



## ARLINGTON COUNTY, VIRGINIA

### County Board Agenda Item Meeting of November 13, 2010

**DATE:** November 2, 2010

**SUBJECT:** Adoption of Natural Resources Management Plan

**C. M. RECOMMENDATION:**

Adopt the attached Natural Resources Management Plan (NRMP) for Arlington County as recommended by the Planning Commission as an element of the Public Spaces Master Plan (an element of the County's Comprehensive Plan), to guide the preservation and protection of Arlington County's natural resources, with the following change: delete the Executive Summary chart on pages 1 through 3 of the attached version of the NRMP and replace it with the attached revised Executive Summary chart.

**ISSUES:** Adoption of the Natural Resources Management Plan ("the Plan") will allow Arlington County to move forward with the development of policies and best management practices to ensure the future protection and preservation of natural resources located on County-owned land. The Plan also recommends exploring the development of an environmental review process for projects on private property which seek discretionary County approvals (such as Site Plans, requests for variances, and Special Use Permits) if the projects will occur within 100 feet of a documented, significant natural resource feature on property under easement for protection of natural resources or on property owned and/or managed by Arlington County government, Arlington Public Schools, Northern Virginia Conservation Trust (NVCT), or any other land trust.

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

**BACKGROUND:** Arlington County's Public Spaces Master Plan (adopted in 2005) highlighted the need for a County-wide inventory and database of Arlington's natural resources, and creation

County Manager:

County Attorney:

Staff: Jamie Bartalon, PRCR

32.

of a Natural Resources Management Plan to guide County efforts in the management, preservation and protection of the local natural environment. From 2005 to 2008, County staff conducted and completed the first ever comprehensive inventory of natural resources within the geographical boundaries of Arlington County. The inventory (formally the Natural Heritage Resource Inventory) included extensive field and literature research in the areas of geology, hydrology, flora and fauna. Significant natural resource features were documented and mapped on a series of GIS layers. The Natural Resources Management Plan is a result of the analysis of data collected through the inventory process, review of related scientific literature, and a review of existing County plans and current work processes.

The original draft of the Plan was developed by staff and refined through a series of work sessions with the Natural Resources Management Plan Joint Commission Working Group (“the Working Group”), which consisted of members of the Urban Forestry Commission, Park and Recreation Commission, and Environment and Energy Conservation Commission (E2C2). The original draft was then routed for review and comment to interdepartmental staff. Between January and June of 2010, the principal staff involved made presentations to interdepartmental staff and the general public. A public forum was held on May 27, 2010, for County staff to present the draft Natural Resources Management Plan and receive public comments. Staff also presented the draft Plan to the Long Range Planning Committee of the Planning Commission, the Beautification Committee, and the Planning Commission. A joint letter (attached to this Report) from the Urban Forestry Commission, the Park and Recreation Commission and E2C2 supporting adoption of the Plan was submitted to the Arlington County Board on October 28, 2010.

At the September 28, 2010, meeting of the Arlington County Board, the Board authorized advertisement of the draft Plan and public hearings in October for the adoption of the Plan. The Board also authorized that comments submitted by the Northern Virginia Conservation Trust (NVCT) at the September 28 meeting be advertised along with the Plan. Staff determined that additional time would be needed to undertake interdepartmental and the Working Group’s review of the suggestions offered by NVCT. Therefore, public hearings on the Plan were postponed until the November 1, 2010, meeting of the Planning Commission and the November 13, 2010, meeting of the County Board.

The September 28, 2010, NVCT letter, with follow-up recommendations by County staff and the Working Group, is attached to this Report. County staff and the Working Group support making 3 of the 11 changes to the Plan that were suggested by NVCT in its September 28, 2010, letter. A fourth NVCT-recommended change to the Plan had already been made in the draft Plan that was submitted to the County Board for the September 28, 2010, County Board meeting. The 3 changes to the Plan supported by staff and the Working Group are: 1) adding a footnote to page 14 of the Plan referencing federal tax law that may result in benefits to land owners who voluntarily grant easements on properties containing significant natural resources; 2) including NVCT among a list of organizations that assist Arlington County government with mobilizing volunteers to assist with natural resource-related public education efforts and environmental improvement projects (page 28 of the Plan); and, 3) expanding Appendix 3 of the Plan (Definitions – pages 40 and 41) to include definitions of conservation easements, Geographic

Information Systems (GIS), and inclusion of “Invasive Alien Plant Species of Virginia” as a source for defining non-native invasive plant species.

During the November 1, 2010, meeting of the Planning Commission, the president of NVCT provided testimony that staff and the Working Group’s responses to comments in NVCT’s September 28, 2010 letter represent a workable compromise on the issues raised by NVCT, and urged adoption of the Plan as modified. Two members of the Working Group also testified in support of adoption of the Plan. The Planning Commission voted to recommend that the County Board adopt the Natural Resources Management Plan as an element of the Public Spaces Master Plan, with incorporation of the 3 changes recommended by staff and the Working Group in response to NVCT’s September 28, 2010, letter and described above. The attached version of the Plan incorporates those changes, and is the version recommended by the Planning Commission.

The County Manager recommends modifying the version of the Plan recommended for approval by the Planning Commission by deleting the Executive Summary chart on pages 1 through 3 of the attached Plan, and replacing it with the attached revised Executive Summary chart. The reason for this modification is that predicted timelines and fiscal impacts contained in the original Executive Summary chart are best addressed during the implementation stage.

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

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

The first three recommendations (the adoption of a policy of “Zero-Loss” of natural lands; the establishment of Natural Resource Conservation Areas; and the revision of environmental

assessment processes and tools) in the attached version of the Plan recommended by the Planning Commission highlight the County government's new approach to natural resource management and preservation. The version of the Plan that has been recommended by the Planning Commission does not include policy ideas that directly impact private property. However, Recommendation #3 directs County staff to explore mechanisms for the environmental review of projects on private property seeking discretionary County approval (such as Site Plans, requests for variances, and Special Use Permits) if the projects involve a land disturbance within 100 feet of a documented, significant natural resource located on property under easement for protection of natural resources or on property owned and/or managed by Arlington County government, Arlington Public Schools, Northern Virginia Conservation Trust, or any other land trust.

This Report seeks the Board's adoption of the Plan (attached) as recommended by the Planning Commission on November 1, 2010, with modification of the Executive Summary chart as noted above.

**FISCAL IMPACT:** There are no fiscal impacts at this time. Future development of implementation strategies may result in future fiscal impacts which are unknown at this time. Any fiscal impacts associated with future implementation strategies will be considered during future budget processes.

STAFF AND JOINT COMMISSION WORKING GROUP RESPONSES TO  
COMMENTS ON DRAFT NATURAL RESOURCES MANAGEMENT PLAN  
(NRMP) SUBMITTED BY THE NORTHERN VIRGINIA CONSERVATION TRUST  
(NVCT)

BACKGROUND:

Mr. Michael Nardolilli, President of NVCT, submitted comments on the draft Natural Resources Management Plan (NRMP) to the County Board at its meeting on September 28, 2010. The Board directed staff to review the comments and formulate responses to the eleven suggestions or recommendations proposed. In response to the Board's request, the NVCT comments were distributed to the appropriate County departments (CPHD, DES, PRCR, CAO, CMO) and staff for comments on October 4, 2010. Additionally, comments were obtained from members of the NRMP Joint Commission Working Group, a seven-person group representing the Urban Forestry Commission, the Park and Recreation Commission, and the Environment and Energy Conservation Commission.

The following document is a copy of the September 28, 2010, NVCT comments, with staff responses and comments from the NRMP Joint Commission Working Group inserted directly after each of the eleven NVCT comments.

September 28, 2010

## COMMENTS ON SEPTEMBER DRAFT OF THE NATURAL RESOURCES MANAGEMENT PLAN

By Michael Nardolilli  
President, the Northern Virginia Conservation Trust

### Introduction

As part of its Mission to “save nearby nature,” The Northern Virginia Conservation Trust (NVCT) has permanently protected 36 parcels in Arlington (31 by conservation easement and 5 parcels that are owned by NVCT in fee) totaling 17 acres of land assessed at \$13 million. As part of its obligations as the first accredited land trust in Virginia, NVCT visits all landowners who have placed their properties under easement with NVCT at least once a year. NVCT also provides “hand’s on” advice as well as a “landowner newsletter” to encourage these landowners to be good stewards of their lands. NVCT testified at the May public forum noting a number of concerns with the May Draft of the Natural Resources Management Plan (NRMP). NVCT also submitted written comments on June 3, 2010. NVCT was disappointed to see that the September Draft did not incorporate these suggested changes. Accordingly, NVCT re-states its concerns and adds a few additional ideas that are designed to strengthen the September Draft.

### Comments

1. Add Additional Sentence to Page 14: Insert additional language immediately after the sentence that reads “All properties meet the criteria for natural lands and contain documented significant natural resources” as follows:

*Accordingly, preservation of these properties would be for “conservation purposes” as defined in 26 U.S.C. Section 170(h)(4) and implementing regulations.*

Rationale: This language would encourage private landowners owning such prized natural lands to protect these important resources by placing permanent conservation easements on their land. Adding this language to the draft Plan makes it clear that their property would qualify for both state and federal tax benefits by fitting within the “safe harbor” of a “clearly delineated ...

local governmental conservation policy.” NVCT envisions that the draft Plan will operate in Arlington in much the same way as Fairfax County’s “Environmental Quality Corridors” (EQC) policy helps preserve land in Fairfax County. Designation of a property as an “EQC” area by Fairfax County helped one NVCT easement donor successfully dismiss a challenge to his claimed donation by the IRS.

**Item #1      Staff supports including similar (but modified) language as a footnote within the NRMP, and the NRMP Joint Commission Working Group concurs with Staff.**

Staff Response:

- Staff supports including the following language as a *footnote* at the bottom of page 14 of the NRMP:

*“It is Arlington County government’s intent that preservation of these and other properties with significant natural resources, if placed under voluntary conservation easements by their owners, would be pursuant to a clearly delineated local governmental conservation policy yielding a significant public benefit for the purpose of 26 U.S.C. § 170(h)(4) and related regulations. Arlington County government does not and can not give legal advice, nor should this footnote be considered legal advice or a legal opinion. Landowners are urged to consult their own attorneys before placing their lands under conservation easement.”*

NRMP Joint Commission Working Group Response:

The NRMP Joint Commission Working Group also supports inclusion of this language as a footnote on page 14 of the NRMP. Both Arlington County staff and the Working Group feel that it is important to include a statement making it clear that the proposed statement does not constitute legal advice to property owners on behalf of Arlington County government and that the statement should be reviewed by the County Attorney’s Office and reworded if necessary.

2. Add NVCT to List of Volunteer Groups on Pages 27 & 28.

**Rationale:** NVCT voluntarily allowed Arlington County's Natural Resource Specialist Gregg Zell to visit NVCT-owned lands in Arlington and was pleased to note his comments that NVCT's Beechwood Circle constituted one of the "most pristine" areas in the County and that NVCT's Little Falls Forest contains an almost State Champion Spice Bush. Accordingly, NVCT should be added to those groups who assisted the County in the development of the Inventory (page 27). Similarly, NVCT not only "saves nearby nature" by filling a unique role as the only holder of conservation easements in the County, NVCT also acts aggressively to assist the County in mobilizing volunteers to remove invasive species and plant trees in Arlington County parks and on NVCT protected properties. Accordingly, NVCT should be added to those groups who help mobilize volunteers (page 28).

**Item #2            Staff support this recommendation in part, and the NRMP Joint Commission Working Group concurs with Staff.**

Staff Responses:

- Arlington County utilizes a large number of volunteers annually, including both individuals and organizations. Staff does not object to adding NVCT to the list of volunteer organization listed on page 28.
- Primary field studies for the Natural Heritage Resource Inventory took place from 2005-2008. During that period, a number of organizational partners (listed on page 27) provided significant technical assistance during the inventory process. In response to an e-mail request from Mr. Nardolilli in June, 2010, Mr. Zell spent two hours touring three NVCT-owned properties to provide management advice. Staff does not support adding NVCT to the list of participating partners on page 27 because the scope of NVCT assistance was not comparable to that of groups currently listed on page 27.

NRMP Joint Commission Working Group Response:

- NVCT could be added to the list of volunteer groups (page 28), but should not be added to the list of working partners that assisted with the development of the Natural Heritage Resource Inventory (page 27) because the groups that are currently listed in the NRMP assisted with development of the Inventory over an extended period of time.

3. Add Additional Sentence at the end of Recommendation 2 on Page 12. The following sentence should be added to Recommendation 2:

*The County should place all County-owned Natural Resource Conservation Areas under permanent conservation easement with the Northern Virginia Conservation Trust in order to ensure the permanent protection of these critical resources.*

Rationale: It is well established that one County Board cannot tie the hands of future County Boards. Accordingly, designation of County-owned natural lands as a Natural Resource Conservation Area will not be sufficient to preserve these resources should a future County Board change its mind and remove the designation. On the other hand, placing these critical lands under permanent conservation easement with NVCT will guarantee a “belt-and-suspenders” approach and make sure that these natural lands are permanently protected. NVCT itself followed this approach after purchasing Beechwood Circle in Arlington. NVCT placed this grove of beech trees under easement with the Virginia Outdoors Foundation in order to make sure that this critical resource would be permanently preserved.

**Item #3            Staff does not support this recommendation for multiple reasons, and the NRMP Joint Commission Working Group concurs with Staff.**

Staff Responses:

- Considerable staff research and analysis would need to take place to fully understand the ramifications of placing any, all, or future proposed NRCAs under permanent easement with an external entity. Staff does not support placing all NRCAs under permanent conservation easement as a condition of the NRMP’s adoption by the County Board.
- Proposed NRCAs are all within County-owned and -managed parkland. Proper management of these sensitive areas will require County resources and specialized staff expertise. It is unlikely that NVCT could provide either the resources or expertise necessary.
- Specifically stating in a long-range management plan that is a sub-element of the County’s Comprehensive Plan that a particular organization (in this case NVCT) should be the beneficiary of such easements does not seem appropriate.

NRMP Joint Commission Working Group Responses:

- A decision by the County Board to place some or all County-owned Natural Resource Conservation Areas (NRCAs) under permanent conservation easements should be a process separate from adoption of the NRMP.
- Proposed NRCAs are all within County-owned and -managed parkland. County staff has the expertise to manage these areas according to the recommendations within the NRMP. NVCT probably does not have the same level of in-house expertise as County staff to meet these management objectives.
- An analysis of the costs and benefits associated with placing a particular NRCA under conservation easement can proceed at any time. It does not need to be an

“across the board” recommendation for all NRCAs as part of the NRMP adoption process.

- Specifically stating in a long-range management plan that is a sub-element of the County’s Comprehensive Plan that a particular organization (in this case NVCT) should be the beneficiary of such easements does not seem appropriate.

4. Add a New Recommendation on Page 17. A new recommendation should be added in the section dealing with “Future Water Resource Challenges” as follows:

*The County should develop an aggressive program of educating the general public about the need to control storm water runoff from their properties and providing funding to encourage individual landowners to take all appropriate actions.*

Rationale: Although the draft Plan clearly states the damage to aquatic resources posed by storm-water runoff, no recommendations appear to deal with this problem. Educating and encouraging private landowners to store, soak up, or divert storm water run-off from their lands could have a significant impact on Arlington’s natural resources.

**Item # 4      Staff does not support this recommendation, and the NRMP Joint Commission Working Group concurs with Staff.**

Staff Responses:

- The County’s Department of Environmental Services (DES) currently provides a number of successful educational and outreach programs to address run-off on private properties.
- As stated within the NRMP, DES is currently in the process of developing a Comprehensive Stormwater Management Plan, representing a compilation of the 1996 Stormwater Master Plan and the 2001 Watershed Management Plan. This issue and NVCT’s recommendation should be directed to DES for consideration during the development of the Comprehensive Stormwater Management Plan.

NRMP Joint Commission Working Group Response:

- The NRMP Joint Commission Working Group does not support adding NVCT’s proposed recommendation to the NRMP. The Working Group notes that the Department of Environmental Services (DES) currently has public education programs to reduce stormwater run-off. This recommendation may be appropriate for inclusion in future updates of the County’s Storm Water Master Plan and/or Watershed Management Plan in order to highlight the importance of stormwater run-off reduction outreach efforts.

5. Add a New Recommendation on Page 17. The following new recommendation should be added under "Future Water Resource Challenges:"

*The County should adopt a general policy goal that no more than 40% of the County should be covered with impervious surfaces.*

Rationale: The impact of impervious surfaces on aquatic systems has long been established. See "Impacts of Impervious Cover on Aquatic Systems" (Center for Watershed Protection, March 2003); Arlington County Watershed Management Plan (January 2001). The draft Plan states that almost 40% of Arlington is now covered by impervious surfaces. The County should adopt a policy of assuring a "no net loss" of pervious surfaces in order to protect its streams, the Potomac River and the Chesapeake Bay.

**Item #5            Staff does not support this recommendation, and the NRMP Joint Commission Working Group concurs with Staff.**

Staff Responses:

- This recommendation is far beyond the scope of the Natural Resources Management Plan, which focuses on the preservation of significant natural resources on County government-owned and -managed properties.
- Inclusion of this recommendation would require a major public process to assess impacts to future development, zoning regulations and existing County ordinances.
- Scheduled comprehensive revisions to the State's stormwater management regulations and pending requirements of the Chesapeake Bay cleanup effort will address this issue to the maximum extent of State and Federal legal authority.

NRMP Joint Commission Working Group Response:

The NRMP Joint Commission Working Group does not support adding NVCT's proposed recommendation to the NRMP. The Working Group feels that this recommendation is far beyond the scope of the NRMP and would require a major public process, since it could have significant impacts on future development and Zoning regulations.

6. Add a New Recommendation on Page 22. The following new recommendation should be added in the section dealing with "Invasive Plant Management:"

*The County should seek the designation of English Ivy as a "noxious weed" under Virginia law to control this destructive plant. Alternatively, the County should seek special authority from the Commonwealth to curb the planting and spreading of invasive plants in Arlington.*

Rationale: Several years ago, NVCT and the County tried to get English Ivy designated as a noxious weed by the General Assembly. NVCT's efforts resulted in the suggested legislation falling one vote short of being reported out of Committee in the State Senate. Although this effort failed, the County should renew its efforts to get additional controls on invasive plants, if not throughout the Commonwealth than at least in Arlington County. At a minimum, this should be a part of Arlington's regular legislative package that is sent to Richmond every year.

**Item #6            Staff does not support this recommendation, and the NRMP Joint Commission Working Group concurs with Staff.**

Staff Responses:

- Arlington County may choose to pursue this (or similar) legislation again, however, staff does not consider it appropriate to include this recommendation in the form of a directive within the NRMP.

NRMP Joint Commission Working Group Response:

- The NRMP Joint Commission Working Group does not support adding NVCT's proposed recommendation to the NRMP. The Working Group recognizes that invasive plants pose a serious threat to Arlington's natural areas and that Arlington County may choose to pursue this (or similar) legislation again, but the Working Group does not feel that it is appropriate to include this as a directive within the NRMP. The Working Group also notes that other invasive plants have the potential to cause as much or more damage to the environment, so legislation aimed at English Ivy alone may not be appropriate.

7. Beef Up the Definitional Section.

Rationale: Most County policies and plans contain detailed definitional sections or glossaries to assist the reader in quickly finding the definitions of key terms. The May Draft NRMP lacked a definitional section and NVCT's June 3<sup>rd</sup> Comments requested the addition of such language. While the September Draft includes a definitional section as we requested, the definitional section contains serious shortcomings, e.g., not including a reference to the DCR's list of "Invasive Alien Plant Species of Virginia" in the definition of "Non-Native Invasive Plant Species;" a definition of "GIS," an explanation of "conservation easements," etc.

**Item #7      Staff supports this recommendation with modification, and the NRMP Joint Commission Working Group concurs with Staff.**

Staff Responses:

- A direct reference to DCR’s list of Invasive Alien Plant Species of Virginia was purposely excluded from the general definition of “Non-native Invasive Species” so as to not limit the designation of documented invasive plants locally. However, staff agrees to modify the definition to satisfy the concerns of both staff and NVCT.
- Staff agrees to add definitions for GIS and conservation easements (without direct reference to NVCT).

NRMP Joint Commission Working Group Response:

- The NRMP Joint Commission Working Group supports expanding the definition of “invasive plants” to include a reference to DCR’s list of “Invasive Alien Plant Species of Virginia,” but with the option of identifying additional species as deemed appropriate. The Working Group also supports adding definitions for GIS and conservation easements.

8. Add a New Recommendation on Page 14. The following new recommendation should be added in the section dealing with “Land Acquisition and Conservation Easements” as follows:

*The County should develop a public process whereby private landowners may voluntarily request review of their properties for inclusion in the Natural Heritage Resource Inventory.*

Rationale: Private landowners may possess significant natural resources on their land that are known neither to the landowner nor the County. A public process should be set up that would encourage such interested private landowners to seek review and designation of their lands under the standards of the Natural Heritage Resource Inventory.

**Item #8      Staff does not support this recommendation, and the NRMP Joint Commission Working Group concurs with Staff.**

Staff Responses:

- The addition and implementation of this recommendation could potentially strain available staff resources with public requests to inventory private properties where there may be little potential to find significant natural resources.
- Since NVCT is contracted to provide services to the County specifically regarding land preservation, staff is available to assist in the technical review of any property under serious consideration for a conservation easement.

NRMP Joint Commission Working Group Response:

- The NRMP Joint Commission Working Group does not support adding NVCT's proposed recommendation to the NRMP. The addition and implementation of this recommendation could potentially strain staff resources with public requests to inventory private properties where there may be no significant natural resources. The Working Group recommends exploring the use of volunteers to assist in initial assessments on private property, but that could be done through an independent process and does not need to be specified in NRMP.

9. Add a New Recommendation on Page 11. The following new recommendation should be added at the beginning of the substantive discussion:

*The County should adopt a general policy goal of protecting all of the resources identified in the Natural Heritage Resource Inventory within the confines of existing law and/or develop proposals to add to the County's legislative package to add any new tools deemed necessary to preserve and protect Arlington County's natural resources.*

Rationale: After taking the time, money and energy to identify all of the County's natural heritage resources, the goal of the NRMP should be to try to protect all the resources identified in the inventory within existing law and possible changes in legislation.

**Item #9            Staff does not support this recommendation, and the NRMP Joint Commission Working Group concurs with Staff.**

Staff Response:

- This recommendation is overly broad with unknown impacts to private properties and public property owners other than the County government. The NRMP was intentionally limited to actions affecting resources on County-owned and County-managed property over which the County already has authority.

NRMP Joint Commission Working Group Response:

- The NRMP Joint Commission Working Group does not support adding NVCT's proposed recommendation to the NRMP. They note that the NRMP was intentionally limited to actions affecting resources on County-owned and County-managed property or other public property over which the County government and other public bodies already have authority. Arlington County may choose to pursue new legislation, but the Working Group does not feel that it is appropriate to include it as a directive within the NRMP.

10. Add Language to Recommendation 3 on Page 12. The following additional language should be added to Recommendation 3 (*additional language in italics*):

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 *on County-owned properties, properties held by other governmental entities (such as the Northern Virginia Regional Park Authority), or properties protected by non-governmental entities (such as the Northern Virginia Conservation Trust).*

... Explore expansion of current County review processes to help ensure that land disturbing activities on private property would not adversely impact documented natural resources on County-owned properties, *properties held by other governmental entities (such as the Northern Virginia Regional Park Authority), or properties protected by non-governmental entities (such as the Northern Virginia Conservation Trust).*

Rationale: While the concept of a "natural resource" buffer for County-owned lands is a good one, there is no reason not to extend similar protections to all identified natural resources on other public and quasi-public lands.

**Item #10      This recommendation has already been incorporated into the draft NRMP.**

Staff Response:

- Staff notes that language addressing NVCT's intent in this recommendation has already been added to the NRMP (as noted in the September 28, 2010, Supplemental Report to the County Board).

NRMP Joint Commission Working Group Response:

- The NRMP Joint Commission Working Group notes that language addressing NVCT's intent in this recommendation has already been added to the NRMP (as noted in the September 28, 2010, Supplemental Report to the Arlington County Board).

11. Add Language on Page 14 Defining “Appropriate Follow-up.” Insert additional language immediately after the sentence that reads “Descriptions and GIS data for these properties have been provided to the PRCP Planning Division for appropriate follow-up” as follows:

*Such follow-up shall include the designation of these properties in the County’s Land Acquisition and Preservation Policy as conservation easement opportunities and consultation with NVCT about ways to educate these landowners about the tax benefits of placing these lands under conservation easement.*

Rationale: The current language provides that these future conservation easement opportunities should be “provided to the PRCP Planning Division for appropriate follow-up” without indicating what that “appropriate follow-up” should be. The suggested language provides guidance to the PRCP Planning Division about what is meant by “appropriate follow-up” and is consistent with the overall intent of the NRMP.

**Item #11      Staff does not support this recommendation, and the NRMP Joint Commission Working Group concurs with Staff.**

Staff Response:

- Staff believes that NVCT’s recommendation to apply specific “end actions” to the term “follow-up” within the NRMP is premature and could jeopardize potentially sensitive work currently under development by the Land Acquisition and Preservation Policy sub-committee of the County’s Park and Recreation Commission. In addition to developing new policy, this sub-committee is currently in the process of compiling an expanded list of properties for potential acquisition by Arlington County government. This data must be assessed and ranked prior to determining what actions will follow. In the context of the NRMP, the term “follow-up” refers to the review, analysis, and investigation of information. This recommendation does not rise to the level of inclusion within the NRMP and would be best addressed through direct communication with the Land Acquisition and Preservation sub-committee.

NRMP Joint Commission Working Group Response:

- The NRMP Joint Commission Working Group does not support adding NVCT’s proposed additional language to the NRMP. Working Group members noted that the referenced issue and other related processes are currently under review by the Land Acquisition and Preservation Policy sub-committee of the Park and Recreation Commission.



ARLINGTON COUNTY  
PARK AND RECREATION COMMISSION  
URBAN FORESTRY COMMISSION  
ENVIRONMENT AND ENERGY  
CONSERVATION COMMISSION

October 28, 2010

Honorable Jay Fisette, Chairman  
Arlington County Board  
2100 Clarendon Blvd., Suite 300  
Arlington, VA 22201

Dear Chairman Fisette,

The Park and Recreation Commission, Urban Forestry Commission, and Environment and Energy Conservation Commission join in urging the County Board to adopt the Natural Resources Management Plan (NRMP).

It is very important to preserve Arlington's remaining natural resources, and the plan includes a broad range of measures for doing so. These include: setting priorities for the preservation of natural resources, organizational changes to permit County staff to deal more effectively with these tasks, new planting and maintenance policies for natural areas, greater emphasis on the control of invasive plants, and developing a GIS-based environmental review process.

Implementation of the recommendations in the NRMP will significantly strengthen the ability to preserve natural resources on County property. Measures for preserving natural resources on private property are beyond the scope of this plan but will be included in the Land Acquisition and Preservation Policy.

We commend County staff -- and naturalist Greg Zell in particular -- for their outstanding work in preparing the NRMP. Representatives of the three commissions participated in shaping the final form of plan.

We believe implementation of the Natural Resources Management Plan will enable the County to be more effective in preserving valuable natural resources in the future. On behalf of our respective commissions, we urge the County Board to adopt the plan.

Sincerely,



Eric Sildon,  
Chair, Park and Recreation Commission



Larry Finch  
Chair, Urban Forestry Commission



Shannon Cunniff  
Chair, Environment and Energy Conservation Commission

cc: Barbara Donnellan, County Manager  
Members, Planning Commission

NOVEMBER 2010

# NATURAL RESOURCES

## MANAGEMENT PLAN



  
**ARLINGTON**  
VIRGINIA

DEPARTMENT OF PARKS, RECREATION  
AND CULTURAL RESOURCES



State Champion Post Oak

## NATURAL RESOURCES MANAGEMENT PLAN November 2010

### ARLINGTON COUNTY BOARD

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

Michael Brown, County Manager

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

Caroline Temmermand, Division Chief, Parks and Natural Resources Division

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

Front Cover Photo Credits: John White, Gary Fleming, Greg Zell, and the Arlington County Department of Community Planning, Housing & Development.

Other report photos by Greg Zell, unless otherwise indicated.

Map Credits: Arlington County Department of Environmental Services – GIS Mapping Center.



# NATURAL RESOURCES MANAGEMENT PLAN

## Executive Summary

## Introduction 4

## Arlington's Natural Resources: Past, Present and Future 5

## The Natural Heritage Resource Inventory: Laying the Groundwork 8

## Natural Resources Management and Protection: Discussion and Recommendations 10

### General Natural Resources Management Strategy 11

### Land Acquisition and Conservation Easements 14

### Water Resources 14

### Vegetation and Natural Lands Management 18

### Geological Resources 24

### Wildlife Resources 25

### Resource-Related Park Management Issues 26

### Partners in Cooperative Local Resource Management 27

### Public Education and Outreach 28

## Appendix 1 - Natural Resource Conservation Areas 29

## Appendix 2 - List of Resource References 38

## Appendix 3 - Definitions 40

## Acknowledgements 42



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

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

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

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



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

## INTRODUCTION

Arlington County is required by the Code of Virginia to adopt a Comprehensive Plan to be used as a community-planning tool. The current Comprehensive Plan, 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

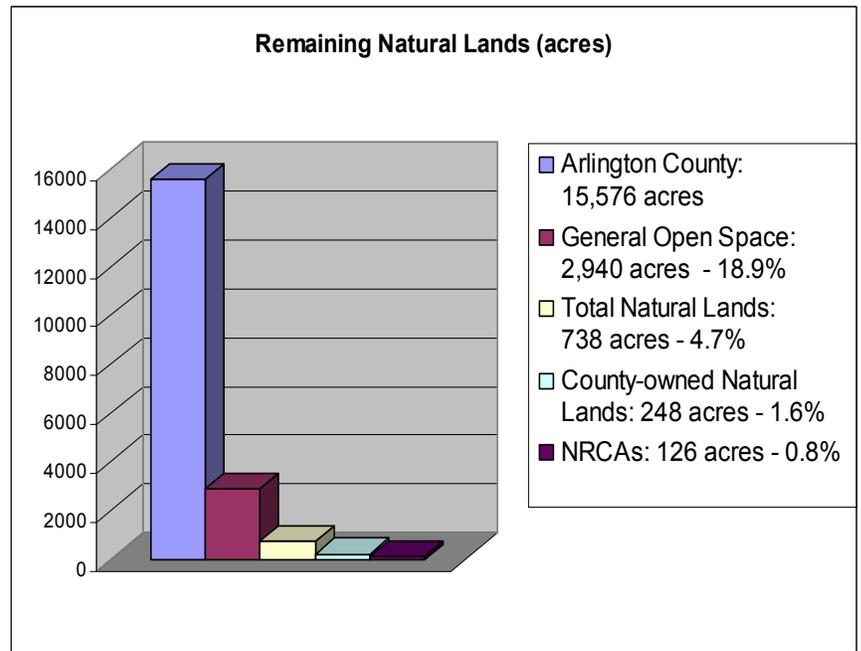
Old Age Oak Forest at Donaldson Run

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](http://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

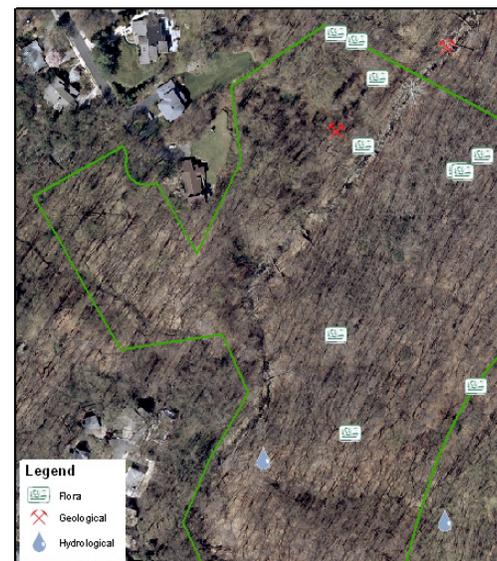
and an updated list of “target” invasive plants rated by threat level has been developed.

### 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.

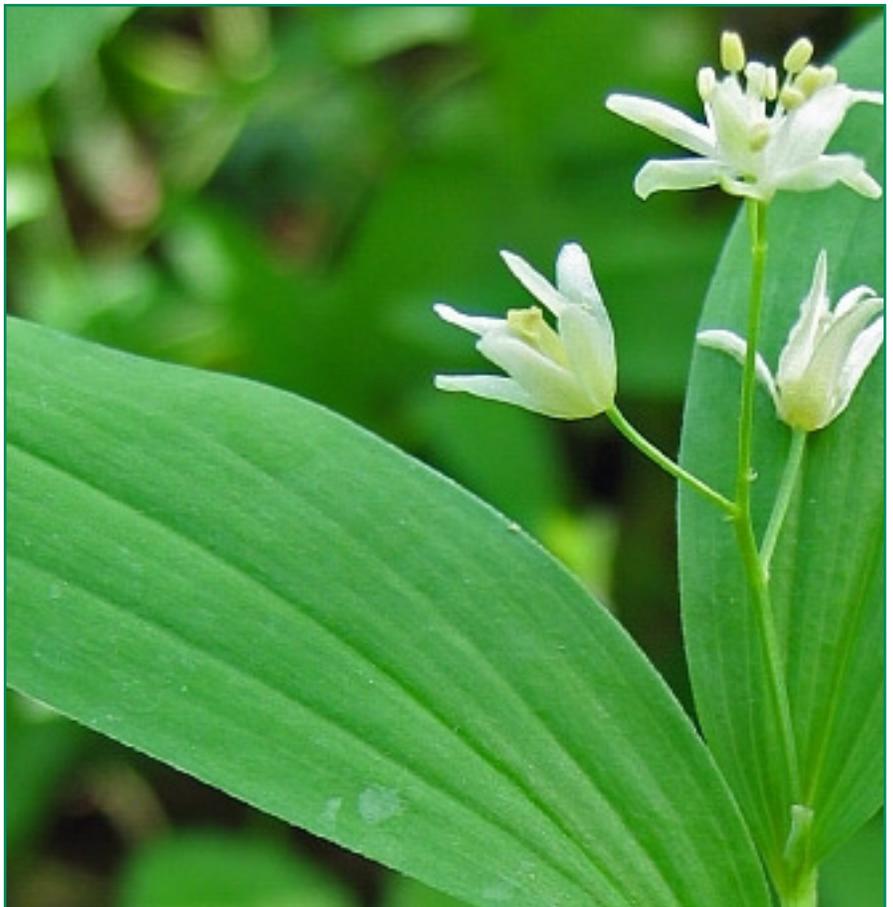
mation to assist and encourage voluntary protection.

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



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

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-

*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-

ation 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.

### **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

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

*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

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 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



Bald Eagles once again nest in Arlington.

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

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

*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

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**

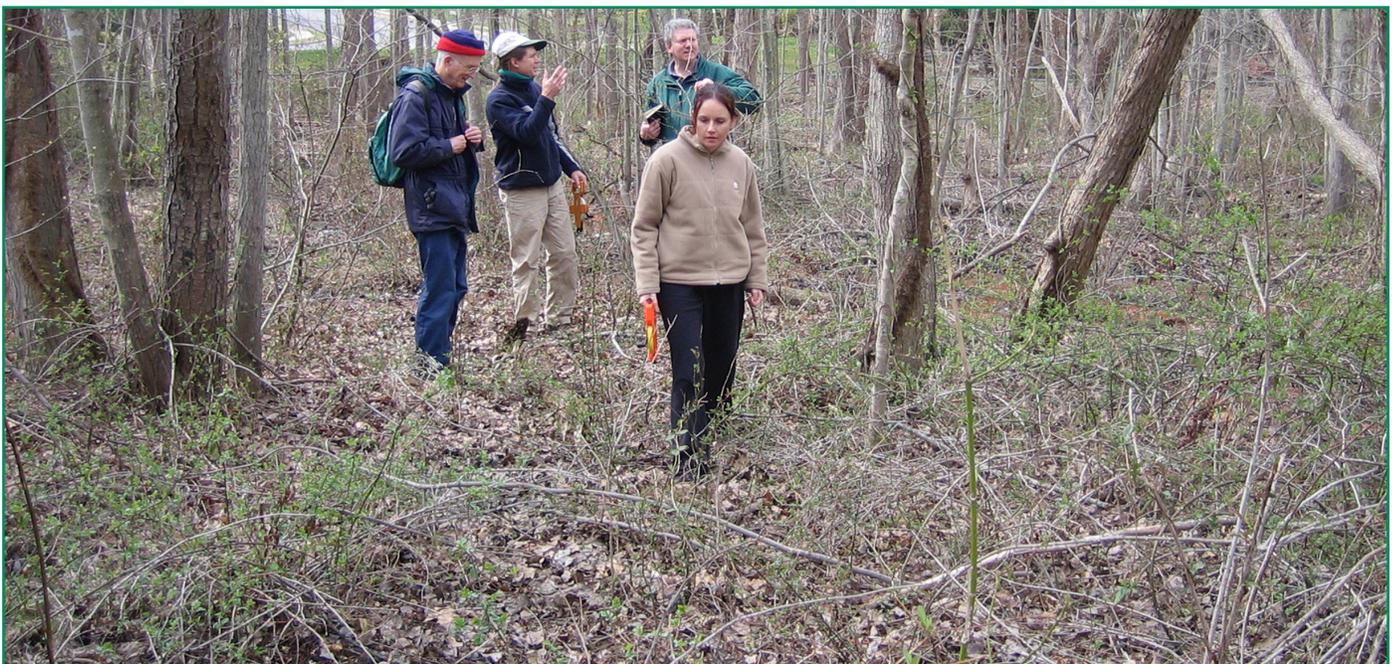
The development of a public policy and management strategy begins the process that will lead to local natural resource conservation and preservation. From the beginning and throughout the process, it will be important to inform, educate, persuade and engage the public in meaningful ways. The many assets 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

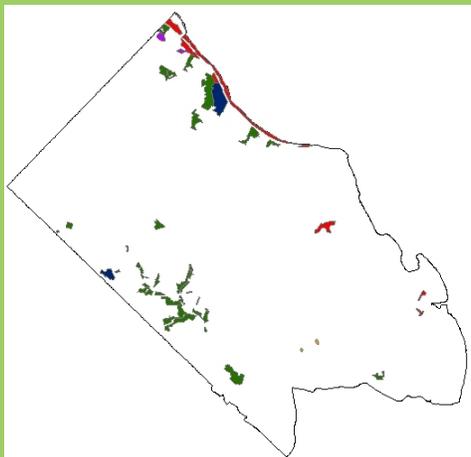
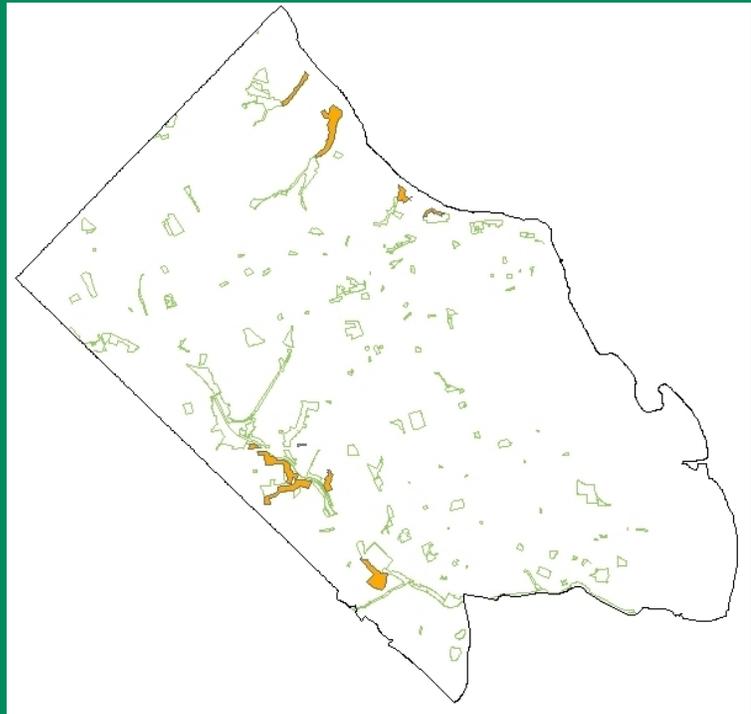
lands remaining on County property. Each park or section of park is shown below by map, with significant natural features listed. Preservation of these natural sites through conservation management is considered a critical element of this Natural Resources Management Plan.

### 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



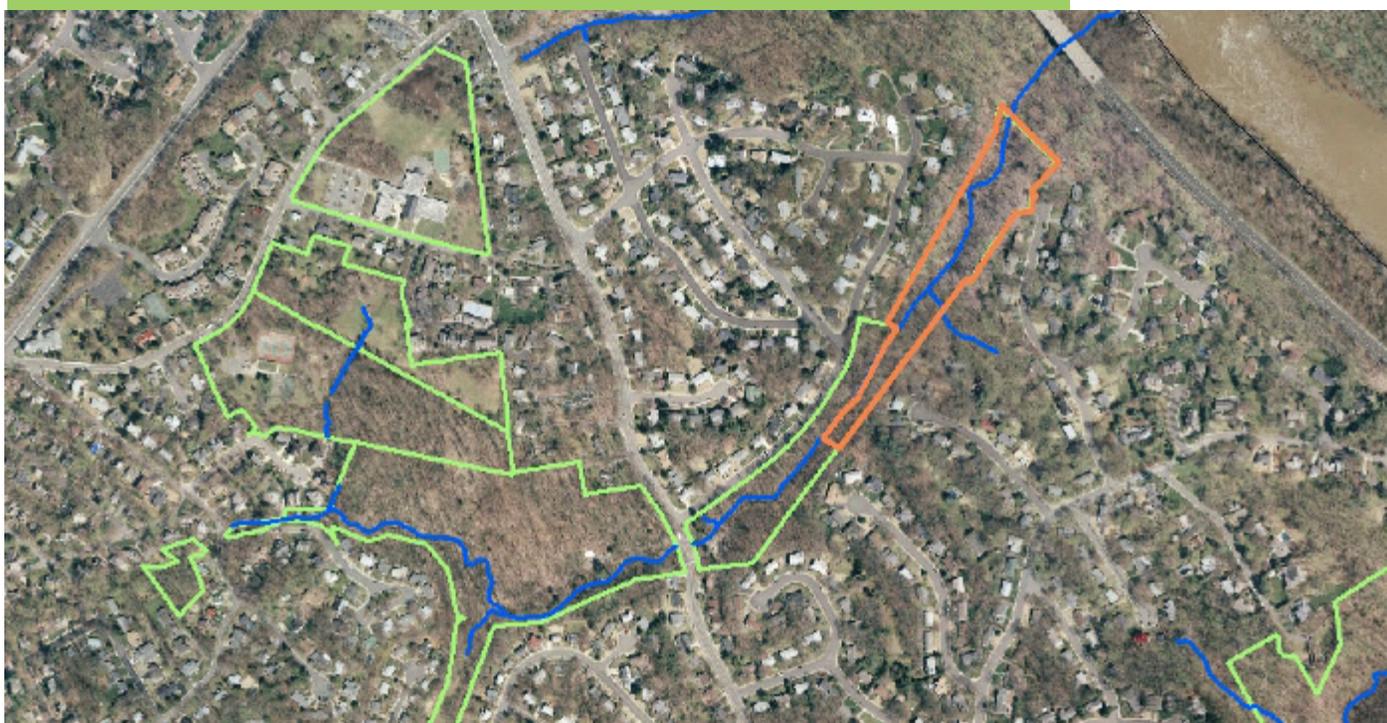
### *Did you know?*

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

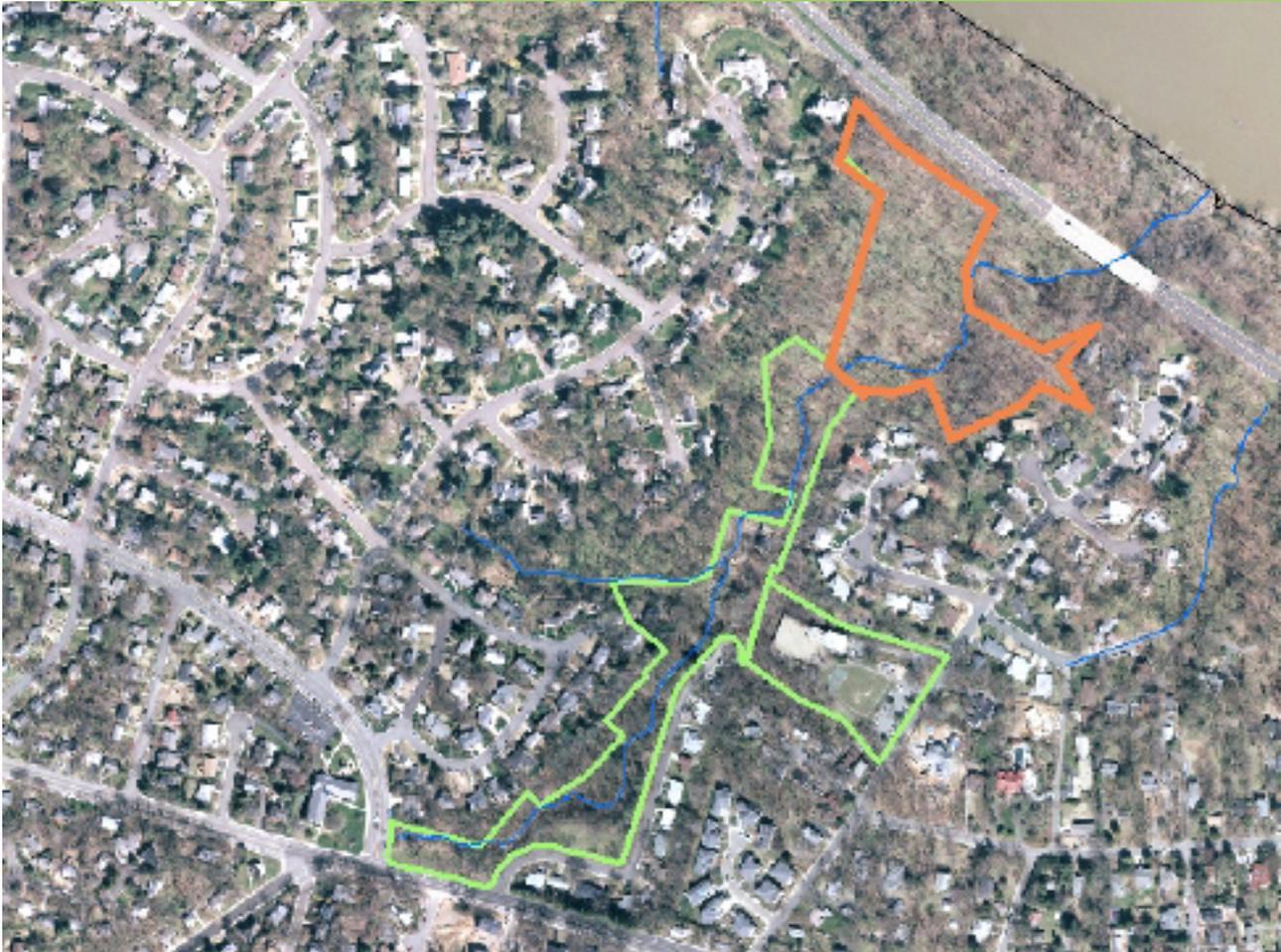
**30.22 acres**

- 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

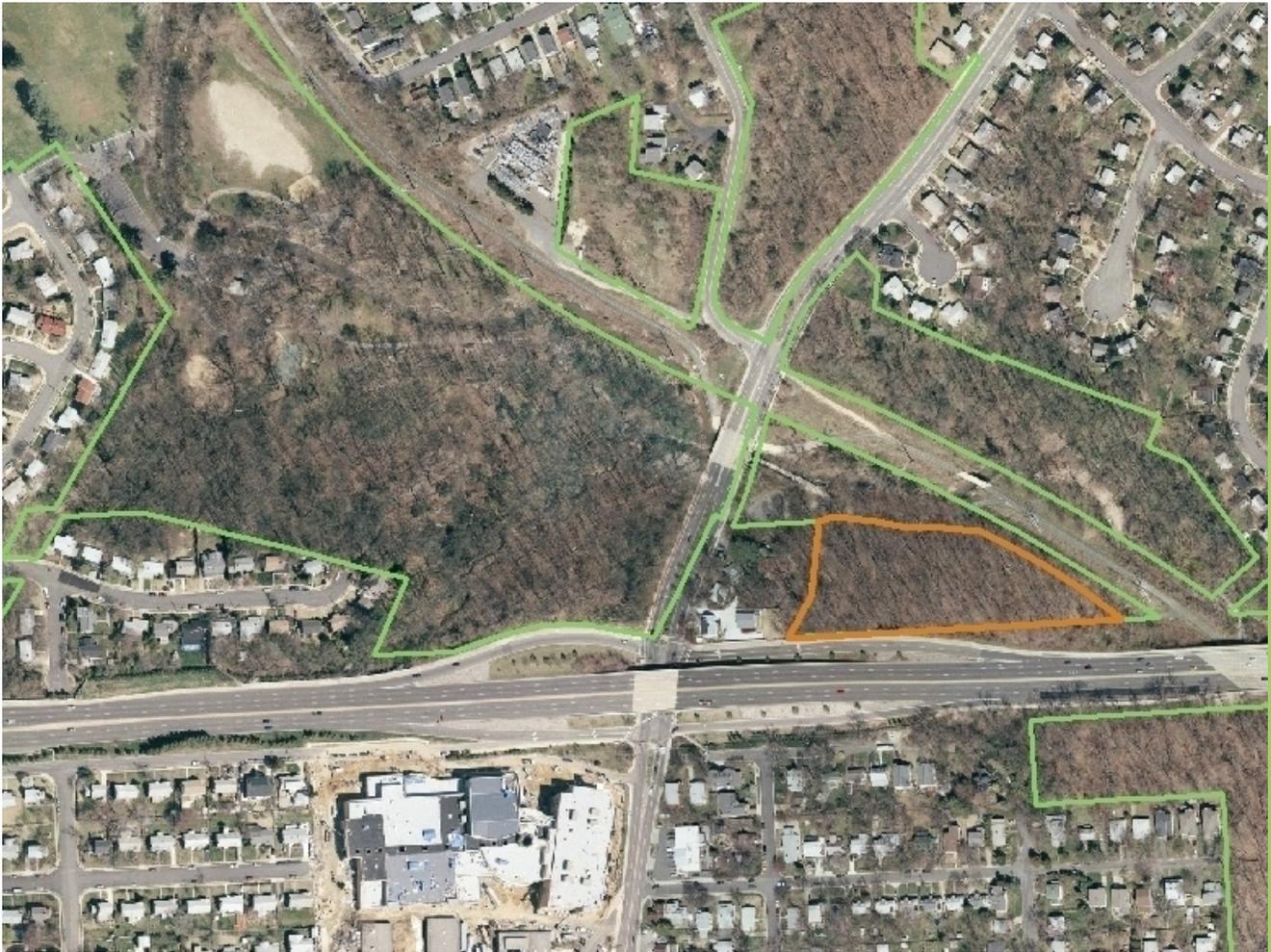


## Fort C.F. Smith Park

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

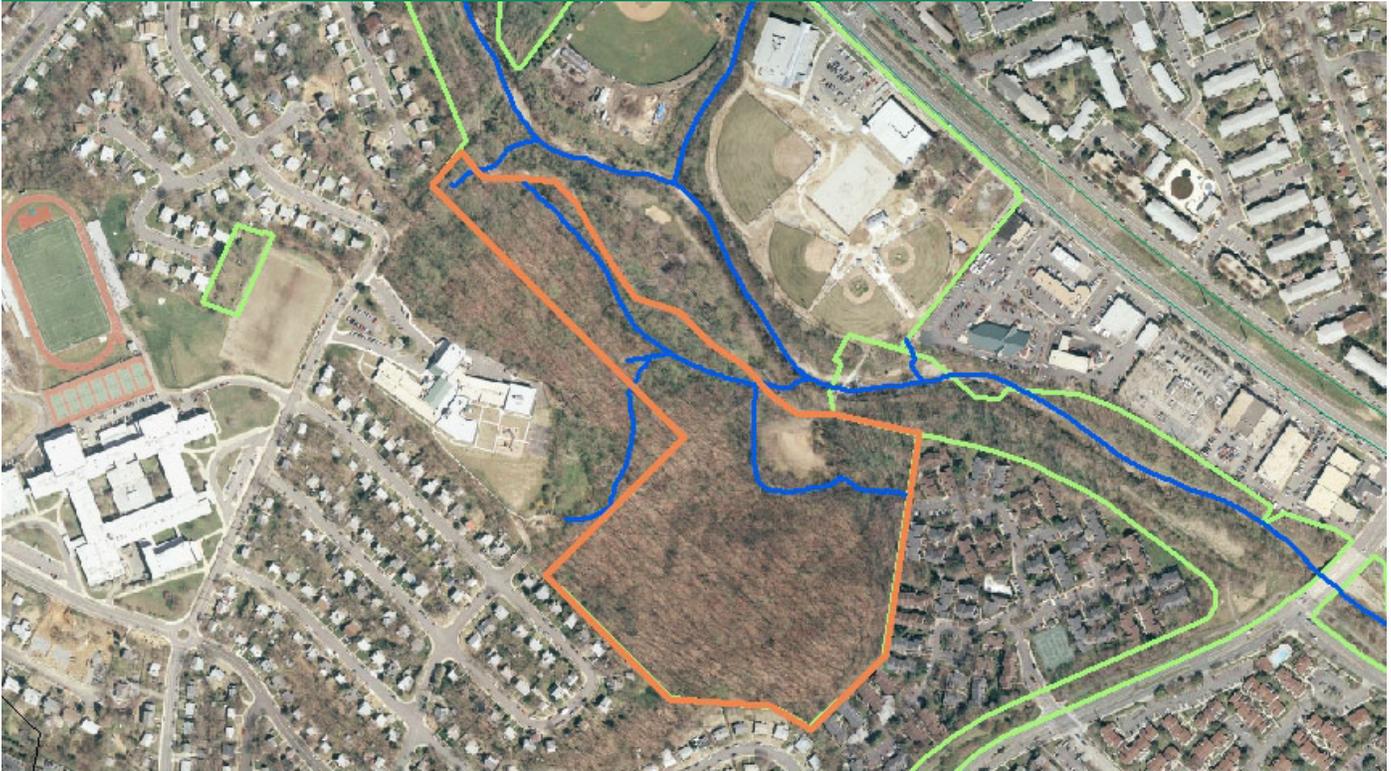


## Arlington Forest Park

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

- A Century of Change in the Flora and Vegetation of an Urban Area – Arlington County, Virginia.* 1998. Allison N. Wack. Smithsonian Institution Research Training Program.
- A Sketch of the Natural History of the District of Columbia.* Bulletin of the Biological Society of Washington No. 1. May, 1918. W. L. McAtee. Washington, D. C.
- Arlington County Chesapeake Bay Preservation Ordinance Interim Guidance Manual – Version 2.0.* Department of Environmental Services / Department of Public Works. August 2003. Arlington County, Virginia.
- Arlington County in Virginia: A Pictorial History.* 1987. Nan and Ross Netherton. The Donning Company / Publishers.
- Arlington County Riverfront Inventory and Analysis.* July 1993. Department of Parks, Recreation and Community Resources and Department of Community Planning, Housing and Development. Arlington County, Virginia.
- Arlington County Tree and Shrub Ordinance (Chapter 67).* Arlington County, Virginia. [www.arlingtonva.us/departments/ParksRecreation/scripts/parks/ParksRecreationScriptsParksTreesOrdinance.aspx](http://www.arlingtonva.us/departments/ParksRecreation/scripts/parks/ParksRecreationScriptsParksTreesOrdinance.aspx)
- Arlington Heritage – Vignettes of a Virginia County.* 1959. Eleanor Lee Templeman. Avenel Books. New York.
- Arlington House – The Robert E. Lee Memorial / Cultural Landscape Report / History / Volume 1.* 2001. USDI, NPS. Washington, D.C.
- Arlington, Virginia Profile 2009.* Department of Community Planning, Housing and Development. Arlington County, Virginia.
- Atlas of the Virginia Flora III.* Harvill, et al. 1992. Virginia Botanical Associates. Rt. 1, Box 63. Burkeville, Virginia 23922.
- Barcroft Bog Management Plan* (unpublished). Greg Zell. June 11, 2004. Department of Parks, Recreation and Community Resources. Arlington, Virginia.
- Chesapeake Bay Preservation Ordinance* (Section 61). February 8, 2003. Arlington County, Virginia.
- Chesapeake Bay Preservation Plan.* Department of Environmental Services. Environmental Planning Office. April 21, 2001. Arlington County, Virginia.
- Draft Final Report: A Natural Resource Inventory of the G. W. Parkway, Roaches Run and Arlington Woods* (unpublished). August 25, 2008. Greg Zell. Arlington County, Virginia.
- Fiscal Year 2006 Annual Report, VPDES Permit No. VA0088579.* September 30, 2006. Arlington County, Virginia.
- Four Mile Run Restoration Master Plan.* Northern Virginia Regional Commission. March 2006. Prepared for Arlington County and City of Alexandria, Virginia.
- Geological Features Inventory of Arlington County – Project Summary.* Tony Fleming. December 30, 2006. NHRI Project (unpublished report). Arlington County, Virginia.
- Histories of Arlington Neighborhoods and Civic Organizations.* Arlington County Civic Federation. <http://civfed.org/historys.htm>
- Images of Arlington.* 2000. Arlington Historical Society.
- Invasive Alien Plant Species of Virginia.* Virginia Department of Conservation and Recreation and Virginia Native Plant Society. [www.dcr.state.us/dnh/pdflist.htm](http://www.dcr.state.us/dnh/pdflist.htm)
- Invasive Plant Program.* Arlington County Department of Parks, Recreation and Cultural Resources. [www.arlingtonva.us/Departments/ParksRecreation/scripts/parks/ParksRecreationScriptsParksInvasive.aspx](http://www.arlingtonva.us/Departments/ParksRecreation/scripts/parks/ParksRecreationScriptsParksInvasive.aspx)
- Invasive Species Program – Draft Report.* Jan Ferrigan. August 2002. Virginia Cooperative Extension and Arlington County Department of Parks, Recreation

and Community Resources. Arlington County, Virginia,

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

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

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

*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.* 888<sup>th</sup> Meeting of the Botanical Society of Washington – President’s Address. December 10, 2007. Rod Simmons.

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

*Regional BMPs in the Four Mile Run Watershed – A Feasibility Investigation.* Don Wayne. November 1, 1993. Northern Virginia Planning District Commission. Annandale, Virginia.

*Report of the Task Force on The Physical Environment.* November, 1986. Submitted to the Commission on Arlington’s Future. Arlington County, Virginia.

*Simplified Geologic Map of Arlington County, Virginia and Vicinity.* Department of Environmental Services, Arlington County, Virginia. Compiled by William Frost and Timothy Ernest. 1999. Updated by Nicholas Jackson, 2006. Arlington County, Virginia.

*The Natural Communities of Virginia, 2<sup>nd</sup> Approximation.* Virginia Department of Conservation and Recreation. [www.dcr.virginia.gov/natural\\_heritage/nchome.shtml](http://www.dcr.virginia.gov/natural_heritage/nchome.shtml)

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

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

*Watershed Management Plan.* Jason Papacosmo. Department of Environmental Services. Environmental Planning Office. January 2001. Arlington County, Virginia.



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



## **ACKNOWLEDGEMENTS**

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

Rod Simmons, Botanist

John Parrish, Contract Botanist

Mark Strong, Botanist Smithsonian Institution,  
Department of Botany

Christopher Frye, Maryland State Botanist MD.  
Department of Natural Resources

Johnny Townsend, Botanist VA. DCR –  
Natural Heritage Program

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

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

Stephen Van Hoven, Arborist DOD –  
Arlington National Cemetery

Anthony Fleming, Geologist

Anthony Bulmer, Naturalist – Small mammals

Andy Rabin and Kevin Munroe – Odonate surveys

Alonso Abugattas, PRCR – Lepidoptera surveys

David Farner, PRCR – Avifauna research

Meghan Tice – Data Management

John White – Herpetology and Photography

Project Wildlife Watch Volunteers

Salamander Search Team Volunteers

Department of Environmental Services – GIS staff

John Dodge, Botanist



DEPARTMENT OF PARKS, RECREATION  
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

<b>8</b>	Develop a strategy for the protection and preservation of seeps, springs and first-order streams found on Arlington County-owned parkland or open space.	Priority 2
<b>9</b>	Develop a clear objective-based methodology and process for the management of streams, artificial wetlands and ponds located on Arlington County-owned open space.	Priority 2
<b>10</b>	Amend Chapter VI of the <i>Urban Forest Master Plan</i> to reflect policy changes in forest management practices for natural lands.	Priority 2
<b>11</b>	Promote the use of native plant species in County-sponsored plantings and enhance the ability to procure local ecotype plant stock.	Priority 3
<b>12</b>	Within Natural Resource Conservation Areas restrict, to the maximum extent practicable, all vegetation plantings to those included in objective-based restoration plans reviewed or developed by the Natural Resources Management Unit.	Priority 2
<b>13</b>	Develop a new long-term, objective-based invasive plant removal strategy combining volunteers, County staff and contractual services in order to maximize efforts and environmental benefit to Arlington's natural resources. Seek Capital Improvement Project (CIP) funding to support large-scale invasive plant removal and natural land restoration and preservation efforts.	Priority 2
<b>14</b>	Clarify the roles and responsibilities of County departments in relation to invasive plant control efforts to identify leadership and foster cooperation.	Priority 3
<b>15</b>	Include an invasive plant monitoring and maintenance component in the design of all future stream restoration projects (DES), new trail side "no-mow and grow" zones (PRCR) and riparian buffer restoration and plantings (DES/PRCR).	Priority 3
<b>16</b>	Inventory and prepare an analysis of existing riparian zones on County-managed open space in order to assess the feasibility of reestablishing natural vegetation along stream corridors in the future.	Priority 3
<b>17</b>	Initiate the formation of a local inter-jurisdictional Natural Resources Working Group for the purpose of strengthening existing partnerships and developing new cooperative working relationships.	Priority 2
<b>18</b>	Establish a Natural Resources Advisory Group to enable Board-appointed advisory commissions to advise more effectively on natural resource issues.	Priority 3
<b>19</b>	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.