

Natural Resources Management Plan





State Champion Post Oak

NATURAL RESOURCES MANAGEMENT PLAN November 2010

ARLINGTON COUNTY BOARD

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NATURAL RESOURCES MANAGEMENT PLAN

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ARLINGTON
VIRGINIA

DEPARTMENT OF PARKS,
RECREATION AND
CULTURAL RESOURCES

EXECUTIVE SUMMARY

The *Natural Heritage Resource Inventory* (NHRI), which was conducted between 2005 and 2008, provides Arlington County with natural resources data so it can systematically define and address issues relating to the protection and management of natural resources within the County. This *Natural Resources Management Plan* (NRMP), which resulted from the NHRI and 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 broad and narrow lenses. 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 Plan. 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 Plan provide supporting information and maps. It’s important to note that the timing of implementation strategies for the 19 primary recommendations will be subject to the availability of resources, including funding.

Recommendation	Priority
1 Adopt a general policy goal of “Zero-Loss” of County-owned natural lands.	Priority 1
2 Establish a new administrative category of County-owned open space, known as Natural Resource Conservation Areas (NRCAs).	Priority 1
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 property owned and/or managed by Arlington County Government, Northern Virginia Regional Park Authority, Arlington Public Schools, Northern Virginia Conservation Trust, or any other land trust.	Priority 1
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
5 Develop an individual natural resources management plan for each County-owned park designated as a Natural Resource Conservation Area, or containing NRCAs.	Priority 1
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.	Priority 2
7 Update and submit to the County Board for approval a revised edition of the Resource Protection Area (RPA) Map and GIS Layer.	Priority 2

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.	Priority 2
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.	Priority 2
10	Amend Chapter VI of the <i>Urban Forest Master Plan</i> to reflect policy changes in forest management practices for natural lands.	Priority 2
11	Promote the use of native plant species in County-sponsored plantings and enhance the ability to procure local ecotype plant stock.	Priority 3
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.	Priority 2
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 benefit to Arlington's natural resources. Seek Capital Improvement Project (CIP) funding to support large-scale invasive plant removal and natural land restoration and preservation efforts.	Priority 2
14	Clarify the roles and responsibilities of County departments in relation to invasive plant control efforts to identify leadership and foster cooperation.	Priority 3
15	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
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.	Priority 3
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.	Priority 2
18	Establish a Natural Resources Advisory Group to enable Board-appointed advisory commissions to advise more effectively on natural resource issues.	Priority 3
19	Arlington County staff 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.	Priority 2

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.



Beaver Lodge (Photo by Alan Schreck)



Historic Carlin Spring 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, initially 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 *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 this *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 planning.

Photo by Gary Fleming, DCR



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

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 this *Natural Resources Management Plan* is shown in Appendix 2. The scope of this 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 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 government agencies. These scientists have provided an invaluable record of the historical flora and fauna of the region,



Photo by Gary Fleming, DCR

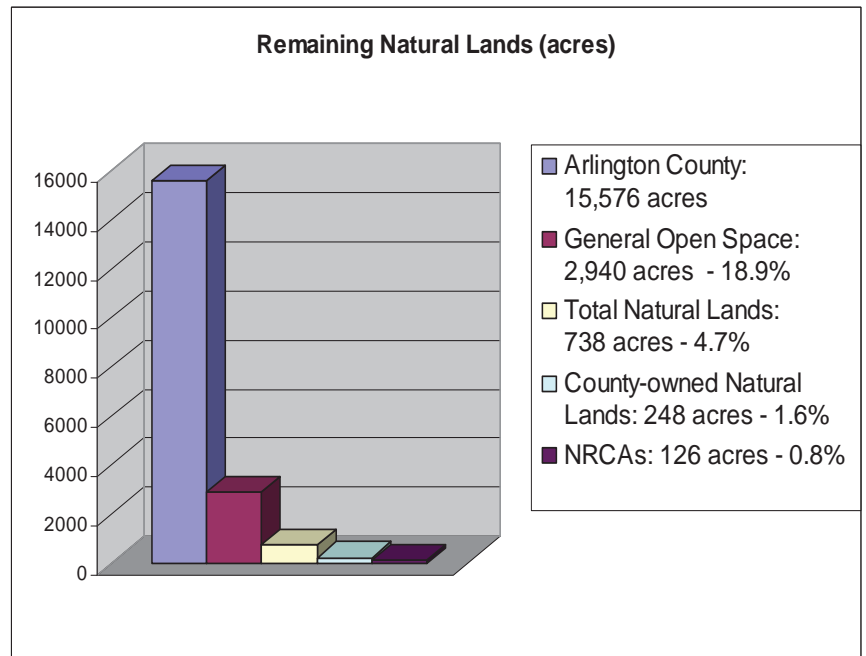
Old Age Oak Forest at Donaldson Run

with a large number of local collections housed at the Smithsonian's Department of Botany and 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 WWI 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 WWII, 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/I-395/ Metrorail (late 1960s through the early 1980s).

The accumulated effects of 20th



Remaining Natural Lands in Arlington County

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 area 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 Metrorail 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.

According to the *Public Spaces Master Plan* and other public documents, the total amount of “open space” in Arlington currently totals approximately 2,940 acres, representing about 18.9% of the County’s area. These figures include Arlington County parks and open spaces, Arlington Public Schools (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 that only 738 acres of “natural lands” remain in Arlington County. This figure is equal to 25% of all open space or 4.7% 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 con-

sists almost entirely of parcels found within Arlington County-owned parkland, on two properties owned by the Commonwealth 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, more than 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 Plan 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 from 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

Photo by Chris Bright, Earth Sangha



Virginia Sweetspire rediscovered after 100 years.

30% of the species present today classified as locally rare (A1/A2).

This Plan 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



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 NHRI, in conjunction with this *Natural*

Resources Management Plan, are fourfold:

1. The County-wide 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 NHRI 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 NHRI provides an accurate baseline of data that will help speed the creation of environmental assessments within pre-inventoried tracts of County-owned properties.
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 Department of Game and Inland Fisheries, Virginia Department of Conservation and Recreation, the 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 docu-

mented 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-owned 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 Commonwealth of Virginia, the National Park Service, the Northern Virginia Regional Park Authority and private parties. Inventoried flora included trees, shrubs and vascular plants, but did not include lichen, fungi and similar species. To date:

- More than 600 native species have been documented.
- More than 100 native species were recorded in Arlington for the first time, each establishing a new County record.
- Fourteen plants, listed by the Virginia Department of Conservation and Recreation as state rare, were 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 Collec-

tion, 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 flora inventory. The program information and GIS mapping elements are currently available to both staff and the general public at www.arlingtonva.us, keywords 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 by the National Park Service, the Northern Virginia Regional Park Authority and the Commonwealth of Virginia. To date, more than 500 acres of parkland have been mapped

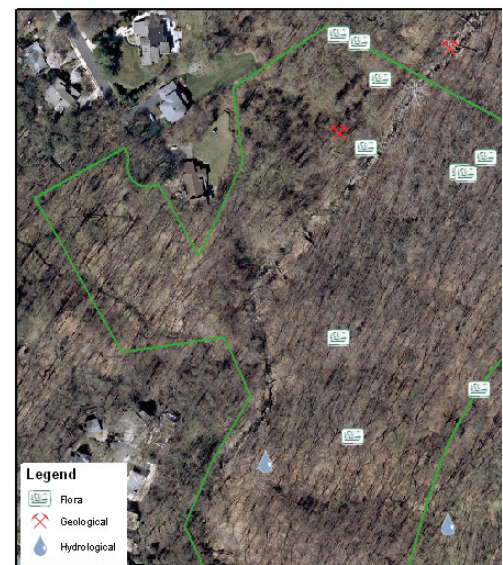
and an updated list of “target” invasive plants rated by threat level has been developed.

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 County 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 individual

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

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.

landowners. In most states, natural resources are generally not protected unless listed on the Federal Register as an endangered species or state-endangered plant or animal. 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 action.

The Plan is intended as a planning tool, with the majority of the recommendations directed to Arlington County departments. 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 where resource

mation to assist and encourage voluntary protection.

The complete set of recommendations made in this Plan, 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



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-owned 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 fewer 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 by 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 departments 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 attri-

butes. 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, invasive 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.

County 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



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

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 property owned and/or managed by Arlington County Government, Northern Virginia Regional Park Authority, Arlington Public Schools, Northern Virginia Conservation Trust, or any other land trust.

For proposed projects on Arlington County-owned properties, there currently exist two primary environmental review processes:

the Environmental Assessment process, administered through A.R. 4.4, and restrictions or limitations applied by the Chesapeake Bay Preservation Ordinance for projects within designated Resource Protection Areas (RPAs). 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 re-

sources, 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 departments would be required to check this layer prior to planning any project on county-owned 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, County 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 the suggested changes to A.R. 4.4, a separate abbreviated environmental review process is suggested to protect significant natural resources on County-owned 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 prop-

erty that will occur within 100 feet of a documented natural resource feature on property under easement for protection of natural resources or on property owned and/or managed by Arlington County Government, Northern Virginia Regional Park Authority, Arlington Public Schools, Northern Virginia Conservation Trust, or any other land trust.

Recommendation 4: Effectively manage Arlington’s natural resources by establishing a single management unit with specialized skills in natural lands preservation and natural resources 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 this Plan, effectively manage documented natural resources, maintain established GIS information, monitor the health of the local natural environment, and liaise with other public landowners in Arlington, the County should focus these responsibilities under a single management function. This work unit would provide expertise in the areas of forest ecology, urban wildlife management and other associated natural sciences. Most of the jurisdictions in our region have addressed the need for natural lands management by establishing staffing levels that range 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.

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. Spe-

cific 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 acquisition 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, partner-

ships 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

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

properties (more than 40 acres 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 substantial.

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’s

area to be covered by impervious surfaces. A summary of general stream-related 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 located 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 U.S. 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

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.

that a majority of the clean water and stormwater standards were imposed on Arlington after full 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 Invento-*



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

ry. Recommendations stem from the findings of that inventory and a review of the documents listed 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. 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. Informa-

tion 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, rec-

reation 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 poison sumac (*Toxicodendron vernix*) is listed as noxious vegetation within the current version of the Chesapeake Bay Preservation Ordinance. 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 is 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 are located 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 departments 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,



Frequent flooding of Four Mile Run Stream.

developers or redevelopers are 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

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 ma-

tion and the National Vegetation 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 County-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.

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.

suitable soil conditions and must meet certain standards. Since this may not be achievable on small residential or commercial lots, the departments of the County should look for future opportunities where natural recharge of rainwater can occur without undue burden. Arlington 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

ture vegetation was an important criterion in determining natural land status. One of the greater challenges of conducting the recent flora 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 Recre-

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 more than 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



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

and parcels varies, but many are considered 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 are 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

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

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, pro-

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 Urban Forest Master 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 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

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

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

serve the same level of protection afforded to trees and forests.

More than 600 extant 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) were once found 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



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

wetlands and urban development, it is expected that more than 30% of all native species currently 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

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

to regenerate native plants. In some cases, this process may take a number of years. As a case in 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 natural forests located in the County. 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 invasive 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, which cover 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



English Ivy threatening natural lands

found that medium to high levels of invasive plants were found in every park inventoried. Distribution and density varies greatly between parks and within each park.

The presence of invasive plants within local parks in Arlington 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 Project (CIP) funding to support large-scale invasive plant removal and natural land restoration and

preservation efforts.

It is unrealistic to expect the removal of all invasive plants from Arlington County, just as it is unrealistic to believe desired environmental goals can be achieved 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

Staff should establish a new set of criteria for the selection and prioritization of work sites on County-owned parkland 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

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 90% (to date) of existing invasive plants from a highly infested 25-acre urban park.

at-risk from invasive plant infestation. Staff should set realistic goals regarding 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 treatments 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 other jurisdictions.

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 County 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 forested 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 departments and divisions 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 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



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

exposures or sandbars along streambeds or scattered cobbles lying on the surface of a steeply 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



Bald Eagles once again nest in Arlington.

engineers. Rock, soils and landforms determine what can be built and where.

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

Arlington. The most recent historical deposits are found along the Potomac River in response to rises in sea level during the most recent 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

geological features. Twenty-three selected sites were inventoried, including two National Park Service properties, one Commonwealth of Virginia property and one Regional Park. As a result of the survey, a number of significant geological features were documented on public-owned property and placed on a GIS layer. In addition, historical disturbances to soil were

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

of scenic waterfalls are revealed at the mouths of Gulf Branch, Donaldson Run and Windy Run. 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

rolling hills to terraces and flats. Terraces are commonly separated by steep hillsides underlain by highly erodible soils. A 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.

As part of the *Natural Heritage Resource Inventory*, a contract geologist was hired to perform an inventory of remaining significant

mapped to assist in the classification of natural plant communities. Identified significant features included rock outcrops, historic quarries, scenic waterfalls and outstanding examples of native bedrock exposures. Three of the documented rock exposures are of scientific value as “type locations.” Recommendation #3 of this Plan provides these extremely limited significant resources with a level of protection.

Wildlife Resources

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 County departments.

- Virtually all woodland (unpaved) 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 should be 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



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.

Partners in Cooperative Local Resource Management

Parks, natural lands and individual 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 communities, wetlands, fragile 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 Inventory*. 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. A Natural Resources Working Group could focus efforts on natural resource issues affecting 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.

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

Arlington County's Environment and Energy Conservation Commission, Park and Recreation Commission, and 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

rather than move the debris to the street for pickup. This practice is environmentally 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, homeowners 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.

Commissions' members informed concerning natural resource issues and enable the Commissions to deal more effectively with those issues. The working group chair would call meetings based on consultations with the natural resource management staff, other program managers and the three Commissions' 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 staff should seek and embrace opportunities to edu-

cate 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 behav-

iors or actions. Volunteer groups, such as Arlingtonians for a Clean Environment (ACE), Tree Stewards, Arlington Regional Master Naturalists (ARMN), Master Gardeners, Northern Virginia Conservation Trust (NVCT) 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 neighboring jurisdictions 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

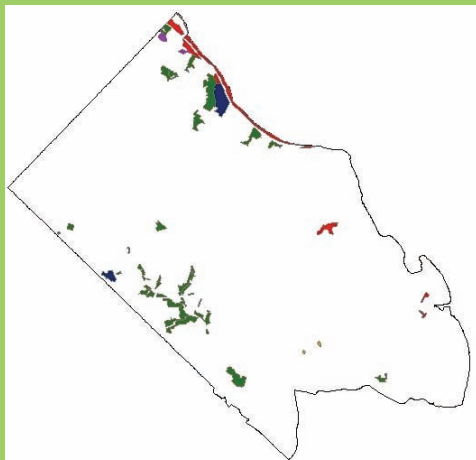
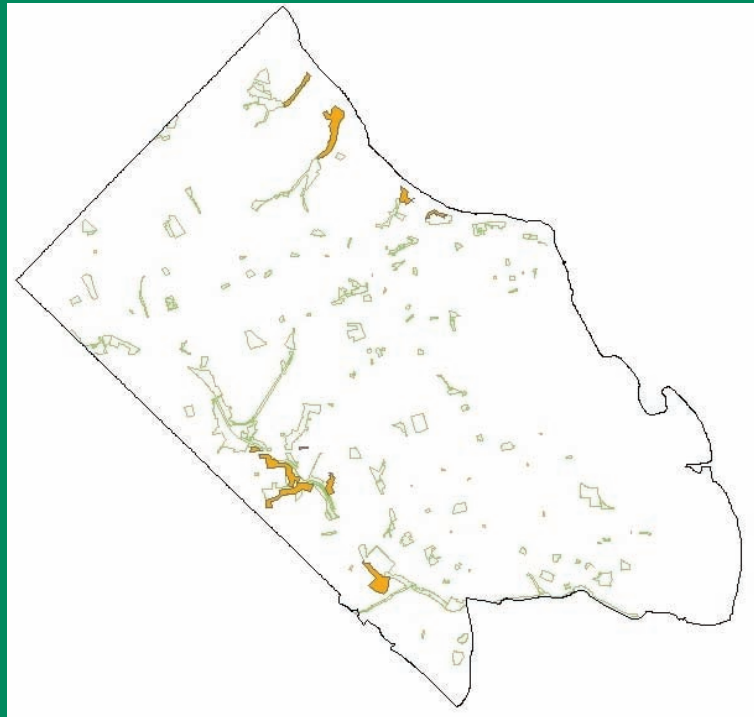
lands remaining on County property. Each park or section of park is shown below by map, with significant natural features listed. Preservation of these natural sites through conservation management is considered a critical element of this Natural Resources Management Plan.

Recommended Natural Resource Conservation Areas

126 Total Acres of recommended NRCA's

Park Locations

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



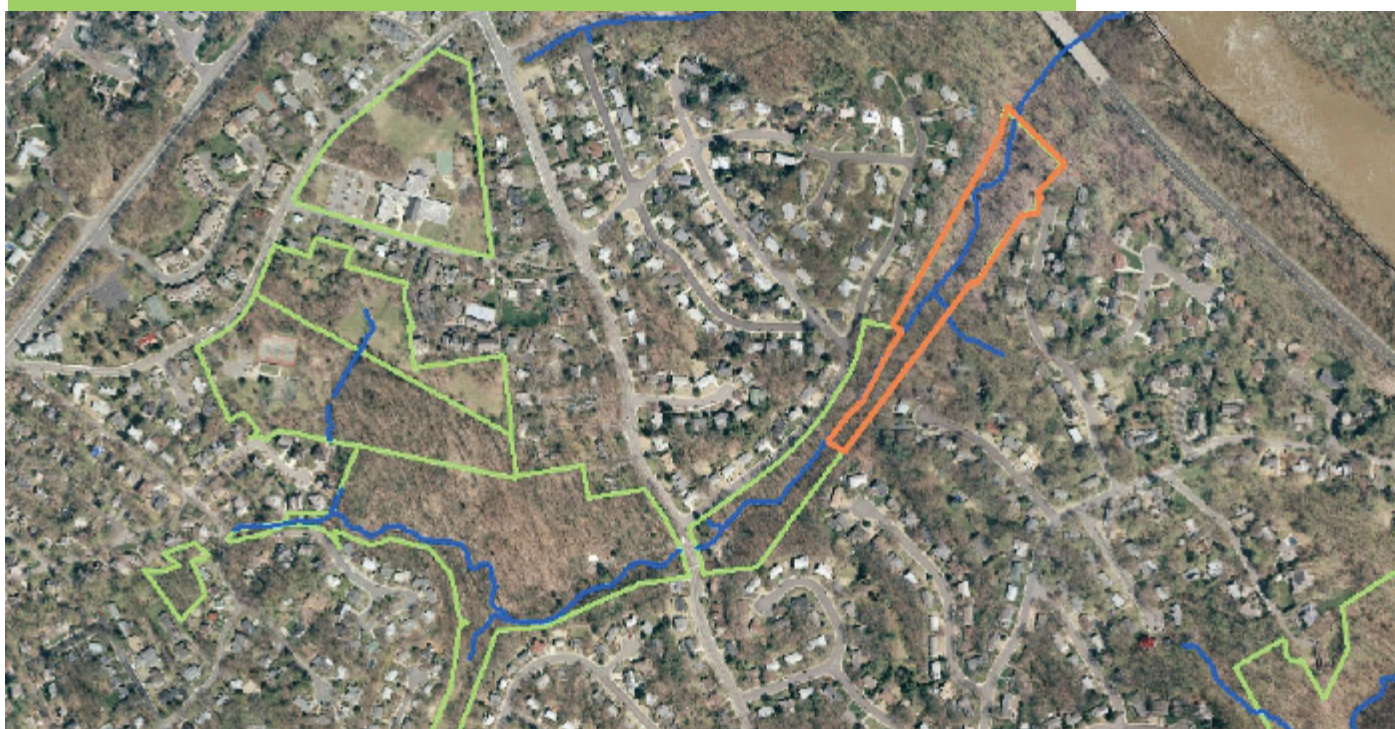
Did you know?

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)

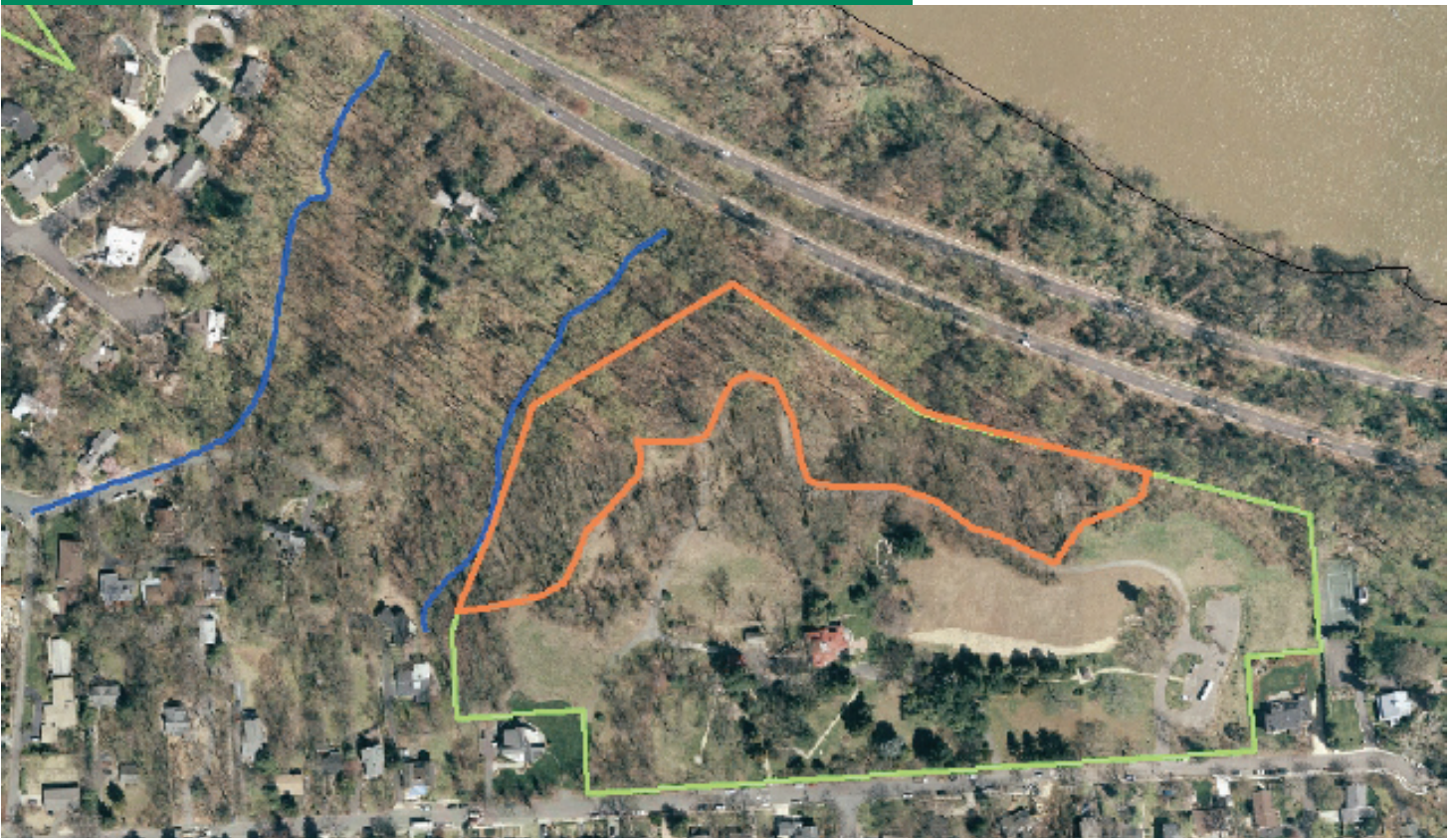
7.5 acres

- 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 (U.S. Route 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
- This is the only significant natural site that is accessible to those with disabilities





Barcroft Park (southwest 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

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- Histories of Arlington Neighborhoods and Civic Organizations.* Arlington County Civic Federation. <http://civfed.org/history.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
- Invasive Plant Program.* Arlington County Department of Parks, Recreation and Cultural Resources. www.arlingtonva.us/Departments/ParksRecreation/scripts/parks/ParksRecreationScriptsParksInvasive.aspx
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Potomac Palisades Task Force – Final Report. August, 1990. Arlington County, Virginia.

PowerPoint Presentation: *Vanishing Flora of Washington and Vicinity: Three Centuries of Botanical Exploration in Alexandria, Virginia.* 888th Meeting of the Botanical Society of Washington – President’s Address. December 10, 2007. Rod Simmons.

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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.

Conservation Easement: Conservation easements are a long-established land protection tool that allows land to continue to be privately owned but restricted to serve and protect the land for the public good. A conservation easement is a legal document voluntarily made between a landowner and a land trust. The easement limits present and future property development rights, e.g. as a farm, forest, open space, and/or natural area, but protects it as well. The easement is legally recorded and bound to the deed of the property permanently. In return for granting a conservation easement, the landowner may be entitled to significant federal, local and state tax benefits. Land trusts hold easements in perpetuity that protect a wide variety of natural and cultural resources, including watershed areas, the setting for historic homes, scenic views, lands adjacent to public parks and game preserves, community lands, and more.

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.).

Geographic Information Systems (GIS): Also known as GIS, Geographic Information System refers to a computer-based set of tools that captures, stores, analyzes and presents data in the form of overlays or data maps. In Arlington County, GIS is routinely utilized by staff for land surveying, urban planning, emergency services, and natural resource management.

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. Invasive and potentially-invasive plants are monitored in Arlington through local field investigation and the review of a number of reference sources, including, but not limited to, DCR’s published list of *Invasive Alien Plant Species of Virginia* (most recent version).

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.

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.

Significant Trees: Individual specimens of trees or



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John White – Herpetology and Photography

Project Wildlife Watch Volunteers

Salamander Search Team Volunteers

Department of Environmental Services – GIS staff

John Dodge, Botanist



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