



## ARLINGTON COUNTY, VIRGINIA

County Board Agenda Item  
Meeting of September 25, 2010

**DATE:** September 8, 2010

**SUBJECT:** Request to Advertise Adoption of the Natural Resources Management Plan

### C. M. RECOMMENDATION:

Authorize advertisement of public hearings to be held at the October 12/14, 2010, meeting of the Planning Commission and at the October 23/26, 2010, meeting of the County Board to consider adoption of the Natural Resources Management Plan for Arlington County, as an element of the Public Spaces Master Plan (an element of the Comprehensive Plan), to provide recommendations for the preservation and protection of Arlington County's natural resources.

**ISSUES:** Adoption of the Natural Resources Management Plan ("the Plan") will allow Arlington County to move forward with the development of policies and best management practices to ensure the future protection and preservation of natural resources located on County-owned land. The Plan also recommends developing an environmental review process for projects on private property which seek discretionary County approvals (such as Site Plans, requests for variances, and Special Use Permits) if the projects will occur within 100 feet of a documented, significant natural resource located on County-owned property.

**SUMMARY:** Arlington County (which contains more than 15,000 acres in total) has approximately 2,940 acres of open space, including federal lands, schools, parks and privately-owned properties. Only 738 acres are considered ecologically natural lands. Of these, 248 acres are County-owned and managed as public parkland. County staff recommends adoption of the Natural Resources Management Plan to best address the outstanding issues of environmental sustainability and preservation of these natural lands and other documented significant natural resource features on County-owned properties.

**BACKGROUND:** Arlington County's Public Spaces Master Plan (adopted in 2005) highlighted the need for a County-wide inventory and database of Arlington's natural resources, and creation of a Natural Resources Management Plan to guide County efforts in the management, preservation and protection of the local natural environment. From 2005 to 2008, County staff conducted and completed the first ever comprehensive inventory of natural resources within Arlington County. The inventory (formally the Natural Heritage Resource Inventory) included extensive field and literature research in the areas of geology, hydrology,

County Manager:

County Attorney:

/ BRC

Staff: Jamie Bartalon, PRCR

48.

flora and fauna. Significant natural resource features were documented and mapped on a series of GIS layers. The Natural Resources Management Plan is a result of the analysis of data collected through the inventory process, review of related scientific literature, and a review of existing County plans and current work processes.

The original draft of the Plan was developed by staff and refined through a series of work sessions with a citizen work group composed of representatives from the Urban Forestry Commission, the Park and Recreation Commission, and the Environment and Energy Conservation Commission. The original draft was then routed for review and comment to interdepartmental staff, including senior staff on the County's Strategic Development Group. Between January and June of 2010, the principal staff involved made presentations to interdepartmental staff and the general public. A public forum was held on May 27, 2010, for County staff to present the draft Natural Resources Management Plan and receive public comments. Staff also presented the draft Plan to the Long Range Planning Committee of the Planning Commission and to the Beautification Committee. After a number of revisions by staff based on comments received through these internal and external processes, staff has prepared a final draft Plan (attached to this Report) for review and recommendation by the Planning Commission and review and adoption by the County Board. This Report seeks the Board's approval of advertisement of the draft Plan for October review and action by the Planning Commission and the County Board.

**DISCUSSION:** Prior to the completion of the Natural Heritage Resource Inventory, County staff lacked sufficient information to make sound decisions regarding the wise stewardship of Arlington's natural resources. Analysis of data collected through the Inventory has confirmed that over the past seventy-five years, urban development within Arlington has greatly impacted and reduced ecologically-natural lands and natural resource features. As a result of these environmental impacts, the community of Arlington County finds itself at a critical junction. In 2010, only 4.4% of the surface area of Arlington County remains as natural lands, 50% of all surface streams have disappeared, invasive plant species are widespread, and only 25-50% of historically-documented wildlife remain. However, despite this high degree of urbanization, approximately 700 acres of intact natural lands remain, and a number of significant natural resources, including significant geological features, sensitive wetlands and rare flora and fauna, were documented.

The draft Natural Resources Management Plan offers 19 primary recommendations which provide a strategy to support both short- and long-term solutions to the important environmental issues facing the community of Arlington County. The Plan's recommendations focus on natural lands and urban forest management, native flora, invasive plant species, geological resources, wildlife, park management and planning issues, land acquisition and conservation easements, cooperative management opportunities, partnership development, and natural resource education. The Plan's recommendations are carefully targeted to provide best management practices for the preservation of natural resources located on County-owned and -managed properties.

The first three recommendations in the attached Natural Resources Management Plan (the adoption of a policy of "Zero-Loss" of natural lands; the establishment of Natural Resource Conservation Areas; and the revision of environmental assessment processes and tools) highlight

the County government's new approach to natural resource management and preservation. The current draft Plan does not recommend actions that directly impact private property. However, Recommendation #3 directs County staff to explore mechanisms for the environmental review of projects on private property seeking discretionary County approval (such as Site Plans, requests for variances, and Special Use Permits) if the projects involve a land disturbance within 100 feet of a documented, significant natural resource located on property owned by the County.

This Report seeks the Board's authorization for the draft Plan to be advertised for public hearing by the Planning Commission on October 12/14, 2010, and by the County Board on October 23/26, 2010, as required by the Code of Virginia.

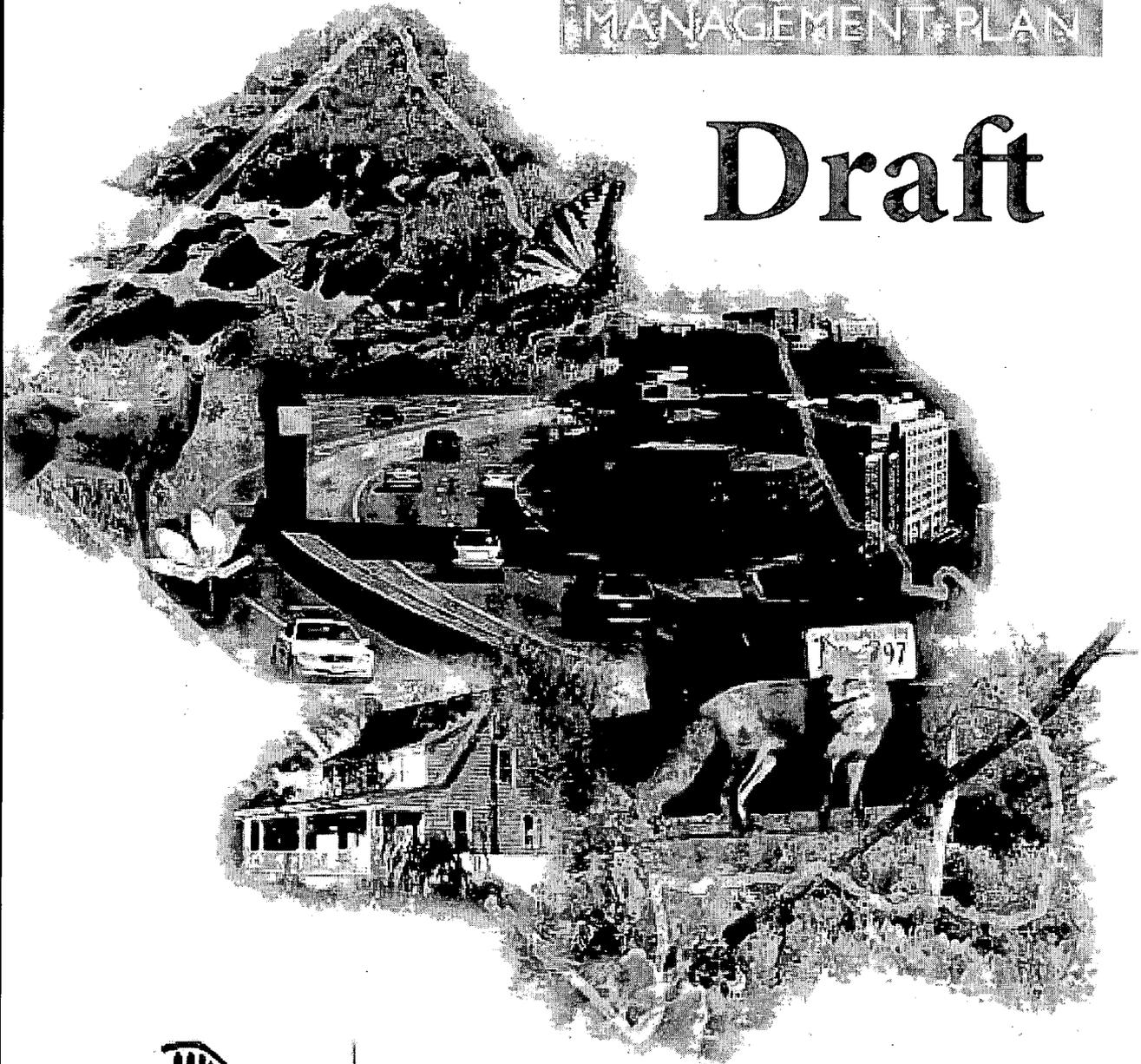
**FISCAL IMPACT:** There are no fiscal impacts at this time.

SEPTEMBER 2010

# NATURAL RESOURCES

MANAGEMENT PLAN

# Draft



ARLINGTON  
VIRGINIA

DEPARTMENT OF PARKS, RECREATION  
AND CULTURAL RESOURCES



State Champion Post Oak

## NATURAL RESOURCES MANAGEMENT PLAN September 2010

### ARLINGTON COUNTY BOARD

Chairman Jay Fisette, Vice-Chairman Christopher Zimmerman and Members Barbara A. Favola, Mary Hughes Hynes and J. Walter Tejada.

Michael Brown, County Manager

Dinesh Tiwari, Director, Department of Parks, Recreation and Cultural Resources

Caroline Temmermand, Division Chief, Parks and Natural Resources Division

The *NATURAL RESOURCES MANAGEMENT PLAN* was prepared by Greg Zell, Natural Resource Specialist, Department of Parks, Recreation and Cultural Resources, Parks and Natural Resources Division, Conservation and Interpretation Section. The following individuals provided assistance in the development of the Natural Resources Management Plan: Jamie Bartalon, Landscape and Forestry Section Supervisor; Larry Finch, Chairman, Urban Forestry Commission; Mary Ann Lawler, Urban Forestry Commission; Steve Campbell, Urban Forestry Commission; Dean Amel, Environment and Energy Conservation Commission; Shannon Cunniff, Chairman, Environment and Energy Conservation Commission; Caroline Haynes, Park and Recreation Commission and Jim Olivetti, Park and Recreation Commission

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# NATURAL RESOURCES MANAGEMENT PLAN

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## EXECUTIVE SUMMARY

The *Natural Heritage Resource Inventory* (NHRI), which was conducted between 2005 and 2008, provides Arlington County with natural resource data so it can systematically define and address issues relating to the protection and management of natural resources within the County. The resulting *Natural Resources Management Plan* (NRMP), which was called for in the 2005 *Public Spaces Master Plan*, defines natural resource problems and recommends policies and actions to preserve Arlington’s documented natural resources for future generations. In offering a strategic approach, this plan views natural resource management through both a broad and narrow lens. This layered strategy, in addition to offering new concepts, identifies areas for agency cooperation, reduces redundancies and leverages current efforts.

Most importantly, this approach emphasizes the importance of managing natural resources as a unified system rather than a set of unrelated natural features.

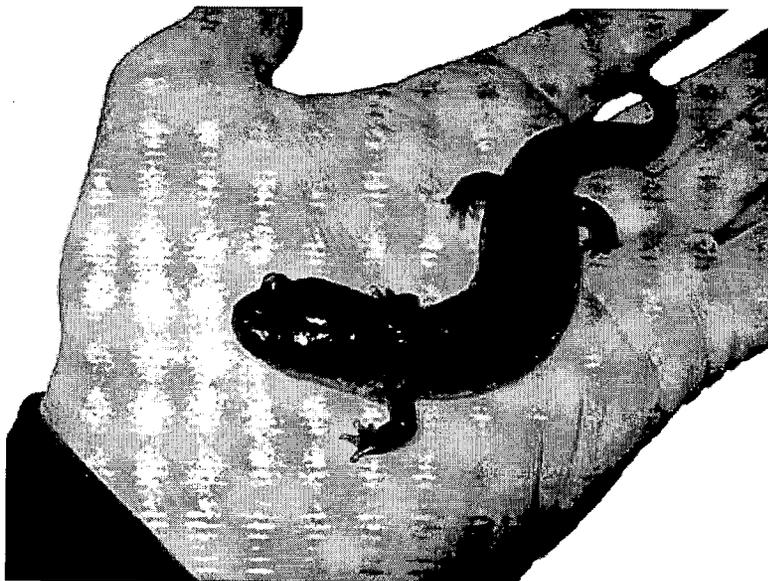
There are 19 primary recommendations with additional suggestions offered throughout the body of the report. Discussion and recommendations focus on natural lands management; urban forest management; native vegetation; invasive plant species; geological resources; wildlife resources; park management and planning issues; land acquisition and conservation easements; cooperative management opportunities; partnership development and natural resource education. A number of appendices at the end of the report provide supporting information and maps.

Recommendation	Priority	Fiscal Impact	Implementation Timeline	Responsibility
1 Adopt a general policy goal of “Zero-Loss” of County-owned natural lands.	Priority 1	None	N/A	County Board
2 Establish a new administrative category of County-owned open space, known as Natural Resource Conservation Areas (NRCAs).	Priority 1	None	One Year	PRCR in conjunction with relevant commissions
3 Develop a new GIS-based environmental review process to protect significant individual natural resources on Arlington County-owned open space from ongoing maintenance activities, redevelopment or new construction on County-owned properties or private properties within 100’ of a designated natural resource feature. Revise current Administrative Regulation 4.4 (Environmental Assessment Process) to incorporate the use of this GIS layer into the review process for all County-initiated land disturbing activities. Explore expansion of current County review processes to help ensure that land disturbing activities on private property would not adversely impact documented natural resources on County-owned properties.	Priority 1	None	One Year	Workgroup from PRCR, DES, E2C2
4 Effectively manage Arlington’s natural resources by establishing a single management unit with specialized skills in natural lands preservation and natural resources management.	Priority 1	To Be Determined	As soon as possible	PRCR

Recommendation	Priority	Fiscal Impact	Implementation Timeline	Responsibility
<b>5</b> Develop an individual Natural Resources Management Plan for each County-owned park designated as a Natural Resource Conservation Area, or containing NRCA's.	Priority 1	None	12 months after formation of the specialized management unit	PRCR
<b>6</b> Actively pursue opportunities to preserve open space through conservation easements, voluntary dedications, partnerships and fee simple acquisition. Potential acquisitions with natural lands or significant natural resources present should be the highest priority. Citizens should be educated about their opportunities to participate in these programs.	Priority 2	Undetermined	One year	PRCR
<b>7</b> Update and submit to the County Board for approval a revised edition of the Resource Protection Area (RPA) Map and GIS Layer.	Priority 2	None	6 months	DES
<b>8</b> Develop a strategy for the protection and preservation of seeps, springs and first-order streams found on Arlington County-owned parkland or open space.	Priority 2	None	18 months	DES
<b>9</b> Develop a clear objective-based methodology and process for the management of streams, artificial wetlands and ponds located on Arlington County-owned open space.	Priority 2	None	18 months	DES in conjunction with PRCR
<b>10</b> Amend Chapter VI of the <i>Urban Forest Master Plan</i> to reflect policy changes in forest management practices for natural lands.	Priority 2	None	Next Plan revision	PRCR and UFC
<b>11</b> Promote the use of native plant species in County-sponsored plantings and enhance the ability to procure local ecotype plant stock.	Priority 3	Unknown - Low	18 months	PRCR
<b>12</b> Within Natural Resource Conservation Areas, restrict to the maximum extent practicable, all vegetation plantings to those included in objective-based restoration plans reviewed or developed by the Natural Resources Management unit.	Priority 2	None	Upon establishment of NRCA's	PRCR
<b>13</b> Develop a new long-term, objective-based invasive plant removal strategy combining volunteers, County staff and contractual services in order to maximize efforts and environmental benefit to Arlington's natural resources. Seek Capital Improvement Projects (CIP) funding to support large-scale invasive plant removal and natural lands preservation efforts.	Priority 2	To be determined	To be determined	PRCR
<b>14</b> Clarify the roles and responsibilities of County departments in relation to invasive plant control efforts to identify leadership and foster cooperation.	Priority 3	None	3 months	PRCR, DES, other relevant agencies

<b>15</b> Include an invasive plant monitoring and maintenance component in the design of all future stream restoration projects (DES), new trail side “no-mow and grow” zones (PRCR) and riparian buffer restoration and plantings (DES/PRCR).	Priority 3	Un-known future maintenance costs	3 months	DES/PRCR
<b>16</b> Inventory and prepare an analysis of existing riparian zones on County-managed open space in order to assess the feasibility of reestablishing natural vegetation along stream corridors in the future.	Priority 3	None	2 years	PRCR
<b>17</b> Initiate the formation of a local inter-jurisdictional Natural Resources Working Group for the purpose of strengthening existing partnerships and developing new relationships.	Priority 2	None	3 months	PRCR
<b>18</b> Establish a Natural Resources Advisory Group to enable Board-appointed advisory commissions to advise more effectively on natural resource issues.	Priority 3	None	3 months	PRCR in conjunction with Citizen Commissions
<b>19</b> Arlington County should seek and embrace opportunities to educate residents about the importance of environmental sustainability, natural resources protection and habitat enhancement on private properties.	Priority 2	None	6 months	PRCR, Natural Resources Management staff, Nature Centers, DES, VCE

*Abbreviations:* PRCR-- Department of Parks, Recreation and Cultural Resources; DES-- Department of Environmental Services; UFC--Urban Forestry Commission and E2C2-- Environment and Energy Conservation Commission; and VCE--Virginia Cooperative Extension.



Only a single small colony of Red Salamanders remains in Arlington.

## INTRODUCTION

Arlington County is required by the Code of Virginia to adopt a Comprehensive Plan to be used as a community-planning tool. The current Comprehensive Plan, adopted in 1960, is composed of nine elements or separate plans that cover such disparate themes as land use, transportation, storm water, water distribution, sanitary systems, recycling, historic preservation, public spaces and preservation of the Chesapeake Bay. The *Public Spaces Master Plan*, adopted in 2005, makes recommendations for the protection and management of natural resources.

The 2005 *Public Spaces Master Plan* calls upon the County to create a natural resources

inventory and develop a management strategy for natural resources protection:

- Create a Natural Resources Policy and Management Plan (Recommendation 2.1). The County lacks a countywide database of natural resources, including flora, fauna and habitat evaluations. These resources need to be evaluated, their significance rated, and a management plan developed to guide how to manage and protect them. A *Natural Resources Management Plan* should be developed to help facilitate the County's ongoing commitment to enhance and preserve its natural resources. The plan's primary goals should be to:
- Bring together various plans, practices, programs and

options that identify and protect the County's natural resources.

- Develop a classification system of the various types of natural resources. Define the lines of authority and responsibility for management of the resources among County, regional and federal agencies.
- Create an additional layer for the County's Geographic Information System to identify and characterize significant natural resource management areas and habitats. (Chapter 5, Recommendations/*Public Spaces Master Plan*. Adopted December 10, 2005.)

### Statement of Purpose

The purpose of the *Natural Resources Management Plan* is to provide Arlington County staff and residents with the knowledge, methods and tools necessary to assume the role of a world-class steward of the local environment. The primary goal of the plan is to bring together the various elements of field research, current practices, existing plans and policies and best management practices to create an achievable set of actionable recommendations relating to the protection of those natural resources under the control of County government. This plan is intended to complement the current *Urban Forest Master Plan* (July 28, 2004), *Watershed Management Plan* (January 2001) and Chesapeake Bay Preservation Ordinance (February 8, 2003). Collectively, these documents serve as a roadmap for future natural resources management

Photo by Gary Fleming, DCR



Virginia Mallow -- one of 14 state-listed rare plants found in Arlington.

planning.  
**Scope**

A number of official public documents, including the Report on the Task Force on the Physical Environment (1986), the Potomac Palisades Task Force Final Report (1990), the Arlington County Riverfront Inventory and Analysis (July 1993), the Open Space Master Plan (1994) and others have recognized the need to

develop a strategy to better protect natural resources within Arlington County. A full list of reports, plans, studies and resources reviewed for the preparation of the *Natural Resources Management Plan* is shown in Appendix 2. The scope of the NRMP is intentionally narrow so that its recommendations can be implemented within a reasonable period, are fiscally achievable and, when completed, will have a measurable, positive

impact on natural resources protection. The recommendations within the plan are prioritized according to recommended needs for implementation, with Priority 1 being the highest priority. Upon adoption of the plan, Arlington County will serve as a role model for environmental stewardship within the region by providing cooperative leadership in the area of natural resources management, resource protection and public education.

## ARLINGTON'S NATURAL RESOURCES: PAST, PRESENT AND FUTURE

### The Past

Lying directly across the Potomac River from the original federal city and the Nation's Capital, the rich human history associated with Arlington County and the surrounding region has been thoroughly documented over the past several hundred years. The patterns of land development associated with that history and its impact on the natural environ-

ment have been less documented, but are no less important to the lives of residents today. The land upon which Arlingtonians reside and the environment that surrounds them are products of that history. While a full accounting of the past could fill volumes, a brief summary of the major events that shaped environmental change is warranted.

While the earliest history includes

generations of Native American inhabitants, periods of European exploration and later colonial influences, many of the historic natural resources of Arlington County (incorporated in 1920) remained largely intact until relatively modern times. Prior to the 20th century, major impacts to the local environment included railroad construction in the mid 1800s, a lengthy period of quarrying stone along the Potomac Gorge, early and continuous development along the Potomac River in south Arlington and the construction of defensive forts and large-scale forest removal during the Civil War. In spite of this land use, the community of Arlington/Alexandria County in 1900 was composed of only 6,430 residents, 379 farms, several villages and few improved roads. Between the late 19th and early 20th centuries, the richness of local natural resources was well documented by scientists associated with the Smithsonian Institution and other government agencies. These scientists have provided an invaluable record of the historical flora and fauna of the



Photo by Gary Fleming, DCR

Old Age Oak Forest at Donaldson Run

region, with a large number of local collections housed at the Smithsonian's Department of Botany and the Natural History Museum.

The 20th century ushered in great change, and the period from the 1920s through the present can be fairly described as an age of growth, development and environmental impact. The singular events and activities that most shaped the transition from a resource-rich rural community to an urban center with accompanying environmental challenges can be directly tied to the expansion of the Federal Government in nearby Washington, D.C. Some of the notable impacts upon the environment within that period were:

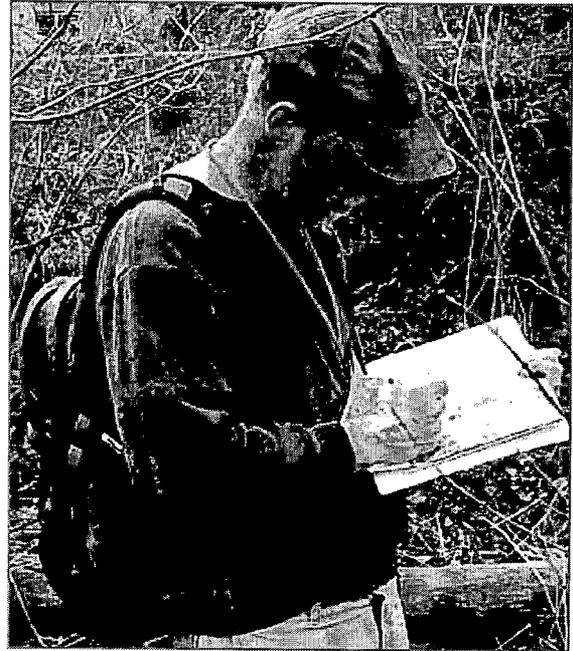
- Introduction of the electric trolley and expansion of local rail lines early in the century that ushered in the age of commuting.
- Development associated with increased jobs and housing needs during World War I and the New Deal.
- Periodic growth of Arlington National Cemetery and Joint Base Myer-Henderson Hall (formerly Fort Myer Military Community).
- Construction of Reagan National Airport (1941).
- Rapid local expansion during World War II, concurrent with the construction of the Pentagon (36,000 employees) and Navy Annex (1944) and the resulting housing boom.
- Construction of the George Washington Memorial Parkway from 1932 to 1960.
- Construction of Shirley Highway (opened in 1949) and I-66/Metro (late 1960s

through the early 1980s).

The accumulated effects of 20th century development forever changed Arlington from a rural to a suburban to an urban community within a span of 60 years. Farmland, forest and field were transformed into residential neighborhoods with the entire attendant infrastructure required, including roads, above- and below-ground utilities, schools and service industries (gas stations, office space and shopping).

### The Present

At just under 26 square miles in size with a 2009 population of about 217,000, Arlington County has one of the highest population densities among counties nationwide. In addition to the large number of residential properties, Arlington boasts a vibrant business community with more than 43 million square feet of office space either built or under construction. The "smart growth" policy initiated by the Arlington County Board has helped to concentrate new commercial development along the Metro corridor and existing major transportation arteries. Arlington is now so developed that the vast majority of future residential or business construction will, by definition, be considered redevelopment or infill.



Geological features being mapped in County parks.

According to the *Public Spaces Master Plan* and other available public documents, the total amount of "open space" in Arlington currently totals approximately 2,940 acres, representing about 18% of the County. These figures include Arlington County parks and open spaces, Arlington Public School (APS) properties, various federal properties, Northern Virginia Regional Park Authority parkland and larger privately owned parcels. Of this total open space, GIS (Geographic Information System) analysis of recent natural resources inventory data indicates only 738 acres of "natural lands" remain in Arlington County. This figure is equal to 25% of all open space or 4.4% of Arlington's landmass. Well over half of the defined natural lands occur on properties owned by the National Park Service as part of the George Washington Memorial Parkway system. The remaining acreage consists almost entirely of parcels found within Arlington

County-owned parkland, on two properties owned by the State of Virginia and within two parks managed by the Northern Virginia Regional Park Authority. A few small parcels of natural lands are found on private property. Unfortunately, these high-value parcels of natural lands are scattered across the County, often isolated, and in some cases bisected by roadways, widely paved trails and other urban infrastructure.

Considering the amount of development and the associated reduction of natural lands within Arlington, an impressive number of significant natural resources were documented and mapped in the preparation of the *Natural Heritage Resource Inventory*. In all, over 1,000 acres of open space received some level of biotic inventory. Identified natural resources include parcel-size natural ecological units (i.e. plant communities and wetlands) and individual point resources (rare plant locations, significant trees, geological exposures and outcrops, seeps and springs, etc.). The parcel-sized units occur almost exclusively within larger publicly owned

forested parkland. Development within or near these parcels has been limited by soil instability, topography (stream valleys) and current restrictions imposed by the Chesapeake Bay Preservation Ordinance.

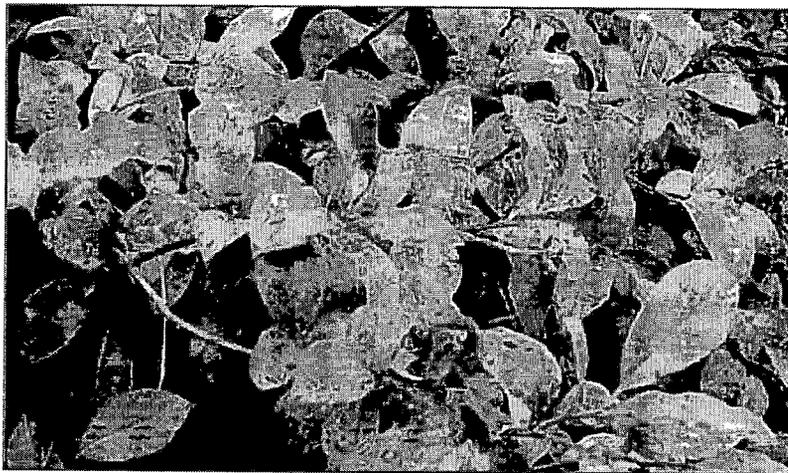
The quality or rating of these remaining natural resources varies widely according to location and size of ecological unit, and both historical and contemporary degradation through development and current use. Unfortunately, many of the parcels consisting of extant natural communities and wetlands, while intact, are considered to be remnants of much larger systems and are of varying ecological quality. A number of point resources, such as State Champion Trees or a single specimen of a rare plant, are found within developed portions of multi-use parks. Over time, the ecological stresses associated with forest fragmentation, isolation of species and loss of habitat have created a patchwork of significant, but scattered resources. Descriptions of existing resources and resource types are discussed in greater detail in the body of this

report under the section titled Natural Resource Management and Protection: Discussion and Recommendations.

### The Future

Arlington County is at an environmental crossroads. Current environmental conditions in Arlington paint a mixed picture. Most of the historical natural resources once found in the County have disappeared and, of those remaining, many suffer some form of degradation. With the completion of its first comprehensive *Natural Heritage Resource Inventory*, County staff is for the first time able to quantify what resources exist, rate their significance or ecological value, and identify their exact locations. It is impossible to know how many valuable natural resources have been lost, even in recent years, because this information had not been gathered. Arlington County government now has the opportunity to move forward, serve as a leader and develop a new urban model for wise natural resource protection and stewardship. Taking no action will place the remaining natural environment at risk of continued degradation and disappearance over time. Comparison of Arlington's current and historic records of native flora provides a contrast between the resource-rich past and uncertain future. While the documentation of at least 600 remaining native plant species is impressive within this small highly urbanized community, it is estimated that more than 200 historically documented species have disappeared, with more than 30% of the species present today classified as locally

Photo by Chris Bright, Earth Sangha



Virginia Sweetspire rediscovered after 100 years.

rare (A1/A2).

This report focuses on the positive steps that Arlington County can take to model stewardship. Specific environmental issues are discussed. Recognized gaps in service and coordination of responsibilities are identified, solutions suggested and recommendations made. While Arlington alone cannot solve many of the broader environmental issues, such as global warming or endemic plant diseases, it does have the ability to protect the now identified ecological resources that occur on County owned and managed parks and



Aging trees in Zachary Taylor Park

## THE NATURAL HERITAGE RESOURCE INVENTORY: LAYING THE GROUNDWORK

In response to recommendations within the *Public Spaces Master Plan*, Arlington County staff began a comprehensive inventory of Arlington's natural resources in October 2005, utilizing special research permits from the National Park Service and the Virginia Department of Game and Inland Fisheries. Primary fieldwork was completed in fall 2008. Sufficient data have been collected and analyzed in order to formulate recommendations related to natural resource management decisions and protective strategies.

### Objective and Benefits

Through an interdisciplinary team approach, the primary objective of the *Natural Heritage Resource Inventory* has been to develop a comprehensive baseline database of remaining ecologically significant natural resources within Arlington County, with an emphasis on County owned and managed open spaces.

The benefits of the inventory, in conjunction with the *Natural*

*Resources Management Plan*, are fourfold:

1. The countywide database of natural resources will assist park managers, park planners and administrators in making land-use decisions relative to open space master planning and future development within County owned and managed parks.
2. The inventory will provide information to support possible future zoning or administrative regulation changes to allow for the addition of a new category of protected-class public open space.
3. The inventory provides an accurate baseline of data that will help speed the creation of environmental assessments within pre-inventoried tracts of public space.
4. Data collected as part of the inventory process have been shared with multiple partners, including the National Park Service, Northern Virginia Regional Park Authority, Department of Defense, Virginia De-

partment of Game and Inland Fisheries, Virginia Department of Conservation and Recreation, Smithsonian Institution, NatureServe, George Mason University and the National Arboretum, opening the door to future cooperation on natural resource protection strategies.

### Project Elements and Deliverables to Date

The primary elements of the *Natural Heritage Resource Inventory* include water resources, geology, native flora, special tree resources, invasive plants, urban wildlife and GIS Mapping. As part of the process, a concerted effort was made to distinguish between elements or features that are historically natural (native) and those that are man-made or introduced. Fieldwork accomplishments to date include:

#### Water Resources (hydrology)

Fourteen unmapped streams or stream segments were documented and will be included in

the next Resource Protection Area map in support of the Chesapeake Bay Preservation Ordinance. In addition, six previously undocumented wetlands were classified, delineated and mapped.

### Geology

Twenty-three parks or natural sites on public properties were inventoried and mapped for significant geological features. Areas of natural and historical soil disturbances were also mapped.

### Native Flora

Plant inventories were conducted in 32 parks and natural sites owned by Arlington County, the State of Virginia, the National Park Service, the Northern Virginia Regional Park Authority and targeted private properties. Inventoried flora includes trees, shrubs and vascular plants, but does not include lichen, fungi and similar species. To date:

- More than 600 native species have been documented.
- More than 100 new County Records have been documented.
- Fourteen state-listed rare plants have been documented and mapped.
- Two globally rare and a number of state rare plant communities have been documented, delineated and mapped.
- More than 300 plant specimens have been pressed and mounted as vouchers. Specimens will be housed at the Arlington Herbarium, National Park Service Collection, Smithsonian Institution Department of Botany, George Mason University Herbarium and the National Arboretum.

- Natural plant communities were classified, delineated and mapped in 24 public parks and select privately owned woodland sites. Twenty-two different community classification types were identified, based on criteria listed within the National Vegetation Classification System and developed by the Virginia Department of Conservation and Recreation.
- A publication titled Native Vascular Flora of Arlington County, Virginia is in production.

### Tree Resources

The Arlington County Champion Tree Program was developed through data collected as part of the floral inventory. The program information and GIS mapping elements are currently available to both staff and the general public at [www.arlingtonva.us](http://www.arlingtonva.us), search Champion Trees. A report documenting and mapping dozens of ecologically significant trees and shrubs found on various public properties was also completed.

### Invasive Plants

The occurrence and gross distribution of exotic invasive plants were documented and mapped in 19 parks, including three properties owned respectively by the National Park Service, Northern Virginia Regional Park Authority and the State of Virginia. To date, over 500 acres of parkland have been mapped and an updated list of "target"

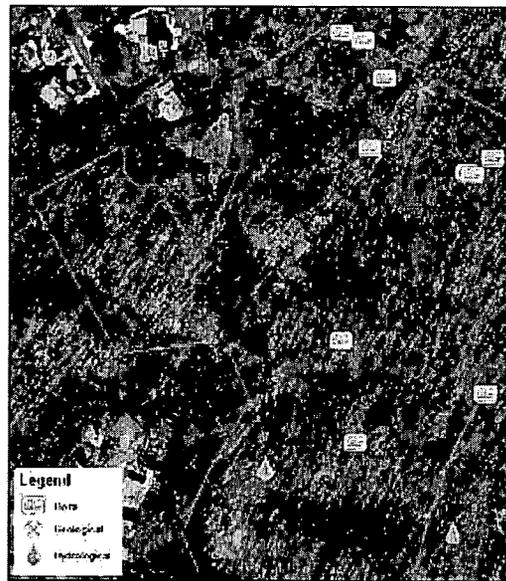
invasive plants rated by threat level has been developed.

### Urban Wildlife

A comprehensive inventory of wildlife species in Arlington has been completed and analysis of data and preparation of technical reports is in progress. Targeted inventory groups include mammals, birds, reptiles, amphibians, butterflies/moths and dragonflies/damselflies.

### GIS Mapping

The following data layers, based on inventory data, have been completed and are available to staff for the development of a set of best practices relative to natural resources management and protection: Significant Tree Layer, Champion Tree Layer, Plant Community Layer, Invasive Plant Layer, Wildflower Viewing Areas of the W&OD Trail Layer and the Natural Resource Features Layer (state and locally rare plants, significant geological features and springs, seeps and ponds).



GIS map of locally rare plants, geological features and springs at Donaldson Run.

## NATURAL RESOURCES MANAGEMENT AND PROTECTION: DISCUSSION AND RECOMMENDATIONS

While significant natural resource features were found scattered across Arlington County, the prime responsibility for environmental protection lies with the individual

where resource inventories have been conducted on properties owned by others, staff has provided these agencies or responsible owner-agents with written reports, data files, maps and GPS/GIS in-

funding impacts and a timeline for implementation, are summarized in the Executive Summary (and detailed further below).

In order to track progress and timely implementation of the

recommendations, staff should provide annual updates to key advisory commissions such as Park & Recreation, Environment & Energy Conservation and Urban Forestry.

*While it is possible to create future recreational space and construct new facilities through land purchase and re-development, the loss of natural lands covered in mature forest could not be replaced within a lifetime.*

landowner. In most states, including Virginia, unless listed on the Federal Register as an endangered species or state-endangered plant or animal, natural resources are generally not protected. Natural features such as state-listed rare plants, state or globally rare plant communities and state Champion Trees are examples of significant resources found locally that have no benefit of state or federal protection. Likewise, locally rare plants, springs and unique geological features are not specifically protected. Protection can only be achieved through voluntary ac-

tion. In most states, including Virginia, unless listed on the Federal Register as an endangered species or state-endangered plant or animal, natural resources are generally not protected. Natural features such as state-listed rare plants, state or globally rare plant communities and state Champion Trees are examples of significant resources found locally that have no benefit of state or federal protection. Likewise, locally rare plants, springs and unique geological features are not specifically protected. Protection can only be achieved through voluntary ac-

tion. The complete set of recommendations made in this report, along with notations regarding authority/responsibility,

### General Natural Resources Management Strategy

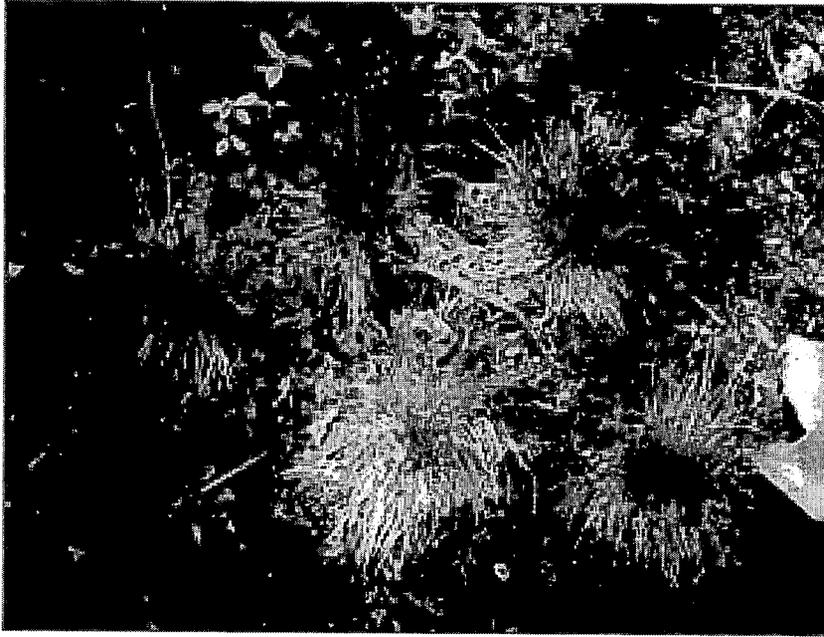
In order to successfully protect Arlington's identified natural resources, a new strategy or way of thinking will be required. This

Photo by Gary Fleming, DCR



The plan is intended as a planning tool, with the majority of the recommendations directed to Arlington County agencies. The National Park Service (George Washington Memorial Parkway), Department of Defense, Northern Virginia Regional Park Authority and a small number of private property owners have also been identified as responsible agents for resource protection on their respective properties. In those circumstances

Starry Solomon's Plume -- one of 14 state-rare plants found in Arlington.



Carex atlantica, a locally rare wetland sedge.

new, layered strategy includes 19 recommendations, the first five of which provide essential tools for a proactive natural resources management approach.

**Recommendation 1: Adopt a general policy goal of “Zero-Loss” of County-owned natural lands.**

Although County-managed general open space accounts for approximately 1,296 acres and includes 142 individual parks and 34 public school properties, the estimated “natural lands” remaining within that total is less than 250 acres.

With extremely limited opportunities in the future to add to that inventory, it is critical to establish a policy that protects natural lands from loss or development. With increasing demands placed on County government to provide additional space for active recreation, new park amenities, Community Canine Areas and park infrastructure improvements, there are likely to be pressures to encroach into existing natural lands. While it

is possible to create future recreational space and construct new facilities through land purchase and redevelopment, the loss of natural lands covered in mature forest could not be replaced within a lifetime. Adoption of a policy of “Zero-Loss” of County-owned

*Any development within defined Natural Resource Conservation Areas, including the reconstruction of sanitary and storm-water systems, would be required to undergo an environmental review demonstrating an overriding need and the ability of best management practices to minimize environmental impact.*

natural lands would send a positive signal and provide guidance to all County agencies involved in open space acquisition, development and management.

**Recommendation 2: Establish a new administrative category of County-owned open space known as Natural Resource Conservation Areas (NRCAs).**

The Department of Parks, Rec-

reation and Cultural Resources (PRCR) should establish special resource management areas within existing parkland, to be identified as Natural Resource Conservation Areas (NRCAs). These delineated areas of natural land would provide for ecosystem-level protection to contiguous forests or plant communities of high value and encourage objective-based management by ecological unit (water, soil, flora and fauna) rather than focusing on a single resource. This special classification of parkland would apply in some cases to entire parks and, in other cases, to identified sections within multi-use parks that are considered to represent ecologically significant natural lands. In most cases, these parks or areas are represented by mature hardwood forests with a number of significant natural features present, such as locally rare plants, seeps or springs, unique geological features, wetlands or other attributes. The

primary management objective within an NRCA would be conservation and preservation of existing natural resources. These areas would continue to provide passive-use opportunities for visitors, such as bird watching, botanical study and hiking. Authorized work activities within these sensitive sites would generally be restricted to environmental improvement activities such as restoration projects, habitat enhancements, inva-

sive plant control, erosion abatement and infrastructure repairs or projects to address public safety. As the primary proprietor for parkland in Arlington County, the decision for inclusion as an NRCA and specific management objectives would be made by designated staff within PRCR through consultation with the Parks and Natural Resources Division Chief.

Staff has identified a number of parks or areas that are recommended for initial inclusion within this new protective class of open space. Additional lands could be added in the future as appropriate. Recommendations are based on a combination of overall high quality or environmental sensitivity of natural resources present, existence of rare or significant features and potential for restoration. This new protected class of open space increases the opportunity for the County to obtain future grants for natural lands restoration projects. The recommended list includes parcels within the following parks: Gulf Branch Park (lower), Windy Run (lower), Donaldson Run, Fort C. F. Smith Historic Site, Long Branch/Glencarlyn Park, Barcroft Park and Arlington Forest Park. The combined area of the recommended parcels totals approximately 126 acres. Staff recommended parcels are displayed by map in Appendix 1.

**Recommendation 3: Develop a new GIS-based environmental review process to protect significant individual natural resources on Arlington County-owned open space from ongoing maintenance activities, redevelopment or new construction**



Over 950 trees and shrubs were measured to determine the largest of each species

**on County-owned properties or private properties within 100' of a designated natural resource feature. Revise current Administrative Regulation 4.4 (Environmental Assessment Process) to incorporate the use of this GIS layer into the review process for all County-initiated land disturbing activities. Explore expansion of current County review processes to help ensure that land disturbing activities on private property would not adversely impact documented natural resources on County-owned properties.**

For proposed projects on Arlington County-owned properties, there currently exist two primary environmental review processes: the Environmental Assessment process, administered through AR 4.4, and restrictions or limitations applied by the Chesapeake

Bay Preservation Ordinance for projects within designated Resource Protection Areas (RPA). However, a number of categorical and blanket exemptions are provided within both processes that allow certain types of projects to proceed without environmental review. The *Natural Heritage Resource Inventory* indicates that there are a number of circumstances in which a project or maintenance regime that would be exempted from review could adversely impact now-identified significant natural resources located along County streets, in streams, on the edge of woodland and paved trails and in close proximity to picnic areas, playgrounds and pavilions in developed multi-use parks. Regardless of location, Recommendation #3 places all significant, individual natural resources, geological features, significant trees, rare plants, and seeps and

springs within a Natural Resource Conservation Area, multi-use park, street or general open space on a new "Environmental Review" GIS Layer. The content of this layer would be a special compilation of resource data already collected and mapped on other existing layers, and County agencies would be required to check this layer prior to planning any project on public property. Any County-sponsored project proposed within 100 feet of a targeted resource would trigger an abbreviated environmental review by the County's Natural Resource Management Unit (see Recommendation #4) prior to proceeding. Projects currently exempted from existing environmental review, except certain emergency repairs to infrastructure, would be included in this review process. In addition, planning agencies should consult this layer at the beginning of each park Master Planning process. This review would allow planners the opportunity to avoid potential design conflicts with significant natural resources in advance, rather than mitigating impact after the required Environmental Assessment. In addition to stated changes to A.R. 4.4, a separate abbreviated environmental review process is suggested to protect significant natural resources on County property that may be adversely impacted by proposed development or land disturbance on nearby private properties. Staff will explore mechanisms to design a process that would allow the environmental review of any site plan, applications for special use permits, variances or other requests for discretionary County approval for projects on private

property that will occur within 100 feet of a documented natural resource feature on County-owned property.

**Recommendation 4: Effectively manage Arlington's natural resources by establishing a single management unit with specialized skills in natural lands preservation and natural resource management.**

Prior to the start of the *Natural Heritage Resource Inventory*, Arlington County lacked a comprehensive knowledge of the volume, location or quality of remaining natural resources on either public or private property within its boundaries. In order to implement the changes and recommendations in the plan, effectively manage documented natural resources, maintain established GIS information, monitor the health of the local natural environment, and liaise with other jurisdictional landowners in Arlington, the County should focus these responsibilities under a single management function. This work unit would provide needed expertise in the areas of forest ecology, urban wildlife management and other associated natural sciences. Most of the surrounding jurisdictions in our region have addressed the need for natural lands management by establishing staffing levels from a single permanent position in small jurisdictions to Division-level work

units in Fairfax and Montgomery Counties. It is suggested that this new functional unit reside within the Parks and Natural Resources Division of the Department of Parks, Recreation and Cultural Resources. Implementation should be accomplished as quickly as fiscally possible in order to maintain momentum in the County government's expressed desire to serve as a responsible steward of the local environment.



Globally rare wetlands in Arlington

**Recommendation 5: Develop an individual natural resource management plan for each County park designated as a Natural Resource Conservation Area, or containing NRCAs within its boundaries.**

Sufficient countywide natural resource data have been collected and mapped to permit staff to develop site-specific natural resource management plans. Preservation, conservation and protection of resources will be more effective when applied at the local park level. The development and production of individual park plans would be the responsibility of the natural resources management unit. Specific park-level plans would ensure

that cooperative management and best management practices are employed across divisional and departmental lines and support the broad conservation goals of stewardship. Opportunities for natural resources restoration or habitat improvement projects would be identified and the plans themselves could be incorporated into existing or future park master plans. Funding and labor for conservation and restoration projects would be leveraged from other agencies, secured through grants and could include the use of volunteer groups such as Tree Stewards and Master Naturalists.

### **Land Acquisition and Conservation Easements**

The *Public Spaces Master Plan* recognizes that very few opportunities remain to add any substantial “natural lands” to the Arlington County inventory through outright purchase. It recommends the development of a Land Acquisition Policy (Recommendation 1.2) that would address the need for additional natural lands to protect sensitive resources through the establishment of conservation easements and collaboration between agencies holding surplus properties. In addition, Recommendation 2.4 of the *Public Spaces Master Plan* states that the County should “Pursue the Use of Easements to Protect Natural Areas and Heritage Resources.”

**Recommendation 6: Actively pursue opportunities to identify and preserve additional open space through conservation easements, voluntary dedications, partnerships and fee simple acquisition.**

**Potential acquisitions with natural lands or significant natural resources present should be the highest priority. Parcels offering additional protection to surface streams or serving as green corridors between natural areas should also be considered for their environmental benefit. Citizens should be educated about opportunities for voluntary participation in these programs.**

During the course of preparing the *Natural Heritage Resource Inventory*, a number of public and private properties (over 40 acres

*The combination of issues and factors affecting our streams is complex and rooted in the development patterns that have caused almost 40% of Arlington to be covered in impervious surfaces.*

total) were identified as presenting opportunities for either expansion of natural lands under County ownership and management or as candidates for voluntary conservation easement protection through the Northern Virginia Conservation Trust. All properties meet the criteria for natural lands and contain documented significant natural resources. Descriptions and GIS data for these properties have been provided to the PRCR Planning Division for appropriate follow-up. The development of a GIS map layer showing all conservation easements within Arlington would be an invaluable tool for County planning staff and resource managers.

### **Water Resources**

#### **Current Issues, Management and Responsibilities**

Arlington County was once rich in

water resources with many miles of naturally flowing streams and beaver ponds, acres of tidal and freshwater marsh along the Potomac River, seasonally flooded back swamps along major streams and an unknown number of small wooded wetlands, known as seeps or fens. However, the impact of urban development on local water resources from the late 1940s through the 1990s was swift and great.

The current unnatural conditions of local streams are similar to those found in other highly developed and densely populated

communities. The cold, clean and clear flowing streams that once supported native brook trout have been replaced with physically and chemically impaired, bank-hardened or eroded conduits for urban stormwater runoff. Today, only an estimated 30 miles of surface freshwater streams remain, with at least twice that number of miles piped underground into an expansive 360-mile stormwater system. Impaired water resources and efforts to mitigate or restore environmental quality to those resources represent one of the greatest challenges to the community of Arlington in the area of natural resources management. The combination of issues and factors affecting Arlington streams is complex and rooted in the development patterns that have caused almost 40% of the County to be covered by impervious surfaces. A summary of general stream-relat-

ed environmental issues that have been identified to date include: loss of groundwater; low normal base flow; frequency of high storm flow velocity and volume; flooding; active down-cutting; stream-bank erosion; sedimentation; non-point source pollution; periodic high levels of fecal coliform; elevated water temperatures; nutrient enrichment; water-borne litter; and continuing illicit, illegal or accidental spill incidents. Collectively, these problems are being addressed, with varying degrees of success, by Arlington County government through the implementation of the ordinances, permits, programs and plans listed below.

The Department of Environmental Services (DES) has primary responsibility for water quality improvement and the protection, management and restoration of streams, wetlands and other water resources in the County. As a result of legal requirements mandated by the Environmental Protection Agency under the Clean Water Act, the Virginia Department of Environmental Quality, the Virginia Department of Conservation and Recreation, the US Army Corps of Engineers and the Northern Virginia Regional Commission, water resources and related issues have been extensively documented and studied by DES since the 1990s. Examples of compliance-related legislation, existing programs and plans that drive water-related work by DES include:

- Chesapeake Bay Preservation Ordinance and Preservation Plan
- Clean Water Act
- Storm Water Detention Ordinance and Master Plan

- Erosion and Sediment Control Ordinance
- Four Mile Run Flood Control Program
- Municipal Separate Storm Sewer System Permit
- Water Quality Standards and Total Maximum Daily Load Program
- Watershed Management Plan
- Four Mile Run Restoration Master Plan

Achieving compliance with all regulations is a serious challenge, made more difficult by the fact that a majority of the clean water and stormwater standards were imposed on Arlington after full

*Small wetland features, while often overlooked from a resource management perspective, are valuable ecological features that not only provide a local source of clean water, but also often serve as the only remaining sanctuary for rare native wetland plants and wildlife.*

development had already occurred. The physical restoration of local streams to an original natural state is not a realistic goal under present environmental conditions (high levels of imperviousness), but with continuing efforts, streams can be made more stable and attractive to carry cleaner water and to serve as higher value recreational amenities.

A long-term goal for measuring success would be to increase the diversity of aquatic life presently found in local streams. Results from the Volunteer Stream Monitoring Program (2001-2008) and from a contracted stream inventory conducted in 1999 show the vast majority of streams in Arlington

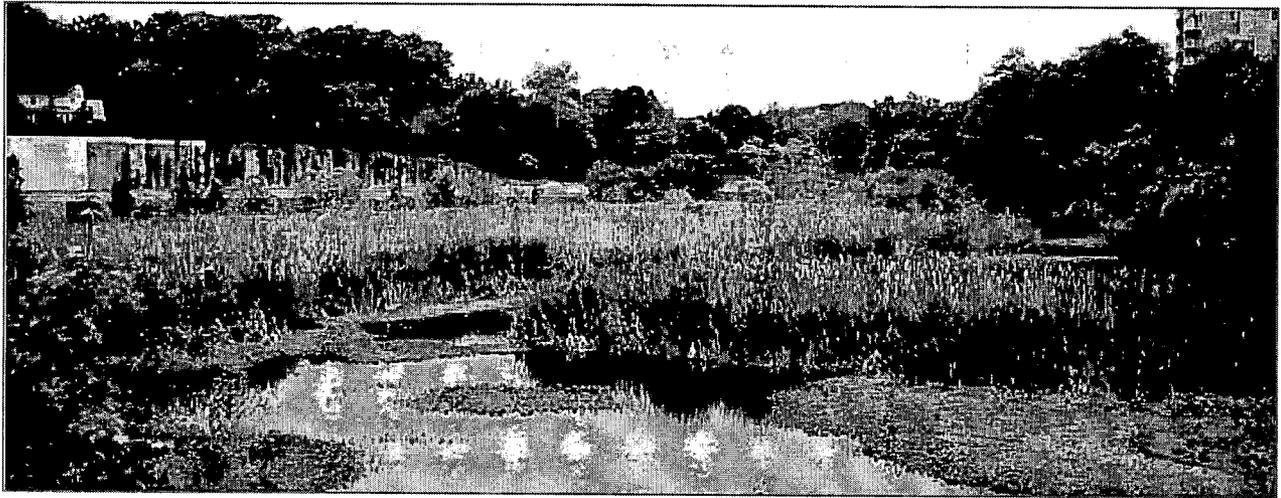
to be in poor or fair condition with only pollution-tolerant aquatic species present. Given the complexity and magnitude of issues that exist, DES, often in partnership with PRCR, has done an excellent job of documenting and attempting to address the myriad problems in spite of funding and staff resource limitations.

The future development of a Comprehensive Stormwater Master Plan by DES, representing an updated compilation of both the 1996 Stormwater Master Plan and the 2001 Watershed Management Plan, will address the continuum of water-related issues that face the Arlington community. It is

suggested that a new plan consider and discuss the alternatives or options available to minimize future increases in impervious surface within the County, and the efficacy and opportunity for the “daylighting” of previously buried streams.

### **Discussion and Recommendations**

As a result of the voluminous data collected and made available by DES and other agencies, only narrowly targeted fieldwork was conducted as part of the recent *Natural Heritage Resource Inventory*. Recommendations stem from the findings of that inventory and a review of the documents listed



Ballston Beaver Pond -- one of Arlington's artificial wetlands.

in Appendix 2. The listed recommendations are considered “enhancements” to current watershed management efforts or recognize gaps in service and challenges to current service provisions.

**Recommendation 7: Update and submit to the County Board for approval a revised edition of the Resource Protection Area (RPA) Map and GIS Layer.**

The Resource Protection Area (RPA) Map officially delineates the protected space adjacent to existing streams and known wetlands within Arlington's borders. It is a tool used frequently by both private developers and County planners to ensure compliance with the Chesapeake Bay Preservation Ordinance, amended February 8, 2003. The *Natural Heritage Resource Inventory* has identified and documented a number of streams and stream segments that do not appear on the current version of the RPA Map. In addition, seven previously undocumented wetlands have been classified, delineated and mapped. Information pertaining to these water resources has been provided to DES staff

to consider for inclusion in the next map revision.

**Recommendation 8: Develop a strategy for the protection and preservation of seeps, springs and first-order streams found on Arlington County-owned parkland or open space.**

In addition to streams and wetlands, a number of freshwater springs and seeps were documented and mapped by GIS. These small wetland features, while often overlooked from a resource management perspective, are valuable ecological features that not only provide a local source of clean water, but also often serve as the only remaining sanctuary for rare native wetland plants and wildlife.

In Arlington, a majority of past studies and restoration work have been related to Four Mile Run and major tributaries. While there is no argument that these water bodies are impaired and in need of restorative work to meet mandatory water quality standards and overall watershed management, recreation and community planning goals, a long-term strategy should

also include active management of smaller headwater streams that feed from springs and other underground water sources. These streams most likely represent the cleanest remaining surface water in the County. They display lower degrees of impact from stormwater runoff, protect diminishing water-dependent fauna and would receive the greatest benefit from protective strategies.

*Natural Heritage Resource Inventory* wildlife surveys have shown that the upper reaches of small streams contain higher populations of terrestrial and aquatic amphibians compared to areas downstream. A number of these small streams have an active natural flow but are also used to convey storm “overflow” from residential neighborhoods during rain events. If possible, these streams should be cut off from the stormwater system. This action would help to retain the water quality, wildlife value and aesthetic view of these less-impacted water bodies within our parks.

It is also of interest to note that

vernix) is listed as noxious vegetation within the current version of the Chesapeake Bay Preservation Ordinance (61-3 Definitions). Upon the next revision of the Ordinance, this native species should be removed from the list to reflect its true ecological status. In Arlington, Poison Sumac is a locally rare plant limited to four small sites and an indicator of the presence of both state and globally rare wetlands.

**Recommendation 9: Develop a clear objective-based methodology and process for the management of streams, artificial wetlands and ponds located on Arlington County-owned open space.**

In addition to the 28.5 miles of surface streams, a number of artificial wetlands and ponds occur on County-managed open space. Fabricated water impoundments typically require frequent maintenance and generally are in greater need of active management than natural bodies of water. A management strategy for artificial

wetlands should include the elements of water quality, stormwater management, wildlife habitat and invasive plant management. In some cases, there is confusion as to which agency is responsible for maintenance, management, restoration or new construction of water impoundments and stream restoration work. A set of agreements, guidelines or workflow processes should be established to delineate geographic and programmatic responsibilities between various County agencies in relation to water resources. Support roles, areas for cooperation and team objectives should be identified.

**Future Water Resource Challenges**

There are significant challenges to managing Arlington’s water resources in the future. While there are no immediate or simple solutions, it is important to note these challenges:

- Aging sanitary sewer lines that weave underground through a majority of the County’s

- stream valley parks and will need to be replaced eventually.
- Deteriorating low-water, concrete bridge crossings along the length of Four Mile Run that need replacement.
- The continuing loss of local groundwater due to increases in impervious cover and stormwater runoff through redevelopment.

Arlington’s sanitary system was constructed at a time when stream valleys were undervalued as natural resources. The land was seen as expendable since it could not easily be developed. A number of low water bridges fording Four Mile Run and other major streams were similarly constructed with old technology to facilitate vehicle maintenance and transportation routes for park visitors. Deterioration of these structures is evident and maintenance costs, in terms of material and labor, have increased. Unfortunately, both forms of infrastructure lie within the path of or adjacent to some of the highest value natural resources remaining in the County. Sanitary upgrades should be accomplished whenever possible “in situ” with new technology already tested in Arlington. In all cases of infrastructure repair or replacement, current best management practices should be employed to ensure the smallest construction footprint.

Continued increases in impervious cover and stormwater runoff coupled with the general loss of groundwater represent a more challenging long-term problem. Currently, under the Chesapeake Bay Preservation Ordinance, developers or redevelopers are



Frequent flooding of Four Mile Run Stream.

required to either treat water on-site or pay into the County's Watershed Management Fund. Even when the developer opts for on-site treatment of stormwater, it does not necessarily equate to infiltration of water back into the soil. The treatment may only hold stormwater for a time before releasing it into the existing stormwater drainage system.

On-site recharge of water (infiltration) requires sufficient space and suitable soil conditions and must

*The quality of each natural land tract or parcel varies, but many are considered to be restorable, and several tracts are considered to be in pristine condition.*

meet certain standards. Since this may not be achievable on small residential or commercial lots, the County should look for future opportunities where natural recharge of rainwater can occur without undue burden. Arlington County Public School sites, public open space properties and larger commercial developments should all be considered. Ultimately, a large majority of the stream-related problems in Arlington can be directly linked to the high volume of stormwater entering local streams, high levels of impervious cover in the County and the inability to successfully capture and re-filter rain back into natural groundwater reservoirs.

## **Vegetation and Natural Lands Management**

### **Natural Lands**

From an ecological standpoint, vegetation represents the visual culmination of all other terrestrial

natural resources. The underlying geology (parent rock) determines soil type, topography and expression of water in streams, springs and the surface ground water. In response to these variable conditions, predictable and identifiable native plant communities and forest types emerge to provide habitat. A goal of the *Natural Heritage Resource Inventory* was to survey Arlington's open space and document remaining natural lands. Naturally occurring mature vegetation was an important

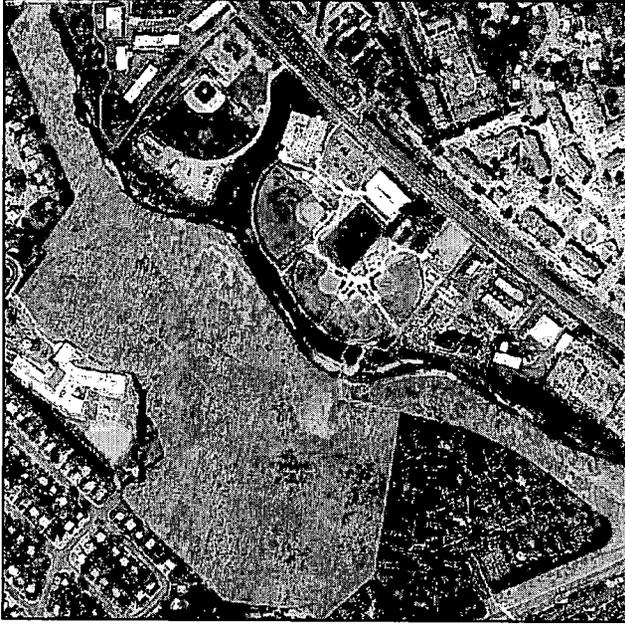
criterion in determining natural land status. One of the greater challenges of conducting the recent floral surveys was to make a distinction between naturally occurring plant communities and vegetation growing as part of the modified urban landscape.

In order to qualify as a naturally occurring forest community, a parcel was required to display all of the relevant structural components – canopy, sub-canopy, shrub layer and herb layer, with canopy and sub-canopy trees represented by native species. Evidence of past soil disturbance was also taken into consideration. Canopy dominance and the presence of indicator or signature plant species within the shrub and herb layer were used to classify or type each qualifying parcel. Community classification followed methodology used by NatureServe, the Virginia Department of Conservation and Recreation and the National Vegeta-

tion Classification System. In addition to natural forested communities, a number of non-forested communities (wetlands and grass glades) were documented and mapped. In total, an estimated 248 acres of "natural lands," including several globally and state-rare natural communities, have been documented, classified by community type and delineated on County owned and managed open space. Measures to protect our remaining natural lands as functioning ecosystems and strategies to protect the isolated individual high-value resources that lie outside of natural lands will help ensure that they remain for future generations to enjoy.

### **Urban Forest Management**

A majority of the documented natural lands in Arlington occur as mature hardwood forest, with virtually no early successional stages of growth or natural meadows. Inventoried forest tracts were found dating from an estimated 85 to 230 years, with most dating to the abandonment of land cleared during the Civil War and farmland abandoned in the late 1800s through the early 1900s. A large number of individual old-age tree specimens predate the Civil War, and over 30 have been recognized as current State Champions. As a result of the historical pattern of local development, forests are largely found within stream-valley parks surrounded by residential backyards or along the Potomac River. The quality of tracts and parcels varies, but many are considered



GIS map of plant communities at Barcroft Park. Developed open space shown in yellow.

to be restorable, and several tracts are considered to be in pristine condition. The primary threats to these natural forests are a result of the surrounding urban environment – invasive plants, increased susceptibility to wind damage and decreased resistance to drought.

Trees and woodlands represent the most observable form of local natural resources. Citizens have proven to be well educated in the environmental benefits associated with trees and supportive of Arlington's award-winning urban forestry program and designation as a "Tree City USA." The County's urban forestry staff, working in close concert with the Urban Forestry Commission, has implemented a number of innovative tree programs and assisted in the development of recent tree-related legislation aimed at protecting Arlington's urban forest. Tree programs that invite public participation include the Notable

Tree, Commemorative Tree, Champion Tree and Specimen Tree programs.

All currently designated Champion, Specimen and Significant Trees will be included on the Environmental Review GIS layer, providing limited protection to those specimens.

Primary responsibility for urban forestry issues and tree-related work on County-owned open space lies with the Landscape and Forestry Section of the PRCR's Parks and Natural Resources Division. Three primary documents guide their work: the Chesapeake Bay Preservation Ordinance, the Tree Preservation Ordinance and the *Urban Forest Master Plan*. A central objective of the urban forestry program and a stated goal of the Arlington County Board is to improve Arlington's urban forest canopy coverage. Over the past 30 years, heavy tree canopy coverage across the County has decreased by more than 40%, though since 1997 it has stabilized. This stabilization is due to several factors including planting more trees, improved urban forest management practices and a decrease in construction activities. In addition, more than 18,000 street trees have been mapped on the County's GIS system for monitoring and maintenance.

**Recommendation 10: Amend Chapter VI of the *Urban Forest Master Plan* to reflect policy changes in forest management practices for natural lands.**

The *Urban Forest Master Plan* (2004) was completed prior to the start of the *Natural Heritage Resource Inventory*. The current Plan primarily addresses policies and management practices relating to the more traditional forms of urban forest management performed within a developed environment, including roadways, streetscapes, commercial and residential development, neighborhood parks and general open space. The majority of the recently classified natural

lands (248 acres) found on County-owned property occur as mature forest communities and will require different management strategies and techniques. Important elements to consider in new policies relating to natural land management would include the following:

- Development of management objectives and priorities
- Selection and source of plant materials for re-vegetation
- Collective management of all plants within natural communities (trees, shrubs, grasses, etc.)
- Use of equipment in sensitive natural communities
- Special management techniques such as "day-lighting" and selective thinning
- Management of pandemic plant diseases or harmful insect pathogens that threaten native forest communities (such as Gypsy Moth, Emerald Ash Borer, Dutch Elm Disease, Hemlock Woolly Adelgid, Dogwood Anthracnose)

- Routine monitoring of forest systems' health as a means of measuring long-term local effects of climate change on species survival and dominance
- Search for opportunities to reestablish natural plant communities in multi-use and neighborhood parks

**Recommendation 11: Promote the use of native plant species in County-sponsored plantings and enhance the ability to procure local ecotype plant stock.**

The use of native plants for restoration and recovery of natural lands should be established as a general County practice. In many situations, particularly within a park or trailside environment, the choice of native species is a desirable alternative to cultivars, hybrids or non-native species. Unfortunately, over the past several decades, the commercial availability of genetically pure species has declined. The nursery industry is largely designed to support the needs of private contractors, landscape companies and private homeowners. As a result of marketing strategies, demand, new technologies and the continual development of cultivars, genetically pure native species are becoming increasingly difficult to obtain commercially. Local ecotype native species, propagated from locally collected seed, represent the "gold standard" of native plants, but have very limited availability. In order to promote the internal use of native plants and enhance opportunities obtain local ecotypes, the following recommendations are made:

- Pro-actively seek commercial

vendors willing to provide pure native species

- Periodically review County-sanctioned planting lists, guides and contracts to ensure

*Only species known to currently grow at the site or known to have grown there historically should be considered for restoration.*

- that native plant promotion goals are being met
- Research the availability of local ecotype plant stock for purchase and use
  - Consider the development of a native plant micro-nursery on County-managed property in order to propagate desired species not obtainable from other sources

**Native Wildflowers, Ferns, Grasses and Sedges**

Known collectively as herbs and forbs, these "lesser" plants are nevertheless an important component of each plant community. Wildflowers, as members of this non-woody plant group, are perhaps the most visible and claim the strongest connection to the public. However, all of these plants play an important role in the ecological balance of a healthy, natural environment and deserve the same level of protection afforded to trees and forests.

Over 600 ex-

tant native plant species were documented as part of the *Natural Heritage Resource Inventory*. An estimated 200 extirpated native species are no longer present. Loss

of wetlands and natural meadows and the elimination of forb-lined railroads account for many historically missing plants. As a testimony to the historical richness and diversity of native local flora, approximately 28% of the known, naturally occurring species in Virginia (40,767 square miles) once occurred within the boundaries of Arlington County (26 square miles). No endangered plant species listed on The Federal Register were found, but 14 state-listed rare species were documented and mapped.

As a result of habitat fragmentation, isolation of colonies, loss of wetlands and urban development, it is expected that more than 30% of all native species currently



Fan-tailed Clubmoss, a single colony remains in Arlington.

found in Arlington will be listed as locally rare (A1/A2) upon publication of the Vascular Flora of Arlington County, Virginia. A number of these plants are restricted to a single location or a small number of remaining colonies. The known locations on both public and private properties have been documented, mapped and placed on a GIS layer. Rare plant resources growing within defined Natural Resource Conservation Areas would receive a degree of protection under Recommendation #2. All mapped rare plants, including those growing outside of natural areas within highly active, multi-use parks would be at reduced risk under Recommendation #3.

**Recommendation 12: Within Natural Resource Conservation Areas, restrict to the maximum extent practicable, all vegetation plantings to those included in objective-based restoration plans reviewed or developed by the Natural Resources Management unit.**

Planting within the most sensitive natural areas should be a carefully planned process. Only native, local-ecotype specimens should be used. They should be carefully matched to the appropriate location based on species, aspect, moisture regime, sunlight requirements and soil type. Only species known to currently grow at the site or known to have grown there historically should be considered for restoration. In some cases, restorations may be accomplished by careful movement of existing plants or hand-distribution of seed. County departments should resist the desire to quickly restore

natural areas after the removal of invasive plants. In the absence of soil disturbance, the historical and natural seed bank within the soil should generally be allowed to regenerate native plants. In some cases, this process may take a number of years. As a case in

***Invasive plant species represent the greatest and most immediate threat to the continued survival of Arlington's natural lands and native plant communities.***

point, two years after the successful removal of ground covering invasive plants from a spring area at Long Branch Nature Center, Dwarf Ginseng (locally rare) reappeared naturally.

### **Invasive Plant Species Management**

Invasive plant species represent the greatest and most immediate threat to the continued survival of Arlington's natural lands and native plant communities. If left unmonitored, the spread and dominance of invasive plants will likely alter the structure and succession of the County's natural forests. The threat has been well documented within the general science community with warnings issued by virtually every state agency responsible for management of natural resources. Future changes in the environment brought about by continued global warming could create even more ideal conditions for the establishment of new invasive species. The importance of invasive plant removal has been emphasized in the County's *Urban Forest Master Plan*, *Watershed Management Plan* and *Chesapeake Bay Preservation*

Ordinance. In 2009, the Virginia General Assembly passed legislation requiring that a statewide invasive species management plan be developed (Code of Va. 2.2-220.2). While most non-native (alien) plants are considered benign, those classified as inva-

sive are destructive to the natural environment. Invasive plants are generally aggressive; they compete with native species for space, nutrients and water, are resistant to natural controls (disease and herbivores) and exhibit high reproductive rates. In areas of high invasiveness, native wildflowers, grasses and ferns are supplanted and disappear. A number of invasive species that grow in the form of vines can blanket large areas of forest and are even capable of killing mature native trees through sunlight starvation.

As part of the *Natural Heritage Resource Inventory*, the volume and distribution of invasive plants were mapped in 19 parks, including one regional park (557 total acres). Areas of moderate to high coverage of invasiveness were documented by species present and mapped. A separate Invasive Plant Distribution GIS layer was produced. In addition, a list of invasive plants documented in all parks surveyed was compiled with species ranked by threat level: low, medium and high. Survey results found that medium to high levels of invasive plants were found in every park inventoried. Distribu-



English Ivy threatening natural lands

tion and density varies greatly between parks and within each park.

The presence of invasive plants within our local parks is not a recent phenomenon. Current high distribution levels are the result of alien plant establishment, growth and movement over the past 40 to 50 years. The most common form of migration into parks is directly from private properties (backyards) that abut parkland. Distribution of seed and fruit is primarily by birds and mammals, but in some cases, invasive plant seeds have been introduced or spread by the use of construction and maintenance equipment (bush hogs), vehicle tires or shoes of hikers.

Recognizing the seriousness of the threat from invasive plants, Arlington County funded the creation of an Invasive Species Program Coordinator through a contract

with Virginia Cooperative Extension in 2002. This responsibility has now been transferred to PRCR. Program elements include site assessment, plant removal activities, public education and volunteer recruitment and training. Volunteer removal efforts are primarily accomplished through groups such as the Remove Invasive Plants (RiP) Volunteer Program, Tree Stewards, Arlington Regional Master Naturalists (ARMN) and others. While volunteers are restricted to hand or mechanical plant removal with hand tools, the Invasive Plant Field Technician is able to provide both independent and supportive chemical treatments. Volunteers currently work at 35 neighborhood or park sites, and log approximately 2,000 volunteer hours of fieldwork and 200 hours of office assistance each year. From a public relations, volunteer recruitment and environmental education standpoint, the Invasive Plant Control Program has been very successful. However, without additional resources and the development of new strategies, it will be difficult to achieve measurable environmental benefit to Arlington's at-risk forests and natural lands.

**Recommendation 13: Develop a new long-term, objective-based invasive plant removal strategy combining volunteers, County staff and contractual services in order to maximize efforts and environmental benefits to Arlington's natural resources. Seek Capital Improvement Projects (CIP) funding to support large-scale invasive plant removal and natural lands preservation efforts.**

It is unrealistic to assume we can remove all invasive plants from Arlington County, just as it is unrealistic to believe that we can achieve obtain desired environmental goals relying solely on a volunteer workforce. However, a carefully managed combination of volunteers and contract services could preserve Arlington's most threatened high-value natural lands. Elements of a new strategy should include a measured balance between aggressive treatment, maintenance and prevention.

### Work Site Selection

Establish a new set of criteria for the selection and prioritization of work sites through the review of newly completed GIS natural resource inventory layers. Highest on the priority list should be high-value parks or parcels identified as the most ecologically important, sensitive or at-risk from invasive plant infestation. Set realistic goals

*The Lubber Run Invasive Plant Management Program, utilizing a combination of neighborhood volunteers and multi-year private vendor contract, is a model that has proven to be successful in removing an estimated 90% (to date) of existing invasive plants from a highly infested 25-acre urban park.*

in regard to acreage to be cleared each year; it is better to clear 18 acres at 100% clearance than 36 acres at 50%.

### Selection of Work Force

Where heavy infestations occur with multiple species present, multi-year contracts with specialized vendors are recommended. Severe infestations covering large spaces require a combination of hand-tool and chemical treat-

ments over several years and are best provided by a specialized contractor. The Lubber Run Invasive Plant Management Program, utilizing a combination of neighborhood volunteers and a multi-year private vendor contract, is a model that has proven to be successful in removing an estimated 99% of existing invasive plants from a highly infested 25-acre urban park. This was the first large-scale effort attempted in Arlington and could become a best practice methodology for others.

That said, volunteer efforts should continue because they are important in a number of ways. Volunteers can:

- Slow the spread of invasive plants in target areas by cutting vines back from trees and removing seed and fruit from select species in late summer and fall.
- Continue to work in small neighborhood sites where 90%

to 100% removal of all invasive plants is an achievable goal and help educate neighbors about invasive plants.

- Provide maintenance-level plant removal after vendors or staff have completed their work.
- Provide preventive monitoring and spot removal in sites that are ecologically significant and have not yet been impacted by invasive plants. Several for-

ested parcels in this category have been identified in Arlington and would rank high as a priority in site selection.

- Monitor pre-selected target areas and serve as a quick reaction force to eliminate newly established plants before they spread.

**Recommendation 14: Clarify the roles and responsibilities of County departments in relation to invasive plant control efforts to identify leadership and foster cooperation.**

Invasive plant control is a critical component of a broad natural resource management strategy and an invaluable tool for the preservation of both natural lands and general open space. A number of County agencies and sub-agencies are simultaneously involved in various tasks related to invasive plant control (plan development and review, project initiation and management, contract management, etc.) To be successful, all activities relating to invasive plant control should be filtered through a single point of contact for approval and coordination, and a

mini-summit of potential partners should be convened to develop a work-flow structure that provides consistent and effective communication, supports the overall goals of the program, allows partners to fully participate and allows for the documentation and measurement of program success.

**Recommendation 15: Include an invasive plant monitoring and maintenance component in**

**the design of all future stream restoration projects (DES), new trailside “no-mow and grow” zones (PRCR) and riparian buffer restoration and plantings (DES/PRCR).**

The stream restoration projects mentioned earlier are designed to provide environmental benefits by helping to control runoff, improve water quality and restore natural vegetation. However, these types of projects also have the potential to create an ideal seedbed for the rapid establishment of invasive species. Sunny, open areas with recently disturbed soils serve as a magnet for a number of aggressive invasive species. Unless this component is considered during project planning, levels of invasiveness within these project areas may actually increase and threaten or negate the benefits of native plantings. For all other projects involving land disturbance on County-owned parkland, the need for invasive plant management should be considered by project managers.

**Recommendation 16: Inventory and prepare an analysis of existing riparian zones on County-managed open space in order to assess the feasibility of reestablishing natural vegetation along stream corridors in the future.**

The Chesapeake Bay Preservation Ordinance, the *Watershed Management Plan* and the *Urban Forest Master Plan* each highlight the importance of establishing native vegetation buffers to protect Arlington’s surface streams. The

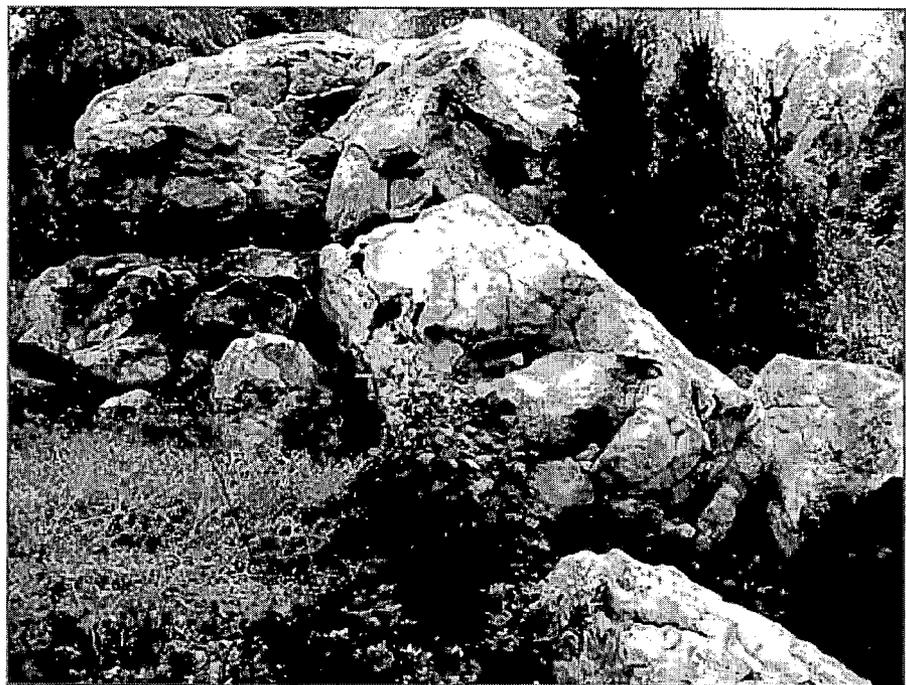
environmental benefits derived from high-quality stream buffers are reflected in cleaner water, decreased runoff and erosion, and wildlife habitat improvement. The inventory and assessment should provide, in measurable terms, the feasibility of restoring natural buffer strips in areas that are currently degraded by invasive plants or exist as a mowed lawn feature into natural meadows or early successional forest. The completed study should be provided to the Parks and Natural Resources Division Chief for review, consideration and possible action.

### **Geological Resources**

Geology has had a profound effect on both the physical and cultural history of Arlington County. The Fall Zone, representing a general boundary or transition between the ancient hard bedrock of the Piedmont Plateau and the softer, more recent sediments of the

Coastal Plain, occupies a large portion of central Arlington. Often typified by cascades and waterfalls, the Fall Zone also indicates the upper limit of navigable waters of the Potomac River and the approximate boundary of the ancient Atlantic Ocean. The ability of sea-going sailing vessels to reach the nearby ports of Georgetown and Alexandria was instrumental in the decision to build the federal city at its current location.

Interpretation of local geology in terms of timelines and origins is both controversial and complex. Due to land changes from urban development, a majority of the surface geology of Arlington has been altered or paved. To the layperson, the most observable surface features include waterfalls, cliffs, rock outcrops, boulders and soil. Less prominent features include rock exposures or sandbars along streambeds or scattered cobbles lying on the surface of a steeply



Quartz outcrop at C. F. Smith Park is identified as a significant geological feature.

sloped mature forest. Topography, soil composition, forest type, drainage patterns and, in some cases, the presence of wildlife species can all be directly related to the underlying geology. Geology is also crucially important to engineers. Rock, soils and landforms determine what can be built and where.



Photo by Alan Schreck

Bald Eagles once again nest in Arlington.

The Piedmont Plateau, most easily observed to the north and west of Interstate 66, is formed from the oldest local bedrock with rolling hill topography and deeply cut stream valleys draining to the Potomac River. A number of scenic waterfalls are revealed at the mouths of Gulf Branch, Donaldson Run and Windy Run.

rises in sea level during the last Ice Age. The various Coastal Plain deposits occur as a series of terraces and are largely composed of some combination of silt, clay, sand and gravel. Topography in the Coastal Plain section transitions, north to south, from rolling hills to terraces and flats. Terraces are commonly separated by steep hillsides underlain by highly erodible soils. A

State of Virginia property and one Regional Park. As a result of the survey, a number of significant geological features were documented on public property and placed on a GIS layer. In addition, historical disturbances to soil were mapped to assist in the classification of natural plant communities. Identified significant features included rock outcrops, historic

*The best tool available to Arlington County to protect native wildlife populations is to protect existing habitat within natural lands and along stream corridors.*

quarries, scenic waterfalls and outstanding examples of native bedrock exposures.

Riverside cliffs along the Potomac Gorge, known as the Palisades, are a prominent "hard rock" feature. Common rocks of the Piedmont include granite, schist, metagabbro and metagraywacke. The Coastal Plain, clearly visible to the south of Interstate 395 is characterized by a series of successive water-borne deposits at the surface. The oldest are estuarine deposits from the ancient Atlantic Ocean and fluvial sand and gravel from the ancestral Potomac River that once flowed across South Arlington. The most recent historical deposits are found along the Potomac River in response to

majority of the historic wetlands in Arlington were located in the Coastal Plain along the valley of Four Mile Run, along the Potomac River or along the toe slopes of terraces. Most of those wetlands are gone, and very little of the original exposed bedrock that lined Four Mile Run remains.

Three of the documented rock exposures are of scientific value as "type locations." Recommendation #3 of this report provides these extremely limited significant resources with a level of protection.

### **Wildlife Resources**

As part of the *Natural Heritage Resource Inventory* Project, a contract geologist was hired to perform an inventory of remaining significant geological features. Twenty-three selected sites were inventoried, including two National Park Service properties, one

Native wildlife is recognized as an important local natural resource and has an interdependent relationship with the other resources that combine to form habitat. In order to establish a baseline of biological data relating to local wildlife populations, a series of inventories

and historical data research was conducted primarily in 2007 and 2008. Wildlife surveys were conducted throughout the County on both public and private land. To accomplish this task, wildlife collection and research permits were obtained from both the National Park Service and the Virginia Department of Game and Inland Fisheries. Initial target faunal groups surveyed included: mammals, birds, reptiles, amphibians, butterflies/moths and dragonflies/damselflies. Several thousand individual records were established through direct observation, field collection, trapping, remote sensing and other methods. With the exception of the Bald Eagle, no federally- or state-listed endangered or threatened species were documented as part of the inventory. A cursory analysis of collected data indicates that more than 50% of historically documented mammals, reptiles and amphibians are expected to be listed as extirpated or undocumented from Arlington. Upon full analysis of collected information, data will be compared to historical records and a special report, titled *Wildlife of Arlington* will be issued. The report will document the current status of wildlife species in Arlington, identify gaps in data, make recommendations for continued studies and monitoring, discuss issues relating to invasive and nuisance wildlife and address population recovery opportunities. Due to distributional inconsistencies related to habitat fragmentation and isolation, specific recommendations relating to habitat enhancement, protection of locally rare species and restoration or reintroduction of species would best be addressed at the local park level through the development of

park-specific natural resources management plans (see Recommendation #5). The best tool currently available to Arlington County government for the protection of native wildlife populations is to protect existing habitat within natural lands (Recommendation #2) and along stream corridors.

### Resource-Related Park Management Issues

During the course of performing the *Natural Heritage Resource Inventory*, a number of opportunities for improvement were noted and are listed here for future consideration by relevant agencies.

- Virtually all woodland (un-paved) trails in Arlington parks are in various states of deterioration and in some cases contributing to active erosion. They should be inspected and remedial action considered. All trails should also be accurately marked by GPS and added to the County's GIS system as a new management data set.
- With very few exceptions, there

are no brochures or park maps available to the public. To save printing costs, digital brochures/maps could be developed for web/digital access. Current online maps only show location with no features such as trails, restrooms, activities, etc.

- Encroachments and illicit dumping were observed in virtually every forested park in the County. It has become commonplace for homeowners of properties that abut parkland to dump yard waste and leaves into the adjacent parkland rather than move the debris to the street for pickup. This practice is environmentally



County Champion Swamp White Oak growing in multi-use park would be protected by Recommendation #3.



Scenic waterfall at Gulf Branch is considered a significant natural resource.

ual resource features are distributed throughout Arlington County without regard to political boundaries or property ownership. Habitat fragmentation from development and the resulting isolation of less mobile populations of both plants and wildlife have placed a number of these resources at risk. In a number of locations across the County, plant

wetlands, fragile

tory. Various working partners included staff from the National Park Service, Northern Virginia Regional Park Authority, Department of Defense, Virginia Department of Game and Inland Fisheries, Virginia Department of Conservation and Recreation, Smithsonian Institution, City of Alexandria, Fairfax County Park Authority and several non-profit conservation groups. The Natural Resources Working Group could focus efforts on natural resource issues within Arlington County, its neighbors and regional partners. Quarterly meetings would include guest speakers, information sharing and review of new research or best management practices within the natural lands management field. Regular contact and cooperation between member jurisdictions would increase the opportunities to develop shared management goals, share natural resource data and fund joint projects and research.

harmful. Invasive plants may be introduced into parkland, and the resulting thick layer of leaves is unable to decompose naturally and creates a “dead-zone” where plants cannot grow. These leaf dumps are also harmful to trees. In some cases, home owners on properties adjacent to public property have made improvements that encroach into parkland. The combination of an aggressive education campaign (County web site, publications and direct mailings) coupled with inspections and enforcement is recommended to change homeowner behavior and recover public parkland.

watersheds or wildlife populations occupy natural landforms that spill over jurisdictional lines on the map. The ability to manage natural resources by ecological unit becomes a more difficult challenge without shared management goals and objectives between various owners. This is particularly true with regard to watershed management and invasive plant control.

**Recommendation 17: Initiate the formation of a local inter-jurisdictional Natural Resources Working Group for the purpose of strengthening existing partnerships and developing new cooperative working relationships.**

A number of beneficial working relationships were developed during the course of performing the *Natural Heritage Resource Inven-*

**Recommendation 18: Establish a Natural Resources Advisory Group to enable Board-appointed advisory commissions to deal more effectively with natural resource issues.**

The Environment and Energy Conservation Commission, the Park and Recreation Commission, and the Urban Forestry Commission have shared interests in natural resources issues. A joint working group of the three commissions, with representation from each, would help to keep commission members informed concerning natural resource issues and enable the commissions to deal more effectively with those

### Partners in Cooperative Local Resource Management

Parks, natural lands and individ-

issues. The working group chair would call meetings based on consultations with the natural resource management staff, other program managers and the three commission chairs.

### **Public Education and Outreach**

The development of a public policy and management strategy begins the process that will lead to local natural resource conservation and preservation. From the beginning and throughout the process, it will be important to inform, educate, persuade and engage the public in meaningful ways. The many assets of the County government and community should be explored as avenues for this continuing education.

### **Recommendation 19: Arlington County should seek and embrace opportunities to educate residents and landowners of the**

### **importance of environmental sustainability, natural resource protection and habitat enhancement on private properties.**

Staff at Arlington's Nature Centers, trained and skilled in the design and presentation of interpretive programs, will be a valuable asset in providing both natural resource information and offering conservation-related programs for residents of all ages. The County's web site offers a number of opportunities for engagement, including a page devoted to Arlington's natural resources. Natural history information, collected through the Natural Heritage Resource Inventory, such as the Flora of Arlington County and the Wildlife of Arlington, should be placed on the Arlington County web site when completed. Both the web site and The Citizen newsletter should be utilized to promote wise land use practices on private property and to discourage damaging behaviors

or actions. Volunteer groups, such as Arlingtonians for a Clean Environment (ACE), Tree Stewards, Arlington Regional Master Naturalists (ARMN), Master Gardeners and others should be solicited for both support of public educational efforts and recruitment for volunteer projects. Continued cooperation with state agencies, including the local office of Virginia Cooperative Extension, will allow citizens to take advantage of natural resource training opportunities and leverage the County's ability to generate and utilize a strong volunteer force. Arlington residents are highly educated, well informed and have strongly supported environmental initiatives in the past when provided the opportunity to participate. A strong partnership between residents, volunteers, non-profits, County government and jurisdictional allies will help to ensure community success in the area of environmental stewardship.



Botanical field team in swamp at Pimmit Run

# APPENDIX I

## NATURAL RESOURCE CONSERVATION AREAS

The following parks and delineated areas within existing County-owned parks are recommended by staff for inclusion as designated Natural Resource Conservation Areas (NRCAs). Criteria for inclusion included an analysis of intact, significant natural resource features or attributes that represent the most ecologically sensitive natural

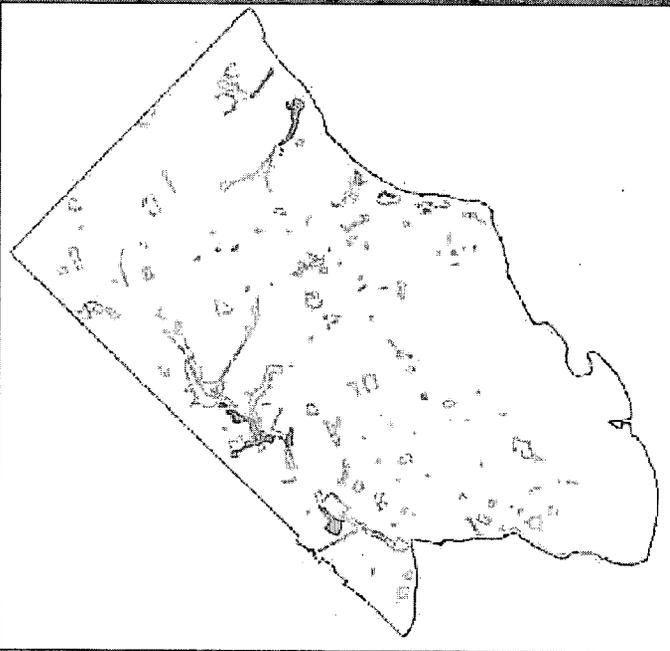
lands remaining on County property. Each park or section of park is shown below by map with significant natural features listed. Preservation of these natural sites through conservation management is considered a critical element of the Natural Resource Management Plan.

### Recommended Natural Resource Conservation Areas

126 Total Acres of recommended areas

Park Locations

- Gulf Branch
- Donaldson Run
- Windy Run
- C.F. Smith
- Long Branch/Glencarlyn
- Arlington Forest
- Barcroft

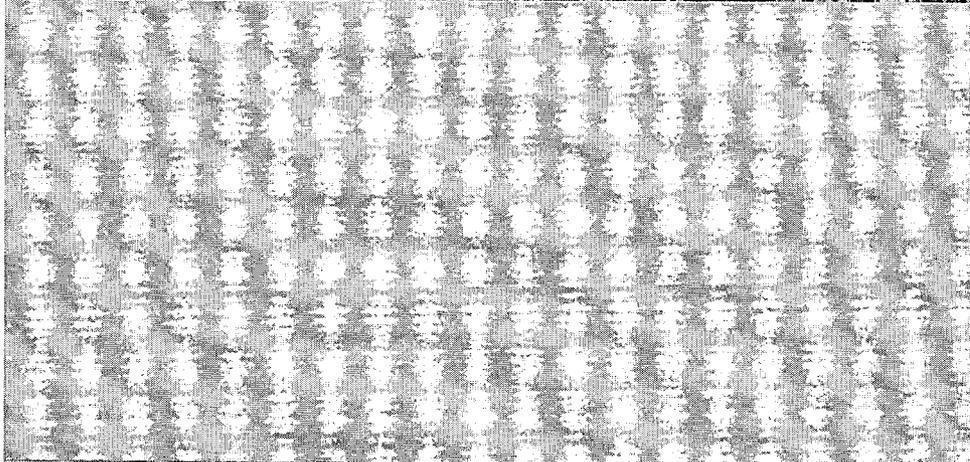


***Did you know?***  
Only 4.4% of Arlington's total land area remains "natural land." The map on the left highlights remaining "natural land" in Arlington; Arlington County owns the "natural land" colored in green.

## Gulf Branch Park (lower)

### 5.4 acres

- High Quality Oak Heath and Mesic-mixed Hardwood Forest
- Locally-rare plants
- Significant wildflower viewing areas.
- County Champion trees present
- Serves as buffer to nearby state-rare plants on G.W. Memorial Parkway property





## Donaldson Run Park

30.22 acres

- Significant woodlands including Mesic-mixed Hardwood Forest, Oak-Heath Forest, Acidic Oak Hickory Forest, and locally-rare Basic Mesic Forest
- Locally-rare native plants
- Woodland seeps
- Significant geological features: Exposures and waterfalls
- Significant trees present
- Serves as buffer to nearby state-rare plants on G.W. Memorial Parkway property

## **Windy Run Park (lower)**

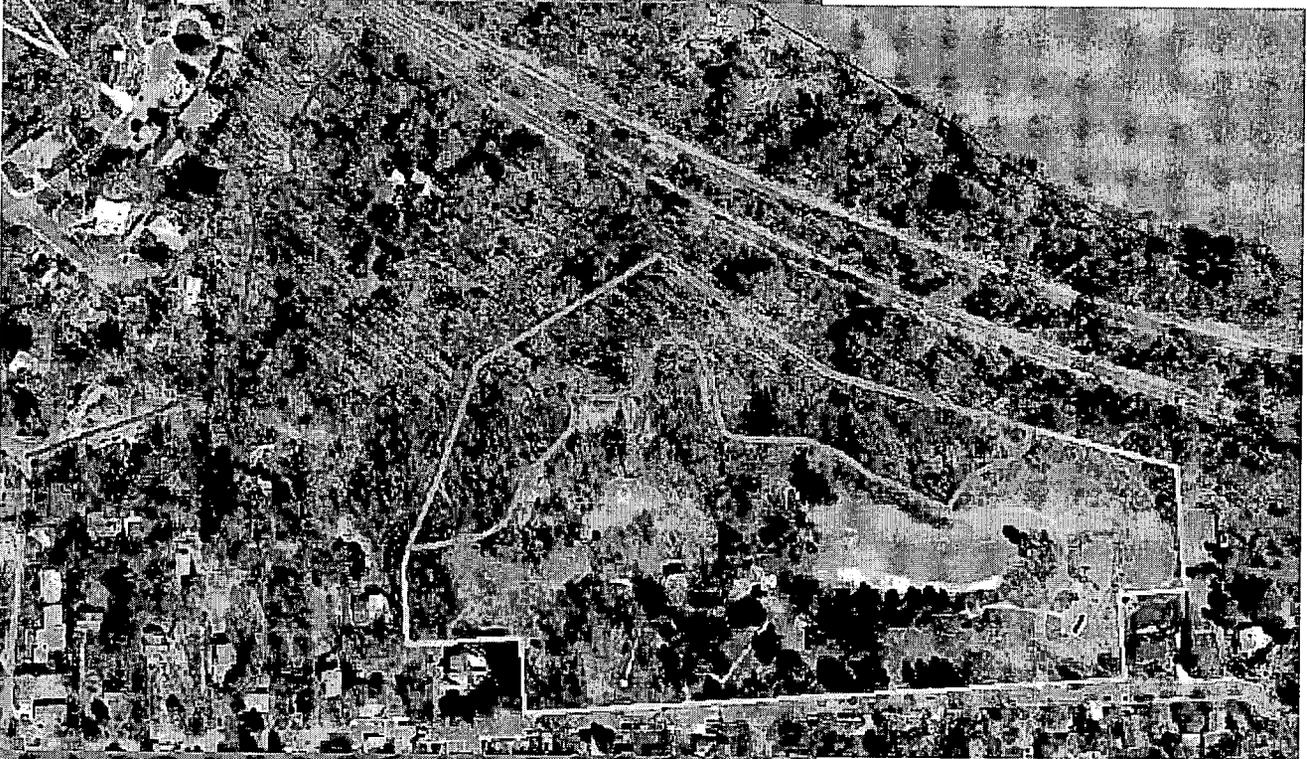
**7.5 acres**

- Significant woodlands present – Oak-Heath Forest and Mesic-mixed Hardwood Forest
- Locally-rare native plants
- Springs and woodland seeps
- State Champion, County Champion and Significant trees present.
- Serves as buffer to nearby state-rare plants on G.W. Memorial Parkway property

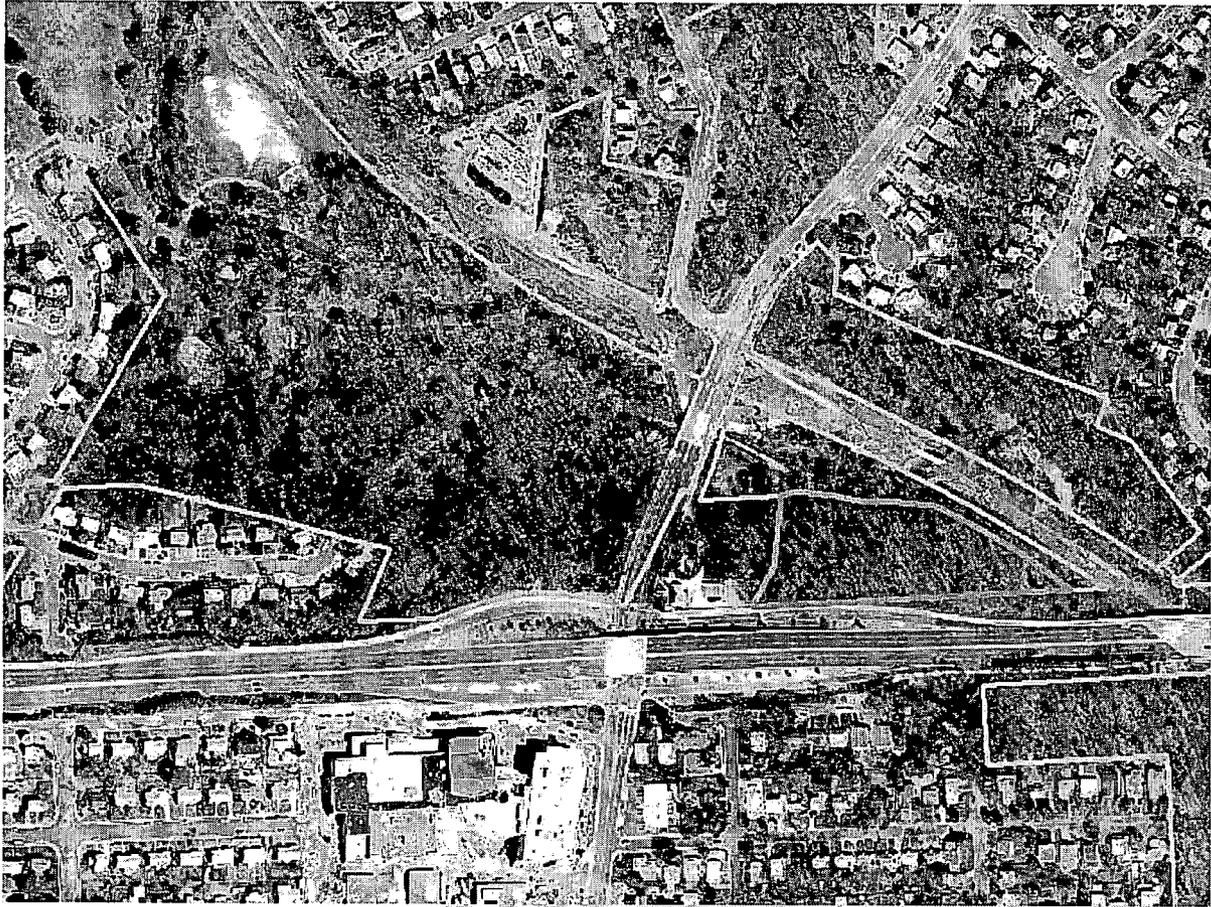


## Fort C.F. Smith Park

4.4 acres



- Significant woodlands, including – Mesic-mixed Hardwood Forest, Oak-Heath Forest, and Acidic Oak Hickory Forest
- Locally-rare native plants
- Historic spring and woodland seep
- Significant geological feature – large granite outcrop
- Large cluster of State Champion, County Champion and Significant trees present



### **Glencarlyn Park (Rt. 50)**

**2.6 acres**

- Outstanding example of undisturbed Acidic Oak Hickory Forest
- Little to no impact from invasive plant species
- County Champion and Significant trees present

## Long Branch / Glencarlyn Park

Three sections total 49.67 acres

- Significant collection of natural woodlands, including Oak-Heath Forest, Acidic Oak-Hickory Forest, Mesic-mixed Hardwood Forest, and a remnant section of locally-rare Basic Mesic Forest
- Large collection of locally-rare native plants
- A number of County Champion and Significant trees present
- Historic springs and woodland seeps
- Significant geological features— stream exposures of scientific importance



## **Arlington Forest Park**

**1.0 acre**

- Rare Plant Community classified as a Dry Gravel Cap Poverty Oat Grass Glade (Oak-Heath Forest remnant)
- Significant trees present
- Restorable natural site with few invasive plants present
- Only significant natural site that is accessible to those with disabilities





### **Barcroft Park (sw portion)**

**24.0 acres**

- Most ecologically significant natural site owned by County
- Globally-rare and State-rare wetlands present
- Significant cluster of locally-rare native plants
- Twenty-three springs
- A number of State Champion, County Champion and Significant trees present
- Unique wildlife habitat present

## APPENDIX 2

### LIST OF SOURCES REVIEWED FOR THE NATURAL RESOURCE MANAGEMENT PLAN

- A Century of Change in the Flora and Vegetation of an Urban Area - Arlington County, Virginia.* 1998. Allison N. Wack. Smithsonian Institution Research Training Program.
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- Histories of Arlington Neighborhoods and Civic Organizations.* Arlington County Civic Federation. <http://civfed.org/historys.htm>
- Images of Arlington.* 2000. Arlington Historical Society.
- Invasive Alien Plant Species of Virginia.* Virginia Department of Conservation and Recreation and Virginia Native Plant Society. [www.dcr.state.us/dnh/pdflist.htm](http://www.dcr.state.us/dnh/pdflist.htm)
- Invasive Plant Program.* Arlington County Department of Parks, Recreation and Cultural Resources. [www.arlingtonva.us/Departments/ParksRecreation/scripts/parks/ParksRecreationScriptsParksInvasive.aspx](http://www.arlingtonva.us/Departments/ParksRecreation/scripts/parks/ParksRecreationScriptsParksInvasive.aspx)
- Invasive Species Program - Draft Report.* Jan Ferrigan. August 2002. Virginia Cooperative Extension and Arlington County Department of Parks, Recreation

and Community Resources. Arlington County, Virginia,

*Lubber Run Park Invasive Plant Management Project.* Arlington County Department of Parks, Recreation and Cultural Resources. [www.arlingtonva.us/departments/ParksRecreation/scripts/planning/InDesign/ParksRecreationScriptsPlanningInDesignLubberRunPlaPlanningInDesignLubberRunPlant.aspx](http://www.arlingtonva.us/departments/ParksRecreation/scripts/planning/InDesign/ParksRecreationScriptsPlanningInDesignLubberRunPlaPlanningInDesignLubberRunPlant.aspx)

*Natural Heritage Resource Inventory* Project data, 2005-8, Greg Zell, et al., unpublished. Arlington County, Virginia.

Permit Renewal Application, VPDES Permit No. VA0088579. 2007-2012 Permit Cycle. February 2007. Arlington County, Virginia.

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*Provision of a Stream Inventory, Report on Watershed Restoration Opportunities, and Training Services for County Staff in Stream Survey Techniques.* Environmental Systems Analysis, Inc. 1999. Annapolis, MD. Prepared for the Department of Environmental Services. Arlington County, Virginia.

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*Urban Forest Master Plan.* 7/28/04. Department of Parks, Recreation and Cultural Resources. Arlington County, Virginia.

*Volunteer Stream Monitoring Program Draft Reports 2002-2005.* Department of Environmental Services. Environmental Planning Office. Arlington County, Virginia

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County Champion Tulip Poplar

## APPENDIX 3

### DEFINITIONS

*Champion Tree:* Individual specimens of trees or shrubs that have been nominated and designated as the largest of that species in Arlington County, and maintained on the most current list of Arlington County Champion Trees and GIS layer. Two or more specimens that score within 5 points of the largest will be listed as Co-Champions. Total score (American Forest Association methodology) is the sole criteria for designation regardless of tree location on private or public property. Some County Champion Trees have also qualified as either State or National Champion specimens. This data set is routinely updated and modified to reflect changes.

*Cultivar:* Also known as a “cultivated variety”, the term cultivar refers to a variety of plants purposely developed by horticulturists to favor selected traits such as height, flower or leaf color, or resistance to disease. Cultivars are often certified by name, and routinely propagated as clones through vegetative means to maintain genetic consistency.

*Ecotype:* A population of (plant) species that has adapted to a particular set of environmental conditions through natural selection. Generally used to define a local population within a limited geographical range, i.e. local. Also defined as a genetically distinct population of plants, of the same species, adapted to specific localized conditions (climate, soils, etc.).

*Native Plant Communities:* Natural lands are composed of a mosaic of self-sustaining and definable ecological communities. A natural or native plant community is “a vegetation classification unit defined on the basis of a characteristic range of species composition, diagnostic species occurrence, habitat conditions, and physiognomy.” The plant community designation is synonymous with the term “association or type” and represents the lowest level of hierarchical classification for natural lands. Extant plant communities in Arlington County were defined in the field using criteria established by the Virginia Department of Conservation and Recreation (DCR) and are displayed on the most

current update to the Plant Community GIS Data Layer. The Virginia Natural Heritage Program (VNHP) currently lists over 120 natural plant communities as occurring within Virginia.

*Native Plant Species:* Defined as those plant species (trees, shrubs, ferns, forbs, grasses and sedges) documented to be growing naturally within the boundaries of Arlington County, reasonably assumed to have had an historical presence since the mid-early 1800’s earlier, and lack a known history of introduction or escape from cultivation. The term “native species” is considered synonymous with “local native species”.

*Natural Lands:* Natural Lands are considered a subset of Open Space and refer to parcels of land “which have experienced only minimal human alteration or have recovered from anthropogenic disturbance under mostly natural regimes of species interaction and disturbance”. In Arlington County, documented natural lands occur primarily as variations of mid-late successional hardwood forest aging from 85-200 years old, generally exhibit historically undisturbed soils and display a complete and diverse native vegetation structure (canopy, sub-canopy, shrub and herb layer). Few non-forested natural lands remain in Arlington, but would include several documented remnant woodland meadows (glens), bogs, seeps, and tidal marsh. The presence of invasive plant species (non-canopy) does not alone disqualify a parcel from qualification as natural lands. Natural lands can be differentiated from the more abundant Managed Landscape, which exhibits some combination of the following features: heavily disturbed soils, non-native plantings, altered topography, presence of mowed turf, and paved trails or service roadways. Managed Landscape areas are normally managed for active recreation and may contain improved facilities and parking lots. The primary source for verification will be the most recent version of the Plant Community GIS Data Layer.

*Non-Native Invasive Plant Species:* Defined as established and reproducing non-native plants, that

through a combination of traits (aggressive growth, propensity to spread, immunity to native diseases, insects or herbivores), threaten the elimination of desired native species through competition and replacement.

*Non-Native Plant Species:* The opposite of locally native plant species. Native to a geographic location other than Arlington County, and if present currently, is the result of intentional or accidental introduction or escape from cultivation, including

hybrids, plants that result from genetic engineering or horticultural cultivars.

*Significant Trees:* Individual specimens of trees or shrubs growing on County property, determined to be ecologically significant based on large size, old age, or local rarity by the Natural Resource Specialist (PRCR), and listed within the most current version of the Tree Report Package and GIS layer. This data set is routinely updated and modified to reflect changes.



### **ACKNOWLEDGEMENTS**

The following individuals and groups are recognized for their assistance with the *Natural Heritage Resource Inventory*

Rod Simmons, Botanist

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Department of Natural Resources

Johnny Townsend, Botanist VA. DCR –  
Natural Heritage Program

Gary Fleming, Vegetation Ecologist VA. DCR –  
Natural Heritage Program

Brent Steury, Natural Resource Manager G. W.  
Memorial Parkway

Stephen Van Hoven, Arborist DOD –  
Arlington National Cemetery

Anthony Fleming, Geologist

Anthony Bulmer, Naturalist – Small mammals

Andy Rabin and Kevin Munroe – Odonate surveys

Alonso Abugattas, PRCR – Lepidoptera surveys

David Farner, PRCR – Avifauna research

Meghan Tice – Data Management

John White – Herpetology and Photography

Project Wildlife Watch Volunteers

Salamander Search Team Volunteers

Department of Environmental Services – GIS staff

John Dodge, Botanist



DEPARTMENT OF PARKS, RECREATION  
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