											
Sanicula canadensis										X														X						
Sarcocornia perennis																							X							
Sassafras albidum																			X											
Schizachyrium littorale		X				X			X				X	X	X			X												X
Schoenoplectus americanus	X										X						X									X				X
Scleria triglomerata										X														X						

Table B-1. (Continued.)

ScientificName	2	5	6	7	8	11	12	15	17	24	33	34	36	37	38	41	42	43	44	45	47	49	50	51	52	53	55	56	57	EXT
Setaria magna						X											X													
Setaria parviflora		X										X			X		X				X	X		X						X
Sideroxylon lycioides																								X						
Sisyrinchium atlanticum								X																						
Smilax auriculata	X			X		X	X				X			X			X	X						X		X				X
Smilax bona-nox	X					X			X	X	X							X	X					X						X
Smilax glauca																			X											
Smilax laurifolia										X																				
Smilax rotundifolia																			X					X					X	
Smilax sp.										X																			X	
Solidago sempervirens	X	X	X	X		X					X		X				X	X		X	X	X	X			X		X		
Spartina patens	X	X	X	X		X			X		X	X		X	X		X	X		X	X	X	X	X	X	X		X		X
Spiranthes sp.		X						X							X					X		X								
Sporobolus virginicus					X		X	X	X			X				X					X		X							
Strophostyles helvola			X	X		X					X						X							X		X		X		
Toxicodendron radicans	X	X		X		X			X	X	X	X	X	X	X		X	X	X			X		X	X	X	X		X	X
Triodanis perfoliata			X																											
Typha domingensis		X																												
Typha latifolia	X																				X									
Typha sp.											X																			
Uniola paniculata			X	X	X	X	X	X	X		X		X			X	X	X		X		X		X		X	X	X		
Vaccinium corymbosum										X																				
Vitis aestivalis										X																X				
Vitis rotundifolia						X				X									X					X						
Wahlenbergia marginata			X																											
Xanthium strumarium																								X						
Zanthoxylum clava-herculis														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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