

The Vascular Flora of Fire-Maintained Grasslands and Woodlands at Quantico Marine Corps Base, Virginia

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INTRODUCTION

In 1998, the Virginia Department of Conservation and Recreation's Division of Natural Heritage (DCR-DNH) initiated a survey of flora and fauna at Quantico Marine Corps Base (MCBQ), Virginia, for the Department of the Navy. This study supported the need of military installations to inventory, monitor, and manage for biodiversity. One component of the project was to inventory the fire-maintained vegetation in Training Area 9 and to produce a list of the plant species present; another was the documentation of any rare plants or natural communities at the site. The vegetation of this site, consisting of savanna-like woodlands and grasslands, is unusual because of the long-term influences of frequent burning, and is replicated in Virginia only at similar sites within Forts A.P. Hill and Pickett.

STUDY AREA

The study area is a highly restricted military training facility that is not open to public access. It is located approximately 50 km SW of Washington, D.C., at the convergence of Fauquier, Prince William, and Stafford counties (Fig. 1). Physiographically, the site is situated in the easternmost portion of the Piedmont Plateau, about 16 km west of the Fall Line marking the boundary between the Piedmont and Coastal Plain. Mean annual temperature is 14.1E C (57.3E F) and mean annual precipitation is 92.1 cm (36.3 in) at Manassas, 22 km north of the study area (Elder, 1989). The area is underlain by metamonzogranite (Rader & Evans, 1993) and topography consists predominantly of undulating to gently rolling uplands, with a few short, steep slopes abutting Canon Creek and its major tributaries. Elevation ranges from 60 m to 130 m. Soils of the uplands are gritty silt loams of the Goldvein

series (Petro, 1956). Several tributaries forming the headwaters of Canon Creek and Dorrells Creek originate in the study area and contain boggy areas with abundant groundwater discharge and organic-rich soils. Larger, more marshy wetlands, including several beaver ponds, occur downstream along Canon Creek and its largest tributaries.

The Quantico Marine Corps Base was established as a combat training facility in 1917, and Training Area 9 has been used for artillery training since World War II. The use of incendiary ammunition, particularly illumination rounds, has subjected parts of this landscape to a regime of random but frequent wildfires of variable intensity. The presence of hazardous unexploded ordnance and metal contamination of forest stands precludes any additional land uses such as timber management.

METHODS

Botanical

Field work by DCR-DNH staff for the grassland inventory began in May 1998 and was completed in August 1999. Because Training Area 9 is a potentially dangerous area, DCR-DNH staff were escorted by Explosive Ordnance Disposal (EOD) personnel, and field visits were limited by MCBQ to a maximum of one visit per 30 days. Evenly spaced trips throughout the growing season were attempted in 1998, and visits were made on the following dates: May 28, July 17, August 24, and October 19. In 1999 three visits (April 19, May 25, and August 24) were made to fill both chronological and landscape data gaps.

A major limitation of this study was that the surveyors were required to walk behind EOD personnel at all times for safety reasons. Discrete areas could be more freely and thoroughly surveyed only after EOD

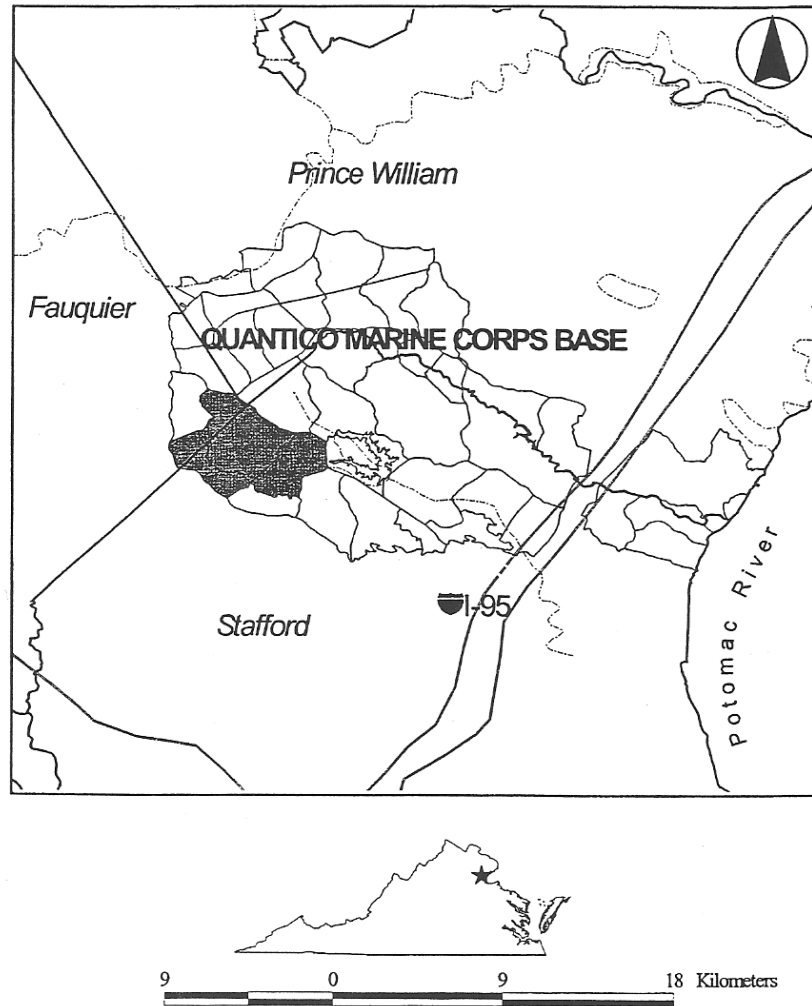


Fig. 1. Location of the study site (shaded area) within Quantico Marine Corps Base, Virginia.

personnel determined them to be free of hazardous ordnance. As a result, the inventory was conducted by walking transects across major environmental gradients, with more intensive inventory targeted in the highest quality, most productive habitats. The latter included not only the open upland grasslands but also savanna-like woodlands and boggy and marshy wetlands. Surveys were conducted primarily within Training Area 9A, but surveys were also conducted in a frequently burned area in Training Area 9B and in a recently burned area in Training Area 9D. All vascular plant taxa were identified and recorded as they were encountered. Because of the rigorous logistical and time constraints, it was not practical to voucher all taxa in the study area. However, voucher specimens were collected to verify some field identifications and to document all new county records. The highest quality areas were surveyed during multiple visits to ensure

that ephemeral plants were captured. Nomenclature follows Kartesz (1999).

When rare plant occurrences were located, additional data were collected following standard DCR-DNH methodology. These data included the date found, population boundaries and concentrations within those boundaries, approximate number of individuals, reproductive and phenological status, and species viability. Habitat factors such as moisture, light, and associated species, and apparent immediate or long-term threats to the rare species populations were also noted.

Natural Communities

Compositional and environmental data were collected from six plots, with two plots placed in representative stands of each of three broad community

types: grasslands, savanna/woodlands, and bogs. In addition to providing data on vegetation structure and associated environmental conditions, plot sampling requires an intensive inventory of all flora within the plot area and therefore captures taxa that may be overlooked during walking surveys. Plots were sampled using the relève method (*sensu* Peet et al., 1998), with 400 m² plots established in woodland vegetation and 100 m² plots in grassland and bog vegetation. Within each plot, all vascular plants were recorded and the total cover of each taxon was estimated as a vertical projection onto the plot area. In addition, the cover of woody species was estimated in six vertical height strata, and the diameters of all woody stems ≥ 2.5 cm DBH were measured. A standard set of environmental data, including slope, slope shape, aspect, surface substrate cover, topographic position, soil drainage class, and soil moisture regime, were measured or estimated. In addition, soil samples were collected from the top 10 cm of mineral soil and analyzed for pH, phosphorus, exchangeable cations, and extractable micronutrients by the Soil Testing and Plant Analysis Laboratory at Virginia Polytechnic Institute and State University.

RESULTS

Flora

During the 1998 and 1999 field visits, 350 taxa were recorded during the floristic inventory. Two additional species were added from a list that had been compiled by DCR-DNH personnel during a brief visit to the study area in 1991, bringing the total to 352 (Virginia Department of Conservation and Recreation, 1992). The list of the flora of the fire-maintained grasslands and woodlands at Quantico, containing the scientific name and habitats in which each taxon was found, is presented in Appendix 1. The flora of these frequently burned areas falls within 74 families. Taxa of four families (Asteraceae: 50 taxa; Poaceae: 40 taxa; Cyperaceae: 33 taxa; and Fabaceae: 23 taxa) comprise 40 % of the total flora. Other well-represented families include Rosaceae (14 taxa) and Fagaceae (12 taxa).

Forty-two new distribution records for Fauquier, Prince William, or Stafford counties were documented with collections. Voucher specimens for these records are deposited at the George Mason University Herbarium (GMUF), and the records will be incorporated into the next edition of the *Atlas of the Virginia Flora* (Harvill et al., 1992). County records are indicated in Appendix 1.

Rare Species

Two state rare species were found at Quantico Marine Corps Base during the Training Area 9 inventory. A population of *Carex buxbaumii* (Buxbaum's sedge), a sedge with a circumboreal distribution, was located in a boggy swale near the northern edge of the study area. This species is very rare in Virginia, with 19 known occurrences in the state. The population occupies viable habitat, with thousands of sterile culms and < 100 fruiting culms in a dense colony covering 30-40 m². The fruiting culms were obvious on the visit of 28 May 1998, and the fruits were shed by 17 July 1998. The habitat is a boggy sphagnous swale subject to frequent fires. The vegetation is predominantly herbaceous, with scattered shrubs. The most abundant associated species include *Osmunda cinnamomea*, *Osmunda regalis* var. *spectabilis*, *Thelypteris palustris* var. *pubescens*, *Carex emoryi*, and *Solidago rugosa*.

The other state-rare species, *Asclepias rubra* (red milkweed), occurs in the same swale. The population is relatively small, but apparently viable, consisting of approximately 20 individuals scattered over a 2 ha area. Plants were of average vigor and were flowering on 17 July 1998, and fruiting on 24 August 1998. Characteristic associates of *A. rubra* at this site include *Alnus serrulata*, *Carex stricta*, *Carex folliculata*, *Osmunda cinnamomea*, and *Melanthium virginicum*.

Significant Natural Communities

During the course of the project, DCR-DNH ecologists identified seven occurrences of three rare, fire-maintained natural community types: Coastal Plain/Piedmont Seepage Bog (three occurrences), Acidic Oak-Hickory Woodland/ Savanna (two occurrences), and Piedmont Prairie (two occurrences). Community nomenclature follows Fleming et al. (2001).

Coastal Plain / Piedmont Seepage Bog

These scrubby to herbaceous wetlands occur in areas of groundwater discharge at the headwaters of three streams in the study area (Fig. 2). Soils of these boggy habitats are saturated year-round and are strongly acidic (mean pH = 4.1), with low base-cation levels. Shrubs and herbaceous species occur in patch-mosaics, with shrub density and stature varying with the interval since the last fire. Characteristic shrubs include *Alnus serrulata*, *Magnolia virginiana*,



Fig. 2. Natural Heritage ecologists and EOD escort examine a frequently burned bog at Quantico Marine Corps Base. Photo by Robert T. Stamps.

Toxicodendron vernix, and *Viburnum nudum* var. *nudum*. Characteristic herbaceous plants include *Andropogon glomeratus*, *Calamagrostis coarctata*, *Carex folliculata*, *Eupatorium pilosum*, *Juncus canadensis*, *Osmunda cinnamomea*, *Oxypolis rigidior*, *Rhynchospora capitellata*, *Rhynchospora gracilentia*, *Saccharum giganteum*, *Scleria muehlenbergii*, *Solidago rugosa*, *Thelypteris palustris* var. *pubescens*, and *Xyris torta*. The state-rare plants *Asclepias rubra* and *Carex buxbaumii* are associated with this community type.

Acidic Oak-Hickory Woodland / Savanna

A large occurrence (> 50 ha) of this vegetation type is located in the western part of the study area, and consists of a variable mosaic of very open to semi-closed woodlands and grasslands with scattered, scrubby trees (Fig. 3). A smaller occurrence is located in the southeastern part of the site. Habitats supporting this community type are dry upland slopes and ridges with strongly acidic (mean pH = 4.5), nutrient-poor, sandy loam soils. Most of the tree canopy is contributed by deciduous species, but some

areas have scattered stands of *Pinus virginiana* and *Pinus taeda*. Dominant trees include *Quercus falcata*, *Quercus alba*, *Quercus stellata*, and *Carya alba*. The understory and shrub layers are normally very sparse but may contain young sprouts of the canopy species as well as scattered patches of *Vaccinium* spp. and *Gaylussacia baccata*. The herbaceous layer is rich in graminoids, particularly *Schizachyrium scoparium*, *Danthonia spicata*, *Dichanthelium* spp., and *Carex pensylvanica*, giving a savanna-like appearance to many of the stands. Characteristic forbs include *Lespedeza frutescens*, *Sericocarpus asteroides*, *Symphytotrichum dumosum* (= *Aster dumosus*), and *Solidago* spp.

Piedmont Prairie

Two sizeable but fragmented occurrences (> 30 ha and > 20 ha) of this vegetation occur in patch-mosaics with the oak-hickory woodlands on dry to moderately moist uplands in the western and southeastern portions of the study area. This community type is a dense grassland composed entirely of herbaceous species, or



Fig. 3. Frequently burned oak-hickory savanna at Quantico Marine Corps Base. Photo by Gary P. Fleming.

nearly so; a few scattered, shrubby woody plants sometimes occur. The dominant grasses, contributing >50% of the cover in any given stand, are *Schizachyrium scoparium* and *Sorghastrum nutans*. Both species almost always occur together, with the latter becoming more abundant as soil moisture increases. Characteristic associates include *Agalinis tenuifolia*, *Aletris farinosa*, *Antennaria neglecta*, *Aristida purpurascens*, *Eupatorium hyssopifolium* var. *hyssopifolium*, *Liatris squarrosa*, *Pycnanthemum tenuifolium*, *Scleria pauciflora*, *Sericocarpus linifolius*, *Solidago nemoralis*, and *Symphotrichum dumosum* (= *Aster dumosus*). This community type is quite similar to some of the mid- and tall-grass prairies of the Midwestern United States, but has many associate species found primarily or exclusively in the eastern states.

DISCUSSION

Flora

The flora of the study area's fire-maintained grasslands and woodlands largely reflects the phytogeography of Virginia's northern Piedmont

physiographic province, with most taxa (e.g., *Acer rubrum*, *Rhus copallinum*, *Schizachyrium scoparium*, *Solidago juncea*, *Carex stricta*, *Vaccinium pallidum*, *Osmunda cinnamomea*, and many others) widely distributed in Virginia.

A smaller group of taxa is representative of a more restricted Virginia distribution but still characteristic of the Piedmont. Some of those distributed primarily in the Piedmont and Coastal Plain include *Toxicodendron vernix*, *Eupatorium hyssopifolium* (both var. *hyssopifolium* and var. *laciniatum*), *Eupatorium rotundifolium*, *Solidago pinetorum*, *Woodwardia areolata*, *Viburnum nudum* var. *nudum*, *Saururus cernuus*, *Amelanchier canadensis*, *Saccharum giganteum*, *Polygala incarnata*, *Dichanthelium scoparium*, *Pinus taeda*, *Linum medium* var. *texanum*, *Quercus phellos*, *Helianthus atrorubens*, *Sericocarpus linifolius*, *Andropogon gyrans*, and *Lobelia puberula*. *Liatris squarrosa*, *Cirsium pumilum*, and *Rudbeckia fulgida* are taxa with Virginia distributions mostly restricted to the Piedmont. *Platanthera ciliaris*, on the other hand, is rare in the Piedmont and more common in the Coastal Plain and mountains.

While this area of MCBQ falls within the Piedmont, it lies only about 16 km west of the Coastal Plain and

therefore the presence of taxa most common in the Coastal Plain is not surprising. Some of these include *Asclepias rubra*, *Xyris torta*, *Hypericum crux-andreae*, *Rhynchospora gracilentia*, *Magnolia virginiana*, *Lyonia mariana*, and *Andropogon glomeratus*. Most of these Coastal Plain taxa are associated with seepage bogs, a community type primarily associated with the Coastal Plain.

A few taxa recorded in this inventory are more common in Virginia's montane Blue Ridge or Ridge and Valley physiographic provinces than in the Piedmont. These include *Pinus rigida*, *Antennaria neglecta*, *Cirsium muticum*, *Carex emoryi*, and *Juncus subcaudatus*. A particularly noteworthy discovery during this study was *Quercus ilicifolia*. This oak is almost entirely restricted to the mountains in Virginia, with a few small, local populations in the western Piedmont counties. Our collection from Quantico (Fleming, McCoy & Coulling 14604) represents a Stafford County record and the population that is farthest removed from this species' normal montane habitats in Virginia.

Although overwhelmingly composed of native taxa, the flora does include some exotic taxa, primarily in the ruderal habitats such as roadsides and wildlife food plots. Only rarely do exotics occur and persist in frequently burned habitats with dense cover of native grasses and forbs. *Lespedeza bicolor*, a shrub introduced for wildlife, is locally invasive and appears to thrive under a burning regime. Exotic species are denoted in Appendix 1.

Significant Natural Communities

Active fire-influenced ecosystems were once widely distributed over the entire southeastern Coastal Plain and parts of the Piedmont Plateau (Vogl, 1973; Christensen, 1981; Christensen 1988). In the pre-Columbian era, lightning strikes and the extensive employment of fire as a hunting tool by Native Americans were sources of major wildfires. As late as the early decades of the 20th century, careless logging operations and coal-burning railroad engines were common instigators of fires that, in the absence of adequate resources to fight them, often burned out of control over large areas (Dean 1969). Due to efficient and widespread fire reduction since the mid-20th century, however, fire-dependent ecosystems have been nearly extirpated statewide. Exceptions are limited to the military base artillery training areas at Fort Pickett, Fort A.P. Hill, and Quantico Marine Corps Base, where frequent incendiary burns maintain specialized habitat conditions and vegetation assemblages, perhaps simulating pre-settlement fire regimes.

Although additional data and analyses will be required to formally classify the fire-influenced communities at Quantico, it appears that the Oak-Hickory Woodland/Savanna and Piedmont Prairie are globally rare community types that are now restricted to Quantico and Fort Pickett, since no other sites in the Atlantic Piedmont have the requisite disturbance regimes in place. The Quantico bogs may be somewhat less rare because of the persistence of similar communities in a number of sites along the Coastal Plain from New Jersey to North Carolina.

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APPENDIX 1. FLORA OF THE FIRE-MAINTAINED GRASSLANDS
AND WOODLANDS AT QUANTICO MARINE CORPS BASE, VIRGINIA

Taxa recorded in 1998-1999 by DCR-DNH. Nomenclature follows Kartesz (1999); synonymy has been provided for treatments that diverge significantly from more traditional nomenclature. The table is arranged alphabetically by family. Several taxa which were recorded by DCR-DNH personnel in 1991 during a brief visit and are likely still present have been marked here with an asterisk (*). Exotic taxa are marked with a plus sign (+). Vouchered taxa are indicated by a "V" and the counties of new records are given in the third column. **Habitat key:** 1-upland grasslands (Piedmont Prairie). 2-oak-hickory woodland /savannas. 3-boggy wetlands. 4-marshy wetlands. 5-ruderal habitats (roadsides, parking areas, wildlife plots, etc.).

Scientific Name	Habitat	County Record
ACERACEAE		
<i>Acer rubrum</i> L.	1, 2, 3, 4	
ACORACEAE		
<i>Acorus calamus</i> L.	4	
ALISMATACEAE		
<i>Alisma subcordatum</i> Raf.	4	
<i>Sagittaria latifolia</i> Willd.	4	
ANACARDIACEAE		
<i>Rhus copallinum</i> L.	1, 2, 3	
<i>Rhus glabra</i> L.	1, 5	
<i>Toxicodendron radicans</i> (L.) Kuntze	2, 4, 5	
<i>Toxicodendron vernix</i> (L.) Kuntze	3	

Scientific Name	Habitat	County Record
APIACEAE		
<i>Angelica venenosa</i> (Greenway) Fern.	2	
<i>Daucus carota</i> L. * +	5	
<i>Oxypolis rigidior</i> (L.) Raf.	3	
<i>Sanicula canadensis</i> L.	2	
APOCYNACEAE		
<i>Apocynum cannabinum</i> L.	1, 2, 5	
AQUIFOLIACEAE		
<i>Ilex opaca</i> Ait.	2	
ARACEAE		
<i>Arisaema triphyllum</i> (L.) Schott	3, 4	
<i>Symplocarpus foetidus</i> (L.) Salisb. ex Nutt.	3	
ARALIACEAE		
<i>Aralia spinosa</i> L.	2	
ASCLEPIADACEAE		
<i>Asclepias amplexicaulis</i> Sm.	1	
<i>Asclepias incarnata</i> L. ssp. <i>pulchra</i> (Ehrh. ex Willd.) Woods.	3, 4	
<i>Asclepias rubra</i> L.	3	V, Fauquier; V, Prince William
<i>Asclepias tuberosa</i> L.	2	
<i>Asclepias viridiflora</i> Raf.	1	
ASTERACEAE		
<i>Achillea millefolium</i> L. var. <i>occidentalis</i> DC.	1, 2	
<i>Ambrosia artemisiifolia</i> L.	5	
<i>Antennaria neglecta</i> Greene	1	
<i>Antennaria plantaginifolia</i> (L.) Richards.	2	
<i>Bidens aristosa</i> (Michx.) Britt.	3, 4, 5	
= <i>Bidens polylepsis</i> Blake		
<i>Centaurea biebersteinii</i> DC. +	5	
= <i>Centaurea maculosa</i> auct. non Lam.		
<i>Chrysopsis mariana</i> (L.) Ell.	1, 2	
<i>Cirsium discolor</i> (Muhl. ex Willd.) Spreng.	1, 5	
<i>Cirsium muticum</i> Michx.	3	
<i>Cirsium pumilum</i> (Nutt.) Spreng.	1	
<i>Coreopsis tripteris</i> L.	2, 3	
<i>Coreopsis verticillata</i> L.	1, 2	
<i>Doellingeria umbellata</i> (P. Mill.) Nees	3	V, Fauquier
= <i>Aster umbellatus</i> P. Miller		
<i>Erechtites hieraciifolia</i> (L.) Raf. ex DC	1, 2, 5	
<i>Erigeron annuus</i> (L.) Pers.	1, 5	
<i>Erigeron strigosus</i> Muhl. ex Willd.	1, 5	
<i>Eupatorium album</i> L.	1, 5	
<i>Eupatorium fistulosum</i> Barratt	3, 4	
<i>Eupatorium hyssopifolium</i> L. var. <i>hyssopifolium</i>	1, 2, 3	
<i>Eupatorium hyssopifolium</i> L. var. <i>laciniatum</i> Gray	2	
<i>Eupatorium perfoliatum</i> L.	3, 4	
<i>Eupatorium pilosum</i> Walt.	1, 2, 3	

Scientific Name	Habitat	County Record
<i>Eupatorium rotundifolium</i> L. var. <i>ovatum</i> (Bigelow) Torr.	1, 2	
<i>Eupatorium rotundifolium</i> L. var. <i>rotundifolium</i>	1, 2, 3	
<i>Euthamia graminifolia</i> (L.) Greene	3	
<i>Helianthus atrorubens</i> L.	1	
<i>Helianthus giganteus</i> L.	3	
<i>Hieracium gronovii</i> L.	1, 2	
<i>Hieracium venosum</i> L.	2	
<i>Ionactis linariifolius</i> (L.) Greene	1	V, Prince William
= <i>Aster linariifolius</i> L.		
<i>Lactuca canadensis</i> L.	1	
<i>Leucanthemum vulgare</i> Lam. +	2, 5	
<i>Liatris squarrosa</i> (L.) Michx.	1, 2	
<i>Packera anonyma</i> (Wood) W.A. Weber & A. Löve	1	
= <i>Senecio anonymus</i> Wood		
<i>Pseudognaphalium obtusifolium</i> (L.) Hilliard & Burt	1	
= <i>Gnaphalium obtusifolium</i> L.		
<i>Rudbeckia fulgida</i> Ait.	1	
<i>Rudbeckia hirta</i> L.	1, 5	
<i>Rudbeckia laciniata</i> L.	3, 4	
<i>Sericocarpus asteroides</i> (L.) B.S.P.	2	
= <i>Aster paternus</i> Cronq.		
<i>Sericocarpus linifolius</i> (L.) B.S.P.	1, 2	
= <i>Aster solidagineus</i> Michx.		
<i>Solidago bicolor</i> L.	1, 2	
<i>Solidago erecta</i> Pursh	2	
<i>Solidago juncea</i> Ait.	1, 2	V
<i>Solidago nemoralis</i> Ait.	1, 2	
<i>Solidago pinetorum</i> Small	1	V, Fauquier
<i>Solidago rugosa</i> P. Mill.	3, 4	
<i>Symphotrichum dumosum</i> (L.) Nesom	1, 2, 3	
= <i>Aster dumosus</i> L.		
<i>Symphotrichum lateriflorum</i> (L.) A.& D. Löve	1, 2, 3, 4, 5	
= <i>Aster lateriflorus</i> (L.) Britt.		
<i>Symphotrichum puniceum</i> (L.) A.& D. Löve	3, 4	
= <i>Aster puniceus</i> L.		
<i>Symphotrichum undulatum</i> (L.) Nesom	1, 2	
= <i>Aster undulatus</i> L.		
<i>Vernonia noveboracensis</i> (L.) Michx.	3, 4	
BALSAMINACEAE		
<i>Impatiens capensis</i> Meerb.	4	
BETULACEAE		
<i>Alnus serrulata</i> (Ait.) Willd.	3, 4	
<i>Betula nigra</i> L.	4	
<i>Corylus americana</i> Walt.	2, 4	
<i>Ostrya virginiana</i> (P. Mill.) K. Koch	2	
BLECHNACEAE		
<i>Woodwardia areolata</i> (L.) T. Moore *	3	

Scientific Name	Habitat	County Record
BRASSICACEAE		
<i>Arabidopsis thaliana</i> (L.) Heynh. +	1, 5	
<i>Barbarea vulgaris</i> Ait. f. +	2, 5	
<i>Cardamine hirsuta</i> L. +	5	
CAMPANULACEAE		
<i>Lobelia inflata</i> L.	1, 2, 5	
<i>Lobelia puberula</i> Michx.	3	
<i>Lobelia spicata</i> Lam. var. <i>scaposa</i> McVaugh	1, 2	
<i>Triodanis perfoliata</i> (L.) Nieuwl.	1, 3	
CAPRIFOLIACEAE		
<i>Lonicera japonica</i> Thunb. +	1, 2	
<i>Sambucus nigra</i> L. ssp. <i>canadensis</i> (L.) R. Bolli = <i>Sambucus canadensis</i> L.	3, 4	
<i>Viburnum acerifolium</i> L.	2	
<i>Viburnum nudum</i> L. var. <i>nudum</i>	3	V, Fauquier
<i>Viburnum prunifolium</i> L.	2	
<i>Viburnum recognitum</i> Fern.	4	
CISTACEAE		
<i>Lechea pulchella</i> Raf.	1, 2	V, Stafford
<i>Lechea racemulosa</i> Michx.	1, 2	
CLUSIACEAE		
<i>Hypericum crux-andreae</i> (L.) Crantz	2	V, Prince William
<i>Hypericum gentianoides</i> (L.) B.S.P.	1, 2	
<i>Hypericum hypericoides</i> (L.) Crantz ssp. <i>multicaule</i> (Michx. ex Willd.) Robson	1, 2	
<i>Hypericum mutilum</i> L.	3	
<i>Hypericum punctatum</i> Lam.	1, 2	
<i>Triadenum virginicum</i> (L.) Raf.	3	
CONVOLVULACEAE		
<i>Ipomoea pandurata</i> (L.) G.F.W. Mey.	1, 2	
CORNACEAE		
<i>Cornus florida</i> L.	1, 2	
<i>Nyssa sylvatica</i> Marsh.	2	
CUSCUTACEAE		
<i>Cuscuta compacta</i> Juss. ex Choisy	3	V, Prince William
<i>Cuscuta gronovii</i> Willd. ex J.A. Schultes	4	
CYPERACEAE		
<i>Bulbostylis capillaris</i> (L.) Kunth ex C.B. Clarke	2	
<i>Carex atlantica</i> Bailey ssp. <i>atlantica</i>	3	V
<i>Carex buxbaumii</i> Wahlenb.	3	V, Prince William
<i>Carex crinita</i> Lam. var. <i>crinita</i>	3, 4	
<i>Carex debilis</i> Michx. var. <i>debilis</i>	3	
<i>Carex emoryi</i> Dewey	3	V
<i>Carex festucacea</i> Schkuhr ex Willd.	4	

Scientific Name	Habitat	County Record
<i>Carex folliculata</i> L.	3	V, Fauquier
<i>Carex hirsutella</i> Mackenzie	1, 2	
<i>Carex intumescens</i> Rudge	3	
<i>Carex laevivaginata</i> (Kukenth.) Mackenzie	4	
<i>Carex lurida</i> Wahlenb.	3, 4	
<i>Carex pensylvanica</i> Lam.	2	
<i>Carex scoparia</i> Schkuhr ex Willd.	4	
<i>Carex stricta</i> Lam.	3, 4	
<i>Carex swanii</i> (Fern.) Mackenzie	1, 3	
<i>Carex tribuloides</i> Wahlenb. var. <i>tribuloides</i>	3, 4	
<i>Cyperus echinatus</i> (L.) Wood	1	
<i>Cyperus strigosus</i> L.	3, 4	
<i>Dulichium arundinaceum</i> (L.) Britt.	4	
<i>Eleocharis obtusa</i> (Willd.) J.A. Schultes	3, 4	
<i>Eleocharis tenuis</i> (Willd.) J.A. Schultes	3	V
<i>Rhynchospora capitellata</i> (Michx.) Vahl	3	
<i>Rhynchospora globularis</i> (Chapman) Small	3	V, Fauquier
<i>Rhynchospora glomerata</i> (L.) Vahl	3	
<i>Rhynchospora gracilentata</i> Gray	3	V, Fauquier; V, Prince William
<i>Schoenoplectus purshianus</i> (Fern.) M.T. Strong	4	
<i>Scirpus cyperinus</i> (L.) Kunth	3, 4	
<i>Scirpus georgianus</i> Harper	3	
<i>Scirpus polyphyllus</i> Vahl	3	
<i>Scleria muehlenbergii</i> Steud.	3	V, Fauquier; V, Prince William
<i>Scleria pauciflora</i> Muhl. ex Willd.	1, 2	V
<i>Scleria triglomerata</i> Michx.	3	V
DENNSTAEDTIACEAE		
<i>Dennstaedtia punctilobula</i> (Michx.) T. Moore	2	
<i>Pteridium aquilinum</i> (L.) var. <i>latiusculum</i> (Desv.) Underwood ex Heller	2, 3	
DIOSCOREACEAE		
<i>Dioscorea quaternata</i> J.F. Gmel.	3	
DRYOPTERIDACEAE		
<i>Onoclea sensibilis</i> L.	3	
EBENACEAE		
<i>Diospyros virginiana</i> L.	2	
ELAEAGNACEAE		
<i>Elaeagnus umbellata</i> Thunb. var. <i>parvifolia</i> (Royle) Schneid. +	5	
ERICACEAE		
<i>Gaylussacia baccata</i> (Wangenh.) K. Koch	2	
<i>Lyonia ligustrina</i> (L.) DC. var. <i>ligustrina</i>	3	V
<i>Lyonia mariana</i> (L.) D. Don	3	
<i>Rhododendron viscosum</i> (L.) Torr.	3	V
<i>Vaccinium corymbosum</i> L.	1, 2, 3	
<i>Vaccinium formosum</i> Andr.	2	

Scientific Name	Habitat	County Record
<i>Vaccinium pallidum</i> Ait.	2	
<i>Vaccinium stamineum</i> L.	2	
EUPHORBIACEAE		
<i>Euphorbia corollata</i> L.	1, 2	
FABACEAE		
<i>Apios americana</i> Medik.	3, 4	
<i>Baptisia tinctoria</i> (L.) R. Br. ex Ait. f.	1, 2	
<i>Chamaecrista fasciculata</i> (Michx.) Greene var. <i>fasciculata</i>	1, 4, 5	
<i>Chamaecrista nictitans</i> (L.) Moench	1	
<i>Crotalaria sagittalis</i> L.	1	
<i>Desmodium ciliare</i> (Muhl. ex Willd.) DC.	1, 2	
<i>Desmodium laevigatum</i> (Nutt.) DC.	2	
<i>Desmodium marilandicum</i> (L.) DC.	1, 2	
<i>Desmodium nuttallii</i> (Schindl.) Schub.	2	
<i>Desmodium paniculatum</i> (L.) DC.	1, 2	
<i>Desmodium perplexum</i> Schub.	1, 2	
<i>Desmodium rotundifolium</i> DC.	2	
<i>Galactia volubilis</i> (L.) Britt.	1, 2	
<i>Lespedeza bicolor</i> Turcz. +	5	
<i>Lespedeza cuneata</i> (Dum.-Cours.) G. Don +	3, 5	
<i>Lespedeza frutescens</i> (L.) Hornem.	2	
= <i>Lespedeza intermedia</i> (S. Wats.) Britt.		
<i>Lespedeza procumbens</i> Michx.	2	
<i>Lespedeza repens</i> (L.) W. Bart.	2	
<i>Lespedeza virginica</i> (L.) Britt.	1, 2	
<i>Melilotus officinalis</i> (L.) Lam. + (Includes <i>Melilotus albus</i> Medik.)	5	
<i>Robinia pseudoacacia</i> L.	1, 5	
<i>Strophostyles umbellata</i> (Muhl. ex Willd.) Britt.	1	
<i>Stylosanthes biflora</i> (L.) B.S.P.	2	
FAGACEAE		
<i>Castanea pumila</i> (L.) P. Mill.	1	
<i>Quercus alba</i> L.	2	
<i>Quercus coccinea</i> Muenchh.	2	
<i>Quercus falcata</i> Michx.	2	
<i>Quercus ilicifolia</i> Wangenh.	1, 2	V, Stafford
<i>Quercus marilandica</i> Muenchh.	2	
<i>Quercus muehlenbergii</i> Engelm.	2	
<i>Quercus phellos</i> L.	2	
<i>Quercus prinus</i> L.	2	
<i>Quercus rubra</i> L.	2	
<i>Quercus stellata</i> Wangenh.	2	
<i>Quercus velutina</i> Lam.	2	
GENTIANACEAE		
<i>Gentiana villosa</i> L.	2, 3	V, Prince William
<i>Sabatia angularis</i> (L.) Pursh	1	

Scientific Name	Habitat	County Record
IRIDACEAE		
<i>Sisyrinchium angustifolium</i> P. Mill.	3	
<i>Sisyrinchium mucronatum</i> Michx.	1	
JUGLANDACEAE		
<i>Carya alba</i> (L.) Nutt. ex Ell.	2	
= <i>Carya tomentosa</i> (Lam. ex Poir.) Nutt.		
<i>Carya glabra</i> (P. Mill.) Sweet	2	
JUNCACEAE		
<i>Juncus acuminatus</i> Michx.	3	
<i>Juncus biflorus</i> Ell.	3	
<i>Juncus canadensis</i> J. Gay ex Laharpe	3, 4	V
<i>Juncus debilis</i> Gray	3	V, Fauquier
<i>Juncus dichotomus</i> Ell.	3	V
<i>Juncus effusus</i> L. var. <i>pylpei</i> (Laharpe) Fern. & Wieg.	3	
<i>Juncus effusus</i> L. var. <i>solutus</i> Fern. & Wieg.	3	
<i>Juncus scirpoides</i> Lam.	3	
<i>Juncus subcaudatus</i> (Engelm.) Coville & Blake	3	
<i>Luzula bulbosa</i> (Wood) Smyth & Smyth	1	V, Fauquier
<i>Luzula echinata</i> (Small) F.J. Herm.	1	V
LAMIACEAE		
<i>Clinopodium vulgare</i> L.	1	
<i>Lycopus virginicus</i> L.	3, 4	
<i>Prunella vulgaris</i> L. +	1, 2, 5	
<i>Pycnanthemum tenuifolium</i> Schrad.	1, 2, 3	
<i>Salvia lyrata</i> L.	1, 5	
<i>Scutellaria elliptica</i> Muhl. ex Spreng.	1, 2	
<i>Scutellaria integrifolia</i> L.	1	
<i>Trichostema dichotomum</i> L.	1, 2	
LAURACEAE		
<i>Sassafras albidum</i> (Nutt.) Nees	2, 3	
LILIACEAE		
<i>Aletris farinosa</i> L.	1, 2, 3	V, Fauquier
<i>Allium vineale</i> L. +	5	
<i>Hypoxis hirsuta</i> (L.) Coville	2	
<i>Lilium superbum</i> L.	3	V, Prince William
<i>Maianthemum racemosum</i> (L.) Link	2	
<i>Melanthium virginicum</i> L.	3	V, Prince William
<i>Uvularia perfoliata</i> L.	2, 3	
<i>Uvularia sessilifolia</i> L.	2	
LINACEAE		
<i>Linum medium</i> (Planch.) Britt var. <i>texanum</i> (Planch.) Fern.	1, 2	
<i>Linum striatum</i> Walt.	3	V, Stafford
MAGNOLIACEAE		
<i>Magnolia virginiana</i> L.	3	V, Fauquier

Scientific Name	Habitat	County Record
MELASTOMATACEAE		
<i>Rhexia virginica</i> L.	3	
NYMPHAEACEAE		
<i>Nuphar lutea</i> (L.) Sm.	4	
OLEACEAE		
<i>Chionanthus virginicus</i> L.	3	
ONAGRACEAE		
<i>Ludwigia alternifolia</i> L.	4	
<i>Ludwigia palustris</i> (L.) Ell.	4	
<i>Oenothera fruticosa</i> L.	1, 5	
ORCHIDACEAE		
<i>Cypripedium acaule</i> Ait. Pink	2	
<i>Platanthera ciliaris</i> (L.) Lindl.	3	V, Prince William
<i>Platanthera clavellata</i> (Michx.) Luer	3	
<i>Spiranthes cernua</i> (L.) L.C. Rich.	3	V, Prince William
<i>Spiranthes lacera</i> (Raf.) Raf. var. <i>gracilis</i> (Bigelow) Luer	1	
<i>Spiranthes vernalis</i> Engelm. & Gray	1	
OSMUNDACEAE		
<i>Osmunda cinnamomea</i> L.	3	
<i>Osmunda regalis</i> L var. <i>spectabilis</i> (Willd.)	3	
OXALIDACEAE		
<i>Oxalis</i> sp.	2	
PINACEAE		
<i>Pinus echinata</i> P. Mill.	2	
<i>Pinus rigida</i> P. Mill.	2	
<i>Pinus taeda</i> L.	2	V, Fauquier
<i>Pinus virginiana</i> P. Mill.	1, 2	
PLANTAGINACEAE		
<i>Plantago aristata</i> Michx.	5	
POACEAE		
<i>Agrostis hyemalis</i> (Walt.) B.S.P.	1	V
<i>Agrostis perennans</i> (Walt.) Tuckerman	2	
<i>Andropogon glomeratus</i> (Walt.) B.S.P.	3	V, Prince William
<i>Andropogon gyrans</i> Ashe	1, 2	
<i>Andropogon virginicus</i> L.	1	
<i>Aristida dichotoma</i> Michx.	1, 5	
<i>Aristida oligantha</i> Michx.	1, 5	
<i>Aristida purpurascens</i> Poir.	1	V, Fauquier
<i>Calamagrostis coarctata</i> (Torr.) Eat.	3	V, Fauquier
<i>Chasmanthium laxum</i> (L.) Yates	2, 3	V, Prince William
<i>Cynodon dactylon</i> (L.) Pers. +	5	
<i>Danthonia spicata</i> (L.) Beauv. ex Roemer & J.A. Schultes	1, 2	

Scientific Name	Habitat	County Record
<i>Dichanthelium acuminatum</i> (Sw.) Gould & C.A. Clark	1, 2	
<i>Dichanthelium clandestinum</i> (L.) Gould	3, 4	
<i>Dichanthelium commutatum</i> (J.A. Schultes) Gould	2	
<i>Dichanthelium depauperatum</i> (Muhl.) Gould	1	
<i>Dichanthelium dichotomum</i> (L.) Gould	1, 2, 3, 4	
Includes <i>Panicum dichotomum</i> L. var. <i>dichotomum</i> , <i>Panicum lucidum</i> Ashe, and <i>Panicum microcarpon</i> Muhl. ex Ell.		
<i>Dichanthelium scoparium</i> (Lam.) Gould	3, 4	
<i>Eragrostis spectabilis</i> (Pursh) Steud.	1	
<i>Festuca subverticillata</i> (Pers.) Alexeev	2	
<i>Leersia oryzoides</i> (L.) Sw.	4	
<i>Panicum anceps</i> Michx.	1	
<i>Panicum dichotomiflorum</i> Michx.	5	
<i>Panicum philadelphicum</i> Bernh. ex Trin.	1	
<i>Panicum rigidulum</i> Bosc ex Nees var. <i>elongatum</i> (Pursh) Lelong	4	
<i>Panicum rigidulum</i> Bosc ex Nees var. <i>rigidulum</i>	3	
<i>Panicum verrucosum</i> Muhl.	3	V
<i>Panicum virgatum</i> L.	3	V
<i>Paspalum laeve</i> Michx.	1, 5	V
<i>Paspalum setaceum</i> Michx.	1	
<i>Poa compressa</i> L. +	1	
<i>Poa pratensis</i> L. +	1, 3	
<i>Saccharum giganteum</i> (Walt.) Pers.	3	V, Fauquier; V, Prince William
<i>Schizachyrium scoparium</i> (Michx.) Nash	1, 2	V
<i>Setaria pumila</i> (Poir.) Roemer & Schultes + = <i>Setaria glauca</i> (L.) Beauv.	1	
<i>Setaria viridis</i> (L.) Beauv. +	5	
<i>Sorghastrum nutans</i> (L.) Nash	1, 2, 3	
<i>Sphenopholis obtusata</i> (Michx.) Scribn.	1	V
<i>Tridens flavus</i> (L.) A.S. Hitchc.	1	
<i>Vulpia octoflora</i> (Walt.) Rydb.	1	
POLEMONIACEAE		
<i>Phlox maculata</i> L.	3	V, Prince William
POLYGALACEAE		
<i>Polygala ambigua</i> Nutt.	1	V
<i>Polygala incarnata</i> L.	1	
<i>Polygala mariana</i> P. Mill.	2, 3	V, Fauquier; V, Prince William
<i>Polygala sanguinea</i> L.	1, 3	
POLYGONACEAE		
<i>Polygonum arifolium</i> L.	4	
<i>Polygonum persicaria</i> L. +	3, 4	
<i>Polygonum punctatum</i> Ell.	4	
<i>Polygonum sagittatum</i> L.	3, 4	
<i>Polygonum virginianum</i> L.	2	
<i>Rumex acetosella</i> L. +	1, 5	

Scientific Name	Habitat	County Record
PORTULACACEAE		
<i>Claytonia virginica</i> L.	3	
POTAMOGETONACEAE		
<i>Potamogeton diversifolius</i> Raf.	4	
PRIMULACEAE		
<i>Lysimachia quadrifolia</i> L.	1, 2, 3	
RANUNCULACEAE		
<i>Clematis virginiana</i> L.	3	
<i>Thalictrum pubescens</i> Pursh	3, 4	
<i>Thalictrum revolutum</i> DC.	3	V
RHAMNACEAE		
<i>Ceanothus americanus</i> L.	2	
ROSACEAE		
<i>Agrimonia parviflora</i> Ait.	4	
<i>Amelanchier canadensis</i> (L.) Medik.	3	V
<i>Amelanchier laevis</i> Wieg.	2	
<i>Amelanchier</i> cf. <i>stolonifera</i> Wieg.	2	
<i>Fragaria virginiana</i> Duchesne	1	
<i>Photinia pyrifolia</i> (Lam.) Robertson & Phipps = <i>Aronia arbutifolia</i> (L.) Pers.	3	
<i>Potentilla canadensis</i> L.	1	
<i>Potentilla simplex</i> Michx.	2, 3	
<i>Prunus serotina</i> Ehrh.	2	
<i>Rosa carolina</i> L.	1, 2	
<i>Rosa palustris</i> Marsh.	3, 4	
<i>Rubus flagellaris</i> Willd.	1, 2, 3	
<i>Rubus hispidus</i> L.	2, 3	
<i>Spiraea prunifolia</i> Sieb. & Zucc. +	5	V, Fauquier
RUBIACEAE		
<i>Cephalanthus occidentalis</i> L.	4	
<i>Diodia teres</i> Walt.	5	
<i>Galium circaezans</i> Michx.	2	
<i>Galium obtusum</i> Bigelow	4	
<i>Galium tinctorium</i> (L.) Scop.	3, 4	
<i>Galium triflorum</i> Michx.	2	
<i>Houstonia caerulea</i> L.	1	
<i>Houstonia purpurea</i> L.	1, 2	
<i>Mitchella repens</i> L.	2	
SALICACEAE		
<i>Populus grandidentata</i> Michx.	1, 2, 3, 5	
<i>Salix humilis</i> Marsh.	2	V
<i>Salix nigra</i> Marsh.	4	
SANTALACEAE		
<i>Comandra umbellata</i> (L.) Nutt.	2	V; Stafford

Scientific Name	Habitat	County Record
SAURURACEAE		
<i>Saururus cernuus</i> L.	4	V, Fauquier
SCROPHULARIACEAE		
<i>Agalinis purpurea</i> (L.) Pennell	1, 3	
<i>Agalinis tenuifolia</i> (Vahl) Raf.	1, 3	
<i>Gratiola neglecta</i> Torr.	4	V, Stafford
<i>Mimulus alatus</i> Ait.	4	
<i>Penstemon laevigatus</i> Ait.	1	
SMILACACEAE		
<i>Smilax glauca</i> Walt.	2, 3	
<i>Smilax rotundifolia</i> L.	2	
SOLANACEAE		
<i>Solanum carolinense</i> L. +	5	
SPARGANIACEAE		
<i>Sparganium americanum</i> Nutt.	4	
THELYPTERIDACEAE		
<i>Thelypteris noveboracensis</i> (L.) Nieuwl.	3, 4	
<i>Thelypteris palustris</i> Schott var. <i>pubescens</i> (Lawson) Fern.	3, 4	
TYPHACEAE		
<i>Typha latifolia</i> L.	4	
URTICACEAE		
<i>Boehmeria cylindrica</i> (L.) Sw.	4	
VERBENACEAE		
<i>Verbena hastata</i> L.	4	
VIOLACEAE		
<i>Viola cucullata</i> Ait.	3, 4	
<i>Viola x primulifolia</i> L.	3	
<i>Viola sagittata</i> Ait.	1, 2	
<i>Viola cf. sororia</i> Willd.	2	
VITACEAE		
<i>Parthenocissus quinquefolia</i> (L.) Planch.	2	
<i>Vitis labrusca</i> L.	3	
XYRIDACEAE		
<i>Xyris torta</i> Sm.	3	V, Fauquier