Maryland

Danielle Spendiff -MDE- <danielle.spendiff1@maryland.gov>

BWRR SCMaglev Project Water Quality Cert. Application - public testimony

[redacted] Tue, Nov 14, 2023 at 6:14 PM

To: "danielle.spendiff1@maryland.gov" <danielle.spendiff1@maryland.gov>

Dear Ms. Spendiff,

The following four attachments comprise my testimony on the Water Quality Certification Application submitted to you for the BWRR SCMaglev Project. These comments are identical to comments submitted to State and Federal regulatory agencies on the Draft Environmental Impact Statement over two years ago. They are as valid today as they were two years ago. The testimony is combined with three attachments. For the many reasons stated in my testimony, I strongly urge you to deny the Water Quality Certification sought by the Applicant. Thank you for considering my comments.

Sincerely,

John Parrish

[redacted]

4 attachments

Maglev DEIS Comments by John Parrish.doc
65K

Upper Anacostia 2006 (Nature Serve) Attachment 1.pdf
1107K

Conservation Priorities Upper Anacostia 2008 Attachment 2.pdf
2012K

Rare Plants at BARC J.M. Parrish 2021 Attachment 3.xls
32K

March 4, 2021

RE: **Baltimore-Washington SCMaglev Draft Environmental Impact Statement (DEIS) and Draft Section 4(f) Evaluation.**

To: Federal Railroad Administration, US-ACE, USDA, US-EPA, US-FWS, MDDNR, MDE

From: John M. Parrish, [redacted]

Dear Regulatory Official,

I am a botanist[1] and a co-author of the three reports (attached) listed below.

The reports describe specific natural environmental assets of the **Beltsville Agricultural Research Center (BARC)** impacted by alternatives presented in the DEIS. They are submitted to be included with this testimony into the public hearing record for the Baltimore-Washington SCMaglev proposal.

The reports contain information regarding globally rare natural communities and rare native plant species at BARC which are not adequately described in the DEIS. The reports are titled:

1) **Upper Anacostia Watershed Plant Communities of Conservation Significance** - Teague J., Sneddon L., Simmons R., Parrish J., Tice M., and Strong M., NatureServe, Arlington Virginia, 2006. (Attachment 1)

2) **Conservation Priorities and Selected Natural Communities of the Upper Anacostia Watershed** - Roderick H. Simmons, John M. Parrish, Meghan D. Tice, and Mark T. Strong – Marilandica, Journal of the Maryland Native Plant Society, Vol. 12, No. 1, Spring 2008. (Att. 2)

   https://mdflora.org/Resources/Publications/Marilandica/marilandica_v12_n1.pdf

3) **Rare Plants at Beltsville Agricultural Research Center** – J. M. Parrish 2021. (Attachment 3)

Reports 1 and 2 contain information regarding the occurrence of three globally rare plant communities in the upper Anacostia watershed at BARC. The communities are defined as part of the U.S. National Vegetation Classification system. The two pine barren communities described in the reports and listed below (A. & B.), are recognized by the presence of old age pitch pine (Pinus rigida) as a co-dominant canopy tree species. The extent of the pitch pine communities can be mapped effectively using aerial photography taken during winter months when the crowns of the pines stand out among the deciduous tree species. Mapping the extent of the seasonal pond community requires ground delineation.

All three globally rare plant communities are directly and/or indirectly impacted by alternatives presented in the DEIS. The impacts are due to train yard facilities and their access roads east and west of B-W Parkway and from rail alignments parallel to the Parkway and rail spurs that go to the train yards. The globally rare plant communities at BARC are titled below in bold and described in the reports cited above.

[1] See relevant credentials at end of testimony.

A. **Pine Barrens Pine-Oak Woodland** – an upland pitch pine community closely related to types found in the New Jersey Pine Barrens. Found on the Central and East Farm Tracts. It is ranked G2G3.
B. **Pine Barrens Lowland Forest** – a pitch pine - deciduous hardwood wetland community representing the southernmost known occurrence for this New Jersey Pine Barren forest type. Found on the Central and East Farm Tracts. Ranked G2G3
C. **Pin Oak – Swamp White Oak Seasonal Pond** – an upland depression pond and swamp complex formed over impermeable clay soils. Found on the Central Farm Tract.
(Note: the community at BARC is a coastal subtype of the Pin Oak - Swamp White Oak Seasonal Pond. Since the publication of reports 1 & 2 above, the community at BARC is now designated as *Coastal Plain Depression Swamp (Willow Oak-Red Maple-Sweet Gum Type)* Ranked as a Global Watchlist (G3) community type and a Maryland State Rare (S2) community type.

The Importance of Preserving Forests and Wetlands in the Upper Anacostia Watershed at BARC

The natural communities at BARC and the Patuxent Research Refuge comprise the largest and most biologically diverse expanse of wild lands remaining between Baltimore and Washington DC. In addition, the largest tracts of forest remaining in the Anacostia River watershed are concentrated at BARC. The forests contain globally rare natural communities, wetlands and many state rare species. The forests at BARC protect the northeastern headwaters of the Anacostia River.

According to the USDA Forest Service, "*Acre for acre, forests are the most beneficial land use in terms of water quality. Acting as a living filter, forests capture rainfall, regulate storm water and stream flow, filter nutrients and sediment, and stabilize soils*."[2] It is essential that the forest tracts at BARC be preserved to achieve the water quality goals of the Anacostia Watershed Restoration Agreement. In fact, the Agreement specifies that forest cover must be protected and expanded to meet these goals. The Army Corps of Engineers, US EPA, National Park Service, State of Maryland, Prince Georges County and others are signatories to this landmark agreement. The preservation of all forestland, and especially the few remaining globally rare forest and wetland communities must be the highest priority. Once lost to development they will never return and water quality cannot be restored without them.

Rare Threatened and Endangered Plant Species
To further illustrate the importance of preserving natural habitats at BARC, report #3 lists twenty-five state rare, threatened, endangered, and watchlist (RTE) plant species at BARC known from within one mile of alternatives presented in the DEIS. This list is by no means complete. More research and field surveys will likely reveal additional RTE species at BARC. The 25 RTE's are recorded in reports, and/or have voucher specimens deposited in regional herbariums. Mapped locations for RTE species are available on request. RTE site mapping is not information appropriate to share in the public record. Twenty of the twenty-five RTE species are recorded in two publications as follows:

Annotated List of the Flora of the Beltsville Agricultural Research Center, Beltsville, Maryland - E.E. Terrell, J.L. Reveal, R.W. Spjut, R.F. Whitcomb, J.H. Kirkbride, M.T. Cimino, and M.T.Strong – USDA ARS-155 May 2000.

[2] *Conserving the Forests of the Chesapeake*: *The Status, Trends, and Importance of Forests for the Bays Sustainable Future*, USDA Forest Service, Northeastern Area NA-TP-03-96, page 7.

Conservation Priorities and Selected Natural Communities of the Upper Anacostia Watershed – Roderick H. Simmons, John M. Parrish, Meghan D. Tice, and Mark T. Strong – Marilandica Journal of the Maryland Native Plant Society Vol. 12, No. 1, Spring 2008.

Voucher specimens associated with the reports are deposited in herbariums at the Smithsonian Institution (US) and the University of Maryland (MARY).

Three RTE species (swamp oats, dark-green sedge and roundleaf sundew) are not included in the reports cited above. They are known from the "airport bog" on the East Farm tract. Vouchers for these species, collected by Hotchkiss & Uhler, are deposited at the US Herbarium, Smithsonian Inst., Washington D.C.

Two RTE species (engelmann's quillwort and needleleaf witchgrass) were discovered within the past year and are not recorded in any publication yet.

Seven state threatened and endangered (T&E) plant species are known from this area.
They include: 1) Sandplain flax - Linum intercursum; 2) Sundial lupine - Lupinus perennis; 3) White-fringed orchid - Platanthera blephariglottis; 4) Northern pitcherplant - Sarracenia purpurea: 5) Long-stalked Greenbrier - Smilax pseudochina; 6) Swamp oats - Sphenopholis pensylvanica; and 7) Dwarf huckleberry - Gaylussacia dumosa.

Many botanists have observed five of the seven T&E species in recent years. Last summer we observed and photographed a colony of **white-fringed orchids** in flower in August 2020. Rod Simmons and I discovered orchid colonies in 2005. Two colony clusters are known. This threatened species would be impacted directly and indirectly by the train yard on the west side of Parkway north of Powder Mill Rd.

The state threatened **sandplain flax** would be directly impacted by the train yard proposed on the east side of BW Parkway at the site of the abandoned Beltsville airport. This plant is found at the east end of the old airport. It was first documented by Simmons et al. and a voucher collected in 2005 by Smithsonian botanist Mark Strong. The voucher is deposited at the US Herbarium in Washington D.C.

The state endangered **dwarf huckleberry** and state threatened **swamp oats** were collected from the "airport bog" in 1946 by Neil Hotchkiss and Fran Uhler. The bog still exists next to the old airport. This is where the BARC east train yard is proposed. The swamp oats have not been detected recently. The dwarf huckleberry was last collected at the airport bog by James Reveal and Rose Broome in 1997.

Rod Simmons and I observed the state threatened **northern pitcher plant** and the state threatened **long-stalked greenbrier** in recent years within one half mile southwest of the proposed BARC east train yard.

The state threatened **sundial lupine** is documented as occurring within a half mile of the BW Parkway, east of the parkway. It apparently has not been observed in recent years.

As shown in the attached spreadsheet, eighteen more rare and watchlist species are known from sites in close proximity to alternatives presented in the DEIS. Some of the sites are directly in harms way. The short and long-term viability of all 25 RTE species depend upon large unbroken tracts of protected land that can provide a diversity of habitats suitable to each species. Large tracts of wild land are absolutely necessary to provide habitat resiliency. This is especially critical for species already considered to be rare. The smaller the tract size, the more vulnerable are the uncommon and rare species.

The Importance of Wetlands for Supporting RTE species and Threats to Wetland Habitats
Fifteen of the 25 RTE species are closely associated with a diversity of wetland habitats such as swamps, bogs, and seepages. The proposed rail alignments, and in particular the train yards, would cause devastating direct and indirect impacts to the species and to the hydrology that supports wetlands where the species grow. This is due to excavating into, dumping fill dirt onto, and re-grading the existing terrain. The train yards, associated access roads, rail, and rail spurs would wipe out huge areas of natural habitat including wetlands, forests and open areas that function as recharge zones for ephemeral and perennial streams and the swamps, bogs and seepages that feed the streams. Such a large scale disturbance, ensuing sedimentation, and outright destruction of the wetland habitats at BARC, puts the rare wetland species in jeopardy. The fifteen RTE wetland species at risk include: Bartonia paniculata, Carex bullata, Carex venusta, Drosera rotundifolia, Gaylussacia dumosa, Isoetes engelmannii, Platanthera blephariglottis, Platanthera flava, Rhynchospora microcephala, Sarracenia purpurea, Smilax pseudochina, Solidago latissimifolia, Solidago uliginosa, Sphenopholis pensylvanica, and Utricularia subulata.

Impacts to RTE's due to Habitat Fragmentation and Non-Native Invasive Plant Species
The train yards, access roads and rail alignments would separate natural habitats and sever ecological connectivity between the habitats. The fragmentation would severely limit the ability of rare plants to disperse seeds into suitable habitats to establish new populations. Furthermore, any remaining natural land abutting the train yards and rail alignments will likely become infested with non-native invasive plants. These remnant habitats would be virtually destroyed, decimating the native plant communities and any rare native plant species present.

Avoidance and Minimization
It would be less harmful to Federal properties and less harmful to natural resources if the above ground portions of the maglev project were routed along an existing rail corridor. However, if the maglev is to be built along the Parkway it can be built via tunneling deep underground at BARC, Patuxent Research Refuge, and other sensitive natural areas. Furthermore, new and less damaging train yard sites must be identified and considered. Land that is already degraded such as industrial sites, abandoned sand and gravel mines and brownfields must be given serious consideration to avoid harm to the irreplaceable ecosystems at BARC and the Refuge.

Mitigation
The forests and wetland communities and complex natural food webs at BARC are irreplaceable. Their losses cannot be mitigated effectively. Their complex ecosystem functions cannot be recreated or replaced. Mitigation would be easier to achieve if the main maglev alignment was built entirely underground and the above ground train yards located at industrial areas or if the above ground portions were built along existing rail corridors. The forests and wetland communities at BARC need to be protected in perpetuity to preserve what little is left of the natural landscape in the highly urbanized Baltimore-Washington region.

Questions for regulators to answer in the NEPA process, Final EIS and Record of Decision:

1) Will the EIS map and quantify acres of impact to globally rare natural communities? If so, what methodology will be used to accomplish this task? If not, then how will you assess your ability to avoid, minimize, and mitigate impacts to these rare habitats?
2) Will the final EIS quantify and explain how the maglev project serves to advance, or compromise, the goals of the Anacostia Restoration Agreement with respect to preserving and expanding acres of forest cover and wetlands? If so, how will this be accomplished? How will the EIS justify the

loss of forests and wetlands whose preservation is critical to meeting the goals of the Anacostia Agreement?

3) Will the EIS explain how it intends to avoid, minimize, and mitigate impacts to specialized habitats containing RTE species that would be destroyed by the maglev project? If so, how will this be accomplished? How will the specialized RTE habitat niches be recreated or replaced?
4) Can the acreage of wetland and forest loss that occurs in the Anacostia watershed be mitigated entirely in the same watershed or is any Anacostia mitigation intended to be sited outside of the Anacostia watershed? If outside of the watershed, what proportion is outside verses inside?
5) Will the EIS explain and formulate the mitigation replacement ratio related to acres of forest and wetland loss? Will the EIS correlate losses and mitigation by watershed so that regulators and the public can understand whether or not mitigation is adequate for each watershed?
6) If the maglev can be built underground to avoid and lessen impacts to cities, why haven't any underground alternatives been presented in the EIS to avoid and minimize impacts to precious natural resources at BARC, PRR, BW Parkway, Greenbelt Forest Reserve and elsewhere?
7) Will up to date RTE surveys be performed in all high quality natural habitats impacted by alternatives presented in the EIS? If not, why not? If not, how can impacts to RTE species be assessed effectively? If not, how can impacts to RTE species be avoided, minimized, and mitigated effectively?

In conclusion:

Ceding or selling Federal lands at BARC and PRR for purposes not intended by their founding legislation, constitutes a betrayal of public trust. Giving up or selling Federal lands for the benefit of private corporations not only sets a bad example, but encourages the abuse of public lands wherever they may occur.

Please do your part as regulatory officials to ensure that the maglev project does not degrade and destroy the last and best natural communities remaining in central Maryland between Baltimore and Washington, and in the Anacostia River watershed.

Thank you for considering my testimony.

John Parrish

In addition to the three attached reports, my relevant background as a botanist in the greater Baltimore-Washington region includes work at the Federal, State and County levels as follows:

- Botanist, US National Park Service, Inventory & Monitoring Program, National Capital Region 2007-2012.

- Botanist for the Arlington County, Virginia - Natural Heritage Resource Inventory 2005-2007.

- Director and Vice-President, Maryland Native Plant Society 1998-2007.

- Botanist for the Maryland Department of Natural Resources, Heritage & Biodiversity Conservation Program, conducting field surveys and describing habitats for the: *Inventory for Rare Plants and Significant Habitats on M-NCPPC Parklands in Montgomery County, Maryland*, Wiegand R., Becker P., Fleming C., and Parrish J., 1995-1997.

Upper Anacostia Watershed
Plant Communities of Conservation Significance

NatureServe

NatureServe is a non-profit organization dedicated to providing the scientific knowledge that forms the basis for effective conservation.

Citation:
Teague, J., L. Sneddon, R. Simmons, J. Parrish, M. Tice, and M. Strong. 2006. *Upper Anacostia Watershed Plant Communities of Conservation Significance.* NatureServe, Arlington, Virginia.

This work was made possible with funding from the Naomi and Nehemiah Cohen Foundation.

Front cover photo: Extensive Pine Barrens Pine – Oak community on the East Farm at Beltsville Agricultural Research Center. Photo © Rod H. Simmons.

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UPPER ANACOSTIA WATERSHED PLANT COMMUNITIES OF CONSERVATION SIGNIFICANCE

Judy Teague
Lesley Sneddon
Rod Simmons
John Parrish
Meghan Tice
Mark Strong

March 2006

Acknowledgements

We gratefully acknowledge the generous support of the the Naomi and Nehemiah Cohen Foundation, which made this report possible.

Plant community surveys were conducted by Rod Simmons, John Parish, Mark Strong and Meghan Tice, botanical consultants. Classification assessments were conducted by NatureServe scientists Lesley Sneddon and Judy Teague, Maryland Natural Heritage Program ecologist Jason Harrison, and botanical consultant Rod Simmons. Important contributors to this report include Judy Teague, Lesley Sneddon, Bruce Stein, and Rod Simmons. Appendix 2 was prepared by Rod Simmons, John Parrish, Meghan Tice, and Mark Strong.

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Executive Summary

The Anacostia River has long been the forgotten river in the Washington D.C. region. Increasing attention is now being focused on this long-neglected resource, and a number of efforts are underway designed to protect and restore the river and its associated watershed. One of the most densely populated watersheds in the Chesapeake Bay drainage basin, the Anacostia has suffered serious ecological degradation due to urbanization and pollution. A significant amount of natural forest cover remains, however, particularly in the upper watershed. But while nearly one-third (30%) of the watershed remains in forest cover, just 15% is considered mature forest. Most forest management and protection efforts in the watershed to date have looked at forest cover very broadly, in part because little information has been available about the relative conservation significance of the different forest types found in the watershed.

To help inform decisions regarding the management and protection of forest resources in the Anacostia watershed, NatureServe conducted an inventory of the significant plant communities of the upper watershed of the Anacostia during the summer and fall of 2005. This study, funded by the Naomi and Nehemiah Cohen Foundation, identifies a number of forest types that are not only regionally, but nationally significant, and therefore deserving of special protection and management.

This project involved three main parts: 1) field inventory and review of existing information on forest types in the watershed; 2) classification of observed vegetation types within the framework of the U.S. National Vegetation Classification (NVC); and 3) an assessment of the conservation significance of the plant communities documented.

Field inventories were conducted within each of the five main sub-watersheds and tributaries: Northwest Branch (including Sligo Creek and Long Branch), Paint Branch, Little Paint Branch, Indian Creek, and Beaverdam Creek. Because of its significant undeveloped land base in the upper watershed, the U.S. Department of Agriculture's Beltsville Agricultural Research Center (BARC) was the focus of much of the field inventory conducted during this study.

Of particular note was the discovery of a previously unrecognized, and globally rare, upland pitch pine community. Tentatively described as the Pine Barrens Pine – Oak community, this forest type is most closely related to vegetation known previously only from the New Jersey Pine Barrens. The presence of very old trees within some occurrences of this community suggests that some stands have persisted within the watershed for a long time.

Another highly significant community that we documented in the watershed is the Fall-line Terrace Gravel Magnolia Bog, a plant community supporting a unique combination of species, including several rare species. This rare magnolia bog community appears to be restricted to the Anacostia and nearby watersheds.

The study also revealed the presence of several other globally rare forest types including Pine Barrens Lowland Forest, an unusual wetland; Pin Oak - Swamp White Oak Seasonal Pond, and Southern Red Maple - Black Gum Seepage Swamp Forest.

Interestingly, while mature hardwood forests have been the focus of most forest management and protection in the watershed, we found that some of the most unusual and globally rare plant communities in the watershed are instead characterized by pines. Indeed, several of these rare plant communities appear to be most closely related to forest types known from the Pine Barrens of New Jersey.

The information collected through this project fills an important gap in our knowledge about the Anacostia watershed and the national capital region more generally. By bringing to light a previously unrecognized plant community type, the project has already contributed to the development of a comprehensive and robust understanding of the nation's vegetation, as documented in the U.S. National Vegetation Classification. These data will also contribute to NatureServe's ongoing work in classifying and mapping vegetation on National Park Service lands within the National Capital Region. And most importantly, we hope that the identification of these significant plant communities in the upper Anacostia watershed will assist the many organizations and agencies who are dedicated to restoring and protecting the environmental values of this important watershed.

Introduction

The Anacostia watershed lies within two major biotic provinces: the Piedmont and the Coastal Plain of Maryland and the District of Columbia. The fall line, or region where the Coastal Plain meets the Piedmont, splits the watershed into these two distinctive parts (Figure 1).

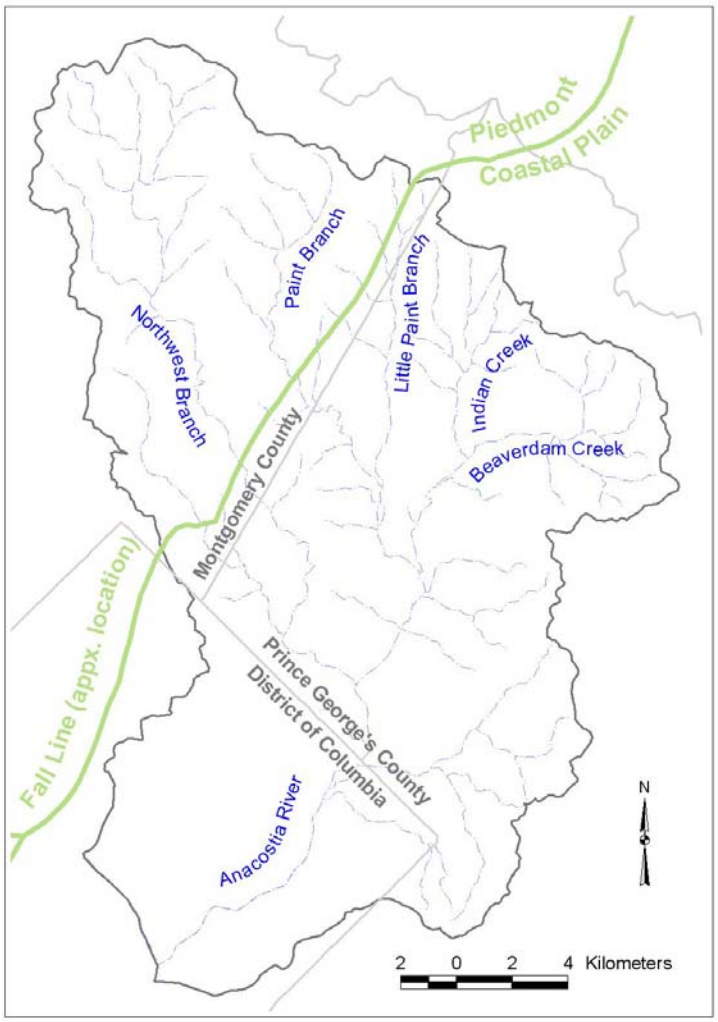

Figure 1. Overview of the Anacostia Watershed

The lower watershed of the Anacostia River, particularly tidal marshes, has been the focus of much restoration effort to date. But ensuring the long-term health and well-being of the river depends on increasing knowledge and protection throughout the watershed. And, although the Anacostia watershed has been the subject of many projects and assessments, none has specifically addressed the identification of significant natural plant communities. A need for such an inventory was identified by the Maryland Department of Natural Resources (1997) in their report on ecologically significant areas in Anne Arundel and Prince George's counties.

By describing, tracking and conserving natural communities, a complex suite of organisms and interactions can be protected. In a general sense, a natural community is a repeating assemblage of interacting species. Unlike the long-standing classification of species, natural communities were not classified using a generally accepted system until the 1990's with the development of the National Vegetation Classification (NVC). This classification system is developed and maintained by NatureServe and its network of Natural Heritage Programs, and has been adopted by the U.S. government's Federal Geographic Data Committee (FGDC) as an interagency vegetation classification standard. It is comprehensive, classifying all vegetation, as well as international, extending to Canada and Latin America.

Prior to development of the NVC, natural communities were described in an *ad hoc* fashion, preventing the comparison of one example to another, particularly across state lines. For

example, swamps dominated by Atlantic white cedar are known variously as “Southern New England basin swamp”, “cedar swamp”, “*Chamaecyparis thyoides / Vaccinium corymbosum* community”, “white cedar swamp forest” and other names in the literature. In some cases the description is confined to a single site, or it may encompass all cedar swamps of the Atlantic coast; it may include open cedar bogs as well as dense cedar forests. While all of these descriptions may be legitimate types, they are not comparable beyond the studies in question. The NVC defines a community with a scientific name “*Chamaecyparis thyoides / Ilex glabra - Rhododendron viscosum* Forest” and a common name of “Coastal Plain Atlantic White-cedar Swamp”, which is applied to Atlantic white cedar - dominated vegetation of the coastal region from Massachusetts to New Jersey.

The NVC provides a common language that ensures that natural communities that are the same but occur across jurisdictional lines (counties, states, refuges, or other political boundaries) are recognized, named and described as the same entities. Because the communities in the NVC are standardized across the entire nation, we can determine other useful information about them, including information on how rare or how common the community is across its entire range. Until the present study was conducted, the standardized community types and their global significance were unknown in the Anacostia watershed. Because we can compare our inventory of communities in the Anacostia watershed with similar vegetation in the region, we can now determine what the standard natural community types are, what the range of those types is, and how common or how rare they are.

As restoration efforts within the Anacostia watershed begin to focus on forests and woodlands of the upper watershed (MWCOG 2001, MWCOG 2005, USACE 2005), descriptions and conservation priorities of natural communities will provide critical information to help set measurable restoration goals. For example, the recent *Anacostia Watershed Forest Management and Protection Strategy* makes a number of recommendations for maintaining and restoring forest cover in the watershed, but considers just four broad forest and tree cover categories: riparian; upland; mature; and urban forest/street trees (MWCOG 2005). While some functions are common amongst many mature upland and riparian forest communities regardless of composition and structure, many are not. Therefore, distinguishing between different mature, upland and riparian forest types will be crucial to setting and meeting restoration goals.

Study Area

This study focused on the upper watershed of the Anacostia River. The approximate boundaries of the study area are as follows. Sandy Spring Road between Old Gunpowder Road and Olney (Rt. 198 and a small section of Rt. 108) follows the divide between the Anacostia and Patuxent River drainages and is the northern boundary of the study area. The eastern boundary more or less extends from the northeastern headwaters of Indian Creek at the Konterra gravel pits to the eastern extent of Beaverdam Creek at the Beltsville Agricultural Research Center (BARC) and south to the headwaters of Brier Ditch and Lower Beaverdam Creek near Lanham. The southern boundary roughly follows Rt. 50 and East-West Highway (Rt. 410) above Bladensburg and Hyattsville. The western boundary follows Georgia Avenue (Rt. 97) from Silver Spring to Olney.

The upper Anacostia watershed is located within Montgomery and Prince George’s Counties, Maryland. The line separating these two counties follows the fall line, or transition zone between

the Piedmont and Coastal Plain physiographic provinces. The upper watershed includes five main sub-watersheds and tributaries: Northwest Branch (including Sligo Creek and Long Branch), Paint Branch, Little Paint Branch, Indian Creek, and Beaverdam Creek (Figure 1). Climate in the study area is humid sub-tropical, with warm to hot temperatures in summer months, mild winters, and an average annual precipitation of about 40 inches (ICPRB 1998). The upper watershed contains a diverse range of geologic conditions, habitats, and flora. Hard crystalline bedrock characterizes the Piedmont Province in Montgomery County and soft, primarily alluvial sedimentary strata characterize the Coastal Plain Province in Prince George's County. Rapids, falls and gorges found along the streams and rivers characterize the transition zone between these two provinces.

A diversity of forest communities blanketed the Anacostia watershed during presettlement times (American Forests 2002). A recent analysis comparing aerial imagery from 1936/38 and 2000 found that forest cover declined 7.9% during this period, from 37.5% to 29.6% (MWCOG 2005). That study found that mature forest covered just 15% of the watershed in 2000 (MWCOG 2005). The upper watershed supports most of this remaining forest with the largest patches located at BARC (Maryland Department of Natural Resources 2005). BARC, comprising about 2,780 hectares (6,866 acres) in the eastern portion of the upper watershed, was also identified as important greenspace in a statewide assessment that addressed green infrastructure (Maryland Department of Natural Resources 2006). Because of its significant undeveloped land base in the upper watershed, BARC was the focus of much of the field inventory conducted during this study.

Project Description and Goals

The goals of this project were to 1) identify significant natural communities in the upper Anacostia watershed of Prince George's and Montgomery counties, Maryland, and 2) share the results with key conservation organizations in the region. The focus of this inventory was on public lands in the five sub-watersheds of the upper Anacostia. Our intent is that the information gathered in this project will help local conservationists target their protection efforts by raising awareness of natural communities in need of greater conservation attention.

Methods

This project involved three main parts:

1) field inventory and review of existing data;
2) classification of observed vegetation types within the framework of the U.S. National Vegetation Classification (NVC); and
3) an assessment of the conservation significance of the plant communities observed in the Anacostia watershed.

Field Inventory and Review of Existing Data

NatureServe contracted with Rod Simmons in March of 2005 to conduct a field inventory of the upper watershed to collect observation and vegetation classification data focusing on communities of conservation concern present on public lands in parts of the Paint Branch, Little Paint Branch, Indian Creek, Beaver Dam Creek, and Northwest Branch tributaries of the Anacostia River.

Seventeen days were spent conducting reconnaissance and collecting observation and classification plot data (Figure 2). An overview of the field inventory effort and descriptions of sites visited during this survey are provided in Appendix 2.

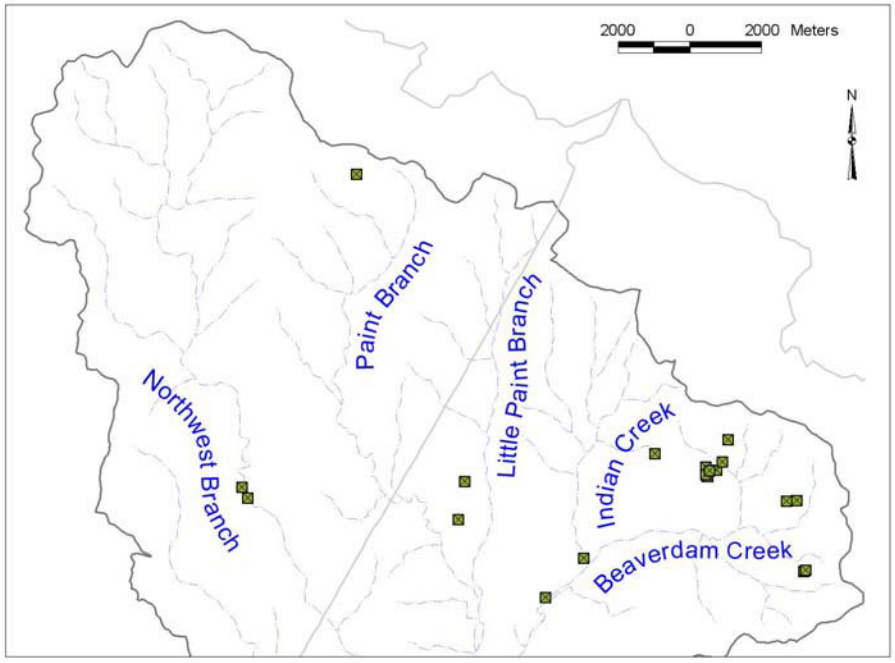

Figure 2. Sites surveyed during this inventory.

Sites were selected based on a number of criteria, including presence of old growth characteristics, a pattern of reoccurrence across the landscape, lack of alteration by artificial disturbances, lack of invasive species, area occupied, and the presence and quality of populations of species of conservation concern.

In addition to our new inventory efforts, we were able to include existing data in our analysis. A small number of classification plots had been previously collected in the upper Anacostia watershed as part of an on-going NatureServe project to classify and map the natural communities of eleven parks in the National Capital Region of the National Park Service.

Ecological Classification

In general, the classification process compares field data from a group of sites to determine similarities and differences. Collecting field data, or "plot" data involves the marking of a plot on the ground and noting all the species within the plot, as well as measuring how much area of the plot each species covers. Environmental data are also collected, such as soil conditions, flooding regime, etc. Plot data were collected in each of five sub-watersheds and compared to existing plots and NVC descriptions to determine whether the plots represented new, undescribed communities, or additional examples of existing types.

Assessing Conservation Status

Many factors are considered when assessing the conservation status of a community type, including number of occurrences, ecological integrity of those occurrences, the geographic range of the type, total area occupied, trends, threats, number of protected occurrences, intrinsic vulnerability and environmental specificity. Environmental specificity, intrinsic vulnerability, threats, and the range of the type become the primary factors when detailed occurrence data are incomplete or lacking.

Results

Anacostia Plant Communities of Conservation Significance

Several communities of conservation significance were documented during this survey, some of which seem to represent new community types not yet described in the U.S. National Vegetation Classification (NVC). These communities are summarized below and their closest NVC analogues are described in detail in Appendix 1.

1. Several examples of a unique upland Pitch Pine (*Pinus rigida*) community were found on BARC lands. This community is most closely related to vegetation known previously only from the New Jersey Pine Barrens. This new NVC community type has been tentatively named the **Pine Barrens Pine – Oak** community, and is globally rare, with fewer than 20 sites known to support it. In addition to its rarity, the occurrences of this community that we documented support old trees, suggesting that some stands have persisted for a long time. Interestingly, this upland pine community has apparently been unrecognized and unreported in the watershed until now.

Pine Barrens Pine – Oak forest on the East Farm at BARC. John Parrish and old-age *Pinus rigida*. Plot: BARC 3. Photo: © R. H. Simmons.

2. Examples of the globally rare **Pine Barrens Lowland Forest** were also discovered in this survey. This community is an unusual wetland type characterized by pitch pine and deciduous hardwoods in the canopy. Pitch pine is more characteristic of dry upland sites, but in the New Jersey Pine Barrens it also occurs in sandy areas that are saturated by groundwater. The occurrences found at BARC represent a southern extension in the range of this rare vegetation type.

John Parrish and Mark Strong at the edge of the Airport Bog on the East Farm at BARC. Old-age Pine Barrens Lowland Forest is visible in the background and to the right of the bog. Photo: © R.H. Simmons.

3. A highly significant community occurring in the Anacostia watershed is a type known as the **Fall-line Terrace Gravel Magnolia Bog**. Documented initially in the early part of the century, it was thought to be an unusual expression of communities restricted to the New Jersey Pine Barrens. However, the significance of this type was not confirmed until recent analyses comparing data collected in this community to other similar vegetation. While it bears some resemblance to vegetation of the New Jersey Pine Barrens, the community supports a unique combination of species, including rarities, and the only occurrences of this community occur in the Anacostia and nearby watersheds.

4. An upland depression swamp was sampled at BARC that appears closely related to an existing NVC association, **Pin Oak - Swamp White Oak Seasonal Pond**. Swamp White Oak (*Quercus bicolor*) upland depression swamps are generally globally rare throughout their range. This community will be analyzed further with a regional dataset during our National Park Service National Capital Regional vegetation classification project.

5. Another seepage swamp forest occurring in the upper watershed along the headwaters of Little Paint Branch appears to be an unusual variant of the globally rare community, **Southern Red Maple - Black Gum Seepage Swamp Forest**. This occurrence includes Swamp White Oak in the canopy. This community occurrence supports populations of the rare lily *Stenanthium gramineum var. robustum*. This plant is a state-listed threatened species.

Large seepage forest with *Stenanthium gramineum* var. *robustum* at the headwaters of the Paint Branch near Spencerville. Plot: Upper Anacostia 9. Photo: © R.H. Simmons.

6. Unusual variants of the apparently globally secure upland community, **Central Appalachian / Northern Piedmont Low-Elevation Chestnut Oak Forest** were documented above the fall line along slopes above Northwest Branch. Though this community is widespread throughout the northern Piedmont and central Appalachians, it is highly threatened within the upper Anacostia watershed. One example supports specimens of Table Mountain Pine (*Pinus pungens*), an uncommon species in the D.C. area.

Mixed ericad shrubland on steep slope of Northwest Branch Gorge at Burnt Mills. Plot: Upper Anacostia 3. Photo: © R.H. Simmons.

7. A significant occurrence of a floodplain forest that is currently considered to be a new community type to the NVC was observed at Indian Creek and Beaverdam Creek. This new floodplain forest is thought to be restricted to the Coastal Plain and outer Piedmont of Maryland and Virginia. The forest canopy is dominated by Swamp Chestnut Oak (*Quercus michauxii*), Red Maple (*Acer rubrum*), Black Gum (*Nyssa sylvatica*), and Tuliptree (*Liriodendron tulipifera*). The ground flora is characterized by early spring wildflowers.

Invasive Plant Species

Invasive species noted at or nearby sites sampled during this survey include Japanese Stiltgrass (*Microstegium vimineum*), Japanese Barberry (*Berberis thunbergii*), Oriental Bittersweet (*Celastrus orbiculatus*), Crabapple (*Malus sp.*), Ornamental Cherry (*Prunus subhirtella*), Wineberry (*Rubus phoenicolasius*), Garlic Mustard (*Allaria petiolata*), Mile-a-minute (*Polygonum perfoliatum*), Oriental Lady's Thumb (*Polygonum cespitosum*), Privet (*Ligustrum sinensis*), Japanese Honeysuckle (*Lonicera japonica*), and Hairy Jointgrass (*Arthraxon hispidus*). Several sites were considered threatened by *Microstegium vimineum* encroachment. A list of potential invasive species for the state of Maryland may be found at http://www.dnr.state.md.us/wildlife/ieplists.asp.

Conclusion

The data collected through this project fills an important gap in our knowledge about the Anacostia watershed. Perhaps the most significant result of our study is the identification of previously undescribed and unreported vegetation types in the watershed. These new types currently are classified as provisional and will require further region-wide analysis before they can be fully developed and formally added to the U.S. National Vegetation Classification. We are currently undertaking several regional projects that should help clarify these classification questions (e.g. National Park Service, National Capital Region Vegetation Classification and Mapping Project; and Delaware Estuary Program Vegetation Classification Project).

Results of our study have been communicated to the Maryland Natural Heritage Program (MDNHP), an operating unit of the Maryland Department of Natural Resources. The field data records ("element occurrences") generated during this study will be incorporated into the MDNHP's state-wide databases, where they will be accessible for planning and environmental review activities. The project's community classification results are also being incorporated into the Natural Heritage program's Maryland state natural community classification.

This survey has provided important information on the significant natural communities on public lands in the upper watershed. However, many areas remain to be inventoried, and in particular, efforts are needed to identify private lands with significant natural communities. This survey focused in particular on forests of the Beltsville Agricultural Research Center (BARC) because of their size, condition, and opportunities for management.

References

American Forests. 2002. Urban Ecosystem Analysis for the Washington D.C. Metropolitan Area: An assessment of existing conditions and a resource for local action. Sponsored by the USDA Forest Service and the Casey Trees Endowment Fund. February 2002.

Maryland Department of Natural Resources. 1997. Ecologically significant areas in Anne Arundel and Prince George's counties, Sites newly identified or updated in 1997. Report submitted by Heritage and Biodiversity Conservation Programs, Maryland Department of Natural Resources, Annapolis , Maryland.

Maryland Department of Natural Resources. 2005. Characterization of the Anacostia River Watershed in Prince George's County, Maryland. Maryland Department of Natural Resources Watershed Services, Annapolis , Maryland *in* partnership with Prince George's County.

Maryland Department of Natural Resources. 2006. Maryland's GreenPrint Program, Protected and Unprotected Components of the Green Infrastructure. Chesapeake and Coastal Watershed Service, Watershed Management and Analysis Division. Map available at http://www.dnr.state.md.us/greenways/gi/gi.html.

MWCOG. 2001. Anacostia Watershed Restoration Indicators and Targets for the Period 2001 – 2010. Report prepared by the Metropolitan Washington Council of Governments, Department of Environmental Programs. (http://www.anacostia.net/download/indicators_and_targets.pdf)

MWCOG. 2005. Anacostia Watershed Forest Management and Protection Strategy. Report prepared by the Metropolitan Washington Council of Governments, Department of Environmental Programs. (http://www.anacostia.net/download/Final_FMPS.pdf

USACE. 2005. Anacostia River and Tributaries, Maryland and the District of Columbia, Comprehensive Watershed Plan, Section 905(b) (WRDA 86) Analysis. Report prepared by the U.S. Army Corps of Engineers, Baltimore District. (http://www.anacostia.net/download/2005-Anacostia_Comprehensive_Plan-905(b).pdf)

Appendix 1. U.S. National Vegetation Classification Association Descriptions

Technical descriptions of the most significant communities identified during this project are provided here.

Upland Communities

Pine Barrens Pine – Oak Woodland **CEGL00XXXX**
Pinus rigida - Quercus coccinea – Quercus falcata / Quercus marilandica Woodland

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Range (global): This association occurs on the Coastal Plain of NJ and MD.
Environmental Description (global): This association is restricted to sandy soils of the MD, DE and NJ Coastal Plain.
Vegetation Description (global): This pitch pine - oak woodland of dry sandy soils occurs in portions of the New Jersey Pine Barrens and the Cape May peninsula, with outliers occurring south of the Delaware Bay on the Maryland inner coastal plain. The canopy is dominated by *Pinus rigida* and a mixture of oaks, most frequently *Quercus falcata and Quercus coccinea.* Other associated oaks include *Quercus velutina* and *Quercus alba*. *Pinus virginiana* sometimes occurs, and in New Jersey, *Pinus echinata* may be an associate. Maryland occurrences may also include *Nyssa sylvatica* and *Liquidambar styraciflua* in the canopy. The tall shrub layer is characterized by *Quercus marilandica, Quercus prinoides, Ilex opaca, Sassafras albidum*¸ and occasionally *Kalmia latifolia.* Maryland occurrences also support *Castanea pumila, Lyonia mariana,* and *Vaccinium fuscatum* in this layer. A short shrub layer is dominated by *Gaylussacia baccata* and *Vaccinium pallidum.* The herbaceous or field layer is usually sparse and may include *Smilax glauca*, *Chimaphila maculata, Gaultheria procumbens, Carex pensylvanica,* and *Cypripedium acaule.*
Global Conservation Rank and Reasons: G2/G3 (Dec 2005)
References: Eastern Ecology Working Group n.d.*, Windisch 1995b

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Central Appalachian / Northern Piedmont Low-Elevation Chestnut Oak Forest **CEGL006299**
Quercus prinus - (Quercus coccinea, Quercus velutina) / Kalmia latifolia / Vaccinium pallidum Forest

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Range (global): This association is currently known from the northern Piedmont and central Appalachians in Virginia, Maryland and West Virginia.
Environmental Description (global): This association is found on acidic, infertile soils on low-elevation (mostly <900 m), mid and upper slopes (occasionally on lower slopes). Site moisture potential is typically subxeric to xeric. Some exposed bedrock is often present.
Vegetation Description (global): The canopy is strongly dominated by *Quercus prinus*. The most frequent canopy associate is *Quercus coccinea*, which varies from sparse to codominant. Other associates frequently include *Quercus velutina* plus *Quercus alba, Quercus rubra, Nyssa sylvatica, Sassafras albidum*, and *Robinia pseudoacacia*. Scattered pines including *Pinus pungens, Pinus rigida, Pinus virginiana, and Pinus strobus* are sometimes present in the canopy. *Acer rubrum* and *Nyssa sylvatica* are usually abundant in the understory tree layers. Tall shrubs include *Kalmia latifolia* (usually dominant), *Viburnum acerifolium*, with *Rhododendron periclymenoides*, which occurs with high frequency and occasional high cover. The dwarf- or short-shrub layer is well-developed and includes *Vaccinium pallidum, Vaccinium stamineum*, and *Gaylussacia baccata*, any one of which can exhibit patch-dominance. The herb layer generally has sparse cover and includes *Aureolaria laevigata, Chimaphila maculata, Comandra umbellata, Cypripedium acaule, Danthonia spicata, Epigaea repens, Hieracium venosum, Lysimachia quadrifolia, Medeola virginiana, Monotropa uniflora, Pteridium aquilinum*, and

Uvularia puberula. Strong dominance of *Quercus prinus* in the canopy, frequent and sometimes abundant *Rhododendron periclymenoides* in the tall-shrub layer, and *Vaccinium pallidum* present and often abundant as a dwarf-shrub are diagnostics for this type.
Noteworthy Associated Plant and/or Animal Species: Tsuga caroliniana (G3)
Dynamics/Successional Trajectory: Windthrow, fire, and ice storms are common natural disturbances in these habitats. Evidence of past fires is present at many sites, and periodic fire appears to be an important ecological factor in oak regeneration. Development of *Acer rubrum*-dominated understories in these forests is widely considered to be the result of drastic reductions of fire frequencies or exclusion of fire altogether. *Castanea dentata* was formerly an important canopy species in these forests prior to chestnut blight.
Global Conservation Rank and Reasons: G5 (29-Jan-2004). Abundant examples occur in Virginia, Maryland, and West Virginia.
References: Allard and Leonard 1943, Eastern Ecology Working Group n.d.*, Fleming 2002a, Fleming and Coulling 2001, Fleming and Moorhead 1996, Fleming and Moorhead 2000, Fleming et al. 2001, Lea 2003, Rawinski et al. 1994, Rawinski et al. 1996

Wetland Communities

Pine Barrens Lowland Forest **CEGL006926**
Pinus rigida - Nyssa sylvatica / Gaylussacia frondosa - Leucothoe racemosa Forest

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Range (global): This community is limited in range to the pine barrens of New Jersey and the inner coastal plain of Maryland.
Environmental Description (global): This association is restricted to groundwater seepage areas associated with sandy uplands of the MD, DE and NJ Coastal Plain.
Vegetation Description (global): This pine barrens lowland forest occurs on sandy soils along braided streams or in depressions in southern New Jersey and on the coastal plain of Maryland. The canopy is a mixture of *Pinus rigida, Acer rubrum, Nyssa sylvatica*, with *Liquidambar styraciflua* in New Jersey. The canopy ranges from mixed deciduous – evergreen to deciduous. The subcanopy is characterized by *Magnolia virginiana,* with occasional *Ilex opaca.* Typical shrubs include *Clethra alnifolia, Leucothoe racemosa, Gaylussacia frondosa, Vaccinium corymbosum*. There is often significant cover of *Smilax rotundifolia* vines. The herbaceous stratum includes *Osmunda cinnamomea* and *Gaultheria procumbens*. Other species of the herbaceous layer may include *Woodwardia aereolata, Chasmanthium laxum, Carex folliculata, Bartonia paniculata, Carex atlantica, Carex seorsa, Glyceria striata,* and *Lycopus virginicus.*
Global Conservation Rank and Reasons: G2 (Dec 2005)
References:

Fall-line Terrace Gravel Magnolia Bog **CEGL006219**
Nyssa sylvatica - (Pinus rigida) / Magnolia virginiana / Rhododendron viscosum - Gaylussacia frondosa / Smilax pseudochina Woodland [Provisional]

Range (global): This community is known from a limited area at and just east of the Fall-line in Montgomery, Prince George's and Charles counties, Maryland; Arlington and Fairfax counties, Virginia; and the District of Columbia.
Environmental Description (global): This community type usually occurs on saturated toeslopes at bases of highly weathered, highly acidic, fluvial-estuarine terrace gravel deposits of Cretaceous or Tertiary age. Irregular microtopography with abundant groundwater seepage forming braided channels, *Sphagnum*-covered hummocks, and mucky depressions is characteristic. Soils consist mostly of coarse gravel and sand, with large cobbles often abundantly exposed at the surface. Soil samples collected from plots were extremely acidic, low in organic matter content, and low in base status.

Vegetation Description (global): McAtee (1918) originally described these "bogs" as having a physiognomic zonation, with *Magnolia virginiana* and various shrubs fringing and forming clumps within a more open center dominated by herbaceous plants. Exceptionally clear historical photographs taken by McAtee in 1909 show the more open condition of one of the bogs. The following species are clearly

identifiable in the photos: *Nyssa sylvatica, Toxicodendron vernix* (abundant), *Gaylussacia cf. frondosa* (abundant), *Viburnum nudum var. nudum, Pinus rigida*, and *Eriocaulon decangulare* (abundant). Herbaceous species mentioned by McAtee (1918) as characteristic of many historical bogs include *Lycopodiella appressa, Carex bullata, Asclepias rubra, Helianthus angustifolius, Rhynchospora gracilenta, Xyris torta, Pogonia ophioglossoides*, and *Utricularia* spp. Except where open conditions have been artificially maintained by powerline rights-of-way, the physiognomy of remnant patches of this community is that of an open woodland with a very dense shrub layer and very small, scattered herbaceous patches. In the 11 analyzed plot samples, *Nyssa sylvatica* has the highest mean tree cover, followed by *Magnolia virginiana, Acer rubrum, Liriodendron tulipifera*, and *Ilex opaca var. opaca*. Shrub cover usually averages about 80%, most of it contributed by the following species in rough descending order of importance: *Rhododendron viscosum, Vaccinium corymbosum, Smilax rotundifolia, Gaylussacia frondosa, Viburnum nudum var. nudum, Leucothoe racemosa, Heteromeles arbutifolia (= Photinia arbutifolia), Ilex verticillata, Amelanchier canadensis, Ilex laevigata*, and *Toxicodendron vernix*. *Rubus hispidus* is a creeping shrub common in most occurrences. The only herbs that achieve significant mean cover are *Osmunda cinnamomea* and *Dichanthelium dichotomum var. dichotomum*. Low-cover herbs occurring in >50% of the plots are *Mitchella repens, Smilax pseudochina, Dioscorea villosa, Solidago rugosa, Dichanthelium dichotomum var. ensifolium, Rhynchospora capitellata, Viola X primulifolia, Medeola virginiana, Lycopus virginicus, Chasmanthium laxum, Glyceria striata*, and *Leersia virginica*. Regionally uncommon or rare "bog" species persisting at one or a few sites include *Solidago uliginosa var. uliginosa, Eurybia radula (= Aster radula), Eriocaulon decangulare, Juncus longii, Drosera intermedia, Asclepias rubra*, and *Kalmia angustifolia*.
Noteworthy Associated Plant and/or Animal Species: Juncus longii (G3Q)
Dynamics/Successional Trajectory: This community occurs in small patches adjacent to very dry, acidic upland forests dominated by oaks and/or pines (McAtee 1918) and was therefore no doubt impacted by occasional wildfires that burned through these fire-prone landscapes. The historical abundance of *Pinus rigida* in the vicinity of these bogs (McAtee 1918) and its persistence in some of the surviving remnants also suggests a history of fire. Fire may have been an important factor maintaining herbaceous patches and limiting the growth of shrubs and trees, but dynamics of this community type are not fully understood. What seems clear is that remnant stands have become more closed and densely shrubby during a period in which fire has been essentially excluded from the region.
Global Conservation Rank and Reasons: G1 (25-Jan-2005): This association is currently extant at less than 10 sites rangewide and occurs in very small patches subject to multiple disturbances, including hydrologic alterations, grazing, sand mining, and development. This community has always had a limited distribution in the Mid-Atlantic fall-line zone and has probably always been rare. However, many historically documented occurrences have been destroyed by development of the Washington, DC metropolitan area, and the few remaining examples have been degraded by fire exclusion, woody succession, and various anthropogenic impacts.
References: Eastern Ecology Working Group n.d., Fleming et al. 2004, McAtee 1918, VADNH 2003

Pin Oak - Swamp White Oak Seasonal Pond **CEGL004643**
Scientific Name

Range (global): This type is apparently restricted to the Virginia Piedmont and possibly the Ridge and Valley.
Environmental Description (global): This association is found in seasonally flooded upland ponds of the Virginia Piedmont and possibly the Ridge and Valley.

Vegetation Description (global): Stands are dominated by mixtures of *Quercus palustris* and *Quercus bicolor*. Herbaceous species include *Carex pellita, Carex stricta, Carex squarrosa, Scirpus georgianus*, and *Agrostis perennans*.
Global Conservation Rank and Reasons: G1G3 (31-Jan-2001): This type is apparently very limited in occurrence, with less than 1000 acres, but it is poorly understood and additional information is needed about taxonomic circumscription, distribution, and occurrences.
References: Fleming et al. 2001, Patterson pers. comm., Southeastern Ecology Working Group n.d., VADNH 2003

Southern Red Maple - Black Gum Seepage Swamp Forest **CEGL006238**
Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var*. nudum / Osmunda cinnamomea - Woodwardia areolata* Forest

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Range (global): This community ranges from southeastern New York and New Jersey to southeastern Virginia on the Coastal Plain. In Virginia, it extends into the extreme eastern portion of the Piedmont.
Environmental Description (global): This association is generally restricted to groundwater-saturated stream bottoms, seeping toeslopes, and poorly drained depressions with seasonally perched water tables. Sites typically have hummock-and-hollow microtopography with braided channels, *Sphagnum*-covered hummocks, mucky depressions, and areas of exposed sand and gravel are common. Soils are extremely acidic and very low in base status.
Vegetation Description (global): Canopy closure ranges from closed to quite open. Plot data from 20 Virginia and Maryland stands indicate that *Acer rubrum* and *Nyssa sylvatica* are consistently dominant overstory species. *Magnolia virginiana* is a frequent overstory associate and usually dominant in a subcanopy layer, or codominant with *Ilex opaca*. *Liriodendron tulipifera* is a frequent but minor overstory associate. Trees tend to be slow-growing and of less than optimal stature in the wet, unstable habitats. Shrub layers tend to be dense and diverse, characteristically containing *Viburnum nudum var. nudum, Vaccinium corymbosum, Smilax rotundifolia, Ilex verticillata*, and *Lindera benzoin*. In parts of the range, *Clethra alnifolia* is a dominant shrub, while in New Jersey, *Chamaedaphne calyculata* and *Gaylussacia frondosa* are present. Additional, less constant shrub associates are *Rhododendron viscosum, Leucothoe racemosa, Chionanthus virginicus, Viburnum dentatum, Toxicodendron vernix*, and *Carpinus caroliniana*. The herb layer varies from dense to sparse. *Osmunda cinnamomea* and *Woodwardia areolata* are generally the most constant and abundant herbs, but *Symplocarpus foetidus* is a patch-dominant in approximately two-thirds of the Virginia and Maryland stands. Additional characteristic herbs occurring at low cover include *Arisaema triphyllum ssp. pusillum, Carex folliculata, Carex seorsa, Chelone glabra, Impatiens capensis, Lycopus virginicus, Mitchella repens, Osmunda regalis var. spectabilis, Platanthera clavellata*, and *Viola cucullata*.
Noteworthy Associated Plant and/or Animal Species: Helonias bullata (G3)
Dynamics/Successional Trajectory: Trees tend to be slow-growing and of less than optimal stature in the wet, unstable habitats. Additionally, these swamps tend to border dry, sandy uplands supporting fire-prone oak/heath forests. Occasional fires, burning into the swamps from the uplands during dry periods, may have once influenced the composition and physiognomy of this type. However, fire has now been excluded from almost all areas within the range. An exception is at Fort A.P. Hill Military Reservation, where military training results in frequent incendiary fires in a roughly 5000-ha area. Stands of this community are very susceptible to flooding from beaver activities, which usually results in the destruction or extreme alteration of a stand. In New Jersey, this community is often situated adjacent to *Chamaecyparis thyoides*-dominated swamp and may replace it after logging.
Global Conservation Rank and Reasons: G3? (30-Mar-2004): The type is restricted to an uncommon wetland habitat in a limited region. It is vulnerable to alteration or destruction by beavers and various anthropogenic activities, including hydrologic modifications.
References: Breden 1989, Breden et al. 2001, Eastern Ecology Working Group n.d., Edinger et al. 2002, Ehrenfeld and Gulick 1981, Fike 1999, Fleming et al. 2001, Fleming pers. comm., Harvill 1967, Heckscher 1994, Hill 1986, McCormick 1979, Patterson pers. comm., Robichaud and Buell 1973, Sipple and Klockner 1984, VADNH 2003, Windisch 1995b

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Range (global): This new floodplain forest is thought to be restricted to the Coastal Plain and outer Piedmont of Maryland and Virginia.
Environmental Description (global): This community occurs along floodplains on moderately well-drained soils.

Vegetation Description (global): Based on limited plot data, variable combinations of *Quercus shumardii*, *Quercus michauxii*, *Quercus rubra*, *Fagus grandifolia*, *Liquidambar styraciflua*, *Acer rubrum, Nyssa sylvatica, Quercus phellos, Quercus palustris, Quercus bicolor, Fraxinus pennsylvanica,* and *Liriodendron tulipifera* may dominate mixed canopies. *Carpinus caroliniana* is a small tree/shrub dominant. Herb layers are rich in spring ephemerals and nutrient-demanding species, including *Asarum canadense*, *Asarum triphyllum, Circaea lutetiana* ssp. *canadensis*, *Podophyllum peltatum*, *Claytonia virginica*, *Cinna arundinacea*, and *Viola sororia*.
References: NCR Draft Classification

Appendix 2. Conservation Priorities and Selected Natural Communities of the Upper Anacostia Watershed

CONSERVATION PRIORITIES AND SELECTED NATURAL COMMUNITIES OF THE UPPER ANACOSTIA WATERSHED

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ABSTRACT

A limited survey of the upper Anacostia River watershed, situated in Prince George's and Montgomery Counties, Maryland, was conducted in the summer and fall of 2005 to identify natural communities of conservation significance. Extensive floristic surveys were conducted and classification data were collected from 23 vegetation plots and observation points. Ten communities of conservation significance were documented. Of these, the globally rare Pine Barrens Pine - Oak Woodland and a type of Coastal Plain Bottomland Forest, are new community types not yet described in the U.S. National Vegetation Classification. In addition, community and habitat descriptions and a checklist of vascular flora are presented, including 22 state-listed, uncommon to highly rare species. A brief discusion on the range and distribution of certain taxa is also presented.

INTRODUCTION

In the summer and fall of 2005, a limited survey was conducted to identify significant natural communities and conservation priorities in the upper Anacostia River watershed, situated in Prince George's and Montgomery Counties, Maryland. Although urban sprawl and its effects have substantially encroached into the region, this vast area still encompasses thousands of acres of high quality forest, wetlands, streams, and plant communities, many of which are highly rare or unique in the greater Washington, D.C. area.

Although parts of this region have been previously explored and documented by researchers from USDA, University of Maryland, Catholic University, Maryland Native Plant Society (MNPS), Smithsonian Institution, Maryland Department of Natural Resources (DNR), Maryland National Capital Park and Planning Commission (M-NCPPC), and others, additional work was needed to survey unexplored areas, inventory important vegetation types, and identify conservation priorities. The extensive oak-pine-heath forest communities, including acidic, upland seepage wetlands, (mainly on the Central and East Farms) at the Beltsville Agricultural Research Center (BARC) in Prince George's County, Maryland were chosen as the primary focus of this study because of their high quality and large size, need for classification, and vulnerability to potential threats. These areas are located in the extreme northeastern edge of the upper Anacostia watershed and give rise to the Beaverdam Creek tributary. Vegetation and significant natural communities were also surveyed in the other upper Anacostia tributaries to the west: Indian Creek, Little Paint Branch, Paint Branch, and Northwest Branch.

This study represents the most comprehensive survey of the upper Anacostia watershed known to date, but is far from complete. While we surveyed many oak-pine-heath communities and upland seepage wetlands at BARC, time constraints prevented us from thoroughly surveying them all or possibly locating additional ones at BARC. To broaden our understanding of the natural communities and conservation priorities throughout the entire upper watershed, we tried to balance our surveys so that all five main tributaries were represented. This study also builds upon the work of many individuals over many years, especially botanists compiling the BARC Flora (Terrell et al. 2000), research by MNPS and colleagues to classify the Fall Line Magnolia Bogs, and rare plant surveys by DNR and M-NCPPC. We generally did not include the results of previous research in this study, except to cite literature.

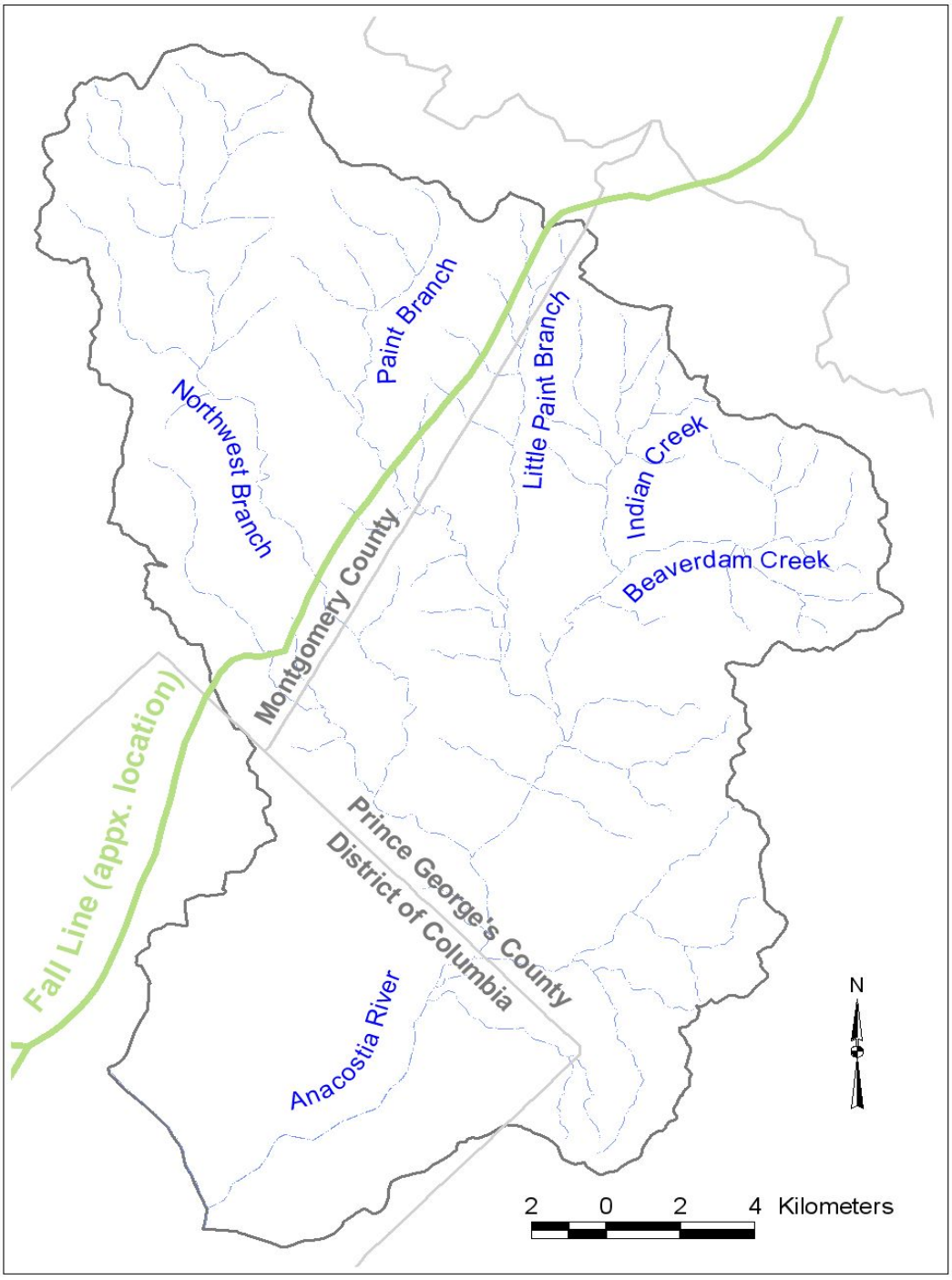

Figure 1. Overview of the Anacostia watershed.

STUDY AREA

The upper Anacostia watershed includes five main sub-watersheds (tributaries): Northwest Branch (including Sligo Creek and Long Branch), Paint Branch, Little Paint Branch, Indian Creek, and Beaverdam Creek (Figure 1). Sandy Spring Road between Old Gunpowder Road and Olney (Rt. 198 and a small section of Rt. 108) follows the divide between the Anacostia and Patuxent River drainages and is the northern boundary of the study area. The eastern boundary more or less extends from the northeastern headwaters of Indian Creek at the Konterra gravel pits to the eastern extent of Beaverdam Creek at BARC and south to the headwaters of Brier Ditch and Lower Beaverdam Creek near Lanham. The southern boundary roughly follows Rt. 50 and East-West Highway (Rt. 410) above Bladensburg and Hyattsville. The western boundary follows Georgia Avenue (Rt. 97) from Silver Spring to Olney. Paint Branch, Little Paint Branch, Indian Creek, and Beaverdam Creek gradually form the Northeast Branch (along with Brier Ditch and Lower Beaverdam Creek) which converges with the Northwest Branch at Bladensburg, forming the Anacostia River.

This region contains a diverse range of geologic conditions, habitats, and flora. Despite much urbanization in the upper watershed, most of which is fairly recent, high quality natural areas remain, particularly throughout BARC, the Konterra sand and gravel pit complex (formerly Contee Gravel Co.), Spencerville-Upper Paint Branch, PEPCO powerline, Ammendale woods, Little Paint Branch Park, White Oak Federal Research Center, including Army Research Lab, Powder Mill Community Park, Buck Lodge Community Park, Northwest Branch Park, Hollywood Swamp, and Greenbelt Park. All of these places remain for the moment in a tentative balance with the ever advancing pace of urban sprawl within the watershed.

Climate

The climate of the upper Anacostia watershed is humid temperate (Bailey 1998), with warm to hot temperatures in summer months, mild winters, and an average annual precipitation of about 40 inches (Interstate Commission on the Potomac River Basin 1998).

Geology

The upper Anacostia watershed lies within the western edge of the coastal plain physiographic province and the eastern edge of the piedmont plateau. The fall line is a zone of transition between the two provinces, where the hard, crystalline bedrock of the piedmont descends under the soft, coastal sediments, giving rise to numerous rapids and falls in streams and rivers. The piedmont bedrock continues to slope southeastward at a rate of about 125 feet per mile (Johnston 1964).

Almost all of the exposed crystalline bedrock of the upper Anacostia watershed occurs within Montgomery County. At the western edge of the watershed in the piedmont are the Norbeck Intrusive Suite (equivalent to the formerly mapped Norbeck Quartz Diorite) and Kensington Tonalite, granitoid intrusions of biotite-hornblende tonalite and muscovite-biotite tonalite, respectively (Maryland Geological Survey 1968, Drake 1998a). These rocks intrude the metasedimentary schistose rocks of the Laurel Formation and Loch Raven Schist, which are equivalent to the formerly mapped Lower Pelitic Schist and Boulder Gneiss of the subdivided Wissahickon Formation (Maryland Geological Survey 1968, Aleinikoff 2002). Much of Northwest Branch and upper Paint Branch cut across this bedrock, forming major stream valleys. Northwest Branch Gorge, with its massive boulders and waterfalls, is one of the region's most spectacular natural features.

The coastal plain section of the upper Anacostia (all of the watershed in Prince George's County and some areas along the fall line in Montgomery County) are underlain by vast deposits of sand, gravel, silt, and clay of the Lower Cretaceous Potomac Group (Patuxent Formation). These deposits overlie crystalline bedrock and are highly variable throughout the formation, ranging from small to massive, heterogeneous lenses to interbedded layers. The thickness of the unit varies from thin layers in places along the fall line to several thousand feet off the eastern shore (Mixon et al. 2000), with an average thickness of 500 feet (Obermeier 1984). Particularly large outcrops of sand occur in the area of the Konterra sand and gravel pits eastward to BARC (Darton 1939, Johnston 1964). Tertiary gravels of Miocene and Pliocene ages cap the highest elevations of the fall line and coastal plain. Quaternary sand and gravel deposits and alluvium outcrop at lower elevations along streams and incised lowland valleys.

METHODS

Because of time constraints and the large size of the study area, we mainly confined our surveys to unexplored areas and communities in need of documentation. We selected sites based on a number of criteria, including the presence of old-growth characteristics, a pattern of reoccurrence across the landscape, a lack of alteration by artificial disturbances, a lack of invasive exotic species, and the presence and quality of populations of species of conservation concern (NatureServe 2005). We did not document exotic flora, except to note cases where such species threaten a site or if a species was unreported for the region. In addition, previous floristic studies in the upper Anacostia watershed and topographic and geologic maps of the area were examined to help determine priorities for surveys. Aerial photos provided by the Maryland Wildlife and Heritage Program were also examined.

Field work began in early August of 2005 and continued through November of 2005. Field reconnaissance and surveys were extensive and were mostly conducted by walking. Particularly large areas, and especially disturbed or weedy sites, were viewed by automobile from road edges to determine if an area warranted further investigation. Extensive field notes on the distribution, rarity, and habitat of plant species were compiled by the second author. Occasionally, plant specimens of notable or difficult to identify taxa were collected, pressed, and deposited at the United States National Herbarium - D.C. and Vicinity Collection (US), the National Arboretum Herbarium (NA), and the City of Alexandria herbarium (coa). Plant identifications were made using the floras of Brown and Brown (1972, 1984) and Fernald (1950). Specimens of *Dichanthelium* were determined and the identification of *Vaccinium* species were checked by John Townsend, botanist with the Virginia Division of Natural Heritage.

Quantitative compositional and environmental data using the rel ve method (Peet et al. 1998, Fleming et al. 2005) were collected from ten representative 400 m² forested plots and one 100 m² herbaceous vegetation plot. In general, the classification process compares field data from a group of sites to determine similarities and differences. Collecting field data involves the marking of a plot on the ground and documenting all the species within the plot, as well as measuring how much area of the plot each species covers. Environmental data are also collected, such as soil conditions, flooding regime, etc. Plot data will be included in a regional analysis of natural community types as part of the U.S. National Vegetation Classification (NVC). To further broaden our classification data, community descriptions were recorded by the second author at 12 observation points.

RESULTS AND DISCUSSION

Floristic summary

A total of 443 vascular plants (including infraspecific taxa and hybrids) representing 249 genera in 94 families were documented in the study area. This does not include all previously documented species, including rare and disjunct taxa.

The majority of taxa are typical of the coastal plain, with many at or near their western limits in Maryland. Taxa that are strongly disjunct from a primary range in the outer coastal plain include *Andropogon glomeratus, Andropogon ternarius, Carya pallida, Croton willdenowii, Dichanthelium leucothrix, Eleocharis tortilis, Euphorbia ipecacuanhae, Euphorbia marilandica, Juncus longii, Linum intercursum, Myrica pensylvanica, Pityopsis graminifolia, Platanthera blephariglottis, Polygala lutea, Rubus cuneifolius, Saccharum gigantea, Scleria muehlenbergii,* and *Vaccinium formosum.*

Thirty-six taxa are additions to the BARC Flora (Terrell et al. 2000), including *Angelica venenosa, Aristolochia serpentaria, Asclepias amplexicaulis, Baccharis halimifolia, Betula populifolia, Carex bullata, Carya pallida, Celtis tenuifolia, Ceratophyllum demersum, Clitoria mariana, Desmodium marilandicum, Dichanthelium columbianum, Dichanthelium leucothrix, Dichanthelium sphaerocarpon* var. *sphaerocarpon, Diodia virginiana, Euphorbia marilandica, Glyceria canadensis, Gratiola virginiana, Juncus debilis, Linum intercursum, Lysimachia terrestris, Mimulus ringens, Murdannia keisak, Pinus strobus, Pityopsis graminifolia, Platanthera blephariglottis, Polygala sanguinea, Poncirus trifoliata, Proserpinaca palustris, Quercus prinoides, Smilax pseudochina, Solidago bicolor, Solidago uliginosa, Stylosanthes biflora, Vaccinium caesariense,* and *Vaccinium formosum*.

Some treatments include *Dichanthelium columbianum* under *D. sabulorum*; *D. leucothrix* under *D. acuminatum*; *Euphorbia marilandica* under *E. corollata*; and *Vaccinium caesariense* and *V. formosum* under *V. corymbosum.*

Rare taxa

Twenty-two of the documented species are listed as uncommon to highly rare in Maryland, including some with endangered or threatened status (DNR 2003). The 22 species are listed below, with brief descriptions of their habitats, rarity, and the sub-watershed in which they occur.

Aster radula (rough-leaved aster) is primarily a northeastern species that reaches its southern range sparingly in Fall Line Magnolia Bogs of the Washington, D.C. region and mountains of Virginia and West Virginia (Fernald 1950, Strong et al., in prep.). It is state endangered in Maryland, occurring in the Indian Creek watershed at the Ammendale and Konterra Bogs and historically at the Powder Mill Bogs in the Paint Branch watershed.

Juncus longii (Long's rush) is a state endangered and globally uncommon species apparently restricted to sandy or clayey, sphagnous swales and bogs of the coastal plain (Strong et al., in prep.). It occurs in the Little Paint Branch watershed at Little Paint Branch Bog #1 and abundantly in a sandy seepage swale near Sellman Road and Interstate 95 A small population also occurs at the edge of Powder Mill Bog #3 on the grounds of the White Oak U.S. Army Research Lab in the Paint Branch watershed.

Linum intercursum (sandplain flax), a state threatened species, occurs on dry to moist, open ground from the coastal plain of New England and the mid-Atlantic to the piedmont and mountains of the southeast, and disjunctly in northern Indiana (Weakley 2006). It was discovered at the edge of a small, sphagnous swale in thin pine woodland at the eastern end of the abandoned east-west runway of the old Beltsville Airport at BARC. The pine woodland is characterized by acidic, often exposed clay soils and is part of the Beaverdam Creek watershed.

Platanthera blephariglottis (white-fringed orchid) is a state threatened species associated with sphagnous swales and bogs of the coastal plain. It was once well-distributed in bogs along the fall line in the Washington, D.C. area in the late 1800s and early 1900s, but most of those bogs and surrounding lands have long since been destroyed (Strong et al., in prep.). Today, it is highly rare on Maryland's western shore, with most of the remaining populations occurring in the Annapolis region (Sipple 1999). A

thriving population was discovered in a pristine, sphagnous seep in *Pinus rigida* dominated forest on the Central Farm at BARC. This area is part of the Beaverdam Creek watershed.

Sarracenia purpurea L. (purple pitcher plant), a state threatened species of the northeastern U.S. that reaches its southern limits in Maryland and northeastern Virginia (Weakley 2006), occurs in Powerline Bog 1 at BARC in the Beaverdam Creek watershed. Terrell et al. (2000) report this species as "possibly introduced" at BARC. While this is plausible, it is worth noting that the BARC bogs are somewhat similar geologically and floristically to bogs in Anne Arundel County with naturally-occurring *Sarracenia purpurea*.

Smilax pseudochina (halberd-leaved greenbrier) is a state threatened species associated with sandy bogs and seeps of the coastal plain and Fall Line Magnolia Bogs in the Washington, D.C. area (Fernald 1950, Strong et al., in prep.). It was newly discovered at the Buck Lodge Bog just below the Buck Lodge Community Park in the Paint Branch watershed. It was also discovered in a large, wooded seep near Powerline Bog 2 at BARC in the Beaverdam Creek watershed.

Stenanthium gramineum var. *robustum* (giant featherbells), a state threatened species, is associated with open and wooded seeps from the mid-Atlantic coastal plain west to Indiana and south to western North Carolina (Fernald 1950, Weakley 2006) It occurs in a large woodland seep at the upper headwaters of the Paint Branch near Spencerville.

Platanthera flava var. *herbiola* (pale green orchid) is a state rare species that inhabits bogs and seeps from the northeastern U.S. south to the mountains and piedmont of North Carolina (Weakley 2006). Many plants were seen in swampy sections of the extensive wooded seepage swale that includes the Airport Bog at BARC. These wetlands are part of the Beaverdam Creek watershed.

Scleria muehlenbergii [*Scleria reticularis* var. *pubescens*] (pitted nutrush) is a state rare species that occurs primarily in open sandy seeps and damp swales of the coastal plain from southern New England south to Florida and west to Texas, and occasionally in the interior to Missouri (Weakley 2006). It occurs abundantly in a sandy seepage swale near Sellman Road and Interstate 95 in the Little Paint Branch watershed.

Bartonia paniculata (screwstem) is an uncommon to rare species associated with bogs and acidic woodland seeps. It occurs mainly on the coastal plain from New England south to Florida and west to east Texas (Weakley 2006). Numerous plants were seen along the extensive wooded seepage swale that includes the Airport Bog at BARC. These wetlands are part of the Beaverdam Creek watershed.

Betula populifolia (gray birch) is rarely known in Maryland, and is disjunct from its primary range in New England and southern Quebec and Ontario where it occurs in acidic, dry to moist soil in open areas, woodland edges, and bogs (Fernald 1950). It is reported for Maryland (Brown and Brown 1972), but its status in the state is unknown. It occurs infrequently in moist, sandy soil under the powerline along the edge of the Coniferous Research Forest on the East Farm at BARC in the Beaverdam Creek watershed.

Carex bullata (button sedge) is an uncommon to rare species associated with seeps, bogs, and other non-alluvial wetlands primarily of the coastal plain (Fernald 1950, Frye and Lea 2001). Several fairly large colonies occur in the vicinity of the Airport Bog on the East Farm at BARC in the Beaverdam Creek watershed. A colony also occurs at the Aitcheson Bog in the Indian Creek watershed and at Little Paint Branch Bog #1 in the Little Paint Branch watershed.

Castanea dentata (American chestnut) was once widespread in upland forests of eastern North America, but its populations have severely declined as a result of the introduced chestnut blight in the early 20th

Century. Today, it barely exists throughout its former range, much reduced in size and numbers. Saplings and old trunk resprouts were observed in acidic, upland forests in all five sub-watersheds of the upper Anacostia River. This species is uncommon to rare in Maryland, with fruiting trees being exceptionally rare.

Dichanthelium leucothrix (white-haired panic grass) is an uncommon to rare species that is characteristic of dry to moist sandy areas and pine barrens of the coastal plain from southern New Jersey south to Florida and west to Texas (Fernald 1950). It was collected in sandy soil on the East Farm at BARC

Eleocharis tortilis (twisted spikerush) is an uncommon to rare species that inhabits seeps and bogs of the coastal plain from New Jersey south to Florida and west to Texas, with infrequent occurrences inland (Weakley 2006). Large colonies occur at Little Paint Branch Bog #1 in the Little Paint Branch watershed.

Juglans cinerea (butternut), a state and globally uncommon to rare species as a result of an introduced fungal disease, occurs in rich floodplain forest near the Bonifant Road crossing of Northwest Branch in Northwest Branch Park. This species ranges in distribution from the northeastern states south to the southern Appalachians (Fernald 1950).

Kalmia angustifolia (sheep laurel) is primarily a northeastern species of dry, acidic barrens and bogs that also occurs less frequently in bogs and sandy barrens of the mid-Atlantic coastal plain and rarely in the southern Appalachians (Fernald 1950, Weakley 2006). Several plants were observed in moist, sandy soil near Powerline Bog 2 on the East Farm at BARC in the Beaverdam Creek watershed. This species is uncommon to rare in Maryland.

Lycopodium tristachyum (deep-root ground pine), an uncommon to rare species of dry, sandy-gravelly soils from Quebec and New England south to North Carolina (Fernald 1950), occurs in acidic, sandy-gravelly soil at the edge of oak-heath forest above the Sandy Spring Bog (McKnew Bog) in the Little Paint Branch watershed.

Magnolia tripetala (umbrella magnolia) is an uncommon to rare species with a primary range in the southern Appalachians and disjunctly in the Ozarks and piedmont and coastal plain of Virginia and Maryland north to southern Pennsylvania (Fernald 1950, Weakley 2006). It occurs in an old-growth upland forest remnant (Longmeade) in the Northwest Branch watershed west of Notley Road.

Quercus prinoides (dwarf chinquapin oak) occurs in a variety of habitats from rocky uplands to sand barrens to open grasslands, and ranges in distribution from New England west to Minnesota and Nebraska south to Texas and infrequently in the Appalachians, piedmont, and coastal plain of the Carolinas, Virginia, and Maryland (Fernald 1950, Harvill et al. 1992, Weakley 2006). It is a common species of the New Jersey Pine Barrens (McAtee 1918). Many specimens of varying sizes, including an ancient tree at nearly a meter in circumference at breast height (surely the state champion), occur in *Pinus rigida* dominated forest on the Central and East Farms at BARC in the Beaverdam Creek watershed. It is probable that exceptionally large trees like this that exceed maximum known sizes for the species are natural hybrids. This species is uncommon to rare in Maryland.

Solidago patula (roughleaf goldenrod) is an uncommon to rare species with seemingly weak characters supporting a taxonomic division between northern and southern varieties. However, throughout its range (considering both northern and southern varieties) from New England west to Wisconsin and south to Florida, it occurs in swamps, seeps, bogs, wet meadows and woods, and along streams (Fernald 1950, Brown and Brown 1984, Johnson 1995, Weakley 2006). Several very large plants occur at the edge of low, mesic woodland along Indian Creek near the Ammendale Bog.

Solidago uliginosa (bog goldenrod) occurs in bogs, seeps, and acidic swamps from New England west to southern Michigan and Wisconsin and south to North Carolina (Fernald 1950, Weakley 2006). It was newly discovered at BARC in a seepage forest community near Springfield Road on the Central Farm. This species is uncommon to rare in Maryland.

Natural communities and habitats

Descriptions of 18 natural communities and 2 habitat types documented in this study are listed below, including some which appear to represent new community types not yet described in the NVC. Several of the 11 surveyed communities at BARC, especially those dominated by *Pinus rigida*, overlap somewhat floristically and may ultimately be classified as variants of fewer types. For example, all of the upland and lowland *Pinus rigida* communities at BARC are tentatively named Pine Barrens Pine - Oak Woodland and Pine Barrens Lowland Forest, respectively. Community type names follow, in part, Fleming et al. (2005), Lea (2004), and the NVC.

Dry to Dry-Mesic *Pinus rigida* Forests and Woodlands

Pinus rigida is the dominant and characteristic tree of the New Jersey Pine Barrens, where it occurs on sandy soils (Harshberger 1916, McAtee 1918). *Pinus rigida* as a dominant community component is highly rare in the greater Washington, D.C. area, more or less reaching its southern coastal extension in the eastern U.S. on the vast, deep Cretaceous sand deposits that extend from BARC eastward through the Odenton area to the Magothy River region between Annapolis and Baltimore. It is locally abundant in a variety of habitats throughout this region, from xeric to hydric, likely owing its presence and distribution more to the deep, sandy soils than the role of fire as a major developing factor. Innumerable old-age trees occur throughout, suggesting that these communities have persisted for millenia. The role of fire as a major factor in creating or maintaining *Pinus rigida* communities in the region is not well-understood and should not be assumed. Fire is apparently a component of some types of pine forest in the New Jersey Pine Barrens, although Harshberger (1916) noted that fire was mainly associated with young, scrubby pine forests and that, conversely, fire had damaged or destroyed old-age pine forests. The presence of old-age *Pinus rigida* in apparent equilibrium with other canopy trees, evidence of *Pinus rigida* seedling recruitment, and almost complete lack of evidence of fire or detrimental effects resulting from its suppression suggest that fire is probably a minor component of *Pinus rigida* communities in the Washington, D.C. area. All of the *Pinus rigida* communities in the region are likely allied with similar types in the New Jersey Pine Barrens.

McAtee (1918) asked the question, “why we have no pine barrens in our region, nor indeed anywhere in the Maryland coastal plain…given that seven-tenths of the distinctive pine barrens plants…occur in eastern Maryland and Delaware?” Curiously, neither Shreve (1910) nor McAtee (1918) noted large stands of *Pinus rigida* within Maryland’s coastal plain, despite visiting Odenton and other sandy areas dominated by pine. Nevertheless, since most survey sites were accessed by electric trolley line and railroad in that era, with stations east of Washington being remote, it is understandable that many areas were inaccessible. Moreover, Hitchcock and Standley (1919) noted that areas to the east of Lanham were “virtually unexplored.”

The following types have yet to be officially classified in Maryland. The names (nominals) for these types are suggestive based on floristic dominance within the stand/community or diagnostic importance, and are provisional at this time. All of these upland communities are tentatively named Pine Barrens Pine – Oak Woodland. This new NVC community type is most closely related to vegetation known previously only from the New Jersey Pine Barrens and is globally rare, with fewer than 20 sites known to support it (NatureServe 2005).

Pine Barrens Pine – Oak Woodland
Pinus rigida - Quercus coccinea / Castanea pumila / Gaylussacia baccata - Vaccinium pallidum Forest

Classification plots: 0; 2 observation points (#1 and #8)

An extensive pine barrens community type that occurs on fairly flat to gently rolling uplands, primarily on the Central and East Farms at BARC. Soils are submesic to xeric, deep, well-drained, acidic and generally infertile sandy loams and sandy clay-loams. This type is perhaps best developed in the Washington, D.C. area at BARC and the Patuxent Wildlife Refuge.

Forest stands are characterized by a widely-spaced, closed to somewhat open canopy of *Pinus rigida* and *Quercus coccinea*, a sparse understory, and an extremely dense, nearly continuous short shrub and herb layer of *Gaylussacia baccata* and *Vaccinium pallidum*. Herbs are almost entirely lacking, except for small traces of *Chimaphila maculata* and *Cypripedium acaule*.

Pinus rigida and *Quercus coccinea* are the predominant (sometimes exclusive) canopy species, with many of the pines being old-age. *Quercus alba* and *Pinus virginiana* also occur in the canopy at observation point #8 on the East Farm, but are not common. The dominant understory species at point #1 on the Central Farm are *Quercus velutina, Quercus alba, Quercus marilandica, Quercus falcata, Sassafras albidum*, and *Nyssa sylvatica*. The understory at point #8 is predominately composed of *Nyssa sylvatica*, and also includes *Quercus falcata, Quercus coccinea, Quercus alba, Pinus virginiana, Sassafras albidum*, and *Acer rubrum*. (Point #8 may be slightly more mesic than point #1, as evidenced by the dominance of *Nyssa sylvatica* in the understory and the presence of *Acer rubrum*) *Castanea pumila* is the characteristic tall shrub, with *Kalmia latifolia* also present at point #8. *Gaylussacia baccata* is by far the dominant shrub throughout the short shrub and herb layer, with *Vacinium pallidum* occurring to a lesser extent. *Vaccinium stamineum*, *Lyonia mariana*, and *Smilax glauca* also occur in the short shrub and herb layer. Herbs of this community are generally very sparse, with *Chimaphila maculata* and *Cypripedium acaule* as the characteristic species.

The best expressions of this type are now rare within the Anacostia watershed, perhaps being more common in the past. The large size and mostly undisturbed condition of these sites, overall rarity, and presence of numerous, old-age *Pinus rigida* make them very high conservation priorities.

Old fire scars were seen at the base of oak trees at point #1, but evidence of fire was not seen at point #8 or in other areas. The lack of fire may pose a long-term threat. However, the very rare presence of *Fagus grandifolia*, a fire intolerant species, was the only indication of this. Although invasive exotic species are essentially absent from these sites, soil disturbance through the construction of roads and trails, including foot traffic, provides corridors for the spread of noxious weeds and opportunistic native species into the forest interior from the edges. Perhaps the largest threats to this community and surrounding forest are major U.S. government land development projects, such as the recently built Department of Defense facilities.

Pine Barrens Pine – Oak Woodland
Pinus rigida / Sassafras albidum - Quercus prinoides / Gaylussacia baccata - Vaccinium pallidum Forest

Classification plots: 2 (Upper Anacostia 2 and 6); 1 observation point (#11)

This rare community type occurs on gently rolling uplands within the pine-oak-heath forests on the Central and East Farms at BARC. The stands are characterized by somewhat open vegetation at all strata levels, locally abundant and gnarled *Sassafras albidum* and *Quercus prinoides* in the understory, and a

patchy short shrub and herb layer represented mainly by *Gaylussacia baccata* and *Vaccinium pallidum* Soils are submesic to xeric, acidic, deep, sandy-peaty loams, with a spongy, fairly thick covering of pine needles. These stands lack the continuous colonies of heaths in the shrub and herb layers that characterize the preceding type, are more floristically diverse, and are recognizable in the broader landscape by their open aspect and dominance of gnarled, fairly large *Sassafras albidum* in the understory. Stands are approximately one to several acres in size.

Pinus rigida, Quercus falcata, Quercus velutina, Quercus marilandica, Quercus alba, and *Pinus virginiana* are the typical canopy species. (The sampled stand - Upper Anacostia 6 - had the highest cover class (9) of *Pinus rigida* of any sampled plot within the upper Anacostia watershed.) The understory is represented by *Sassafras albidum, Quercus velutina, Quercus coccinea, Quercus falcata, Quercus alba,* and *Pinus virginiana*. The dominant species in the tall shrub layer are *Quercus prinoides, Sassafras albidum, Castanea pumila, Quercus marilandica,* and *Vaccinium fuscatum*. (*Quercus prinoides* is highly rare in the Washington, D.C. region.) Other species that occasionally occur in the tall shrub layer are *Quercus falcata, Quercus velutina, Quercus phellos, Ilex opaca, Liquidambar styraciflua, Acer rubrum,* and *Prunus serotina*. *Gaylussacia baccata* and *Vaccinium pallidum* are the dominant species of the short shrub and herb layers, and are often intermixed with low covers of *Vaccinium stamineum, Castanea pumila, Amelanchier* spp., *Smilax rotundifolia, Smilax glauca,* and *Mitchella repens*. *Gaylussacia frondosa, Amelanchier canadensis,* and *Lyonia mariana* were noted in the Upper Anacostia 6 plot, which was slightly more mesic than the others. The herbs are very sparse to lacking, with *Carex cf. nigromarginata, Cypripedium acaule,* and *Chimaphila maculata* as the most typical species. However, nearby these stands are open glades with exposed sandy soil and scattered patches of *Dichanthelium commutatum* var. *ashei, D. columbianum, D. depauperatum, D. leucothrix, Carex* spp., and other herbs.

This community type is highly rare within the Anacostia watershed, perhaps being more common in the past. The local abundance of *Quercus prinoides* (especially in association with *Pinus rigida*), mostly pristine condition, and overall rarity in the region make these sites very high conservation priorities.

Invasive exotic species are almost totally absent from these stands, although, not surprisingly, one stilt grass plant (*Microstegium vimineum*) was found growing along a deer trail through the Upper Anacostia 6 plot. Old, unpaved service roads that lead into the forest from the agricultural fields, including areas fairly close to the stands, are now infested with noxious weeds like *Microstegium vimineum, Polygonum cespitosum,* and *Perilla frutescens*. Potentially invasive native species that expand their range from more mesic sites into upland areas, such as *Liquidambar styraciflua* and *Liriodendron tulipifera,* also occurred as seedlings in the stands and may present a future threat. The lack of fire may also pose a long-term threat, although there was no indication of this. Perhaps the largest threats to this community and surrounding forest are major U.S. government land development projects.

Pine Barrens Pine – Oak Woodland
Pinus rigida - Pinus virginiana / Vaccinium fuscatum / Epigaea repens Forest

Classification plots: 0; 1 observation point (#4)

Relatively small stands occur on fairly flat to gently rolling uplands close to Powder Mill Road on the Central Farm at BARC. Similar stands may also occur along Beaver Dam Road on the East Farm. Soils are submesic to xeric, acidic, deep sandy loams, with a thick, spongy cover of pine needles. They are floristically less diverse than the other *Pinus rigida* communities, and are characterized by a closed canopy of *Pinus rigida* and *Pinus virginiana,* including old-age specimens, and very sparse vegetation in all other strata. Their composition and proximity to open disturbed areas and road edges may suggest an unusual successional pine community type, despite being old-age, that remains somewhat arrested in

development. Stands are approximately several acres in size.

The canopy is composed of large *Pinus rigida* and *Pinus virginiana*, some of which are old-age. *Liquidambar styraciflua* and *Nyssa sylvatica* are the common understory species, but are not dominant. *Vaccinium fuscatum* is the typical tall shrub. *Gaylussacia baccata, Vaccinium pallidum, Vaccinium stamineum, Lyonia mariana,* and *Smilax glauca* comprise the very open short shrub layer. The very sparse herb layer is composed of scattered *Cypripedium acaule, Mitchella repens,* and *Epigaea repens*. The presence of *Epigaea repens* in a *Pinus rigida* community is locally significant.

Also significant are the occurrences of *Pityopsis graminifolia, Euphorbia marilandica,* and historically *Lupinus perennis* that grow along the edges of these and similar communities.

Despite the possibility that these stands may be somewhat successional in nature, their overall rarity in the region, mostly pristine condition, and presence of old-age *Pinus rigida* and *Pinus virginiana* make them high conservation priorities.

Invasive exotic species are largely absent from the stands. However, a very small trace of *Microstegium vimineum* was noted at observation point #4. An old, unpaved service road that leads through the forest near the stands is heavily infested with *Microstegium* and other weeds, which are slowly spreading into the forest. Perhaps the largest threats to this community and surrounding forest are major U.S. government land development projects.

Pine Barrens Pine – Oak Woodland
Pinus rigida - Quercus falcata - Quercus (alba, coccinea, velutina) / Gaylussacia frondosa Forest

Classification plots: 2 (BARC 1 and 3; 1 observation point (#6). BARC 1 was sampled in 2004 as part of the 2004-2007 National Park Service-NatureServe National Capital Region (NCR) vegetation classification project.

This fairly extensive type occurs on generally flat uplands on the East Farm at BARC along the powerline between Beaver Dam Road and Springfield Road (Deciduous Research Forest) and just east of Soil Conservation Road and north of Beck Lake (Coniferous Research Forest). Soils are submesic to somewhat xeric, weathered, acidic, sandy loams and sandy clay-loams that are often underlain by densely compacted hardpans of sandy-silty clay-loam that retain moisture seasonally. Stands are characterized by a mixture of mature pines and oaks in the mostly closed canopy, a generally closed understory dominated by *Nyssa sylvatica* and *Acer rubrum*, and a dense, nearly continuous short shrub and herb layer dominated by *Gaylussacia frondosa*. (Occasional old-age pines are scattered throughout.)

Pinus rigida is the predominant canopy species, with *Quercus falcata* a characteristic co-dominant and occasional dominant. Other typical canopy species include *Quercus alba, Quercus velutina, Quercus coccinea,* and *Pinus virginiana* The dominant understory species is *Nyssa sylvatica*. *Acer rubrum, Quercus coccinea, Quercus velutina,* and *Sassafras albidum* also occur in the understory. Characteristic species of the tall shrub layer are *Nyssa sylvatica, Sassafras albidum, Acer rubrum, Vaccinium fuscatum, Vaccinium corymbosum, Amelanchier arborea, Ilex opaca,* and *Smilax rotundifolia.* Low covers of *Kalmia latifolia* and *Leucothoe racemosa* are present in the BARC 3 stand. *Gaylussacia frondosa* is the dominant medium to tall shrub in the BARC 1 stand, with *Castanea pumila* as co-dominant. The short shrub and herb layers of this type are predominately comprised of *Gaylussacia frondosa,* along with much smaller covers of *Vaccinium pallidum, Vaccinium stamineum, Lyonia ligustrina, Lyonia mariana, Smilax glauca, Epigaea repens, Gaultheria procumbens,* and *Lycopodium obscurum Epigaea repens* and *Galutheria procumbens,* in association with *Pinus rigida* communities, are highly rare in the Washington, D.C. area. The state-rare *Chimaphila umbellata* is reported for the Deciduous Research Forest (Terrell et

al. 2000) and potentially occurs within this community. Herbs are very sparse to lacking, with *Monotropa uniflora* and *Cypripedium acaule* as the typical species. (*Medeola virginiana* is a very minor component of the BARC 3 stand.)

The fairly large extent and pristine condition of these sites, overall rarity in the region, and presence of mature, as well as old-age, *Pinus rigida* make them very high conservation priorities.

Invasive exotic species are essentially absent from the stands and surrounding forest. However, small amounts occur along the roads, trails, and powerline near the stands. (A large infestation of woody invasive exotic plants and *Microstegium vimineum* occurs near Powerline Bog 1 in the Deciduous Research Forest.) Numerous pits several feet deep are scattered throughout the Coniferous Research Forest in and around the stands Construction of the pits, presumably for research, obviously affects the integrity of the forest. The lack of fire may also pose a long-term threat, although there was no indication of this. Perhaps the largest threats to this community and surrounding forest are major U.S. government land development projects.

Other Dry to Dry-Mesic Forests and Woodlands

Appalachian/Northern Piedmont Low-Elevation Chestnut Oak Forest
Quercus alba - Quercus montana - Pinus pungens / Kalmia latifolia - Viburnum acerifolium Forest (slope variant)

Classification plots: 1 (Upper Anacostia 1)

This relatively small section of forest covers an area approximately 5 acres in size, with the plot location being the best representation within the stand, and occurs on north-facing, sloping land along Northwest Branch. The soils are weathered, well-drained, shallow silty-loams intermixed with numerous saprolitic rock fragments. (Rock outcrops are not present within the stand.) This unusual variant combines montane elements (*Pinus pungens* and *Aralia nudicaulis*) with *Viburnum acerifolium*, a characteristic element of northeastern oak-hickory forests. This apparently globally secure upland community is highly threatened within the upper Anacostia watershed.

Quercus alba is the dominant canopy species, with *Quercus montana* and *Quercus coccinea* prominent. Old-age *Pinus pungens* is well-distributed, but produces a fairly small crown and canopy cover. (*Pinus pungens* is a rare species in the Washington, D.C. area, generally disjunct from its primary range in the Appalachians.) *Carya glabra* is also intermixed in the canopy as well as *Liriodendron tulipifera*, which occurs near the toe-slope at a fairly high cover. *Nyssa sylvatica*, *Castanea dentata*, *Acer rubrum*, *Fagus grandifolia*, *Ilex opaca*, *Cornus florida*, and *Sassafras albidum* are the dominant understory species. *Kalmia latifolia* and *Viburnum acerifolium* are the dominant shrubs, intermixed with *Viburnum recognitum*, *Amelanchier arborea*, and *Amelanchier laevis*. The short shrub and herb layer is somewhat sparse, with *Aralia nudicaulis*, *Vaccinium pallidum*, and *Lonicera sempervirens* as the dominant species. *Lonicera sempervirens* is rare in the region and typically occurs in rocky or gravelly oak forests along the fall line.

Threats to the stand include encroachment from opportunistic native species like *Fagus grandifolia* and *Liriodendron tulipifera*, which expand their range into upland forests and eventually shade out oak and pine seedlings and shrub colonies. (*Fagus grandifolia* does not appear to be a component of this community and has recently invaded the stand.) *Pinus pungens* appears to be dying out of the stand, likely the result of increasing shade. Invasive exotic plants found within the plot include *Celastrus orbiculatus*, *Malus* sp., *Prunus subhirtella*, and *Rubus phoenicolasius*. *Microstegium vimineum* and

Polygonum cespitosum, in addition to *Rubus phoenicolasius*, are scattered along the heavily-used footpath below the stand.

Appalachian/Northern Piedmont Low-Elevation Chestnut Oak Forest
Quercus spp. / Kalmia latifolia - mixed ericad - Hamamelis virginiana - Amelanchier arborea Shrubland/Woodland (slope variant)

Classification plots: 1 (Upper Anacostia 3)

This very small community covers an area approximately an acre in size on a moderate to steep, southwest-facing upper slope above Northwest Branch. The terrain abruptly becomes very steep where the slope intersects large outcrops of schist of the Laurel Formation. The soils are weathered, well-drained, shallow silty-loams intermixed with numerous saprolitic rock fragments of the underlying schist. (Rock outcrops are not numerous within the sampled plot.) Although this stand might technically be classified as a woodland, it may perhaps be more appropriately described as a shrubland, owing to the extreme density and high diversity of the shrub species and the relatively sparse canopy and stunted nature of the overstory species.

The canopy and understory are comprised of *Quercus coccinea*, *Quercus rubra*, *Quercus montana*, *Quercus alba*, and *Quercus velutina*, including a low cover of *Pinus virginiana* The shrub and herb layers form a continuous, extremely dense thicket with a high diversity of ericaceous (heath-family) species. *Kalmia latifolia* is the dominant shrub, followed by *Hamamelis virginiana* Other shrubs of prominent cover include *Gaylussacia baccata*, *Vaccinium pallidum*, *Vaccinium stamineum*, *Rhododendron periclymenoides*, *Gaultheria procumbens*, *Epigaea repens*, *Amelanchier arborea*, *Castanea dentata*, and *Castanea pumila*. *Aronia melanocarpa* occurs just outside the plot on a rock ledge, but is likely an associate of the community as well. Both *Aronia melanocarpa* and *Gaultheria procumbens* are fairly rare in the Washington, D.C. area. Herbaceous plants are generally lacking, although *Baptisia tinctoria*, *Solidago speciosa* var. *erecta*, *Hieracium paniculatum*, and various graminoids occur sparingly in openings and are characteristic of the community. Bryophytes comprise a fairly high cover.

This stand is nearly pristine, with almost no invasive exotic plants or evidence of disturbance, except an old, small trail. However, recent construction by M-NCPPC of a large, unpaved trail through the interior of the dry, upland oak-heath forest above the plot has given rise to an increasingly serious infestation of *Microstegium vimineum*, which is starting to seed into the plot.

Oak – Heath Forest
Quercus montana - Gaylussacia baccata - Vaccinium pallidum Forest (including variants)

Classification plots: 2 (Upper Anacostia 4 and 8)

This community type occurs on the upper slopes and summits of terraces and hills which form the highest elevations at BARC at greater than 200 feet in elevation. The stands are characterized by a nearly monospecific canopy of old-age *Quercus montana*, a sparse understory, extremely dense, nearly continuous colonies of *Gaylussacia baccata* and *Vaccinium pallidum*, and a very sparse herb layer and total species composition. The canopy varies from closed to somewhat open, depending on the exposure to wind and other growth-limiting factors. The soils vary considerably in composition, although they are all acidic to strongly acidic in pH. Soils of the sampled stand on the Central Farm (Upper Anacostia 4) are a deep, weathered sandy-loam, with minor amounts of very small quartzite gravel (<1cm) and no evidence of larger gravels or cobbles. This is the typical soil type for much of the BARC uplands. In

contrast, the soils from the sampled stand on the North Farm (Upper Anacostia 8) and the observed stand on the South Farm are typical of tertiary gravel terraces (Pliocene to Miocene age) that occur at the highest elevations along the fall line in the greater Washington, D.C. area. These soils are extremely weathered (leached), strongly acidic (average pH 4.0), sandy clay-loams that are light gray in color (Simmons 1995). Scattered, large quartzite cobbles (gravels) 20cm or greater in size typically "cap" the surface and are also interbedded in the soil with smaller gravels.

Forest overstories at these high, windswept locations consist almost exclusively of *Quercus montana*, with a minor cover of *Pinus virginiana* The North and South Farm stands are almost completely lacking in understory vegetation, except for *Quercus montana*. The Central Farm plot contains a slightly higher cover of understory trees, including *Sassafras albidum*, *Quercus coccinea*, and *Nyssa sylvatica*, in addition to *Quercus montana*, likely owing to the sub-mesic, sandy-loamy soils. *Quercus* spp., *Sassafras albidum*, *Nyssa sylvatica*, *Castanea pumila*, and *Diospyros virginiana* represent the tall shrubs of the Central Farm plot. *Kalmia latifolia*, *Rhododendron periclymenoides*, *Quercus* spp., and *Pinus virginiana* comprise the tall shrub layer of the North and South Farm stands. *Gaylussacia baccata* and *Vaccinium pallidum* are the dominant short shrubs throughout all stands, and are intermixed with *Vaccinium stamineum*, *Lyonia mariana*, and *Castanea pumila*. *Kalmia latifolia* is also prominent in the short shrub layer of the North and South Farm stands. Herbs are essentially absent, except for small traces of *Chimaphila maculata* and *Cypripedium acaule*

Invasive exotic plants were not observed at these sites.

Good examples of upland Oak - Heath Forest have become increasingly rare throughout the region as a result of urban sprawl. Most if not all are old-age communities, having been spared from farming in the past because the gravelly, acidic soils generally do not support agriculture. In addition to the stands at BARC, other notable examples occur at a few sites within the Konterra sand and gravel complex, Little Paint Branch Park, Powder Mill Community Park, Buck Lodge Community Park, and Greenbelt Park. All of these sites are high conservation priorities.

Palustrine Communities

Pinus rigida Associated Seepage Communities (Non-alluvial Wetlands)

Pinus rigida is the dominant or co-dominant canopy species in the following upland seepage communities, all of which occur on the Central and East Farms at BARC, except for the Fall Line Terrace Gravel Magnolia Bog type. (The description below does not entirely apply to this type, as it differs somewhat geologically and floristically from seepage communities and bogs at BARC.) Many of the pines are old-age and very large, some being the largest seen in the upper Anacostia watershed. These communities occur as hillside seeps or seepage swales within a larger mosaic of upland pine-oak-heath forest. Most of the characteristic species overlap to varying degrees, with a few notable exceptions. Many species are state-listed as uncommon to highly rare. Soils are moist to saturated, acidic, sandy-peaty loams and peaty sands, with minor amounts of small, pebbly gravels occasionally present and a spongy, thick covering of pine needles and duff. A thick layer of mucky peat is often typical of heavily saturated areas.

Occasional wildfires may have infrequently occurred in the surrounding pine-oak-heath forests and possibly into the wetlands, but the presence and abundance of *Pinus rigida* in seepage wetlands apparently does not suggest a history of fire, but rather the ability of the pines to function as wetland species. In contrast to other canopy trees that occur around and sometimes in seepage wetlands, only *Pinus rigida* and *Nyssa sylvatica* apparently survive the combination of saturated sand and gravel soils

and wind-shearing in the canopy. This is probably because both species do not produce a large crown when growing in wetlands. *Liriodendron tulipifera* typically reaches extreme size and old age at the edges of springs and seepages, and can occur as a canopy dominant in seepage forest communities that are not highly saturated, but does not grow to maturity or last very long as a canopy component in highly saturated areas. Periodic fire was probably one of many factors that contributed to regeneration of pine-dominated forests and seepage wetlands, but is likely a minor one historically in the greater Washington, D.C. area in comparison with ice storms, strong winter winds, thunderstorms, hurricanes, and occasional tornadoes. Moreover, the saturated sand and gravel soils and impermeable clays restrict the growth of trees with broad crowns.

All *Pinus rigida* seepage communities are considered globally rare by the Natural Heritage Program network. The presence of old-age *Pinus rigida* in association with highly rare or regionally important community types, the largely undisturbed condition of the stands, the presence of rare flora, and their value as wetlands make all of these sites very high conservation priorities.

Pine Barrens Lowland Forest
Pinus rigida - Nyssa sylvatica - Acer rubrum / mixed ericad / Osmunda cinnamomea - Platanthera blephariglottis Woodland

Classification plots: 0; 1 observation point (#2)

This exceptional seepage forest community on the Central Farm at BARC is approximately one to several acres in size and sits atop a gentle ravine slope formed by several braided springs. Old-age *Pinus rigida* comprise the fairly open forest canopy. The vegetation in all underlying strata is also somewhat sparse, giving the forest an overall open appearance. *Acer rubrum*, *Nyssa sylvatica*, and *Sassafras albidum* are the understory dominants. The shrub layers consist of *Vaccinium* spp., *Gaylussacia frondosa*, *Lyonia ligustrina*, *Leucothoe racemosa*, *Chionanthus virginicus*, *Rhododendron viscosum*, *Amelanchier canadensis*, *Rubus hispidus*, and *Smilax rotundifolia*, with no particular species dominant. Herbs are represented by *Osmunda cinnamomea*, *Woodwardia areolata*, *Platanthera blephariglottis*, *Carex* spp., and *Chasmanthium laxum*. Patches of *Sphagnum* moss are common in shallow depressions and on small hummocks. *Platanthera blephariglottis* is a state-threatened species that was known historically from several seepage bogs in the upper Anacostia watershed (McAtee 1918, Strong et al., in prep.), but has not been seen in nearly a hundred years, as most suitable habitats have been destroyed. It is also a new addition to the BARC Flora (Terrell et al. 2000).

Although several large *Platanthera blephariglottis* plants were observed in flower and some with seed capsules formed, deer browsing is potentially a serious threat to the future survival of this species at BARC. Browsing of woody plants like *Rhododendron viscosum* is a problem as well. Invasive exotic plants are absent from this community, although *Microstegium vimineum* has become a major problem in the stream valley below and it is well established along service roads leading into the upland forest. U.S. government wetland mitigation projects that replace high quality existing wetlands, such as seepage forests and bogs, with artificial ponds or wetlands are major potential threats.

Pine Barrens Lowland Forest
Pinus rigida - Liriodendron tulipifera - Acer rubrum / Ilex opaca / Osmunda cinnamomea - Carex folliculata Forest

Classification plots: 0; 1 observation point (#5)

This high quality seepage forest occurs on the Central Farm at BARC just off Springfield Road across from Capitol College. Much of the community is a long hillside seep with braided, sphagnous

depressions that descends to a perennial seepage stream. The tall height of the canopy trees and somewhat patchy understory and shrub layers gives the forest a rather open appearance, except for the forest floor which is carpeted with extensive colonies of tall *Osmunda cinnamomea*. Very large, old-age *Pinus rigida*, intermixed with *Liriodendron tulipifera*, dominate the mostly closed canopy. Other typical canopy species include *Acer rubrum, Quercus phellos*, and *Quercus alba*. The understory is mainly composed of *Acer rubrum*, with some *Liquidambar styraciflua* and *Nyssa sylvatica*. The most abundant tall shrub is *Ilex opaca*, which is intermixed with *Chionanthus virginicus, Ilex laevigata, Magnolia virginiana, Gaylussacia frondosa, Aronia* sp., *Vaccinium* spp., and *Rubus hispidus*. Extensive colonies of very large *Osmunda cinnamomea* and abundant *Carex folliculata* dominate the herb layer. *Osmunda regalis, Carex* spp., and other herbaceous plants are also present. A single specimen of *Solidago uliginosa* was observed in a sphagnous depression. *Solidago uliginosa* is a Maryland "Watch List" species and a new addition to the BARC Flora (Terrell et al. 2000). *Sphagnum* moss is also an important component of the community and grows in boggy seeps and shallow depressions throughout the site.

Invasive exotic plants are essentially absent from this community, although *Microstegium vimineum* and other weeds have become established along Springfield Road above the site and are potential future threats. Potential widening or straightening of Springfield Road or other construction in the vicinity would present a significant threat to the wetlands and surrounding forest. Improperly directed stormwater runoff from Capitol College or increased flow of channelized runoff into the small seepage stream below the site would also seriously threaten the future integrity of the site. In addition, U.S. government wetland mitigation projects that replace high quality existing wetlands with artificial ponds or wetlands are major potential threats.

Pine Barrens Lowland Forest
Liriodendron tulipifera - Pinus rigida - Nyssa sylvatica / Rubus hispidus / Osmunda cinnamomea - Carex folliculata Woodland

Classification plots: 0; 1 observation point (#3)

This ancient and unusual seepage wetland on the Central Farm at BARC is distinguished by a broad, bowl-like boggy depression and exceptionally old-age trees that surround the rim of the basin. The large, spring-formed depression that is perhaps five to six feet deep at the headwaters of the spring and extreme age of the surrounding trees suggest a landscape created over very long periods of time. A braided network of seepage streams flows through the depression downstream into the gently sloping valley. The soils throughout the wetlands are highly saturated, acidic, peaty-sands with small gravels. *Sphagnum* moss forms thick carpets along the sandy-gravelly seepage streams and numerous hummocks. Numerable large, fallen trees in different stages of decomposition lay across the depression, likely the result of high winds and saturated soils. It appears that the wetlands perpetually remain somewhat open. The entire site is approximately several acres in size.

As typically occurs, old-age *Liriodendron tulipifera* trees grow at the edge of the spring in moist, sandy-loamy soil and are the dominant canopy species at the upper edge of the depression at this site. One ancient *Liriodendron* measured nearly 20' CBH, and was the largest seen during this study. An equally ancient *Pinus rigida* tree, a state champion-sized specimen at approximately 12' CBH, was also rooted at the edge of the depression but unfortunately had fallen over in recent years.

A diverse assemblage of plants, many characteristic of bogs, occurs throughout the depression and along the braided seepage streams. Old and widely-spaced *Nyssa sylvatica* and *Acer rubrum* dominate the open canopy in the depression. The somewhat open understory and shrub layers consist of a diverse assemblage of species, with none particularly dominant, and include *Nyssa sylvatica, Acer rubrum, Toxicodendron vernix, Chionanthus virginicus, Lindera benzoin, Viburnum nudum, Magnolia virginiana,*

Vaccinium spp., *Gaylussacia frondosa*, *Rhododendron viscosum, Rubus hispidus*, and others. Large colonies of *Osmunda cinnamomea* are intermixed with *Osmunda regalis*, *Woodwardia virginica*, *Carex folliculata* and other carices, *Viola primulifolia*, *Chelone glabra*, *Scirpus polyphyllus*, and many other herbs. In addition to *Sphagnum*, a diversity of mosses are also represented.

Invasive exotic plants are largely absent from this community, but *Microstegium vimineum* is starting to take root in certain portions of the wetlands and needs to be eradicated before it becomes established. Large *Microstegium* infestations and other invasives occur on disturbed ground to the northwest near government buildings. Improperly directed stormwater runoff from the adjacent buildings and other changes to the site's hydrology would also greatly threaten the future integrity of these wetlands. Additional construction or enlarging of buildings nearby would also present a serious threat to the site and stream valley. In addition, U.S. government wetland mitigation projects that replace high quality existing wetlands with artificial ponds or wetlands are major potential threats.

Pine Barrens Lowland Forest
Pinus rigida - Nyssa sylvatica - Acer rubrum / Ilex opaca - Magnolia virginiana / Clethra alnifolia Forest

Classification plots: 1 (BARC 2); 2 observation points (#7 and #10). BARC 2 was sampled in 2004 as part of the 2004-2007 National Park Service-NCR vegetation classification project.

A fairly extensive, high quality seepage forest type that occurs in gentle seepage swales on the East Farm at BARC - mainly in the section between Powder Mill Road and Beaver Dam Road that forms the easternmost headwaters of Beaverdam Creek. Soils are acidic and vary from damp, spongy, sandy-peaty loams to highly saturated areas of peaty muck intermixed with or covering sand. This type, though not common, is the most widespread seepage wetland at BARC and typically grades into the Acidic Seepage Swamp community of Fleming et al. (2005). It also occurs near or with a type of seepage bog that is represented at BARC, including the Airport Bog, Powerline Bogs 1 and 2, and small boggy openings or swales characterized by large colonies of *Carex bullata*.

Widely-spaced, old-age *Pinus rigida*, some of the largest in Maryland, comprise the mostly closed canopy. Large, old *Nyssa sylvatica* and *Acer rubrum* are also important canopy species in the BARC 2 stand, with minor amounts of *Quercus phellos*. (*Quercus alba* and *Quercus coccinea* overhang the stand from the surrounding drier forest.) Other important canopy components at observation point #10 include *Liriodendron tulipifera*, *Quercus phellos*, and *Pinus virginiana*. The understory is somewhat open and typically includes *Nyssa sylvatica*, *Acer rubrum*, *Ilex opaca*, and *Magnolia virginiana*. *Quercus falcata* is also dominant in the understory at point #10. The shrub layers are patchy to tangled and dense, with *Ilex opaca* as the dominant tall shrub. Other characteristic shrub layer species are *Clethra alnifolia*, which is often co-dominant, *Magnolia virginiana, Rhododendron viscosum*, *Smilax rotundifolia, Vaccinium* spp., *Leucothoe racemosa*, *Gaylussacia frondosa*, and *Amelanchier canadensis* The herb layer is sparse at point #7 and is represented by patches of *Osmunda cinnamomea* and *Lycopodium obscurum* Herbs are mostly lacking at point #10. In contrast, the herb layer in the BARC 2 stand is diverse and fairly thick in cover, likely owing to the wetter soils, with *Woodwardia areolata, Woodwardia virginica, Osmunda cinnamomea, Carex folliculata, Carex atlantica* ssp. *capillacea*, *Carex seorsa*, *Chasmanthium laxum, Mitchella repens*, *Rubus hispidus*, *Dichanthelium dichotomum*, and *Viola primulifolia* as the typical species. *Maianthemum canadense* grows in damp, sandy-peaty soil on hummocks in the plot, and with *Gaultheria procumbens* in nearby stands.

Invasive exotic plants are mostly absent from the stands, although a minor amount of *Polygonum cespitosum* was found at the BARC 2 plot and large patches of *Microstegium vimineum* grow in the swamp adjacent to observation point #7. Innumerable seedlings of *Liquidambar styraciflua* are invading

the BARC 2 plot and surrounding swale, probably resulting from soil disturbance by deer. In addition, deer overbrowsing at the BARC 2 stand has decimated the *Clethra alnifolia, Rhododendron viscosum, Leucothoe racemosa*, and *Ilex verticillata* colonies to the height of short seedlings. Potential hydrologic changes, such as ditching or channelizing water into the swales, would also present a serious threat to this community. Major upstream damming by beavers of one of the Beaverdam Creek tributaries that flowed from the Airport Bog resulted in extensive backflooding into seepage forests and the loss of several old-age *Pinus rigida* trees. The original stream flow has been restored, apparently by natural processes, but possible eradication of beaver downstream from more appropriate habitats may have caused the situation. Perhaps the greatest potential threats to these communities are U.S. government wetland mitigation projects that replace high quality existing wetlands with artificial ponds or wetlands. A large, artificial wetlands was constructed several years ago between the Airport Bog and Springfield Road in the Wetland Research Forest.

Small sections of similar forest were discovered at Greenbelt Park, bordering the west side of the Baltimore-Washington Parkway in the Indian Creek watershed.

Pine Barrens Lowland Forest
Acer rubrum - Nyssa sylvatica - (Pinus rigida) / Magnolia virginiana / Clethra alnifolia - mixed ericad Woodland (includes the Airport Bog, Beltsville Airport Bog)

Classification plots 0, 1 observation point (#12)

This exceptional community of approximately 30 acres consists of a large, linear seepage swamp that extends from near the entrance of the Animal and Plant Health Inspection Service compound off Powder Mill Road to near the entrance of the old Beltsville Airport off Springfield Road. Numerous converging seepages and abundant groundwater flow give rise to highly saturated, mucky soils within the swamp and a topography of braided channels, hummocks, and depressions with standing water. Old-age *Pinus rigida* grow in the damp, acidic, sandy-peaty soils of the surrounding seepage forest and overhang the swamp.

The vegetation of the swamp predominately consists of a dense tangle of understory trees and tall shrubs, with scattered open glades dominated by graminoids and other herbs. Typical woody species include *Acer rubrum, Nyssa sylvatica, Magnolia virginiana, Clethra alnifolia, Alnus serrulata, Vaccinium* spp., *Rhododendron viscosum, Amelanchier canadensis*, and *Toxicodendron vernix*. All of which, except *Acer rubrum* and *Nyssa sylvatica*, reach great size here. Occasionally, mature and old-age *Pinus rigida* grow within the swamp complex at the upper headwaters near Powder Mill Road. The herb layer is diverse and fairly thick in cover, especially in the less-saturated headwaters region, and is largely represented by *Osmunda cinnamomea, Osmunda regalis, Woodwardia areolata, Carex folliculata, Leersia virginica, Glyceria striata, Juncus debilis, Chasmanthium laxum*, and *Lycopus virginicus*, as well as others. *Bartonia paniculata* is locally abundant, especially in the upper headwaters region. *Platanthera flava* var. *herbiola* also occurs in this area. *Gratiola virginiana* is common in highly saturated places. *Sphagnum* moss carpets the numerous hummocks and depressions throughout the swamp.

The historic Airport Bog or Beltsville Airport Bog was likely located along the southern reaches of the swamp, near the confluence with a large seepage swale. It was more open and less swampy in the past, and more resembled a bog (Chris Ludwig, Virginia Division of Natural Heritage, pers. comm., Terrell et al. 2000). The site once harbored rare relicts of flora typical of the outer Coastal Plain, such as *Myrica pensylvanica, Polygala lutea*, and others, that were characteristic long ago of many of the bogs in and around Washington, D.C. (Strong et al., in prep.). Today, remnants of this site remain at the edge of the seepage swamp, although the rarest flora seems to have disappeared or is suppressed in the seed bank. Backflooding of this area by beaver dams along the outflow of the seepage swamp (an upper Beaverdam Creek tributary) has turned much of the bog site into Acidic Seepage Swamp. However, since the dams

no longer exist and the normal outflow is restored, the site is now more open and a diversity of herbaceous bog vegetation is becoming re-established. The large area just below the bog where the beaver ponds were has also been transformed, from open, standing water to wet meadows dominated by *Leersia oryzoides* and other graminoids and shallow ponds of *Utricularia gibba* This may be a natural process of regenerating wetlands, including bogs, along larger seepage streams.

Invasive exotic plants are largely absent from the seepage swamp complex although *Microstegium vimineum* and *Polygonum perfoliatum* are becoming established along open areas near the outflow, likely the result of disturbance from deer and the proximity to disturbed, open areas along the east-west runway of the old airport. Overbrowsing by deer may also be a problem. Perhaps the greatest potential threats to this community are U.S. government wetland mitigation projects that replace high quality existing wetlands with artificial ponds or wetlands.

Fall Line Terrace Gravel Magnolia Bog
Nyssa sylvatica - (Pinus rigida) / Magnolia virginiana / Rhododendron viscosum - Gaylussacia frondosa / Smilax pseudochina Woodland

Classification plots: 0 during this survey, but Simmons et al. in 2002 sampled the 6 known remaining bogs of this type that occur in the upper Anacostia watershed. In 2005, a small, high quality example at Greenbelt Park, identified by Chris Lea of the National Park Service in 2003, was also sampled as part of the 2004-2007 National Park Service-NCR vegetation classification project.

This community is a globally rare type of seepage wetland that was once much more widespread in saturated, sandy-gravelly soils of the exposed Potomac Formation along the Fall Line in the Washington, D.C. area (McAtee 1918, Strong et al., in prep.). This type does not occur at BARC, but is associated with *Pinus rigida* The BARC bogs, despite some similarities, differ geologically and floristically from the Fall Line Magnolia Bogs, and occur in the upper Beaverdam Creek drainage. In addition to sampling the 6 Fall Line Magnolia Bogs in 2002 and one at Greenbelt Park in 2005, Powerline Bog 2 at BARC was also sampled. Because these sites were previously documented, they are not included in this study, except as conservation priorities. (See mdflora.org for descriptions and flora of Fall Line Magnolia Bogs and Terrell et al. (2000) for floristic content of the BARC bogs.)

Seven known remaining Fall Line Magnolia Bogs and 5 small variants (somewhat disturbed areas with rare or important bog flora that may be remnants of bogs) occur in the upper Anacostia watershed in the Paint Branch, Little Paint Branch, and Indian Creek drainages:

Paint Branch: Powder Mill Bog #3; Powder Mill Bog #1 remnant (variant); Buck Lodge Bog (variant)

Little Paint Branch: Sandy Spring Bog (McKnew Bog); Gunpowder Bog (variant); Little Paint Branch Bog #1; Little Paint Branch Bog #2 (variant)

Indian Creek: Aitcheson Bog; Konterra Bog #1; Konterra Bog #2 (variant); Ammendale Bog; Greenbelt Bog

Many of these sites are remarkably pristine, especially in areas removed from powerlines and utility easements, and the ones in the upper Anacostia watershed generally represent the best remaining examples of the type throughout its global range. However, the future survival of these sites is uncertain at best, with many factors indicating a bleak outcome unless preventive measures are adopted. The sites are small, typically 1 to 5 acres and sometimes less than an acre. To date, apparently only 2 bogs have been officially preserved within parks: the wooded section of Little Paint Branch Bog #1 at Little Paint Branch Park (M-NCPPC) and Greenbelt Bog at Greenbelt Park (NPS). (The recently discovered bog

variant that is likely a remnant of McAtee's Powder Mill Bog #1 is located in fairly pristine woods at the western end of Sellman Road in what is apparently a part of Powder Mill Community Park (M-NCPPC). In addition, the first two authors met with Bob Wardwell, natural resources manager of the Army Research Lab, and Katharine McCarthy of the Maryland Wildlife and Heritage Program to delineate the boundaries of Powder Mill Bog #3 and discuss restoration efforts. Unfortunately, the rest of the bogs currently remain unprotected.

Alteration of the steady supply of groundwater seepage to the bogs, either by interrupting the flow by building too closely or densely or by directing channelized stormwater runoff into the bogs, is second only to habitat destruction as the principal reason for their demise. The placement of sewer easements below several of the bogs decades ago, although somewhat stabilized by this time, has also damaged sites and presents a future threat if work ever needs to be done along the lines.

PEPCO powerline maintenance, despite concerns by DNR, MNPS, and others, continues to be exceedingly destructive to several bogs or bog sections that occur under powerline easements.

Many sites are largely free of invasive exotic species, especially those in wooded settings away from trails and utility easements. However, invasives are becoming a serious problem at a number of sites. *Miscanthus sinensis*, an overplanted noxious weed with a preference for moist soils, is slowly becoming established under the powerline at the Sandy Spring Bog. *Rhamnus cathartica* has nearly overtaken Little Paint Branch Bog #2 and is becoming established in Little Paint Branch Bog #1 and along the powerline in general. *Polygonum perfoliatum* is also becoming established in this area. *Microstegium vimineum*, spread by deer and people along trails, is starting to appear in the wooded section of the Sandy Spring Bog and has completely engulfed the last remaining population of *Eriocaulon decangulare*, a state-listed rare species, at Powder Mill Bog #3. *Arthraxon hispidus*, *Celastrus orbiculatus*, and *Ampelopsis brevipedunculata* are major potential weed threats as well. Some native species that take advantage of soil disturbance and clearing in and around bogs and seeps, such as *Liquidambar styraciflua*, *Liriodendron tulipifera*, *Fagus grandifolia*, *Toxicodendron radicans*, *Vitis labrusca*, and others, also become invasive and smother bog vegetation.

Other Acidic Seepage Communities and Non-alluvial Wetlands

Acidic Seepage Forest
Quercus bicolor - Nyssa sylvatica - Acer rubrum / Clethra alnifolia / Lycopodium obscurum - Osmunda cinnamomea Forest

Classification plots: 0; 1 observation point (#9)

A unique seepage forest community located on the East Farm at BARC that consists of a long drainage swale and vernal pools. The stand occupies the lowest gradient of a gently sloping swale and is bordered by a long stretch of *Quercus falcata - Quercus phellos / Ilex opaca Forest*, including some old-age stands. Further upslope, the vegetation transitions to dry, mixed oak-pine-heath forest. Soils are mesic to saturated (in the areas with vernal pools), acidic, deep, clayey-loams with a high build-up of spongy, organic material and decaying wood. Extensive colonies of *Lycopodium obscurum* carpet the ground throughout the stand and surrounding forest, except in areas with vernal pools. The *Lycopodium* colonies demarcate the permanently moist capillary fringe, where the water table is very close to the soil surface (Simmons and Strong 2001).

Quercus bicolor, *Acer rubrum*, and *Nyssa sylvatica* are the dominant canopy species. The understory is predominately composed of *Nyssa sylvatica*, *Acer rubrum*, *Quercus phellos*, *Liquidambar styraciflua*, and

Magnolia virginiana. *Clethra alnifolia* is the dominant shrub, and is intermixed with *Leucothoe racemosa*, *Vaccinium corymbosum*, *Rhododendron viscosum*, *Aronia arbutifolia*, and *Smilax rotundifolia*. The canopy and understory vary in densities, but are mostly closed. Heavy deer browsing has reduced much of the sizeable *Clethra* and *Rhododendron* colonies to a uniform height of approximately 12 inches, thereby removing much of the tall shrub layer. The herb layer is very dense and lush with *Osmunda cinnamomea*, *Osmunda regalis*, *Woodwardia areolata*, and numerous carices (*Carex* spp.) growing amidst a nearly continuous carpet of *Lycopodium obscurum*.

The uniqueness of this site, its largely undisturbed condition, and the combination of vernal pools with *Quercus bicolor* and surrounding seepage forest make this community a very high conservation priority.

The site is mostly pristine with no invasive exotic species observed. Deer overbrowsing appears to be a problem. Perhaps the largest potential threats are U.S. government wetland mitigation projects that have seriously degraded or destroyed significant natural areas at BARC.

Acidic Seepage Forest
Liriodendron tulipifera - Nyssa sylvatica - Quercus (alba, falcata) / Smilax rotundifolia / Thelypteris noveboracensis - Stenanthium gramineum Forest

Classification plots: 1 (Upper Anacostia 9)

An exceptional upland seepage forest at the headwaters of the Paint Branch near Spencerville in Montgomery County. The stand is perched below a large, upland seepage swamp and along a small, spring-fed tributary of the upper Paint Branch. Soils are mesic, fairly acidic, deep, somewhat micaceous, clayey-silt loams. Where shallow depressions occur or where seepage flow is heavier, soils are permanently saturated and mucky. Both this site and the adjacent seepage swamp represent the westernmost extent of some coastal elements in the Anacostia watershed.

The somewhat open canopy is composed of a mixture of upland forest species and trees that typically grow near seeps and springs. *Liriodendron tulipifera* is the dominant canopy species, intermixed with *Nyssa sylvatica*, *Quercus alba*, and *Quercus falcata* The understory and tall shrub layers are very sparse, with *Nyssa sylvatica*, *Acer rubrum*, *Vaccinium fuscatum*, and *Smilax rotundifolia* as the main representatives. Scattered, dense thickets of tall shrubs were probably once typical of this community, but deer overbrowsing has reduced several species and *Rhododendron viscosum* in particular to unnaturally short heights. The herb layer is very lush and diverse, with *Thelypteris noveboracensis*, *Carex debilis*, *Osmunda cinnamomea*, *Stenanthium gramineum* var. *robustum*, *Medeola virginiana*, *Cinna arundinacea*, *Carex intumescens*, *Mitchella repens*, and *Rubus hispidus* as the dominant species. *Stenanthium gramineum* var. *robustum* is a state-threatened species.

The high quality and large size of this site and the adjacent upland seepage swamp, as well as the occurrence of several coastal species that reach their western extent here, make them very high conservation priorities.

Invasive exotic species are mostly absent from this site and upland seepage swamp, with only very minor amounts of *Microstegium vimineum*, *Polygonum cespitosum*, and *Polygonum perfoliatum* observed. However, the open fields and forest edge to the northwest and well-used trails within the forest unfortunately provide ample opportunities for invasives to become established and threaten the wetlands and surrounding forest in the future. Deer overbrowsing remains a serious threat to some species within the stand. Heavy wind shearing which removed the crowns of several canopy trees was observed within the stand, but apart from the trees no significant damage seems to have occurred.

Acidic Seepage Swale
Juncus longii - Scleria muehlenbergii - Andropogon glomeratus Herbaceous Vegetation

Classified Stands: 1 plot (Upper Anacostia 10)

A small, open seepage wetland at the bottom of a swale under the powerline near Sellman Road and Interstate 95 in the Little Paint Branch drainage. This site is located very near the four historic Powder Mill Bogs and the Little Paint Branch Bogs, including a bog surveyed by Titus Ulke in 1917, and is especially close to the former site of the Cold Spring Bog (Powder Mill Bog #2), which also contained *Scleria muehlenbergii* and many of the same species (McAtee 1918, Strong et al., in prep.). Soils are saturated, acidic, peaty sands with small amounts of pea gravel.

The site is almost entirely composed of graminoid vegetation, with *Juncus longii*, *Scleria muehlenbergii*, *Eleocharis olivacea*, *Andropogon glomeratus*, *Rhynchospora capitellata*, *Rhynchospora gracilenta*, *Panicum dichotomiflorum*, *Dichanthelium scoparium*, *Fimbristylis autumnalis*, and *Juncus acuminatus* as the dominant species. *Juncus longii* is state-endangered and *Scleria muehlenbergii* is highly state-rare.

The assemblage of many bog species in a unique habitat and the dominance of rare flora make this site a very high conservation priority.

Invasive exotic species have not greatly degraded the site, but *Agrostis stolonifera*, *Setaria pumila*, and *Dactylis glomerata* occur within the stand in fairly high numbers. *Polygonum perfoliatum*, *Ampelopsis brevipedunculata*, and other highly invasive weeds are present in areas along the powerline and are also a great threat to the seepage wetland and surrounding native flora in general. *Typha latifolia*, a native plant typical of open marshes and swampy areas that occasionally invades seepage wetlands, is abundant in an adjacent wetland to the east and is a serious potential threat to the site as well. In addition to invasive species, damage to the site by maintenance vehicles and improper herbicide use is a major potential threat.

Coastal Plain Upland Depression Swamp
Quercus (bicolor, palustris) - Acer rubrum - Liquidambar styraciflua / Vaccinium fuscatum / Utricularia gibba Forest

Classified Stands: 1 (Upper Anacostia 5)

An exceptional example of a coastal plain Upland Depression Swamp. These wetlands are seasonally-flooded, shallow depressions within forests that form above hardpan clays or shallow bedrock, and mainly occur in the piedmont within the relatively flat Triassic Basin (Fleming et al. 2005). The BARC sites (including an adjacent additional stand) occur on impermeable, heavy clay and are permanently saturated to ponded, with shallow water nearly reaching 3 feet in depth at the center of the pond. Swamp forest surrounds the depression, with the ponded area being quite open. Soils are highly saturated, mucky clays. Upland Depression Swamps are globally rare throughout their range (Fleming 2005, NatureServe 2005), and are much less common on the coastal plain.

The mostly closed canopy is composed of *Quercus bicolor*, *Quercus palustris*, *Liquidambar styraciflua*, and *Acer rubrum*. *Acer rubrum* is the dominant tree of the mostly closed understory, intermixed with *Nyssa sylvatica*, *Quercus bicolor*, *Liquidambar styraciflua*, *Chionanthus virginicus*, and *Smilax rotundifolia*. The somewhat patchy shrub layer is predominately composed of *Vaccinium fuscatum*, along with *Ilex opaca*, *Acer rubrum*, *Nyssa sylvatica*, and *Smilax rotundifolia*. *Cephalanthus occidentalis* grows in the open section of the pond. The herbaceous layer is very sparse in the swamp forest surrounding the pond, except for extensive carpets of *Sphagnum* moss. Dense mats of *Utricularia gibba*,

Ceratophyllum demersum, and *Proserpinaca palustris* grow in standing water of the pond.

The uniqueness and rarity of this site and its value as a wetlands make this community a very high conservation priority.

Invasive exotic species are remarkably absent from this site. Perhaps the largest potential threats are U.S. government wetland mitigation projects that have seriously degraded or destroyed significant natural areas at BARC.

Alluvial Floodplain Communities

Coastal Plain Bottomland Forest
Quercus michauxii - Acer rubrum - Nyssa sylvatica / Toxicodendron radicans / Uvularia sessilifolia Forest

Classification plots: 1 (Upper Anacostia 7); 1 observation point (#12)

An exceptional, old-age community where Indian Creek branches into numerous braided streams across a broad alluvial plain between the convergence of Indian Creek and Beaverdam Creek and Greenbelt Road (Rt. 193). This site was historically known as the "Hollywood Swamp" (Hitchcock and Standley 1919). The entire site consists of several hundred acres and is highly significant as the westernmost known occurrence of coastal bottomland forest in the state. In addition, the site represents an ancient relict of coastal flora from a pre-glacial period when that vegetation was once widespread along the fall line in the Washington, D.C. area. *Clethra alnifolia* is fairly well distributed throughout the site and reaches its western limit in Maryland here, and slightly further west along forested streambanks in the vicinity of the Powder Mill Bogs. *Quercus michauxii*, also a species typically associated with the outer coastal plain, reaches its western limit in central Maryland here where it occurs as a dominant component of the community. (*Q. michauxii* occurs farther west up the Potomac River in rare, scattered patches.) Soils are moderately well drained, mesic, silty clay-loams.

In the sampled plot, which is fairly representative of the bottomland forest community throughout the site, old-age *Quercus michauxii, Acer rubrum, Nyssa sylvatica*, and *Liriodendron tulipifera* comprise the somewhat closed canopy. Large, old-age *Quercus phellos, Quercus palustris, Quercus bicolor, Fraxinus pennsylvanica, Quercus alba, Quercus rubra*, and *Liquidambar styraciflua*, with none particularly dominant, are intermixed with the above species in a transect at observation point #12 and generally represent the typical canopy species of the site. *Quercus bicolor* appears to be more common in the section north of the Capital Beltway, while *Quercus michauxii* is more abundant in the southern portion of the tract. The fairly open understory is composed of a mix of *Nyssa sylvatica, Acer rubrum, Liquidambar styraciflua, Fagus grandifolia, Prunus serotina, Quercus rubra, Quercus alba, Magnolia virginiana*, and *Carpinus caroliniana*. *Toxicodendron radicans* is also important in the understory. The shrub layer is patchy and includes *Smilax rotundiolia, Ilex opaca, Ilex verticillata, Lindera benzoin, Rhododendron viscosum, Vaccinium* spp., *Clethra alnifolia, Viburnum recognitum, Viburnum nudum*, and *Toxicodendron radicans*. The herb layer is diverse but somewhat patchy throughout, with *Uvularia sessilifolia, Viola sororia, Cinna arundinacea, Boehmeria cylindrica, Pilea pumila, Carex* spp., and *Arisaema triphyllum* as the dominant species for much of the growing season. Large colonies of spring ephemerals occur on well-drained, silty soils throughout the forest as well.

This site is highly significant, especially considering its large size, diverse vegetation, and abundance of relictual coastal flora, and is a very high conservation priority.

Other Habitats

Powerline Habitats

Several miles of the large, north-south powerline easement were walked, from just north of Metzerott Road in College Park to Rt. 198 near the Sandy Spring Bog. Several powerlines at BARC were also walked. Powerlines, despite being artificially disturbed and maintained, are important habitats and refuges for a diversity of native grasses and other plants requiring open conditions.

Soils along the large powerline are generally dry and acidic, and range from gravelly to sandy. Soils under the powerlines at BARC are mostly dry and sandy, with some sections being loamy-sands. Occasionally, soils are moist to saturated where the powerlines cross seeps and streams.

Many species were seen along the large powerline that were not found elsewhere in the study area, including *Andropogon ternarius, Asclepias tuberosa, Cirsium discolor, Croton willdenowii, Cyperus flavescens, Eupatorium album, Eupatorium rotundifolium, Hibiscus moscheutos, Juncus validus, Liatris graminifolia, Linum medium, Lobelia puberula, Lycopodium tristachyum, Monarda punctata, Paspalum laeve, Polygala incarnata, Polygala nuttallii, Rubus cuneifolius, Sabatia angularis,* and *Saccharum gigantea*

Konterra Sand and Gravel Pits

The abandoned complex of sand and gravel mines at Konterra (Contee), situated mostly between Old Gunpowder Road and Laurel, covers a vast area and is regionally significant as the headwaters of Indian Creek and a large portion of Little Paint Branch. Much of this area is still largely undeveloped, with an abundance of groundwater resources, wetlands, and streams. Unfortunately, industrial parks and urban sprawl are rapidly encroaching, and the site is purportedly planned to be an "edge city" at the eastern end of the proposed Inter County Connector (ICC). The site is also characterized by exceptionally diverse vegetation, including many uncommon and rare species, and relatively few invasive exotic species. It is also the location of 3 of the best remaining examples of Fall Line Magnolia Bogs and numerous boggy openings and remnants.

ANNOTATED LIST OF VASCULAR PLANTS

Families, genera, species, and subtaxa are arranged alphabetically within major taxonomic divisions. The scientific name is listed first, followed by the common name. Nomenclature generally follows Kartesz (BONAP 1998, 1999), and in some cases Weakley (2006). Synonyms are provided in brackets for species. An asterisk before a taxon denotes a non-native species - either an invasive exotic plant such as *Celastrus orbiculatus* or one that is native to the state or region but not to the study area, such as *Symphoricarpos albus*.

PTERIDOPHYTA

ASPLENIACEAE

Asplenium platyneuron (L.) B.S.P. ebony spleenwort

BLECHNACEAE

Woodwardia areolata (L.) T. Moore netted chain fern
Woodwardia virginica (L.) Sm. Virginia chain fern

DENNSTAEDTIACEAE

Dennstaedtia punctilobula (Michx.) T. Moore hay-scented fern
Pteridium aquilinum (L.) Kuhn var. *latiusculum* (Desv.) Underwood ex Heller bracken fern

DRYOPTERIDACEAE

Athyrium asplenioides (Michx.) A.A. Eaton [*Athyrium filix-femina* ssp. *asplenioides* (Michx.) Hulten] southern lady fern
Dryopteris carthusiana (Vill.) H.P. Fuchs spinulose wood fern
Onoclea sensibilis L. sensitive fern
Polystichum acrostichoides (Michx.) Schott Christmas fern

LYCOPODIACEAE

Lycopodium digitatum Dill. ex A. Braun fan clubmoss
Lycopodium clavatum L. running ground pine
Lycopodium obscurum L. ground pine
Lycopodium tristachyum Pursh. deep-root ground pine

OPHIOGLOSSACEAE

Osmunda cinnamomea L. cinnamon fern
Osmunda regalis L. var. *spectabilis* (Willd.) Gray royal fern

THELYPTERIDACEAE

Thelypteris noveboracensis (L.) Nieuwl. New York fern
Thelypteris palustris Schott marsh fern

SPERMATOPHYTA: GYMNOSPERMAE

CUPRESSACEAE

Juniperus virginiana L. eastern red cedar

PINACEAE

Pinus pungens Lamb. table mountain pine
Pinus rigida P. Mill. pitch pine
Pinus strobus L. eastern white pine (Apparently native to Northwest Branch, but not to BARC.)
**Pinus taeda* L. loblolly pine
Pinus virginiana P. Mill. Virginia pine
Tsuga canadensis (L.) Carr. eastern hemlock

TAXODIACEAE

**Taxodium distichum* (L.) L.C. Rich. bald cypress

SPERMATOPHYTA: ANGIOSPERMAE
MONOCOTYLEDONEAE

AGAVACEAE

Yucca filamentosa L. Adam's needle

ALISMATACEAE

Sagittaria latifolia Willd. var. *pubescens* (Muhl. ex Nutt.) J.G. Sm. downy arrowhead

ARACEAE

Arisaema triphyllum (L.) Schott. Jack-in-the-pulpit
Peltandra virginica (L.) Schott. arrow arum
Symplocarpus foetidus (L.) Salisb. ex Nutt. skunk cabbage

COMMELINACEAE

**Murdannia keisak* (Hassk.) Hand.-Maz. wart-removing herb

CYPERACEAE

Bulbostylis capillaris (L.) Kunth ex C.B. Clarke dense-tuft hair sedge
Carex bullata Schkuhr ex Willd. button sedge
Carex atlantica ssp. *capillacea* (Bailey) Reznicek bog sedge
Carex complanata Torr.& Hook. hirsute sedge
Carex crinita Lam. var. *crinita* fringed sedge
Carex debilis Michx. white edge sedge
Carex digitalis Willd. slender woodland sedge
Carex folliculata L. long sedge

Carex glaucodea Tuckerman ex Olney blue sedge
Carex intumescens Rudge greater bladder sedge
Carex longii Mackenzie Long's sedge
Carex lurida Wahlenb. sallow sedge
Carex cf. nigromarginata Schwein. black edge sedge
Carex radiata (Wahlenb.) Small eastern star sedge
Carex seorsa Howe weak stellate sedge
Carex swanii (Fern.) Mackenzie Swan's sedge
Carex tribuloides Wahlenb. blunt broom sedge
Carex typhina Michx. cat-tail sedge
Cyperus echinatus (L.) Wood globe flat sedge
Cyperus flavescens L. yellow flatsedge
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus* slender flatsedge
Cyperus strigosus L. straw-colored flatsedge
Dulichium arundinaceum (L.) Britt. three-way sedge
Eleocharis obtusa (Willd.) J.A. Schultes blunt spikerush
Eleocharis olivacea Torr. olive-green spikerush
Eleocharis tenuis (Willd.) J.A. Schultes slender spikerush
Eleocharis tortilis (Link) J.A. Schultes twisted spikerush
Fimbristylis autumnalis (L.) Roemer & J.A. Schultes slender fimbry
Rhynchos pora capitellata (Michx.) Vahl brownish beakrush
Rhynchospora gracilenta Gray slender beakrush
Schoenoplectus purshianus (Fern.) M.T. Strong weak-stalked bulrush
Scirpus cyperinus (L.) Kunth woolgrass
Scirpus georgianus Harper Georgia bulrush
Scirpus polyphyllus Vahl leafy bulrush
Scleria muehlenbergii Steud. [*Scleria reticularis* var. *pubescens* Britt.] reticulated nutrush

DIOSCOREACEAE

Dioscorea villosa L. wild yam

ERIOCAULACEAE

Eriocaulon decangulare L. ten-angle pipewort

IRIDACEAE

Iris versicolor L. blue flag
Sisyrinchium angustifolium P. Mill. narrow-leaved blue-eyed grass

JUNCACEAE

Juncus acuminatus Michx. tapertip rush
Juncus canadensis J. Gay ex Laharpe Canada rush
Juncus debilis Gray weak rush
Juncus effusus L. soft rush
Juncus longii Fern. Long's rush
Juncus scirpoides Lam. scirpus-like rush
Juncus subcaudatus (Engelm.) Coville & Blake woodland rush
Juncus tenuis Willd. path rush

Juncus validus Coville round-head rush

LEMNACEAE

Lemna minor L. common duckweed

LILIACEAE

Maianthemum canadense Desf. Canada mayflower
Maianthemum racemosum (L.) Link Solomon's plume
Medeola virginiana L. Indian cucumber root
Polygonatum biflorum (Walt.) Ell. Solomon's seal
Stenanthium gramineum (Ker-Gawl.) Morong var. *robustum* (S. Wats.) Fern. giant featherbells
Uvularia sessilifolia L. sessile-leaved bellwort

ORCHIDACEAE

Cypripedium acaule Ait. pink lady's slipper
Goodyera pubescens (Wild.) R. Br. ex Ait. downy rattlesnake plantain
Isotria verticillata Raf. large whorled pogonia
Platanthera blephariglottis (Willd.) Lindl. white-fringed orchid
Platanthera clavellata (Michx.) Luer green woodland orchid
Platanthera flava (L.) Lindl. var. *herbiola* (R. Br. ex Ait. f.) Luer pale-green orchid
Platanthera lacera (Michx.) G. Don ragged-fringed orchid
Spiranthes cernua (L.) L.C. Rich nodding ladies' tresses
Tipularia discolor (Pursh) Nutt. cranefly orchid

POACEAE

Agrostis perennans (Walt.) Tuckerman autumn bentgrass
**Agrostis stolonifera* L. spreading bent
Andropogon glomeratus (Walt.) B.S.P. bushy bluestem
Andropogon ternarius Michx. split-beard bluestem
Andropogon virginicus L. broomsedge
**Anthoxanthum odoratum* L. sweet vernal grass
Aristida oligantha Michx. prairie three-awn
Arthraxon hispidus (Thunb.) Makino small carp grass
Calamagrostis coarctata (Torr.) Eat. reed bentgrass
Chasmanthium laxum (L.) Yates slender wood oats
Cinna arundinacea L. stout woodreed
**Dactylis glomerata* L. orchard grass
Danthonia spicata (L.) Beauv. ex Roemer & J.A. Schultes poverty oat grass
Dichanthelium acuminatum (Sw.) Gould & C. A. Clark var. *lindheimeri* (Nash) Gould & C. A. Clark Lindheimer rosette grass
Dichanthelium boscii (Poir.) Gould & C.A. Clark Bosc's rosette grass
Dichanthelium clandestinum (L.) Gould deertongue grass
Dichanthelium columbianum (Scribner) Freckmann American witch grass
Dichanthelium commutatum (J.A. Schultes) Gould var. *ashei* (Pearson ex Ashe) Mohlenbrock variable rosette grass
Dichanthelium depauperatum (Muhl.) Gould starved rosette grass
Dichanthelium dichotomum (L.) Gould var. *dichotomum* cypress rosette grass

Dichanthelium leucothrix (Nash) Freckmann white-haired panic grass
Dichanthelium lucidum (Ashe) LeBlond bog witch grass
Dichanthelium scoparium (Lam.) Gould velvet rosette grass
Dichanthelium sphaerocarpon (Ell.) Gould var. *sphaerocarpon* round-seeded rosette grass
Eragrostis spectabilis (Pursh) Steud. purple lovegrass
Festuca subverticillata (Pers.) Alexeev nodding fescue
Glyceria laxa (Scribn.) Scribn. [*Glyceria canadensis* var. *laxa* (Scribn.) A.S. Hitchc.]
Glyceria melicaria (Michx.) F.T. Hubbard melic manna grass
Glyceria obtusa (Muhl.) Trin. Atlantic manna grass
Glyceria striata (Lam.) A.S. Hitchc. fowl manna grass
Leersia oryzoides (L.) Sw. rice cutgrass
Leersia virginica Willd. white grass
**Microstegium vimineum* (Trin.) A. Camus Japanese stilt grass
**Miscanthus sinensis* Anderss. Chinese silver grass
Panicum anceps Michx. beaked panicgrass
Panicum dichotomiflorum Michx. fall witchgrass
Panicum verrucosum Muhl. warty panic grass
Panicum virgatum L. switch grass
Paspalum laeve Michx. field crowngrass
Phalaris arundinacea L. reed canary grass
**Phragmites australis* (Cav.) Trin. ex Sted. common reed
Saccharum giganteum (Walt.) Pers. sugarcane plumegrass
Schizachyrium scoparium (Michx.) Nash little bluestem
**Setaria pumila* (Poir.) Roemer & J.A. Schultes yellow bristle grass
Sorghastrum nutans (L.) Nash Indian grass
Tridens flavus (L.) A.S. Hitchc. purpletop grass
Tripsacum dactyloides (L.) L. Eastern gamagrass

SMILACACEAE

Smilax glauca Walt. glaucous greenbrier
Smilax pseudochina L. halberd-leaved greenbrier
Smilax rotundifolia L. round-leaved greenbrier

SPARGANIACEAE

Sparganium americanum Nutt. American burr-reed

TYPHACEAE

Typha latifolia L. common cattail

XYRIDACEAE

Xyris sp. yellow-eyed grass

SPERMATOPHYTA: ANGIOSPERMAE
DICOTYLEDONAE

ACERACEAE

Acer negundo L. box elder
Acer rubrum L. red maple

ANACARDIACEAE

Rhus copalinum L. winged sumac
Rhus typhina L. staghorn sumac
Toxicodendron radicans (l.) Kuntze poison ivy
Toxicodendron vernix (L.) Kuntze poison sumac

APIACEAE

Angelica venenosa (Greenway) Fern. hairy angelica
Cryptotaenia canadensis (L.) DC honewort
Hydrocotyle americana L. American marsh pennywort
Oxypolis rigidior (L.) Raf. cowbane
Sanicula canadensis L. black snakeroot

APOCYNACEAE

Apocynum cannabinum L. Indian hemp

ARALIACEAE

Aralia nudicaulis L. wild sarsaparilla
Aralia spinosa L. devil's walking stick
**Hedera helix* L. English ivy

ARISTOLOCHIACEAE

Aristolochia serpentaria L. Virginia snakeroot

ASCLEPIADACEAE

Asclepias amplexicaulis Sm. wavy-leaved milkweed
Asclepias incarnata ssp. *pulchra* (Ehrh. ex Willd.) swamp milkweed
Asclepias syriaca L. common milkweed
Asclepias tuberosa L. butterfly milkweed

ASTERACEAE

Achillea millefolium L. common yarrow
Ambrosia artemisiifolia L. common ragweed
Antennaria plantaginifolia (L.) Richards. plantain-leaved pussytoes
Aster dumosus L. [*Symphyotrichum dumosum* (L.) Nesom] bushy aster
Aster lateriflorus (L.) Britt. [*Symphyotrichum lateriflorum* (L.) A & D Löve var. *lateriflorum*]
calico aster

Aster pilosus Willd. [*Symphyotrichum pilosum* (Willd.) Nesom. var. *pilosum*] white oldfield aster
Aster puniceus L. [*Symphyotrichum puniceum* (L.) A. & D. Löve var. *puniceum*] purple-stemmed aster
Aster radula Ait. [*Eurybia radula* (Ait.) Nesom.] rough-leaved aster
Aster vimineus Lam. [*Symphyotrichum racemosum* (Ell.) Nesom] small white aster
Baccharis halimifolia L. groundsel-bush
Bidens aristosa (Michx.) Britt. tickseed sunflower
Bidens bipinnata L. Spanish needles
Bidens frondosa L. devil's beggarticks
Chrysopsis mariana (L.) Ell. Maryland golden aster
Cirsium discolor (Muhl. ex Willd.) Spreng. field thistle
Conyza canadensis (L.) Cronq. horseweed
Conoclinium coelestinum (L.) DC. [*Eupatorium coelestinum* L.] mistflower
Erechtites hieraciifolia (L.) Raf. ex DC. fireweed
Eupatorium album L. white thoroughwort
Eupatorium dubium Willd. ex Poir. coastal plain Joe-pye-weed
Eupatorium fistulosum Barratt Joe-pye-weed
Eupatorium hyssopifolium L. var. *laciniatum* Gray hyssop-leaved thoroughwort
Eupatorium perfoliatum L. boneset
Eupatorium pilosum Walt. rough boneset
Eupatorium rotundifolium L. round-leaved thoroughwort
Eupatorium rotundifolium L. var. *ovatum* (Bigelow) Torr. round-leaved thoroughwort
Eupatorium serotinum Michx. late-flowering thoroughwort
Euthamia graminifolia (L.) Nutt. var. *graminifolia* [*Solidago graminifolia* (L.) Salisb.] grass-leaved goldenrod
Gnaphalium obtusifolium L. [*Pseudognaphalium obtusifolium* (L.) Hilliard & Burtt] sweet everlasting
Hieracium gronovii L. hairy hawkweed
Hieracium paniculatum L. panicled hawkweed
Hieracium scabrum Michx. rough hawkweed
**Hypochaeris radicata* L. hairy cat's-ear
Liatris graminifolia Willd. grass-leaved blazing star
Mikania scandens (L.) Willd. climbing hempvine
Pityopsis graminifolia (Michx.) Nutt. var. *graminifolia* [*Chrysopsis graminifolia* (Michx.) Ell.] silk grass
Prenanthes serpentaria Pursh. lion's foot
Rudbeckia hirta L. black-eyed Susan
Solidago bicolor L. silverrod
Solidago canadensis L. var. *scabra* Torr. & Gray [*Solidago altissima* L.] tall goldenrod
Solidago gigantea Ait. late goldenrod
Solidago juncea Ait. early goldenrod
Solidago nemoralis Ait. gray goldenrod
Solidago odora Ait. fragrant goldenrod
Solidago patula Muhl. ex Willd. round-leaved goldenrod
Solidago puberula Nutt. downy goldenrod
Solidago rugosa P. Mill. rough goldenrod
Solidago speciosa Nutt. var. *erecta* (Pursh.) MacM. erect goldenrod
Solidago uliginosa Nutt. bog goldenrod
Vernonia noveboracensis (L.) Michx. New York ironweed

BALSAMINACEAE

Impatiens capensis Meerb. orange jewelweed

BERBERIDACEAE

**Berberis thunbergii* DC. Japanese barberry

BETULACEAE

Alnus serrulata (Ait.) Willd. common alder
Betula populifolia Marsh. gray birch
Betula nigra L. river birch
Carpinus caroliniana Walt. ironwood

BIGNONIACEAE

Campsis radicans (L.) Seem. ex Bureau trumpet creeper

BRASSICACEAE

**Alliaria petiolata* (Bieb.) Cavara & Grande garlic mustard
Cardamine pensylvanica Muhl. ex Willd. quaker bittercress
Lepidium virginicum L. poor-man's pepper

CABOMBACEAE

Brasenia schreberi J.F. Gmel. watershield

CAMPANULACEAE

Lobelia cardinalis L. cardinal flower
Lobelia inflata L. Indian tobacco
Lobelia puberula Michx. downy lobelia

CAPRIFOLIACEAE

**Lonicera japonica* Thunb. Japanese honeysuckle
**Lonicera maackii* (Rupr.) Herder Amur honeysuckle
Lonicera sempervirens L. trumpet honeysuckle
Sambucus canadensis L. elderberry
**Symphoricarpos albus* (L.) Blake common snowberry
Viburnum acerifolium L. maple-leaved viburnum
Viburnum dentatum L. var. *lucidum* Ait. southern arrowwood
Viburnum nudum L. swamp-haw

CELASTRACEAE

**Celastrus orbiculatus* Thunb. Asian bittersweet

CERATOPHYLLACEAE

Ceratophyllum demersum L. coontail

CISTACEAE

Helianthemum canadense (L.) Michx. frostweed
Lechea pulchella Raf. Leggett's pinweed
Lechea racemulosa Michx. pinweed

CLETHRACEAE

Clethra alnifolia L. sweet pepperbush

CLUSIACEAE

Hypericum canadense L. Canadian St. John's wort
Hypericum gentianoides (L.) B.S.P. pineweed
Hypericum hypericoides (L.) Crantz St. Andrew's cross
Hypericum mutilum L. dwarf St. John's wort
Triadenum virginicum (L.) Raf. Virginia marsh St. John's wort

CONVOLVULACEAE

Ipomoea pandurata (L.) G.F.W. Mey. wild potato vine

CORNACEAE

Cornus florida L. flowering dogwood

CUSCUTACEAE

Cuscuta sp. dodder
Cuscuta compacta Juss. ex Choisy var. *compacta* compact dodder

EBENACEAE

Diospyros virginiana L. persimmon

ERICACEAE

Epigaea repens L. trailing arbutus
Gaultheria procumbens L. wintergreen
Gaylussacia baccata (Wangenh.) K. Koch black huckleberry
Gaylussacia frondosa (L.) Torr. & Gray ex Torr. dangleberry
Kalmia angustifolia L. sheep laurel
Kalmia latifolia L. mountain laurel
Leucothoe racemosa (L.) Gray fetterbush
Lyonia ligustrina (L.) DC. maleberry
Lyonia mariana (L.) D. Don staggerbush
Rhododendron periclymenoides (Michx.) Shinners pinxterbloom

Rhododendron viscosum (L.) Torr. swamp azalea
Vaccinium caesariense Mackenzie New Jersey highbush blueberry
Vaccinium corymbosum L. highbush blueberry
Vaccinium formosum H.C. Andrews southern highbush blueberry
Vaccinium fuscatum Ait. black highbush blueberry
Vaccinium pallidum Ait. lowbush blueberry
Vaccinium stamineum L. deerberry

EUPHORBIACEAE

Acalypha gracilens Gray slender three-seeded mercury
Acalypha rhomboidea Raf. three-seeded mercury
Croton glandulosus L. var. *septentrionalis* Muell.-Arg. northern croton
Croton willdenowii G.L. Webster egg-leaf rushfoil
Euphorbia corollata L. flowering spurge
Euphorbia ipecacuanhae L. American ipecac
Euphorbia maculata L. [*Chamaesyce maculata* (L.) Small] spotted spurge
Euphorbia marilandica Greene flowering spurge
Euphorbia nutans Lag. [*Chamaesyce nutans* (Lag.) Small] eyebane

FABACEAE

Apios americana Medik. groundnut
Baptisia tinctoria (L.) R. Br. ex Ait. f. yellow wild indigo
Clitoria mariana L. butterfly pea
Chamaecrista fasciculata (Michx.) Greene partridge pea
Chamaecrista nictitans (L.) Moench sensitive plant
Desmodium marilandicum (L.) DC. small-leaved tick trefoil
Desmodium paniculatum (L.) DC. panicled tick trefoil
Desmodium rotundifolium DC. round-leaved tick trefoil
Lespedeza capitata Michx. round-headed bush clover
**Lespedeza striata* (Trunb.) Hook. & Arn. Japanese bush clover
Lespedeza hirta (L.) Hornem. hairy bush clover
Lespedeza procumbens Michx. trailing bush clover
Lespedeza repens (L.) W. Bart. creeping bush clover
Lespedeza virginica (L.) Britt. slender bush clover
Lupinus perennis L. lupine
Senna hebecarpa (Fern.) Irwin & Barneby American wild sensitive plant
Strophostyles helvula (L.) Ell. trailing wild bean
Tephrosia virginiana (L.) Pers. goat's rue

FAGACEAE

Castanea dentata (Marsh.) Borkh. American chestnut
Castanea pumila (L.) P. Mill. chinquapin
Fagus grandifolia Ehrh. American beech
Quercus alba L. white oak
Quercus bicolor Willd. swamp white oak
Quercus x *bushii* Sarg. [*Q. marilandica* Muenchh. x *Q. velutina* Lam.] Bush's oak
Quercus coccinea Muenchh. scarlet oak
Quercus falcata Michx. southern red oak

Quercus marilandica Muenchh. blackjack oak
Quercus michauxii Nutt. swamp chestnut oak
Quercus montana Willd. chestnut oak
Quercus palustris Muenchh. pin oak
Quercus phellos L. willow oak
Quercus prinoides Willd. dwarf chinquapin oak
Quercus x *saulii* Schneid. [*Q. alba* x *Q. montana*] Saul's oak
Quercus stellata Wangenh. post oak
Quercus x *subfalcata* Trel. [*Q. falcata* Michx. x *Q. phellos* L.]
Quercus velutina Lam. black oak

GENTIANACEAE

Bartonia paniculata (Michx.) Muhl. screw-stem
Sabatia angularis (L.) Pursh rose pink

HALORAGACEAE

Proserpinaca palustris L. mermaid weed

HAMAMELIDACEAE

Hamamelis virginiana L. witch hazel
Liquidambar styraciflua L. sweet gum

JUGLANDACEAE

Carya alba (L.) Nutt. ex Ell. [*Carya tomentosa* (Lam. ex Poir.) Nutt.] mockernut hickory
Carya cordiformis (Wangenh.) K. Koch bitternut hickory
Carya glabra (P. Mill.) Sweet pignut hickory
Carya ovalis (Wangenh.) Sarg. false shagbark hickory
Carya pallida (Ashe) Engl. & Graebn. sand hickory
Juglans cinerea L. butternut

LAMIACEAE

Lycopus virginicus L. bugleweed
Monarda punctata L. spotted beebalm
**Perilla frutescens* (L.) Britt. var. *frutescens* beefsteak plant
**Prunella vulgaris* L. ssp. *vulgaris* common heal-all
Pycnanthemum muticum (Michx.) Pers. clustered mountain mint
Pycnanthemum tenuifolium Schrad. narrow-leaved mountain mint
Scutellaria integrifolia L. hyssop skullcap
Scutellaria lateriflora L. mad dog skullcap
Trichostema dichotomum L. blue curls

LAURACEAE

Lindera benzoin (L.) Blume spicebush
Sassafras albidum (Nutt.) Nees sassafras

LENTIBULARIACEAE

Utricularia gibba L. humped bladderwort
Utricularia vulgaris L. greater bladderwort

LINACEAE

Linum intercursum Bickn. sandplain flax
Linum medium (Planch.) Britt. var. *texanum* (Planch.) Fern. stiff yellow flax
Linum striatum Walt. ridged yellow flax

MAGNOLIACEAE

Liriodendron tulipifera L. tulip tree
Magnolia tripetala (L.) L. umbrella magnolia
Magnolia virginiana L. sweetbay magnolia

MALVACEAE

Hibiscus moscheutos L. ssp. *moscheutos* crimson-eyed rose mallow

MELASTOMATACEAE

Rhexia mariana L. Maryland meadow beauty
Rhexia virginica L. Virginia meadow beauty

MONOTROPACEAE

Monotropa uniflora L. Indian pipe

MYRICACEAE

Myrica pensylvanica Mirbel [*Morella pensylvanica* (Mirbel) Kartesz] bayberry

NYMPHAEACEAE

Nuphar lutea (L.) Sm. ssp. *advena* (Ait.) Kartesz and Gandhi spatterdock
Nymphaea odorata Ait. American white water lily

NYSSACEAE

Nyssa sylvatica Marsh. black gum

OLEACEAE

Chionanthus virginicus L. fringe tree
Fraxinus americana L. white ash
Fraxinus pennsylvanica Marsh. green ash
**Ligustrum* sp. privet

ONAGRACEAE

Circaea lutetiana L. enchanter's nightshade
Epilobium coloratum Biehler purple-leaved willow herb
Ludwigia alternifolia L. seedbox
Ludwigia palustris (L.) Ell. marsh seedbox
Oenothera biennis L. common evening primrose

OXALIDACEAE

Oxalis dillenii Jacq. slender wood sorrel

PHYTOLACCACEAE

Phytolaca americana L. pokeweed

PLATANACEAE

Platanus occidentalis L. sycamore

POLYGALACEAE

Polygala incarnata L. procession flower
Polygala lutea L. orange milkwort
Polygala mariana P. Mill. Maryland milkwort
Polygala nutallii Torr. & Gray Nuttall's milkwort
Polygala sanguinea L. purple milkwort

POLYGONACEAE

Polygonum arifolium L. halberd-leaved tearthumb
**Polygonum cespitosum* Blume var. *longisetum* (deBruyn) A.N. Steward Oriental lady's thumb
Polygonum hydropiperoides Michx. water pepper
Polygonum pensylvanicum L. Pennsylvania smartweed
**Polygonum perfoliatum* L. Asiatic tearthumb
Polygonum punctatum Ell. dotted smartweed
Polygonum sagittatum L. arrow-leaved tearthumb
**Rumex acetosella* L. sheep sorrel

PRIMULACEAE

Lysimachia quadrifolia L. whorled yellow loosestrife
Lysimachia terrestris (L.) B.S.P. swamp candles

PYROLACEAE

Chimaphila maculata (L.) Pursh spotted wintergreen
Chimaphila umbellata (L.) W. Bart. pipsissewa

RHAMNACEAE

Rhamnus cathartica L. European buckthorn

RANUNCULACEAE

Thalictrum pubescens Pursh tall meadow-rue

ROSACEAE

Amelanchier arborea (Michx. f.) Fern. downy serviceberry
Amelanchier canadensis (L.) Medik. eastern serviceberry
Amelanchier laevis Wieg. smooth serviceberry
Aronia arbutifolia (L.) Pers. [*Photinia pyrifolia* (Lam.) Robertson & Phipps] red chokeberry
Aronia melanocarpa (Michx.) Ell. [*Photinia melanocarpa* (Michx.) Robertson & Phipps] black chokeberry
Geum canadense Jacq. white avens
**Malus* sp. non-native crabapple
Malus coronaria (L.) P. Mill. sweet crabapple
Rosa palustris Marsh swamp rose
Potentilla canadensis L. common cinquefoil
**Prunus* sp. non-native? plum
Prunus serotina Ehrh. black cherry
Prunus subhirtella Miq. Higan cherry
Rubus allegheniensis Porter Allegheny blackberry
Rubus argutus Link sawtooth blackberry
Rubus cuneifolius Pursh sand blackberry
Rubus flagellaris Willd. northern dewberry
Rubus hispidus L. bristly dewberry
**Rubus phoenicolasius* wineberry

RUBIACEAE

Cephalanthus occidentalis L. button bush
Diodia teres Walt. rough buttonweed
Diodia virginiana L. Virginia buttonweed
Galium cicaezans Michx. wild licorice
Galium pilosum Ait. var. *pilosum* hairy bedstraw
Galium tinctorium (L.) Scop. stiff marsh bedstraw
Galium triflorum Michx. fragrant bedstraw
Mitchella repens L. partridgeberry

RUTACEAE

**Poncirus trifoliata* (L.) Raf. hardy orange

SALICACEAE

**Populus alba* L. white poplar
Populus deltoides Bartr. ex Marsh. eastern cottonwood
Populus grandidentata Michx. big-toothed aspen

Salix nigra Marsh. black willow

SARRACENIACEAE

Sarracenia purpurea L. purple pitcher plant

SCROPHULARIACEAE

Gratiola virginiana L. round-fruit hedge-hyssop
Linaria canadensis (L.) Dum.-Cours. [*Nuttallanthus canadensis* (L.) D.A. Sutton] blue toadflax
Lindernia dubia (L.) Pennell false pimpernel
Melampyrum lineare Desr. cow wheat
Mimulus alatus Ait. winged monkeyflower
Mimulus ringens L. square-stemmed monkeyflower
Penstemon digitalis Nutt. ex Sims foxglove beardtongue
**Verbascum thapsus* L. great mullein
Veronica officinalis L. common speedwell

SIMAROUBACEAE

**Ailanthus altissima* (P. Mill.) Swingle tree-of-heaven

SOLANACEAE

Solanum carolinense L. horse nettle

ULMACEAE

Celtis occidentalis L. common hackberry
Celtis tenuifolia Nutt. dwarf hackberry
Ulmus americana L. American elm

URTICACEAE

Boehmeria cylindrica (L.) Sw. false nettle
Pilea pumila (L.) Gray clearweed

VERBENACEAE

Verbena hastata L. blue vervain

VIOLACEAE

Viola lanceolata L. bog white violet
Viola primulifolia L. primrose-leaved violet
Viola sagittata Ait. arrow-leaved violet

VITACEAE

**Ampelopsis brevipedunculata* (Maxim.) Trautv. porcelain berry
Parthenocissus quinquefolia (L.) Planch. Virginia creeper

Vitis aestivalis Michx. var. *aestivalis* summer grape
Vitis labrusca L. fox grape
Vitis vulpina L. winter grape

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LITERATURE CITED

Aleinikoff, J.N., J.W. Horton, Jr., A.A. Drake, Jr., and C.M. Fanning. 2002. SHRIMP and conventional U-Pb ages of Ordivician granites and tonalites in the central Appalachian piedmont: implications for Paleozoic tectonic events. American Journal of Science 302: 0-75.

Alexandria Drafting Company. 2005. Prince George's County street map. Alexandria, Virginia.

Bailey, R.G. 1998. Ecoregions: the ecosystem geography of the oceans and the continents. Springer-Verlag, New York, New York.

Biota of North America Program (BONAP) Database. 1998. University of North Carolina, Campus Box 3280, Coker Hall, Chapel Hill, NC 27599-3280. (http://www.bonap.org/)

Brown, M.L. and R.G. Brown. 1984. Herbaceous plants of Maryland. Port City Press, Inc., Baltimore, Maryland.

Brown, R.G. and M.L. Brown. 1972. Woody plants of Maryland. Port City Press, Inc., Baltimore, Maryland.

Darton, N.H. 1939. Gravel and sand deposits of eastern Maryland adjacent to Washington and Baltimore. Bulletin 906-A. United States Government Printing Office, Washington, D.C.

Drake, A.A., Jr. 1998a. Geologic map of the Kensington quadrangle, Montgomery County, Maryland. U.S. Geological Survey Geologic Quadrangle Map GQ-1774.

Fernald, M.L. 1950. Gray's Manual of Botany. Eighth Edition. American Book Company, New York, New York.

Fleming, G.P., P.P. Coulling, K.D. Patterson, and K. Taverna. 2005. The natural communities of Virginia: classification of ecological community groups. Second approximation. Version 2.1. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. http://www.dcr.virginia.gov/dnh/ncintro.htm.

Frye, C.T. and C. Lea. 2001. Atlas and annotated list of *Carex* (Cyperaceae) of Maryland and the District of Columbia. The Maryland Naturalist 44: 41-108.

Harshberger, J.W. 1916. The vegetation of the New Jersey Pine Barrens. Christopher Sower Company, Philadelphia, Pennsylvania.

Harvill, A.M., Jr., T.R. Bradley, C.E. Stevens, T.P. Wieboldt, D.M.E. Ware, D.W. Ogle, G.W.

Ramsey, and G.P. Fleming. 1992. Atlas of the Virginia flora. Virginia Botanical Associates, Burkeville, Virginia.
Hitchcock, A.S. and P. Standley. 1919. Flora of the District of Columbia and vicinity. Contrib. U.S. Natl. Herb. Volume 21.
Interstate Commission on the Potomac River Basin. 1998. Anacostia: the other river. Rockville, Maryland.
Johnson, M.F. 1995. Goldenrods in Virginia: *Euthamia* (Nutt.) Nutt. and *Solidago* L. Castanea 60: 114-140.
Johnston, P.M. 1964. Geology and ground-water resources of Washington, D.C., and vicinity. Geological Survey Water-Supply Paper 1776. United States Government Printing Office, Washington, D.C.
Kartesz, J.T. 1999. Synthesis of the North American flora. North Carolina Botanical Garden, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina.
Lea, C. 2004. Vegetation types in national capital region parks. Working draft. National Park Service, Washington, D.C.
Maryland Department of Natural Resources. 2003. Rare, threatened, and endangered plants of Maryland. Annapolis, Maryland.
Maryland Geological Survey Online. 2006. Geologic map of Maryland. Baltimore, Maryland.
McAtee, W.L. 1918. A sketch of the natural history of the District of Columbia. Bulletin of the Biological Society of Washington No. 1.
Mixon, R.B., L. Pavlides, D.S. Powars, A.J. Froelich, R.E. Weems, J.S. Schindler, W.L. Newell, L.E. Edwards, and L.W. Ward. 2000. Geologic Map of the Fredericksburg 30' x 60' quadrangle, Virginia and Maryland. U.S. Geological Survey Geologic Investigations Series Map I-2607.
NatureServe. 2005. Upper Anacostia watershed plant communities of conservation significance. Arlington, Virginia.
Obermeier, S.F. 1984. Engineering geology and slope design of the Cretaceous Potomac deposits in Fairfax County, Virginia and vicinity. U.S. Geological Survey Bulletin 1556.
Peet, R.K., T.R. Wentworth, and P.S. White. 1998. A flexible, multipurpose method for recording vegetation composition and structure. Castanea 63: 262-274.
Shreve, F., M.A. Chrysler, F.H. Blodgett, and F.W. Besley. 1910. The plant life of Maryland. Maryland Weather Service Special Publication Vol. III. The John Hopkins Press, Baltimore, Maryland.
Simmons, R.H. 1995. A survey of terrace gravel communities in the Washington, D.C. area. Unpublished report.
Simmons, R.H. and M.T. Strong. 2001. Araby Bog: a globally rare Magnolia bog in Charles County, Maryland. Marilandica 9: 6-9.
Sipple, W.S. 1999. Days afield: exploring wetlands in the Chesapeake Bay region. Gateway Press, Baltimore, Maryland.
Strong, M.T., R.H. Simmons, and G.P. Fleming. In preparation. The last remaining terrace gravel magnolia bogs and their flora in Washington, D.C. and vicinity.
Terrell, E.E., J.L. Reveal, R.W. Spjut, R.F. Whitcomb, J.H. Kirkbride Jr., M.T. Cimino, and M.T. Strong. 2000. Annotated list of the flora of the Beltsville Agricultural Research Center,Beltsville, Maryland. USDA, Agricultural Research Service. ARS-155.
Weakley, A.S. 2006. Flora of the Carolinas, Virginia, Georgia, and surrounding areas. Working Draft of January 2006. University of North Carolina, Chapel Hill, North Carolina.

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CONSERVATION PRIORITIES AND SELECTED NATURAL COMMUNITIES OF THE UPPER ANACOSTIA WATERSHED

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ABSTRACT

A limited survey of the upper Anacostia River watershed, situated in Prince George's and Montgomery Counties, Maryland, was conducted in the summer and fall of 2005 to identify natural communities of conservation significance. Extensive floristic surveys were conducted and classification data were collected from 23 vegetation plots and observation points. Ten communities of conservation significance were documented. Of these, the globally rare Pine Barrens Pine - Oak Woodland and a type of Coastal Plain Bottomland Forest, are new community types not yet described in the U.S. National Vegetation Classification. In addition, community and habitat descriptions and a checklist of vascular flora are presented, including 22 state-listed, uncommon to highly rare species. A brief discussion on the range and distribution of certain taxa is also presented.

INTRODUCTION

In the summer and fall of 2005, a limited survey was conducted to identify significant natural communities and conservation priorities in the upper Anacostia River watershed, situated in Prince George's and Montgomery Counties, Maryland. Although parts of this region have been previously explored and documented by researchers from USDA, University of Maryland, Catholic University, Maryland Native Plant Society (MNPS), Smithsonian Institution, Maryland Department of Natural Resources (DNR), Maryland National Capital Park and Planning Commission (M-NCPPC), and others, additional work was needed to survey unexplored areas, inventory important vegetation types, and identify conservation priorities. The extensive oak-pine-heath forest communities, including acidic, upland seepage wetlands, (mainly on the Central and East Farms) at the Beltsville Agricultural Research Center (BARC) in Prince George's County, Maryland were chosen as the primary focus of this study because of their high quality and large size, need for classification, and vulnerability to potential threats. These areas are located in the extreme northeastern edge of the upper Anacostia watershed and give rise to the Beaverdam Creek tributary. Vegetation and significant natural communities were also surveyed in the other upper Anacostia tributaries to the west: Indian Creek, Little Paint Branch, Paint Branch, and Northwest Branch.

This study represents the most comprehensive survey of the upper Anacostia watershed known to date, but is far from complete. While we surveyed many oak-pine-heath communities and upland seepage wetlands at BARC, time constraints prevented us from thoroughly surveying them all or possibly locating additional ones at BARC. To broaden our understanding of the natural communities and conservation priorities throughout the entire upper watershed, we tried to balance our surveys so that all five main tributaries were represented. This study also builds upon the work of many individuals over many years, especially botanists compiling the BARC Flora (Terrell et al. 2000), research by MNPS and colleagues to classify the Fall Line Magnolia Bogs, and rare plant surveys by DNR and M-NCPPC. We generally did not include the results of previous research in this study, except to cite literature or an important historical collection.

STUDY AREA

The upper Anacostia watershed includes five main sub-watersheds (tributaries): Northwest Branch (including Sligo Creek and Long Branch), Paint Branch, Little Paint Branch, Indian Creek, and Beaverdam Creek. Sandy Spring Road between Old Gunpowder Road and Olney (Rt. 198 and a small section of Rt. 108) follows the divide between the Anacostia and Patuxent River drainages and is the northern boundary of the study area. The eastern boundary more or less extends from the northeastern headwaters of Indian Creek at the Konterra gravel pits to the eastern extent of Beaverdam Creek at BARC and south to the headwaters of Brier Ditch and Lower Beaverdam Creek near Lanham. The southern boundary roughly follows Rt. 50 and East-West Highway (Rt. 410) above Bladensburg and Hyattsville. The western boundary follows Georgia Avenue (Rt. 97) from Silver Spring to Olney. Paint Branch, Little Paint Branch, Indian Creek, and Beaverdam Creek gradually form the Northeast Branch (along with Brier Ditch and Lower Beaverdam Creek) which converges with the Northwest Branch at Bladensburg, forming the Anacostia River.

Although urban sprawl and its effects have substantially encroached into the region, this vast area still encompasses thousands of acres of high quality forest, wetlands, streams, and plant communities, many of which are highly rare or unique in the greater Washington, D.C. area. Exceptional natural areas occur throughout BARC, the Konterra sand and gravel pit complex, Spencerville-Upper Paint Branch, PEPCO powerline, Ammendale woods, Little Paint Branch Park, White Oak Federal Research Center, including Army Research Lab, Powder Mill Community Park, Buck Lodge Community Park, Northwest Branch Park, Hollywood Swamp, and Greenbelt Park. All of these places remain for the moment in a tentative balance with the ever advancing pace of urban sprawl within the watershed.

Climate

The climate of the upper Anacostia watershed is humid temperate (Bailey 1998), with warm to hot temperatures in summer months, mild winters, and an average annual precipitation of about 40 inches (Interstate Commission on the Potomac River Basin 1998).

Geology

The upper Anacostia watershed lies within the western edge of the coastal plain physiographic province and the eastern edge of the piedmont plateau. The fall line is a zone of transition between the two provinces, where the hard, crystalline bedrock of the piedmont descends under the soft, coastal sediments, giving rise to numerous rapids and falls in streams and rivers. The piedmont bedrock continues to slope southeastward at a rate of about 125 feet per mile (Johnston 1964).

Almost all of the exposed crystalline bedrock of the upper Anacostia watershed occurs within Montgomery County. At the western edge of the watershed in the piedmont are the Norbeck Intrusive Suite (equivalent to the formerly mapped Norbeck Quartz Diorite) and Kensington Tonalite, granitoid intrusions of biotite-hornblende tonalite and muscovite-biotite tonalite, respectively (Maryland Geological Survey 1968, Drake 1998a). These rocks intrude the metasedimentary schistose rocks of the Laurel Formation and Loch Raven Schist, which are equivalent to the formerly mapped Lower Pelitic Schist and Boulder Gneiss of the subdivided Wissahickon Formation (Maryland Geological Survey 1968, Aleinikoff 2002). Much of Northwest Branch and upper Paint Branch cut across this bedrock, forming major stream valleys. Northwest Branch Gorge, with its massive boulders and waterfalls, is one of the region's most spectacular natural features.

The coastal plain section of the upper Anacostia (all of the watershed in Prince George's County and some areas along the fall line in Montgomery County) is underlain by vast deposits of sand, gravel, silt, and clay of the Lower Cretaceous Potomac Group (Patuxent Formation). These deposits overlie crystalline bedrock and are highly variable throughout the formation, ranging from small to massive, heterogeneous lenses to interbedded layers. The thickness of the unit varies from thin layers in places along the fall line to several thousand feet off the eastern shore (Mixon et al. 2000), with an average thickness of 500 feet (Obermeier 1984). Particularly large outcrops of sand occur in the area of the Konterra sand and gravel pits eastward to BARC (Darton 1939, Johnston 1964). Tertiary gravels of Miocene and Pliocene ages cap the highest elevations of the fall line and coastal plain. Quaternary sand and gravel deposits and alluvium outcrop at lower elevations along streams and incised lowland valleys.

METHODS

Because of time constraints and the large size of the study area, we mainly confined our surveys to unexplored areas and communities in need of documentation. We selected sites based on a number of criteria, including the presence of old-growth characteristics, a pattern of reoccurrence across the landscape, a lack of alteration by artificial disturbances, a lack of invasive exotic species, and the presence and quality of populations of species of conservation concern (NatureServe 2005). We did not document exotic flora, except to note cases where such species threaten a site or if a species was unreported for the region. In addition, previous floristic studies in the upper Anacostia watershed and topographic and geologic maps of the area were examined to help determine priorities for surveys. Aerial photos provided by the Maryland Wildlife and Heritage Program were also examined.

Field work began in early August of 2005 and continued through November of 2005. Field reconnaissance and surveys were extensive and were mostly conducted by walking. Particularly large areas, and especially disturbed or weedy sites, were viewed by automobile from road edges to determine if an area warranted further investigation. Detailed field notes on the distribution, rarity, and habitat of plant species were compiled by the second author. Occasionally, plant specimens of notable or difficult to identify taxa were collected, pressed, and deposited at the United States National Herbarium - D.C. and Vicinity Collection (US), the National Arboretum Herbarium (NA), and the City of Alexandria herbarium (coa). Plant identifications were made using the floras of Brown and Brown (1972, 1984) and Fernald (1950). Specimens of *Dichanthelium* were determined and the identification of *Vaccinium* species were checked by John Townsend, botanist with the Virginia Division of Natural Heritage.

Quantitative compositional and environmental data using the relève method (Peet et al. 1998, Fleming et al. 2005) were collected from ten representative 400 m² forested plots and one 100 m² herbaceous vegetation plot. In general, the classification process compares field data from a group of sites to determine similarities and differences. Collecting field data involves the marking of a plot on the ground and documenting all the species within the plot, as well as measuring how much area of the plot each species covers. Environmental data are also collected, such as soil conditions, flooding regime, etc. Plot data will be included in a regional analysis of natural community types as part of the U.S. National Vegetation Classification (NVC). To further broaden our classification data, community descriptions were recorded by the second author at 12 observation points.

RESULTS AND DISCUSSION

Floristic summary

A total of 443 vascular plants (including infraspecific taxa and hybrids) representing 249 genera in 94 families were documented in the study area. This does not include all previously documented species, including rare and disjunct taxa.

The majority of taxa are typical of the coastal plain, with many at or near their western limits in Maryland. Taxa that are strongly disjunct from a primary range in the outer coastal plain include *Andropogon glomeratus*, *Andropogon ternarius*, *Carya pallida*, *Croton willdenowii*, *Dichanthelium leucothrix*, *Eleocharis tortilis*, *Euphorbia ipecacuanhae*, *Euphorbia marilandica*, *Juncus longii*, *Linum intercursum*, *Myrica pensylvanica*, *Pityopsis graminifolia*, *Platanthera blephariglottis*, *Polygala lutea*, *Saccharum gigantea*, *Scleria muehlenbergii*, and *Vaccinium formosum*.

Thirty-six taxa are additions to the BARC Flora (Terrell et al. 2000), including *Angelica venenosa, Aristolochia serpentaria, Asclepias amplexicaulis, Baccharis halimifolia, Betula populifolia, Carex bullata, Carya pallida, Celtis tenuifolia, Ceratophyllum demersum, Clitoria mariana, Desmodium marilandicum, Dichanthelium columbianum, Dichanthelium leucothrix, Dichanthelium sphaerocarpon* var. *sphaerocarpon, Diodia virginiana, Euphorbia marilandica, Glyceria canadensis, Gratiola virginiana, Juncus debilis, Linum intercursum, Lysimachia terrestris, Mimulus ringens, Murdannia keisak, Pinus strobus, Pityopsis graminifolia, Platanthera blephariglottis, Polygala sanguinea, Poncirus trifoliata, Proserpinaca palustris, Quercus prinoides, Smilax pseudochina, Solidago bicolor, Solidago uliginosa, Stylosanthes biflora, Vaccinium caesariense,* and *Vaccinium formosum*.

Some treatments include *Dichanthelium columbianum* under *D. sabulorum*; *D. leucothrix* under *D. acuminatum*; *Euphorbia marilandica* under *E. corollata*; and *Vaccinium caesariense* and *V. formosum* under *V. corymbosum*.

Rare taxa

Twenty-two of the documented species are listed as uncommon to highly rare in Maryland, including some with endangered or threatened status (DNR 2003). The 22 species are listed below, with brief descriptions of their habitats, rarity, and the sub-watershed in which they occur.

Aster radula (rough-leaved aster) is primarily a northeastern species that reaches its southern range sparingly in Fall Line Magnolia Bogs of the Washington, D.C. region and mountains of Virginia and West Virginia (Fernald 1950, Strong et al., in prep.). It is state endangered in Maryland, occurring in the Indian Creek watershed at the Ammendale and Konterra Bogs and historically at the Powder Mill Bogs in the Paint Branch watershed.

Juncus longii (Long's rush) is a state endangered and globally uncommon species apparently restricted to sandy or clayey, sphagnous swales and bogs of the coastal plain (Strong et al., in prep.). It occurs in the Little Paint Branch watershed at Little Paint Branch Bog #1 and abundantly in a sandy seepage swale near Sellman Road and Interstate 95. A small population also occurs at the edge of Powder Mill Bog #3 on the grounds of the White Oak U.S. Army Research Lab in the Paint Branch watershed.

Linum intercursum (sandplain flax), a state threatened species, occurs on dry to moist, open ground from the coastal plain of New England and the mid-Atlantic to the piedmont and mountains of the southeast, and disjunctly in northern Indiana (Weakley 2006). It was discovered at the edge of a small, sphagnous swale in thin pine woodland at the eastern end of the abandoned east-west runway of the old Beltsville Airport at BARC. The pine woodland is characterized by acidic, often exposed clay soils and is part of the Beaverdam Creek watershed.

Platanthera blephariglottis (white-fringed orchid) is a state threatened species associated with sphagnous swales and bogs of the coastal plain. It was once well-distributed in bogs along the fall line in the Washington, D.C. area in the late 1800s and early 1900s, but most of those bogs and surrounding lands have long since been destroyed (Strong et al., in prep.). Today, it is highly rare on Maryland's western shore, with most of the remaining populations occurring in the Annapolis region (Sipple 1999). A thriving population was discovered in a pristine, sphagnous seep in *Pinus rigida* dominated forest on the Central Farm at BARC. This area is part of the Beaverdam Creek watershed.

Sarracenia purpurea L. (purple pitcher plant), a state threatened species of the northeastern U.S. that reaches its southern limits in Maryland and northeastern Virginia (Weakley 2006), occurs in Powerline Bog 1 at BARC in the Beaverdam Creek watershed. Terrell et al. (2000) report this species as "possibly introduced" at BARC. While this is plausible, it is worth noting that the BARC bogs are somewhat similar geologically and floristically to bogs in Anne Arundel County with naturally-occurring *Sarracenia purpurea*.

Smilax pseudochina (halberd-leaved greenbrier) is a state threatened species associated with sandy bogs and seeps of the coastal plain and Fall Line Magnolia Bogs in the Washington, D.C. area (Fernald 1950, Strong et al., in prep.). It was newly discovered at the Buck Lodge Bog just below the Buck Lodge Community Park in the Paint Branch watershed. It was also discovered in a large, wooded seep near Powerline Bog 2 at BARC in the Beaverdam Creek watershed.

Stenanthium gramineum var. *robustum* (giant featherbells), a state threatened species, is associated with open and wooded seeps from the mid-Atlantic coastal plain west to Indiana and south to western North Carolina (Fernald 1950, Weakley 2006). It occurs in a large woodland seep at the upper headwaters of the Paint Branch near Spencerville.

Platanthera flava var. *herbiola* (pale green orchid) is a state rare species that inhabits bogs and seeps from the northeastern U.S. south to the mountains and piedmont of North Carolina (Weakley 2006). Many plants were seen in swampy sections of the extensive wooded seepage swale that includes the Airport Bog at BARC. These wetlands are part of the Beaverdam Creek watershed.

Scleria muehlenbergii [*Scleria reticularis* var. *pubescens*] (pitted nutrush) is a state rare species that occurs primarily in open sandy seeps and damp swales of the coastal plain from southern New England south to Florida and west to Texas, and occasionally in the interior to Missouri (Weakley 2006). It occurs abundantly in a sandy seepage swale near Sellman Road and Interstate 95 in the Little Paint Branch watershed.

Bartonia paniculata (screwstem) is an uncommon to rare species associated with bogs and acidic woodland seeps. It occurs mainly on the coastal plain from New England south to Florida and west to east Texas (Weakley 2006). Numerous plants were seen along the extensive wooded seepage swale that includes the Airport Bog at BARC. These wetlands are part of the Beaverdam Creek watershed.

Betula populifolia (gray birch) is rarely known in Maryland, and is disjunct from its primary range in New England and southern Quebec and Ontario where it occurs in acidic, dry to moist soil in open areas, woodland edges, and bogs (Fernald 1950). It is reported for Maryland (Brown and Brown 1972), but its status in the state is unknown. It occurs infrequently in moist, sandy soil under the powerline along the edge of the Coniferous Research Forest on the East Farm at BARC in the Beaverdam Creek watershed.

Carex bullata (button sedge) is an uncommon to rare species associated with seeps, bogs, and other non-alluvial wetlands primarily of the coastal plain (Fernald 1950, Frye and Lea 2001). Several fairly large colonies occur in the vicinity of the Airport Bog on the East Farm at BARC in the Beaverdam Creek watershed. A colony also occurs at the Aitcheson Bog in the Indian Creek watershed and at Little Paint Branch Bog #1 in the Little Paint Branch watershed.

Castanea dentata (American chestnut) was once widespread in upland forests of eastern North America, but its populations have severely declined as a result of the introduced chestnut blight in the early 20th Century. Today, it barely exists throughout its former range, much reduced in size and numbers. Saplings and old trunk resprouts were observed in acidic, upland forests in all five sub-watersheds of the upper Anacostia River. This species is uncommon to rare in Maryland, with fruiting trees being exceptionally rare.

Dichanthelium leucothrix (white-haired panic grass) is an uncommon to rare species that is characteristic of dry to moist sandy areas and pine barrens of the coastal plain from southern New Jersey south to Florida and west to Texas (Fernald 1950). It was collected in sandy soil on the East Farm at BARC.

Eleocharis tortilis (twisted spikerush) is an uncommon to rare species that inhabits seeps and bogs of the coastal plain from New Jersey south to Florida and west to Texas, with infrequent occurrences inland (Weakley 2006). Large colonies occur at Little Paint Branch Bog #1 in the Little Paint Branch watershed.

Juglans cinerea (butternut), a state and globally uncommon to rare species as a result of an introduced fungal disease, occurs in rich floodplain forest near the Bonifant Road crossing of Northwest Branch in Northwest Branch Park. This species ranges in distribution from the northeastern states south to the southern Appalachians (Fernald 1950).

Kalmia angustifolia (sheep laurel) is primarily a northeastern species of dry, acidic barrens and bogs that also occurs less frequently in bogs and sandy barrens of the mid-Atlantic coastal plain and rarely in the southern Appalachians (Fernald 1950, Weakley 2006). Several plants were observed in moist, sandy soil near Powerline Bog 2 on the East Farm at BARC in the Beaverdam Creek watershed. This species is uncommon to rare in Maryland.

Lycopodium tristachyum (deep-root ground pine), an uncommon to rare species of dry, sandy-gravelly soils from Quebec and New England south to North Carolina (Fernald 1950), occurs in acidic, sandy-gravelly soil at the edge of oak-heath forest above the Sandy Spring Bog (McKnew Bog) in the Little Paint Branch watershed.

Magnolia tripetala (umbrella magnolia) is an uncommon to rare species with a primary range in the southern Appalachians and disjunctly in the Ozarks and piedmont and coastal plain of Virginia and Maryland north to southern Pennsylvania (Fernald 1950, Weakley 2006). It occurs in an old-growth upland forest remnant (Longmeade) in the Northwest Branch watershed west of Notley Road.

Quercus prinoides (dwarf chinquapin oak) occurs in a variety of habitats from rocky uplands to sand barrens to open grasslands, and ranges in distribution from New England west to Minnesota and Nebraska south to Texas and infrequently in the Appalachians, piedmont, and coastal plain of the Carolinas, Virginia, and Maryland (Fernald 1950, Harvill et al. 1992, Weakley 2006). It is a common species of the New Jersey Pine Barrens (McAtee 1918). Many specimens of varying sizes, including an ancient tree at nearly a meter in circumference at breast height, occur in *Pinus rigida* dominated forest on the Central and East Farms at BARC in the Beaverdam Creek watershed.

Solidago patula (roughleaf goldenrod) is an uncommon to rare species with seemingly weak characters supporting a taxonomic division between northern and southern varieties. However, throughout its range (considering both northern and southern varieties) from New England west to Wisconsin and south to Florida, it occurs in swamps, seeps, bogs, wet meadows and woods, and along streams (Fernald 1950, Brown and Brown 1984, Johnson 1995, Weakley 2006). Several very large plants occur at the edge of low, mesic woodland along Indian Creek near the Ammendale Bog.

Solidago uliginosa (bog goldenrod) occurs in bogs, seeps, and acidic swamps from New England west to southern Michigan and Wisconsin and south to North Carolina (Fernald 1950, Weakley 2006). It was newly discovered at BARC in a seepage forest community near Springfield Road on the Central Farm. This species is uncommon to rare in Maryland.

Natural communities and habitats

Descriptions of 18 natural communities and 2 habitats documented in this study are listed below, including some which appear to represent new community types not yet described in the NVC. Several of the 11 surveyed communities at BARC, especially those dominated by *Pinus rigida*, overlap somewhat floristically and may ultimately be classified as variants of fewer types. For example, all of the upland and lowland *Pinus rigida* communities at BARC are tentatively named Pine Barrens Pine - Oak Woodland and Pine Barrens Lowland Forest, respectively. Community type names follow, in part, Fleming et al. (2005), Lea (2004), and the NVC.

Dry to Dry-Mesic *Pinus rigida* Forests and Woodlands

Pinus rigida is the dominant and characteristic tree of the New Jersey Pine Barrens, where it occurs on sandy soils (Harshberger 1916, McAtee 1918). *Pinus rigida* as a dominant community component is highly rare in the greater Washington, D.C. area, more or less reaching its southern coastal extension in the eastern U.S. on the vast, deep Cretaceous sand deposits that extend from BARC eastward through the Odenton area to the Magothy River region between Annapolis and Baltimore. It is locally abundant in a variety of habitats throughout this region, from xeric to hydric, likely owing its presence and distribution more to the deep, sandy soils than the role of fire as a major developing factor. Innumerable old-age trees occur throughout, suggesting that these communities have persisted for millenia. The role of fire as a major factor in creating or maintaining *Pinus rigida* communities in the region is not well-understood and should not be assumed. Fire is apparently a component of some types of pine forest in the New Jersey Pine Barrens, although Harshberger (1916) noted that fire was mainly associated with young, scrubby pine forests and that, conversely, fire had damaged or destroyed old-age pine forests. The presence of old-age *Pinus rigida* in apparent equilibrium with other canopy trees, evidence of *Pinus rigida* seedling recruitment, and almost complete lack of evidence of fire or detrimental effects resulting from its suppression suggest that fire is probably a minor component of *Pinus rigida* communities in the Washington, D.C. area. All of the *Pinus rigida* communities in the region are likely allied with similar types in the New Jersey Pine Barrens.

McAtee (1918) asked the question, "why we have no pine barrens in our region, nor indeed anywhere in the Maryland coastal plain…given that seven-tenths of the distinctive pine barrens plants…occur in eastern Maryland and Delaware?" Curiously, neither Shreve (1910) nor McAtee (1918) noted large stands of *Pinus rigida* within Maryland's coastal plain, despite visiting Odenton and other sandy areas dominated by pine. Nevertheless, since most survey sites were accessed by electric trolley line and railroad in that era, with stations east of Washington being remote, it is understandable that many areas were inaccessible. Moreover, Hitchcock and Standley (1919) noted that areas to the east of Lanham were "virtually unexplored."

The following types have yet to be officially classified in Maryland. The names (nominals) for these types are suggestive based on floristic dominance within the stand/community or diagnostic importance, and are provisional at this time. All of these upland communities are tentatively named Pine Barrens Pine – Oak Woodland. This new NVC community type is most closely related to vegetation known previously only from the New Jersey Pine Barrens and is globally rare, with fewer than 20 sites known to support it (NatureServe 2005).

Pine Barrens Pine – Oak Woodland
Pinus rigida - Quercus coccinea / Castanea pumila / Gaylussacia baccata - Vaccinium pallidum Forest

Classification plots: 0; 2 observation points (#1 and #8)

An extensive pine barrens community type that occurs on fairly flat to gently rolling uplands, primarily on the Central and East Farms at BARC. Soils are submesic to xeric, deep, well-drained, acidic and generally infertile sandy loams and sandy clay-loams. This type is perhaps best developed in the Washington, D.C. area at BARC and the Patuxent Wildlife Refuge.

Forest stands are characterized by a widely-spaced, closed to somewhat open canopy of *Pinus rigida* and *Quercus coccinea*, a sparse understory, and an extremely dense, nearly continuous short shrub and herb layer of *Gaylussacia baccata* and *Vaccinium pallidum*. Herbs are almost entirely lacking, except for small traces of *Chimaphila maculata* and *Cypripedium acaule*.

Pinus rigida and *Quercus coccinea* are the predominant (sometimes exclusive) canopy species, with many of the pines being old-age. *Quercus alba* and *Pinus virginiana* also occur in the canopy at observation point #8 on the East Farm, but are not common. The dominant understory species at point #1 on the Central Farm are *Quercus velutina*, *Quercus alba*, *Quercus marilandica*, *Quercus falcata*, *Sassafras albidum*, and *Nyssa sylvatica*. The understory at point #8 is predominately composed of *Nyssa sylvatica*, and also includes *Quercus falcata*, *Quercus coccinea*, *Quercus alba*, *Pinus virginiana*, *Sassafras albidum*, and *Acer rubrum.* (Point #8 may be slightly more mesic than point #1, as evidenced by the dominance of *Nyssa sylvatica* in the understory and the presence of *Acer rubrum*.) *Castanea pumila* is the characteristic tall shrub, with *Kalmia latifolia* also present at point #8. *Gaylussacia baccata* is by far the dominant shrub throughout the short shrub and herb layer, with *Vacinium pallidum* occurring to a lesser extent. *Vaccinium stamineum*, *Lyonia mariana*, and *Smilax glauca* also occur in the short shrub and herb layer. Herbs of this community are generally very sparse, with *Chimaphila maculata* and *Cypripedium acaule* as the characteristic species.

The best expressions of this type are now rare within the Anacostia watershed, perhaps being more common in the past. The large size and mostly undisturbed condition of these sites, overall rarity, and presence of numerous, old-age *Pinus rigida* make them very high conservation priorities.

Old fire scars were seen at the base of oak trees at point #1, but evidence of fire was not seen at point #8 or in other areas. The lack of fire may pose a long-term threat. However, the very rare presence of *Fagus grandifolia*, a fire intolerant species, was the only indication of this. Although invasive exotic species are essentially absent from these sites, soil disturbance through the construction of roads and trails, including foot traffic, provides corridors for the spread of noxious weeds and opportunistic native species into the forest interior from the edges. Perhaps the largest threats to this community and surrounding forest are major U.S.

government land development projects, such as the recently built Department of Defense facilities.

Pine Barrens Pine – Oak Woodland
Pinus rigida / Sassafras albidum - Quercus prinoides / Gaylussacia baccata - Vaccinium pallidum Forest

Classification plots: 2 (Upper Anacostia 2 and 6); 1 observation point (#11)

This rare community type occurs on gently rolling uplands within the pine-oak-heath forests on the Central and East Farms at BARC. The stands are characterized by somewhat open vegetation at all strata levels, locally abundant and gnarled *Sassafras albidum* and *Quercus prinoides* in the understory, and a patchy short shrub and herb layer represented mainly by *Gaylussacia baccata* and *Vaccinium pallidum.* Soils are submesic to xeric, acidic, deep, sandy-peaty loams, with a spongy, fairly thick covering of pine needles. These stands lack the continuous colonies of heaths in the shrub and herb layers that characterize the preceding type, are more floristically diverse, and are recognizable in the broader landscape by their open aspect and dominance of gnarled, fairly large *Sassafras albidum* in the understory. Stands are approximately one to several acres in size.

Pinus rigida, *Quercus falcata*, *Quercus velutina*, *Quercus marilandica*, *Quercus alba*, and *Pinus virginiana* are the typical canopy species. (The sampled stand - Upper Anacostia 6 - had the highest cover class (9) of *Pinus rigida* of any sampled plot within the upper Anacostia watershed.) The understory is represented by *Sassafras albidum*, *Quercus velutina*, *Quercus coccinea*, *Quercus falcata*, *Quercus alba*, and *Pinus virginiana*. The dominant species in the tall shrub layer are *Quercus prinoides*, *Sassafras albidum*, *Castanea pumila*, *Quercus marilandica*, and *Vaccinium fuscatum*. (*Quercus prinoides* is highly rare in the Washington, D.C. region.) Other species that occasionally occur in the tall shrub layer are *Quercus falcata*, *Quercus velutina*, *Quercus phellos*, *Ilex opaca*, *Liquidambar styraciflua*, *Acer rubrum*, and *Prunus serotina*. *Gaylussacia baccata* and *Vaccinium pallidum* are the dominant species of the short shrub and herb layers, and are often intermixed with low covers of *Vaccinium stamineum*, *Castanea pumila*, *Amelanchier* spp., *Smilax rotundifolia*, *Smilax glauca*, and *Mitchella repens*. *Gaylussacia frondosa*, *Amelanchier canadensis*, and *Lyonia mariana* were noted in the Upper Anacostia 6 plot, which was slightly more mesic than the others. The herbs are very sparse to lacking, with *Carex cf. nigromarginata*, *Cypripedium acaule*, and *Chimaphila maculata* as the most typical species. However, nearby these stands are open glades with exposed sandy soil and scattered patches of *Dichanthelium commutatum* var. *ashei*, *D. columbianum*, *D. depauperatum*, *D. leucothrix*, *Carex* spp., and other herbs.

This community type is highly rare within the Anacostia watershed, perhaps being more common in the past. The local abundance of *Quercus prinoides* (especially in association with *Pinus rigida*), mostly pristine condition, and overall rarity in the region make these sites very high conservation priorities.

Invasive exotic species are almost totally absent from these stands, although, not surprisingly, one stilt grass plant (*Microstegium vimineum*) was found growing along a deer trail through the Upper Anacostia 6 plot. Old, unpaved service roads that lead into the forest from the agricultural fields, including areas fairly close to the stands, are now infested with noxious weeds like *Microstegium vimineum*, *Polygonum cespitosum*, and *Perilla frutescens*. Potentially invasive native species that expand their range from more mesic sites into upland areas, such as *Liquidambar styraciflua* and *Liriodendron tulipifera*, also occurred as seedlings in the stands and may present a future threat. The lack of fire may also pose a long-term threat, although there was no indication of this. Perhaps the largest threats to this community and surrounding forest are major U.S. government land development projects.

Pine Barrens Pine – Oak Woodland
Pinus rigida - Pinus virginiana / Vaccinium fuscatum / Epigaea repens Forest

Classification plots: 0; 1 observation point (#4)

Relatively small stands occur on fairly flat to gently rolling uplands close to Powder Mill Road on the Central Farm at BARC. Similar stands may also occur along Beaver Dam Road on the East Farm. Soils are submesic to xeric, acidic, deep sandy loams, with a thick, spongy cover of pine needles. They are floristically less diverse than the other *Pinus rigida* communities, and are characterized by a closed canopy of *Pinus rigida* and *Pinus virginiana*, including old-age specimens, and very sparse vegetation in all other strata. Their composition and proximity to open disturbed areas and road edges may suggest an unusual successional pine community type, despite being old-age, that remains somewhat arrested in development. Stands are approximately several acres in size.

The canopy is composed of large *Pinus rigida* and *Pinus virginiana*, some of which are old-age. *Liquidambar styraciflua* and *Nyssa sylvatica* are the common understory species, but are not dominant. *Vaccinium fuscatum* is the typical tall shrub. *Gaylussacia baccata*, *Vaccinium pallidum*, *Vaccinium stamineum*, *Lyonia mariana*, and *Smilax glauca* comprise the very open short shrub layer. The very sparse herb layer is composed of scattered *Cypripedium acaule*, *Mitchella repens*, and *Epigaea repens*. The presence of *Epigaea repens* in a *Pinus rigida* community is locally significant.

Also significant are the occurrences of *Pityopsis graminifolia*, *Euphorbia marilandica*, and historically *Lupinus perennis* that grow along the edges of these and similar communities.

Despite the possibility that these stands may be somewhat successional in nature, their overall rarity in the region, mostly pristine condition, and presence of old-age *Pinus rigida* and *Pinus virginiana* make them high conservation priorities.

Invasive exotic species are largely absent from the stands. However, a very small trace of *Microstegium vimineum* was

noted at observation point #4. An old, unpaved service road that leads through the forest near the stands is heavily infested with *Microstegium* and other weeds, which are slowly spreading into the forest. Perhaps the largest threats to this community and surrounding forest are major U.S. government land development projects.

Pine Barrens Pine – Oak Woodland
Pinus rigida - Quercus falcata - Quercus (alba, coccinea, velutina) / Gaylussacia frondosa Forest

Classification plots: 2 (BARC 1 and 3; 1 observation point (#6). BARC 1 was sampled in 2004 as part of the 2004-2007 National Park Service-NatureServe National Capital Region (NCR) vegetation classification project.

This fairly extensive type occurs on generally flat uplands on the East Farm at BARC along the powerline between Beaver Dam Road and Springfield Road (Deciduous Research Forest) and just east of Soil Conservation Road and north of Beck Lake (Coniferous Research Forest). Soils are submesic to somewhat xeric, weathered, acidic, sandy loams and sandy clay-loams that are often underlain by densely compacted hardpans of sandy-silty clay-loam that retain moisture seasonally. Stands are characterized by a mixture of mature pines and oaks in the mostly closed canopy, a generally closed understory dominated by *Nyssa sylvatica* and *Acer rubrum*, and a dense, nearly continuous short shrub and herb layer dominated by *Gaylussacia frondosa*. (Occasional old-age pines are scattered throughout.)

Pinus rigida is the predominant canopy species, with *Quercus falcata* a characteristic co-dominant and occasional dominant. Other typical canopy species include *Quercus alba*, *Quercus velutina*, *Quercus coccinea*, and *Pinus virginiana*. The dominant understory species is *Nyssa sylvatica*. *Acer rubrum*, *Quercus coccinea*, *Quercus velutina*, and *Sassafras albidum* also occur in the understory. Characteristic species of the tall shrub layer are *Nyssa sylvatica*, *Sassafras albidum*, *Acer rubrum*, *Vaccinium fuscatum*, *Vaccinium corymbosum*, *Amelanchier arborea*, *Ilex opaca*, and *Smilax rotundifolia*. Low covers of *Kalmia latifolia* and *Leucothoe racemosa* are present in the BARC 3 stand. *Gaylussacia frondosa* is the dominant medium to tall shrub in the BARC 1 stand, with *Castanea pumila* as co-dominant. The short shrub and herb layers of this type are predominately comprised of *Gaylussacia frondosa*, along with much smaller covers of *Vaccinium pallidum*, *Vaccinium stamineum*, *Lyonia ligustrina*, *Lyonia mariana*, *Smilax glauca*, *Epigaea repens*, *Gaultheria procumbens*, and *Lycopodium obscurum*. *Epigaea repens* and *Galutheria procumbens*, in association with *Pinus rigida* communities, are highly rare in the Washington, D.C. area. The state-rare *Chimaphila umbellata* is reported for the Deciduous Research Forest (Terrell et al. 2000) and potentially occurs within this community. Herbs are very sparse to lacking, with *Monotropa uniflora* and *Cypripedium acaule* as the typical species. (*Medeola virginiana* is a very minor component of the BARC 3 stand.)

The fairly large extent and pristine condition of these sites, overall rarity in the region, and presence of mature, as well as old-age, *Pinus rigida* make them very high conservation priorities.

Invasive exotic species are essentially absent from the stands and surrounding forest. However, small amounts occur along the roads, trails, and powerline near the stands. (A large infestation of woody invasive exotic plants and *Microstegium vimineum* occurs near Powerline Bog 1 in the Deciduous Research Forest.) Numerous pits several feet deep are scattered throughout the Coniferous Research Forest in and around the stands. Construction of the pits, presumably for research, obviously affects the integrity of the forest. The lack of fire may also pose a long-term threat, although there was no indication of this. Perhaps the largest threats to this community and surrounding forest are major U.S. government land development projects.

Other Dry to Dry-Mesic Forests and Woodlands

Appalachian/Northern Piedmont Low-Elevation Chestnut Oak Forest
Quercus alba - Quercus montana - Pinus pungens / Kalmia latifolia - Viburnum acerifolium Forest (slope variant)

Classification plots: 1 (Upper Anacostia 1)

This relatively small section of forest covers an area approximately 5 acres in size, with the plot location being the best representation within the stand, and occurs on north-facing, sloping land along Northwest Branch. The soils are weathered, well-drained, shallow silty-loams intermixed with numerous saprolitic rock fragments. (Rock outcrops are not present within the stand.) This unusual variant combines montane elements (*Pinus pungens* and *Aralia nudicaulis*) with *Viburnum acerifolium*, a characteristic element of northeastern oak-hickory forests. This apparently globally secure upland community is highly threatened within the upper Anacostia watershed.

Quercus alba is the dominant canopy species, with *Quercus montana* and *Quercus coccinea* prominent. Old-age *Pinus pungens* is well-distributed, but produces a fairly small crown and canopy cover. (*Pinus pungens* is a rare species in the Washington, D.C. area, generally disjunct from its primary range in the Appalachians.) *Carya glabra* is also intermixed in the canopy as well as *Liriodendron tulipifera*, which occurs near the toe-slope at a fairly high cover. *Nyssa sylvatica*, *Castanea dentata*, *Acer rubrum*, *Fagus grandifolia*, *Ilex opaca*, *Cornus florida*, and *Sassafras albidum* are the dominant understory species. *Kalmia latifolia* and *Viburnum acerifolium* are the dominant shrubs, intermixed with *Viburnum recognitum*, *Amelanchier arborea*, and *A. laevis*. The short shrub and herb layer is somewhat sparse, with *Aralia nudicaulis*, *Vaccinium pallidum*, and *Lonicera sempervirens* as the dominant species. *Lonicera sempervirens* is rare in the region and typically occurs in rocky or gravelly oak forests along the fall line.

Threats to the stand include encroachment from opportunistic native species like *Fagus grandifolia* and *Liriodendron tulipifera*, which expand their range into

upland forests and eventually shade out oak and pine seedlings and shrub colonies. (*Fagus grandifolia* does not appear to be a component of this community and has recently invaded the stand.) *Pinus pungens* appears to be dying out of the stand, likely the result of increasing shade. Invasive exotic plants found within the plot include *Celastrus orbiculatus*, *Malus* sp., *Prunus subhirtella*, and *Rubus phoenicolasius*. *Microstegium vimineum* and *Polygonum cespitosum*, in addition to *Rubus phoenicolasius*, are scattered along the heavily-used footpath below the stand.

Appalachian/Northern Piedmont Low-Elevation Chestnut Oak Forest
Quercus spp. / Kalmia latifolia - mixed ericad - Hamamelis virginiana - Amelanchier arborea Shrubland/Woodland (slope variant)

Classification plots: 1 (Upper Anacostia 3)

This very small community covers an area approximately an acre in size on a moderate to steep, southwest-facing upper slope above Northwest Branch. The terrain abruptly becomes very steep where the slope intersects large outcrops of schist of the Laurel Formation. The soils are weathered, well-drained, shallow silty-loams intermixed with numerous saprolitic rock fragments of the underlying schist. (Rock outcrops are not numerous within the sampled plot.) Although this stand might technically be classified as a woodland, it may perhaps be more appropriately described as a shrubland, owing to the extreme density and high diversity of the shrub species and the relatively sparse canopy and stunted nature of the overstory species.

The canopy and understory are comprised of *Quercus coccinea*, *Quercus rubra*, *Quercus montana*, *Quercus alba*, and *Quercus velutina*, including a low cover of *Pinus virginiana*. The shrub and herb layers form a continuous, extremely dense thicket with a high diversity of ericaceous (heath-family) species. *Kalmia latifolia* is the dominant shrub, followed by *Hamamelis virginiana*. Other shrubs of prominent cover include *Gaylussacia baccata*, *Vaccinium pallidum*, *Vaccinium stamineum*, *Rhododendron periclymenoides*, *Gaultheria procumbens*, *Epigaea repens*, *Amelanchier arborea*, *Castanea dentata*, and *Castanea pumila*. *Aronia melanocarpa* occurs just outside the plot on a rock ledge, but is likely an associate of the community as well. Both *Aronia melanocarpa* and *Gaultheria procumbens* are fairly rare in the Washington, D.C. area. Herbaceous plants are generally lacking, although *Baptisia tinctoria*, *Solidago speciosa* var. *erecta*, *Hieracium paniculatum*, and various graminoids occur sparingly in openings and are characteristic of the community. Bryophytes comprise a fairly high cover.

This stand is nearly pristine, with almost no invasive exotic plants or evidence of disturbance, except an old, small trail. However, recent construction by M-NCPPC of a large, unpaved trail through the interior of the dry, upland oak-heath forest above the plot has given rise to an increasingly serious infestation of *Microstegium vimineum*, which is starting to seed into the plot.

Oak – Heath Forest
Quercus montana - Gaylussacia baccata - Vaccinium pallidum Forest (including variants)

Classification plots: 2 (Upper Anacostia 4 and 8)

This community type occurs on the upper slopes and summits of terraces and hills which form the highest elevations at BARC at greater than 200 feet in elevation. The stands are characterized by a nearly monospecific canopy of old-age *Quercus montana*, a sparse understory, extremely dense, nearly continuous colonies of *Gaylussacia baccata* and *Vaccinium pallidum*, and a very sparse herb layer and total species composition. The canopy varies from closed to somewhat open, depending on the exposure to wind and other growth-limiting factors. The soils vary considerably in composition, although they are all acidic to strongly acidic in pH. Soils of the sampled stand on the Central Farm (Upper Anacostia 4) are a deep, weathered sandy-loam, with minor amounts of very small quartzite gravel (<1cm) and no evidence of larger gravels or cobbles. This is the typical soil type for much of the BARC uplands. In contrast, the soils from the sampled stand on the North Farm (Upper Anacostia 8) and the observed stand on the South Farm are typical of tertiary gravel terraces (Pliocene to Miocene age) that occur at the highest elevations along the fall line in the greater Washington, D.C. area. These soils are extremely weathered (leached), strongly acidic (average pH 4.0), sandy clay-loams that are light gray in color (Simmons 1995). Scattered, large quartzite cobbles (gravels) 20cm or greater in size typically "cap" the surface and are also interbedded in the soil with smaller gravels.

Forest overstories at these high, windswept locations consist almost exclusively of *Quercus montana*, with a minor cover of *Pinus virginiana*. The North and South Farm stands are almost completely lacking in understory vegetation, except for *Quercus montana*. The Central Farm plot contains a slightly higher cover of understory trees, including *Sassafras albidum*, *Quercus coccinea*, and *Nyssa sylvatica*, in addition to *Quercus montana*, likely owing to the sub-mesic, sandy-loamy soils. *Quercus* spp., *Sassafras albidum*, *Nyssa sylvatica*, *Castanea pumila*, and *Diospyros virginiana* represent the tall shrubs of the Central Farm plot. *Kalmia latifolia*, *Rhododendron periclymenoides*, *Quercus* spp., and *Pinus virginiana* comprise the tall shrub layer of the North and South Farm stands. *Gaylussacia baccata* and *Vaccinium pallidum* are the dominant short shrubs throughout all stands, and are intermixed with *Vaccinium stamineum*, *Lyonia mariana*, and *Castanea pumila*. *Kalmia latifolia* is also prominent in the short shrub layer of the North and South Farm stands. Herbs are essentially absent, except for small traces of *Chimaphila maculata* and *Cypripedium acaule*.

Invasive exotic plants were not observed at these sites.

Good examples of upland Oak - Heath Forest have become increasingly rare throughout the region as a result of urban sprawl. Most if not all are old-age communities, having been spared from farming in the past because the gravelly, acidic soils generally do not support agriculture. In addition to the stands at BARC, other notable examples occur at a

few sites within the Konterra sand and gravel complex, Little Paint Branch Park, Powder Mill Community Park, Buck Lodge Community Park, and Greenbelt Park. All of these sites are high conservation priorities.

Palustrine Communities

***Pinus rigida* Associated Seepage Communities (Non-alluvial Wetlands)**

Pinus rigida is the dominant or co-dominant canopy species in the following upland seepage communities, all of which occur on the Central and East Farms at BARC, except for the Fall Line Terrace Gravel Magnolia Bog type. (The description below does not entirely apply to this type, as it differs somewhat geologically and floristically from seepage communities and bogs at BARC.) Many of the pines are old-age and very large, some being the largest seen in the upper Anacostia watershed. These communities occur as hillside seeps or seepage swales within a larger mosaic of upland pine-oak-heath forest. Most of the characteristic species overlap to varying degrees, with a few notable exceptions. Many species are state-listed as uncommon to highly rare. Soils are moist to saturated, acidic, sandy-peaty loams and peaty sands, with minor amounts of small, pebbly gravels occasionally present and a spongy, thick covering of pine needles and duff. A thick layer of mucky peat is often typical of heavily saturated areas.

Occasional wildfires may have infrequently occurred in the surrounding pine-oak-heath forests and possibly into the wetlands, but the presence and abundance of *Pinus rigida* in seepage wetlands apparently does not suggest a history of fire, but rather the ability of the pines to function as wetland species. In contrast to other canopy trees that occur around and sometimes in seepage wetlands, only *Pinus rigida* and *Nyssa sylvatica* apparently survive the combination of saturated sand and gravel soils and wind-shearing in the canopy. This is probably because both species do not produce a large crown when growing in wetlands. *Liriodendron tulipifera* typically reaches extreme size and old age at the edges of springs and seepages, and can occur as a canopy dominant in seepage forest communities that are not highly saturated, but does not grow to maturity or last very long as a canopy component in highly saturated areas. Periodic fire was probably one of many factors that contributed to regeneration of pine-dominated forests and seepage wetlands, but likely plays a minor role historically in the greater Washington, D.C. area in comparison with ice storms, strong winter winds, thunderstorms, hurricanes, occasional tornadoes, and episodes of catastrophic drought. Moreover, the saturated sand and gravel soils and impermeable clays generally restrict the growth of trees with broad crowns.

All *Pinus rigida* seepage communities are considered globally rare by the Natural Heritage Program network. The presence of old-age *Pinus rigida* in association with highly rare or regionally important community types, the largely undisturbed condition of the stands, the presence of rare flora, and their value as wetlands make all of these sites very high conservation priorities.

Pine Barrens Lowland Forest
Pinus rigida - Nyssa sylvatica - Acer rubrum / mixed ericad / Osmunda cinnamomea - Platanthera blephariglottis Woodland

Classification plots: 0; 1 observation point (#2)

This exceptional seepage forest community on the Central Farm at BARC is approximately one to several acres in size and sits atop a gentle ravine slope formed by several braided springs. Old-age *Pinus rigida* comprise the fairly open forest canopy. The vegetation in all underlying strata is also somewhat sparse, giving the forest an overall open appearance. *Acer rubrum*, *Nyssa sylvatica*, and *Sassafras albidum* are the understory dominants. The shrub layers consist of *Vaccinium* spp., *Gaylussacia frondosa*, *Lyonia ligustrina*, *Leucothoe racemosa*, *Chionanthus virginicus*, *Rhododendron viscosum*, *Amelanchier canadensis*, *Rubus hispidus*, and *Smilax rotundifolia*, with no particular species dominant. Herbs are represented by *Osmunda cinnamomea*, *Woodwardia areolata*, *Platanthera blephariglottis*, *Carex* spp., and *Chasmanthium laxum*. Patches of *Sphagnum* moss are common in shallow depressions and on small hummocks. *Platanthera blephariglottis* is a state-threatened species that was known historically from several seepage bogs in the upper Anacostia watershed (McAtee 1918, Strong et al., in prep.), but has not been seen in nearly a hundred years, as most suitable habitats have been destroyed. It is also a new addition to the BARC Flora (Terrell et al. 2000).

Although several large *Platanthera blephariglottis* plants were observed in flower and some with seed capsules formed, deer browsing is potentially a serious threat to the future survival of this species at BARC. Browsing of woody plants like *Rhododendron viscosum* is a problem as well. Invasive exotic plants are absent from this community, although *Microstegium vimineum* has become a major problem in the stream valley below and it is well established along service roads leading into the upland forest. In addition, U.S. government wetland mitigation projects that replace high quality existing wetlands, such as seepage forests and bogs, with artificial ponds or wetlands are major potential threats.

Pine Barrens Lowland Forest
Pinus rigida - Liriodendron tulipifera - Acer rubrum / Ilex opaca / Osmunda cinnamomea - Carex folliculata Forest

Classification plots: 0; 1 observation point (#5)

This high quality seepage forest occurs on the Central Farm at BARC just off Springfield Road across from Capitol College. Much of the community is a long hillside seep with braided, sphagnous depressions that descends to a perennial seepage stream. The tall height of the canopy trees and somewhat patchy understory and shrub layers gives the forest a rather open appearance, except for the forest floor which is carpeted with extensive colonies of tall *Osmunda cinnamomea*. Very large, old-age *Pinus rigida*, intermixed with *Liriodendron tulipifera*, dominate the mostly closed canopy. Other typical canopy species include *Acer rubrum*, *Quercus phellos*, and *Quercus alba*. The understory is

mainly composed of *Acer rubrum*, with some *Liquidambar styraciflua* and *Nyssa sylvatica*. The most abundant tall shrub is *Ilex opaca*, which is intermixed with *Chionanthus virginicus*, *Ilex laevigata*, *Magnolia virginiana*, *Gaylussacia frondosa*, *Aronia* sp., *Vaccinium* spp., and *Rubus hispidus*. Extensive colonies of very large *Osmunda cinnamomea* and abundant *Carex folliculata* dominate the herb layer. *Osmunda regalis*, *Carex* spp., and other herbaceous plants are also present. A single specimen of *Solidago uliginosa* was observed in a sphagnous depression. *Solidago uliginosa* is a Maryland "Watch List" species and a new addition to the BARC Flora (Terrell et al. 2000). *Sphagnum* moss is also an important component of the community and grows in boggy seeps and shallow depressions throughout the site.

Invasive exotic plants are essentially absent from this community, although *Microstegium vimineum* and other weeds have become established along Springfield Road above the site and are potential future threats. Potential widening or straightening of Springfield Road or other construction in the vicinity would present a significant threat to the wetlands and surrounding forest. Improperly directed stormwater runoff from Capitol College or increased flow of channelized runoff into the small seepage stream below the site would also seriously threaten the future integrity of the site. In addition, U.S. government wetland mitigation projects that replace high quality existing wetlands with artificial ponds or wetlands are major potential threats.

Pine Barrens Lowland Forest
Liriodendron tulipifera - Pinus rigida - Nyssa sylvatica / Rubus hispidus / Osmunda cinnamomea - Carex folliculata Woodland

Classification plots: 0; 1 observation point (#3)

This ancient and unusual seepage wetland on the Central Farm at BARC is distinguished by a broad, bowl-like boggy depression and exceptionally old-age trees that surround the rim of the basin. The large, spring-formed depression that is perhaps five to six feet deep at the headwaters of the spring and extreme age of the surrounding trees suggest a landscape created over very long periods of time. A braided network of seepage streams flows through the depression downstream into the gently sloping valley. The soils throughout the wetlands are highly saturated, acidic, peaty-sands with small gravels. *Sphagnum* moss forms thick carpets along the sandy-gravelly seepage streams and numerous hummocks. Numerable large, fallen trees in different stages of decomposition lay across the depression, likely the result of high winds and saturated soils. It appears that the wetlands perpetually remain somewhat open. The entire site is approximately several acres in size.
As typically occurs, old-age *Liriodendron tulipifera* trees grow at the edge of the spring in moist, sandy-loamy soil and are the dominant canopy species at the upper edge of the depression at this site. One ancient *Liriodendron* measured nearly 20' CBH, and was the largest seen during this study. An equally ancient *Pinus rigida* tree, a state champion-sized specimen at approximately 12' CBH, was also rooted at the edge of the depression but unfortunately had fallen over in recent years.

A diverse assemblage of plants, many characteristic of bogs, occurs throughout the depression and along the braided seepage streams. Old and widely-spaced *Nyssa sylvatica* and *Acer rubrum* dominate the open canopy in the depression. The somewhat open understory and shrub layers consist of a diverse assemblage of species, with none particularly dominant, and include *Nyssa sylvatica*, *Acer rubrum*, *Toxicodendron vernix*, *Chionanthus virginicus*, *Lindera benzoin*, *Viburnum nudum*, *Magnolia virginiana*, *Vaccinium* spp., *Gaylussacia frondosa*, *Rhododendron viscosum*, *Rubus hispidus*, and others. Large colonies of *Osmunda cinnamomea* are intermixed with *Osmunda regalis*, *Woodwardia virginica*, *Carex folliculata* and other carices, *Viola primulifolia*, *Chelone glabra*, *Scirpus polyphyllus*, and many other herbs. In addition to *Sphagnum*, a diversity of mosses are also represented.

Invasive exotic plants are largely absent from this community, but *Microstegium vimineum* is starting to take root in certain portions of the wetlands and needs to be eradicated before it becomes established. Large *Microstegium* infestations and other invasives occur on disturbed ground to the northwest near government buildings. Improperly directed stormwater runoff from the adjacent buildings and other changes to the site's hydrology would also greatly threaten the future integrity of these wetlands. Additional construction or enlarging of buildings nearby would also present a serious threat to the site and stream valley. In addition, U.S. government wetland mitigation projects that replace high quality existing wetlands with artificial ponds or wetlands are major potential threats.

Pine Barrens Lowland Forest
Pinus rigida - Nyssa sylvatica - Acer rubrum / Ilex opaca - Magnolia virginiana / Clethra alnifolia Forest

Classification plots: 1 (BARC 2); 2 observation points (#7 and #10). BARC 2 was sampled in 2004 as part of the 2004-2007 National Park Service-NCR vegetation classification project.

A fairly extensive, high quality seepage forest type that occurs in gentle seepage swales on the East Farm at BARC - mainly in the section between Powder Mill Road and Beaver Dam Road that forms the easternmost headwaters of Beaverdam Creek. Soils are acidic and vary from damp, spongy, sandy-peaty loams to highly saturated areas of peaty muck intermixed with or covering sand. This type, though not common, is the most widespread seepage wetland at BARC and typically grades into the Acidic Seepage Swamp community of Fleming et al. (2005). It also occurs near or with a type of seepage bog that is represented at BARC, including the Airport Bog, Powerline Bogs 1 and 2, and small boggy openings or swales characterized by large colonies of *Carex bullata*.

Widely-spaced, old-age *Pinus rigida*, some of the largest in Maryland, comprise the mostly closed canopy. Large, old *Nyssa sylvatica* and *Acer rubrum* are also important canopy species in the BARC 2 stand, with minor amounts of *Quercus phellos*. (*Quercus alba* and *Quercus coccinea* overhang the stand from the surrounding drier forest.) Other

important canopy components at observation point #10 include *Liriodendron tulipifera*, *Quercus phellos*, and *Pinus virginiana*. The understory is somewhat open and typically includes *Nyssa sylvatica*, *Acer rubrum*, *Ilex opaca*, and *Magnolia virginiana*. *Quercus falcata* is also dominant in the understory at point #10. The shrub layers are patchy to tangled and dense, with *Ilex opaca* as the dominant tall shrub. Other characteristic shrub layer species are *Clethra alnifolia*, which is often co-dominant, *Magnolia virginiana*, *Rhododendron viscosum*, *Smilax rotundifolia*, *Vaccinium* spp., *Leucothoe racemosa*, *Gaylussacia frondosa*, and *Amelanchier canadensis*. The herb layer is sparse at point #7 and is represented by patches of *Osmunda cinnamomea* and *Lycopodium obscurum*. Herbs are mostly lacking at point #10. In contrast, the herb layer in the BARC 2 stand is diverse and fairly thick in cover, likely owing to the wetter soils, with *Woodwardia areolata*, *Woodwardia virginica*, *Osmunda cinnamomea*, *Carex folliculata*, *Carex atlantica* ssp. *capillacea*, *Carex seorsa*, *Chasmanthium laxum*, *Mitchella repens*, *Rubus hispidus*, *Dichanthelium dichotomum*, and *Viola primulifolia* as the typical species. *Maianthemum canadense* grows in damp, sandy-peaty soil on hummocks in the plot, and with *Gaultheria procumbens* in nearby stands.

Invasive exotic plants are mostly absent from the stands, although a minor amount of *Polygonum cespitosum* was found at the BARC 2 plot and large patches of *Microstegium vimineum* grow in the swamp adjacent to observation point #7. Innumerable seedlings of *Liquidambar styraciflua* are invading the BARC 2 plot and surrounding swale, probably resulting from soil disturbance by deer. In addition, deer overbrowsing at the BARC 2 stand has decimated the *Clethra alnifolia*, *Rhododendron viscosum*, *Leucothoe racemosa*, and *Ilex verticillata* colonies to the height of seedlings. Potential hydrologic changes, such as ditching or channelizing water into the swales, would also present a serious threat to this community. Major upstream damming by beavers of one of the Beaverdam Creek tributaries that flowed from the Airport Bog resulted in extensive backflooding of seepage forests and the loss of several old-age *Pinus rigida* trees. The original stream flow has been restored, apparently by natural processes, but possible eradication of beaver downstream from more appropriate habitats may have caused the situation. Perhaps the greatest potential threats to these communities are U.S. government wetland mitigation projects that replace high quality existing wetlands with artificial ponds or wetlands. A large, artificial wetlands was constructed several years ago between the Airport Bog and Springfield Road in the Wetland Research Forest.

Small sections of similar forest were discovered at Greenbelt Park, bordering the west side of the Baltimore-Washington Parkway in the Indian Creek watershed.

Pine Barrens Lowland Forest
Acer rubrum - Nyssa sylvatica - (Pinus rigida) / Magnolia virginiana / Clethra alnifolia - mixed ericad Woodland (includes the Airport Bog, Beltsville Airport Bog)

Classification plots 0, 1 observation point (#12)

This exceptional community of approximately 30 acres consists of a large, linear seepage swamp that extends from near the entrance of the Animal and Plant Health Inspection Service compound off Powder Mill Road to near the entrance of the old Beltsville Airport off Springfield Road. Numerous converging seepages and abundant groundwater flow give rise to highly saturated, mucky soils within the swamp and a topography of braided channels, hummocks, and depressions with standing water. Old-age *Pinus rigida* grow in the damp, acidic, sandy-peaty soils of the surrounding seepage forest and overhang the swamp.

The vegetation of the swamp predominately consists of a dense tangle of understory trees and tall shrubs, with scattered open glades dominated by graminoids and other herbs. Typical woody species include *Acer rubrum*, *Nyssa sylvatica*, *Magnolia virginiana*, *Clethra alnifolia*, *Alnus serrulata*, *Vaccinium* spp., *Rhododendron viscosum*, *Amelanchier canadensis*, and *Toxicodendron vernix*. All of which, except *Acer rubrum* and *Nyssa sylvatica*, reach great size here. Occasionally, mature and old-age *Pinus rigida* grow within the swamp complex at the upper headwaters near Powder Mill Road. The herb layer is diverse and fairly thick in cover, especially in the less-saturated headwaters region, and is largely represented by *Osmunda cinnamomea*, *Osmunda regalis*, *Woodwardia areolata*, *Carex folliculata*, *Leersia virginica*, *Glyceria striata*, *Juncus debilis*, *Chasmanthium laxum*, and *Lycopus virginicus*, as well as others. *Bartonia paniculata* is locally abundant, especially in the upper headwaters region. *Platanthera flava* var. *herbiola* also occurs in this area. *Gratiola virginiana* is common in highly saturated places. *Sphagnum* moss carpets the numerous hummocks and depressions throughout the swamp.

The historic Airport Bog or Beltsville Airport Bog was likely located along the southern reaches of the swamp, near the confluence with a large seepage swale. It was more open and less swampy in the past, and more resembled a bog (Chris Ludwig, Virginia Division of Natural Heritage, pers. comm., Terrell et al. 2000). The site once harbored rare relicts of flora typical of the outer Coastal Plain, such as *Myrica pensylvanica*, *Polygala lutea*, and others, that were characteristic long ago of many of the bogs in and around Washington, D.C. (Strong et al., in prep.). Today, remnants of this site remain at the edge of the seepage swamp, although the rarest flora seems to have disappeared or is suppressed in the seed bank. Backflooding of this area by beaver dams along the outflow of the seepage swamp (an upper Beaverdam Creek tributary) has turned much of the bog site into Acidic Seepage Swamp. However, since the dams no longer exist and the normal outflow is restored, the site is now more open and a diversity of herbaceous bog vegetation is becoming re-established. The large area just below the bog where the beaver ponds were has also been transformed, from open, standing water to wet meadows dominated by *Leersia oryzoides* and other graminoids and shallow ponds of *Utricularia gibba*. This may be a natural process of regenerating wetlands, including bogs, along larger seepage streams.

Invasive exotic plants are largely absent from the seepage swamp complex. However, *Microstegium vimineum* and *Polygonum perfoliatum* are becoming established along open areas near the outflow, likely the result of disturbance from deer and the proximity to disturbed, open areas along the east-west runway of the old airport. Overbrowsing by deer may also be a problem. Perhaps the greatest potential threats to this community are U.S. government wetland mitigation projects that replace high quality existing wetlands with artificial ponds or wetlands.

Fall Line Terrace Gravel Magnolia Bog
Nyssa sylvatica - (Pinus rigida) / Magnolia virginiana / Rhododendron viscosum - Gaylussacia frondosa / Smilax pseudochina Woodland

Classification plots: 0 during this survey, but Simmons et al. in 2002 sampled the six known remaining bogs of this type that occur in the upper Anacostia watershed. In 2005, a small, high quality example at Greenbelt Park, identified by Chris Lea of the National Park Service in 2003, was also sampled as part of the 2004-2007 National Park Service-NCR vegetation classification project.

This community is a globally rare type of seepage wetland that was once much more widespread in saturated, sandy-gravelly soils of the exposed Potomac Formation along the Fall Line in the Washington, D.C. area (McAtee 1918, Strong et al., in prep.). This type does not occur at BARC, but is associated with *Pinus rigida*. The BARC bogs, despite some similarities, differ geologically and floristically from the Fall Line Magnolia Bogs, and occur in the upper Beaverdam Creek drainage. In addition to sampling the six Fall Line Magnolia Bogs in 2002 and one at Greenbelt Park in 2005, Powerline Bog 2 at BARC was also sampled. Because these sites were previously documented, they are not included in this study, except as conservation priorities. (See mdflora.org for descriptions and flora of Fall Line Magnolia Bogs and Terrell et al. (2000) for floristic content of the BARC bogs.)

Seven known remaining Fall Line Magnolia Bogs and five small variants (somewhat disturbed areas with rare or important bog flora that may be remnants of bogs) occur in the upper Anacostia watershed in the Paint Branch, Little Paint Branch, and Indian Creek drainages:

Paint Branch: Powder Mill Bog #3; Powder Mill Bog #1 remnant (variant); Buck Lodge Bog (variant)

Little Paint Branch: Sandy Spring Bog (McKnew Bog); Gunpowder Bog (variant); Little Paint Branch Bog #1; Little Paint Branch Bog #2 (variant)

Indian Creek: Aitcheson Bog; Konterra Bog #1; Konterra Bog #2 (variant); Ammendale Bog; Greenbelt Bog

Many of these sites are remarkably pristine, especially in areas removed from powerlines and utility easements, and the ones in the upper Anacostia watershed generally represent the best remaining examples of the type throughout its global range. However, the future survival of these sites is uncertain at best, with many factors indicating a bleak outcome unless preventive measures are adopted. The sites are small, typically one to five acres and sometimes less than an acre. To date, apparently only two bogs have been officially preserved within parks: the wooded section of Little Paint Branch Bog #1 at Little Paint Branch Park (M-NCPPC) and Greenbelt Bog at Greenbelt Park (NPS). (The recently discovered bog variant that is likely a remnant of McAtee's Powder Mill Bog #1 is located in fairly pristine woods at the western end of Sellman Road in what is apparently a part of Powder Mill Community Park (M-NCPPC). In addition, the first two authors met with Bob Wardwell, natural resources manager of the Army Research Lab, and Katharine McCarthy of the Maryland Wildlife and Heritage Program to delineate the boundaries of Powder Mill Bog #3 and discuss restoration efforts. Unfortunately, the rest of the bogs currently remain unprotected.

Alteration of the steady supply of groundwater seepage to the bogs, either by interrupting the flow by building too closely or densely or by directing channelized stormwater runoff into the bogs, is second only to habitat destruction as the principal reason for their demise. The placement of sewer easements below several of the bogs decades ago, although somewhat stabilized by this time, has also damaged sites and presents a future threat if work ever needs to be done along the lines.

PEPCO powerline maintenance, despite concerns by DNR, MNPS, and others, continues to be exceedingly destructive to several bogs or bog sections that occur under powerline easements.

Many sites are largely free of invasive exotic species, especially those in wooded settings away from trails and utility easements. However, invasives are becoming a serious problem at a number of sites. *Miscanthus sinensis*, an overplanted noxious weed with a preference for moist soils, is slowly becoming established under the powerline at the Sandy Spring Bog. *Rhamnus cathartica* has nearly overtaken Little Paint Branch Bog #2 and is becoming established in Little Paint Branch Bog #1 and along the powerline in general. *Polygonum perfoliatum* is also becoming established in this area. *Microstegium vimineum*, spread by deer and people along trails, is starting to appear in the wooded section of the Sandy Spring Bog and has completely engulfed the last remaining population of *Eriocaulon decangulare*, a state-listed rare species, at Powder Mill Bog #3. *Arthraxon hispidus*, *Celastrus orbiculatus*, and *Ampelopsis brevipedunculata* are major potential weed threats as well. Some native species that take advantage of soil disturbance and clearing in and around bogs and seeps, such as *Liquidambar styraciflua*, *Liriodendron tulipifera*, *Fagus grandifolia*, *Toxicodendron radicans*, *Vitis labrusca*, and others, also become invasive and smother bog vegetation.

Other Acidic Seepage Communities and Non-alluvial Wetlands

Acidic Seepage Forest
Quercus bicolor - Nyssa sylvatica - Acer rubrum / Clethra alnifolia / Lycopodium obscurum - Osmunda cinnamomea Forest

Classification plots: 0; 1 observation point (#9)

A unique seepage forest community located on the East Farm at BARC that consists of a long drainage swale and vernal pools. The stand occupies the lowest gradient of a gently sloping swale and is bordered by a long stretch of *Quercus falcata - Quercus phellos / Ilex opaca Forest*, including some old-age stands. Further upslope, the vegetation transitions to dry, mixed oak-pine-heath forest. Soils are mesic to saturated (in the areas with vernal pools), acidic, deep, clayey-loams with a high build-up of spongy, organic material and decaying wood. Extensive colonies of *Lycopodium obscurum* carpet the ground throughout the stand and surrounding forest, except in areas with vernal pools. The *Lycopodium* colonies demarcate the permanently moist capillary fringe, where the water table is very close to the soil surface (Simmons and Strong 2001).

Quercus bicolor, *Acer rubrum*, and *Nyssa sylvatica* are the dominant canopy species. The understory is predominately composed of *Nyssa sylvatica*, *Acer rubrum*, *Quercus phellos*, *Liquidambar styraciflua*, and *Magnolia virginiana*. *Clethra alnifolia* is the dominant shrub, and is intermixed with *Leucothoe racemosa*, *Vaccinium corymbosum*, *Rhododendron viscosum*, *Aronia arbutifolia*, and *Smilax rotundifolia*. The canopy and understory vary in densities, but are mostly closed. Heavy deer browsing has reduced much of the sizeable *Clethra* and *Rhododendron* colonies to a uniform height of approximately 12 inches, thereby removing much of the tall shrub layer. The herb layer is very dense and lush with *Osmunda cinnamomea*, *Osmunda regalis*, *Woodwardia areolata*, and numerous carices (*Carex* spp.) growing amidst a nearly continuous carpet of *Lycopodium obscurum*.

The uniqueness of this site, its largely undisturbed condition, and the combination of vernal pools with *Quercus bicolor* and surrounding seepage forest make this community a very high conservation priority.

The site is mostly pristine with no invasive exotic species observed. Deer overbrowsing appears to be a problem. Perhaps the largest potential threats are U.S. government wetland mitigation projects that have seriously degraded or destroyed significant natural areas at BARC.

Acidic Seepage Forest
Liriodendron tulipifera - Nyssa sylvatica - Quercus (alba, falcata) / Smilax rotundifolia / Thelypteris noveboracensis - Stenanthium gramineum Forest

Classification plots: 1 (Upper Anacostia 9)

An exceptional upland seepage forest at the headwaters of the Paint Branch near Spencerville in Montgomery County. The stand is perched below a large, upland seepage swamp and along a small, spring-fed tributary of the upper Paint Branch. Soils are mesic, fairly acidic, deep, somewhat micaceous, clayey-silt loams. Where shallow depressions occur or where seepage flow is heavier, soils are permanently saturated and mucky. Both this site and the adjacent seepage swamp represent the westernmost extent of some coastal elements in the Anacostia watershed.

The somewhat open canopy is composed of a mixture of upland forest species and trees that typically grow near seeps and springs. *Liriodendron tulipifera* is the dominant canopy species, intermixed with *Nyssa sylvatica*, *Quercus alba*, and *Quercus falcata*. The understory and tall shrub layers are very sparse, with *Nyssa sylvatica*, *Acer rubrum*, *Vaccinium fuscatum*, and *Smilax rotundifolia* as the main representatives. Scattered, dense thickets of tall shrubs were probably once typical of this community, but deer overbrowsing has reduced several species and *Rhododendron viscosum* in particular to unnaturally short heights. The herb layer is very lush and diverse, with *Thelypteris noveboracensis*, *Carex debilis*, *Osmunda cinnamomea*, *Stenanthium gramineum* var. *robustum*, *Medeola virginiana*, *Cinna arundinacea*, *Carex intumescens*, *Mitchella repens*, and *Rubus hispidus* as the dominant species. *Stenanthium gramineum* var. *robustum* is a state-threatened species.

The high quality and large size of this site and the adjacent upland seepage swamp, as well as the occurrence of several coastal species that reach their western extent here, make them very high conservation priorities.

Invasive exotic species are mostly absent from this site and upland seepage swamp, with only very minor amounts of *Microstegium vimineum*, *Polygonum cespitosum*, and *Polygonum perfoliatum* observed. However, the open fields and forest edge to the northwest and well-used trails within the forest unfortunately provide ample opportunities for invasives to become established and threaten the wetlands and surrounding forest in the future. Deer overbrowsing remains a serious threat to some species within the stand. Heavy wind shearing which removed the crowns of several canopy trees was observed within the stand, but apart from the trees no significant damage seems to have occurred.

Acidic Seepage Swale
Juncus longii - Scleria muehlenbergii - Andropogon glomeratus Herbaceous Vegetation

Classified Stands: 1 plot (Upper Anacostia 10)

A small, open seepage wetland at the bottom of a swale under the powerline near Sellman Road and Interstate 95 in the Little Paint Branch drainage. This site is located very near the four historic Powder Mill Bogs and the Little Paint Branch Bogs, including a bog surveyed by Titus Ulke in 1917, and is especially close to the former site of the Cold Spring Bog (Powder Mill Bog #2), which also contained *Scleria muehlenbergii* and many of the same species (McAtee 1918, Strong et al., in prep.). Soils are saturated, acidic, peaty sands with small amounts of pea gravel.

The site is almost entirely composed of graminoid vegetation, with *Juncus longii*, *Scleria muehlenbergii*, *Eleocharis olivacea*, *Andropogon glomeratus*, *Rhynchospora capitellata*, *Rhynchospora gracilenta*, *Panicum dichotomiflorum*, *Dichanthelium scoparium*, *Fimbristylis autumnalis*, and *Juncus acuminatus* as the dominant species. *Juncus longii* is state-endangered and *Scleria muehlenbergii* is highly state-rare.

The assemblage of many bog species in a unique habitat and the dominance of rare flora make this site a very high conservation priority.

Invasive exotic species have not greatly degraded the site, but *Agrostis stolonifera*, *Setaria pumila*, and *Dactylis glomerata* occur within the stand in fairly high numbers. *Polygonum perfoliatum*, *Ampelopsis brevipedunculata*, and other highly invasive weeds are present in areas along the powerline and are also a great threat to the seepage wetland and surrounding native flora in general. *Typha latifolia*, a native plant typical of open marshes and swampy areas that occasionally invades seepage wetlands, is abundant in an adjacent wetland to the east and is a serious potential threat to the site as well. In addition to invasive species, damage to the site by maintenance vehicles and improper herbicide use are major potential threats.

Coastal Plain Upland Depression Swamp
Quercus (bicolor, palustris) - Acer rubrum - Liquidambar styraciflua / Vaccinium fuscatum / Utricularia gibba Forest

Classified Stands: 1 (Upper Anacostia 5)

An exceptional example of a coastal plain Upland Depression Swamp. These wetlands are seasonally-flooded, shallow depressions within forests that form above hardpan clays or shallow bedrock, and mainly occur in the piedmont within the relatively flat Triassic Basin (Fleming et al. 2005). The BARC sites (including an adjacent stand) occur on impermeable, heavy clay and are permanently saturated to ponded, with shallow water nearly reaching 3 feet in depth at the center of the pond. Swamp forest surrounds the depression, with the ponded area being quite open. Soils are highly saturated, mucky clays. Upland Depression Swamps are globally rare throughout their range (Fleming 2005, NatureServe 2005), and are much less common on the coastal plain.

The mostly closed canopy is composed of *Quercus bicolor*, *Quercus palustris*, *Liquidambar styraciflua*, and *Acer rubrum*. *Acer rubrum* is the dominant tree of the mostly closed understory, intermixed with *Nyssa sylvatica*, *Quercus bicolor*, *Liquidambar styraciflua*, *Chionanthus virginicus*, and *Smilax rotundifolia*. The somewhat patchy shrub layer is predominately composed of *Vaccinium fuscatum*, along with *Ilex opaca*, *Acer rubrum*, *Nyssa sylvatica*, and *Smilax rotundifolia*. *Cephalanthus occidentalis* grows in the open section of the pond. The herbaceous layer is very sparse in the swamp forest surrounding the pond, except for extensive carpets of *Sphagnum* moss. Dense mats of *Utricularia gibba*, *Ceratophyllum demersum*, and *Proserpinaca palustris* grow in standing water of the pond.

The uniqueness and rarity of this site and its value as a wetlands make this community a very high conservation priority.

Invasive exotic species are remarkably absent from this site. Perhaps the largest potential threats are U.S. government wetland mitigation projects that have seriously degraded or destroyed significant natural areas at BARC.

Alluvial Floodplain Communities

Coastal Plain Bottomland Forest
Quercus michauxii - Acer rubrum - Nyssa sylvatica / Toxicodendron radicans / Uvularia sessilifolia Forest

Classification plots: 1 (Upper Anacostia 7); 1 observation point (#12)

An exceptional, old-age community where Indian Creek branches into numerous braided streams across a broad alluvial plain between the convergence of Indian Creek and Beaverdam Creek and Greenbelt Road (Rt. 193). This site was historically known as the "Hollywood Swamp" (Hitchcock and Standley 1919). The entire site consists of several hundred acres and is highly significant as the westernmost known occurrence of coastal bottomland forest in the state. In addition, the site represents an ancient relict of coastal flora from a pre-glacial period when that vegetation was once widespread along the fall line in the Washington, D.C. area. *Clethra alnifolia* is fairly well distributed throughout the site and reaches its western limit in Maryland here, and slightly further west along forested streambanks in the vicinity of the Powder Mill Bogs. *Quercus michauxii*, also a species typically associated with the outer coastal plain, reaches its western limit in Maryland here where it occurs as a dominant component of the community. (*Q. michauxii* occurs farther west up the Potomac River in rare, scattered patches.) Soils are moderately well drained, mesic, silty clay-loams.

In the sampled plot, which is fairly representative of the bottomland forest community throughout the site, old-age *Quercus michauxii*, *Acer rubrum*, *Nyssa sylvatica*, and *Liriodendron tulipifera* comprise the somewhat closed canopy. Large, old-age *Quercus phellos*, *Quercus palustris*, *Quercus bicolor*, *Fraxinus pennsylvanica*, *Quercus alba*, *Quercus rubra*, and *Liquidambar styraciflua*, with none particularly dominant, are intermixed with the above species in a transect at observation point #12 and generally represent the typical canopy species of the site. *Quercus bicolor* appears to be more common in the section north of the Capital Beltway, while *Quercus michauxii* is more abundant in the southern portion of the tract. The fairly open understory is composed of a mix of *Nyssa sylvatica*, *Acer rubrum*, *Liquidambar styraciflua*, *Fagus grandifolia*, *Prunus serotina*, *Quercus rubra*, *Quercus alba*, *Magnolia virginiana*, and *Carpinus caroliniana*. *Toxicodendron radicans* is also important in the understory. The shrub layer is patchy and includes *Smilax rotundiolia*, *Ilex opaca*, *Ilex verticillata*, *Lindera benzoin*, *Rhododendron viscosum*, *Vaccinium* spp., *Clethra alnifolia*, *Viburnum recognitum*, *Viburnum nudum*, and *Toxicodendron radicans*. The herb layer is diverse but somewhat patchy throughout, with *Uvularia sessilifolia*, *Viola sororia*, *Cinna arundinacea*, *Boehmeria cylindrica*, *Pilea pumila*, *Carex* spp., and *Arisaema triphyllum* as the dominant species for much of the growing season. Large colonies of spring ephemerals occur on well-drained, silty soils throughout the forest as well.

This site is highly significant, especially considering its large size, diverse vegetation, and abundance of relictual coastal flora, and is a very high conservation priority.

Other Habitats

Powerline Habitats

Several miles of the large, north-south powerline easement were walked, from just north of Metzerott Road in College Park to Rt. 198 near the Sandy Spring Bog. Several powerlines at BARC were also walked. Powerlines, despite being artificially disturbed and maintained, are important habitats and refuges for a diversity of native grasses and other plants requiring open conditions.

Soils along the large powerline are generally dry and acidic, and range from gravelly to sandy. Soils under the powerlines at BARC are mostly dry, acidic, and sandy. Occasionally, soils are moist to saturated where the powerlines cross seeps and streams.

Many species were seen along the large powerline that were not found elsewhere in the study area, including *Andropogon ternarius*, *Asclepias tuberosa*, *Cirsium discolor*, *Croton willdenowii*, *Cyperus flavescens*, *Eupatorium album*, *Eupatorium rotundifolium*, *Hibiscus moscheutos*, *Juncus validus*, *Liatris graminifolia*, *Linum medium*, *Lobelia puberula*, *Lycopodium tristachyum*, *Monarda punctata*, *Paspalum laeve*, *Polygala incarnata*, *Polygala nuttallii*, *Sabatia angularis*, and *Saccharum gigantea*.

Konterra Sand and Gravel Pits

The abandoned complex of sand and gravel mines at Konterra (formerly Contee Gravel Co.), situated mostly between Old Gunpowder Road and Laurel, covers a vast area and is regionally significant as the headwaters of Indian Creek and a large portion of Little Paint Branch. Much of this area is still undeveloped, with an abundance of groundwater resources, wetlands, and streams. Unfortunately, industrial parks and urban sprawl are rapidly encroaching, and the site is purportedly planned to be an "edge city" at the eastern end of the proposed Inter- County Connector (ICC).

The site is also characterized by exceptionally diverse vegetation, including many uncommon and rare species, and relatively few invasive exotic species. In addition, it contains three of the best remaining examples of Fall Line Magnolia Bogs and numerous boggy openings and remnants.

Species seen at Konterra that were not found elsewhere in the study area include *Desmodium rotundifolium*, *Glyceria melicaria*, *Lycopodiella appressa*, and *Malus coronaria*.

ANNOTATED LIST OF VASCULAR PLANTS

Families, genera, species, and subtaxa are arranged alphabetically within major taxonomic divisions. The scientific name is listed first, followed by the common name. Nomenclature generally follows Kartesz (BONAP 1998, 1999), and in some cases Weakley (2006). Synonyms are provided in brackets for some recently revised species that may be unfamiliar. An asterisk before a taxon denotes a non-native species; either an invasive exotic plant such as *Celastrus orbiculatus* or one that is native to the state or region but not to the study area, such as *Symphoricarpos albus*.

PTERIDOPHYTA

ASPLENIACEAE

Asplenium platyneuron (L.) B.S.P. ebony spleenwort

BLECHNACEAE

Woodwardia areolata (L.) T. Moore netted chain fern
Woodwardia virginica (L.) Sm. Virginia chain fern

DENNSTAEDTIACEAE

Dennstaedtia punctilobula (Michx.) T. Moore hay-scented fern
Pteridium aquilinum (L.) Kuhn var. *latiusculum* (Desv.) Underwood ex Heller bracken fern

DRYOPTERIDACEAE

Athyrium asplenioides (Michx.) A.A. Eaton [*Athyrium filix-femina* ssp. *asplenioides* (Michx.) Hulten] southern lady fern
Dryopteris carthusiana (Vill.) H.P. Fuchs spinulose wood fern
Onoclea sensibilis L. sensitive fern
Polystichum acrostichoides (Michx.) Schott Christmas fern

LYCOPODIACEAE

Lycopodiella appressa (Chapman) Cranfill southern bog clubmoss
Lycopodium digitatum Dill. ex A. Braun fan clubmoss
Lycopodium clavatum L. running ground pine
Lycopodium obscurum L. ground pine
Lycopodium tristachyum Pursh. deep-root ground pine

OPHIOGLOSSACEAE

Osmunda cinnamomea L. cinnamon fern
Osmunda regalis L. var. *spectabilis* (Willd.) Gray royal fern

THELYPTERIDACEAE

Thelypteris noveboracensis (L.) Nieuwl. New York fern
Thelypteris palustris Schott marsh fern

SPERMATOPHYTA: GYMNOSPERMAE

CUPRESSACEAE

Juniperus virginiana L. eastern red cedar

PINACEAE

Pinus pungens Lamb. table mountain pine
Pinus rigida P. Mill. pitch pine
Pinus strobus L. eastern white pine (Apparently native to Northwest Branch, but not to BARC.)
**Pinus taeda* L. loblolly pine
Pinus virginiana P. Mill. Virginia pine
Tsuga canadensis (L.) Carr. eastern hemlock

TAXODIACEAE

**Taxodium distichum* (L.) L.C. Rich. bald cypress

SPERMATOPHYTA: ANGIOSPERMAE
MONOCOTYLEDONEAE

AGAVACEAE

Yucca filamentosa L. Adam's needle

ALISMATACEAE

Sagittaria latifolia Willd. var. *pubescens* (Muhl. ex Nutt.) J.G. Sm. downy arrowhead

ARACEAE

Arisaema triphyllum (L.) Schott. Jack-in-the-pulpit
Peltandra virginica (L.) Schott. arrow arum
Symplocarpus foetidus (L.) Salisb. ex Nutt. skunk cabbage

COMMELINACEAE

**Murdannia keisak* (Hassk.) Hand.-Maz. wart-removing herb

CYPERACEAE

Bulbostylis capillaris (L.) Kunth ex C.B. Clarke dense-tuft hair sedge
Carex bullata Schkuhr ex Willd. button sedge
Carex atlantica ssp. *capillacea* (Bailey) Reznicek bog sedge
Carex complanata Torr. & Hook. hirsute sedge
Carex crinita Lam. var. *crinita* fringed sedge
Carex debilis Michx. white edge sedge
Carex digitalis Willd. slender woodland sedge
Carex folliculata L. long sedge
Carex glaucodea Tuckerman ex Olney blue sedge
Carex intumescens Rudge greater bladder sedge
Carex longii Mackenzie Long's sedge
Carex lurida Wahlenb. sallow sedge
Carex cf. nigromarginata Schwein. black edge sedge
Carex radiata (Wahlenb.) Small eastern star sedge
Carex seorsa Howe weak stellate sedge
Carex swanii (Fern.) Mackenzie Swan's sedge
Carex tribuloides Wahlenb. blunt broom sedge
Carex typhina Michx. cat-tail sedge
Cyperus echinatus (L.) Wood globe flat sedge
Cyperus flavescens L. yellow flatsedge
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus* slender flatsedge
Cyperus strigosus L. straw-colored flatsedge
Dulichium arundinaceum (L.) Britt. three-way sedge
Eleocharis obtusa (Willd.) J.A. Schultes blunt spikerush
Eleocharis olivacea Torr. olive-green spikerush
Eleocharis tenuis (Willd.) J.A. Schultes slender spikerush
Eleocharis tortilis (Link) J.A. Schultes twisted spikerush
Fimbristylis autumnalis (L.) Roemer & J.A. Schultes slender fimbry
Rhynchospora capitellata (Michx.) Vahl brownish beakrush
Rhynchospora gracilenta Gray slender beakrush
Schoenoplectus purshianus (Fern.) M.T. Strong weak-stalked bulrush
Scirpus cyperinus (L.) Kunth woolgrass
Scirpus georgianus Harper Georgia bulrush
Scirpus polyphyllus Vahl leafy bulrush
Scleria muehlenbergii Steud. [*Scleria reticularis* var. *pubescens* Britt.] reticulated nutrush

DIOSCOREACEAE

Dioscorea villosa L. wild yam

ERIOCAULACEAE

Eriocaulon decangulare L. ten-angle pipewort

IRIDACEAE

Iris versicolor L. blue flag
Sisyrinchium angustifolium P. Mill. narrow-leaved blue-eyed grass

JUNCACEAE

Juncus acuminatus Michx. tapertip rush
Juncus canadensis J. Gay ex Laharpe Canada rush
Juncus debilis Gray weak rush
Juncus effusus L. soft rush
Juncus longii Fern. Long's rush
Juncus scirpoides Lam. scirpus-like rush
Juncus subcaudatus (Engelm.) Coville & Blake woodland rush
Juncus tenuis Willd. path rush
Juncus validus Coville round-head rush

LEMNACEAE

Lemna minor L. common duckweed

LILIACEAE

Maianthemum canadense Desf. Canada mayflower
Maianthemum racemosum (L.) Link Solomon's plume
Medeola virginiana L. Indian cucumber root
Polygonatum biflorum (Walt.) Ell. Solomon's seal
Stenanthium gramineum (Ker-Gawl.) Morong var. *robustum* (S. Wats.) Fern. giant featherbells
Uvularia sessilifolia L. sessile-leaved bellwort

ORCHIDACEAE

Cypripedium acaule Ait. pink lady's slipper
Goodyera pubescens (Willd.) R. Br. ex Ait. downy rattlesnake plantain
Isotria verticillata Raf. large whorled pogonia
Platanthera blephariglottis (Willd.) Lindl. white-fringed orchid
Platanthera clavellata (Michx.) Luer green woodland orchid
Platanthera flava (L.) Lindl. var. *herbiola* (R. Br. ex Ait. f.) Luer pale-green orchid
Platanthera lacera (Michx.) G. Don ragged-fringed orchid
Spiranthes cernua (L.) L.C. Rich nodding ladies' tresses
Tipularia discolor (Pursh) Nutt. cranefly orchid

POACEAE

Agrostis perennans (Walt.) Tuckerman autumn bentgrass
**Agrostis stolonifera* L. spreading bent
Andropogon glomeratus (Walt.) B.S.P. bushy bluestem
Andropogon ternarius Michx. split-beard bluestem
Andropogon virginicus L. broomsedge
**Anthoxanthum odoratum* L. sweet vernal grass
Aristida oligantha Michx. prairie three-awn
Arthraxon hispidus (Thunb.) Makino small carp grass
Calamagrostis coarctata (Torr.) Eat. reed bentgrass
Chasmanthium laxum (L.) Yates slender wood oats
Cinna arundinacea L. stout woodreed
**Dactylis glomerata* L. orchard grass
Danthonia spicata (L.) Beauv. ex Roemer & J.A. Schultes poverty oat grass
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark var. *lindheimeri* (Nash) Gould & C.A. Clark Lindheimer rosette grass
Dichanthelium boscii (Poir.) Gould & C.A. Clark Bosc's rosette grass
Dichanthelium clandestinum (L.) Gould deertongue grass
Dichanthelium columbianum (Scribner) Freckmann American witch grass
Dichanthelium commutatum (J.A. Schultes) Gould var. *ashei* (Pearson ex Ashe) Mohlenbrock variable rosette grass
Dichanthelium depauperatum (Muhl.) Gould starved rosette grass
Dichanthelium dichotomum (L.) Gould var. *dichotomum* cypress rosette grass
Dichanthelium leucothrix (Nash) Freckmann white-haired panic grass
Dichanthelium lucidum (Ashe) LeBlond bog witch grass
Dichanthelium scoparium (Lam.) Gould velvet rosette grass
Dichanthelium sphaerocarpon (Ell.) Gould var. *sphaerocarpon* round-seeded rosette grass
Eragrostis spectabilis (Pursh) Steud. purple lovegrass
Festuca subverticillata (Pers.) Alexeev nodding fescue
Glyceria laxa (Scribn.) Scribn. [*Glyceria canadensis* var. *laxa* (Scribn.) A.S. Hitchc.]
Glyceria melicaria (Michx.) F.T. Hubbard melic manna grass
Glyceria obtusa (Muhl.) Trin. Atlantic manna grass
Glyceria striata (Lam.) A.S. Hitchc. fowl manna grass
Leersia oryzoides (L.) Sw. rice cutgrass
Leersia virginica Willd. white grass
**Microstegium vimineum* (Trin.) A. Camus Japanese stilt grass
**Miscanthus sinensis* Anderss. Chinese silver grass
Panicum anceps Michx. beaked panicgrass
Panicum dichotomiflorum Michx. fall witchgrass
Panicum verrucosum Muhl. warty panic grass
Panicum virgatum L. switch grass
Paspalum laeve Michx. field crowngrass
Phalaris arundinacea L. reed canary grass
**Phragmites australis* (Cav.) Trin. ex Steud. common reed
Saccharum giganteum (Walt.) Pers. sugarcane plumegrass
Schizachyrium scoparium (Michx.) Nash little bluestem
**Setaria pumila* (Poir.) Roemer & J.A. Schultes yellow bristle grass
Sorghastrum nutans (L.) Nash Indian grass
Tridens flavus (L.) A.S. Hitchc. purpletop grass
Tripsacum dactyloides (L.) L. Eastern gamagrass

SMILACACEAE

Smilax glauca Walt. glaucous greenbrier
Smilax pseudochina L. halberd-leaved greenbrier
Smilax rotundifolia L. round-leaved greenbrier

SPARGANIACEAE

Sparganium americanum Nutt. American burr-reed

TYPHACEAE

Typha latifolia L. common cattail

XYRIDACEAE

Xyris sp. yellow-eyed grass

SPERMATOPHYTA: ANGIOSPERMAE
DICOTYLEDONAE

ACERACEAE

Acer negundo L. box elder
Acer rubrum L. red maple

ANACARDIACEAE

Rhus copalinum L. winged sumac
Rhus typhina L. staghorn sumac
Toxicodendron radicans (L.) Kuntze poison ivy
Toxicodendron vernix (L.) Kuntze poison sumac

APIACEAE

Angelica venenosa (Greenway) Fern. hairy angelica
Cryptotaenia canadensis (L.) DC. honewort
Hydrocotyle americana L. American marsh pennywort
Oxypolis rigidior (L.) Raf. cowbane
Sanicula canadensis L. black snakeroot

APOCYNACEAE

Apocynum cannabinum L. Indian hemp

ARALIACEAE

Aralia nudicaulis L. wild sarsaparilla
Aralia spinosa L. devil's walking stick
**Hedera helix* L. English ivy

ARISTOLOCHIACEAE

Aristolochia serpentaria L. Virginia snakeroot

ASCLEPIADACEAE

Asclepias amplexicaulis Sm. wavy-leaved milkweed
Asclepias incarnata ssp. *pulchra* (Ehrh. ex Willd.) swamp milkweed
Asclepias syriaca L. common milkweed
Asclepias tuberosa L. butterfly milkweed

ASTERACEAE

Achillea millefolium L. common yarrow
Ambrosia artemisiifolia L. common ragweed
Antennaria plantaginifolia (L.) Richards. plantain-leaved pussytoes
Aster dumosus L. [*Symphyotrichum dumosum* (L.) Nesom var. *dumosum*] bushy aster
Aster pilosus Willd. [*Symphyotrichum pilosum* (Willd.) Nesom var. *pilosum*] white oldfield aster
Aster puniceus L. [*Symphyotrichum puniceum* (L.) A. & D. Löve var. *puniceum*] purple-stemmed aster
Aster radula Ait. [*Eurybia radula* (Ait.) Nesom] rough-leaved aster
Aster vimineus Lam. [*Symphyotrichum racemosum* (Ell.) Nesom] small white aster
Baccharis halimifolia L. groundsel-bush
Bidens aristosa (Michx.) Britt. tickseed sunflower
Bidens bipinnata L. Spanish needles
Bidens frondosa L. devil's beggarticks
Chrysopsis mariana (L.) Ell. Maryland golden aster
Cirsium discolor (Muhl. ex Willd.) Spreng. field thistle
Conyza canadensis (L.) Cronq. horseweed
Conoclinium coelestinum (L.) DC. [*Eupatorium coelestinum* L.] mistflower
Erechtites hieraciifolia (L.) Raf. ex DC. fireweed
Eupatorium album L. white thoroughwort
Eupatorium dubium Willd. ex Poir. coastal plain Joe-pye-weed
Eupatorium fistulosum Barratt Joe-pye-weed
Eupatorium hyssopifolium L. var. *laciniatum* Gray hyssop-leaved thoroughwort
Eupatorium perfoliatum L. boneset
Eupatorium pilosum Walt. rough boneset
Eupatorium rotundifolium L. round-leaved thoroughwort
Eupatorium rotundifolium L. var. *ovatum* (Bigelow) Torr. round-leaved thoroughwort
Eupatorium serotinum Michx. late-flowering thoroughwort
Euthamia graminifolia (L.) Nutt. var. *graminifolia* [*Solidago graminifolia* (L.) Salisb.] grass-leaved goldenrod
Gnaphalium obtusifolium L. [*Pseudognaphalium obtusifolium* (L.) Hilliard & Burtt] sweet everlasting
Hieracium gronovii L. hairy hawkweed
Hieracium paniculatum L. panicled hawkweed
Hieracium scabrum Michx. rough hawkweed
**Hypochaeris radicata* L. hairy cat's-ear
Liatris graminifolia Willd. grass-leaved blazing star
Mikania scandens (L.) Willd. climbing hempvine
Pityopsis graminifolia (Michx.) Nutt. var. *graminifolia* [*Chrysopsis graminifolia* (Michx.) Ell.] silk grass
Prenanthes serpentaria Pursh. lion's foot
Rudbeckia hirta L. black-eyed Susan
Solidago bicolor L. silverrod
Solidago canadensis L. var. *scabra* Torr. & Gray [*Solidago altissima* L.] tall goldenrod
Solidago gigantea Ait. late goldenrod
Solidago juncea Ait. early goldenrod
Solidago nemoralis Ait. gray goldenrod
Solidago odora Ait. fragrant goldenrod
Solidago patula Muhl. ex Willd. round-leaved goldenrod
Solidago puberula Nutt. downy goldenrod
Solidago rugosa P. Mill. rough goldenrod
Solidago speciosa Nutt. var. *erecta* (Pursh.) MacM. erect goldenrod
Solidago uliginosa Nutt. bog goldenrod
Vernonia noveboracensis (L.) Michx. New York ironweed

BALSAMINACEAE

Impatiens capensis Meerb. orange jewelweed

BERBERIDACEAE

**Berberis thunbergii* DC. Japanese barberry

BETULACEAE

Alnus serrulata (Ait.) Willd. common alder
Betula populifolia Marsh. gray birch
Betula nigra L. river birch
Carpinus caroliniana Walt. ironwood

BIGNONIACEAE

Campsis radicans (L.) Seem. ex Bureau trumpet creeper

BRASSICACEAE

**Alliaria petiolata* (Bieb.) Cavara & Grande garlic mustard
Cardamine pensylvanica Muhl. ex Willd. quaker bittercress
Lepidium virginicum L. poor-man's pepper

CABOMBACEAE

Brasenia schreberi J.F. Gmel. watershield

CAMPANULACEAE

Lobelia cardinalis L. cardinal flower
Lobelia inflata L. Indian tobacco
Lobelia puberula Michx. downy lobelia

CAPRIFOLIACEAE

**Lonicera japonica* Thunb. Japanese honeysuckle
**Lonicera maackii* (Rupr.) Herder Amur honeysuckle
Lonicera sempervirens L. trumpet honeysuckle
Sambucus canadensis L. elderberry
**Symphoricarpos albus* (L.) Blake common snowberry
Viburnum acerifolium L. maple-leaved viburnum
Viburnum dentatum L. var. *lucidum* Ait. southern arrowwood
Viburnum nudum L. swamp-haw

CELASTRACEAE

**Celastrus orbiculatus* Thunb. Asian bittersweet

CERATOPHYLLACEAE

Ceratophyllum demersum L. coontail

CISTACEAE

Helianthemum canadense (L.) Michx. frostweed
Lechea pulchella Raf. Leggett's pinweed
Lechea racemulosa Michx. pinweed

CLETHRACEAE

Clethra alnifolia L. sweet pepperbush

CLUSIACEAE

Hypericum canadense L. Canadian St. John's wort
Hypericum gentianoides (L.) B.S.P. pineweed
Hypericum hypericoides (L.) Crantz St. Andrew's cross
Hypericum mutilum L. dwarf St. John's wort
Triadenum virginicum (L.) Raf. Virginia marsh St. John's wort

CONVOLVULACEAE

Ipomoea pandurata (L.) G.F.W. Mey. wild potato vine

CORNACEAE

Cornus florida L. flowering dogwood

CUSCUTACEAE

Cuscuta sp. dodder
Cuscuta compacta Juss. ex Choisy var. *compacta* compact dodder

EBENACEAE

Diospyros virginiana L. persimmon

ERICACEAE

Epigaea repens L. trailing arbutus
Gaultheria procumbens L. wintergreen
Gaylussacia baccata (Wangenh.) K. Koch black huckleberry
Gaylussacia frondosa (L.) Torr. & Gray ex Torr. dangleberry
Kalmia angustifolia L. sheep laurel
Kalmia latifolia L. mountain laurel
Leucothoe racemosa (L.) Gray fetterbush
Lyonia ligustrina (L.) DC. maleberry
Lyonia mariana (L.) D. Don staggerbush
Rhododendron periclymenoides (Michx.) Shinners pinxterbloom
Rhododendron viscosum (L.) Torr. swamp azalea
Vaccinium caesariense Mackenzie New Jersey highbush blueberry
Vaccinium corymbosum L. highbush blueberry
Vaccinium formosum H.C. Andrews southern highbush blueberry
Vaccinium fuscatum Ait. black highbush blueberry
Vaccinium pallidum Ait. lowbush blueberry
Vaccinium stamineum L. deerberry

EUPHORBIACEAE

Acalypha gracilens Gray slender three-seeded mercury
Acalypha rhomboidea Raf. three-seeded mercury
Croton glandulosus L. var. *septentrionalis* Muell.-Arg. northern croton
Croton willdenowii G.L. Webster egg-leaf rushfoil
Euphorbia corollata L. flowering spurge
Euphorbia ipecacuanhae L. American ipecac
Euphorbia maculata L. [*Chamaesyce maculata* (L.) Small] spotted spurge
Euphorbia marilandica Greene flowering spurge
Euphorbia nutans Lag. [*Chamaesyce nutans* (Lag.) Small] eyebane

FABACEAE

Apios americana Medik. groundnut
Baptisia tinctoria (L.) R. Br. ex Ait. f. yellow wild indigo
Clitoria mariana L. butterfly pea
Chamaecrista fasciculata (Michx.) Greene partridge pea
Chamaecrista nictitans (L.) Moench sensitive plant
Desmodium marilandicum (L.) DC. small-leaved tick trefoil
Desmodium paniculatum (L.) DC. panicled tick trefoil
Desmodium rotundifolium DC. round-leaved tick trefoil
Lespedeza capitata Michx. round-headed bush clover
**Lespedeza striata* (Trunb.) Hook. & Arn. Japanese bush clover
Lespedeza hirta (L.) Hornem. hairy bush clover
Lespedeza procumbens Michx. trailing bush clover
Lespedeza repens (L.) W. Bart. creeping bush clover
Lespedeza virginica (L.) Britt. slender bush clover
Lupinus perennis L. lupine
Senna hebecarpa (Fern.) Irwin & Barneby American wild sensitive plant
Strophostyles helvula (L.) Ell. trailing wild bean
Tephrosia virginiana (L.) Pers. goat's rue

FAGACEAE

Castanea dentata (Marsh.) Borkh. American chestnut
Castanea pumila (L.) P. Mill. chinquapin
Fagus grandifolia Ehrh. American beech
Quercus alba L. white oak
Quercus bicolor Willd. swamp white oak
Quercus x *bushii* Sarg. [*Q. marilandica* Muenchh. x *Q. velutina* Lam.] Bush's oak
Quercus coccinea Muenchh. scarlet oak
Quercus falcata Michx. southern red oak
Quercus marilandica Muenchh. blackjack oak
Quercus michauxii Nutt. swamp chestnut oak
Quercus montana Willd. chestnut oak
Quercus palustris Muenchh. pin oak
Quercus phellos L. willow oak
Quercus prinoides Willd. dwarf chinquapin oak
Quercus x *saulii* Schneid. [*Q. alba* x *Q. montana*] Saul's oak
Quercus stellata Wangenh. post oak
Quercus x *subfalcata* Trel. [*Q. falcata* Michx. x *Q. phellos* L.]
Quercus velutina Lam. black oak

GENTIANACEAE

Bartonia paniculata (Michx.) Muhl. screw-stem
Sabatia angularis (L.) Pursh rose pink

HALORAGACEAE

Proserpinaca palustris L. mermaid weed

HAMAMELIDACEAE

Hamamelis virginiana L. witch hazel
Liquidambar styraciflua L. sweet gum

JUGLANDACEAE

Carya alba (L.) Nutt. ex Ell. [*Carya tomentosa* (Lam. ex Poir.) Nutt.] mockernut hickory
Carya cordiformis (Wangenh.) K. Koch bitternut hickory
Carya glabra (P. Mill.) Sweet pignut hickory
Carya ovalis (Wangenh.) Sarg. false shagbark hickory
Carya pallida (Ashe) Engl. & Graebn. sand hickory
Juglans cinerea L. butternut

LAMIACEAE

Lycopus virginicus L. bugleweed
Monarda punctata L. spotted beebalm
**Perilla frutescens* (L.) Britt. var. *frutescens* beefsteak plant
**Prunella vulgaris* L. ssp. *vulgaris* common heal-all
Pycnanthemum muticum (Michx.) Pers. clustered mountain mint
Pycnanthemum tenuifolium Schrad. narrow-leaved mountain mint
Scutellaria integrifolia L. hyssop skullcap
Scutellaria lateriflora L. mad dog skullcap
Trichostema dichotomum L. blue curls

LAURACEAE

Lindera benzoin (L.) Blume spicebush
Sassafras albidum (Nutt.) Nees sassafras

LENTIBULARIACEAE

Utricularia gibba L. humped bladderwort
Utricularia vulgaris L. greater bladderwort

LINACEAE

Linum intercursum Bickn. sandplain flax
Linum medium (Planch.) Britt. var. *texanum* (Planch.) Fern. stiff yellow flax
Linum striatum Walt. ridged yellow flax

MAGNOLIACEAE

Liriodendron tulipifera L. tulip tree
Magnolia tripetala (L.) L. umbrella magnolia
Magnolia virginiana L. sweetbay magnolia

MALVACEAE

Hibiscus moscheutos L. ssp. *moscheutos* crimson-eyed rose mallow

MELASTOMATACEAE

Rhexia mariana L. Maryland meadow beauty
Rhexia virginica L. Virginia meadow beauty

MONOTROPACEAE

Monotropa uniflora L. Indian pipe

MYRICACEAE

Myrica pensylvanica Mirbel [*Morella pensylvanica* (Mirbel) Kartesz] bayberry

NYMPHAEACEAE

Nuphar lutea (L.) Sm. ssp. *advena* (Ait.) Kartesz and Gandhi spatterdock
Nymphaea odorata Ait. American white water lily

NYSSACEAE

Nyssa sylvatica Marsh. black gum

OLEACEAE

Chionanthus virginicus L. fringe tree
Fraxinus americana L. white ash
Fraxinus pennsylvanica Marsh. green ash
**Ligustrum* sp. privet

ONAGRACEAE

Circaea lutetiana L. enchanter's nightshade
Epilobium coloratum Biehler purple-leaved willow herb
Ludwigia alternifolia L. seedbox
Ludwigia palustris (L.) Ell. marsh seedbox
Oenothera biennis L. common evening primrose

OXALIDACEAE

Oxalis dillenii Jacq. slender wood sorrel

PHYTOLACCACEAE

Phytolaca americana L. pokeweed

PLATANACEAE

Platanus occidentalis L. sycamore

POLYGALACEAE

Polygala incarnata L. procession flower
Polygala lutea L. orange milkwort
Polygala mariana P. Mill. Maryland milkwort
Polygala nutallii Torr. & Gray Nuttall's milkwort
Polygala sanguinea L. purple milkwort

POLYGONACEAE

Polygonum arifolium L. halberd-leaved tearthumb
**Polygonum cespitosum* Blume var. *longisetum* (deBruyn) A.N. Steward Oriental lady's thumb
Polygonum hydropiperoides Michx. water pepper
Polygonum pensylvanicum L. Pennsylvania smartweed
**Polygonum perfoliatum* L. Asiatic tearthumb
Polygonum punctatum Ell. dotted smartweed
Polygonum sagittatum L. arrow-leaved tearthumb
**Rumex acetosella* L. sheep sorrel

PRIMULACEAE

Lysimachia quadrifolia L. whorled yellow loosestrife
Lysimachia terrestris (L.) B.S.P. swamp candles

PYROLACEAE

Chimaphila maculata (L.) Pursh spotted wintergreen
Chimaphila umbellata (L.) W. Bart. pipsissewa

RHAMNACEAE

Rhamnus cathartica L. European buckthorn

RANUNCULACEAE

Thalictrum pubescens Pursh tall meadow-rue

ROSACEAE

Amelanchier arborea (Michx. f.) Fern. downy serviceberry
Amelanchier canadensis (L.) Medik. eastern serviceberry
Amelanchier laevis Wieg. smooth serviceberry
Aronia arbutifolia (L.) Pers. [*Photinia pyrifolia* (Lam.) Robertson & Phipps] red chokeberry
Aronia melanocarpa (Michx.) Ell. [*Photinia melanocarpa* (Michx.) Robertson & Phipps] black chokeberry
Geum canadense Jacq. white avens
**Malus* sp. non-native crabapple
Malus coronaria (L.) P. Mill. sweet crabapple
Rosa palustris Marsh swamp rose
Potentilla canadensis L. common cinquefoil
**Prunus* sp. non-native? plum
Prunus serotina Ehrh. black cherry
Prunus subhirtella Miq. Higan cherry
Rubus allegheniensis Porter Allegheny blackberry
Rubus argutus Link sawtooth blackberry
Rubus flagellaris Willd. northern dewberry
Rubus hispidus L. bristly dewberry
**Rubus phoenicolasius* Maxim. wineberry

RUBIACEAE

Cephalanthus occidentalis L. button bush
Diodia teres Walt. rough buttonweed
Diodia virginiana L. Virginia buttonweed
Galium cicaezans Michx. wild licorice
Galium pilosum Ait. var. *pilosum* hairy bedstraw
Galium tinctorium (L.) Scop. stiff marsh bedstraw
Galium triflorum Michx. fragrant bedstraw
Mitchella repens L. partridgeberry

RUTACEAE

**Poncirus trifoliata* (L.) Raf. hardy orange

SALICACEAE

**Populus alba* L. white poplar
Populus deltoides Bartr. ex Marsh. eastern cottonwood
Populus grandidentata Michx. big-toothed aspen
Salix nigra Marsh. black willow

SARRACENIACEAE

Sarracenia purpurea L. purple pitcher plant

SCROPHULARIACEAE

Gratiola virginiana L. round-fruit hedge-hyssop
Linaria canadensis (L.) Dum.-Cours. [*Nuttallanthus canadensis* (L.) D.A. Sutton] blue toadflax
Lindernia dubia (L.) Pennell false pimpernel
Melampyrum lineare Desr. cow wheat
Mimulus alatus Ait. winged monkeyflower
Mimulus ringens L. square-stemmed monkeyflower
Penstemon digitalis Nutt. ex Sims foxglove beardtongue
**Verbascum thapsus* L. great mullein
Veronica officinalis L. common speedwell

SIMAROUBACEAE

**Ailanthus altissima* (P. Mill.) Swingle tree-of-heaven

SOLANACEAE

Solanum carolinense L. horse nettle

ULMACEAE

Celtis occidentalis L. common hackberry
Celtis tenuifolia Nutt. dwarf hackberry
Ulmus americana L. American elm

URTICACEAE

Boehmeria cylindrica (L.) Sw. false nettle
Pilea pumila (L.) Gray clearweed

VERBENACEAE

Verbena hastata L. blue vervain

VIOLACEAE

Viola lanceolata L. bog white violet
Viola primulifolia L. primrose-leaved violet
Viola sagittata Ait. arrow-leaved violet

VITACEAE

**Ampelopsis brevipedunculata* (Maxim.) Trautv. porcelain berry
Parthenocissus quinquefolia (L.) Planch. Virginia creeper
Vitis aestivalis Michx. var. *aestivalis* summer grape
Vitis labrusca L. fox grape
Vitis vulpina L. winter grape

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LITERATURE CITED

Aleinikoff, J.N., J.W. Horton, Jr., A.A. Drake, Jr., and C.M. Fanning. 2002. SHRIMP and conventional U-Pb ages of Ordivician granites and tonalites in the central Appalachian piedmont: implications for Paleozoic tectonic events. American Journal of Science 302: 0-75.

Alexandria Drafting Company. 2005. Prince George's County street map. Alexandria, Virginia.

Bailey, R.G. 1998. Ecoregions: the ecosystem geography of the oceans and the continents. Springer-Verlag, New York, New York.

BONAP. Biota of North America Program Database. 1998. University of North Carolina, Campus Box 3280, Coker Hall, Chapel Hill, NC 27599-3280. (http://www.bonap.org/)

Brown, M.L. and R.G. Brown. 1984. Herbaceous plants of Maryland. Port City Press, Inc., Baltimore, Maryland.

Brown, R.G. and M.L. Brown. 1972. Woody plants of Maryland. Port City Press, Inc., Baltimore, Maryland.

Darton, N.H. 1939. Gravel and sand deposits of eastern Maryland adjacent to Washington and Baltimore. Bulletin 906-A. United States Government Printing Office, Washington, D.C.

Drake, A.A., Jr. 1998a. Geologic map of the Kensington quadrangle, Montgomery County, Maryland. U.S. Geological Survey Geologic Quadrangle Map GQ-1774.

Fernald, M.L. 1950. Gray's Manual of Botany. Eighth Edition. American Book Company, NewYork, New York.

Fleming, G.P., P.P. Coulling, K.D. Patterson, and K. Taverna. 2005. The natural communities of Virginia: classification of ecological community groups. Second approximation. Version 2.1. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond,Virginia.http://www.dcr.virginia.gov/dnh/ncintro.htm.

Frye, C.T. and C. Lea. 2001. Atlas and annotated list of *Carex* (Cyperaceae) of Maryland and the District of Columbia. The Maryland Naturalist 44: 41-108.

Harshberger, J.W. 1916. The vegetation of the New Jersey Pine Barrens. Christopher Sower Company, Philadelphia, Pennsylvania.

Harvill, A.M., Jr., T.R. Bradley, C.E. Stevens, T.P. Wieboldt, D.M.E. Ware, D.W. Ogle, G.W. Ramsey, and G.P. Fleming. 1992. Atlas of the Virginia flora. Virginia Botanical Associates, Burkeville, Virginia.

Hitchcock, A.S. and P. Standley. 1919. Flora of the District of Columbia and vicinity. Contrib. U.S. Natl. Herb. Volume 21.

Interstate Commission on the Potomac River Basin. 1998. Anacostia: the other river. Rockville, Maryland.

Johnson, M.F. 1995. Goldenrods in Virginia: *Euthamia* (Nutt.) Nutt. and *Solidago* L. Castanea 60: 114-140.

Johnston, P.M. 1964. Geology and ground-water resources of Washington, D.C., and vicinity. Geological Survey Water-Supply Paper 1776. United States Government Printing Office, Washington, D.C.

Kartesz, J.T. 1999. Synthesis of the North American flora. North Carolina Botanical Garden, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina.

Lea, C. 2004. Vegetation types in national capital region parks. Working draft. National Park Service, Washington, D.C.

Maryland Department of Natural Resources. 2003. Rare, threatened, and endangered plants of Maryland. Annapolis, Maryland.

Maryland Geological Survey Online. 2006. Geologic map of Maryland. Baltimore, Maryland.

McAtee, W.L. 1918. A sketch of the natural history of the District of Columbia. Bulletin of the Biological Society of Washington No. 1.

Mixon, R.B., L. Pavlides, D.S. Powars, A.J. Froelich, R.E.Weems, J.S. Schindler, W.L. Newell, L.E. Edwards, and L.W. Ward. 2000. Geologic Map of the Fredericksburg 30’ x 60’ quadrangle, Virginia and Maryland. U.S. Geological Survey Geologic Investigations Series Map I-2607.

NatureServe. 2005. Upper Anacostia watershed plant communities of conservation significance. Arlington, Virginia.

Obermeier, S.F. 1984. Engineering geology and slope design of the Cretaceous Potomac deposits in Fairfax County, Virginia and vicinity. U.S. Geological Survey Bulletin 1556.

Peet, R.K., T.R. Wentworth, and P.S. White. 1998. A flexible, multipurpose method for recording vegetation composition and structure. Castanea 63: 262-274.

Shreve, F., M.A. Chrysler, F.H. Blodgett, and F.W. Besley. 1910. The plant life of Maryland. Maryland Weather Service Special Publication Vol. III. The John Hopkins Press, Baltimore, Maryland.

Simmons, R.H. 1995. A survey of terrace gravel communities in the Washington, D.C. area. Unpublished report.

Simmons, R.H. and M.T. Strong. 2001. Araby Bog: a globally rare Magnolia bog in Charles County, Maryland. Marilandica 9: 6-9.

Sipple, W.S. 1999. Days afield: exploring wetlands in the Chesapeake Bay region. Gateway Press, Baltimore, Maryland.

Strong, M.T., R.H. Simmons, and G.P. Fleming. In preparation. The last remaining terrace gravel magnolia bogs and their flora in Washington, D.C. and vicinity.

Terrell, E.E., J.L. Reveal, R.W. Spjut, R.F. Whitcomb, J.H. Kirkbride Jr., M.T. Cimino, and M.T. Strong. 2000. Annotated list of the flora of the Beltsville Agricultural Research Center, Beltsville, Maryland. USDA, Agricultural Research Service. ARS-155.

Weakley, A.S. 2006. Flora of the Carolinas, Virginia, Georgia, and surrounding areas. Working Draft of January 2006. University of North Carolina, Chapel Hill, North Carolina.

Wild Sarsaparilla
(*Aralia nudicaulis*)

MNPS Field Botany Update

By Rod Simmons

Bear Branch Bog, Prince George's County, Maryland: This site was recently discovered by Bill Morgante, wetlands scientist and MNPS member, and visited by Rod Simmons and Mark Strong on October 9, 2007. The headwaters of Bear Branch begin as springs just north of and very near the headwaters of Little Paint Branch and Indian Creek. All three streams emanate from the vast sand and gravel aquifers of the Konterra complex (formerly Contee Gravel Co.). However, Bear Branch flows into the Patuxent River and Little Paint Branch and Indian Creek flow to the Anacostia. Conservation efforts have been extremely challenging in this region because much of the Konterra site and remaining woodland and rural areas in nearby Laurel, comprising many thousands of acres, are rapidly being transformed into urban sprawl and impervious pavement. In past years, MNPS members have surveyed areas along Bear Branch to the west of this site; much of it characterized as an extensive mosaic of high-quality woodland seeps with many components of Magnolia Bogs.

The Bear Branch Bog is a fairly large, mostly undisturbed example of the globally-rare Fall Line Terrace Gravel Magnolia Bog, which were once greatly concentrated and fairly numerous in the Laurel area. Typically, the entire site comprises a mosaic of open bogs and surrounding acidic seepage woodland on a gently sloping, gravelly hillside above the stream. Flora observed in October includes:

Canopy: (maximum height 80') *Acer rubrum, Liriodendron tulipifera, Pinus rigida*, and *Quercus alba*.

Sub-canopy: *Magnolia virginiana* and *Nyssa sylvatica*.

Shrub layer: *Alnus serrulata, Aronia arbutifolia, Chionanthus virginicus, Gaylussacia frondosa, Ilex opaca, Ilex verticillata, Leucothoe racemosa, Lyonia ligustrina, Rhododendron viscosum, Smilax rotundifolia, Toxicodendron vernix*, and *Vaccinium* spp.

Herb layer: *Amelanchier canadensis, Aralia nudicaulis, Arisaema triphyllum, Calamagrostis coarctata, Carex folliculata, Carex intumescens, Carex leptalea* ssp. *harperi, Chasmanthium laxum, Chelone glabra, Cypripedium acaule, Dichanthelium lucidum, Dioscorea villosa, Eupatorium pilosum, Lobelia puberula, Lycopodium obscurum, Lycopus virginicus, Maianthemum canadense, Medeola virginiana, Mitchella repens, Osmunda cinnamomea, Osmunda regalis, Pinus rigida* (seedlings), *Rubus hispidus, Selaginella apoda, Smilax pseudochina, Solidago rugosa, Solidago uliginosa, Symplocarpus foetidus, Thalictrum pubescens, Thelypteris noveboracensis, Uvularia sessilifolia, Viburnum nudum, Viburnum recognitum, Viola cucullata, Viola primulifolia, Woodwardia areolata*, and *Woodwardia virginica*.

A Book Review

By Walt Sonneville

Sugarloaf: The Mountain's History, Geology, and Natural Lore
By Melanie Choukas-Bradley
Illustrations by Tina Thieme Brown
University of Virginia Press
Paper ISBN 0-8139-2167-6 $11.95
112 pages, 5-1/2 x 8-1/2
26 b&w illustrations

Perhaps it should be called "Mount Anomaly." What is this topographical prominence doing on relatively flat land just 35 miles from Washington, D.C. at the border of Montgomery and Frederick counties? It is not part of the more-distant Blue Ridge, where the Shenandoah and the Catoctin mountains lie. And is it really a mountain? *Washington Post* writer Katy Parisi stated in her column "Daylife" (August 2, 1991) "technically, Sugarloaf is not even a mountain, but a monadnock. A monadnock…is a big hunk of rock that is able to resist erosion far better than the soil plain around it. The softer plain wears down, revealing what looks like a mountain."

Thank heavens for Choukas-Bradley, who defends the geologic dignity of Sugarloaf by declaring in the first sentence of her first chapter: "Sugarloaf Mountain is a monadnock, a mountain [emphasis added] that stands alone after the surrounding countryside has eroded away around it."

With an elevation of 1,282' and standing 800 feet above the surrounding countryside, we can readily accept Sugarloaf as a real mountain, not a hill. Besides, when one is on its 15 miles of interlocking hiking trails, there is little to distinguish it from similar mountainous trails at the Catoctin (1,700' elevation) or the Shenandoah (4,000').

The history of Sugarloaf provided in this book includes a brief sketch of its "discoverer," a Swiss explorer named Franz Louis Michel [American Indians were obviously familiar with the site long before European settlers, pp.15-17]. According to reference sources other than Choukas-Bradley, Sugarloaf was discovered by Michel in 1707. Michel was looking for minerals, especially silver, in the mountains of northern Virginia and the Monacacy area. The maps of the Potomac and Monocacy rivers and Sugarloaf Mountain proved lures for later explorers in their search for minerals.

Readers interested in local history are given just enough information about Michel and other explorers to want more information. Choukas-Bradley identifies two reference sources, a book entitled *Pioneers of Old Monocacy: The Early Settlement of Frederick County, Maryland 1721-1743*, and a documentary film entitled *Sugarloaf: The Quest for Riches and Redemption in the Monocacy Valley*.

Members of the Maryland Native Plant Society should expect to find Choukas-Bradley's passages on plants of greatest interest. Here the author provides tantalizing, but limited, information. After all, this is a book on the mountain's history, geology, and natural lore (flora and fauna). Only three pages are devoted to the chapter entitled "Plants of Sugarloaf Mountain," making it one of the two shortest chapters. But that doesn't leave the reader disappointed because an ample review of plant life is woven into two other chapters. The 19-page chapter, "Sugarloaf's Trail System," and the 10-page chapter, "Sugarloaf Country Through the Seasons" have enough information to satisfy hikers who want to know the what-where-when of plant life on the mountain.

Readers with an insatiable need for more botanical information [should consult] the author's 415-page companion book: *An Illustrated Guide to Eastern Woodland Wildflowers and Trees: 350 Plants Observed at Sugarloaf Mountain, Maryland.* A count of 350 represents admirable coverage of the "the more than 500 species of plants" claimed in a trail-guide flier published by Stronghold, Inc., the trustees of this 3,300-acre privately-owned mountain.

Different habitats and soil types support a broad range of species. The author states: "Plants indigenous to the Mid-Atlantic Coastal Plain, Piedmont, and mountain regions overlap here. Because of the pristine nature of Sugarloaf's woodlands, rare and threatened species find valuable habitat…." Included as threatened species in Maryland are the purple-fringed (*Platanthera grandiflora*) and the yellow-fringed (*Platanthera ciliaris*) orchids, for whom Sugarloaf is "critical habitat."

Visitors in the spring may enjoy the wild pink azalea, the uncommon wintergreen, and the "incomparably beautiful pink lady's slipper," jack-in-the-pulpit, wild sarsaparilla, and many others. Late summers and fall "are dominated by aster or daisy family members, including goldenrod, asters, and Eupatoriums. The floral stars of [late summer] are the cardinal flowers…with a backdrop of royal and cinnamon fern…"

The woods are dominated by oaks (primarily the chestnut oak) and hickories, accompanied by many other varieties. The trees, of course, make October the mountain's most photogenic month, attracting weekend crowds. After their leaves have fallen, the witch hazels produce their golden leaves and golden ribbonlike blossoms. A co-attraction are the American beech trees with their "smooth gray trunks and limbs and amber foliage that persists into the winter."

Pinus pungens, the table mountain pine, is selected by the author as "Sugarloaf's most dramatic tree." It grows mostly in the mountains from northern Georgia through Pennsylvania. Wind stunts their growth to make them appear bonsai-like, complementing the mountain's pink quartzite.

Area residents may remember what we heard about this pine following the fire in the Shenandoah Park in 1999. The Forest Service set "controlled burns" (which became uncontrolled over 1,600 acres) to clear underbrush and rejuvenate pines, such as the pitch and table mountain pines. Both rely on fire to clear underbrush and to expose their seed to the high temperatures needed to release seeds. Perhaps the [companion] book on plants and trees will disclose how underbrush is controlled at Sugarloaf to encourage pine reproduction.

That [companion book] might also include discussion of an ornamental fruit tree found at Sugarloaf, the pawpaw. A newsletter published by Stronghold, Inc. described the pawpaw as "once a staple of Native Americans and a godsend to the mountain men and pioneers." What better lore to attract young visitors, especially should they find ripe fruit and discover for themselves its custard-like texture with a perfume fragrance. Finding ripe fruit is a challenge because it is favored by squirrels, raccoons, and opossums.

Choukas-Bradley is superbly qualified to write about trees. She is the author of *City Trees: The Complete Field Guide to the Trees of Washington, D.C.*

No book on Sugarloaf is complete without a review of the role played by Gordon Strong in converting a deforested mountain into a forested park for all to enjoy. Before he bought most of the mountain (with subsequent purchases made by Stronghold, Inc. after Strong's death in 1954) many of the trees had been felled to produce charcoal to manufacture pig iron at nearby furnaces. Later a fungus ravaged the American chestnut, a dominant tree in the Sugarloaf region. Choukas-Bradley tells us "By 1900 a badly denuded Sugarloaf was almost as battle-scarred as the postbellum South." That condition was not unique to Sugarloaf.

Logging, clear-cutting for the iron industry, and bark stripping for tanning in the nearby Catoctin Mountains reduced that landscape to "trees about the size of a fence post" by 1935, the year the National Park Service acquired 10,000 of Catoctin's acres (according to John Means in his book *Maryland's Catoctin Mountain Parks*).

This book, with its beautiful pen-and-ink illustrations by Tina Thieme Brown, amply succeeds in its declared purpose of being "designed for the day hiker, the naturalist, and the arm-chair historian." It makes one want to visit, as *Washington Post* writer Charles Fenyvesi put it in a 1998 column, "my favorite four-star locale."

Walt Sonneville, a Gaithersburg resident, can generally sight Sugarloaf from his community. He and others are pleased to have it as a neighbor.

Ed. Note: This book review was provided by Walt in perfect timing for the release of the book. We apologize for delays in getting *Marilandica* to press, but are pleased to include his excellent review in this issue.

"It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and so to reflect that these elaborately constructed forms, so different from each other, and dependant on each other in so complex a manner, have all been produced by laws acting around us…Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is a grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one, and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been and are being evolved."

~ Darwin

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Contents

Species	Common Name	Rank - Status	Where Found at BARC	Terrell et.al 2000	Simmons et.al 2008	Hotchkiss/Uhler 1946	Vouchers & Observ.	approximate distance
Bartonia paniculata	twining screwstem	S3	East Farm - Wetland Research Forest	x	x		Strong et al. 1999 (US)	within 1/8 mile of east trainyard
Betula populifolia	gray birch	S1	East Farm - Coniferous Research Forest		x		observed, not collected	within 3/4 mile of east railway
Carex bullata	button sedge	S3	East Farm - Wetland Research Forest		x		Strong et al. 2005 (US)	within 1/4 mile of east trainyard
Carex venusta	dark green sedge	S3S4	East Farm - Airport Bog			x	Hotchkiss 1946 (US)	within 1/8 mile of east trainyard
Chimaphila umbellata	pipsissewa	S3	Central Farm - along Entomology Rd.	x	x		observed, not collected	direct hit by west trainyard
Coreopsis verticillata	whorled coreopsis	S3	East Farm - Deciduous Research Forest	x			Strong et al. 2000 (US)	within 1/2 mile of east trainyard
Cyperus lancastriensis	Lancaster's cyperus	S2S3	Central Farm - meadow by Building 465	x			Spjut 1999 (MARY)	direct hit by west trainyard
Dichanthelium aciculare	needle-leaf witchgrass	S2	Central Farm - glade				Simmons 2020 (photo)	within 3/4 mile of west trainyard
Drosera rotundifolia	roundleaf sundew	S3	East Farm - Airport Bog			x*	observed, not collected	within 1/8 mile of east trainyard
Eupatorium altissimum	tall boneset	S3	East Farm - SCS Rd 1/2m s.of P. Mill Rd	x			Terrell 1997 (MARY)	direct hit by east railway spur
Gaylussacia dumosa	dwarf huckleberry	S1 - Endangered	East Farm - Airport Bog	x		x	Hotchkiss 1946 (US)	within 1/8 mile of east trainyard
Isoetes engelmannii	Engelmann's quillwort	S3	Central Farm - north of Powder Mill Rd.				Simmons 2021 (photo)	within 1/4 mile of west trainyard
Kalmia angustifolia	sheep laurel	S3S4	East Farm - Deciduous RF & Airport Bog	x	x	x	Strong et al. 2000 (US)	1/8 & 1/2 mile of east trainyard
Krigia dandelion	potato dandelion	S2S3	Central Farm - along Biocontrol Rd.	x			Reveal 1999 (MARY)	within 1/2 mile of west trainyard
Linum intercursum	sandplain flax	S2 - Threatened	East Farm - Beltsville Airport east end		x		Strong et al. 2005 (US)	direct hit by east trainyard
Lupinus perennis	sundial lupine	S2 - Threatened	East Farm - W. edge Conifer Res. Forest	x			Jenson 1940 (US)	within 1/2 mile of east railway
Platanthera blephariglottis	white-fringed orchid	S2 - Threatened	Central Farm - north of Powder Mill Rd.		x		Simmons 2020 (photo)	direct hit; 250' of west trainyard
Platanthera flava	pale green orchid	S2S3	East Farm - Wetland Research Forest	x	x		Strong et al. 2005 (US)	within 1/4 mile of east trainyard
Rhynchospora microcephala	small-headed beakrush	S2	East Farm - Deciduous Research Forest	x			Strong et al. 1999 (US)	within 1/2 mile of east trainyard
Sarracenia purpurea	northern pitcher plant	S2 - Threatened	East Farm - Deciduous Research Forest	x	x		observed, not collected	within 1/2 mile of east trainyard
Smilax pseudochina	long-stalked greenbrier	S2 - Threatened	East Farm - Deciduous Research Forest		x		observed, not collected	within 1/2 mile of east trainyard
Solidago latissimifolia	Elliott's goldenrod	S3	East Farm - Deciduous Research Forest	x			Strong et al. 1999 (US)	within 1/2 mile of east trainyard
Solidago uliginosa	bog goldenrod	S3	Central Farm - north of Powder Mill Rd.		x		observed, not collected	within 1/2 mile of west trainyard
Sphenopholis pensylvanica	swamp oats	S2 - Threatened	East Farm - Airport Bog			x	Hotchkiss 1946 (US)	within 1/8 mile of east trainyard
Utricularia subulata	zigzag bladderwort	S3	East Farm - Airport Bog & Deciduous RF	x		x	Hotchkiss 1946 (US)	1/8 & 1/2 mile of east trainyard

Key
S1 = highly rare
S2 = rare
S3 = rare to uncommon