CONSERVATION PLANNING FOR THE MANAGEMENT AND PROTECTION OF NATURAL AREAS IN THE CITY OF VIRGINIA BEACH, VIRGINIA

FINAL REPORT

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Virginia Department of Environmental Quality
Coastal Resource Management Program

Virginia Department of Conservation and Recreation
Division of Natural Heritage

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SUMMARY

The Virginia Natural Area Preserves Act defines **natural areas** as "any area of land, water, or both...which is important in preserving rare or vanishing flora, fauna, native ecological systems, geological, natural historical, scenic, or other similar feature...of the Commonwealth" (Section 10.1-209, Code of Virginia). Natural heritage resources are defined as "the habitat of rare, threatened, or endangered plant and animal species, rare or state significant natural communities or geologic sites, and similar features of scientific interest" (Section 10.1-209, Code of Virginia). The Virginia Department of Conservation and Recreation administers the Virginia Natural Area Preserves Act through its Division of Natural Heritage.

In 1992, the City of Virginia Beach received a grant from the Coastal Resources Management Program of the Virginia Department of Environmental Quality to conduct conservation planning for natural areas identified through the natural areas inventory of the City of Virginia Beach. The goal of the conservation planning project was to provide comprehensive and refined information to guide the conservation of Virginia Beach's natural areas. The City worked cooperatively with the Virginia Department of Conservation and Recreation to undertake this conservation planing project.

During this conservation planning project, additional data regarding each site's natural heritage resources, threats, and ownership were collected. By combining the new data with existing knowledge from the inventory project, the following information was provided for each of seven natural areas through this project:

- primary and secondary ecological boundaries for each natural area;
- descriptions of the natural heritage resources of each site;
- information regarding the current status, use, ownership, and zoning of each natural area;
- considerations for the recreational, scenic, and educational value of the sites; and
- guidelines on options that the City can use to protect its natural areas.

The purpose of this information is to facilitate well-informed planning and wise land use decisions by the City. The information is also intended to help guide the City in its own endeavors to actively protect the natural diversity within its jurisdiction. The report can be further utilized to increase awareness of local officials and residents of regional biodiversity issues, guide environmental review of projects which may affect the natural areas, and to assist local conservation organizations in their land protection and environmental education efforts.

INTRODUCTION

In 1989, the Virginia Department of Conservation and Recreation, Division of Natural Heritage, was contracted by the City of Virginia Beach to begin work on a three-year natural areas inventory. The project was supported for year one in its entirety by the City. Years two and three of the project were supported through Coastal Zone Management grants from the National Oceanic and Atmospheric Administration, with matching funds provided by the City. The grants were administered by the Coastal Resources Management Program of the Virginia Department of Environmental Quality (formerly the Virginia Council on the Environment). The goal of the inventory was to systematically identify the region's best remaining natural areas, wetlands and rare species sites. Twenty-three significant natural areas were documented in this study, and combined into eighteen natural areas for management and identification purposes. The final report for the natural areas inventory was completed in 1993 (Clampitt, et. al.).

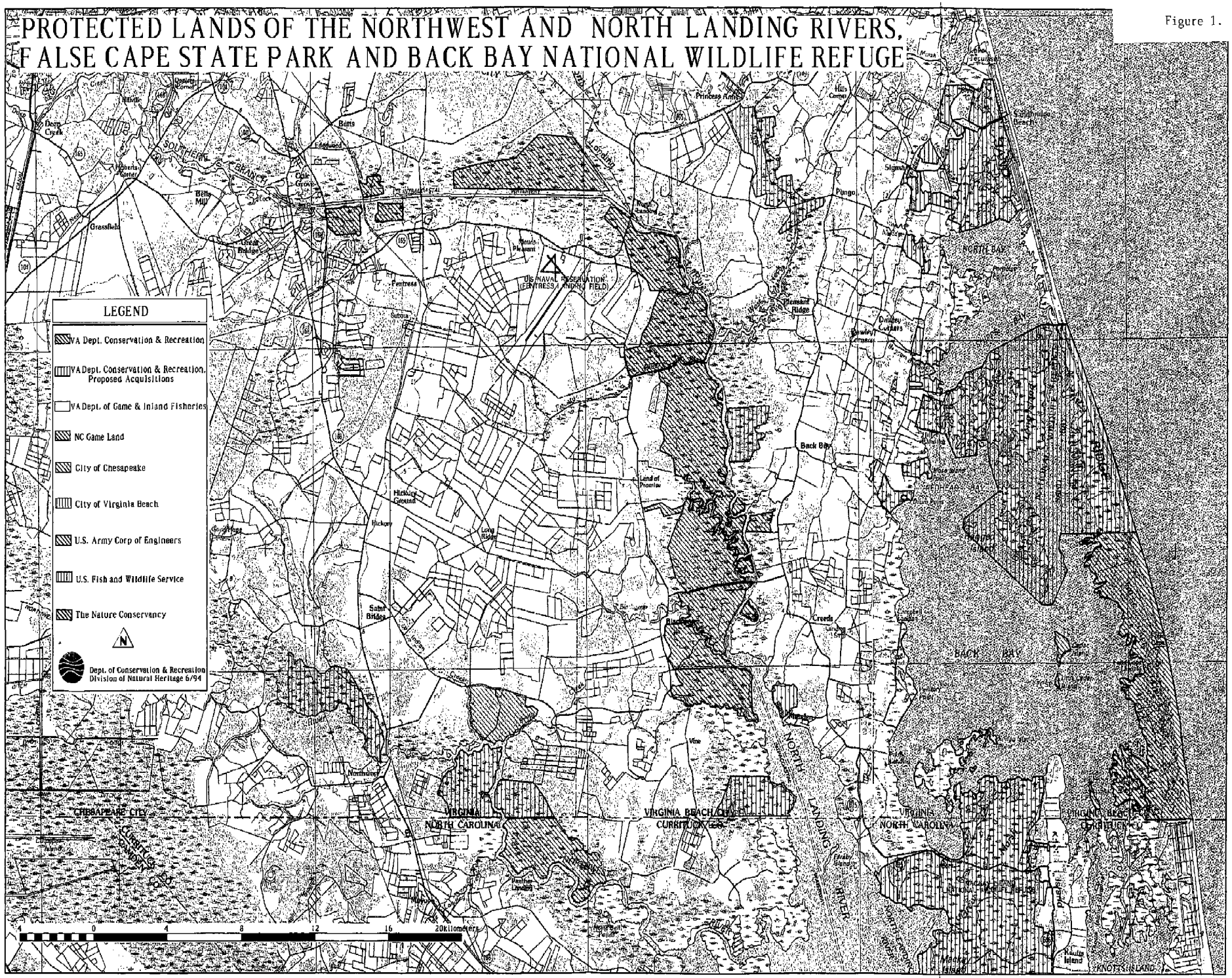
In 1993, the City of Virginia Beach received a grant from the Coastal Resources Management Program to complete a conservation planning project for natural areas identified in the inventory. Matching funds were provided by the City, with the conservation planning work to be undertaken in cooperation with the Department of Conservation and Recreation, Division of Natural Heritage. Of the original eighteen natural areas identified in the natural areas inventory, eleven were chosen as priorities for conservation planning and landowner contact, based upon their biodiversity significance and ownership status. This report relates the methods, results, and conclusions from the conservation planning effort for seven of these eleven natural areas in Virginia Beach. The other four priority natural areas are undergoing final study and will be included in a supplement to this final report to be completed later this year. The remaining seven areas were not chosen due to being combined into the eleven priority areas for management planning purposes, being located on federal or state properties, or due to the relatively lower biodiversity significance evidenced at these areas.

The seven natural areas presented in this report comprise some of the most significant natural areas within the City of Virginia Beach. The purpose of the conservation planning project is to provide comprehensive information to guide the management and protection for these significant natural areas. Individual objectives for this conservation planning project include the development of natural area protection boundaries, natural area management and protection strategies, the implementation of a natural area landowner contact and education program, and site protection for these high priority natural areas.

Numerous natural areas have been acquired for protection in the City of Virginia Beach, both prior to and as a direct result of the natural areas inventory. Figure 1 gives identifies the locations and landowners of these protected lands.

Figure 1.

PROTECTED LANDS OF THE NORTHWEST AND NORTH LANDING RIVERS, FALSE CAPE STATE PARK AND BACK BAY NATIONAL WILDLIFE REFUGE



OVERVIEW OF THE DEPARTMENT OF CONSERVATION AND RECREATION - DIVISION OF NATURAL HERITAGE

The Virginia Natural Area Preserves Act of 1989 (Section 10.1-209 et. seq., Code of Virginia) directs the Virginia Department of Conservation and Recreation to "preserve the natural diversity of biological resources of the Commonwealth." The Act further establishes the Virginia Natural Heritage Program and requires the Department to develop a **natural heritage plan**, produce an **inventory** of the Commonwealth's **natural heritage resources**, maintain a **natural heritage data bank** of inventory data, and provide for the **protection and stewardship** of natural areas. The Virginia Department of Conservation and Recreation administers the Virginia Natural Area Preserves Act through its Division of Natural Heritage. The Department of Conservation and Recreation, Division of Natural Heritage is the Commonwealth's principal collector and manager of information on natural heritage resources and performs a variety of protection and stewardship tasks for priority natural areas and natural heritage resources throughout the state. **Natural heritage resources** are defined as "the habitat of rare, threatened, or endangered plant and animal species, rare or state significant natural communities or geologic sites, and similar features of scientific interest" (Section 10.1-209, Code of Virginia). The Virginia Natural Area Preserves Act defines **natural area** as "any area of land, water, or both...which is important in preserving rare or vanishing flora, fauna, native ecological systems, geological, natural historical, scenic, or other similar feature...of the Commonwealth" (Section 10.1-209, Code of Virginia).

Each natural heritage resource is assigned a rank that indicates its relative rarity on a five-point scale (1 = extremely rare, 5 = common) or otherwise indicates the status of the species with letters (e.g., X = apparently extirpated). Table 1 defines each rank in detail. Each natural heritage resource receives two ranks. One rank indicates the resource's rarity throughout its entire range (the global or "G" rank) and the other indicates the resource's rarity within Virginia (the state or "S" rank). For example, mountain camellia is ranked as G4/S2 indicating the species is uncommon throughout its range and very rare in Virginia.

The primary criterion for ranking natural heritage resources is the number of occurrences, that is the number of known distinct locations containing that resource. Also of great importance to the ranking process is the number of individuals at each location or, for highly mobile organisms, the total number of individuals. Other considerations include the condition of the occurrences, the number of protected occurrences, and threats. Although all species protected under state or federal endangered species laws are rare, not all rare species are listed as endangered or threatened. Natural heritage rarity ranks should not be interpreted as legal designations, but as indices of known biological rarity.

In addition to ranking each natural heritage resource in terms of rarity, Department of Conservation and Recreation scientists also rank each location or occurrence of natural heritage resources in Virginia on a four-point scale (A = excellent, D = poor), so that protection efforts can be aimed not only at the rarest natural heritage resources, but at the best examples of each. In the case of species, an occurrence of a natural heritage resource is ranked according to its

TABLE 1 - DEFINITION OF NATURAL HERITAGE RARITY RANKS

State rarity ranks are defined below; global rarity ranks are similar, but refer to a species rarity throughout its entire range. State and global ranks are denoted, respectively, with an "S" and a "G" followed by a character. Note that GA and GN are not used and GX means extinct. These ranks should not be interpreted as legal designations.

S1	extremely rare; usually five or fewer occurrences in the state or may be few remaining individuals; often very vulnerable to extirpation
S2	very rare; usually between five and twenty occurrences or with many individuals in fewer occurrences, often susceptible to becoming extirpated
S3	rare to uncommon; usually between twenty and one hundred occurrences; may have fewer occurrences, but with many large number of individuals in some populations; may be vulnerable to large-scale disturbances
S4	uncommon to common; usually more than one hundred occurrences, but may be fewer occurrences with many large populations; may be restricted to only a portion of the state; not usually vulnerable to immediate threats
S5	very common; demonstrably secure under present conditions
SA	accidental in the state
SH	historically known from the state, but not verified for an extended period (usually fifteen or more years); this rank is used primarily when inventory has been attempted recently
SN	regularly occurring migrants, transients, or non-breeding seasonal residents; usually no specific site can be identified with its range in the state; note that congregation and staging areas are monitored separately
SU	status uncertain; often because of low search effort or cryptic nature of the resource
SX	apparently extirpated from the state

quality (size and vigor of population, etc.), **condition** (natural quality of habitat, etc.), **viability** (the likelihood of long-term survival of resource), and **defensibility** (level of difficulty of protecting the resource). Given the intimate relationship between a natural community and its environment, occurrences of rare or exemplary natural communities are ranked in terms of their **quality** and **size**.

One of the many ways that the Department of Conservation and Recreation, Division of Natural Heritage uses the ranks of natural heritage resources and their locations is to assess the biodiversity significance of natural areas, which may include only one natural heritage resource or may harbor many. Based upon the ranks, each site is assigned a biodiversity (or "B") rank on the following five-point scale:

B1 outstanding significance, only known site for a natural heritage resource or an excellent occurrence of a G1 species

B2 very high significance, the best example of any natural community type, a good occurrence of a G1 species, or an excellent occurrence of a G2 or G3 species

B3 high significance, excellent example of any natural community type, a good occurrence of a G3 species

B4 moderate significance, a good example of a rare natural community type, a fair occurrence of a G3 species, an excellent or good occurrence of a S1 or S2 species

B5 general significance, fair to poor occurrence of a rare natural community, an S1 species, or S2 species, an excellent or good occurrence of a S3 species

Natural areas which harbor many natural heritage resources may have their B rank upgraded to a level higher than that which would be indicated by the presence of any one of the resources. For example, a site containing good occurrences of four different G3 species would be ranked B2, rather than B3.

REVIEW OF NATURAL AREAS INVENTORY

The goal City of Virginia Beach natural areas inventory conducted from 1989 to 1993 was to systematically identify the best remaining natural areas of the City. The natural areas inventory was conducted in six steps:

1- review aerial photographs;
2- gather existing information;
3- conduct aerial reconnaissance of potential natural areas;
4- perform an initial ground survey;
5- complete a thorough biological survey of each potential natural area; and

6- compile the results and prepare a final report.

At the completion of the natural areas inventory, the Department of Conservation and Recreation, Division of Natural Heritage had records of 20 rare vertebrate species (7 birds, 5 mammals, 4 reptiles, 2 amphibians, 2 fish), 39 rare invertebrate species, 82 rare plant species, and 2 rare mosses from the City of Virginia Beach. Nineteen natural communities of statewide significance were also identified. These findings rank the City first in terms of biodiversity significance of all localities in the Commonwealth located east of the Blue Ridge geological province.

Thirty-four potential natural areas were identified during the early phase of the Virginia Beach inventory. Further investigation determined that of these, 23 ecologically significant potential natural areas were documented and found to support natural heritage resources. The sites were prioritized according to their biological significance, described in detail, and mapped. Eight of the potential natural areas have been altered or heavily disturbed and are unlikely to support any rare, threatened, or endangered species or significant natural habitats. The remaining 3 potential natural areas were of low priority and were omitted from the inventory because of difficulty of access. While these 11 areas have an extremely low potential for supporting natural heritage resources, they may be important to the City for other reasons, e.g., buffering water courses from upland developments or as open space and greenways. In reviewing the results of the inventory, several of the potential natural areas were merged to form 18 natural areas, which ranged in size from 50 acres to over 4000 acres. Twelve of the 18 natural areas are of statewide significance (i.e., ranked B4 or higher). During this inventory, Department of Conservation and Recreation scientists developed preliminary conservation planning boundaries for these 18 sites. In developing these boundaries, the scientists considered a number of factors, including habitat for rare species, protection of water quality, and buffers from adjacent land uses.

In addition to the 18 natural areas identified in the inventory, 14 other natural areas were identified previously by the Department of Conservation and Recreation, Division of Natural Heritage, within the City of Virginia Beach. These areas were identified during inventories of state and federal lands. Together, these comprise a grand total of 32 natural areas located within the City of Virginia Beach.

The preliminary conservation planning boundaries for the 18 identified natural areas were intended to be used to support wise planning and decision-making for the conservation of the natural areas. In the final report on the inventory project, the Department of Conservation and Recreation, Division of Natural Heritage encouraged the City of Virginia Beach to take the following actions to protect these sites:

1- Participate fully in the development of local protection tools;

2- Properly manage natural areas within the City of Virginia Beach;

3- Include the Division of Natural Heritage in the review of projects in or near natural areas;

4- Promote strategies for increasing tourism that utilizes the City's natural areas in a compatible manner;

5- Expand public awareness of the need for protecting and managing natural areas; and

6- Increase cooperation among pertinent organizations.

Further information regarding the inventory project can be found in An Inventory for Southeast Virginia's Critical Natural Areas, Exemplary Wetlands, and Endangered Species Habitats Natural Heritage Technical Report #93 - 13 (Rawinski and Fleming, 1993), and in A Natural Areas Inventory of the City of Virginia Beach, Virginia Natural Heritage Technical Report #93-14 (Clampitt et. al., 1993). A listing of the other inventory projects conducted on state and federal lands within the City of Virginia Beach is contained in the literature citations and pertinent references section this report.

CONSERVATION PLANNING PROJECT

The goal of the City of Virginia Beach conservation planning project is to provide more comprehensive and refined information to guide the conservation, management and protection for eleven significant natural areas identified in the inventory project. Conservation planning for the natural areas of the City of Virginia Beach is the logical next step after the natural areas inventory. As noted previously, this report contains information for seven of the eleven priority natural areas, based on biodiversity significance. The remaining four natural areas will be documented in a supplement to this final report to be completed later this year. The supplement to this final report will also contain digitized conservation planning boundaries for use by the City of Virginia Beach in their geographic information system.

To complete this project, additional information on the natural heritage resources, threats, site management and protection needs, and ownership was collected for each natural area. In the immediate future, landowners for each of these natural areas will be contacted by Department of Conservation and Recreation staff in an effort to educate them about the ecological significance of their land and to discuss natural area management and protection needs.

By combining the new data with existing knowledge from the inventory project, the following information was provided for each of the seven natural areas through this project:

- refined conservation planning boundaries and biodiversity ranks for seven of the eighteen state - significant natural areas;

- more detailed descriptions for the natural heritage resources and ecological significance of each site;
- expanded protection and stewardship recommendations for each natural area;
- further information on the current status and use of each site;
- basic information regarding ownership and zoning of each natural area;
- considerations for the recreational, scenic, and educational value of each site; and
- information regarding options the City of Virginia Beach can utilize to protect its natural areas.

The purpose of this information is to facilitate better natural area protection and ecological management, well-informed planning, and wise land use decisions by natural resource agencies, conservation groups, and the City of Virginia Beach. The information will help guide the City decision makers in their endeavors to actively protect the natural diversity of their localities. The report can be further utilized to increase awareness of local officials and residents of regional biodiversity issues, guide environmental review of projects which may affect the natural areas, and to assist local conservation organizations in their land conservation and environmental education efforts.

The conservation planning boundaries and recommendations for protection and stewardship furnished in this document should **not** be interpreted as acquisition boundaries, proclamation boundaries, or regulatory land-use zones. Instead, the conservation planning boundaries and recommendations should be considered as tools to help steer wise land use planning on the complex economic, social, and ecological landscape at all levels of government and the private sector.

The involvement of the Virginia Department of Conservation and Recreation in the conservation of these natural areas does not end with the submission of this final report. The Department is committed to providing assistance and support to local governments, developers, consultants, conservation organizations, businesses, and private citizens concerned with the preservation of biodiversity in the remaining natural areas of the City of Virginia Beach. Additional meetings will occur with natural area owners here to further the site protection and management objectives. The Department of Conservation and Recreation will also continue to use the information in this report to guide its environmental review activities in the City of Virginia Beach.

METHODS

COLLECTION OF INFORMATION

For this conservation planning project, existing knowledge regarding the natural areas and new information relevant to their conservation and the natural heritage resources they support were collected and studied. Recent aerial photography, soil surveys, field notes from the inventory project, scientific publications, and conservation literature were included in this review. Additionally, several scientific and conservation experts outside of the Department of Conservation and Recreation, Division of Natural Heritage were consulted for their specialized information or skills relating to conservation of the natural areas.

Property ownership and zoning was researched for each natural area from City records. Basic ownership and zoning information is provided in each natural area report presented in the results section.

Each natural area was visited at least once during the data collection phase of this project. During the visits, efforts were made to find the natural heritage resources originally documented by the inventory project, locate additional resources associated with the sites, assess the condition of the resources, determine threats to the resources, and establish what protection and stewardship measures are necessary to insure the long-term survival of the resources.

CONSERVATION PLANNING PRINCIPLES

Standard natural heritage conservation planning guidelines were used for this project. The first step of conservation planning involved gathering of information relevant to the site including information on natural heritage resources, geology, hydrology, landscape features, economic and social factors of a site. An ecological analysis of this information is conducted and provides the scientific foundation for the conservation planning process. In addition a stress analysis is conducted and provides information which will shape the protection and management recommendations included in the plan. After these analyses are completed, the ecological boundaries are determined and landownership information is compiled. The ownership information allows for further refinement of the protection strategies. Stewardship strategies are best determined with an understanding of ecological forces influencing a natural area and particular ecosystems. In developing management recommendation, the following categories are considered: ecological management, monitoring, research, inventory, and public use/facilities management.

Additional information on these planning guidelines can be found in the Preserve Selection and Design Manual of The Nature Conservancy and in site conservation planning procedures outlined in reports of the Department of Conservation and Recreation, Division of Natural Heritage.

ECOLOGICAL BOUNDARIES

A principle component of conservation planning for any natural area is the conservation planning, or ecological boundaries. Preliminary conservation boundaries, such as those established in the City of Virginia Beach natural areas inventory, are carefully refined into two ecological boundaries: primary and secondary. It should be noted here that these boundaries are delineated for planning purposes only and have no regulatory intent.

The primary ecological boundary encompasses the natural heritage resources of the site and the secondary ecological boundary includes all areas intended to mitigate threats to the natural heritage resources and allow for proper ecological management. The area within the primary boundary should normally be restricted from disturbance of any kind, while some environmentally sensitive land uses are compatible with the conservation of the area between the primary and secondary boundaries.

The **primary ecological boundary** simply includes all known occurrences of natural heritage resources at a site. Because "natural heritage" resource is defined (in part) as the habitat of rare species, the primary ecological boundary encompasses the locations where rare species have been documented as well as the surrounding habitats in which they are likely to be found. The conservation planner should be intimately familiar with the habitat requirements of the species in question and the habitats available in the natural area. Primary ecological boundaries around rare or exemplary natural communities delineate the extent of the communities. This requires the planner to be knowledgeable regarding the ecological parameters defining the natural community type. The primary ecological boundary does not include any "buffer" to separate the natural heritage resources from the effects of adjacent land (or water) uses. Primary ecological boundaries may also include species movement corridors connecting two or more stations of natural heritage resources of the same type within a single natural area. Corridors are only included in the primary ecological boundary where they are determined to be essential habitat for the survival of the resources within the natural area.

The **secondary ecological boundary** includes all lands and water intended to mitigate natural and human threats to the natural heritage resources of the site and lands related to special management needs. The secondary ecological boundary is often used to indicate an area within which certain land (or water) uses may affect the viability of the natural heritage resources. Occasionally, secondary ecological boundaries are also used to designate areas for some types of ecological management or scientific research, such as areas for fire breaks for prescribed burning or wildfire control. Secondary ecological boundaries may also include species movement corridors. Unlike corridors within primary ecological boundaries, corridors designated by secondary ecological boundaries normally connect two or more natural areas containing similar resources, not similar habitats within a single natural area.

The most common purpose of secondary ecological boundaries is to provide a buffer zone to the primary, or core, area. Buffer zones are areas of transition between natural heritage resources and surrounding land uses designed to protect the resources within the primary boundary from

damage or degradation. Even the strongest and most complete protection of the core area containing natural heritage resources would be useless if surrounding land uses incompatible with the existence of the natural heritage resources were not attenuated. Buffer zones are generally the most effective and convenient way to protect natural heritage resources from surrounding incompatible land uses. The size and composition of a buffer zone varies depending upon the biology of the natural heritage resource and the disturbances to which it may be subjected. A buffer zone may be designed to protect the core area by maintaining surface and ground water quality and quantity, preventing alterations of ambient light, temperature, humidity, or wind conditions, or screening sensitive organisms from human activities and noise. Buffer zones can also be designed to minimize soil erosion and to prevent the invasion of aggressive or "weedy" species.

The design of effective secondary ecological boundaries requires that the planner be familiar with the biology and threats of the natural heritage resource and have a basic understanding of how ecosystems function. An understanding of the structure, function, and uses of the landscape and movement patterns of species upon the landscape is also essential. For these reasons, site visits to targeted natural areas are mandatory before accurate ecological boundaries can be designed.

The best and most current information is always used to guide the conservation planning decisions. As the knowledge of the biological, geological, hydrological, social, and economic aspects of the natural area increases or changes, alterations or revisions in the ecological boundaries may be necessary to reflect the updated information. In some cases, complete information is not available. For example, the biology of some species is not well-understood due to a lack of scientific research or sometimes abiotic (non-living) environmental factors, such as ground water flow patterns or soil composition, have not been determined for an area. In these cases, conservation planning decisions are based upon the available information on and knowledge extrapolated from similar species, natural communities, and ecosystems.

The determination of compatible activities and uses within the primary and secondary ecological boundaries is dependent upon the biology of the natural heritage resources of the site and the ecology of the natural area. Land use standards are specific to each site and may vary even among sites that support similar natural heritage resources if other environmental factors are different.

Secondary ecological boundaries are not designed to protect the natural heritage resources from large scale environmental catastrophes such as global warming or acidic precipitation. Solutions to these broad problems must be addressed in similarly broad environmental education, policies, and regulations.

Primary and secondary ecological boundaries should not be interpreted as regulatory zones or acquisition boundaries, but as conservation tools to help guide the protection and stewardship of natural heritage resources.

Ecological boundaries for each natural area are presented in the conservation planning reports in the results and recommendations section.

GEOGRAPHIC INFORMATION SYSTEMS

A geographic information system is a computer system which integrates traditional electronic databases with layered digitized graphic information about landscapes. Geographic information systems allow the merging, analysis, and manipulation of the graphic and text data in concert. Local governments often use geographic information systems to relate their mapped information, such as property tracts, zoning, and utility and road corridors, to the corresponding text data, such as property owners, land use, and utility service information. The City of Virginia Beach has a geographic information system on-line and is considering the installation of a companion pc-based system for use as an on-line network environment query system, as well.

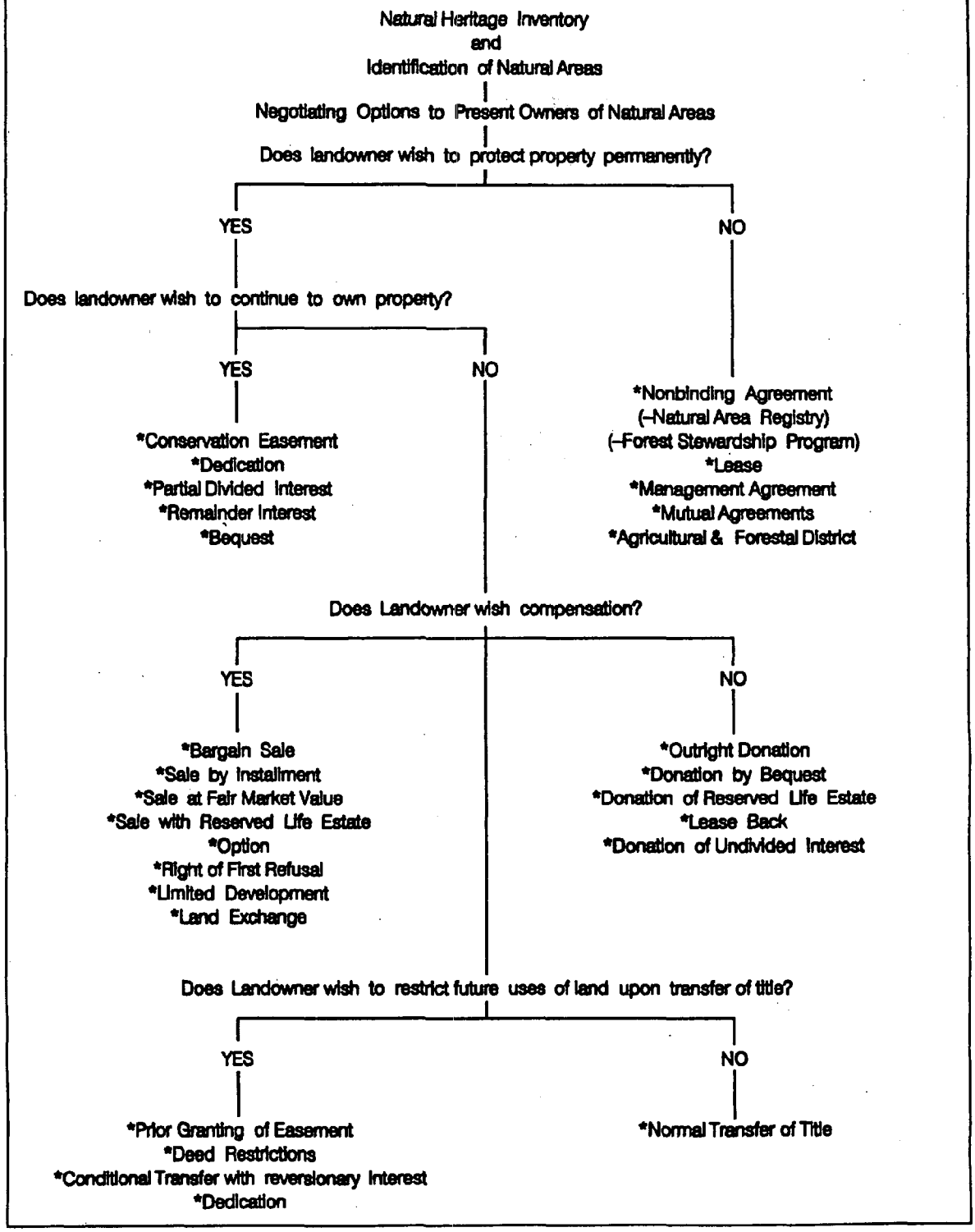
With the assistance of the Department of Conservation and Recreation, Division of Natural Heritage, the City of Virginia Beach will be generating digitized primary and secondary ecological boundaries for each natural area. The City intends to commence this work following completion of the other four priority natural areas which are currently undergoing final study. The digitized geographic data for each natural area and its accompanying attribute data will be included in a supplement to this final report to be completed later this year. The City will be able to incorporate the electronic natural area data into their geographic information system. This will allow planning staff to examine the ecological boundaries integrated with other mapped information already in its geographic information system.

PROTECTION OF NATURAL AREAS

Many natural area protection tools are available to local governments, conservation organizations, natural resource agencies, and private citizens. Examples include acquisition, easements, natural area registry, and conservation zoning. Figure 2 depicts a conceptual model of land protection options used by the Department of Conservation and Recreation. The City of Virginia Beach has all of these protection options available (except Natural Area Dedication) for its use, plus several protection options unique to local governments. Two documents to guide the City in its efforts to secure protection of the natural areas within its jurisdiction appear in Appendix A and Appendix B.

An important primary component of the City of Virginia Beach conservation planning project will be the task of contacting natural area landowners and seeking protection for these natural areas. A more complete discussion of the landowner contact procedure follows this section of the report.

TABLE 2. Natural Area Protection Options.



Several protection options are available to ensure the conservation of natural heritage resources and the natural areas in which these resources occur. The options are chosen to meet the individual needs of the particular area of land as well as the desires of the individual landowner. A specific protection tool may be used individually or more than one may be used in conjunction with another. Some options encourage voluntary protection, without legal implications or long-term commitments; other options legally protect property for extended periods or permanently to ensure protection today as well as the future.

LANDOWNER CONTACT

One of the most simple, but crucial, tools for protecting natural areas is a landowner contact program. Many natural areas are degraded simply due to lack of knowledge. It is extremely important to inform the landowners that their property is ecologically significant. It is very difficult for someone to protect a resource if they are unaware that it exists.

The purpose of this program is three-fold:

1- to inform natural area owners that their land is of high ecological significance;

2- to educate landowners about the natural heritage resources on their property, the value of protecting biological diversity, reasons for species or natural community rarity, and the threats, management, and conservation needs of their site; and

3- to establish a positive relationship with a landowner so that future contact and conservation strategies may be approached.

Five steps are involved in the process of contacting landowners: conducting ownership research, preparing introductory letters, scheduling personal meetings, compiling site packages, and visiting the landowner. Once the significant lands are determined, ownership information and boundary maps are collected from local courthouses. Next, an introductory letter (Appendix C) is mailed that briefly explains the Department of Conservation and Recreation, Division of Natural Heritage's purpose, why the owner's land is significant, and the request for a meeting in the near future. For natural area landowners along the North Landing River, a primer on the natural and cultural values of the watershed has been prepared as part of this project (Appendix D).

Approximately two weeks after mailing the letters, the landowners will be contacted by telephone to set a meeting date to discuss the natural area. Site packages describing the natural heritage resources will be given to the owners during the visit. The contents of the packages include a Department of Conservation and Recreation brochure, a Department of Conservation and Recreation, Division of Natural Heritage brochure, a fact sheet describing the natural area,

a fact sheet or other information about the species within the natural areas, and a fact sheet describing Virginia's Registry of Natural Areas. In addition to supplying the owner with this information, the location and features of their land will be pointed out using boundary maps, topographic maps, and aerial photographs.

General information about the landowners, their feelings towards conservation, their future plans for the land, and other information learned during the visit will be recorded on a landowner contact report form after the visit (Appendix E). Thank-you letters and other correspondences are mailed within a month after the meeting (Appendix F). It is extremely important to keep in touch with the owner after the initial contact is established.

Once a relationship is established with private or public landowners through landowner contact, stronger protection for natural areas such as registry, management agreements, easements or acquisitions may result.

NATURAL AREA REGISTRY

Virginia's Natural Area Registry is a protection tool which involves a voluntary commitment by the landowner to protect the site under his or her ownership. No legal agreement is signed and permanent natural area protection does not occur. The Natural Area Registry program encourages landowners of significant natural areas throughout Virginia to voluntarily protect the resources on their land to the best of their ability (Appendix G). Landowners who participate in the registry program agree to inform the Department of Conservation and Recreation of any potential threats to the resources or other changes, such as intent to sell the property (Appendix H).

Aside from being rewarded with the pride of conserving one of the most significant natural areas in Virginia, the owner receives a plaque in recognition of the significance of their property and their effort in preserving it. In addition, the landowner may receive management advice and assistance from professional natural area management staff, if they so desire.

The Natural Area Registry is an option available to both public and private landowners and may be used alone or in conjunction with another protection tool, such as a management agreement.

NATURAL AREA MANAGEMENT AGREEMENTS

A management agreement is an appropriate option for landowners who have been managing their land as conservation-minded stewards but have no desire to sell their property or encumber the land with an easement. Such a landowner would like to continue to own and manage their property in a way which will protect the resources on their land. The management agreement is a legal agreement but it does not provide permanent protection for the land. If this option is chosen, the landowner and the Department of Conservation and Recreation will prepare

agreement that clearly states the management objectives, schedules, and responsibilities. This agreement must be acceptable to both parties. These agreements fulfill the conservation goals of the Department of Conservation and Recreation while meeting the individual needs of the landowner as well.

OPEN SPACE EASEMENTS

An open space easement provides stronger natural area protection than the previously mentioned options. An easement is a legal agreement recorded with the property deed which restricts certain property rights in perpetuity. This is an excellent option for property owners who take pride in their land for its beauty, natural resources, family heritage, etc. and want to ensure that future generations will be able to enjoy the land in its natural condition. The landowner gives up a property right, such as the right to subdivide the land for development in order to achieve specific conservation goals, yet still enjoys many other property rights, such as the right to farm.

This option is quite flexible in that, depending upon the landowners wishes, the easement may be strict to ensure no future land disturbance or it may place very limited restrictions. Open space easements may reduce federal estate taxes and Virginia inheritance taxes, reduce assessment for real estate purposes, and entitle the landowner to a charitable deduction for state and federal income tax purposes.

NATURAL AREA DEDICATION

Natural Area Preserve Dedication is the strongest protection tool available to natural areas. Dedication is a legal process whereby the landowner restricts future uses of a property for the purpose of preserving the land in its natural state. Dedication of a property places it in the Virginia Natural Areas Preserve System. This protection option is available to private landowners, state agencies, or other public body (excluding federal). With dedication, the private landowner retains ownership rights of the property as well as the right to sell or transfer the property. However, the landowner relinquishes the rights to use the land in ways which are inappropriate for the preservation goals for the property. Only lands of the highest ecological significance qualify for inclusion in Virginia Natural Area Preserve System. In addition to the satisfaction of preserving important natural heritage resources, the landowner also receives the same financial incentives as available for open space easements. A document prepared by a local ad-hoc group and the Nature Conservancy to help guide the City in its efforts to secure dedication of agricultural lands which may adjoin natural areas appears in Appendix I.

NATURAL AREA ACQUISITION

The most direct method for conservation of natural areas is acquisition of the property. Though, due to the limited amount of funds available and the expense of land, this option is only applicable to a small percentage of the most ecologically significant natural areas in Virginia.

STEWARDSHIP GUIDELINES

Natural area stewardship involves the administration and management of a natural area after it is protected to assure the long-term survival of the natural heritage resources it supports. Basic stewardship recommendations are given for each natural area in the results and recommendations section. The higher priority sites (B1-B3) deserve comprehensive stewardship plans.

An important aspect of stewardship is determining compatible and incompatible land (and water) uses within the natural area. Which land uses are harmonious with the resources will depend upon the type of natural heritage resource, the ecosystem, and the type of land use being considered. Allowable land uses will therefore vary from site to site. Certain forms of some land uses may be incompatible, while more environmentally sensitive methods of the same general land use type may be compatible. For example, clearcutting of timber within a buffer zone delineated by the secondary ecological boundary of a given natural area may produce unacceptable effects to the natural heritage resources of the site, but selective cutting with strict environmental performance standards may be compatible. For some natural heritage resources, land uses may be only seasonally restricted. For example, timber harvest may not be compatible in the vicinity of a bird nesting colony during the nesting season, but can be conducted in the vicinity of the colony when nesting birds are not present.

Ecological management is the most important component of natural area stewardship. Ecological management includes all activities on a natural area specifically intended to benefit, save, or maintain natural heritage resources. Examples of ecological management include prescribed burning, removal or planting of vegetation for habitat restoration, problem species control, and restoration of natural processes. Some natural heritage resources require intensive active management, while others require no or little active management.

Probably the two most common ecological management strategies that will benefit natural areas and natural heritage resources in the City of Virginia Beach are restoring natural processes such as fire and controlling invasive species. Fire has played a major role in the ecology of many plant communities in the coastal plain of Virginia. Many communities such as longleaf pine-turkey oak barrens, pocosins, and estuarine marshes require fire to stimulate flowering and seed production, enhance regeneration by exposing bare mineral soil, reduce shade and competition from woody overstory species, and release nutrients into the soil. Natural fires no longer sweep

over vast expanses of Virginia's landscape and play the role they once did in maintaining these ecosystems. The reintroduction of fire as a prescribed management action is necessary. Ecological burning is intended to restore fire to its natural frequencies and time of year to simulate natural processes occurring in natural areas.

Invasive species are plants or animals which directly or indirectly threaten the viability of natural heritage resources or have the potential to do so. Most invasive species are aliens. Alien species are those whose natural range does not include the coastal plain of Virginia, but which were intentionally or unintentionally introduced to the region by humans. Often these alien species become particularly invasive in disturbed areas. Examples of invasive species include common reed, kudzu, Japanese honeysuckle, purple loosestrife and feral pigs. Some native species can also threaten natural heritage resources, especially in urban areas where nature's delicate balance has been disrupted. Beaver and white-tailed deer are examples of native species which can adversely affect natural heritage resources.

Stewardship also includes biological monitoring activities. Biological monitoring involves the periodic quantitative study of natural heritage resources and their environment. The purpose of biological monitoring is to furnish long term scientific data, to provide warnings as to any declines or damage to natural heritage resources, and to determine possible causes of such events. Additionally, biological monitoring may document increases in rare species populations and recovery of disturbed ecosystems. Monitoring visits usually also include some analysis of the status of invasive species and environmental conditions. Whether or not and how often a natural heritage resource is monitored is determined by its priority, sensitivity, and threats.

Stewardship should also address the need for additional biological inventory or scientific research. In many natural areas, the true status of the natural heritage resources is poorly known and the potential for additional natural heritage resources to be found has not been thoroughly examined. Additional biological inventory may be recommended for these situations. Some species, habitats, and natural communities are not well understood due to a lack of scientific research. Natural areas provide an excellent setting for field research which may not only increase the general knowledge of the natural heritage resources and sensitive ecosystems, but may also provide information directly pertinent to the site's conservation.

RECREATIONAL, SCENIC, AND EDUCATIONAL CONSIDERATIONS

Natural areas have uses other than the preservation of biodiversity. Depending upon the size and situation of the site and the sensitivity of the natural heritage resources it contains, a natural area may also furnish recreational, visual, and educational resources. The City of Virginia Beach can integrate natural areas into its comprehensive plan to improve the quality of life for residents and attract visitors.

The natural areas identified in the City may offer a variety of recreational opportunities. Public access to some of these areas will raise public awareness of the natural resources and promote their protection. Appendix J is an example of a recent effort to promote increased public awareness of these natural areas, along with their ecotourism potential. Recreational opportunities within or adjoining the natural areas include nature observation, boating, canoeing, hiking, biking, and horseback riding. The natural areas contribute to greenspace either as designated greenways or open space. Recreational facilities are being developed by both public and private groups along the natural areas of the North Landing River. These facilities can serve as a starting point in development of a comprehensive and extensive greenways system in the City. The concept of incorporating the natural areas into a local comprehensive, open space, and parks and recreation plan, such as the draft Virginia Beach Outdoors Plan, is encouraged to provide various levels of recognition and protection for the valuable natural and biological resources.

A North Landing River watershed public access and visual assessment project was recently completed (Potter, et.al., 1994). The purpose of this study was to evaluate the North Landing River and its tributaries for public access opportunities, and to identify the visual components contributing to this State Scenic River. This report is intended to give local governments and private groups interested in public access and visual quality a basis for dealing with issues related to these topics, along with adequate background information to begin work on implementation of the projects identified in the plan.

Natural areas often contribute to the scenic resources of an area. A preliminary visual assessment for each of the natural areas of the City of Virginia Beach should be conducted for the conservation and enhancement of scenic resources. These natural areas have a significant visual character which is typical of the environment early European settlers encountered upon arriving on the continent. The preservation of scenic resources is important to capture these historical perspectives of the early colonists as well as enhance the present perceptions of the environment.

The educational opportunities which the natural areas could offer are numerous. The focus of environmental education on the City's natural areas could include levels ranging from public awareness to scientific research. There may be additional opportunities to form linkages for educational and interpretive facilities which would create an entire system of natural area educational opportunities within the Hampton Roads region. A coalition of public education representatives as well as educators and research scientists from surrounding institutions could facilitate such a system of educational opportunities in the area.

Preliminary recommendations regarding the recreational, scenic, and educational possibilities of each natural area are included in the natural area reports. This information was provided by Janit Potter of the Department of Conservation and Recreation, Division of Planning and Recreation Resources.

RESULTS AND RECOMMENDATIONS

Information collection and site visits for this project began in 1989 and were completed in June of 1994. Ecological boundaries and conservation planning recommendations were formulated for the seven natural areas included in this final report through June of 1994. The remaining four natural areas ecological boundaries and conservation planning recommendations will be concluded by September of 1994.

The conservation planning boundaries and recommendations for protection and stewardship furnished in this document should not be interpreted as acquisition boundaries, proclamation boundaries, or regulatory land-use zones. Instead, the conservation planning boundaries and recommendations should be considered tools to help steer wise land use planning on the complex economic, social, and ecological landscape at all levels of government and the private sector.

The Virginia Department of Conservation and Recreation strongly urges the City of Virginia Beach to vigorously utilize all the conservation tools at its disposal to secure protection for its natural areas and provide for the long-term stewardship of the sites. The Department of Conservation and Recreation's commitment to natural areas conservation in the City of Virginia Beach does not end with the conclusion of this project. Project staff will continue to offer support to the local governments, developers, consultants, conservation organizations, and private citizens in the forms of environmental review, refined conservation planning, and active technical assistance with planning, protection, and stewardship of natural areas.

CONSERVATION PLANNING REPORTS

Each conservation planning report presented here includes information on the location, biodiversity rank, natural heritage resources, ecological boundaries, and surrounding land uses. Each report includes a map indicating the primary and secondary ecological boundaries and text providing justification of these boundaries. Further, a general description of each natural area, protection and stewardship recommendations, and recreational, scenic, and educational considerations are included in each conservation planning account.

Primary and secondary ecological boundaries should not be interpreted as regulatory zones or acquisition boundaries, but as conservation tools to help guide the protection and stewardship of natural heritage resources.

Table 3 shows the format for the conservation planning reports and explains what data is presented in each field of information.

TABLE 3 - KEY TO CONSERVATION PLANNING REPORT FORMAT

LOCATION: the USGS 7.5' quadrangle in which the natural area occurs.

BIODIVERSITY RANK: the overall (global) significance of the natural area in terms of the rarity of the natural heritage resources and the quality of their occurrences. These ranks are explained in detail in the introduction to this report.

GENERAL DESCRIPTION: a brief narrative picture of the natural area. This section usually includes information on topography, general vegetation, wetlands and watercourses, soils, historic and existing land uses within the natural area, and land use surrounding the natural area.

NATURAL HERITAGE RESOURCES: a synopsis of the natural heritage resources found in the natural area. Information given usually includes common and scientific names, taxonomic affiliation, global and state ranks, global and state range, a brief physical description, habitat requirements, threats and vulnerabilities, and occurrence data. For the protection of the resources, precise locations are not provided. Normally, natural communities are discussed first, then each species is discussed in order of decreasing rarity.

PRIMARY ECOLOGICAL BOUNDARY: description and justification of the primary ecological boundary.

SECONDARY ECOLOGICAL BOUNDARY: description and justification of the secondary ecological boundary.

ONSITE AND OFFSITE CONSIDERATIONS: a discussion of current land use and general information regarding current zoning and comprehensive planning within a local and regional context .

MANAGEMENT RECOMMENDATIONS: Recommendations include compatible and incompatible land uses, need for further inventory or scientific research, ecological management needs, and biological monitoring needs.

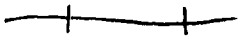
PROTECTION RECOMMENDATIONS: existing and proposed protection of the natural area. Information furnished includes existing regulations that protect the natural area, existing legal protection to the land, and suggestions for protection tools appropriate for the natural area.

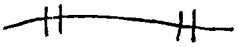
RECREATIONAL, SCENIC, AND EDUCATIONAL RECOMMENDATIONS: existing and potential recreational opportunities; preliminary assessment of scenic value; suggestions for appropriate educational activities. These comments were provided by Janit Potter of the Department of Conservation and Recreation, Division of Planning and Recreation Resources.

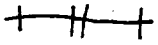
INFORMATION NEEDS: additional information needed to improve our ability to protect and manage each natural area.

MAP: A map of each natural area showing the primary and secondary ecological boundaries accompanies each natural area report. U.S. Geologic Survey 7.5 minute topographic maps are used as base maps with the ecological boundaries superimposed upon them. The scale is 1:24,000 (1 inch = 2000 feet). A site map legend for the ecological boundary symbols used on the maps is presented below. Although the most current revisions available are used for base maps, many of the most recent developments are not depicted upon them. Because of the missing information on many of the base maps and their relatively large scale, a small margin for error may exist with many of the ecological boundaries. Fine tuning of the boundaries can be accomplished through field survey as necessary.

CONSERVATION PLANNING BOUNDARIES:

PRIMARY BOUNDARIES 

SECONDARY BOUNDARIES 

WHERE PRIMARY AND SECONDARY BOUNDARIES CORRESPOND 

NORTH LANDING RIVER EASTERN WETLANDS

LOCATION: Virginia, City of Virginia Beach

USGS Quadrangle: Pleasant Ridge
Creeds

BIODIVERSITY RANK: B3

DIRECTIONS:
The North Landing River Eastern Wetlands is located on the east side of the river. The site includes the lower portion of West Neck Creek and the wetlands on the east side of the river extending south to the Pungo Ferry Bridge.

GENERAL DESCRIPTION:
The North Landing River Eastern Wetlands encompass extensive forested swamp, estuarine marsh, bay swamps, and low forested uplands. The site is most noted for its exemplary Atlantic white cedar swamps, the estuarine marshes along West Neck Creek, and shrub bay swamps. As many as nine rare plants, seven rare animals, and four rare natural communities have been documented from this site.

NATURAL HERITAGE RESOURCES: Table of Natural Heritage Resources

Scientific Name	Common Name	G/S Rank	EO Rank	Fed / St Rank
communities:				
Oligotrophic saturated forest	Atlantic white cedar swamp	S1	C	- -
Oligotrophic saturated forest	Atlantic white cedar swamp	S1	D	- -
Estuarine herbaceous vegetation	big cordgrass oligohaline marsh	S5	AB	- -
Oligotrophic saturated scrub	sweetbay-red bay shrub swamp	S2	A	- -
Estuarine herbaceous vegetation	three-square bulrush-cattail oligohaline marsh	S3	A	- -
plants:				
Ludwigia alata	winged seedbox	G3G4S1	B	- -
Carex decomposita	epiphytic sedge	G3G4S1	B	3C C
Lilaeopsis attenuata	Carolina lilaeopsis	G3S1S2	AB	- C
Stewartia malachondendron	silky camellia	G4S2	A	- -
Chamaecyparis thyoides	Atlantic white cedar	G4S2	D	- -
Chamaecyparis thyoides	Atlantic white cedar	G4S2	AB	- -
Chamaecyparis thyoides	Atlantic white cedar	G4S2	U	- -
Chamaecyparis thyoides	Atlantic white cedar	G4S2	B	- -
Lobelia elongata	elongated lobelia	G3G5S1	A	- -
Physostegia leptophylla	slender-leaved dragon-head	G4G5S2	A	C2 -
Paspalum distichum	joint paspalum	G5 S1	C	- -
Cladium mariscus ssp Jamaicense	sawgrass	G5T5S1	A	- -
animals:				
Euphyes dukesi	scarce swamp skipper	G3G4S2	U	- -
Ixobrychus exilis	least bittern	G5S2	CD	- -
Enallagma durum	a damselfly	G5S2	U	- -
Altides halesus	great purple hairstreak	G5S3	C	- -
Crotalus horridus atricaudatus	canebrake rattlesnake	G5T2QS1	U	- LE
Sorex longirostris fisheri	Dismal Swamp SE shrew	G5T2QS2	U	LT LT
Synaptomys cooperi helaletes	southern bog lemming	G5T3S3	U	3C -

Extensive swamp forests occur along the river corridor between the marsh and uplands. These swamps are characterized by bald cypress (Taxodium distichum), black gum (Nyssa sylvatica), red maple (Acer rubrum) and sweet gum (Liqudambar styraciflua). The forested

wetlands here include two relatively large stands of Atlantic white cedar. **Atlantic white cedar swamps** are rare in Virginia, known from only six locations statewide. The largest and most exemplary stands remaining are found in the Great Dismal Swamp and the North Landing River. Atlantic white cedar has declined over much of its range. Geographically, it is restricted to freshwater wetlands within a narrow band of east coastal United States. Although cedar swamps and bogs were never widely distributed, they are being increasingly encroached upon by mining, draining for alternative uses, and ill-planned forestry practices (Laderman, 1987). The stands along the North Landing River are high quality examples of this rare swamp community.

Within the swamp forest are slightly raised sandy islands dominated by American beech, sweetgum, loblolly pine (Pinus taeda), white oak (Quercus alba) and red maple. These islands provide habitat for rarities such as the **silky camellia**, the **canebrake rattlesnake**, and the **Dismal Swamp southeastern shrew**.

Epiphytic sedge, often called cypress-knee sedge, is one of the globally rare plants known from the swamp forest. At one time, the range of this sedge included a large portion of the east coast and midwestern United States, but in recent years its range has shrunk considerably. It is now found in somewhat disjunct locations (Ostlie, 1990). The epiphytic sedge is found usually in undisturbed, organic-rich backwaters. It occurs on floating or partially submerged rotting logs, stumps, and most often, on cypress knees along the edge of the swamp forest. It is a perennial species that bears its perigynia in mid-summer. Dispersal of seeds is believed to be facilitated by waterbirds, carried inadvertently on the feet and deposited onto a log or stump when the birds come to rest (Ostlie, 1990). Epiphytic sedge is threatened by negative changes in water quality, direct habitat destruction and disruptions in normal hydrology which may either raise or lower water levels for long periods of time.

The **canebrake rattlesnake** is found primarily in the swamp forests and upland/swampy ecotones. This rare animal is restricted to a small portion of southeast Virginia. This snake, which is listed as state endangered, is declining rapidly due to habitat loss and deliberate molestation and destruction by people. The canebrake rattlesnake feeds primarily on grey squirrels and cotton-tail rabbits, but spends large amounts of time resting in cypress swamps in or near the water (Savitzky, pers. comm.). These rattlesnakes are live-bearing snakes; they give birth to just one to two litters per year; and they spend approximately four to five winter months in underground bromation dens. The canebrake rattlesnake is often mis-dentified with the more aggressive and more visible eastern cottonmouth. Canebrake rattlesnakes are generally reclusive and non-aggressive (Savitzky, pers. comm.; Erdle, pers. observation) and their cryptic coloration frequently renders them virtually invisible.

The best marsh occurrences are found along West Neck Creek near the confluence with the North Landing River. Marshes also form a narrow fringe along the eastern border of the river. The marshes are classified as estuarine herbaceous wetlands. Within this broad grouping, two robust marsh plant associations dominate, the **big cordgrass oligohaline marsh** and the **three square bulrush-cattail oligohaline marsh.** Big cordgrass and sawgrass

tend to dominate along the water's edge and the bulrush and cattail association are commonly interior. In addition to being a rare community type, the marshes support several rare species of plants and animals.

These marshes, like others along the North Landing River, are influenced by slightly brackish to fresh water and the irregular water level fluctuations caused by wind tides. They form back from the mouth of the estuary and are sometimes referred to as "back bay or lagoon marshes". Prevailing winds from the east and south push seawater up Currituck Inlet and farther northward providing a corridor for many plant species such as sawgrass and Eliott's aster to reach their northern range limits.

Healthy marshes provide a variety of ecological benefits and are imperative in maintaining the health of the North Landing River Ecosystem. Marshes enhance water quality. They help contain flood waters and mitigate against damage from storms. They also provide a buffer against shoreline erosion and produce large amounts of nutrients and energy. Additionally, marshes provide habitat for numerous plants and animals.

Carolina lilaeopsis is but one of the rare marsh plants found at this site. This attractive member of the tea family is rare throughout its range from Virginia to northern Florida, and in Virginia there are just 11 known occurrences (Ludwig, 1993). Carolina lilaeopsis is a candidate for listing in Virginia as State Threatened or Endangered. This perennial herb bears a dainty white flower and is customarily found in shallow water, marshes and swamps (Godfrey and Wooten, 1981).

Sawgrass is a characteristic species of the robust emergent marshes. Helathy occurrences of this state rare sedge occur at this site. This sedge reaches its northern range limit here and is more common to marshlands farther south such as the Florida Everglades.

The rare **least bittern** is found in the marshes near the confluence of West Neck Creek and the North Landing River. It builds its nest near open water within marsh vegetation. This secretive bird frequently incorporates living cattails and reeds into the nest structure, which add to its camouflage and provide stability. Least bitterns feed mostly on small fish, crustaceans and insects (Potter, 1980).

One of the rarest butterflies in the state is the **scarce swamp skipper**, also called the brown sedge skipper. Host plants for this medium-sized, dark-orangish-brown butterfly are primarily sedges. This animal is a fairly specialized marsh species, as female skippers lay eggs on the undersides of leaves of specific sedge species (Scott, 1986). Of the butterflies, skippers are generally the strongest and fastest flyers, and are frequently difficult to spot because they move so quickly. As the name implies, this butterfly is known from wooded and sedge swamps, where they spend their entire life cycles. Adult sedge skippers can be observed as they sip nectar from nearby flowers.

PRIMARY ECOLOGICAL BOUNDARY:
The primary ecological boundary includes known occurrences of natural heritage resources as well as their potential habitats. The boundary along the west side follows the river channel.

The boundary along the east side follows a slightly elevated ridge to include all swamp forest occurrences and the upland wetland ecotone which provides important habitat for rare species such as silky camellia and the canebrake rattlesnake. The southern boundary for the site follows the upland/wetland boundary near the Pungo Ferry Marina.

SECONDARY ECOLOGICAL BOUNDARY:
The secondary ecological boundary includes lands and water intended to mitigate natural and human threats to the elements and their respective habitats. In addition to including lands related to special management needs such as prescribed burning, this secondary boundary serves as a "watershed planning boundary". In general, the secondary ecological boundary follows an elevated ridge. The protection and maintenance of land within this secondary boundary is important for the protection of water quality and critical surface and groundwater recharge areas.

SMOKE MANAGEMENT CORRIDOR:
The smoke management corridor is included in the conservation plan to encompass surrounding areas that must be considered for smoke management planning and landowner notification. Within this corridor, landowners will be offered information regarding the prescribed fire activities occurring on nearby conservation lands. Prior to burning, landowners will be notified of burn plans and schedules and expectations for smoke management. Prescribed burning in these wetlands will likely generate large volumes of smoke. Smoke management planning is essential to ensure public health and safety as well as meet ecological objectives. The smoke management corridor follows the secondary ecological boundary and/or the burn compartment, at a distance of approximately .5 to 1 mile. This corridor is based on guidelines developed by the Virginia Department of Forestry and the Federal Interagency Coordinating Committee for Fire Management. The corridor includes paved roads and waterways which may become hazardous for navigation during heavy smoke periods.

ONSITE AND OFFSITE CONSIDERATIONS:
Surrounding land use in this area is primarily agricultural. Soybeans, wheat, and field corn are the primary crops grown in the area. Farming practices are generally considered compatible with natural area preservation. Unfortunately, many farms are being abandoned due to hard economic times and more and more rural open space is being replaced by residential and tract housing developments, or other intensive land uses such as golf courses. This type of development may have significant secondary impacts on sensitive natural areas.

Best Management Practices designed to minimize sedimentation and agricultural runoff should be adhered to in this watershed, as farming activities could influence water quality as well. The North Landing River was identified in the Nonpoint Source Pollution Watershed Assessment Report as a high priority (H1, 95-100%) for pollution potential from nutrient loadings from agricultural land. The same report assessed the North Landing River as a high priority (H1) for overall agricultural pollution, and as (H2, 90-95%) for urban nutrient load pollution (Wilson, 1993).

Pesticide and herbicide use within the area should be carefully planned to minimize negative

impacts on sensitive wetlands. Pesticides used for lawn, garden, or forest could inadvertently jeapardize rare invertebrates. Buffers to wetlands should be maintained and biocides carefully chosen and applied by skilled certified applicators.

Past logging practices in forested wetlands have eliminated some areas of Atlantic white cedar and degraded habitat for other forest dwelling species. Current logging practices do not appear to threaten natural heritage resources, largely because of the marginal condition of the wetland timber resource. Logging is not recommended in wetland areas and logging practices on uplands should follow strict BMP's designed to maintain hydrologic flow, reduce erosion, and control sedimentation. Large tract clear-cutting or other large scale land altering activities could influence hydrology and water quality in the area. These activities should be monitored closely to ensure proper buffers are established to protect sensitive resources and water quality, as well as provide corridors for wildlife movement.

A powerline siting is being considered across West Neck Creek to a substation on adjacent uplands. The Department of Conservation and Recreation and other resource agencies are working with Virginia Power to design the most environmentally sensitive route and develop construction and mitigation plans to reduce impacts to estuarine marsh communities and rare species found here.

Planners and officials of the City of Virginia Beach are aware of the environmental significance of the North Landing River. This area has been designated as an "environmentally sensitive area" (City of Virginia Beach, 1991). The distinction of being an environmentally sensitive area does not, however, afford the river or the immediate surrounding lands any additional protection from development or land use alteration. In 1991, the Comprehensive Plan for the City of Virginia Beach called for a "Rural Preservation Plan" (City of Virginia Beach, 1991). In addition to several additional objectives, the Rural Preservation Plan dictates "Study of the City's southern watersheds that considers environmental needs associated with residential and agricultural land use in this area, and the development of regulations as appropriate based on the study." It is presumed that this study is ongoing.

Also cited in the Comprehensive Plan for the City is a "Southern Watersheds Management Ordinance." This is cited in the "Environmental Policies and Objectives" section, page II-D-6 (City of Virginia Beach, 1991). This management ordinance sets "standards that include, but are not limited to the provision of reserve sewage disposal drainfield sites, minimal disturbance of land, the controls for all land disturbing activities over 2500 square feet of development within fifty feet of any shoreline or wetland, and the use of best management practice facilities for controlling stormwater runoff."

In November of 1993, a workshop to emphasize the values of the Southern Watersheds was hosted by the City of Virginia Beach for local citizens. This workshop spawned discussions with citizens, local conservation groups, City officials, and The Nature Conservancy. This ad hoc group has developed a proposal for the preservation of agricultural land within the southern watersheds. More information on this proposal is included in an appendix to this report.

MANAGEMENT RECOMMENDATIONS:
Fire has played an important role in creating and maintaining the natural communities at this site. Atlantic white cedar swamps depend on fire to open the habitat and establish conditions suitable for seed germination. Regular prescribed burning of the marshes and cedar swamps will be necessary to ensure the continued health and viability of this ecosystem. Prescribed burn and wildfire contingency plans for the North Landing River wetlands are being developed by the Department of Conservation and Recreation (DCR) and The Nature Conservancy (TNC) in cooperation with the Virginia Department of Forestry and local fire officials.

Common reed, a potentially aggressive marsh grass, occurs in many of the riverine marshes of the North Landing River. It has not been identified as a serious problem at this particular site but will be monitored, especially given utility developments proposed for siting through the marshes. An inter-agency reed grass control project which evaluates and treats selected stands of common reed within the southern watersheds and particularly along the North Landing River is currently underway. The treatment for this invasive plant involves herbicide applications and prescribed fire management.

Long-term monitoring is recommended for rare natural communities such as the Atlantic white cedar swamps and estuarine marshes. Additionally, rare plant and animal species like epiphytic sedge, sawgrass, winged seedbox, the canebrake rattlesnake and the scarce swamp skipper should be monitored to ensure continued health and productivity of the existing populations.

A better understanding of the hydrology of the North Landing River is imperative for future management decisions and protection of critical upland buffers to the wetlands. Hydrologic research is currently underway elsewhere within the watershed. This project is described in the conservation plan for the North Landing River Pocosins. A hydrologic transect will be established in the Atlantic white cedar swamp of the North Landing River Eastern Wetlands and compared with hydrologic data from the pocosins and forested swamps on the west side of the river.

Lands situated between the primary and secondary ecological boundaries are suitable for environmentally compatible land uses. Activities which may possibly alter the hydrology of sensitive wetlands should be carefully assessed and avoided within this area. On-going hydrologic assessments will help guide proper land uses and the evaluations of impacts related to these activities.

PROTECTION RECOMMENDATIONS:
Land protection efforts on the east side of the river are just getting underway. DCR and TNC have targeted lands supporting exemplary Atlantic white cedar swamps as priorities for landowner contact and stronger protection. TNC recently received a gift of 150 acres of wetland near Creeds School. This tract contains a remnant stand of Atlantic white cedar. DCR has negotiated the purchase of a 250 acre tract north of this area. This tract supports an exemplary Atlantic white cedar swamp and several other rare species. DCR expects to close on this tract in summer 1994. Both tracts will be dedicated as part of the Virginia

Natural Area Preserves and jointly managed along with other conservation lands within the riverine preserve system.

Landowner contacts will continue and it is hoped that other key tracts supporting exemplary cedar swamps and estuarine marshes will be permanently protected. Developing partnerships and management strategies with adjacent landowners is essential in protecting critical buffers and carrying out management programs for the preserve system. Natural area registries and management agreements are recommended for lands within the secondary ecological boundaries. Impacts from surrounding land-uses should be mitigated by encouraging sound soil and water conservation practices and maintaining vegetated buffers to wetlands. A model conservation plan for landowners will be developed in 1995, as part of the hydrologic assessment and conservation planning project currently underway.

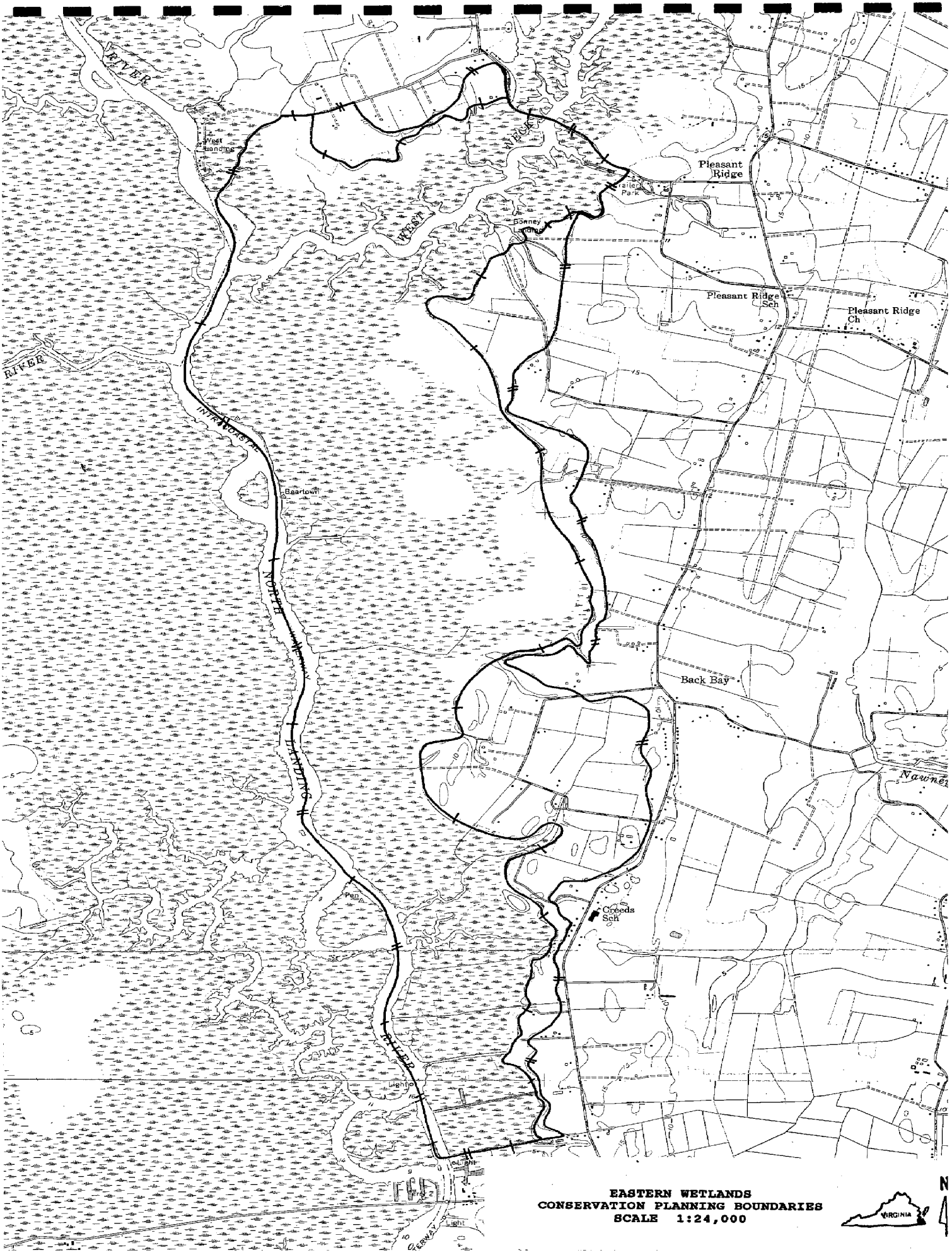
Conservation planning boundaries will be incorporated into the City's land-use planning documents and the development review process. DCR Division of Natural Heritage offers its expertise and knowledge in reviewing project proposals and working with City planning staff.

RECREATIONAL, SCENIC AND EDUCATIONAL RECOMMENDATIONS:
In 1988, the General Assembly of Virginia passed a 'Scenic River Designation Bill' making the North Landing River and Tributaries part of the Virginia Scenic Rivers System (Code of Virginia, Chapter 4, Section 10.1-413.2). This designation recognizes the aesthetic as well as the functional values of this remarkably beautiful river. The Virginia Scenic River Program began in 1970 with approval by the General Assembly of the Virginia Scenic Rivers Act. A local board composed of citizens of the Cities of Virginia Beach and Chesapeake advises DCR on scenic river issues. The North Landing River and West Neck Creek are also part of the local Scenic Waterways System.

The North Landing River is fairly slow-moving and quite picturesque. Recent recreational planning efforts have identified areas for potential river access/canoe put-ins and canoe trails along the entire North Landing River. The noteworthy designation as a 'State Scenic River' and future plans to better use and enhance the public's access to the river mesh well with the City of Virginia Beach's plans to emphasize nature and eco-tourism in the city.

The land which borders the North Landing River, and especially the northern portion of the river, is subject to intense development pressures. A public education program for current residents, developers, builders and river users might enhance public awareness about this riverine system and the tremendous biodiversity it supports. The City of Virginia Beach should encourage the designation of greenways and open space and the development of interpretive facilities in areas appropriate for public access. The establishment of programs to encourage environmentally sensitive planning and construction practices will help protect sensitive natural heritage resources.

INFORMATION NEEDS:
Additional vertebrate and invertebrate inventories are needed in this area.



EASTERN WETLANDS
CONSERVATION PLANNING BOUNDARIES
SCALE 1:24,000

NORTH LANDING RIVER GUM SWAMP

LOCATION: Virginia, City of Virginia Beach
City of Chesapeake

U.S.G.S. Quadrangles: Pleasant Ridge
Fentress
Princess Anne
Kempsville

BIODIVERSITY RANK: B4

DIRECTIONS:
North Landing River Gum Swamp is located along the northern border of the watershed. The site lies partly in the Cities of Virginia Beach and Chesapeake. It covers the area east of Centerville Turnpike, and north of the Intracoastal Waterway (Albemarle and Chesapeake canal). Stumpy Lake and Elbow Road form its border on the north and Salem Road on the east.

GENERAL DESCRIPTION:
The site encompasses an extensive water tupelo and bald cypress swamp and supports several rare plant and animal species. This wetland also supports one the the state's largest nesting colonies for great blue herons and great egrets. The wetlands form along the headwaters of the North Landing River and supply an important source of freshwater to help maintain the delicate balance of fresh and saline waters in the estuarine ecosystem.

NATURAL HERITAGE RESOURCES: Table of Natural Heritage Resources

Scientific Name	Common Name	G/S Rank	EO Rank	Fed/St Rank
communities:				
Eutrophic semipermanently flooded forest	**water tupelo/bald cypress/ carolina ash swamp**	**S4**	**B**	**- -**
plants:				
Trillium pusillum Virginianum	**Virginia least trillium**	**G3T2S2**	**BC**	**C2 -**
Tillandsia usneoides	**spanish moss**	**G5S2**	**BC**	**- -**
animals:				
Euphyes dukesi	**scarce swamp skipper**	**G3G4S2**	**U**	**- -**
Celastrina ebenina	**sooty azure**	**G4S3S4**	**U**	**- -**
Poanes aaroni aaroni	**saffron skipper**	**G4T4S3**	**U**	**- -**
Crotalus horridus atricaudatus	**canebrake rattlesnake**	**G5T2QS1**	**U**	**- LE**
Casmerodius albus	**great egret (nesting)**	**G5S2**	**U**	**- -**
Ardea herodias	**great blue heron (nesting)**	**G5S3**	**U**	**- -**
Synaptomys cooperi helaletes	**southern bog lemming**	**G5T3S3**	**U**	**3C -**
Sorex longirostris fisheri	**Dismal Swamp SE shrew**	**G5T2QS2**	**U**	**LT LT**

Gum Swamp is characterized by extensive forested swamps consisting primarily of water gum (Nyssa aquatica), cypress (Taxodium distichum), black gum (Nyssa sylvatica), water ash (Fraxinus caroliniana), red maple (Acer rubrum) and sweet gum (Liquidambar styraciflua).

Bald cypress forms a "supra" canopy above the mature hardwoods. Forested swamps extend southward to a narrow band of dredge materials placed along the banks of the Intracoastal waterway and the Albemarle and Chesapeake Canal.

Spanish moss is found draped over cypress and other trees within the swamp forest. This species is rare in Virginia, reaching its northern range limit here.

Another rare plant of the swamp forest and loblolly pine uplands is the **Virginia least trillium**. This small, delicate trillium is in the lily family. It is a globally rare species and is a candidate for listing under the Federal Endangered Species Act. The Virginia least trillium occupies wetland and upland habitats. It is found in moist loblolly pine forests and in seasonally wet swamp forests. As the name suggests, the Virginia least trillium is difficult to find. Searches are best conducted in spring when the delicate white and pink blossoms are visible.

One of the largest and most viable **heron breeding colonies** in Virginia is found in the swamp forest. Great Blue herons and great egrets build large nests in or near the tops of tall trees. These wading birds are a familiar sight along the waterway. They are often seen feeding and resting at Stumpy Lake and the marshes along the North Landing River. They are known to fly long distances to find appropriate food sources. Great blue herons eat a surprising array of fish, insects, mammals, amphibians, crustaceans, reptiles and occasionally even other birds (Butler, 1992). They are extremely sensitive to human disturbance during the nesting and fledging season which runs from March 15 through August 31. They have been known to abandon nests and eggs if bothered during the critical nesting season (Butler, 1992).

Another animal found in the swamp forest is the **canebrake rattlesnake**. This subspecies is listed as State Endangered. It is found in only a small portion of southeastern Virginia. Its numbers here are decreasing rapidly due to habitat loss and deliberate molestation and destruction by people. The canebrake rattlesnake feeds primarily on grey squirrels and cotton-tail rabbits (Savitzky, pers. comm.) but spends large amounts of time resting in cypress swamps in or near the water. The canebrake rattlesnake spends approximately four to five winter months in underground bromation dens. They are live-bearing snakes, but do not mature to reproductive condition until approximately 6-7 years of age. These animals are reclusive and non-agressive (Savitzky, pers. comm.; Erdle, pers. observation) and their cryptic coloration frequently renders them virtually invisible.

The Dismal Swamp southeastern shrew also inhabits the swamp forest. It is found only in southeastern Virginia (in the Dismal Swamp and some remnant locations) and in northern/northeastern North Carolina. These tiny mouse-like mammals spend much of their time under leaf litter, and under and around decaying logs and stumps. The primary food source of the shrew is spiders, earthworms, grubs and other insect larvae. It is believed that they bear one to two litters of young per year, but because shrews are small and secretive, much biology and natural history of these animals remains unknown. Principle threats to the shrew are habitat destruction and loss; and habitat alteration which allows interbreeding with the more common upland shrew, the southeastern shrew (Sorex longirostris longirostris).

The ecotones between swamp forest and uplands are called **canebrakes**. Extensive areas of canebrake can be viewed from Elbow Road. This vegetation type is now much reduced from its original size. As the name implies, canebrakes are composed primarily of the grass, cane (Arundinaria gigantia). Cane occurs with scattered low trees and shrubs such as wax myrtle (Myrica cerifera), red bay (Persea palustris), and sweet bay magnolia (Magnolia virginiana). Canebrakes provide critical habitat for rare species such as the Dismal Swamp southeastern shrew, the canebrake rattlesnake, and the Southern bog lemming.

A narrow fringe of marsh buffers the channel edges at the southeastern corner of the site (near the bridge at North Landing). Although these estuarine marshes are not expansive, they support several rare species of butterflies.

Scarce swamp skipper, or the brown sedge skipper, is found here. This is one of the rarest butterflies in Virginia. Scarce swamp skippers are medium-sized, dark-orangish-brown butterflies which can be found primarily in the marshes. Female skippers lay eggs on the undersides of leaves of specific sedge species (Scott, 1986) so these animals are dependent upon the the continued health and diversity of the marshes. Of the butterflies, skippers are generally the strongest and fastest flyers, and are frequently difficult to spot because they move so quickly. As the name implies, this butterfly is known from wooded and sedge swamps and marshes, where they spend their entire life cycles (Scott, 1986). Adult sedge skippers can sometimes be observed as they sip nectar from nearby flowers.

PRIMARY ECOLOGICAL BOUNDARY:
The primary ecological boundary includes known occurrences of natural heritage resources as well as their potential habitats. The boundary encompasses forested swamps, canebrake ecotones, and selected forested uplands supporting the Virginia least trillium and canebrake rattlesnake.

The primary and secondary ecological boundaries are contiguous around the heron breeding colony. In this area, the boundaries have been expanded to a distance of approximately 1500 feet from the colony center. It includes forested swamps and uplands to provide critical buffers to protect nesting birds from disturbance (Butler, 1992). Documentation exists describing great blue heron and great egret nest and colony abandonments with increased visits by humans or land clearing activities such as road building and logging.

SECONDARY ECOLOGICAL BOUNDARY:
The secondary ecological boundary includes lands and water intended to mitigate natural and human threats to the elements and their respective habitats. Because the headwaters of the North Landing River are just northeast of the immediate Gum Swamp area, the secondary ecological boundary is expanded to include these adjacent swamps and marshes. Maintenance of water quality and normal hydrology are vital to the continued health of not only the Gum Swamp site, but to the entire North Landing River watershed. Along the northwest and southern edges of the site, the secondary ecological boundary closely follows the primary ecological boundary but expands in areas to include canebrake ecotones.

ONSITE AND OFFSITE CONSIDERATIONS:

Surrounding land use is primarily agricultural on the northwest and southern sides. To the east and northeast lies a heavily populated portion of the City of Virginia Beach. In recent years many local farms have been developed for alternative uses such as residential and tract housing. This type of development, and large tract, land-clearing activities may have significant impacts on sensitive natural areas. These activities may influence the hydrology of the area and impact natural heritage resources. Encroachment into this forested swamp further fragments habitat for the nesting colonial birds, canebrake rattlesnake, and Dismal Swamp southeastern shrew.

Best Management Practices designed to minimize sedimentation, runoff, and nutrient loadings should also be adhered to in this watershed. The North Landing River was identified in the Nonpoint Source Pollution Watershed Assessment Report as a high priority (H1, 95-100%) for pollution impacts from nutrient loadings from agricultural land. The same report assessed the North Landing River as a high priority (H1) for overall agricultural pollution, and as (H2, 90-95%) for urban nutrient load pollution (Wilson, 1993).

Pesticide and herbicide use in the watershed should adhere to BMPs designed to minimize impacts to wetlands and wetland dependent species. Pesticides and herbicides used for lawn, golf course maintenance, forestry, and agricultural pests may inadvertently jeapordize rare species. Biocides should be carefully chosen and applied by skilled applicators. Adequate buffers shuold be maintained to protect sensitive wetland resources from harmful chemicals.

Planners and officials of the City of Virginia Beach are aware of the environmental significance of the southern watersheds, and the North Landing River has been designated as an "environmentally sensitive area" (City of Virginia Beach, 1991). The distinction of being an environmentally sensitive area does not, however, afford the river or the immediate surrounding lands any additional protection from development or land use alteration. In 1991, the Comprehensive Plan for the City of Virginia Beach called for a "Rural Preservation Plan" (City of Virginia Beach, 1991). In addition to several additional objectives, the Rural Preservation Plan dictates "Study of the City's southern watersheds that considers environmental needs associated with residential and agricultural land use in this area, and the development of regulations as appropriate based on the study."

Also cited in the Comprehensive Plan for the City is a "Southern Watersheds Management Ordinance." This is cited in the "Environmental Policies and Objectives" section, page II-D-6 (City of Virginia Beach, 1991). This management ordinance sets "standards that include, but are not limited to the provision of reserve sewage disposal drainfield sites, minimal disturbance of land, the controls for all land disturbing activities over 2500 square feet of development within fifty feet of any shoreline or wetland, and the use of best management practice facilities for controlling stormwater runoff."

The preferred alignment for the Virginia Southeastern Expressway follows Elbow Road along the spillway of Stumpy Lake. This route will impact the wetlands of Gum Swamp. A final impact statement is currently being developed for this project which will address primary and secondary impacts to the significant wetlands and natural heritage resources found here. A variety of organizations and agencies are working with the project proponents to address

these issues. The final statement should address impacts to natural heritage resources as well as impacts to the entire wetland ecosystem related to the maintenance of the hydrologic regime and protection of water quality. The wetlands of Gum Swamp are important sources of freshwater and help maintain the delicate balance between fresh and saline waters in this estuarine ecosystem.

Recreational activities in the watershed include boating and shore fishing, hunting, canoeing, wildlife observation, water skiing, and power boating. The river also plays a role in interstate commerce and transportation. The waterway is still used for commercial shipping, although its primary use is for recreational boating. Toxic spills related to commercial activities are a threat to natural heritage resources. Several agencies and organizations are working to develop comprehensive strategies for the containment and clean-up of spills and the protection of sensitive natural resources on the river.

MANAGEMENT RECOMMENDATIONS:
The Nature Conservancy will develop a resource management plan for conservation lands within their ownership. This plan will be developed in coordination with the Department of Conservation and Recreation to complement and coordinate management activities for other tracts within the North Landing River Preserve System.

Long-term monitoring is recommended for rare species such as the Virginia least trillium and canebrake rattlesnake. The heron breeding colony should also be monitored and birds tracked to determine critical resting and feeding sites along the river. Common reed (Phragmites australis), a potentially aggressive marsh grass occur in scattered locations. It status should be monitored to ensure it does not encroach within the remnant marsh communities.

A better understanding of the role of fire in canebrake ecotones is needed. Prescribed fire may help maintain these communities and enhance habitat conditions for many rare species.

Little hydrologic information exists for this northern portion of the watershed. Hydrologic studies are recommended to determine groundwater and surface water interactions and the geochemical influences on the wetlands. A better understanding of the hydrology is essential for protection of critical upland buffers and guides future site management.

PROTECTION RECOMMENDATIONS:
The Nature Conservancy owns a 1152 acre tract of forested swamp within this natural area. This tract protects a significant portion of the heron nesting colony and several other rare species. This tract will be dedicated as part of the Virginia Natural Area Preserve System.

Landowner contacts will continue and it is hoped that other key tracts will be permanently protected. Natural area registries and management agreements are recommended for lands within the secondary ecolgical boundary. Impacts from surrounding land-uses should be mitigated by encouraging sound soil and water conservation practices and maintaining vegetated buffers to wetlands.

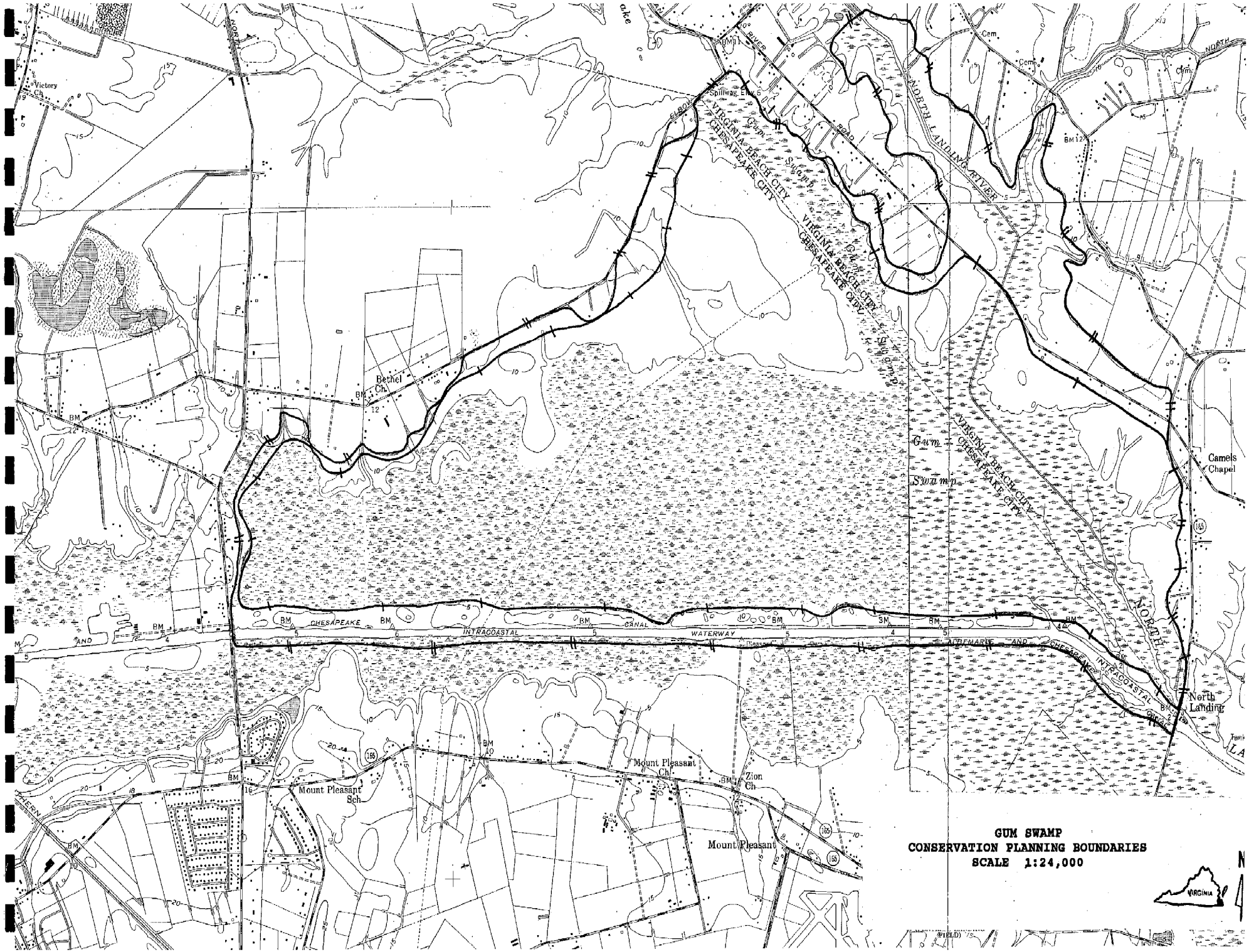
Conservation planning boundaries will be incorporated into the City's land-use planning documents and environmental review process. DCR Division of Natural Heritage offers its expertise and knowledge in reviewing project proposals and working with City planning staff.

RECREATIONAL, SCENIC AND EDUCATIONAL RECOMMENDATIONS:
In 1988, the General Assembly of Virginia passed a "Scenic River Designation Bill" making the North Landing River and Tributaries part of the Virginia Scenic Rivers System (Code of Virginia, Chapter 4, Section 10.1-413.2). This designation recognizes the aesthetic as well as the functional values of this remarkably beautiful river. The Virginia Scenic River Program began in 1970 with approval by the General Assembly of the Virginia Scenic Rivers Act.

The North Landing River is fairly slow-moving and picturesque. Recent recreational planning efforts have identified areas for potential river access along the entire North Landing River (Potter, et al. 1994). These river access efforts and proposals are detailed in the final report of the Virginia Department of Conservation and Recreation, North Landing River Watershed Public and Visual Assessment. The completion of this report, and its proposals fit well with the City of Virginia Beach's plans to emphasize the southern portion of the city and eco/nature tourism.

It is recommended that all activities on lands surrounding this sensitive and ecologically significant natural area be appropriate for and compatible with long-term preservation. Planning efforts should emphasize passive recreational activities such as interpretive trails and educational opportunities, canoe trails and other low impact endeavors.

INFORMATION NEEDS:
Conservation planning is needed for the wetlands linking Gum Swamp with the North Landing River Pocosins. This wetland area north of the Pocaty River and along the west side of the North Landing River is linked hydrologically to these sites and provides a logical corridor for wildlife movement.



GUM SWAMP
CONSERVATION PLANNING BOUNDARIES
SCALE 1:24,000

NORTH LANDING RIVER POCOSINS

LOCATION: Virginia, City of Virginia Beach
U.S.G.S. Quadrangle: Pleasant Ridge and Creeds

BIODIVERSITY RANK: B2

DIRECTIONS:
The North Landing River Pocosins occur on the west side of the North Landing River. The site is located just south of the confluence of the Pocaty River and the North Landing River and extends south to include the North Landing River Natural Area Preserve (which is bisected by Pungo Ferry Road).

GENERAL DESCRIPTION:
Extensive forested swamps, pocosins, and estuarine marshes characterize this site. The natural area is most noted for its rare pocosin and estuarine marsh communities. As many as four rare communities, 10 rare plant species, and five rare animal species have been documented from the site.

NATURAL HERITAGE RESOURCES: Table of Natural Heritage Resources

Scientific Name	Common Name	G/S Rank	EO Rank	St / Fed Rank
communities:				
oligotrophic saturated scrub	fetter-bush-sheep laurel low pocosin	G3S1	BC	- -
oligotrophic saturated woodland	pond pine/fetter-bush tall pocosin	G3S1	A	- -
estuarine herbaceous vegetation	three-square bulrush-cattail oligo.marsh	S3	A	- -
estuarine herbaceous vegetation	big cordgrass oligohaline marsh	S5	AB	- -
plants:				
Lilaeopsis attenuata	carolina lilaeopsis	G3S1S2	D	C -
Ludwigia alata	winged seedbox	G3G4S1	B	- -
Lobelia elongata	elongated lobelia	G3G5S1	AB	- -
Cleistes divaricata	spreading pogonia	G4S1	D	- -
Carex striata	a sedge	G4S1S2	AB	- -
Chamaecyparis thyoides	Atlantic white cedar	G4S2	A	- -
Physostegia leptophylla	slender-leaved dragon-head	G4G5S2	A	- C2
Cladium mariscus ssp jamaic.	sawgrass	G5T5S1	A	- -
Kalmia angustifolia	sheep laurel	G5S2S3	A	- -
Spiranthes odorata	sweetscent ladies-tresses	G5S2	A	- -
animals:				
Euphyes dukesi	scarce swamp skipper	G3G4S2	A	C -
Poanes aaroni aaroni	saffron skipper	G4T4S3	U	- -
Crotalus horridus atricaudatus	canebrake rattlesnake	G5TQS1	U	LE -
Ixobrychus exilis	least bittern	G5S2	D	- -
Atlides helesus	great purple hairstreak	G5S3	U	- -
Sorex longirostris fisheri	Dismal Swamp SE shrew	G5T2QS2	U	LT LT

This site is most noted for its **low and tall pocosin communities.** Pocosins are natural communities characterized by peaty soils and heath-like vegetation. Along the North Landing River, they are situated between the oligohaline marshes and deepwater swamp forests. A high water table, abundance of sphagnum moss, and slow decay of organic material contribute to deep peat and acidic soils. These conditions, along with nutrient poor soils and frequent fires, are common features of pocosin communities. Plant associations grade from shrubby, low pocosins dominated by a dense layer of low heaths with occasional open herbaceous areas to tall shrub pocosins with sparse to dense small trees and shrubs. Red maple (Acer rubrum), Atlantic white cedar, and pond pine (Pinus serotina) are dominant trees in these wetlands. These wetlands are locally called "juniper bogs" referring to the abundance of Atlantic white cedar in bog-like habitats. A dense understory of fetterbush (Lyonia lucida), sheep laurel (Kalmia angustifolia), inkberry (Ilex glabra), sweet bay (Magnolia virginiana), and red bay (Persea palustris) grow beneath the tree canopy. Throughout the pocosin is a thick tangle of greenbrier (Smilax laurifolia), a thorny vine. Virginia chain fern is sometimes the only herb found in these heath dominated wetlands. Rare plants are found in pocosins as islands or openings in the lowest pocosins. These rarities include **spreading pogonia** and **Walter's sedge.** Few surveys have been conducted on the animal species of pocosins, however, rare butterflies such as Hessel's hairstreak are known to inhabit these wetlands.

Pocosins are found throughout the Atlantic coastal plain from southeastern Virginia to Northern Florida, and west to Mississippi. In Virginia, peat-based pocosins have never been common, but have historically been found in the Great Dismal Swamp and along the lower Blackwater, North Landing, Northwest, and Nottoway rivers. Currently, they are limited in Virginia to remnant communities in the Great Dismal Swamp and along the North Landing River. They are considered an endangered community type in Virginia and a globally declining resource throughout their range. It has been estimated that less than 30 percent of this wetland type remains throughout the Atlantic coastal plain (Sharitz and Gibbons 1982). Virginia has faired even worse, with only 17 per cent of its pocosins remaining today. Hydrologic alterations, fire suppression, and peat mining are the greatest threats to these wetlands. The best remaining pocosins in Virginia occur within this natural area along the North Landing River.

The marshes at this site are classified as estuarine herbaceous wetlands. Within this broad grouping, two marsh plant associations dominate, the **big cordgrass oligohaline marsh** and the **three-square bulrush-cattail oligohaline marsh.** These marshes are fairly extensive and considered exemplary occurrences in Virginia. In addition to being rare community types, they support several rare species of plants and animals. Plants such as elongated lobelia, sawgrass, carolina lilaeopsis and slender-leaved dragon-head can be found here, along with rare animals such as the canebrake rattlesnake, least bittern and several rare lepidoptera species.

The marshes are influenced by slightly brackish to fresh water and the irregular water level fluctuations caused by wind tides. They are formed back from the mouth of the estuary and are sometimes referred to as "back bay or lagoon marshes". Prevailing winds from the south

and east push seawater through Currituck inlet and farther north providing a corridor for many southern plant species to reach their northern range limits. These marshes are plant species rich and considered unique to the mid-Atlantic region of Virginia and North Carolina. They are primarily found along the North Landing River, Northwest River, and the Back Bay watersheds. (Caljouw and Hobbs 1991, Clampitt 1993).

At this site, the marshes are quite picturesque and form a "mosaic" with meandering creeks, low wooded uplands, and shrub swamps. They serve a variety of ecological needs and benefits. They are essential in maintaining the health of the North Landing River wetland ecosystem. The marshes, in addition to supporting many rare species of plants and animals, also contain flood waters and mitigate against damage from storms. They provide a buffer against shoreline erosion and pollution in the waterways. They produce and recycle nutrients and energy, and consequently provide habitat for a multitude of plants and animals.

Carolina lilaeopsis is one of the rare plants found in the marshes. This attractive member of the tea family is rare throughout its range from Virginia to northern Florida, and in Virginia there are just 11 known occurrences (Ludwig, 1993). Carolina lilaeopsis is a candidate for listing in Virginia as State Threatened or Endangered. This perennial herb bears a dainty white flower and is customarily found on muddy substrates in shallow water, marshes and swamps (Godfrey and Wooten, 1981).

Elongated lobelia is another marsh plant bearing lovely purple, trumpet-like flowers. This rare herb is found from Delaware to southeastern Georgia, and is known from fewer than ten places in the state (Ludwig, 1993). Like carolina lilaeopsis, elongated lobelia is also found in swamps and marshes on the coastal plain (Godfrey and Wooten, 1981).

The rare **least bittern** builds its nest near open water, but within marsh vegetation. This secretive bird frequently incorporates living cattails and aquatic reeds into the nest structure to add camouflage and stability. Least bitterns feed primarily on small fish, crustaceans and insects (Potter, 1980).

One of the rarest lepidoptera found in the state is the **scarce swamp skipper**, also called the brown sedge skipper. Host plants for this medium-sized, dark-orangish-brown butterfly are primarily sedges. This animal is a very specialized marsh species, as female skippers lay eggs on the undersides of leaves of certain sedge species (Scott, 1986). Of the butterflies, skippers are generally the strongest and fastest flyers, and are frequently difficult to spot because they move so quickly. As the name implies, this butterfly is known from wooded and sedge swamps, where they spend their entire life cycles. Adult sedge skippers can be observed as they sip nectar from nearby flowers. These butterflies are threatened by habitat loss, and the loss of specific sedges upon which they lay their eggs.

Forested swamps generally occur between the uplands and pocosin wetlands. These swamps are characterized by bald cypress (Taxodium distichum), black gum (Nyssa sylvatica), red maple (Acer rubrum), and black willow (Salix nigra). Sedges and grasses such as swamp sedge (Carex hyalinolepis) and cane (Arundinaria gigantea) are often the only herbs in these shaded wetland communities. The rare epiphytic sedge sometimes occurs in these swamp

forests. Although no records occur from this site, surveys should be conducted for this sedge since there is potential habitat. Openings in these forested swamps often have heavy concentrations of cane grass and are referred to as canebrakes.

These swamp forests support a rare mammal which is federally listed as threatened, the **Dismal Swamp southeastern shrew**. This globally rare species is currently restricted to southeastern Virginia (in the Dismal Swamp and some remnant locations along the North Landing and Northwest rivers) and to northern and eastern North Carolina. These tiny mouse-like mammals spend much of their time under leaf litter, and under and around decaying logs and stumps. The primary food sources of this shrew are spiders, earthworms, grubs and other insect larvae. It is believed that they bear one to two litters of young per year, but because shrews are small and secretive, much of the biology and natural history of these animals remains unknown. Principle threats to these animals are habitat fragmentation and loss.

The **canebrake rattlesnake**, listed as state endangered, occurs in the forested swamps and wooded upland buffers of the natural area. This snake is restricted to a small portion of southeastern Virginia. Its numbers are decreasing due to habitat loss and deliberate molestation and destruction by humans. The canebrake rattlesnake feeds primarily on grey squirrels and cotton-tail rabbits (Savitsky, pers. comm.). It spends large amounts of time resting in cypress swamps in or near the water. The canebrake spends four to five winter months in underground bromation dens. They are live-bearing snakes and do not mature to reproductive condition until approximately six or seven years. These animals are generally reclusive and nonaggressive (Savitsky, pers. comm.; Erdle, pers. observation) and their cryptic coloration frequently renders them virtually invisible.

The **great purple hairstreak** is one of the rare butterflies found in the forested swamps. Virginia is the northern extent of this beautiful butterfly's range on the east coast, and it is rare in the state. These butterflies are blueish-purple on the upper sides of their wings, and black on the bottom. Males often have hairlike tails on the hingwings, plus streaks of white or brown, giving rise to the common name "hairstreak". Great purple hairstreaks are customarily found in wooded areas where their host plants, mistletoe, are parasitic on trees.

PRIMARY ECOLOGICAL BOUNDARY:

It should be noted that conservation planning boundaries for the North Landing River Pocosins encompass two natural areas, the North Pocosin Natural Area and the Pungo Ferry Pocosin Natural Area. Although these natural areas were described separately in the final report of the Natural Areas Inventory for the City of Virginia Beach (Clampitt 1993), they have been combined in this report for ecological reasons. These sites support contiguous fire-dependent communities and common strategies for management and protection.

The primary ecological boundaries surrounding this site follow natural landscape features such as vegetative communities, waterways, and creeks whenever possible. The boundary

encompasses known occurrences of natural heritage resources as well as their potential habitats. On the north and east sides of the site, the primary ecological boundary is contiguous with the center of the river channels of the Pocaty River to the north, and of the North Landing River to the east. Maintaining the existing hydrology is imperative to maintaining a viable interconnected wetland ecosystem. To encompass all existing pocosins and forested wetlands and uplands, along the southwestern edge, the primary boundary follows the channel of Blackwater Creek. The boundary on the west side follows the edge of the marshes and swamp forest.

SECONDARY ECOLOGICAL BOUNDARY:
The secondary ecological boundary includes some lands and water intended to mitigate natural and human threats to the elements and their habitats. The buffer lands included within the secondary ecological boundary will also provide managerial access for special management needs, as well as access for educational purposes.

Generally speaking, this secondary ecological boundary could also be considered a "**watershed planning boundary**". Land use within this critical boundary should be monitored carefully, and uses should be environmentally compatible with the preservation of the significant natural resources. The primary ecological boundary and the secondary ecological boundary are contiguous for all of the North Landing River Pocosins site except for some portions of the west side. On the west side of the site, the secondary ecological boundary expands to the the height of land bordering Blackwater Road. This expansion of the boundary is imperative for inclusion of critical groundwater recharge zones for the wetland communities. Maintenance of normal hydrologic regimes and good water quality is crucial within this boundary for the protection of wetland communities. The swamp/upland interface that is included within this boundary also provides critical foraging habitat and cover for the canebrake rattlesnake (Savitsky, pers. comm.), the Dismal Swamp southeastern shrew, and the great purple hairstreak. It also serves as an important access point and buffer for future management activities within the preserve system. Prescribed fire management will be critical for the maintenance of this area, and the buffer provided by the secondary ecological boundary will provide important managerial and administrative access as well as fire breaks.

SMOKE MANAGEMENT CORRIDOR:
A smoke management corridor is included in the conservation plan to encompass surrounding areas that must be considered for smoke management planning and landowner notification related to prescribed fire activities. Within this corridor, landowners will be offered information regarding the prescribed fire activities occurring on nearby conservation lands. Prior to scheduled burns, landowners will be notified about burn plans and expectations regarding smoke management. Because prescribed fire management is imperative to the restoration and preservation of these resources, smoke management planning for these activities are large considerations and are designed to ensure public health and safety as well as meet ecological objectives. The smoke management corridor follows the secondary ecological boundary and/or the potential burn compartments, at a distance of approximately 0.5 to 1 mile. This corridor is based on planning guidelines developed by the Virginia

Department of Forestry and the Federal Interagency Coordinating Committee for Fire Management. This corridor also includes paved roads and water channels which may be become hazardous during heavy smoke periods.

ONSITE AND OFFSITE CONSIDERATIONS:
Surrounding land use in this area is primarily agricultural. Soybeans, wheat, and field corn are the primary crops grown in the area. These farming practices are generally considered compatible land uses with natural area preservation. Unfortunately, many farms are being abandoned due to hard economic times and more and more rural open lands are being replaced by residential and tract housing developments or other intensive land uses such as golf courses. This type of development may have significant secondary impacts on sensitive wetland natural areas.

Agricultural landowners should adhere to best management practices designed to minimize sedimentation and agricultural runoff in this watershed. Poorly planned farming activities could impact water quality in tributary creeks and the main stem of the North Landing River. The North Landing River was identified in the Nonpoint Source Pollution Watershed Assessment Report as a high priority (H1, 95-100%) for pollution potential by nutrient loadings from agricultural land. The same report assessed the North Landing River as a high priority (H1) for overall agricultural pollution potential, and as (H2, 90-95%) for urban nutrient load pollution (Wilson, 1993).

Surrounding residential and agricultural pesticide and herbicide use should adhere to BMPs designed to minimize negative effects on wetlands and wetland dependent species. Pesticides used for lawn and farm pest species could inadvertently jeopardize rare butterfly populations. Biocides should be carefully chosen and applied by skilled certified applicators.

Current logging practices do not appear to threaten natural heritage resources. Logging is not recommended in pocosin and forested swamps of this natural area. Logging practices on the uplands should follow strict best management practices designed to maintain hydrologic flow, reduce erosion, and control sedimentation. Large tract, clear-cutting or other large scale land altering activities have the potential to influence hydrology and water quality within the area and eliminate wildlife corridors. These activities should be carefully planned and monitored to ensure they provide the proper corridors for wildlife movement and buffers to protect sensitive resources and water quality.

Recreational activities in the watershed include boat and shore fishing, hunting, canoeing, wildlife observation, environmental interpretation, water skiing, and power boating. The river also plays a role in interstate commerce and transportation. Although the Intracoastal Waterway is still used for some commercial shipping today, its primary use is recreational boating. Toxic spills related to commercial activities are a threat to sensitive wetland resources. Several agencies and organizations are working to develop comprehensive strategies for the containment and clean-up of spills and protection of sensitive resources.

Planners and officials of the City of Virginia Beach are aware of the environmental significance of this site. In fact, the North Landing River has been designated as an

"environmentally sensitive area" (City of Virginia Beach, 1991) by the City. The distinction of environmental sensitivity does not, however, afford the river or the immediate surrounding lands any additional protection from development or land use alteration. In 1991, the Comprehensive Plan for the City of Virginia Beach called for a "Rural Preservation Plan" (City of Virginia Beach, 1991). In addition to several additional objectives, the Rural Preservation Plan dictates "Study of the City's southern watersheds that considers environmental needs associated with residential and agricultural land use in this area, and the development of regulations as appropriate based on the study."

Also cited in the Comprehensive Plan for the City is a "Southern Watersheds Management Ordinance". This is cited in the "Environmental Policies and Objectives" section, page II-D-6 (City of Virginia Beach, 1991). This management ordinance sets "standards that include, but are not limited to the provision of reserve sewage disposal drainfield sites, minimal disturbance of land, the preservation of existing vegetation, erosion and sediment controls for all land disturbing activities over 2500 square feet in area, the protection of ground water supplies, the prohibition of development within fifty feet of any shoreline or wetland, and the use of best management practice facilities for controlling stormwater runoff".

In November of 1993, a workshop to emphasize the values of the Southern Watersheds was hosted by the City of Virginia Beach for local citizens. This workshop spawned discussions between citizens, local conservation groups, City officials, and The Nature Conservancy. This ad hoc group has developed a proposal for the preservation of agricultural land within the watersheds. More information on this proposal is included in an appendix to this report.

MANAGEMENT RECOMMENDATIONS:

The Virginia Department of Conservation and Recreation (DCR) and The Nature Conservancy (TNC) are currently developing resource management plans for lands within the North Landing River Preserve System. This planning effort involves as many as 32 resource managers, scientific experts, and conservation planners and is partially funded by NOAA through a Virginia Coastal Resources Management Program grant. The expected completion date for the plan is October 1994.

Several research and management programs are currently underway. These and other recommended programs are briefly outlined here. Invasive species such as common reed (Phragmites australis) and nutria (or coypu) are problem species throughout the watershed requiring biological monitoring and specialized control programs. Common reed is an aggressive grass that has spread rapidly in the watershed. It quickly invades disturbed areas and is extremely tolerant of increased salinities, nutrients, and sediments. Once established, it easily forms dense clones and replaces native vegetation, including many rare plants. When native plants are displaced, food and shleter for waterfowl and wildllife is eliminated. A common reed control program is currently underway in the Southern Watersheds. This is a two year habitat demonstration project funded by the U.S. Environmental Protection Agency (EPA) and U.S. Fish and Wildlife Service (USFWS). The project is coordinated by DCR and USFWS with assistance from Virginia Department of Forestry (DOF) and a variety of other cooperators.

Through this interagency project, the status of common reed is evaluated in the watershed and selected stands are treated which pose the greatest threat to rare species, natural communities, and wildlife. Treatment is generally a two-step process of herbiciding and prescribed burning. A glyphosate herbicide is applied to selected stands toward the end of the growing season. This biodegradable herbicide not only kills above ground stems but is translocated via plant tissues to underground stems and roots affecting all plant parts. Prescribed burns are conducted in the dormant season to remove thick litter and encourage growth of native desirable plants. This combination treatment should be conducted for several years to be most effective. A 150 acre tract within the DCR Natural Area Preserve was herbicide treated and burned in 1993-1994. Retreatment will occur in late summer 1994. This demonstration project has fostered partnerships between state and federal agencies and will lead to long-term strategies for the control of common reed in the North Landing River.

Nutria is a large rodent which was introduced from South America in 1899 into southern U.S. marshes to bolster the fur trade. In the North Landing River, this species has increased greatly and is outcompeting native muskrats for marsh habitat and food. Overgrazed areas of marsh vegetation are readily apparent in the North Landing River Pocosins site. Studies are needed to determine the status of nutria in the North Landing River and most effective means of control.

A comprehensive site fire management plan is needed for the wetlands within the preserve system. Fire plays a significant role in the development and maintenance of pocosins and estuarine marsh communities. These wetland communities depend on fire to set back plant succession, eliminate competing vegetation, release nutrients back into the soil, and provide habitat and food for a variety of wildlife and waterfowl species. Rare plant species such as spreading pogonia, bog cranberry, sawgrass, and Atlantic white cedar depend on fire to maintain open habitats and the proper conditions for seed germination.

Pocosin vegetation is highly flammable and fires naturally occur in these communities every two or three decades. Uncontrolled wildfires in these high intensity fuels pose a threat to human life and property. The last wildfire in this area occurred 15 years ago and burned over 2000 acres. Carefully planned and controlled burns will reduce the threat of potential wildfires causing personal injury, property loss, or ecosystem damage. Prescribed burn planning involves an assessment of fuel types and the development of appropriate prescriptions for burning, and the maintenance or construction of firebreaks.

Planning also reduces the cost associated with wildfire control. A well thought out wildfire contingency plan will stratify types of response by area, season, and fire behavior. The plan will identify appropriate suppression methods given fuel types, existing natural and artificial firebreaks, access routes, and available firefighting equipment and personnel.

Prescribed burn and wildfire contingency plans for the North Landing River will be developed by DCR, TNC, and DOF with assistance from local fire officials. Private landowners adjacent to the wetlands play an important role in developing and implementing these plans. They help determine where firebreaks and access points are possible and their

cooperation is essential in maintaining these features to contain fire within prescribed units.

A fire history study is currently underway at this site. Fire ecologists are analyzing peat and tree cores to determine when fires occurred over the past 1000 years in the pocosins. Fossil pollen and charcoal are analyzed from the peat cores and carbon dated. Existing forest stands will be surveyed. Age structure and fire scars from tree cores and wedges will give us information on recent fire return intervals. This information will help us understand past fire regimes and the response of vegetation to these disturbances.

Hydrologic research is also underway to determine the geochemical controls influencing the wetlands. This study is funded through EPA and the U.S. Geological Survey (USGS) and conducted by professional hydrologists with field assistance from DCR and TNC. The study includes the determination of peat thickness and depth to the underlying aquifer and confining units. Well transects are installed and water levels monitored to determine seasonal ground water levels, direction of flow, and interaction of surface and ground water. Water is sampled for major ions and nutrients. This information gives insight to regional vs. local hydrologic patterns and indicates if nearby land-use practices have influenced water quality in the wetlands. This study provides essential information to develop more detailed conservation plans for upland buffers. It allows us to test the effectiveness of best management practices such as vegetated buffer strips.

Monitoring programs are recommended for the rarest and most threatened species at the site. Species considered for monitoring include Atlantic white cedar, spreading pogonia orchid, scarce swamp skipper, canebrake rattelsnake, and Dismal Swamp southeastern shrew. Monitoring will be conducted to track species vigor and population numbers over time. Many species serve as biological indicators and may help us detect future change or impacts to wetland communities. Plant community monitoring programs should also be conducted to correlate habitat changes with species fluctuations and to ensure the effectiveness of managment practices.

Lands situated between the primary and secondary ecological boundaries are suitable for environmentally compatible land-uses. Activities which may possibly alter the hydrology of sensitive wetlands should be carefully assessed and avoided within this area. On-going hydrologic assessments will help guide these evaluations. When large scale land disturbing activities are planned within the secondary ecological boundaries, DCR Division of Natural Heritage staff should be consulted to avoid impacts to natural heritage resources.

PROTECTION RECOMMENDATIONS:
This site merits a high level of protection as it supports exemplary pocosins, estuarine marshes, and many rare species. DCR and TNC have purchased as many as seven tracts of land protecting over 4,000 acres of wetlands at this site. These tracts form the core of the 9,000 acre preserve system along the North Landing River. All tracts will be dedicated as part of the Virginia Natural Area Preserve System. Negotiations with other landowners continue, in hopes of securing the protection of other key tracts within the primary ecological boundary.

Developing partnerships and management strategies with adjacent landowners are essential in protecting critical buffers and implementing management programs on conservation lands. Landowners will be presented information on the signficant natural areas and protection options available to them. Natural area registry or management agreements are recommended for lands within the secondary ecological boundaries. Impacts from surrounding land uses should be mitigated by encouraging sound soil and water conservation practices and maintaining vegetated buffers to wetlands. A model conservation plan will be developed for landowners in 1995 as part of the hydrologic assessment and conservation project underway.

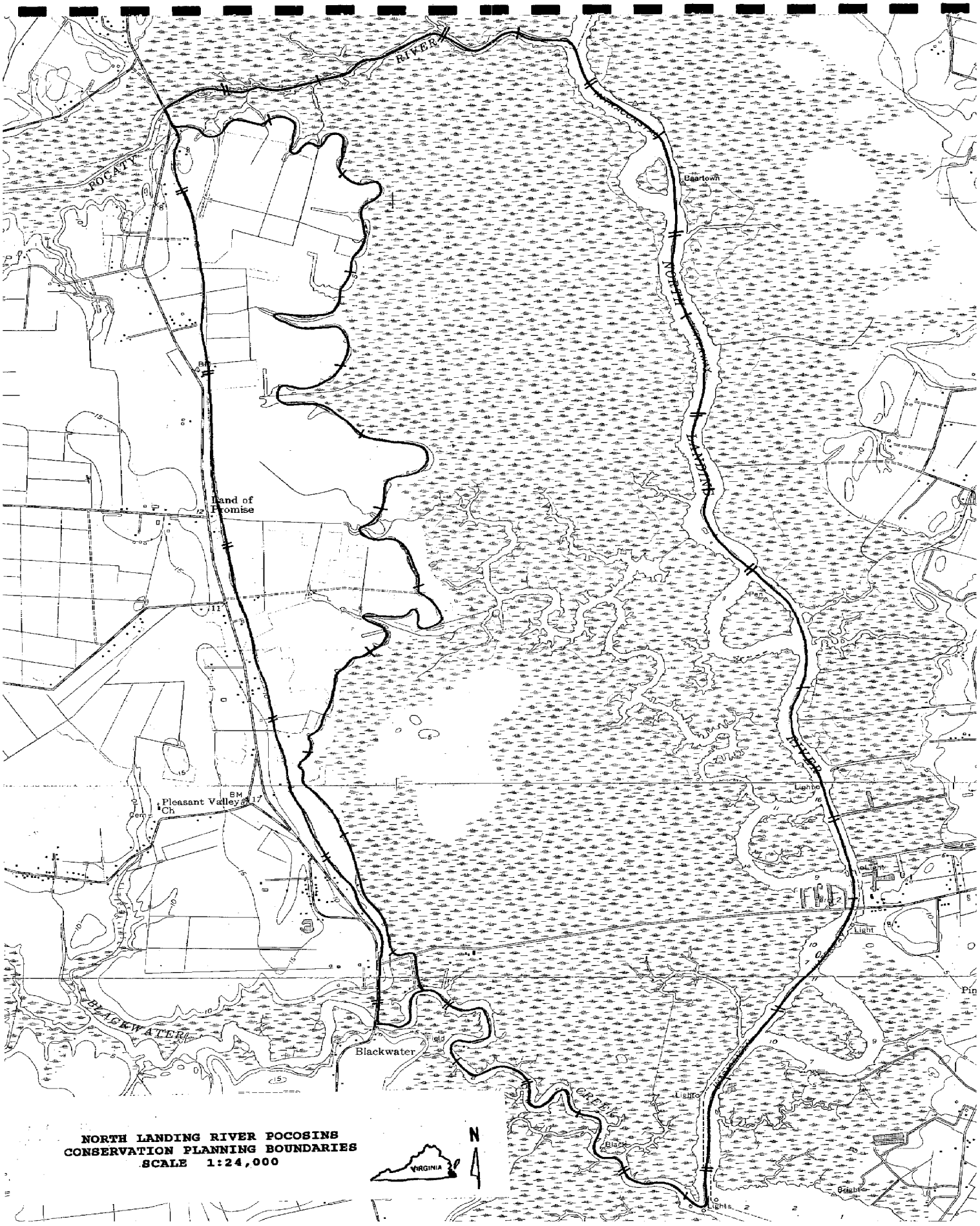
Conservation planning boundaries will be incorporated into the City's land-use planning documents and environmental review process. DCR Division of Natural Heritage offers its knowledge and expertise in reviewing project proposals and working with planning staff.

RECREATIONAL, SCENIC AND EDUCATIONAL RECOMMENDATIONS:
In 1988, the General Assembly of Virginia passed a "Scenic River Designation Bill" making the North Landing River and tributaries part of the Virginia Scenic Rivers System (Code of Virginia, Chapter 4, Section 10.1-413.2). This designation recognizes the aesthetic as well as the functional values of this remarkably beautiful river. The Virginia Scenic River Program began in 1970 with approval by the General Assembly of the Virginia Scenic Rivers Act. A local board composed of citizens of the Cities of Chesapeake and Virginia Beach advise DCR on scenic river issues.

The waters of the North Landing River are fairly slow-moving and picturesque. Recent recreational planning efforts have identified areas for potential river access/canoe put-ins and canoe trails along the entire North Landing River. Efforts by DCR towards the planning and implementation of a canoe launch at Alton's Creek are well underway. A small tract of upland was recently purchased by DCR for preserve and river access. This site, located off Blackwater Road and bordering Alton's Creek, provides other passive recreational and environmental education opportunities. A trail and boardwalk from the uplands to the wetlands emphasizes the natural history and signficance of this wetland ecosystem.

It is recommended that recreational activities on lands surrounding this extremely sensitive and ecologically significant natural area be compatible with long-term preservation goals for the resource. Planning efforts should emphasize passive recreational activities such as interpretive trails and educational opportunities, canoe trails, and other low impact endeavors.

INFORMATION NEEDS:
Additional vertebrate and invertebrate inventories are needed, especially for Hessel's Hairstreak, canebrake rattlesnake, Dismal Swamp southeastern shrew, and the eastern big-eared bat.



NORTH LANDING RIVER POCOSINS
CONSERVATION PLANNING BOUNDARIES
SCALE 1:24,000

NORTH LANDING RIVER OAKUM CREEK

LOCATION: Virginia, City of Virginia Beach
U.S.G.S. Quadrangle: Creeds

BIODIVERSITY RANK: B3

DIRECTIONS:
North Landing River Oakum Creek is located along the east side of the North Landing River. The site includes much of the lower end of the creek, the mouth and associated marshes and uplands, south of Creeds and north of Munden. The natural area includes part of Munden Point Park.

GENERAL DESCRIPTION:
Oakum Creek is a small, slow-moving, and tightly-meandering tributary to the North Landing River. Near the mouth of the creek, at its confluence with the North Landing River, there are marshes which support several rare species of plants and animals. Munden Point Park, a city park, is located just south of this confluence, and some ecologically sensitive areas and rare species habitat are located within the park.

NATURAL HERITAGE RESOURCES: Table of Natural Heritage Resources

Scientific Name	Common Name	G / S Rank	EO Rank	Fed / St Rank
plants:				
Lilaeopsis attenuata	**carolina lilaeopsis**	**G3S1S2**	**B**	**- C**
Lobelia elongata	**elongated lobelia**	**G3G5S1**	**A**	**- -**
Cladium mariscus Jamaicense	**sawgrass**	**G5T5S1**	**A**	**- -**
animals:				
Euphyes dukesi	**scarce swamp skipper**	**G3G4S2**	**U**	**C -**
Poanes aaroni aaroni	**saffron skipper**	**G4T4S3**	**U**	**- -**
Crotalus horridus atricaudatus	**canebrake rattlesnake**	**G5T2QS2**	**U**	**- LE**

Oakum Creek runs for 2 to 2.5 miles and has its headwaters in fields east of the intersection of Pungo Ferry Road and Princess Anne Road. It obtains much of its waters from ditches and drains in that area. Oakum Creek runs south, passing through the town of Creeds, and there it begins a southwest direction towards the North Landing River channel. The marshes supporting rare plants and animals are bordered on the northeast and the east by a forest. This forested area was described by Departmetn of Conservation and Recreation ecologists as being a species-rich forest, with an excellent possibility of supporting additional rare plant and animal species.

Oakum Creek flows for two and a half miles from an area east of the intersection of Pungo Ferry Road and Princess Anne Road to its confluence with the North Landing River, approximately a mile north of the town of Munden. Throughout most of this stretch, Oakum Creek runs through nutrient-rich marshes, skirting agricultural fields and forested uplands. At the confluence of Oakum Creek and the North Landing River, where the water is fresh to very slightly brackish, high quality marshes support several rare species of plants and animals.

The estuarine marshes at this site are classified as estuarine herbaceous wetlands. A rare plant association found within this broad wetland grouping is the oligohaline marsh dominated by robust emergents such as big cordgrass, common reed, southern cattail, and the rare sawgrass. This site, like many along the North Landing River, experiences irregular water level fluctuations resulting from wind tides. The water is slightly brackish to fresh. A bald cypress swamp has formed at the mouth of the creek, and the rare plants, carolina lilaeopsis and elongated lobelia, are found near the mouth of the creek where cypress knees offer some shelter from storm waves and boat wakes.

Sawgrass is part of the marsh community described above. This rare sedge is frequently found in freshwater marshes, although it can tolerate some salt (Schafale and Weakley, 1990), and may occur in brackish marshes as well. Sawgrass is the primary component of the Everglades in Florida, and is near the northern edge of its range here in Virginia.

Another rare plant found in the marshes is **carolina lilaeopsis**. This attractive member of the tea family is at the northernmost edge of its range here in Virginia. It is considered globally rare, ranging from Virginia to northern Florida, with fewer than 100 total documented occurrences (Ludwig, 1993). This perennial herb bears a dainty, white flower, and is customarily found in shallow water, marshes and swamps (Godfrey and Wooten, 1981). In Virginia, this rare plant is known from 11 locations and is a candidate for listing as State Threatened or Endangered.

Elongated lobelia is also found from the Oakum Creek site. This herb is found from Delaware to southeastern Georgia and is considered rare in Virginia, with fewer than 10 documented occurrences (Ludwig, 1993). Like carolina lilaeopsis, elongated lobelia is also found in swamps and marshes on the coastal plain (Godfrey and Wooten, 1981). It bears a lovely purple, trumpet-like flower in late summer.

One of the rarest butterflies in the state is the **scarce swamp skipper,** also called the brown sedge skipper. Host plants for this medium-sized, dark-orangish-brown butterfly are primarily sedges, where the female skippers lay eggs on the undersides of leaves of specific sedge species (Scott, 1986). Of the butterflies, skippers are generally the strongest and fastest flyers, and are frequently difficult to spot because they move so quickly. As the name implies, this butterfly is known from wooded and sedge swamps, where they spend their entire lifecycles. Adult sedge skippers can be observed as they sip nectar from nearby flowers.

Healthy marshes and creeks provide a variety of ecological benefits and are imperative in maintaining the health of a riverine system. Marshes enhance water quality, help contain flood waters, and mitigate against storm damage. They provide a buffer against shoreline erosion, and produce large amounts of nutrients and energy. Additionally, marshes provide habitat for a multitude of plants and animals.

The forested uplands at this site are extremely diverse and there is a high probability that they support additional rare species of plants and animals. Although the forest has been cut-over in the past, it remains species-rich, and is characterized by some large magnolia

(Magnolia virginia) and scattered sweetleaf (Symplocos tinctoria).

PRIMARY ECOLOGICAL BOUNDARY:
The primary ecological boundary includes known occurrences of natural heritage resources, and their potential habitats. This boundary encompasses the marshes along the North Landing River channel and Oakum Creek. Appropriate management will enhance these marshes and the rare plants found here. Because the restoration potential for these areas is quite high, more rarities may be found with additional surveys. The primary boundary is contiguous with the channel of the North Landing River along the west side of the site, and for the remainder of the site it expands to take in marshes along Oakum Creek, as well as the creek itself. These marshes are known and potential habitat for rare species at this site. The primary ecological boundary includes the watershed of the small, unnamed branch of Oakum Creek located to the south. This area contributes to the water quality of the marshes and is excellent potential habitat for rarities.

On the south, southwestern edge of the site, the primary and secondary ecological boundaries are contiguous, and cross through Munden Point Park. This park is owned by the City of Virginia Beach, and consists of some river frontage with boat launches and recreational activities. The portion of the park that is included within the ecological boundaries of this potential natural area are some lands fronting the North Landing River and some lands adjacent to Oakum Creek and the small, unnamed branch of Oakum Creek. These areas appear to be well away from the more intensive recreation areas of Munden Point Park.

SECONDARY ECOLOGICAL BOUNDARY:
The secondary ecological boundary includes lands and water intended to mitigate natural and human threats to the elements and their respective habitats. This boundary also includes lands related to special management needs such as prescribed burning.

The boundary is contiguous with the primary ecological boundary for much of the site, however, on the eastern side of the park, the secondary ecological boundary expands to include the species-rich forested uplands mentioned previously. This forest buffers the smaller branch of Oakum Creek and the relatively undisturbed nature of this area, combined with the character of the woodland, make it ideal potential habitat for additional rarities, as well as the canebrake rattlesnake and other rare butterflies. Canebrake rattlesnakes spend large amounts of time resting and foraging in uplands and upland/marsh interface zones, and this small woodland is important habitat for this species.

ONSITE AND OFFSITE CONSIDERATIONS:
Surrounding land use in this area is primarily agricultural, although in recent years many local farms have been developed for alternative uses such as residential and tract housing. This type of development may have significant impacts on sensitive natural areas.

Agricultural land-use is generally compatible with natural area protection. Best Management Practices designed to minimize sedimentation and agricultural runoff should also be adhered to in this watershed, as farming activities could influence water quality in Oakum Creek. The North Landing River was identified in the Nonpoint Source Pollution Watershed

Assessment Report as a high priority (H1, 95-100%) for pollution impacts from nutrient loadings from agricultural land. The same report assessed the North Landing River as a high priority (H1) for overall agricultural pollution, and as (H2, 90-95%) for urban nutrient load pollution (Wilson, 1993).

Current logging practices do not appear to be a threat to natural heritage resources. BMPs designed to maintain hydrologic flow, reduce erosion, and control sedimentation should be adhered to within this small watershed. Large tract, clear-cutting or other large-scale land altering activities could influence hydrology and water quality in Oakum Creek, and therefore should be monitored closely to avoid hydrologic impacts and maintain critical buffers to sensitive wetlands.

Planners and officials of the City of Virginia Beach are aware of the environmental significance of the southern watersheds, and the North Landing River has been designated as an "environmentally sensitive area" (City of Virginia Beach, 1991). The distinction of being an environmentally sensitive area does not, however, afford the river or the immediate surrounding lands any additional protection from development or land use alteration. In 1991, the Comprehensive Plan for the City of Virginia Beach called for a "Rural Preservation Plan" (City of Virginia Beach, 1991). In addition to several additional objectives, the Rural Preservation Plan dictates "Study of the City's southern watersheds that considers environmental needs associated with residential and agricultural land use in this area, and the development of regulations as appropriate based on the study." It is presumed that this study is ongoing.

Also cited in the Comprehensive Plan for the City is a "Southern Watersheds Management Ordinance." This is cited in the "Environmental Policies and Objectives" section, page II-D-6 (City of Virginia Beach, 1991). This management ordinance sets "standards that include, but are not limited to the provision of reserve sewage disposal drainfield sites, minimal disturbance of land, the controls for all land disturbing activities over 2500 square feet of development within fifty feet of any shoreline or wetland, and the use of best management practice facilities for controlling stormwater runoff."

MANAGEMENT RECOMMENDATIONS:

Staff at Munden Point Park should be advised of the rare plant and animal species located within and near the park, as well as appropriate management techniques and strategies for the maintenance of these and the control of invasive species such as common reed. It is recommended that Department of Conservation and Recreation Division of Natural Heritage Stewardship staff and park personnel jointly develop management plans for significant natural areas within the park.

A better understanding of the hydrology of the North Landing River system is imperative for future management decisions. A study of this nature is currently underway in other parts of the riverine system, and management plans and ecological boundaries will be continually refined as more information is obtained.

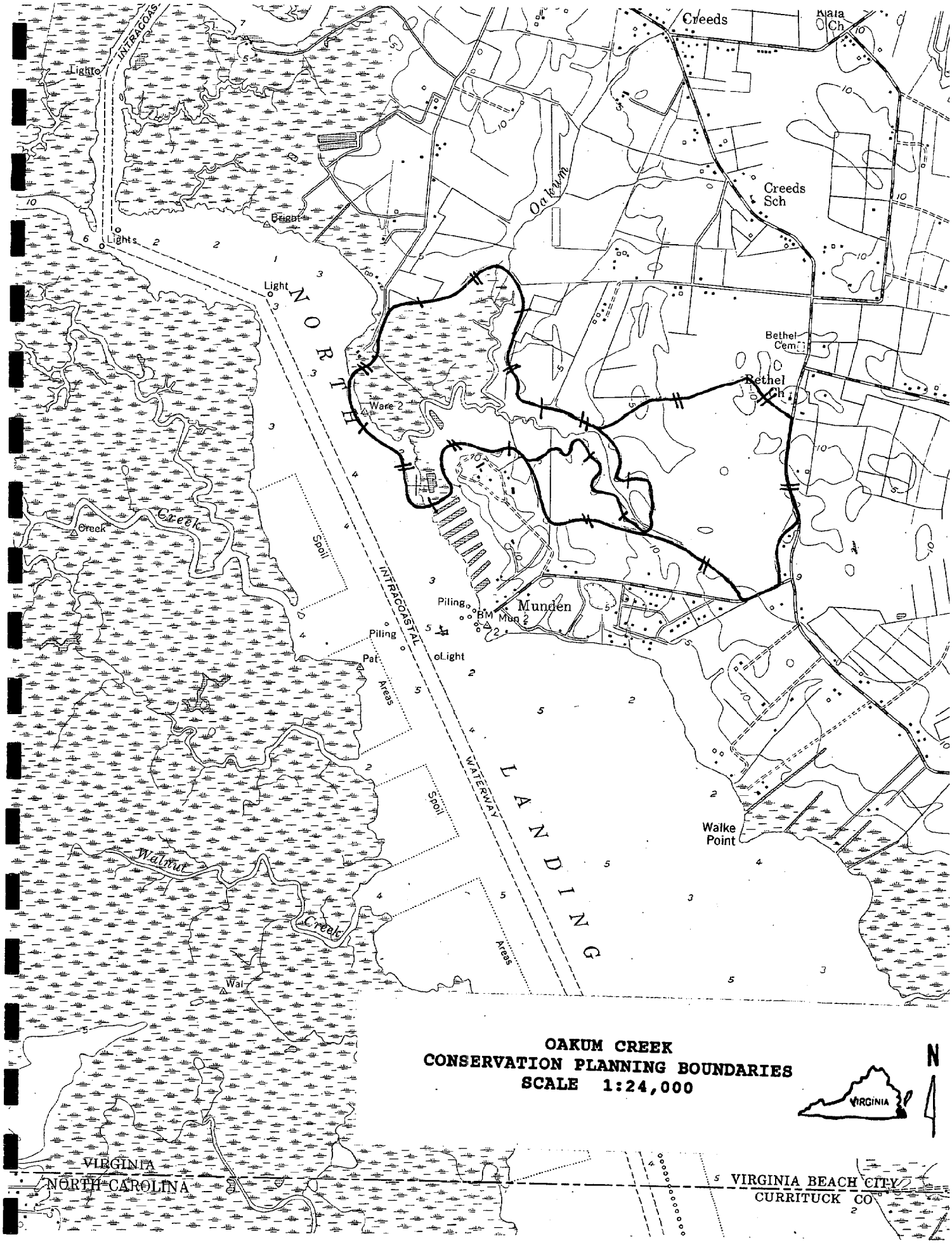
PROTECTION RECOMMENDATIONS:
Natural area management agreements, registries and other less-than-fee-acquisition protection options are recommended for this site. Natural area preserve dedication should be considered for areas within the conservation planning boundaries at Munden Point Park. Voluntary partnerships with private landowners will protect sensitive wetlands. Impacts from surrounding land-uses should be mitigated by encouraging sound soil and water conservation practices and maintaining vegetated buffers to the wetlands.

Conservation planning boundaries for this site will be incorporated into the City's land-use planning documents, development review process, and park administrative plans. DCR Division of Natural Heritage offers its knowledge and expertise in reviewing project proposals and working with City planning and resource management staff.

RECREATIONAL, SCENIC AND EDUCATIONAL RECOMMENDATIONS:
In 1988, the General Assembly of Virginia passed a "Scenic River Designation Bill" making the North Landing River and tributaries part of the Virginia Scenic Rivers System (Code of Virginia, Chapter 4, Section 10.1-413.2). This designation recognizes the aesthetic as well as the functional values of this remarkably beautiful river. The Virginia Scenic River Program began in 1970 with approval by the General Assembly of the Virginia Scenic Rivers Act.

The North Landing River is fairly slow-moving and quite picturesque. Recent recreational planning efforts have identified areas for potential river access/canoe put-ins along the entire North Landing River. The noteworthy designation as a "State Scenic River" and future plans to better use and enhance the public's access to the North Landing River mesh well with the City of Virginia Beach's plans to emphasize ecotourism in the city.

A public education program for nearby residents, developers, builders and river-users might enhance public awareness about this riverine system and the tremendous biodiversity it supports. If not presently in place, additional interpretive programs could be initiated by staff at Munden Point Park to further educate park visitors.



OAKUM CREEK
CONSERVATION PLANNING BOUNDARIES
SCALE 1:24,000

N

NORTH LANDING RIVER SOUTHERN MARSHES

LOCATION: Virginia, City of Virginia Beach
Quadrangle: Creeds

BIODIVERSITY RANK: B2

DIRECTIONS:
The North Landing River Southern Marshes is located along the western shore of the North Landing River, south of Blackwater Creek and north of the Virginia/North Carolina State Line. The site includes both Blackwater Creek and Milldam Creek.

GENERAL DESCRIPTION:
The Southern Marshes encompass forested swamps and extensive oligohaline marshes. Within the swamp forest are small, slightly raised, sandy islands which support a diverse array of rare plants and animals. Plant species richness is high throughout the site, especially in the marshes. A small but exemplary stand of Atlantic white cedar occurs here as well. The site supports three rare natural communities, eight rare plants, and nine rare animal species.

NATURAL HERITAGE RESOURCES: Table of Natural Heritage Resources

Scientific Name	Common Name	G / S Rank	EO Rank	Fed / St Rank
communities:				
Estuarine herbaceous vegetation	**big cordgrass oligohaline marsh**	**S5**	**AB**	**- -**
Estuarine herbaceous vegetation	**spikerush short oligohaline marsh**	**S1**	**AB**	**- -**
Estuarine herbaceous vegetation	**three-square bulrush-cattail oligohaline marsh**	**S3**	**A**	**- -**
plants:				
Boltonia caroliniana	**carolina boltonia**	**G2QS1**	**U**	**- -**
Chamaecyparis thyoides	**Atlantic white cedar**	**G4S2**	**BC**	**- -**
Cladium mariscus ssp Jamaicense	**sawgrass**	**G5T5S1**	**A**	**- -**
Spiranthes odorata	**sweetscent Ladies'-tresses**	**G5S2**	**A**	**- -**
Stewartia malachodendron	**silky camellia**	**G4S2**	**B**	**- -**
Physostegia leptophylla	**slender-leaved dragon-head**	**G4G5S2**	**A**	**C2 -**
Ludwigia alata	**winged seedbox**	**G3G4S1**	**B**	**- -**
Carex decomposita	**epiphytic sedge**	**G3G4S1**	**B**	**3C D**
animals:				
Euphyes dukesi	**scarce swamp skipper**	**G3G4S2**	**U**	**- -**
Poanes aaroni aaroni	**saffron skipper**	**G4T4S3**	**U**	**- -**
Rallus elegans	**king rail**	**G4QS2**	**U**	**- -**
Rallus limicola	**Virginia rail**	**G5S2**	**U**	**- -**
Ixobrychus exilis	**least bittern**	**G5S2**	**CD**	**- -**
Atlides helesus	**great purple hairstreak**	**G5S3**	**U**	**- -**
Crotalus horridus atricaudatus	**canebrake rattlesnake**	**G5T2QS1**	**U**	**- LE**
Synaptomys cooperi helaletes	**southern bog lemming**	**G5T3S3**	**U**	**3C -**
Sorex longirostris fisheri	**Dismal Swamp southeastern shrew**	**G5T2QS2**	**U**	**LT LT**

The most diverse and extensive oligohaline marshes in Virginia are found within this natural area. The marshes are classified as estuarine herbaceous wetlands. Within this broad grouping, there are three distinct plant associations; the **big cordgrass oligohaline marsh,**

the **spikerush short oligohaline marsh** and the **three-square bulrush-cattail oligohaline marsh**.

The marshes here are generally dominated by robust emergents such as big cordgrass, common reed, southern cattail, narrow-leaf cattail, black needlerush, and the rare sawgrass. Some areas of low marsh contain a diverse mix of plants including carolina boltonia, sweetscent Ladies'-tresses, slender-leaved dragon-head and winged seedbox. The marshes also support rare animals such as the king rail, Virginia rail, least bittern, and several rare species of butterflies, including the great purple hairstreak.

The marshes are influenced by slightly brackish to fresh water and the irregular water level fluctuations resulting from wind tides. They form back from the mouth of the estuary and are sometimes referred to as "back bay or lagoon marshes". Prevailing winds from south and east push seawater through Currituck Inlet and farther north providing a corridor for many southern plants to reach their northern range limits. These marshes are plant species rich and considered unique to the mid-Atlantic region of Virginia and North Carolina. (Caljouw and Hobbs 1991, Clampitt 1993). This site supports the best example of this community type known in Virginia.

The marshes are picturesque and form a mosaic with meandering creeks, guts, low wooded uplands, and shrub swamps. They serve a variety of ecological functions. They are essential in maintaining the health of the North Landing River wetland ecosystem. The marshes, in addition to supporting many rare species, also conatin flood waters and mitigate against damage from storms. They provide a buffer against shoreline erosion and pollution in the waterways. They produce and recycle nutrients and energy, and consequently provide habitat for a multitude of plants and animals.

The rare **least bittern**, builds its nest near open water within marsh vegetation, frequently incorporating living cattails and aquatic reeds into the nest structure. These small secretive birds feed mostly on small fish, crustaceans and insects (Potter, 1980). Several breeding pairs have been documented from this site.

Elongated lobelia is a rare marsh plant bearing beautiful purple, trumpet-like flowers. The range of this rare herb is from Delaware to southeastern Georgia (Godfrey and Wooten, 1981). In Virginia, elongated lobelia is known from fewer than ten locations (Ludwig, 1993). These plants are customarily found in swamps and marshes on the coastal plain (Godfrey and Wooten, 1981). Extensive populations occur within the marshes of the North Landing River.

This site also supports the **scarce swamp skipper**, also known as the brown sedge skipper, one of the rarest butterflies in Virginia. Scarce swamp skippers are medium-sized, dark-orangish-brown butterflies which can be found primarily in the marshes. Female skippers lay eggs on the undersides of leaves of specific sedge species (Scott, 1986) so these animals are dependent upon the the continued health and diversity of the marshes. Of the butterflies, skippers are generally the strongest and fastest flyers, and are frequently difficult to spot

because they move so quickly. As the name implies, this butterfly is known from wooded and sedge swamps and marshes, where they spend their entire life cycles. Adult sedge skippers can sometimes be observed as they sip nectar from nearby flowers.

Swamp forests border the marshes along their western fringes. These swamps are characterized by bald cypress (Taxodium distichum), swamp tupelo (Nyssa aquatica), red maple (Acer rubrum), loblolly pine (Pinus taeda), and sweetgum (Liquidambar styraciflua). The swamps support such rarities as epiphytic sedge and a small stand of Atlantic white cedar.

Atlantic white cedar wetlands are regionally declining. The range of this wetland type is much reduced due to wetland alteration projects and poorly planned logging practices. Atlantic white cedar is geographically restricted to freshwater wetlands along a narrow band of the eastern coastal United States. Although cedar swamp and bogs were never widely distributed, they are increasingly encroached upon by mining and draining for alternative land-uses (Laderman 1987). The small Atlantic white cedar stand at this site is surrounded by a larger hardwood swamp.

Epiphytic sedge, often called cypress-knee sedge, occurs along creek channels and open water pools within the swamp forest. In recent years, this species range has shrunk considerably along the east coast and midwestern United States. It is now found in somewhat disjunct locations throughout parts of its historic range (Ostlie 1990). In Virginia, it is known from the North Landing River and from only one other river statewide. The epiphytic sedge is usually found in undisturbed, organic-rich backwaters; it occurs on floating or partially-submerged rotting logs, stumps and most often, on cypress knees along the edge of the swamp forest. It is a perennial species that bears its perigynia in mid-summer. Dispersal of seeds is believed to be facilitated by waterbirds, carried inadvertently on the feet and deposited onto the log or stump when the birds come to rest (Ostlie, 1990). Epiphytic sedge is threatened by negative changes in water quality, direct habitat destruction and disruptions in normal hydrologic flow, which may either raise or lower water levels.

The **canebrake rattlesnake**, a state endangered species, is found primarily in the swamp forest. This snake is restricted to a small portion of southeastern Virginia. Its numbers here are decreasing rapidly due to habitat loss and deliberate molestation and destruction by people. The canebrake rattlesnake feeds primarily on grey squirrels and cotton-tail rabbits (Savitzky, pers. comm.) but spends large amounts of time resting in cypress swamps in or near the water. The canebrake rattlesnake spends approximately four to five months in underground bromation dens during the winter. They are live-bearing snakes, and have one to two litters per year. These animals are reclusive and non-aggressive (Savitzky, pers. comm.; Erdle, pers. observation) and their cryptic coloration frequently renders them virtually invisible.

The **Dismal Swamp southeastern shrew** is found only in southeastern Virginia (primarily in the Dismal Swamp with satellite populations along the riverine wetlands of the Southern Watersheds) and in northern/northeastern North Carolina. These tiny, mouse-like mammals spend much of their time under leaf litter, and under and around decaying logs and stumps.

The primary food source of the shrew is spiders, earthworms, grubs and other insect larvae. It is believed that they bear one to two litters of young per year, but because shrews are small and secretive, much biology and natural history of these animals remains unknown. Principle threats to the shrew are habitat destruction and loss; and habitat alteration which allows interbreeding with the more common upland shrew, the southeastern shrew (Sorex longirostris longirostris).

The ecotone, or interface zone, between forested wetlands and uplands provides habitat for a rare plant and several rare animal species. The **silky camellia** is found in this ecotone. Silky camellia is a rare member of the tea family, and is characteristically found in moist forests, low woods and on creek banks (Radford, 1968). This plant is rare throughout its range, and is known from only 16 locations in Virginia. The silky camellia is a small shrub with lovely, delicate, white flowers. These forested areas (wetland, edge and upland) are also critical habitat for the Dismal Swamp southeastern shrew, southern bog lemming, and canebrake rattlesnake.

PRIMARY ECOLOGICAL BOUNDARY:
The primary ecological boundary includes known occurrences of natural heritage resources as well as their potential habitats. All of the extensive marshes along the southwest side North Landing River are included within this boundary, as are the associated upland islands, swamp forests and some upland forests considered important buffers and possibly supporting rare species. Small portions of the upper watershed for Blackwater Creek and Milldam Creek are included within the primary ecological boundary. At the southern end of the site, the primary ecological boundary must adhere to political considerations, as it coincides with the Virginia/North Carolina line.

SECONDARY ECOLOGICAL BOUNDARY:
The secondary ecological boundary includes lands and water intended to mitigate natural and human threats to the elements and their respective habitats. This boundary also includes lands related to special management needs such as prescribed burning at this site. Because water quality and maintenance of a normal hydrologic regime are critical to some of the rare plants at this site, this boundary also encompasses wetlands and some of the associated uplands within the watersheds of Blackwater Creek and Milldam Creek.

The secondary ecological boundary coincides with the primary ecological boundary on the south and east sides of the site. On the west side of the site however, the secondary boundary expands slightly to include some raised islands and marsh/upland interfaces along the North Landing River. These interface areas are critical habitat for several rare species such as the silky camellia, canebrake rattlesnake, Dismal Swamp southeastern shrew, great purple hairstreak and the southern bog lemming. The secondary ecological boundary also expands minimally around the drainages for Blackwater Creek and Milldam Creek to provide some buffer for these important tributaries, and to allow for future management needs.

SMOKE MANAGEMENT CORRIDOR:
The smoke management corridor is included for the North Landing River Southern Marshes site to encompass surrounding areas that must be considered during future prescribed fire

management. Landowners within this corridor will be offered information about the prescribed burn management plans and practices. Prior to scheduled burns, every effort will be made to notify these landowners about burn plans and schedules. Because prescribed fire management is imperative to the restoration and preservation of these resources, smoke management planning for these activities are important considerations and are designed to enusre public safety and health while meeting ecolgocial management objectives. The smoke management corridor follows the secondary ecological boundary and/or the burn compartments at a distance of approximately 0.5 to 1 mile. This corridor is based on planning guidelines developed by the Virginia Department of Forestry and the Federal Interagency Coordinating Committee for Fire Management. This corridor also includes paved roads and open water which may become hazardous during heavy smoke periods.

ONSITE AND OFFSITE CONSIDERATIONS:
Surrounding land use in this area is primarily agricultural. Soybeans, wheat, and field corn are the primary crops grown in the area. These farming practices are generally considered compatible with natural area preservation efforts. Unfortunately, many farms are being sold due to difficult economic times. More and more rural open land is being replaced by residential and large tract housing developments or other intensive land-uses such as golf courses. This type of development may have significant secondary impacts on sensitive natural areas in the watershed.

Agricultural landowners should adhere to best management practices designed to minimize sedimentation and agricultural runoff in the watershed. Poorly planned farming activities could impact water quality in the tributary creeks and the main stem of the North Landing River. The North Landing River was identified in the Nonpoint Source Pollution Watershed Assessment Report as a high priority (H1, 95-100%) for pollution impacts from nutrient loadings from agricultural land. The same report assessed the North Landing River as a high priority (H1) for overall agricultural pollution, and as (H2, 90-95%) for urban nutrient loading pollution (Wilson, 1993).

Surrounding landowners using pesticides and herbicides should adhere to BMP's designed to minimize negative effects on wetlands and wetland dependent species. Pesticides used for lawn, farm, or forest pest species could inadvertently jeopardize rare invertebrates. Certain herbicides may impact water quality and threaten non-target plant species if not carefully selected and applied.

Current logging practices do not appear to threaten natural heritage resources. Logging practices on the adjacent uplands should follow strict BMP's designed to control sedimentation, maintain hydrologic flows, and reduce ersosion. Large tract, clear-cutting or other large-scale land altering activities could influence hydrology and water quality in the area, and should be monitored closely to ensure they provide adequate buffers and standards to protect sensitive resources and water quality.

Recreational activities in the watershed include boat and shore fishing, hunting, canoeing, wildlife observation, water skiing, and power boating. The river also plays a role in

interstate commerce and transportation. The waterway is still used for commercial shipping today, although its primary use is for recreational boating. Toxic spills related to commercial activities are a threat to sensitive wetland resources. Several agencies and organizations are working to develop comprehensive strategies for the containment and clean-up of spills and the protection of sensitive resources on the river.

Planners and officials of the City of Virginia Beach are aware of the environmental significance of many of the sites located within the City, and the North Landing River has been designated as an "environmentally sensitive area" (City of Virginia Beach, 1991). The distinction of being an environmentally sensitive area does not, however, afford the river or the immediate surrounding lands any additional protection from development or land use alteration. In 1991, the Comprehensive Plan for the City of Virginia Beach called for a "Rural Preservation Plan" (City of Virginia Beach, 1991). In addition to several additional objectives, the Rural Preservation Plan dictates "Study of the City's southern watersheds that considers environmental needs associated with residential and agricultural land use in this area, and the development of regulations as appropriate based on the study." It is presumed that this study is ongoing.

Also cited in the Comprehensive Plan for the City is a "Southern Watersheds Management Ordinance." This is cited in the "Environmental Policies and Objectives" section, page II-D-6 (City of Virginia Beach, 1991). This management ordinance sets "standards that include, but are not limited to the provision of reserve sewage disposal drainfield sites, minimal disturbance of land, the controls for all land disturbing activities over 2500 square feet of development within fifty feet of any shoreline or wetland, and the use of best management practice facilities for controlling stormwater runoff."

In November of 1993 a workshop to emphasize the values of the Southern Watersheds was hosted by the City of Virginia Beach. This workshop spawned discussions between citizens, local conservation groups, City officials, and The Nature Conservancy. This ad hoc group has developed a proposal for the preservation of agricultural land within the watersheds. More information on this proposal is included in an appendix to this report.

MANAGEMENT RECOMMENDATIONS:

The Virginia Department of Conservation and Recreation (DCR) and The Nature Conservancy (TNC) are currently developing resource management plans for lands within the North Landing River Preserve System. This planning effort involves as many as 32 scientific experts, resource managers, and conservation planners, and is partially funded by NOAA through a Virginia Coastal Resources Management Program grant. The expected completion date for this project is October 1994.

Fire has played an integral role in the maintenance of these marshes. To preserve the biodiversity and health of these communities, fire must be re-introduced on a regular basis. Many of the marshes are already being invaded by woody species such as red maple, swamp rose, and wax myrtle; and lack of frequent fire in the marshes is a major reason for the increase in woody plants. Appropriate fire management will enhance the marshes and rare plants found there. Because restoration potential for these areas is quite high, additional

rarities may be found with prescribed fire management.

Prescribed fire and wildfire contingency plans for the North Landing River will be developed by DCR, TNC, and DOF, with assistance from local fire officials. Private landowners adjacent to the wetlands play an important role in developing and implementing these plans. They help to determine where firebreaks and access points are possible and their cooperation is essential in maintaining these features to contain fire within prescribed units.

Common reed (Phragmites australis), a potentially aggressive marsh grass, occurs in many of these marshes. An inter-agency reed grass control project which evaluates and treats selected stands of common reed within the southern watersheds, and particularly along the North Landing River, is currently underway. The treatment for this invasive plant involves herbicide applications and prescribed fire management. Several tracts within this site are being treated as part of a U.S. Environmental Protection Agency (EPA) and U.S. Fish and Wildlife Service (USFWS) habitat demonstration project.

Long-term monitoring is recommended for rare species such as epiphytic sedge, Atlantic white cedar, winged seedbox, canebrake rattlesnake, southern bog lemming, and Dismal Swamp southeastern shrew. Monitoring will be conducted to track species vigor and population numbers. Many of these species serve as biological indicators and may help detect future changes or impacts to wetland communities. Plant community monitoring programs should also be conducted to correlate habitat changes with species fluctuation and to ensure the effectiveness of management practices.

A better understanding of the hydrology of the North Landing River wetland ecosystem is imperative for future management decisions. A study of this nature is currently underway at the North Landing River Pocosins. See the conservation plan for that site for more details on that research project.

Lands situated between the primary and secondary ecological boundaries are suitable for environmentally compatible land-uses. When large scale land disturbing activities are planned within the secondary ecological boundaries, DCR Division of Natural Heritage staff should be consulted to avoid impacts to natural heritage resources. These activities should be carefully planned and implemented so as not to disrupt hydrology within sensitive wetlands, and to maintain critical buffers and corridors for wildlife.

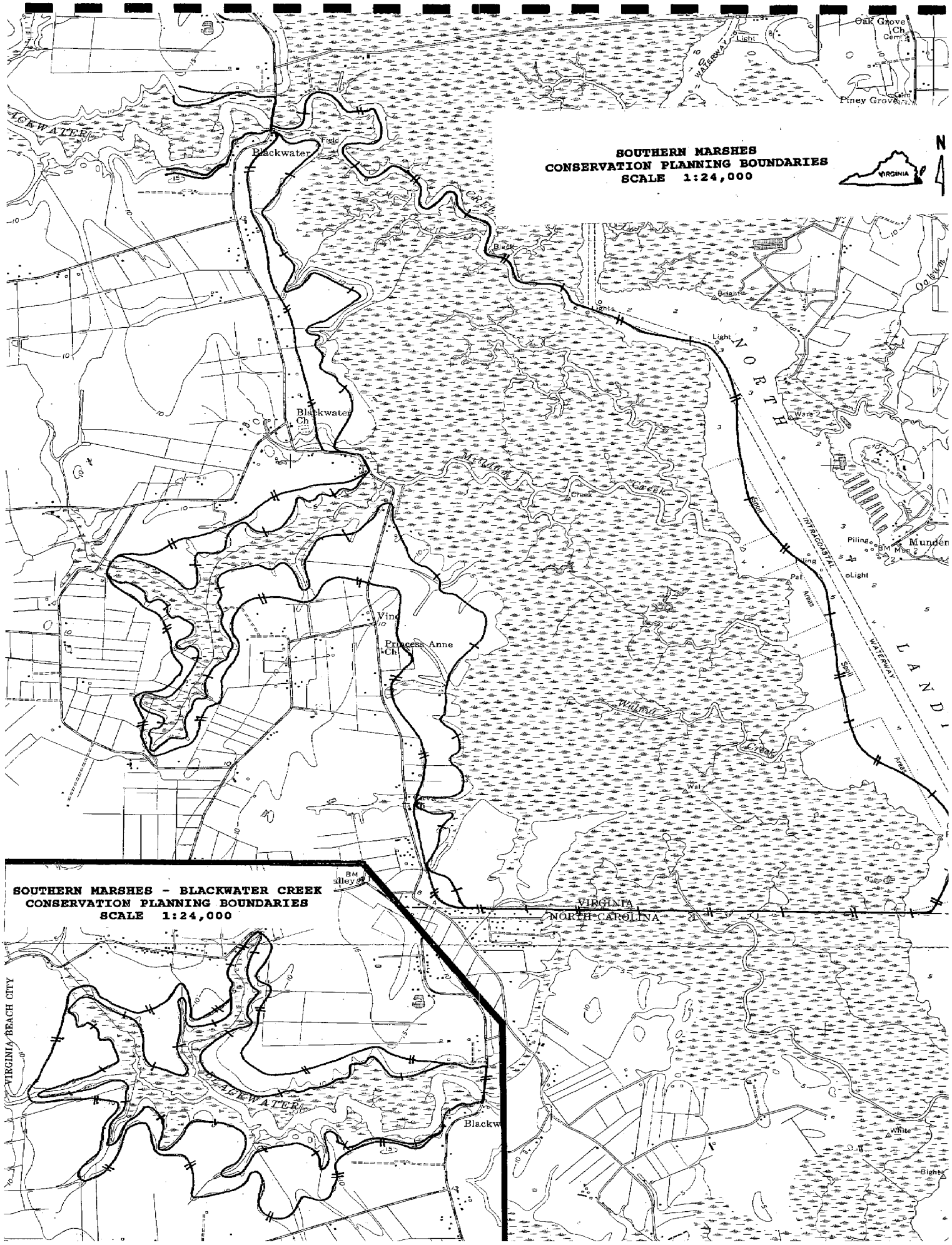
PROTECTION RECOMMENDATIONS:
This site merits a high level of protection as it supports exemplary estuarine marshes and many rare species. TNC has purchased two tracts within this natural area totalling 1024 acres. DCR will close soon on the acquisition of a 650 acre tract along the Virginia/North Carolina border. All tracts owned by TNC and DCR will be dedicated and managed as part of the Virginia Natural Area Preserve System. Landowner contacts and negotiations will continue. Natural area registries or landowner agreements are recommended for tracts within the secondary ecological boundaries. Impacts from surrounding land uses should be mitigated by encouraging sound soil and water conservation practices and maintaining adequate buffers to critical wetlands.

Conservation planning boundaries will be incorporated in the city land-use planning and development review process. To assist with this effort, conservation planning boundaries are being digitized by City of Virignia Beach planning department as part of this project. DCR Division of Natural Heritage offers its knowledge and expertise in reviewing project proposals.

RECREATIONAL, SCENIC AND EDUCATIONAL RECOMMENDATIONS:
In 1988, the General Assembly of Virginia passed a "Scenic River Designation Bill" making the North Landing River and Tributaries part of the Virginia Scenic Rivers System (Code of Virginia, Chapter 4, Section 10.1-413.2). This designation recognizes the aesthetic as well as the functional values of this remarkably beautiful river. The Virginia Scenic River Program began in 1970 with approval by the General Assembly of the Virginia Scenic Rivers Act.

Natural history interpretation and passive recreational opportunities are available on TNC land south of Pungo Ferry Road. TNC has constructed an extensive boardwalk and viewing platform along the marshes of Blackwater Creek. The North Landing River is fairly slow-moving and picturesque. Recent recreational planning efforts have identified areas for potential river access/canoe put-ins and canoe trails along the entire North Landing River (Potter et al. 1994). These river access efforts and proposals are detailed in the final report of the Virginia Department of Conservation and Recreation, North Landing River Watershed Public and Visual Assessment. The completion of this report, and its proposals, fit well with the City of Virginia Beach's plans to emphasize the southern portion of the city and ecotourism.

INFORMATION NEEDS:
Additional vertebrate and invertebrate inventories may reveal more rarities at this site.


SOUTHERN MARSHES
CONSERVATION PLANNING BOUNDARIES
SCALE 1:24,000
N
VIRGINIA
Oak Grove Ch
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Princess Anne Ch
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Walnut Creek
NORTH
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INTRACOASTAL WATERWAY
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VIRGINIA
NORTH CAROLINA
SOUTHERN MARSHES - BLACKWATER CREEK
CONSERVATION PLANNING BOUNDARIES
SCALE 1:24,000
VIRGINIA BEACH CITY
BLACKWATER
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White
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STUMPY LAKE

LOCATION: Virginia, City of Virginia Beach
City of Chesapeake

U.S.G.S. Quadrangles: Fentress
Kempsville

BIODIVERSITY RANK: B4

DIRECTIONS:
Stumpy Lake lies at the head of Gum Swamp, north of Elbow Road and west of Indian River Road. Access from Elbow Road which crosses just below the southern dam of Stumpy Lake.

GENERAL DESCRIPTION:
Stumpy Lake is a water reservoir for the City of Norfolk. This lake is created by a dam at the head of Gum Swamp (which is located at the south/southeastern end of the lake). A golf course has been built on part of the adjacent uplands, but a seasonally-wet forest still persists on the western edge of the lake, south of the golf course. The lake supports a rare animal, and the adjacent uplands support a rare plant and three rare animals. There are also historic records of a very rare millipede and a rare plant from the forest on the west side of the lake.

NATURAL HERITAGE RESOURCES: Table of Natural Heritage Resources

Scientific Name	Common Name	G/S Rank	EO Rank	Fed/St Rank
plants:				
Phlox pilosa	downy phlox	G5S2	H	
Tillandsia usneoides	spanish moss	G5S2	BC	- -
Trillium pusillim virginianum	Virginia least trillium	G3T2S2	BC	C2 -
animals:				
Crotalus horridus atricaudatus	canebrake rattlesnake	G5T2QS1	U	- LE
Pseudopolydesmus paludicolis	a millipede	G1S1	H	- SSC
Anodonta imbecillis	paper pondshell	G5S2	U	- -
Synaptomys cooperi helaletes	southern bog lemming	G5T3S3	U	3C -
Sorex longirostris fisheri	Dismal Swamp southeastern shrew	G5T2QS2	U	LT LT

Stumpy Lake is lined by bald cypress (Taxodium distichum) and water tupelo (Nyssa sylvatica). The north end of the lake is a very eutrophic, mucky shrub swamp which is dominated by Carolina willow, with a dense mat of duckweek and water fern. This area is heavily used for resting and feeding by Great Egrets, Great Blue Herons, Green-back Herons, Wood ducks and other birds.

The forested areas to the west and southwest of the lake are dominated by pines, red maple and black gum. On the edges of the lake and along the wet drainages within the woodland, very large cypress stumps (1-2 meters in diameter) can be found. Scattered along the ecotone, or upland and wetland interface zone, and within the forested uplands, where there

is a slightly open canopy, canebrake vegetation is found. These canebrakes are now much reduced from their original size. Although they may support a diverse array of vegetation such as grasses, shrubs and small trees, the canebrakes are composed primarily of cane (Arundinaria gigantia). They are important habitat for rare species such as the Dismal Swamp southeastern shrew, the canebrake rattlesnake, and the Southern bog lemming.

The rarest plant found here is the Virginia least trillium. This tiny, delicate trillium is globally rare and is being considered as a candidate for federal listing under the Endangered Species Act of 1993, as amended. This species is generally found in loblolly pine and hardwood forests on seasonally wet or mesic soils. The tiny three petalled blossoms can be seen in spring and the plant is difficult to find when not in blossom.

Spanish moss is a rare plant found draped over trees in forested swamps and around the lakeshore of this site. This plant is more common farther south but reaches the northern edge of its range here in Virginia.

The **canebrake rattlesnake**, found at Stumpy Lake, is listed as state endangered. This snake is found in only a small portion of southeastern Virginia. It's numbers here are decreasing rapidly due to habitat loss and deliberate molestation and destruction by people. The canebrake rattlesnake feeds primarily on grey squirrels and cotton-tail rabbits (Savitzky, pers. comm.) but spends large amounts of time resting in cypress swamps in or near the water. The canebrake rattlesnake spends approximately four to five winter months in underground bromation dens. They are live-bearing snakes, but do not mature to reproductive condition until approximately 6-7 years of age. These animals are reclusive and non-agressive (Savitzky, pers. comm.; Erdle, pers. observation) and their cryptic coloration frequently renders them virtually invisible.

The **Dismal Swamp southeastern shrew** is found only in southeastern Virginia (in the Dismal Swamp and satellite locations in the Southern Watersheds) and in northern/northeastern North Carolina. Although these shrews haven't been collected in the immediate vicinity of Stumpy Lake, these animals are known from the Gum Swamp Natural Area, which is adjacent to Stumpy Lake. Because shrews are fairly mobile and much contiguous habitat exists, it can probably be presumed that the Stumpy Lake site supports the Dismal Swamp southeastern shrew as well. These tiny mouse-like mammals spend much of their time under leaf litter, and under and around decaying logs and stumps. The primary food source of the shrew is spiders, earthworms, grubs and other insect larvae. It is believed that they bear one to two litters of young per year, but because shrews are small and secretive, much biology and natural history of these animals remains unknown. Principle threats to the shrew are habitat destruction and loss; and habitat alteration which allows interbreeding with the more common upland shrew, the southeastern shrew (Sorex longirostris longirostris).

PRIMARY ECOLOGICAL BOUNDARY:
Stumpy Lake is north of, and contiguous with another natural area known as Gum Swamp. Water flows from the Stumpy Lake spillway into Gum Swamp and is a significant water input to the Gum Swamp Natural Area as well as the entire North Landing River wetland

ecosystem. The site lies partially within the City of Virginia Beach and the City of Chesapeake, boundaries for this site were drawn for ecological purposes and transcend ownership and political boundaries.

The primary ecological boundary includes known occurrences of natural heritage resources as well as their potential habitats. Much of the primary ecological boundary coincides with Indian River Road and Elbow Road. The lake and many of the associated wetlands are skirted by Indian River Road, and the seasonally flooded forest is actually cut by Elbow Road, and is consequently found adjacent to the hardtop road. On the western side of the site, the boundary zigs and zags to avoid housing developments, the golf course, and agricultural fields.

Much of the Stumpy Lake watershed is included within the ecological boundaries. Wetlands at the northern end of the lake and central forested areas are included to help maintain water quality for aquatic invertebrates such as the paper pondshell mussel. Inclusion of the seasonally flooded forests adjacent to the lake should provide habitat and protection for the rare least trillium, spanish moss and rare animals found there.

SECONDARY ECOLOGICAL BOUNDARY:

The secondary ecological boundary includes lands and water intended to mitigate natural and human threats to the elements and their respective habitats. At Stumpy Lake, the secondary ecological boundary coincides with the primary ecological boundary along much of its perimeter. Along the west side of the site, the secondary ecological boundary expands somewhat to provide buffers for rare species from highly developed areas.

ONSITE AND OFFSITE CONSIDERATIONS:

Surrounding land use in this area is agricultural on the western and southern sides. To the east, northeast and northwest lie heavily populated portions of the City of Virginia Beach. In recent years many local farms have been developed for alternative uses such as residential and tract housing. This type of development, and large tract, land clearing activities may have significant impacts on sensitive natural areas. These activities may influence the hydrologic integrity of the wetlands. Additionally, increased light regimes and changes in soil moisture may occur near the natural areas, allowing colonization by invasive, non-native plant species.

Best management practices designed to minimize sedimentation, runoff, and nutrient loadings should also be adhered to in this watershed. The North Landing River was identified in the Nonpoint Source Pollution Watershed Assessment Report as a high priority (H1, 95-100%) for pollution impacts from nutrient loadings from agricultural land. The same report assessed the North Landing River as a high priority (H1) for overall agricultural pollution, and as a high priority (H2, 90-95%) for urban nutrient load pollution (Wilson, 1993).

Pesticide and herbicide use in the watershed should adhere to best management practices designed to minimize impacts to wetlands and wetland resources. Pesticides and herbicides used for lawn, golf course maintenance, forestry, and agricultural pests may inadvertently jeopardize rare invertebrates. Biocides should be carefully chosen and applied by skilled

applicators. Adequate buffers should be maintained to protect sensitive wetland resources from harmful chemicals.

Planners and officials of the City of Virginia Beach are aware of the environmental significance of many of the souhtern watersheds, and the North Landing River has been designated as an "environmentally sensitive area" (City of Virginia Beach, 1991). The distinction of being an environmentally sensitive area does not, however, afford the river or the immediate surrounding lands any additional protection from development or land use alteration.

Also cited in the Comprehensive Plan for the City is a "Southern Watersheds Management Ordinance." This is cited in the "Environmental Policies and Objectives" section, page II-D-6 (City of Virginia Beach, 1991). This management ordinance sets "standards that include, but are not limited to the provision of reserve sewage disposal drainfield sites, minimal disturbance of land, the controls for all land disturbing activities over 2500 square feet of development within fifty feet of any shoreline or wetland, and the use of best management practice facilities for controlling stormwater runoff."

The preferred alignment for the Virginia Southeastern Expressway follows Elbow Road along the spillway of the lake. A final impact statement is currently being developed for this project which will address primary and secondary impacts to the significant wetlands and natural heritage resources found here. A variety of organizations and agencies are working with the project proponents to address these issues. The final statement should address impacts to natural heritage resources as well as impacts to the entire wetland ecosystem related to maintenance of the hydrologic regime and protection of water quality. The wetlands of Stumpy Lake and Gum Swamp are important sources of freshwater to the river and help maintain the delicate balance between fresh and saline waters in this estuarine ecosystem.

MANAGEMENT RECOMMENDATIONS:
It is recommended that the Cities of Norfolk and Virginia Beach develop resource management plans for significant natural area within public ownership. The Department of Conservation and Recreation's Division of Natural Heritage offers its expertise in developing management strategies for the rare species and natural communities found here.

Long-term monitoring is recommended for rare species such as the Virginia least trillium, canebrake rattlesnake, and paper pondshell mussel. Additional zoological surveys are recommended to determine the status of the downy phlox and rare millipede reported from the area in the 1950s.

Prescribed burning is recommended for forested wetlands supporting canebrake vegetation. Fire management will restore habitat for rare species such as silky camellia and reduce heavy fuel loadings within this urban/wildland interface.

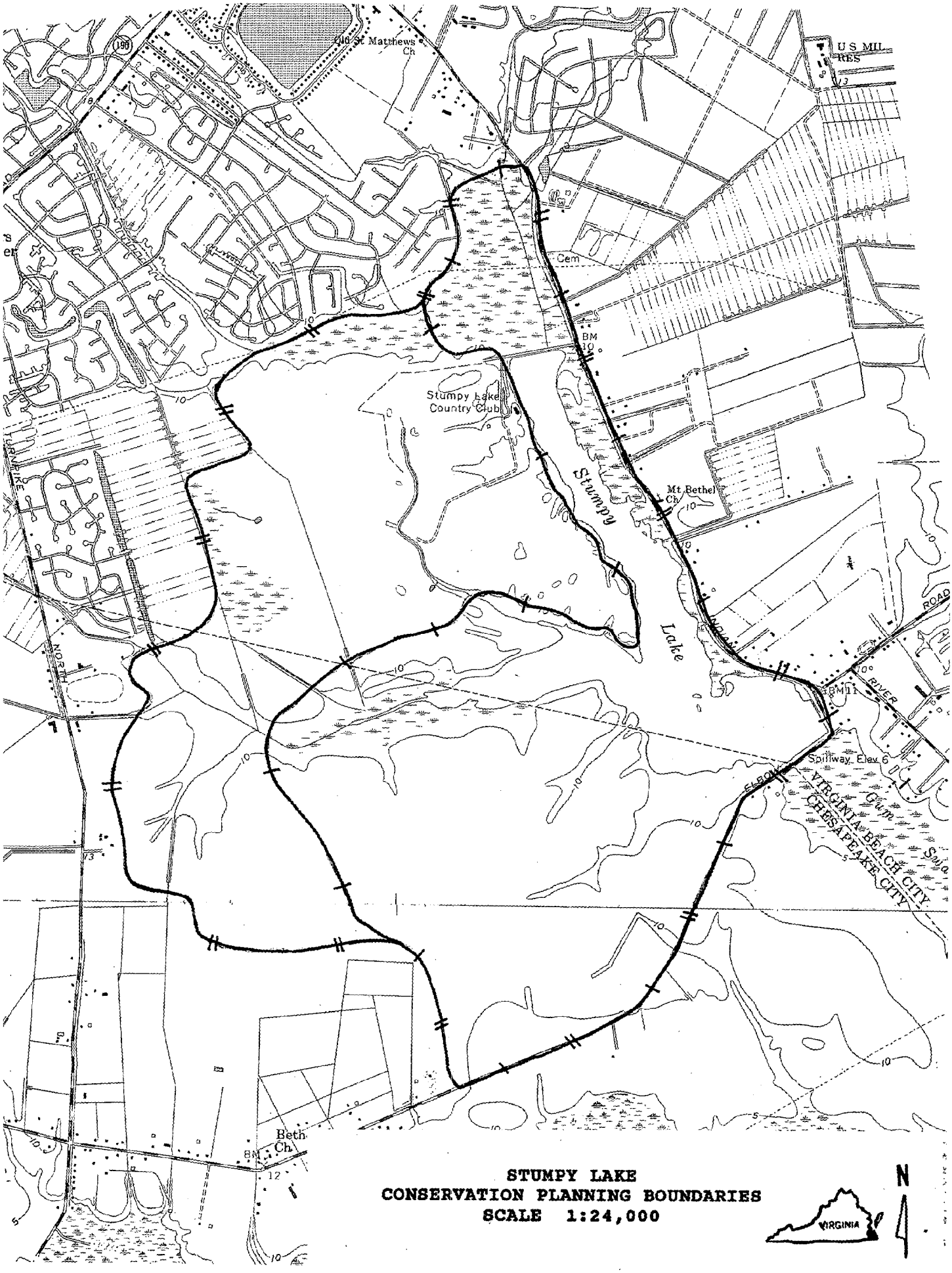
PROTECTION RECOMMENDATIONS:
Natural area dedication is recommended for public lands within the primary ecological

boundaries of this site. Much of this land is owned and managed by the City of Norfolk. Golf course and natural area management strategies should be coordinated to protect sensitive resources while allowing continued recreational activities to occur here. Two small tracts located on the north and west sides of the site are owned by the City of Virginia Beach. Natural area dedication is recommended for these parcels also. The remaining lands are privately owned and warrant landowner contact through the natural area registry program.

RECREATIONAL, SCENIC AND EDUCATIONAL RECOMMENDATIONS:
This site provides trememdous potential for natural area interpretation and passive recreation opportunities. Its location within the northern reaches of the watershed, its close proximity to highly urbanized areas, and inherent natural features make it an ideal location to launch an environmental education and natural history interpretive program for the riverine wetland ecosystem.

Lands owned by the City of Virginia Beach off Lynnhaven Parkway and the City of Norfolk bordering Indian River Road provide ready access and passive recreational opportunities. The Department of Conservation and Recreation offers its expertise and knowledge in developing recreational programs and natural history interpretation programs at this site. A Public Access and Visual Assessment Report for the North Landing River was recently completed by the Department of Conservation and Rercreation (Potter 1994) and provides more detailed recommendations for such a project.

INFORMATION NEEDS:
Additional invertebrate inventories are necessary at this site. More comprehensive searches for rarities such as the Virginia least trillium and Dismal Swamp southeastern shrew should also be conducted. Hydrologic and water quality assessments of these headwater wetlands will help us better understand the riverine ecosystem.



STUMPY LAKE
CONSERVATION PLANNING BOUNDARIES
SCALE 1:24,000

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LANDOWNER CONTACT PROGRAM -
THE APES REGION AS A CASE STUDY

The purpose of the landowner contact program for the City of Virginia Beach natural areas is threefold:

1- to inform owners that their land is of high ecological significance;

2- to educate owners about the natural heritage resources, their characteristics, and threats; and

3- to establish relationships with landowners so that additional contacts and stronger natural area protection strategies may be pursued at a later date.

Immediately upon completion of this project, the owners of significant natural areas in the City of Virginia Beach will be contacted. Landowners will be contacted for eleven areas in this City. These sites will be Gum Swamp, North Landing River Eastern Marshes, North Pocosin, Pungo Ferry Pocosin, North Landing River Southern Marshes, Oakum Swamp, Stumpy Lake, Black Gut, Muddy Creek, Nawney Creek, and West Neck Creek. Several hundred land parcels are contained within the primary and secondary conservation boundaries for these natural areas. The vast majority of tracts within the conservation boundaries for these areas are in private ownership.

The success rate of meeting with landowners after the initial contact letter or telephone call will prove critical to the overall success of the landowner contact program. A similar landowner contacts program was undertaken by the Department of Conservation and Recreation for the APES region. In this project, ninety percent of the landowners visited were interested in learning about the natural areas and the species and natural communities they support. A majority of these landowners had a genuine interest in learning about the species, and were proud that such rarities existed on their property. Several of the landowners expressed an interest in strong natural area protection and management such as conservation easements, management agreements, and acquisition. Other landowners responded positively to the concept of placing their land on the natural area registry in the future.

A few landowners were interested in learning about the significance of their property, yet not sure about the possibility of future protection for various reasons. For example, one parcel was an estate controlled by nine family members and the likelihood of getting all the owners together and to agree to manage the area would be difficult. Another owner, the land manager of property under a trust fund, was interested in protection, but the property may not be under their management in the next few years. Another parcel was deeded to heirs and the current owner was wary of imposing restrictions on the way the heirs might use the land in the future. Two of the owners seemed to have an indifferent attitude towards conservation. They listened to all of the information presented, but did not comment on it one way or the other.

The few landowners who declined a visit from the Department of Conservation and Recreation Natural Area Protection Specialist did so for various reasons. One landowner was interested in the information, but lived out of state and was concerned about traveling to Virginia to learn more. Another owner viewed their property solely as a means of producing income from timber production and had no interest in learning anything else about the natural values of their property. The remaining three landowners were quite antagonistic and defensive during telephone conversations. They obviously felt threatened, possibly in fear of possible land use restrictions due to presence of rare species or concern of being approached by a state agency.

At the time this report was written, no landowners in the APES region had placed their property on the Virginia Registry of Natural Areas. However, as mentioned previously, several landowners had expressed interest in placing their land on the registry and it was expected that several landowners would do so in the future. During the first personal meeting with a landowner, the registry program was not mentioned unless the landowner showed a strong conservation interest or requested information on ways they could help conserve the species and communities of concern. A few landowners felt pressured when asked if they were interested in placing their natural area on the registry. Rather than endanger the possibility of a productive relationship with a landowner in the future, the issue was not pursued during the first personal visit.

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APPENDICES

A. Local Options for Conserving Natural Areas

B. Open Space Handbook

C. Landowner Contact Letter

D. North Landing River Primer

E. Landowner Contact Report Form

F. Landowner Contact Follow-Up Letter

G. Natural Area Registry Brochure

H. Natural Area Registry Agreement

I. Virginia Beach Agricultural Reserve Program

J. Discover Virginia Beach Treasures Brochure

APPENDIX A

LOCAL OPTIONS FOR CONSERVING NATURAL AREAS

by Shepard Moon
Virginia Council on the Environment

LOCAL OPTIONS FOR CONSERVING NATURAL AREAS

Virginia Council on the Environment

February 19, 1993

This report was prepared by staff of the Virginia Council on the Environment (now the Virginia Department of Environmental Quality) at the request of the Department of Conservation and Recreation. It is a general guide to land management options available to local governments in Virginia for conserving natural areas. The report is for use in conjunction with the Division of Natural Heritage report, Conservation Planning for the Natural Areas of the City of Virginia Beach, which contains detailed information on identified natural areas in the City of Virginia Beach. The Natural Heritage report is the final product of a multi-year effort to survey and promote protection for important natural areas in the subject localities. The Natural Heritage survey was conducted at the request of local officials. The concepts presented here are applicable throughout Virginia and can be used for natural area conservation planning in any locality of the Commonwealth.

This report was funded, in part, by the Virginia Council on the Environment's Coastal Resources Management Program through Grant #NA17OZ0359-01 of the National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resource Management, under the Coastal Zone Management Act of 1972, as amended.

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LOCAL OPTIONS FOR CONSERVING NATURAL AREAS

I. Introduction

This report describes options available to Virginia localities for conserving natural areas identified through a natural heritage resource inventory. Natural heritage resources are "the habitat of rare, threatened, or endangered plant and animal species, rare or state significant natural communities or geologic sites, and similar features of scientific interest" (Virginia Natural Area Preserves Act, *Virginia Code* §10.1-209 et seq.). Natural areas are determined based on an inventory, conducted by the Department of Conservation and Recreation's Division of Natural Heritage, which systematically identifies natural heritage resources and the land area necessary to protect them.

Natural areas are increasingly threatened by the cumulative effects of human activities which alter the natural environment. Habitat disturbance, fragmentation, or destruction is occurring as a result of encroaching urban development as well as logging, agriculture, and surface mining. The conservation techniques described in this report can be used in various combinations to prevent the loss of important natural areas and provide a comprehensive local natural areas protection program.

In describing natural area boundaries, staff scientists from the Division of Natural Heritage consider a number of factors including;

- the extent of current and potential habitat for important biological communities,
- species migration corridors, and
- buffer requirements to maintain surface and ground water quality and quantity within the site, and exclude or control problem species.

Using these guidelines, a preserve design is prepared for each natural area which generally consists of two zones: a core reserve, and a buffer zone. Each zone has its own special planning considerations. In general, the core reserve requires the highest level of protection. A buffer zone around the core protects it from outside threats and encroachments. This buffer may still be used in a low intensity manner if appropriate performance standards are applied. The specific requirements of each

zone may vary from site to site, based on the characteristics and needs of the resources found there.

The primary goal of a local natural areas program is to conserve natural heritage resources. Other benefits of preserving these natural areas include providing habitat for other, more common species, as well as providing opportunities for recreation, education and research. In order to better integrate natural area conservation into the local decision process, complementary goals should be to protect these resources in ways that do not impose unfair restrictions on private property, and that serve as an asset for local economic and community development efforts.

Most efforts to date to conserve natural heritage resources have focused either on state and federal regulations or traditional non-regulatory options such as acquisition or easements. These most commonly used methods are discussed in the next two sections of this report. There is also, however, a growing trend toward increased local government involvement in natural area conservation. An enhanced local role can fill the gaps where federal and state programs are unable to limit habitat loss from land development and other activities which fall under the purview of local programs. Information on the location of natural areas can assist localities in planning for community development and implementing local land management programs. These options for managing development are also discussed later in this report.

A key principle for a successful local natural areas program is to integrate natural heritage resource conservation into the planning and land management process in a way that considers local circumstances and accommodates community development. There is no single approach for natural area conservation that is appropriate for all localities. An appropriate program is determined by local conditions such as population density, anticipated growth, the extent and value of natural areas, public awareness of the issue, and the general vision the community has for its future. Each strategy has advantages and disadvantages in different situations and for different localities. Certain local governments will choose to emphasize one approach over another. The most effective local programs, however, will likely consist of a combination of strategies and management techniques. These issues will be discussed in the last section entitled "developing a natural areas conservation program".

II. State and Federal Regulations

State and federal mandates play an important role in conserving natural heritage resources. Some, such as state and federal endangered species laws, are directed specifically at protecting these resources. Others are focused on managing significant lands such as wetlands, beaches, or Chesapeake Bay Preservation Areas which may contain natural heritage resources or be closely tied to the well being of these resources. Still others, such as the National Environmental Policy Act and Virginia's Environmental Impact Review Process are designed to identify and manage the effects of proposed public facilities, including impacts to natural heritage resources. Taken together, these mandates can provide an important component of a comprehensive natural area conservation program.

State and Federal Laws Protecting Rare Plants and Animals

Virginia's natural heritage includes a number of species which are listed or proposed for inclusion on the state or federal endangered or threatened species lists. Several protection measures are afforded to listed endangered and threatened species such as systematic surveys, preparation and implementation of recovery plans, permit review, land acquisition and other species conservation actions.

Virginia has two laws designed to protect endangered species. The Virginia Endangered Species Act (*Virginia Code* §29.1-230 et seq.) was passed in 1972 and is administered by the Department of Game and Inland Fisheries. This legislation prohibits the taking, transportation, sale, etc. of endangered and threatened animal species, except by permit. Virginia's Endangered Plant and Insect Act (*Virginia Code* §3.1-1020 et seq.) was passed by the General Assembly in 1979 in order to extend protection and management to endangered and threatened species of plants and insects. This act is administered by the Department of Agriculture and Consumer Services and prohibits the taking or possession of listed species except from a person's own land or by permit.

The U.S. Fish and Wildlife Service administers the federal Endangered Species Act, which was passed in 1973. The Fish and Wildlife Service's regulations promulgated pursuant to this act prohibit the taking of any endangered species including significant modification or degradation of their habitat. Cooperative agreements for the implementation and enforcement of provisions of the federal Endangered Species Act have been signed by the U.S. Fish and Wildlife Service with

the Department of Game and Inland Fisheries and the Department of Agriculture and Consumer Services.

Environmental Impact Review

Environmental review affords an important opportunity to provide early comments on the potential impacts to natural heritage resources from proposed federal and state development projects. Projects proposed, funded, or permitted by a federal agency may require some level of environmental review under the National Environmental Policy Act (NEPA). Under this act, any federal agency proposing, funding, or granting a permit for an activity which could affect a threatened or endangered species must consult with the U.S. Fish and Wildlife Service. The rules governing the federal environmental impact process require that federal agencies contact affected state and local governments in preparing and reviewing federal documents. The Council on the Environment is the coordinating agency for the Commonwealth of Virginia for federal environmental documents, with the exception of road projects.

The Commonwealth of Virginia also requires an environmental review of major state-funded projects. The Virginia Environmental Quality Act (*Virginia Code* §10.1 - 1200 et seq.) requires that any state agency or institution proposing to construct facilities costing more that $100,000 must prepare an environmental impact report and submit it to the Council on the Environment. If there is a possibility that natural heritage resources will be affected by a state project, the Division of Natural Heritage will be asked to comment. The impacts to natural heritage resources must be described in the environmental impact report along with measures to avoid or minimize these impacts. Following a review of the project, the Council provides comments to the Governor prior to authorization for project funding. Unlike the federal NEPA, state legislation does not require state agencies to prepare an environmental impact report before issuing permits to private parties.

Certain agencies and organizations submit permit applications and project notices directly to the Division of Natural Heritage in response to various mandates beyond the coordinated review programs described above. These include the Virginia Department of Transportation, the Virginia Marine Resources Commission, the State Water Control Board, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service and other permitting and regulatory agencies, along with some private concerns. Again, the objective of this review is to protect natural heritage resources

by avoiding or minimizing impacts to the resources. The Division of Natural Heritage reviews these proposals and makes recommendations to assist in planning efforts.

State and Federal Regulation of Significant Areas

State and federal regulations apply to certain classes of environmentally significant areas which may contain or be closely linked to natural heritage resources. These include wetlands, dunes, beaches, and Chesapeake Bay Preservation Areas. These areas provide rich habitats and often have a higher than average likelihood of supporting rare species. Although natural heritage conservation may not be the sole or primary purpose for protecting these areas, applicable regulations can form an important component of a comprehensive local natural areas program.

Wetlands, both tidal and non-tidal, have a number of important physical and biological functions, including providing important habitat for many rare and endangered species. Nationally, almost 35 percent of protected animal species are found in wetlands, although wetlands cover only about 5 percent of the nation's land area. In Virginia, over 50 percent of our rare, threatened, or endangered plant species are found in wetlands.

State law regulates the use of tidal wetlands in Virginia (*Virginia Code* §28.2-1300 et seq.). This law is administered cooperatively by local wetlands boards and the Virginia Marine Resources Commission. A permit from the local wetlands board is required prior to starting construction, dredging, or filling a tidal wetland. Permits are to be issued only if the proposed activity would not violate the intent and standards of the law and the benefits of the activity exceed its detriment. One of the standards listed in the law is that "wetlands of primary ecological significance shall not be altered so that the ecological systems in the wetlands are unreasonably disturbed."

Non-tidal wetlands are regulated under Section 404 of the Clean Water Act (1977), administered by the U.S. Army Corps of Engineers. The Act prohibits disposal of dredged material or placement of fill material into "waters of the United States," which are interpreted by the Environmental Protection Agency to include most non-tidal wetlands. Section 401 of the Act gives states the authority to review the 404 permit applications (as well as other federal water permits or license requests), and to certify accordance with state water quality standards and policies. As a result of 1989 Virginia legislation, the state has strengthened its 401 certification program through the issuance of a Virginia Water Protection Permit.

Beaches and coastal primary sand dunes in Virginia are regulated by *Virginia Code* §28.2-1400 et seq. This law is administered in similar fashion to the wetlands law and requires a permit for any dune or beach disturbing activity above the mean high water mark. Beaches below the mean high water mark are regulated by the wetlands law.

The Chesapeake Bay Preservation Act (*Virginia Code* §10.1-2100 et seq.), although enacted to protect water quality, has provisions which can help conserve natural heritage resources. The Chesapeake Bay Preservation Area Designation and Management Regulations are administered by the Chesapeake Bay Local Assistance Department and implemented by local governments in the Tidewater region of Virginia. The regulations require local governments to designate tidal and contiguous non-tidal wetlands, tidal shores, and at least a 100 foot buffer as Resource Protection Areas. Development or alteration of these areas is, in most cases, prohibited. Adjacent lands which may affect water quality are designated as Resource Management Areas. Land uses in these areas must meet specific water quality protection criteria.

The regulations that apply to each of these environmentally significant areas can be instrumental in protecting natural heritage resources. It is important to recognize, however, that these programs were not designed solely to conserve natural heritage resources. In some cases, the regulations may permit activities which are detrimental to these resources. For example, non-tidal wetlands such as bottomland hardwood areas may be logged under current regulations, thus severely altering the ecosystem. This does not mean that the regulations have no value for habitat protection, but rather that it may be necessary in some cases to use other management techniques in addition to the applicable regulations.

III. Non-regulatory Options

The state and federal regulatory programs described above may afford protection against some of the threats to natural areas. More than likely, however, they will not by themselves provide sufficient conservation measures to fully protect a natural area. In order to provide comprehensive natural area conservation, other protection techniques need to be used as well. An integral part of a comprehensive natural area conservation program will be effective partnerships among the various parties having influence over activities that affect the target resources. Landowners,

businesses, developers, environmental groups and citizens in general need to be included in this partnership along with local and state government. This section describes some techniques that can be used for building partnerships to conserve natural areas through non-regulatory means.

Acquisition

Fee simple acquisition is one of the oldest and most direct strategies for conserving natural areas. Natural areas can be acquired by the federal, state, or local governments, or by private concerns. Funds to acquire these areas can also come from some combination of these groups. There are hundreds of natural areas in need of protection in Virginia. Because funds are limited and land is expensive, only a small percentage of the most biologically important natural areas can be protected through outright acquisition by the state and federal governments or by private conservation organizations. Still, acquisition can play an important role in local natural area conservation and can be particularly effective if local governments, businesses, and conservation groups take an active role in acquiring important properties.

In some cases land acquisition may be the only realistic option for preserving significant natural areas. For instance where parcels lie entirely within an important natural area, conservation might require a difficult compromise between habitat preservation and reasonable use of the land. Where the owner is interested in altering land in ways detrimental to the natural heritage resources, some form of acquisition may be the most appropriate preservation technique. The property could be acquired by the local government, a private environmental group, or a coalition of interests including businesses and private citizens.

There are a number of options, and combinations of options, available for acquiring and maintaining important natural areas. The simplest option is for the local government to purchase property with either general funds or through a local bond issue. This option, of course, requires strong support from local citizens. Local government funds can also be used as "seed money" to attract contributions from businesses, citizen groups and private individuals, or to be used as a match for other grants. Funds may also be available on a competitive basis from the state or federal governments and national conservation organizations. In addition to fee simple purchase of property, these funds could also be used to protect natural heritage resources by leasing land. This technique can be a more cost effective use of funds if

the property owner is interested in such arrangements.

Acquisition of important natural areas can provide a core from which to build a more comprehensive open space network. It may also encourage nearby property owners to preserve their land through other techniques such as those discussed below.

Conservation Easements

Conservation easements are legally enforceable agreements between a landowner and a government agency or conservation organization that place restrictions on the present and future use of land. State agencies and local governments can hold easements, or property, under the provisions of the Open Space Land Act (*Virginia Code* § 10.1-1700 et seq.). The Virginia Outdoors Foundation, which was created to accept and hold gifts of open space land, also accepts easements (*Virginia Code* § 10.1-1800 et seq.). Non-profit conservation organizations can hold conservation easements under the provisions of the Virginia Conservation Easement Act (*Virginia Code* § 10.1-1009 et seq.). An easement can run for a term of years or can be a perpetual easement to be observed by the present and future owners of the land. Easements are attractive for both the conservation-minded landowner as well as the agency or conservation organization. The restrictive terms of the easement are entirely negotiable between the parties involved. The present and future landowners continue to enjoy many uses of the property while the agency or conservation organization achieves their conservation goals for the site. There are also financial benefits for the donor of the easement such as a possible reduced assessment for real estate purposes, a charitable deduction for state and federal income tax purposes, and reduction of federal estate taxes and Virginia inheritance taxes.

Dedication of Natural Area Preserves

The Virginia Natural Area Preserves Act authorizes the Department of Conservation and Recreation to accept the dedication of qualified natural areas into the Virginia Natural Area Preserves System. Natural area dedication is the strongest form of protection that can be afforded a natural area. It involves recording a legally binding agreement which states the conservation purpose of a property and grants a conservation interest to the Department. The terms of a dedication agreement can be similar to those of a conservation easement and should state intentions for the use of the property, its management, development, and possible public uses. The dedication

agreement is recorded with the deed of the property and is perpetual. The Natural Area Preserves Act allows any private landowner, state agency, or other public body (other than federal) to dedicate their lands as natural area preserves. Private landowners may dedicate their property as a natural area preserve and still maintain ownership and all rights to sell or otherwise transfer title to the property. In addition to the satisfaction of preserving important natural resources, the same financial benefits offered the donor of a conservation easement are available to a private landowner who dedicates land as a natural area preserve.

Natural Areas Registry and Management Agreements

The Virginia Natural Area Preserves Act also authorizes the Department of Conservation and Recreation to maintain a state registry of voluntarily protected natural areas. The Division of Natural Heritage is initiating a registry program for voluntary conservation of publicly and privately owned natural areas. Natural Area registry agreements will be sought on private, state, and federal lands. Participating landowners receive a plaque that recognizes the significance of the property and its placement on the Department's Natural Area Registry. In return, the landowner offers voluntary protection for their property and agrees to notify the Department of Conservation and Recreation of any intent for ownership to change hands, as well as the condition of the natural heritage resources on the land. In return for this voluntary protection, a landowner receives the personal satisfaction of knowing that they have contributed to a statewide natural area conservation effort. Landowners also receive advice and assistance with site and species management and monitoring, and other assistance from the Department of Conservation and Recreation relating to natural area conservation.

A management agreement is a contract between the landowner of a natural area and an agency or conservation organization to achieve specific conservation objectives. Management agreements are designed to clearly state the desires of the landowner and the conservation group in regard to the conservation intent for the site and the duration of the agreement. These agreements can be used to conserve natural areas on either publicly or privately owned land. A natural area management agreement may be an effective conservation option alone, or may be used in conjunction with some other technique such as natural areas registry.

Tax Incentives

Under the "Land Use Assessment Law" (*Virginia Code* §58.1-3230 et seq.) a locality may, at its own option, adopt a program of preferential assessment for lands devoted to agriculture, horticulture, forestry, and open space uses. In localities which adopt this program, real estate which meets qualification standards formulated by the State Land Evaluation Advisory Committee is assessed by local officials according to its "use value" as opposed to its fair market value. Such assessments promote the conservation of open space by ameliorating pressures which might otherwise force a property's conversion to more intensive use.

The Agricultural and Forestal Districts Act (*Virginia Code* §15.1-1506 et seq.) allows farm or timberland owners to voluntarily form agricultural or forestal districts. These are areas in which landowners declare their intention to maintain their land in agricultural or timber harvesting for a period of five to eight years. Although the primary goal of this legislation is to preserve the economic production aspects of these lands, the act also states that the areas will serve to "conserve and protect agricultural and forestal lands as valued natural and ecological resources which provide essential open spaces for clean air sheds, watershed protection, wildlife habitat, as well as for aesthetic purposes." In return for entering into a district agreement, landowners receive certain financial incentives and protection from development pressures. Landowners in an agricultural or forestal district are automatically eligible for use-value assessments for property taxes. Limitations are placed on the expenditure of public funds for infrastructure expansion in districts as well as restrictions on the acquisition of land through eminent domain. Local governments rezoning parcels next to agricultural and forestal districts must also consider the existence of these districts in their decision making.

Although agricultural and forestal districts do not prohibit all activities which may be detrimental to natural areas, they can help reduce development pressures and provide some buffering from development. In this respect, these districts would be most valuable when combined with some form of acquisition, such as conservation easements, for the most important natural areas within a district.

IV. Managing Development

Non-regulatory protection options, used in combination with state and federal regulations, can provide a strong core for a local natural area conservation program. But these regulations and agreements, although valuable components, do not by themselves represent a comprehensive natural areas program and probably cannot protect all of the natural areas in a locality. State and federal regulations will not apply to all of the land within most natural areas. Non-regulatory protection options are limited by available funds and by the wishes of current landowners. In order to supplement these strategies and develop a more extensive system of protected natural areas, local governments should use their land management authority to harness the development pressures threatening natural areas. Development proposals can then actually be used to conserve these areas. To accomplish this objective, a strong natural area conservation component in the comprehensive plan is essential. The plan can provide a blueprint for natural area conservation which can be implemented through several different flexible zoning techniques. This section describes these planning and land management mechanisms which are available to localities for conserving natural areas by managing development.

Comprehensive Planning

All localities in Virginia are required to adopt a comprehensive plan. Comprehensive planning provides a means for anticipating and influencing changes occurring within a community. Comprehensive plans include information on existing conditions, community goals and objectives, and strategies for attaining the community's vision for its future. Conserving natural areas should be an integral part of this vision.

With regard to natural areas, deciding how to best display the occurrence of rare species populations is a matter of some debate. A natural areas inventory will provide detailed information on natural area boundaries, as well as a description of the natural heritage resources within the area and their location and management requirements. The debate occurs over how much detail should be given in comprehensive plans available to the public. There is some concern that including details on species location may invite harm to those species from collectors or by landowners wishing to remove what they may see as an obstacle to achieving their goals for their property. On the other hand, limiting the level of detail to very general location information also limits the usefulness of the information for planning purposes. Some have argued that very general location information is sufficient and

that precise location data should be reserved for local staff review of development proposals. This strategy has limitations, however, because it does not encourage developers to consider sensitive resources as they design developments. Each locality must decide how to best balance these risks and opportunities.

There is no debate, however, over the value of developing strong comprehensive plan goals and objectives for conserving natural areas. The comprehensive plan can be a powerful tool for coordinating a comprehensive natural area conservation program. A goal is an end towards which community actions are aimed. An objective is a measurable activity to be accomplished in pursuit of that goal. The final part of the natural area planning process is to develop conservation strategies. Strategies are specific proposals for accomplishing an objective. Strategies to employ for attaining natural area conservation objectives should include the non-regulatory and development management options described in this report. These strategies, when added to applicable state and federal regulations, form a well balanced and comprehensive natural area conservation program.

One planning strategy for natural area conservation is to incorporate natural areas into a comprehensive open space plan. Open space planning involves identifying open spaces and recommending strategies to conserve these areas through various land management techniques. An open space plan may address conservation of many important community features, including natural areas, historic sites and districts, scenic routes and rivers along with their adjacent "viewsheds", national, state or local parks and forests, other environmentally sensitive areas such as wetlands and steep slopes, groundwater recharge areas, and public reservoir watersheds. In addition to their primary purposes, these areas may provide opportunities for recreation and education. Open space planning can also help guide growth and result in a more orderly community.

The cultural and recreational value of open space can be amplified by connecting various resources through a system of greenways. Greenways are linear corridors of private and public lands and waters providing access to open space and other recreational resources. These corridors can also be used to connect rural open spaces with more urbanized areas. Often abandoned rail lines, utility right-of-ways, scenic routes, rivers, and stream floodplains are used as greenways. If greenways contain a sufficient amount of undisturbed vegetation, they may also add to the habitat value of the natural areas they connect by providing a natural corridor between them. Habitat corridors among natural areas provide avenues of movement for species and help keep populations genetically healthy.

To help incorporate the concepts of natural areas, open space, and greenways into the planning process, various natural and cultural resources can be assembled into a single data base. Although not a necessity, a computerized geographic information system (GIS) can make it easier to manage such a data base. A GIS can be useful in land management decisions such as rezoning requests by providing a quick reference on the natural resources that will be affected by a particular decision.

The combined benefits of open spaces and greenways make it easier to justify conservation of significant resources in the face of expanding suburban growth. In addition to conserving valued natural and cultural resources, they provide a valuable community asset which contributes to a higher quality of life. As a community asset, these areas can have the added benefit of enhancing local economic development and tourism efforts. To achieve these many benefits, however, the strategies identified in the comprehensive plan must be implemented through local land management authority such as zoning.

Conventional Zoning

State law enables localities to use their zoning authority to protect open spaces (*Virginia Code* §15.1-486), and to provide for the preservation of "lands of significance for the protection of the natural environment" (*Virginia Code* §15.1-489). State law also cites conservation of natural resources as one of the matters to be considered in drawing and applying zoning ordinances and districts (*Virginia Code* §15.1-490).

Conventional zoning can be used for natural area conservation, however it has some limitations. In general, conventional zoning by itself does not offer the flexibility needed to protect natural areas while allowing reasonable use of private property. Conventional zoning typically only classifies land uses and regulates development density. It does not provide the flexibility to conserve sensitive natural areas while allowing appropriate development in other, more suitable portions of a tract. Classifying large tracts of land for natural area preservation would require strict limits on development and may prohibit most uses of land within that zone.

Limiting development to very low densities through large lot zoning also presents problems. Although the number of dwelling units may be an appropriately low intensity for protection of the natural area, no actual protection is afforded to living resources since they are subject to the will of individual property owners. Large

lot zoning may actually cause more rapid loss of natural areas because more land is required to meet the demand for development.

Flexible Zoning

Other more flexible zoning techniques are available for conserving natural areas. These include overlay zones, cluster and planned unit development provisions, and conditional zoning. These techniques can be used in conjunction with conventional zoning and incorporate guidelines for preserving natural areas and open space into the development review process. They can encourage sensitive site design which conserves natural areas without sacrificing other objectives. Each of these techniques can be used to provide more flexibility because they offer an opportunity for negotiation regarding site design.

Overlay zones are special districts that are placed "on top of" portions of other conventional zoning districts. The development standards for the overlay zone are then added to the standards of the original zones. Overlay zones can be used to outline natural areas or land designated for open space preservation. Within this zone, developments can be required to provide a certain percentage of open space or meet certain design standards which increase the viability of natural areas. Overlay zones can also include provisions for density bonuses for clustering development and preserving open space.

Cluster development encompasses many techniques that allow moderate to high density development in exchange for conservation of open space and natural areas. Clustering is an excellent way to preserve open space by minimizing the amount of land needed for development. Development costs are usually lower because fewer streets are needed and water and sewer systems can be made more compact. By concentrating development on the most suitable portion of a tract, open space, including natural areas elsewhere on the tract, can be preserved.

A planned unit development, or PUD, is a form of clustering, but is generally larger and can include non-residential land uses. Planned unit development regulations set an average development density for large tracts and then permit higher density and cluster development on selected portions of the tract. The more intensely developed areas are off-set by areas with little or no development. Clustering of both residential and non-residential uses can be done within a PUD, thus yielding benefits to the developer while conserving open space and natural areas. Many PUD

regulations appear as floating zones which are not designated on a zoning map. This allows more flexibility for the community to reserve judgement on placement of such large developments until a request is received.

Conditional zoning is a procedure that allows localities to accept conditions proffered (voluntarily offered) by an applicant for a rezoning. Proffered conditions are commitments, not required by the zoning ordinance, to limit how the property is to be used or to provide facilities to meet the needs of the area being rezoned. Under conditional zoning, developers could proffer to leave important natural areas undeveloped and assure the protection and management of these areas. Other measures to protect natural areas could also be proffered such as stormwater management facilities to protect the water quality of sensitive aquatic habitats, or water dependent terrestrial species and communities.

The purpose of conditional zoning is to add flexibility to the way zoning is practiced. It allows applicants to proffer conditions that make the proposed rezoning more acceptable to the community. Conditional zoning enabling legislation (*Virginia Code* §15.1-491.1 et seq.) requires that proffers must relate to the rezoning and conform with the comprehensive plan. Upon approval, conditions become legally binding on the property and are enforced by the zoning administrator.

Transfer, Purchase and Lease of Development Rights

Another mechanism which holds promise for the future is the transfer, purchase or leasing of development rights. Current state law does not allow the transfer of development rights between parcels of land, however a number of efforts have been made to promote this legislation. Where such systems have been used in other states, owners of designated open space have been assigned development rights according to a formula based on the amount of land owned in the area where development is to be restricted. Landowners in these designated areas may not develop their land, but may transfer, sell or lease the development rights while keeping the land itself. Once the development rights are gone, the land may be used only for limited purposes such as open space conservation, agriculture or forestry and is taxed accordingly.

The development rights removed from these "sending" properties can then be used to increase allowable density on other more suitable properties. In some cases, the community itself may obtain development rights from property owners in order to restrict growth while, at the same time, providing compensation to those property

owners. Advocates of the use of development rights see them as the most effective and equitable way yet devised to conserve open space in areas experiencing rapid growth. Although the transfer of development rights alone does not assure habitat protection, it can be used in combination with other non-regulatory techniques such as easements to conserve natural areas while providing compensation to landowners.

V. Developing a Natural Areas Conservation Program

The various techniques described in this report present a broad spectrum of options for local governments to use for conserving natural areas. Beyond addressing natural area conservation in the local comprehensive plan, there is no one technique, or combination of techniques, that is best for all natural areas or all localities. A local strategy must consider a number of variables. This sections describes these variables and their relation to conservation strategies.

Local governments must adopt strategies for individual natural areas that consider the characteristics of each site. An initial step should be to prioritize natural areas according to their natural values and risk of loss from development. The natural areas inventory provides information on the natural heritage value of each area. This information should be combined with details on other natural values such as opportunities for passive recreation, water quality maintenance, education, research, and linkages to other open space areas. The potential for development is determined by factors such as current land use designation and zoning, environmental constraints such as steep slopes or wetlands, access, available utilities, and proximity to urban growth areas. Natural areas with high natural values and high development potential should be given first priority.

Once natural areas have been prioritized, other factors such as ownership patterns and parcel size should be analyzed. It is important to determine the attitudes of the property owner, or owners, with regard to natural area conservation. Conservation minded owners may be willing to provide voluntary protection for the natural area. If so, representatives from a state agency such as the Department of Conservation and Recreation, or a private organization such as The Nature Conservancy may be able to provide technical assistance by working with the landowner to assure protection. If the landowner desires compensation for conserving the site, he may be interested in a below-market-value sale, or sale of a conservation easement on the property.

If owners are less conservation minded, other strategies will be necessary. An

important factor in this case is the location of the natural area in relation to individual parcels and owners. If the designated natural area, or portion of the natural area, constitutes only a small portion of the parcel in question there may be an opportunity to conserve the natural area while still allowing reasonable use of the remainder of the site. This could be accomplished through the flexible zoning techniques described above. If, however, the natural area constitutes a high percentage of the parcel, negotiation through flexible zoning may not be feasible. In this case, it may be difficult to conserve the natural area while allowing reasonable use of the site. Under these circumstances, the only option for protecting the natural area may be acquisition of either the property or a conservation easement at market rate.

In cases where some form of acquisition, whether at or below market value, is the only option available, localities should seek creative solutions for raising the necessary funds. Local funds, either from the general budget or from the sale of bonds, can be used as seed money to attract other resources. Although scarce, grant monies from the state or federal governments or private national conservation organizations may be available to provide matching funds. Local fundraising through private conservation groups or businesses could also be added into this effort.

Whatever strategy is used must be appropriate for local circumstances such as projected growth and community attitudes. Localities experiencing, or expecting, moderate to high growth can harness development pressure to conserve natural areas. Flexible zoning techniques can be used in these localities to protect natural areas as growth occurs. In this way, as land is developed, the more sensitive features of that land, such as natural areas, are permanently protected. In the face of rapid growth, citizens may also be more willing to commit public and private funds to resource protection. Although natural areas in growing communities may be the most threatened, these circumstances may offer more opportunities for resource conservation.

Highly urbanized areas and rural areas with little projected growth may require different strategies. In these cases, it may be difficult to use local land management authority to conserve natural areas because little growth is occurring. Highly urbanized areas may have few remaining natural areas, but because of their scarcity, these areas may be highly valued by citizens. Citizens in rural localities with little expected growth, on the other hand, may not be as willing to support conservation efforts because natural resources seem abundant and unthreatened. This does not mean, however, that actions to conserve natural areas through local land management

authority are inappropriate for localities that do not expect high growth. On the contrary, a natural area conservation strategy which includes comprehensive planning and flexible land management techniques is appropriate for any locality. This type of strategy is simply more likely to be effective in growing localities that have more opportunities to use this technique.

In conclusion, there are a number of options available for localities to use to conserve natural areas. The keys to protecting these areas are good information on the resources to be preserved, a strong natural area or open space component in the comprehensive plan, land management ordinances that provide adequate flexibility, and in particular, strong public involvement and support for natural area conservation.

APPENDIX B

OPEN SPACE HANDBOOK

by the
Virginia Tech Community Design Assistance Center,
Virginia Cooperative Extension,
and the Virginia Tech Division of
University Outreach and International Programs, Public Service Program Unit

OPEN SPACE HANDBOOK

Virginia Tech Community Design Assistance Center ○ Virginia Cooperative Extension ○ Publication 305-771○ Revised March 1994

OPEN SPACE HANDBOOK

A DECISIONMAKER'S GUIDE FOR VIRGINIA

Virginia Cooperative Extension ○ Publication 305-771 ○ Revised March 1994

The *Open Space Handbook* was edited by Garnett Mellen with graphics by Chaya Prabu, Ray Senes, and Van Anderson. Produced by the Virginia Tech Community Design Assistance Center in coordination with the Blacksburg and Montgomery County Planning Commissions, and the New River Valley Planning District Commission. This *Handbook* was prepared through funding provided by the Virginia Environmental Endowment and is being distributed through the Virginia Cooperative Extension.

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INTRODUCTION

This report provides guidelines to those who influence land use decisions in Virginia. Managing Virginia's open spaces is an opportunity to enhance the future. This document defines open space, its benefits, and planning steps to protect open space. To maintain open lands, the process must be a joint effort between private and public groups: citizens, land owners, private organizations, developers, farmers, planners, elected officials, and government agencies.

This handbook, which grew out of Montgomery County's effort to protect open space, is the result of a dialogue between Montgomery County citizens and their county officials. When the County in 1991 revised its comprehensive plan, which is a general planning document used to set priorities every five years, citizen and local officials planted the seeds for protecting open space. A grant from the Virginia Environmental Endowment (VEE) augmented the project's costs. Copies of the Montgomery County/Town of Blacksburg Open Space Plan are available through the New River Valley Planning District Commission. This handbook is available from your local extension agent or the Virginia Tech Community Design Assistance Center.

The Montgomery County planning effort involved many: the New River Planning District Commission, Montgomery County, the Town of Blacksburg, the Virginia Tech Community Design Assistance Center, several classes of Virginia Tech students, the Montgomery County Open Space Citizens' Advisory Committee, the Montgomery County Citizens Environmental Committee, and citizen participants in the Montgomery County Open Space workshops. A Technical Advisory Committee offered their special expertise. Special thanks are extended to Dick Gibbons, Elizabeth Gilboy, Bill Gladden, Paul Hagenmuller, Dave Hirschman, Duane Hyde, Randi Lemmon, Paxton Marshall, Shep Moon, Joe Powers, Will Shepherd, and Steve Via. The section on information gathering was adapted from "*The Can Do Book of Local Water Resources Management in Virginia*". The description of open space management techniques and tools was adapted from *Montgomery County/Town of Blacksburg Open Space Plan.*

WHAT IS OPEN SPACE?

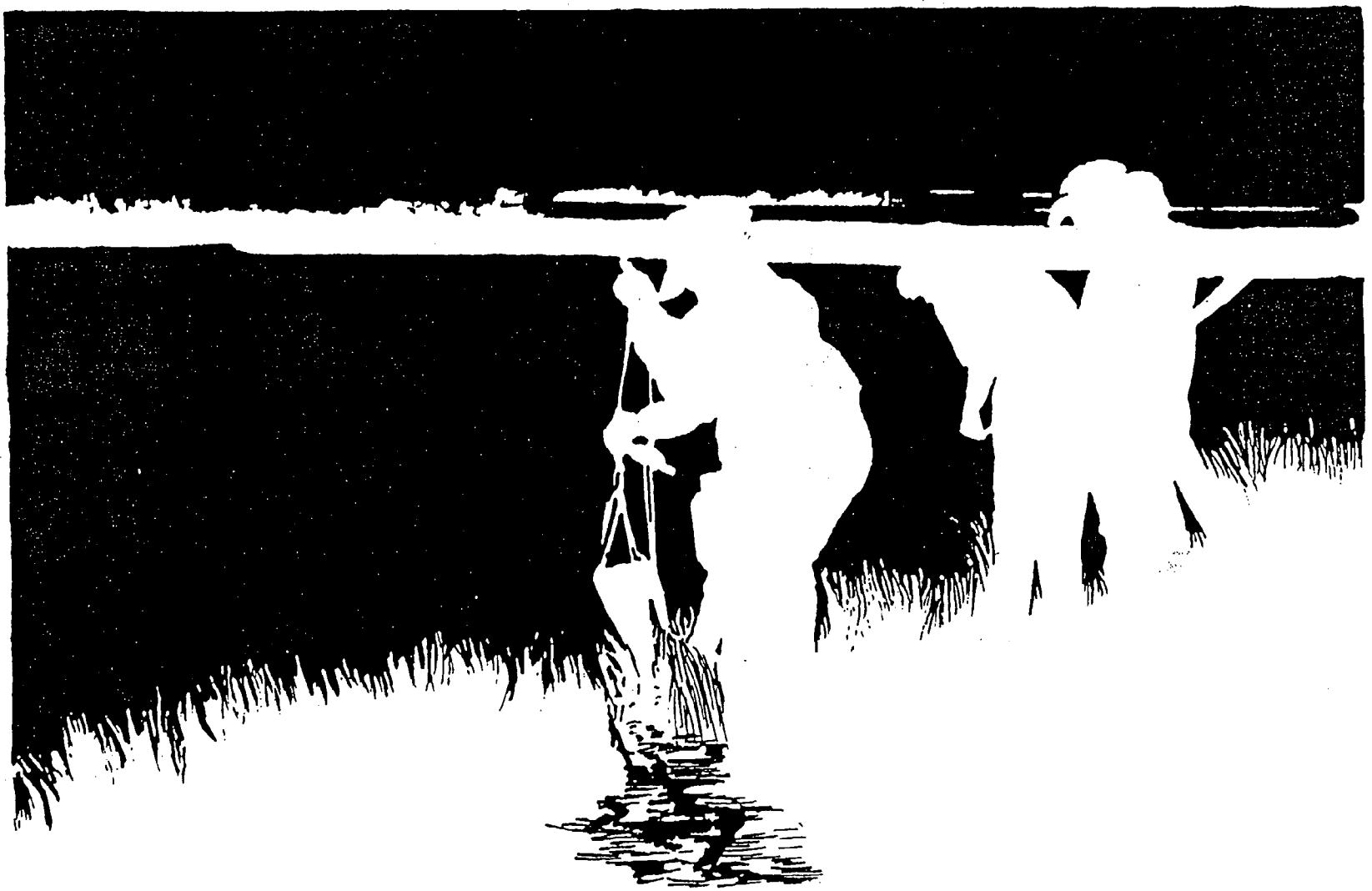
Open space is a general category of land use. Other examples of general land use categories are industrial, agricultural, commercial and residential. Within a category there may occur a wide range of activities. Just as industrial land use can be as diverse as mines, quarries, ship yards and pulp mills, open space land use may include many various activities. Parks, forests, farms, rivers, and beaches are usually thought of as open space, but other types of places such as wild life habitats, groundwater recharge areas, mountains and ridges, historic sites, scenic roads, trails, and even golf courses are also considered open space. The activities that occur in these settings are usually of low impact, but open space should not be looked upon as areas only to be conserved and preserved. They are places to be managed and used. The Jefferson and George Washington National Forests are examples of open space in our state that are managed for wildlife, hunters, hikers, bikers, and loggers.

Open space is as diverse as the communities across Virginia, and can be found in both the countryside and urban areas, as well as in wealthy and low income neighborhoods. It can be enjoyed by all ages in many different ways. It is our legacy of the past, the places we value, our favorite swimming hole, the old church and cemetery up the road, and that beautiful farm on the way to grandma's. A community's sense of identity is directly associated with trees, water, grass, flowers, smells, birds, a place to sit, a nice view, an old building, or a running trail. Open space in Virginia includes Monticello, the Blue Ridge Parkway, the Appalachian Trail, the seascape of Virginia Beach. There are also economic benefits to many types of open lands; recreation-related business, increased tourism, protecting natural resources, and steering growth to areas most efficiently served by local services and utilities.

Perhaps of greater urgency than economic benefits or maintaining our scenic landscapes is preserving the basic environmental functions that sustain our health, safety, and welfare. Forested watersheds surrounding our water supplies can help insure safe, clean drinking water. Carefully planned trails can be developed to keep our children away from busy roads. Farm land can be conserved, and the costs of urban infrastructure kept low by encouraging clustered building. As a locality grows and changes, a community's quality of life can be upheld and strengthened by incorporating protected open space throughout the area's land-use mosaic.

The federal and state government, largely due to their social mandate to protect health, safety and welfare, encourage enhancement of open lands in appropriate locations. They participate in open space protection by: ownership of forests and park lands; regulating wetlands, and soil and erosion control; and by offering tax breaks for significant open space lands. Beyond federal and state government, local jurisdictions can take a prominent roll. Local governments can facilitate decisions about what and where open space should be developed. Municipalities have the power and prerogative to designate open space, just as they can plan and create industrial parks.

Usually, government actions are directed by citizen initiatives, such as designation of a wild and scenic river, or registering an old bridge as a historic landmark. Private interests working with the local government can define what open space means to your city, town, or region, and can set the pace for open space development and policy. Communities who choose to plan for open space decide for themselves which natural and cultural features within their locality are special and how to maintain them. People working together to steward Virginia's open lands can protect our outdoors. A well thought out open space plan is a bold first step toward preserving your communities future landscape.



OPEN SPACE AND GROWTH

Historically with ample open land, intensive development was usually confined to stable soils, flat lands, areas with access to water, and lands not threatened by flooding or other natural hazards. Remote, inaccessible, and environmentally less-suitable lands were left undeveloped. The post-World War II population, transportation, and urbanization boom has drawn large areas of the rural landscape into the urban sphere. Presently, Virginia is experiencing rapid growth and expansion. From 1980 to 1991, the population skyrocketed 17.6 percent compared to the 10.7 percent growth for the nation. The Commonwealth's growth rate during this period was the fourth fastest among the states east of the Mississippi River. Almost 95 percent of the total population increase occurred in the 44 localities of the "golden crescent", ranging from Fairfax County in the north to Virginia Beach in the southeast. The eastern Virginia landscape is especially affected by this growth. As the baby boomers populate Virginia and migration to the region increases, urban sprawl is reaching lands best suited for recreation, agriculture, conservation, and other open space uses. These vulnerable areas include lands of cultural, natural, and visual significance (historic sites, wetlands, steep slopes, prime farm land, scenic landmarks, etc.). These threatened areas are part of the fabric of our cities, as well as, our countryside.

There are many benefits to growth, such as expanded job opportunities, better community facilities, and more cultural attractions. However, growth can create costly problems. Landowners, taxpayers, and employers all suffer when growth creates unforseen consequences: excessive erosion, pollution, destruction of treasured views, loss of productive farmland, and high costs of expanded public utilities. When little consideration is given for where and how development occurs, damage may result, harming natural systems which in turn may affect our health and well being. With rampant development, open space often assumes a structure of remnant patches of the pre-existing landscape that do not adequately represent the original landscape's physical and aesthetic structure.

The Chesapeake Bay is an example of a regional watershed that has supported fishing, swimming, boating, supplied drinking water, and added great beauty to Virginia. This water system is now threatened by intensive land use that has diverted tributaries, interrupted wetlands that filter recharge waters, and overloaded streams with excess pollution and sediment. Fortunately, the Chesapeake Bay is now recognized as an important regional system and special constraints have been placed upon it. The constraints directly and indirectly protect open space throughout the watershed, both in urban and rural settings.

Foresight and planning can help avoid the negative economic consequences that can arise from unmanaged growth. Economic problems can arise when municipalities are faced with the expense of providing new developments with transportation, water, sewer, police, and fire protection. For example in 1991, in City of Virginia Beach, a new single family house provided $4,331 of new tax revenue annually, but cost the city $5,334 each year in expanded services, a deficit to the city and its taxpayers of over $1000. This type of deficit can be minimized if developers, planners, and the community all participate in planning how growth is to be managed. Establishing designated open space areas can be an effective way to direct urban growth away from lands that are more appropriately employed for low-impact activities, at the same time, promoting growth in areas that are suitable. Instead of giving up all land adjacent to primary roads, all areas close to market centers, and our most beautiful spots, natural splendor and value can be added to our landscape. Development in clustered centers with open space as a complementary frame can help ensure a healthy, pleasing environment.

PLANNING FOR OPEN SPACE

Planning should be one of the first actions individual citizens, government agencies, and private groups undertake when directing land-use change. A publicly supported planning effort is usually a community-wide conversation about the past and present to envision the future. It can charter the path for protecting local open space. The conversation is most effective when it is an interactive dialogue between the community and those responsible for land planning. Community values can direct planning and planning can keep citizens informed and aid them in decision making.

Figure 1 shows the cyclical planning-process steps with community values as the central foundation. Often, the process is initiated when a problem or issue is identified. A change is sought by redefining local priorities, gathering information about the situation, proposing objectives to answer the problem, choosing appropriate action strategies to guide the process toward tangible results, and defining anticipate maintenance and administration requirements. A location and land-use plan can be an effective guidepost for directing change in accordance with the objectives of an open space planning effort. Periodically, the planning cycle begins anew as the community's perspective shifts, and institutions and their programs adjust to reflect evolving values. The planning process does not always flow in a clear-cut linear direction; steps may be skipped, repeated, or as is often the case, happen all at once. Be creative about the process, and involve your local planning agencies, politicians, and other resource people. Think about the appropriate time to include outside expertise, and consider what approach is best suited your situation.

The seven planning steps described can guide you and your community through the open space planning process. The boxes located throughout this section are options, examples, and suggestions posed to explain some of the responses that can be expected. At the end of each step under the headings "**ASK:**", question yourself and your community about the relevant issues for that step.

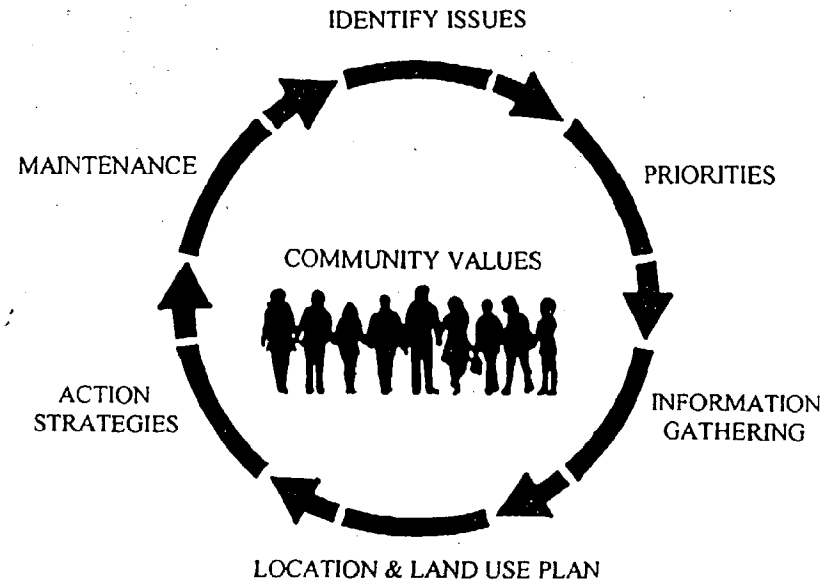


FIGURE ONE

STEP 1.....

COMMUNITY VALUES

People generally take pride in the place they live. A community's unique appreciation of their landscape is a part of their collective community values. These values are based on people's perceptions of what they view as important. As depicted in the Planning Process Diagram, community values are central to the entire process. Every stride and decision needs to reflect a community's consensus of which places are special and what activities are most desirable.

COMMUNITY INVOLVEMENT WORKSHOP

The intent of community involvement programs is to identify community values. The broader the cross-section of individuals participating in shaping open space protection, the wider the range of creative alternatives, and the more the community will view an open space plan as relevant to their needs. Getting people involved can help influence the success of a planning effort.

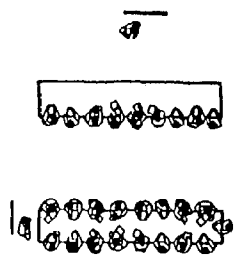
Community involvement can be used throughout the planning process. The questions at the end of "Step 1" are appropriate to ask at each step in the process. Choosing the right approach to involve citizens will assist in obtaining quality information and making good decisions. There are many community participation techniques and different techniques are appropriate in different situations. The following are just a few techniques that can be used to elicit community involvement.

TECHNIQUES:

An **advisory committee** can oversee the development of an open space planning effort. An advisory committee can help make decisions, offer technical skills, and help elicit support. The group should include individuals with diverse interests. Some controversy may arise; but addressing all views early can help to identify issues, provide direction, and avoid the risk of appearing to ignore the range of concerns.

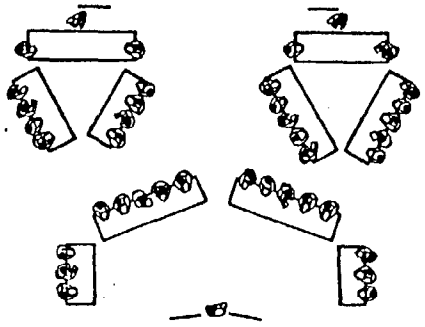
Workshops are typically the principal vehicle for community participation. By having several rounds of workshops throughout the planning process, you can keep awareness high. Workshops can serve several purposes: education, development of ideas, collecting information, reporting results, and demonstrating alternative solutions. They can be held at different locations in the community in order to make it easier for people to attend. The following graphic "Setting

SETTING UP A PUBLIC MEETING



Conventional Layout

- Standard meeting formats create an atmosphere of intimidation. Participants are less likely to participate at large, crowded tables.
- Format fosters domination by an individual rather than allowing for group discussion.
- Standard formats do not allow all participants to view presented material.



Innovative Layout

- Innovative formats create a relaxed, spacious atmosphere, with small discussion groups of no more than 6-8 participants per table. This setup is less intimidating since it encourages all to participate within smaller, informal groups.
- Format fosters group discussion rather than allowing the domination by any one individual.
- Innovative formats incorporate many easels and groups of tables, angled toward the presented material, so all can view the presentation.

Up a Public Meeting" suggests creating a comfortable atmosphere for holding a productive meeting.

Surveys are an effective way to get a general overview of your community's values. They also offer an opportunity to alert more people to the open space planning effort. Usually, surveying the entire community is not feasible, but a representative sample can be easily reached by phone, mail, or door-to-door surveys. Questions comparing types of open space can indicate the preferences of the community.

Educational Events are fun and can peak interest. Entertainment, laughter, and enjoying the outdoors can go a long way toward developing an appreciation of open space. Lectures, slide shows, field trips, festivals, and activities for children centered around the theme of open space can increase awareness.

Listening is a fundamental aspect of any dialogue. It is also a new technique used to explore public opinion, encourage consideration of key issues, and rouse support. Listening empowers those who often are not given a voice in decision making. When using this technique and setting up a one-on-one dialogue, the more personal contact the better. Go to peoples' homes, to their clubs, their schools. Present the concept of open space without judgement and ask for people's ideas. This technique is labor intensive. People must be recruited to go out and talk, listen, and record comments. Recording and reporting tabulated results back to the community is an important part of listening. Ideas should be publicly acknowledged to inform people of their collective priorities. Listening can be used throughout the entire planning process, but it is especially useful at the beginning of new phases to get direction from citizens. Box 1 is an example of a listening session.

BOX 1
EXAMPLE OF A LISTENING SESSION

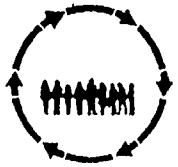
Fact:	**Open space needs to be defined by each unique community. It can be...(explain range of types of open space).**
Ask & Listen:	**What do you think open space in our community is? How and where would open space be appropriate? Different people have different definition of open space so listen carefully.**
Record:	**(Participant's ideas)**
Fact:	**Our community is having problems with water and air pollution.**
Ask & Listen:	**What should we do?**
Record:	**(Participant's ideas)**
Fact:	**Did you know that our drinking water comes from the river. The watershed could be managed as open space.**
Ask & Listen:	**What do you think?**
Record:	**(Participant's ideas)**
Fact:	**Agricultural enterprises play a significant role in our community's economy and rural character.**
Ask & Listen:	**What should we be doing, if anything, to preserve our farms?**
Record:	**(Participant's ideas)**

Getting input from people from diverse backgrounds rounds out the open space picture. Different age groups, professions, religions, sexes, and cultural traditions, often have different values and needs. Economic condition, ability to move around, and special interests, all influence how people perceive the landscape. Documenting people's opinions, thoughts, and ideas is essential. Later in the process, recorded comments can be used to communicate and understand the community consensus.

ASK:

* Define your community? What social groups make up the community? How can you reach them?
* Within the context of a community involvement event, what do you want from the community?
* Are there existing organizations that can be tapped to help with the community involvement events (students, public agencies, non-profits, etc.)?
* When is public involvement appropriate and effective?
* When is it timely to schedule workshops and meetings?
* What is the time frame for each step and how does community involvement fit?
* How much financial and personnel effort is available to implement the program?
* What sort of activities will get the community excited about participating in decisions about open space?
* Present clear, concise ideas?
* Slides, photographs, and drawings can be invaluable in any presentation - a picture is worth a thousand words.
* Has your public involvement event been well advertised?

STEP 2.....



IDENTIFY ISSUES

Identifying issues is the beginning of community-wide dialogue to protect open space. Understanding local concerns will greatly assist anyone who makes decisions that effect land. Community involvement techniques described in "Step 1" can be invaluable for identifying issues. Workshops and surveys are especially appropriate because they can efficiently elicit reactions from a large percentage of the community.

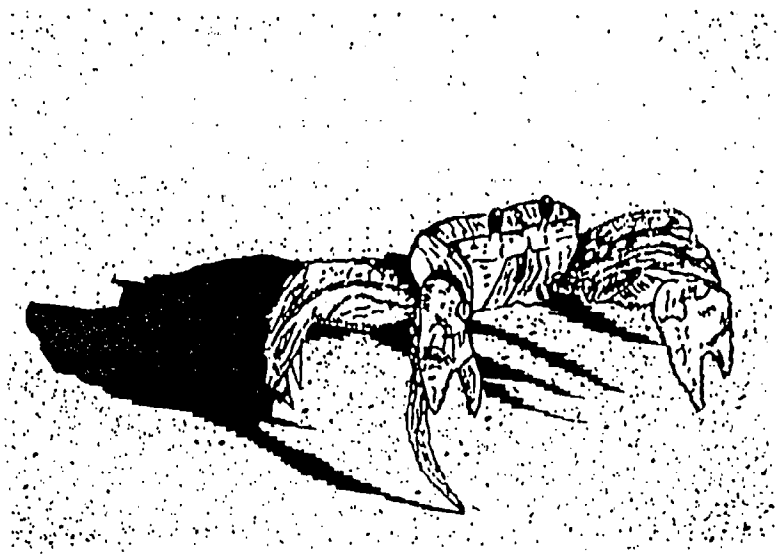
Legal, political, and technical information can be used to introduce discussions. Government identified issues (such as wetlands and publicly-owned lands) and preliminary resource information can be presented as a framework in which the community can begin to work. Ask citizens about perceived problems and opportunities that influence open lands. Explore the background and intricacies of those situations. Real or perceived issues can motivate protection of open space. For example, the perceived threat of a proposed power line or highway can motivate Virginians to pass zoning ordinances and to study local rivers for eligibility as wild and scenic. Box 2 gives a sample list of issues that your community may identify as important. There will be many complaints but the goal is to take issues and turn them into priorities and solutions.

Before open space is understood and appreciated, a great deal of community discussion and education must occur. The issues identified and knowledge gained about local open space need to be shared. Take opportunities to explain open space issues through radio talk shows, newspaper articles, and news spots on television.

BOX 2
SAMPLE LIST OF OPEN- SPACE ISSUES

- **jobs**
- **litter**
- **trails**
- **tourism**
- **traffic**
- **wildlife**
- **wetlands**
- **flooding**
- **pollution**
- **recreation**
- **busy roads**
- **growth areas**
- **soil erosion**
- **urban sprawl**
- **water quality**
- **public services**
- **attractive views**
- **landowner rights**
- **loss of farm land**
- **sense of community**
- **mineral extraction**
- **endangered species**
- **quiet neighborhoods**
- **economic development**
- **historic preservation**
- **game animal populations**
- **recreational opportunity**
- **government-identified issues**
- **places for children to play**
- **natural resource management**

Find names and addresses of those responsible for all aspects of managing, developing or converting\destroying open space. Call or write them and ask for their opinions. Ask them for legal, political, or resource information. Ask them to get involved. Some opportunities for presenting open space issues include: public hearings, zoning review, board of director's meetings, supervisors' meetings, political campaigns, and updates of your county or town comprehensive plan (get open space designated in your local plan). The following are some of those who may take on responsibility for open space: the planning commission, the county board of supervisors, city or town council, lawmakers, private agencies, business organizations, chamber of commerce, civic organizations, special interest groups, environmental groups, homeowners, and farmers.



ENDANGERED CRAB

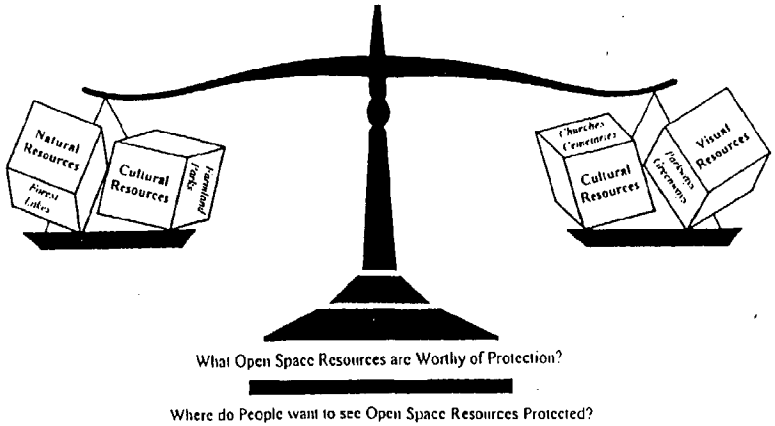
ASK:

* **What open spaces do people value? What places do they want to see protected?**
* **Are there secondary priorities that should be considered?**
* **What special places does the community consider sacred?**
* **Are there outdoor recreational activities that people would like to see promoted?**
* **How much, if any, are people willing to spend?**
* **Which natural, cultural, and visual resources would the community like to see protected over others?**
* **What concerns do people have about designating areas as open space?**
* **Does the public perceive a threat to existing open lands?**
* **What locations are preferred for high-intensity land uses (industrial, commercial, residential)?**
* **Will an open space plan be a growth management tool and\or a way to protect resources?**
* **What are your specific local environmental problems? How do they affect your community's open space?**
* **Who is responsible for making changes to solve land-use problems? Who manages open space?**
* **Where are the locations in the community affected by existing or proposed open space?**
* **Is local government interested in the orderly development of open space?**
* **Can developers, governments and landowners be convinced to work together to preserve open areas?**
* **Identify circumstances that could influence open space. When will the issue be coming to a climax? Is there opportunity to have ideas about open space presented?**

STEP 3

PRIORITIES

"Step 3 - Priorities", further defines open space issues and pulls the most important to the forefront. If your community identifies farmland as a critical issue, find out if the real priority is the local farming economy, pastoral views of farmland, or the availability of fresh produce, or another issue. These concerns all underline preserving farmland, but their approaches would be very different. Using community involvement techniques, such as workshops, ask people to specifically name places and resources worthy of protecting, and why they are significant. Public health, welfare, and safety are always of foremost importance when setting priorities.



BALANCING OPEN SPACE PRIORITIES

Protecting and managing land can be approached in different ways depending on the acreage of open space in which a community is interested. A small town may be concerned with the town green, public gardens, and the oldest house in town. A city may want to encourage open space building set backs, parks, and the beautification of a river that flows through downtown. The priorities of a county or region may include managing larger open space areas, such as: watersheds, agricultural lands, wildlife migration routes, forest management areas, or an historic-regional tour. The size of the community and the types of resources protected will determine the land area and your planning effort's level of detail.

The amount of land your community is concerned with will also guide your information gathering. For small areas and site specific situations, the accuracy of data is critical, while for larger areas information collected may be more general. The Department of Conservation and Recreation's Natural Heritage Program considers the exact location of endangered species sensitive and releases only the location of species within one minute blocks (approximately 950 acres). An endangered species is easier to manage within a regional land planning context (for example a watershed), than a small area. Site development projects, such as grading and building, may require more specific habitat details, such as: the exact location of a species, the type habitat critical to the species' survival, and other relevant information.

BOX 3
A LIST OF POSSIBLE PRIORITY RESOURCES

CULTURAL RESOURCES:
- Archeological Sites
- Farmland
- Historic Sites and Districts
- Parks
- Recreational Areas
- Farms
- Churches
- Cemeteries

NATURAL RESOURCES:
- Coastal Areas and Beaches
- Bird Sanctuaries
- Forest
- Lakes and Shores
- Rivers and Floodways
- Steep Slopes
- Watersheds
- Wetlands
- Wildlife and Botanical Areas
- Public Hunting and Fishing Areas
- Wilderness

VISUAL RESOURCES:
- Byways and Parkways
- Greenways
- Significant Scenic Areas
- Viewsheds
- Ridgelines
- Points of Interests

ASK:

* Of the issues identified as important in "Step 2", which ones do people rank the most important?
* What specific resources do people value?
* Why are the resources valued?
* What is it about those resources that makes them significant?
* Beyond special resources, what places are important?
* Where do people want to see open space protected--a neighborhood, a watershed, a county, a region, the state?
* How can open space help protect your community's health, safety, and welfare (for example, protecting a watershed above a drinking water reservoir would help maintain a clean drinking water supply)?

STEP 4.....

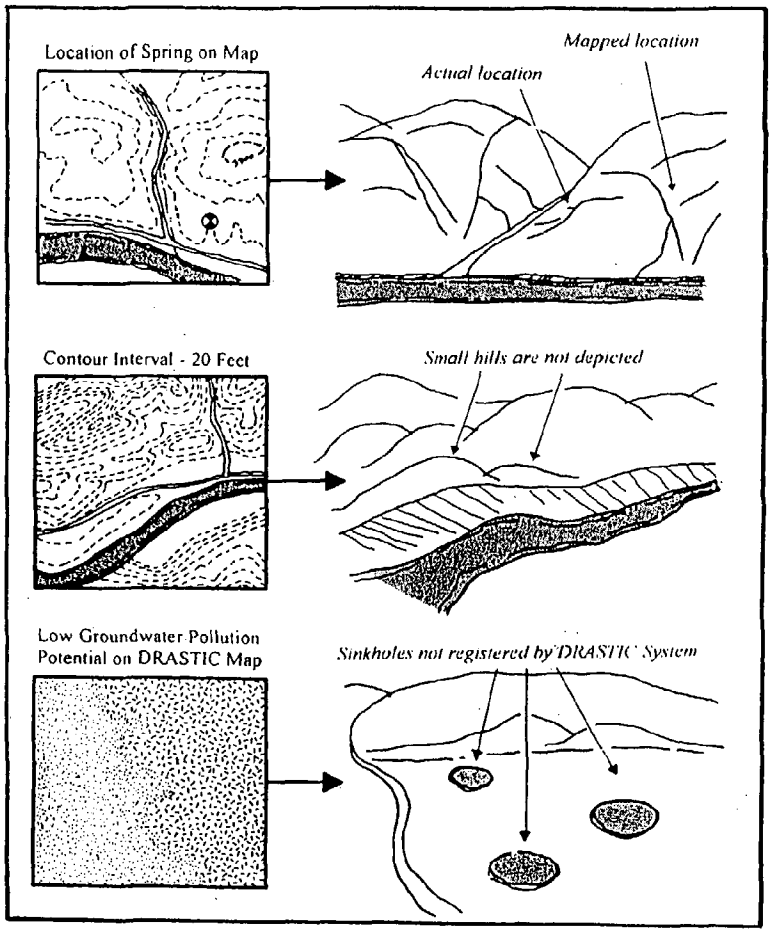
INFORMATION GATHERING

There are several phases of data gathering throughout the planning process. Each successive phase is more detailed than the last. A preliminary data gathering effort can be useful when kicking off the "Identify Issues Step" to publicly introduce local open space amenities and threats. In the setting "Priorities Step", specific detailed information about local resources and growth potential can help clarify where to place local priorities. When evaluating proposed open space locations, a data analysis can help guide decisions. Even in "Step 7 - Maintenance", gathering information about how well open space is meeting the community's expectations can improve the management and administration of open space lands.

Data-related activities need to be well thought out or the results could be costly and misrepresent the resources. Before starting an information gathering effort it is useful to seek professional planning help. County, state, and federal planning offices, universities, and private firms can offer assistance. Data can be handled in many different ways, before delving into data collection and analysis a review of several issues fundamental to the use of data will help avoid many common pitfalls.

COLLECTING DATA:

Methods for collecting data include: (1) gathering data from existing published and unpublished sources: and (2) making field observations.



ISSUES OF MAP ACCURACY

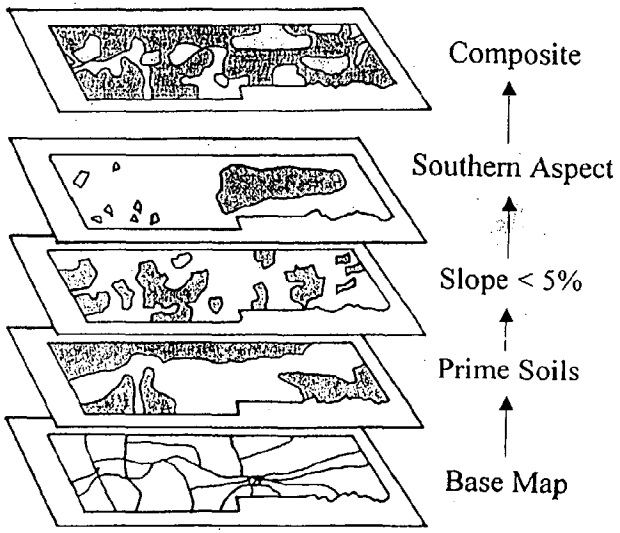
Common wisdom dictates that utilizing existing sources should precede and guide field work in order to minimize the time, costs, and expertise required. Field observations can enhance the quality of data collected by checking the accuracy of existing sources and adding more detailed features that these sources may not include.

Check with your local planning commission, planning district commissions, planning departments, extension agents, county foresters, local agencies, historians, and others with special knowledge of your area. They may know further sources of published and unpublished information. Universities and other research institutions often conduct local studies on many various resources. Make a few phone calls and check their libraries. In Box 4a and 4b, examples are given of published data and the agency to contact to obtain the information. Some data are available for a fee while other information are free. Some data are available in digital form to be used in conjunction with a computer data base.

It is important to realize that however data are gathered, they will not produce an exact description of reality. Collecting data is an activity that aims to simplify the real world. The investigator is selectively gathering pieces of information that describe, in an inexact way, what "really exists". For example, topographic maps represent the contour of the land, but provide only the level of detail afforded by their contour interval (the vertical distance represented by the space between contour lines). The US Geologic Service 7.5 minute topographic maps may have inherent error up to 20 feet. In like fashion, soils, geology, and other types of information have inherent limitations. Their interpretations are based on limited sampling points and the need to classify an infinite spectrum of types of data (e.g., soil, rock) into distinct categories (e.g., Berks soil series, Tuscarora sandstone). These limitations are not so much commentaries on the quality of data as they are on the expectations of data users.

ANALYZING DATA:

Limitations associated with data amplify as data is used, combined, and overlaid--the activities that constitute data analysis. For instance, if a group is concerned about an endangered plant's habitat, they may overlay soils information, vegetation types, and land-use data, all with their attendant accuracies. However, the resulting delineation's maximum accuracy would be that of the least accurate data layer. The DRASTIC system of groundwater vulnerability mapping provides a good example of how data analysis can dilute the accuracy of original information. DRASTIC is an acronym: D is depth to groundwater, R is (net) recharge, A is aquifer media, S is soil media, T is topographic (slope), I is impact of the vadose zone, and C is conductivity (hydraulic) of the aquifer. DRASTIC is a method of



THE OVERLAY PROCESS

mapping potential areas of groundwater contamination. With DRASTIC, seven data categories are overlayed, combined and weighed to produce a final ranking. The resultant mapped categories, however, can only be generalized to areas 100 acres or more in size. Again, this does not detract from DRASTIC, or any other data analysis technique, but addresses the need for data user expectations to be brought in line with the capabilities of various data tools. The applications of data use (e.g., overlay zones) must be coordinated with data gathering and analysis strategies at the inception of program design. Data should be a tool and not the master of the planning process.

DOCUMENTING AND MAPPING DATA:

Once the information is collected it needs to be documented so that others can easily understand it. The information may be written or mapped. Presenting the data and analysis clearly will help those in the community make good decisions about how they want their community to look. Place written material and maps in public locations, such as libraries and schools, so the community can follow the open space planning process. It is important that the community be kept informed throughout the planning process.

Albemarle County has recently undertaken an in-depth information gathering effort. They have consolidated all currently available information regarding locally significant resources in order to identify the most important lands to preserve or conserve as open space. Their Open Space Concept Map, drawn as a county resource reference map, is intended to serve two functions: to guide decision making by identifying significant resources; and to provide a starting point for their identification and conservation of "Rural Area"[1]. Albemarle County's documentation is an example of how to compile and display gathered data.

BOX 4a
INFORMATION AND ITS SOURCES

DATA AGENCY

- **Archeology**
  - VA Dept of Historic Resources
- **Caves**
  - National Speleological Society
  - VA Cave Board
- **Digital Geographic Data**
  - Council on the Environment, Ecomaps
  - Information Support Systems Laboratory
- **Endangered Species**
  - VA Dept of Game and Inland Fisheries
  - VA Dept of Conservation and Recreation, Division of Natural Heritage
- **Flood Plain**
  - Federal Emergency Management Agency (FEMA)
  - VA Dept of Conservation and Recreation, Bureau of Flood Protection
- **Geology**
  - VA DMME*, Division of Mineral Resources
- **Historic Resource**
  - VA Dept of Historic Resources
- **Karst Topography**
  - VA DMME*, Division of Mineral Resources
- **Land Use**
  - Information Support Systems Laboratory*
- **National Wetlands Inventory**
  - Council on the Environment
  - Information Support Systems Laboratory*

* Department of Mines Minerals and Energy

BOX 4b
INFORMATION AND ITS SOURCES

DATA AGENCY

- **Prime Farmland**
  - U.S. Soil Conservation Service
  - VA Dept of Agricultural and Consumer Service
  - VA Dept of Conservation and Recreation, Division of Soil and Water Conservation
- **Roads and Byways**
  - Local government planning agencies
  - Virginia Dept of Transportation (VDOT)
- **Shoreline Feature**
  - VA Institute of Marine Sciences
- **Sinkholes**
  - VA DMME*
- **Soil Surveys**
  - U.S. Soil Conservation Service
- **State Scenic Rivers and Byways**
  - VA Dept of Conservation and Recreation
- **Topography**
  - VA DMME*, Division of Mineral Resources
  - U.S. Geological Survey
- **Utilities (Water, Sewer, Gas)**
  - *Local government planning agencies/Public Works*
  - Local Utility Companies
- **Water Resources**
  - VA Dept of Environmental Quality, Water Regional Office
- **Zoning Areas**
  - Local government planning agencies

* The Information Support Systems Laboratory is part of the Virginia Tech Dept of Agricultural Engineering, College of Agriculture.

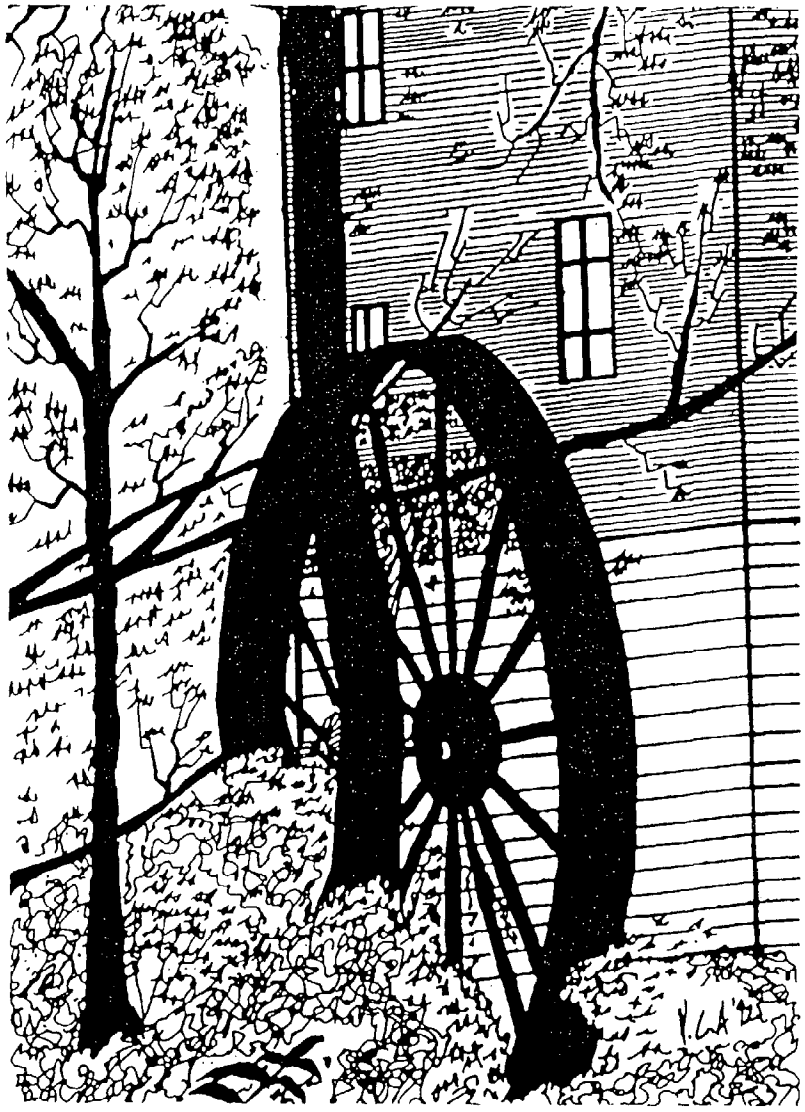
COMPUTERS:

In the data collection and analysis phase, computer data base systems and geographic information systems (GIS) can be used to organize and store information. Their potential is far reaching but their limitations should also be noted. As computers become more widely used for resource planning, it is crucial for computer users to become sensitive to issues of accuracy inherent in source data and in the data manipulation process. Before investing time and money in a computer system, make sure you understand the advantages and disadvantages of computer manipulated data.

Investment in computer systems appropriate for open space planning can effectively be coordinated with other local objectives, like Emergency-911 implementation, upgrading tax parcel maps, and utility mapping. Use automated mapping or true GIS software that is available locally. Computers make tasks simpler, but they require motivated people, an up-front investment of ten to one hundred thousand dollars, and data acquisition and input (which is the most expensive component of the system). In Virginia several sources of data and management guidance are available: Geography Departments of local universities, the Virginia Tech Agricultural Engineering Information Support Systems Lab (ISSL), the Council on the Environment, local vendors (i.e. engineering firms), and local planning district commissions. Coordinate efforts. Your local government or others may already have computer capabilities.

ASK:

* What information do you need?
* How will the data be used?
* Is there published information available?
* What field observations need to be made?
* Who is going to collect the needed information and how much will it cost?
* Who has special knowledge that can be tapped? (Old citizens, historians, academic people?)
* How will the information gathering be documented?
* Could local schools, universities or local specialist (historians) be of assistance?



STEP 5

OBJECTIVES

Open space objectives usually address location and use of special open space lands. Your community may want to preserve a specific place, such as a a river corridor, or a field on the edge of town. The community may identify certain uses as important: protecting a river corridor could ensure a clean drinking water supply, keep development out of the flood plain, or promote canoeing and fishing. Fields on the edge of town may be set aside for sports fields, to preserve agricultural land, or to enhance the locality's primary town entrance. In an open space protection effort, clearly defining where and how open space will be used is a definitive step that your community can rally behind.

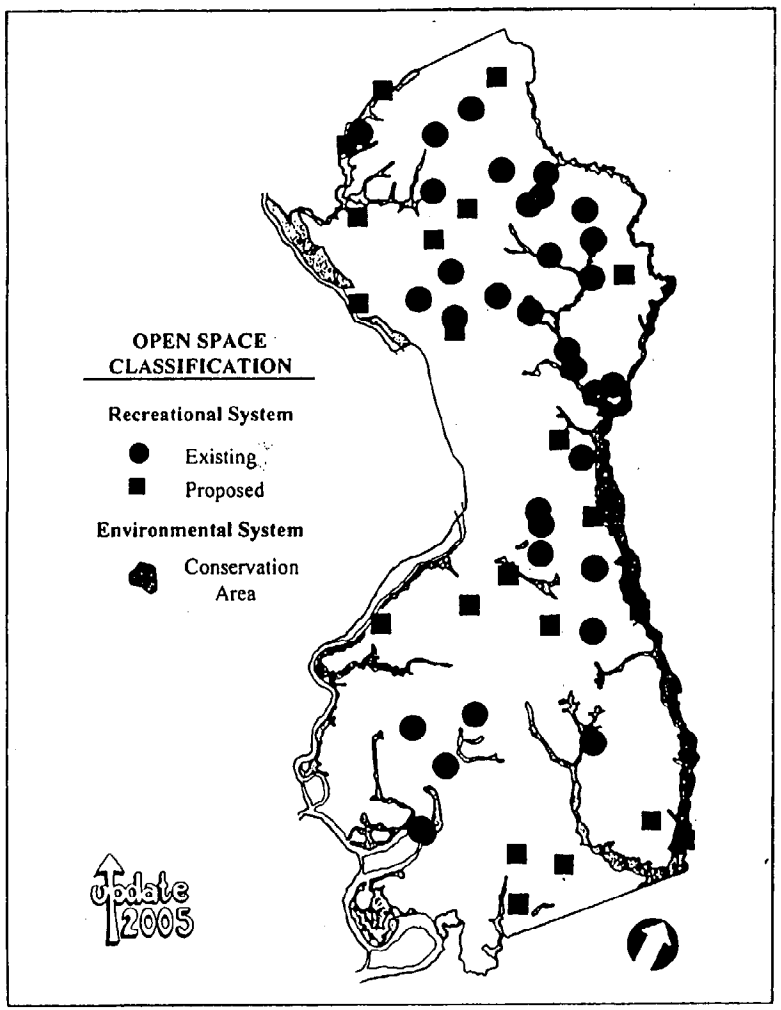
Open space objectives should be supported by the ideas generated through the rest of the planning process. Draw from conclusions of the previously completed planning steps: "Community Values", "Identify Issues", "Priorities", and "Information Gathering". Further details can be added to a plan when action strategies and a maintenance scheme are determined. "Action Strategies" and "Maintenance" are discussed in the following two planning steps.

To develop location objectives, the land proposed for dedication to open space should agree with the factors your community has defined as important. The process of developing data maps described in "Step 4 - Information Gathering", can be invaluable as you identify open spaces worthy of special protection. A good backbone of a location plan is existing open lands (such as parks, town greens, federal lands, and college and school grounds). These lands have already been identified as valuable and set aside for special uses. Proposed open space lands can be added to your existing open space network to fulfill your community's objectives.

When specifying land-use objectives, consider that open lands can supported a variety of activities: agriculture, recreation, resource protection, etc. Think specifically about who and what will occupy the area. There are different groups that take advantage of various activities and different open space uses are not always complementary. For example, the smell and noisy machinery associated with a dairy farm may clash with golfers on a golf course, or tourist at a farm museum.

Open space objectives are often culminate in a plan that is a combination of written descriptions and graphic maps representing existing or proposed open space sites and activities. When developing plans for your neighborhood, town, or region, realize that you are creating a framework to set aside open space over time. When explaining open space objectives, through written descriptions and maps, keep your readers in mind. Use crisp, clear language and graphics as you describe open space goals and designs.

Plans are often outlined in phases, and connections between areas can be emphasized. Henrico County in 1989 adopted an open space plan to their county comprehensive plan. Their plan outlined existing and proposed open space locations and recreational land use. Their objective was to promote recreation, protect water resources, and encouraging wildlife habitat. They designed a map, of important stream corridors connecting existing open space, that guides long range planning toward meeting their objectives.



HENRICO COUNTY
PARKS, RECREATION AND OPEN SPACE MAP

ASK:

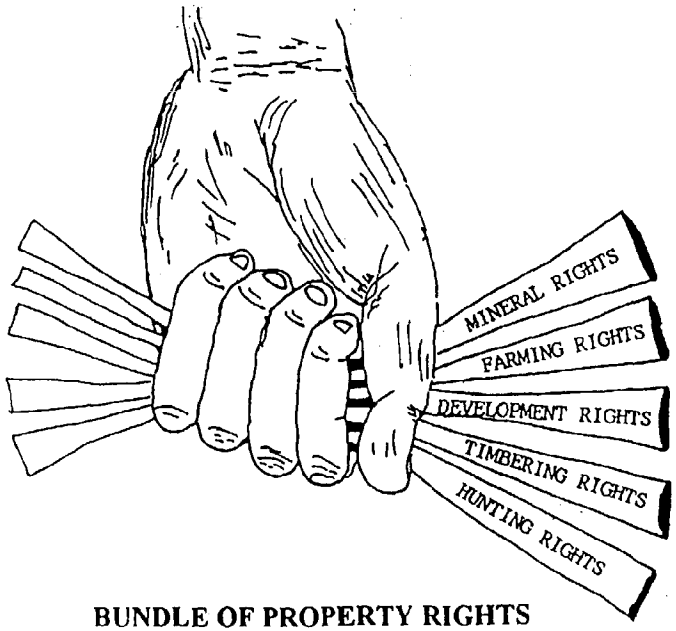
* What locations are appropriate for open space?
* What resources or valued places can guide decisions about which areas are appropriate for designation?
* What activities are valued by the community?
* Will adjacent land uses be compatible?
* Are there lands that should be converted to open space?
* Are there existing, unprotected open space lands that need to be maintained?
* How will the information collected be used to identify and map location of open space?
* Will a location map show existing and/or proposed open space?
* What open space activities has the community identified as important?

STEP 6

ACTION STRATEGIES

An action strategy outlines how to procure open space within your community. Often the defined strategies become part of the supporting documents of an open space plan.

To understand the various mechanisms used to acquire and manage property, land interests will be explained. Fee-simple or less-than-fee interests in land may be purchased, donated, leased, or exchanged.



BUNDLE OF PROPERTY RIGHTS

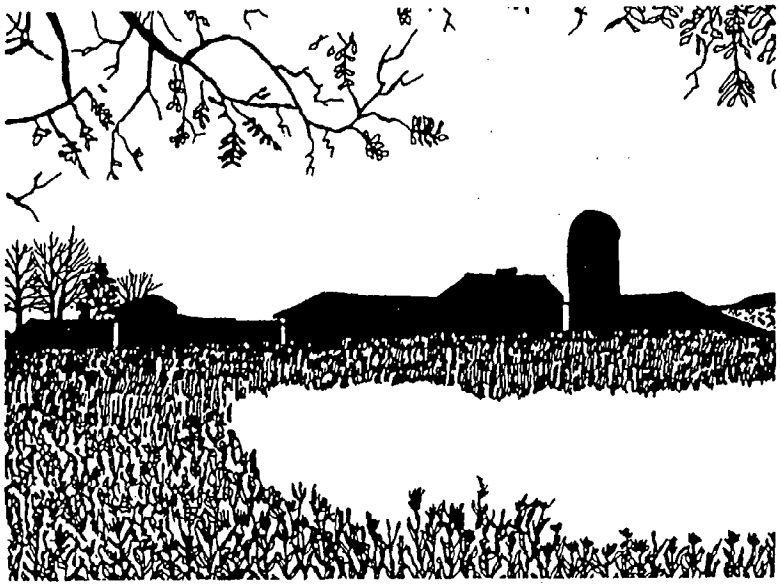
Land interests can be referred to as a "bundle of rights". This bundle usually includes the right to farm, cut timber, build structures, extract minerals, post property, and otherwise develop land. Separation of these rights from property is called less-than-fee interest. In a fee-simple land acquisition the buyer purchases full title to all land rights. This type of purchase provides the owner with the greatest control over a site. One disadvantage of a fee-simple purchase is the expense. Obtaining a less-than-fee interest is a way of acquiring control of the land without paying for the entire "bundle of rights". Less-than-fee ownership, usually referred to as an easement, is a few sticks of a property's "bundle of rights."

All land management tools have government sanction and are intended to serve the public's interest. The tools vary in their extent of government participation and bite, strength of protection, degree of permanence, and cost. Figure 2 is an overview of the tools to be discussed. This is by no means a comprehensive list, yet this listing provides a look at the various planning techniques used in Virginia and some that are not yet acceptable in the State. When choosing which tools are most appropriate for your unique situation, consider the resources to be protected, the growth pressure in your area, and the location and use of open space. The various open space management strategies cover a spectrum of attributes; some set open space as a permanent land use, some protect open lands for a limited time period, some protect land with a "handshake", and some agreements are legally binding. It is not one particular management tool but a combination of mechanisms that pulls an all-encompassing open space planning effort together.

Strategies will be discussed starting with those that employ the largest degree of government involvement, and moving to those that have the least government involvement and the highest citizen participation. The tools with the most government involvement are grouped under the categories of "Government Acquisition", "Regulation", and

"Taxation". The management tools with the least government involvement are grouped under the categories of "Private Acquisition and Conservation", and "Recognition and Non-binding Agreements". Several types of private partnerships and corporations exist which may own property for the protection of open space: land trusts, homeowners associations, and special purpose conservation organizations, like The Nature Conservancy.

Figure 2 is a matrix of open space tools comparing their extent of government involvement, strength of protection, degree of permanence, and initial costs. Fee-simple interests and conservation easements are discussed in both sections, "Tools with the Greatest Extent of Government Involvement" and "Tools with the Least Extent of Government Involvement", but have been consolidated as one entry within the matrix.



TOOLS WITH THE GREATEST EXTENT OF GOVERNMENT INVOLVEMENT

GOVERNMENT ACQUISITION

Local, state, and federal government may acquire land as fee-simple interest or less-than-fee easements. There are several avenues for government acquisition: purchase, donation, withdrawal from the public domain, exchange and condemnation. Government agencies acquiring open space should consider that the land will be taken out of the tax base; consequently, the obtained parcel should be of high open space quality and clearly for the community's benefit.

Fee-simple interest is defined as holding all the rights to a piece of land. Fee-simple interests may be purchased by public or private groups or individuals. See the section "Tools with the Least Extent of Government Involvement" for a description of how private individuals or groups may use this tool to their advantage. When government agencies acquire fee-simple interest in property often the property is set aside as park land. The advantage of fee-simple ownership for both public and private property owners is that it allows a large degree of control. The disadvantage is permanent management responsibility and, if purchased, cost.

Fee-simple interests and lease back involves purchasing or receiving donated land that is then managed by another party. The objective of this technique is to buy land and rent it with certain restrictive measures attached that protect the open quality of the property. Lease back usually keeps land in the use it was before government purchasing. The Blue Ridge Parkway in the 1930's and 40's bought land in western Virginia. They often lease the right-of-way as farmland, with restrictions to ensure that the land be managed for compatibility with the quality of the parkway.

FIGURE 2
ACTION STRATEGIES

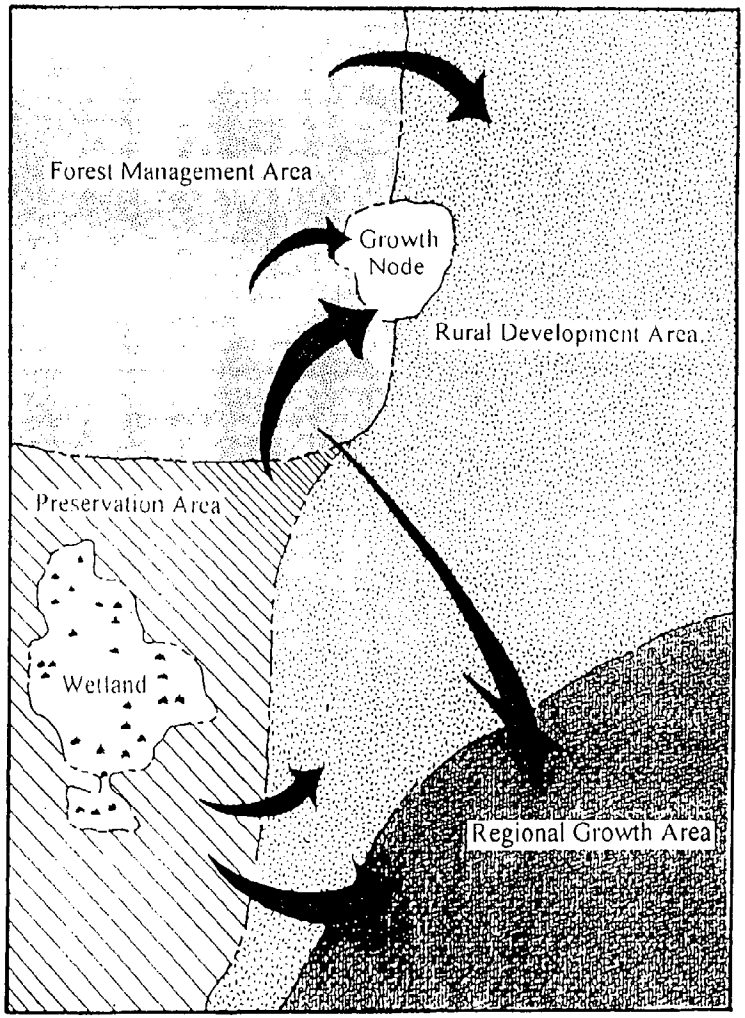
● HIGH ◎ MEDIUM ○ LOW TOOLS	GOVERNMENT INVOLVEMENT High-Low	STRENGTH Strong-Weak	PERMANENCE Long-Short	COSTS High-Low
Fee-simple Interests	●	●	●	●
Fee-simple Interests & Lease Back	●	●	●	●
Land Exchange	●	●	●	○
Transfer of Development Rights	●	●	●	◎
Conservation Easement	◎	●	●	◎
Urban Growth Boundaries	●	◎	◎	◎
Right-to-Farm Laws	◎	◎	◎	◎
Condemnation	●	●	●	●
Comprehensive Plans	●	◎	◎	◎
Capital Improvement Program	●	●	◎	○
Zoning	●	◎	◎	◎
Overlay Zoning	●	◎	◎	◎
Agricultural Zoning	●	◎	◎	◎
Large Lot Zoning	●	◎	◎	◎
Cluster or Density Zoning	●	◎	◎	◎
Sliding Scale Zoning	●	◎	◎	◎

● HIGH ◎ MEDIUM ○ LOW TOOLS	GOVERNMENT INVOLVEMENT High-Low	STRENGTH Strong-Weak	PERMANENCE Long-Short	COSTS High-Low
Performance Zoning	●	◎	◎	○
Steep-Slope Provisions	●	◎	◎	◎
Planned Unit Developments	◎	◎	◎	●
Subdivision Ordinances	●	◎	◎	○
Setbacks and Buffer Provisions	●	◎	○	◎
Water Resource Regulations	●	◎	◎	◎
Greenway Corridor	◎	◎	●	○
Land-Use Taxation Incentives	◎	●	○	○
Agricultural and Forestal Districts	◎	●	○	◎
Bargain Sales	○	●	●	◎
Purchase of Development Rights	◎	●	●	◎
Remainder Interest	○	●	●	○
Deed Restrictions	○	○	●	○
VA Scenic Highways and Byways	○	○	◎	○
VA Scenic Rivers Program	○	○	●	○
Management Agreements	○	○	○	○
Build Coalitions	○	●	●	○

Land exchange is another fee-simple acquisition tool. Public agencies (and non-profit organizations) may exchange land that is appropriate for development for high quality open space land. For a land exchange to work, property owners must be willing to accept exchange and the properties must be of comparable value. Land exchanges can also be arranged as a swap of less-than-fee interests often called transfer of development rights. The U.S. Forest Service will use land exchanges to obtain fee-simple ownership of privately held parcels of land within their congressionally-approved boundaries. They will often swap excess land they own these privately held properties.

Transfer of Development Rights (TDRs) are a relatively recent planning device that separate property interests and manipulate those interests, specifically restricting the right to develop land. They are designed to protect sensitive areas. In TDR systems, "sending zones" are established where development is discouraged, and "receiving zones" where high-density developments are encouraged and accommodated. The state of Maryland has used TDRs extensively and successfully.

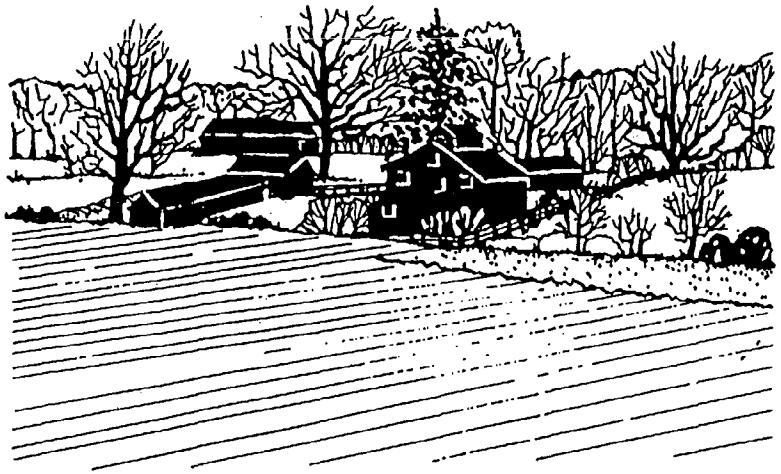
A **conservation easement** may be purchased by or donated to a government agency. Five state agencies hold conservation easements: the Division of Historic Landmarks, the Natural Heritage Program, the Department of Game and Inland Fisheries, the Marine Resources Commission, and the Virginia Outdoors Foundation (VOF). All, but the VOF, hold easements to protect specific resources. The VOF has an encompassing legislative mandate to address preservation of the natural, scenic, historic, scientific, and recreational areas of the state. The VOF holds land easements with a variety of associated resources. See Box 6 for two examples of easements held by the state. See "Tools with the Least Extent of Government Involvement" for an explanation of how land owners and private organizations may use conservation easements.



TRANSFER OF DEVELOPMENT RIGHTS

BOX 6
EXAMPLES OF CONSERVATION EASEMENTS

The following are two examples of conservation easements held by government agencies in Virginia. The 1854 Bayne-Fowler House in Alexandria is protected by an easement held by the Virginia Division of Historic Landmarks. The award winning Piedmont Vineyards, located on a 600 acre conservation easement in Middlebury, was donated to the Virginia Outdoors Foundation in 1976. Easements may also be held by non-governmental organizations. See the description of tools described under the LEAST EXTENT OF GOVERNMENT INVOLVEMENT.



PIEDMONT VINEYARDS

Urban Growth Boundaries (UGBs) consist of a perimeter drawn around an urbanized area, within which urban development is strongly encouraged, and outside of which development activities are limited. Within the UGB, urban services and facilities are provided.Typically the boundaries are designed to accommodate projected growth for a 10 to 20 year period. Oregon currently has stringent UGBs that allow localities to prevent almost all development outside the boundaries. Most Virginia localities designate urban-growth districts, but do not rigidly direct development. One example of a UGB is Virginia Beach's "Green Line," which limits infrastructure and places strong development requirements on the city's southern section. The northern portion of the city is designated as a growth area within which all infrastructure is provided. Virginia Beach's Green-Line is still in effect, but because of political pressure the location of the line has been altered. By changing the line and reduced the size of the area to be protected, it has been suggested that Virginia Beach has set a precedent that will ultimately weaken their use of the UGB concept.

Right-to-Farm Law are intended to protect and encourage farming. These laws or ordinances protect farmers and ranchers against certain legal actions associated with farming impacts, such as odors, noise, flies, dust, and other annoyances. Forty-seven states including Virginia have enacted these laws. Virginia's Right to Farm Act prevents established farms from being charged with nuisance suits by adjacent landowners. The Act does not completely close the door on nuisance suits, but the plaintiff is required to provide evidence of improper farm operation, or that a farm has changed its operations significantly.

Condemnation is an acquisition tool used when the government employs its power of eminent domain and obtains a desired property. Eminent domain is implemented when a property owner is an unwilling seller, or when there is a title discrepancy. Withdrawal

from the public domain to preserve open space is usually done through an act of Congress or the state legislature. Condemnation is not often used and is usually employed only as a last resort. In 1988 a legislative taking was used to protect the Manassas National Battlefield in Prince William County from rampant development that threatened the historic open site.

REGULATION

Over the last fifteen years land use control and management has received increasing attention from federal, state and regional authorities as local governments have often failed to aggressively address local land-use problems. While the state has the authority to regulate local land-use practices, for the most part land-use control is delegated to local governments. The following regulatory tools are considered a manipulation-of-property-rights that can be used by local governments. For a locality to employ some of these tools, the State must be petitioned to grant enabling legislation. Ask your local government planning staff about the Dillon Rule (the enabling legislation) and if ordinances need to be passed to implement the following management tools.

Comprehensive plans are required for all Virginia cities and counties and are required to be updated every five years. It is a planning device, rather than a regulatory tool. It officially guides the local governing body in developing regulations. In a local comprehensive plan, by outlining the location of open space land, local governments can be authorized to encourage and support the donation of conservation easements to qualified organizations or government agencies. By defining only high quality open space in your comprehensive plan, assures the community that properties that are best suited for potential development will not be designated open space.

Montgomery County, in an update of their comprehensive plan in 1990, included a statement about protecting open space. The New River Planning District Commission, the Montgomery County Planning Commission, and the Blacksburg Planning Commission have development of an open space plan for the County that has not yet been adopted. Virginia Beach and the counties of Albemarle and Fauquier have adopted open space elements in their respective comprehensive plans. Virginia Beach has had many legal and community problems implementing their open space plan; Albemarle has only recently added an open space provision, and Fauquier has had tremendous success implementing their open space protection strategies. The Isle of White County's Comprehensive Plan has a section that addresses agricultural preservation. Their award winning comprehensive plan helps to protect the county's open space.

Capital Improvements Program (CIP) affect open lands when facilities and other public investments (such as roads, sewer, and public water) are built in areas previously undeveloped. A CIP identifies specific projects, their priority, timing, and financing. A CIP plans expenditures for a five year period and is typically revised on a yearly basis. If required to be consistent with your open space plan and/or comprehensive plan, a CIP can be beneficial to an open space planning effort by looking at all public investments for the future and projecting how they may affect your county's natural, cultural, and recreational resources.

Zoning has long been Virginia's regulatory tool of choice as a means of preserving open lands. Zoning regulations usually direct the zones or pockets where types of buildings and land use can be developed. Traditional development zoning is most often applied in more urban areas. Controls such as density, building height, bulk, allowable use, etc. are imposed according to zone types which have been adopted at either the state or local level. Box 7 describes the negotiation process that is often used within the context of zoning review.

Overlay zoning can protect a defined resources (such as wetlands, scenic areas, historic districts, or stream corridors). This tool is often used in conjunction with existing zoning and lays on top of the traditional zoning categories (commercial, residential, agricultural, etc). For example, suppose that upon investigation a wetland is found to be in a commercial zone. The wetland can be protected within the commercial zone by overlaying a designated protection area that provides additional specific regulations that govern the use and development of the critical area within the commercial zone. This method of zoning, however, cannot be relied upon to permanently preserve open space. It is most effective when used in conjunction with other tools, such as conservation easements.

BOX 7
PROFFER SYSTEM

In Virginia, local governments often use a "proffer system" in light of the fact that they are working under a local-governmental system of proposal review in which developers are only required to meet the "standards" for development. In this proposal review process localities use the "proffer system" in which rezoning applicants agree to provide certain amenities in their design, such as environmental consideration, which exceed the normal zoning ordinance requirements. These legally binding agreements are not required but add a certain flexibility to local authority's power to enable certain environmental considerations to be met (Randolph, 1991). Your local zoning review board may use this "proffer system" process to protect land. Before a zoning review board will use their power to protect open lands, they must be become sensitive to the issues of open space.

Agricultural Zoning is intended to preserve agriculture as a permanent land use. Agricultural zoning ordinances limit the intrusion of new, non-agricultural uses (usually non-farm buildings) and requires a large minimum lot size (50-160 acres). The minimum lot size is based on the minimum acreage necessary for a productive commercial full-time farm to be viable. Agricultural zoning differs from large-lot zoning in that agricultural uses are favored and encouraged while land consumptive large-lot developments are discouraged. Implementing agricultural zoning depends upon farmers and other rural residents being supportive. Fauquier County has 85%-15% zoning where 15% of the parcel can be developed while 85% remains in agricultural or open space use for a period of 25 years. In this way some development is permitted, but the overriding goal of the ordinance is the preservation of farming.

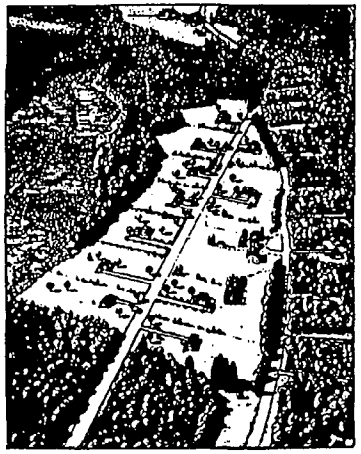
Large lot zoning limits the size of lots from 1 to 50 acres, within a specified zone (limiting the density of development). Large lot zoning can help retain open space, but this tool has been criticized for excluding lower income groups from enjoying the landscape. When large lot zoning is used to maintain open space character, it should be used in conjunction with other tools that provide for permanent protection. Cluster zoning and planned unit developments (PUDs) can answer the problems of large lot zoning. They can effectively provide open space which serves recreation and conservation needs, and enhances the character of a community or neighborhood.

In **cluster** or **density zoning** a maximum residential density for an area is established. The developer is allowed to alter the lot size for each house as long as the set limit is not exceeded. Residential developments can be designed with all homes placed in a small area leaving the remainder of the land open to be owned and managed by the residents. Clustered developments cost less for both the builder and the taxpayer because the amount of infrastructure (streets, water, sewer, etc.) and public services (trash, emergency services, school-bus

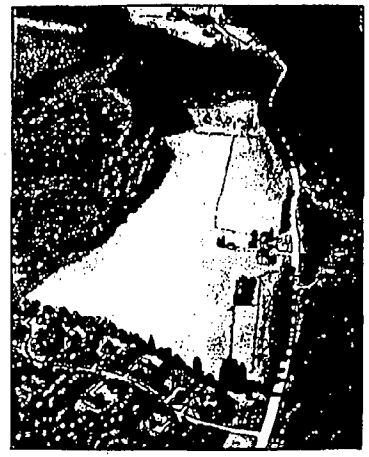
pick up) required for these developments are less than those required for traditional developments which may sprawl for acres and acres. See the graphic below which demonstrates the results of traditional zoning verses cluster zoning. Several Virginia counties and towns have adopted special cluster ordinances, including the town of Leesburg, and the counties of Clark, Albemarle, Fauquier, Fairfax, and Stafford.

Sliding scale zoning is an attempt to protect agricultural land from high density development by imposing a limit on the number of dwelling units allowed per acre. Clark and Fauquier Counties have implemented sliding scale zoning. Fauquier opted for this zoning after exploring cluster zoning, and the county now requires up to 85% open space on any tract approved for new development in the rural area zone. In 1981, Highland County adopted a sliding scale approach to single-family homes built in their agriculture zoning district. The purpose of their single-family district is to promote the rural, agricultural, forestal, and open space character of the land within the zone. The Highland sliding-scale limits the number of single family units to one on every 14.99 acres, and 11 units are permitted on tracts of 500 acres.

DEVELOPMENT RESPONDING TO TRADITIONAL VERSES CLUSTER ZONING



Conventional Development Consumes Many Lots of Land



Cluster Development can be Grouped in the Forest

Performance Zoning is designed to evaluate proposed developments on a project-by-project basis weighing standards established by the community. The process involves a detailed analysis of existing conditions, a project evaluation with points assigned, and the approval or disapproval of the proposed development. One of the goals of performance zoning is to not allow development that cost the community more than it will produce in taxes and income. Communities in New York, New Jersey, and Pennsylvania have had mixed success with performance zoning. Bedford County uses the Land Use Guidance System (LUGS), which is very similar to performance zoning in that it relies heavily on public workshops to formulate point totals for a proposed development, and has no previously assigned zoning districts.

Steep-Slope Provisions limit certain building activities on steep slopes (generally slopes greater than 25%). These provisions are concerned with construction on steep slopes that may cause severe soil erosion, sedimentation, water pollution, and negative impacts on views of ridgelines. Factors such as soil type, geology, and vegetation are used to determine the amount and intensity of development that a slope can handle. Some communities have an outright ban on development of slopes greater than 25%; others limit the amount of land allowed to be disturbed; and still others restrict the amount of development based on additional factors such as soil type, geology, and vegetative cover. Albemarle County has a steep-slope ordinance.

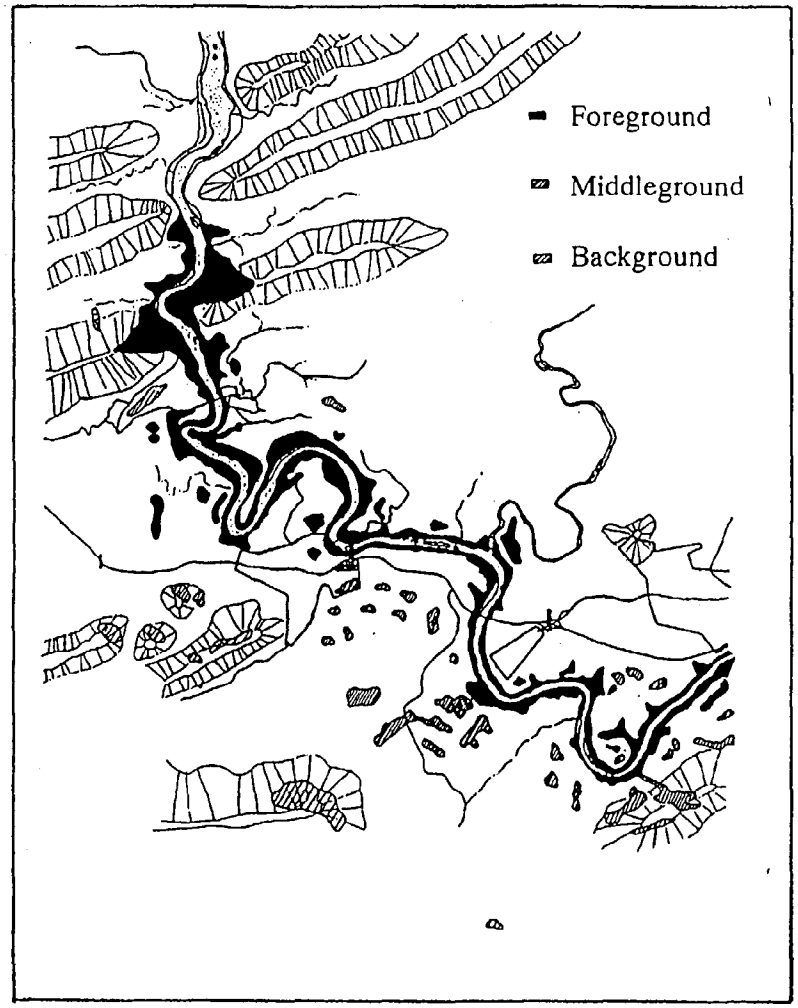
Planned unit developments (PUD) are gaining in popularity in Virginia. A PUD is a type of development pre-planned in its entirety with subdivision and zoning controls applied to the project as a whole rather than on a lot-by-lot basis as is done with a standard development. These developments do not rely on specific regulations but on negotiations between planners and developers during the project review process. Imaginative design alternatives can evolve which incorporate mixed land uses, including residential use (homes and apartments) and commercial use (stores and restaurants). PUDs usually involve parcels of 100 acres or more.

Subdivision ordinances can affect open space preservation by controlling how a development is laid out and what percentage of the property will remain as open space. These regulations guide subdivision design standards, such as lot size, water and sewer service, width and location of streets, etc. One way to address open space is to require that all new subdivision developments include a certain percentage of open space.

During the subdivision-proposal review, opportunities exist for shaping the design and environmental impact of a development. Conditional zoning, such as density bonuses or other benefits, may be negotiated in exchange for greater open space inclusions in the proposal's design. This negotiation has been especially effective in areas such as Washington State where developers are required by the state to furnish an environmental impact statement along with their subdivision proposals. Your local planning staff can ask developers to protect environmentally sensitive areas. This is a discretionary proposal review process, in that it goes beyond merely approving the standard development requirements (Randolph 1991)[2]. The state legislature must pass enabling legislation for localities to require environmental impact statements with development proposals.

Setbacks and **Buffers Provisions** address small areas of open space, most often within an urban setting. These regulations require a strip of open space to separate two land uses. Setbacks usually require structures to be located a specified distance from a resource (for example all buildings must be at least fifty feet from a stream), or they may set a variable distance depending on the resource and its surrounding features (for example setbacks from a stream may be based on adjacent slope, soil type, or size of the stream). Buffers differ slightly from setbacks because they imply that something (typically vegetation) must be within the buffer area to physically screen the resource (for example plants are left uncut within 50 yards of a stream to filter a non-point source pollutants). The details of setbacks and buffers (size and distance, etc.) are often addressed in zoning and subdivision ordinances, and in formal documents describing design guidelines.

Water resource regulations are generally concerned with health and safety and may be enacted within your locality to protect open space. Septic tank regulations and local wellhead protection programs ensure that adequate space is allocated near sensitive sewage and water supplies. Local soil erosion and sediment control regulations may be passed to support the existing state and Federal laws. Stormwater management standards regulate the quantity and quality of runoff allowed from development. Stormwater management standards are optional for small localities and are required for cities with populations exceeding 100,000 and large state institutions such as universities. Watershed regulations may be enacted. The Chesapeake Bay Act made great strides in protecting water resources within that watershed and may be used as a model for other areas. The difficulty of enforcement is one of the largest disadvantages of many of these regulations.



VISUAL ASSESSMENT OF NEW RIVER, GILES COUNTY
Analyzed as part of the Giles County Greenway Corridor Study

Chesapeake Bay Preservation Act requires that within the Chesapeake Bay watershed a one hundred foot buffer around all perennial water bodies, including streams and wetlands, must be maintained. Albemarle County, though not in the defined Chesapeake Bay watershed, has adopted an ordnance modeled after the Chesapeake Bay Preservation Act.

A **Greenway Corridor** is a linear section of undeveloped land that generally follows a defined resource, such as a stream corridor, ridgeline, or an abandoned rail line. Greenway planning attempts to identify resource corridors and then creates a linkage pattern that develops a network of interconnecting greenway corridors. A good example of greenway planning in Virginia is the Laudon County/Leesburg Greenway. The Metropolitan Richmond Greenways Project is a multi-jurisdictional effort to protect the James River.

Another example of an open space stream corridor project, that is in its initial planning phase, is the greenway-planning endeavor for Giles County. The Visual Assessment Map of the New River is one of the data layers that will help guide decisions about the greenway.

TAXATION

In Virginia, a land owner who makes a commitment to preserve his or her land as open space may be eligible to receive tax deductions offered by federal, state, and local governments. Federal tax laws allow both corporations and individuals to take deductions on income, estate, and property taxes for property donations (including easements) to government agencies or qualified non-profit organizations. See the description of conservation easements and fee-simple interests for a brief explanations of how to qualify for tax deductions for charitable contributions of property. When donating property for the purpose of open space preservation, consult a tax attorney or an accountant.

Land-use tax (special valuation) incentives are available to certain properties to be taxed according to their current use value rather than their highest fair market value. The principle objective of this differential assessment is to decrease the tax burden on landowners using the land for agriculture, horticulture, forestry, or open space along the rural-urban fringe. Box 8 explains the unique opportunities for certain properties to qualify for special-tax valuation. Property taxes in some areas may be reduced up to 70% thereby reducing pressures on landowners to sell out under duress to developers or speculators. A rollback tax penalty is often coupled with land-use tax incentives to increase the strength of the special-valuation tax tool and to discourage landowners enrolled in such programs from changing their property to more intensive uses. This rollback tax generally is based on the difference between the taxes paid and the taxes that would have been paid according to the fair market value of the land for a specified number of past years, plus an interest penalty. Currently, fifty-three localities in Virginia have established land-use tax ordinances (which allow creation of Open Space, Agricultural or Forestal Districts).

The following documents explain special valuation of open space property, and how the state may enable counties, cities, and towns to adopt ordinances that allow for tax breaks: *Code of Virginia*, *Manual of the State Land Evaluation Advisory Council*, *Standards for Classification of Real Estate Devoted to Open Space Use under the Land-Use Assessment Law*, and *The Virginia Outdoors Plan*. At least six Virginia counties have employed special open space tax incentives: Albemarle, Chesterfield, Hanover, Henrico, Laudon, and Prince William. The general consensus is that, before adopting a local open space tax assessment ordinance, the criteria for qualified properties should be rigorously defined and limited.

Designated **Agricultural and Forestal Districts** (defined by the *Agricultural and Forestal Districts Act*) are an example of land that is assessed and taxed by special valuation. Agricultural and Forestal Districts (AFDs) are established to protect the Commonwealth's farms and forests. AFDs provide the landowner with certain tax

BOX 8
OPPORTUNITIES FOR CERTAIN PROPERTIES TO QUALIFY FOR SPECIAL-TAX VALUATION

There are unique opportunities for certain properties to qualify for special-tax valuation. Beyond the properties that are used for agriculture, horticulture, forestry, and open space, a parcel may qualify for special valuation if adjacent to a scenic river, a scenic highway, a Virginia Byway, or if identified in the Virginia Outdoors Plan. There must be a property assessment conducted by a qualified appraiser before land can be given special tax valuation. There are standards defined by federal and state taxation agencies that guide appraisers in identifying open space.

benefits and places restrictions on local public utilities and local governments. The restrictions on government actions include requirements that the locality consider the existence of an AFD whenever administrative and planning decisions are made concerning parcels adjacent to an AFD. Districts may only be initiated by landowners, but must be approved by the locality. In Virginia, this method has proven to be weak in permanently preserving open space because the landowner agrees to only temporarily limit development on their property (usually for a four to ten year period).

TOOLS WITH THE LEAST EXTENT OF GOVERNMENT INVOLVEMENT

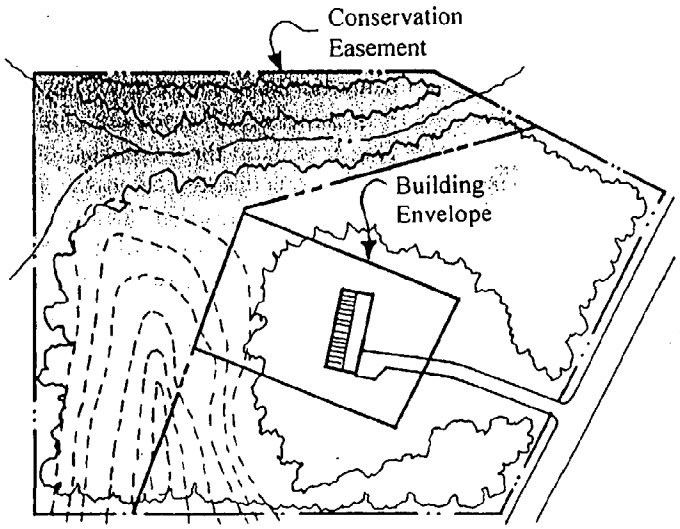
PRIVATE ACQUISITION AND CONSERVATION

Private groups and citizens may sell or purchase land, receive property donations, and obtain easements. The degree of protection and permanence of privately acquired open space lands depends in part on the conditions placed on the acquired property.

Fee-simple interest have been introduced in "Tools with the Greatest Extent of Government Involvement", but because land transfers may be initiated by private land owners or private organizations this tools is also addressed here. A property owner who donates property to a government agency or a qualified non-profit organization may receive a deduction on their income tax. Fee-simple donations may also be presented as a bequest made in a will. Gifts of property to tax-exempt organizations can reduce estate taxes. Arrangements should be made ahead of time. Less-than-fee interests in property in the form of easements may be donated in a similar manner.

Bargain Sales are a type of sale of fee-simple interest in which the owner sells property for less than its fair market value. If the organization buying the property is tax-exempt, the owner may be able to take a tax deduction for the difference between the actual sale price and the fair market value. The tax deduction may help compensate for the lost lower sales price.

Conservation Easements is a less-than fee simple interest used to protect open space by dividing and manipulating the property rights in some way to protect the open quality of the land. Conservation easements may be bought, sold, given or received by government agencies or by private organizations. (For a description of how government agencies may use this tool see "conservation easements" under "Tools with the Greatest Extent of Government Involvement".



CONSERVATION EASEMENT

Non-profits who meet the IRS criteria, have had an office in Virginia for five years, and which provide public access to their lands may hold easements. (The public access may be either physical or visual access.) When private organizations receive donated easements, the tax advantages are structured in the same way as if a government agencies were receiving the donation. Conservation easements are one of the most permanent privately-orchestrated land protection tools.

Open space easements set permanent restrictions on special land resources within a property's deed. These restrictions stay with the parcel of land regardless of the owner. To promote open space easements, also referred to as conservation and scenic easements, several Virginia laws have been passed. The *Virginia Conservation Easement Act* allows a public body or charitable organization to acquire a property easement. The *Open Space Land Act* ties open space easements to the plans of local governments. This act states that "use of the real property for open space land shall conform to the official, comprehensive plan for the area in which the property is located." The IRS code and the *Code of Virginia* set guidelines that ensure that easement gifts: are of high quality, are for the scenic enjoyment of the general public, are held in perpetuity, and comply with the local comprehensive plan. The state legislature created the Virginia Outdoors Foundation to hold property easements with special open space qualities. Any citizen who wishes to donate an easement should make sure that their local comprehensive plan has a section addressing open space because, if their is no open space plan and the property owner's land is not locally-designated as open space, then they cannot take advantage of the IRS deduction for open space easement. Federal and local governmental agencies may hold easements but they rarely choose to do so. Non-profits which meet the IRS criteria and provide public access to their lands may also may hold easements. Like the government agencies, they hold easements for a variety of reasons.

Purchase of development rights (PDR) is a relatively new tool. The purchase of conservation easements is sometimes referred to as a PDR, but PDRs involve purchasing just the development rights associated with a property, while conservation easements can be used to purchase development rights, mining rights, grazing rights, or a whole host of other rights tied to the ownership of property. PDRs are generally employed by a willing-seller, who wishes to retain ownership and control of the property and at the same time wishes to "cash in" on the principal value of the property-its development value. PDRs are typically used to preserve significant agricultural or natural/cultural resource areas. See the figure demonstrating a PDR's exchange.

BOX 9
LAND TRUSTS

A special note needs to be made about land trusts. They are private, tax-exempt organizations dedicated to land conservation, generally through land planning, land acquisition and conservation easement acquisition. Land trust may use a variety of the tools described in this document, easements being implemented most often. To qualify as a land trust which may hold easements in Virginia, a non-profit must have had an office in Virginia for at least five years. The following national and state land trusts are eligible to hold easements in Virginia: the Nature Conservancy, the National Trust for Historic Preservation, the Chesapeake Bay Foundation, the Potomac Appalachian Trail Club, and the Waterford Foundation, Inc.

A **remainder interest** is a another type of less-than-fee interest. To protect open space, a remainder interest can be donated to a private conservation group. This legal property-title transfer includes a provision that gives the owner, or specified persons, the right to live on the property or to use it during their lifetime. Income tax deductions are also possible with this arrangement. The owner of Falls Ridge Preserve in Montgomery County gave The Nature Conservancy 640 acres and set up a remainder interest on an life estate of his home. At the owner's death the Nature Conservancy took on the management of his home and the six-acre remainder interest.

Deed restrictions can be placed on property by a land owner and become the sole protection mechanism once the property title is transferred. Theoretically, deed restrictions are one of the most binding forms of protection, but are hard to enforce. Legally little short of government condemnation will extinguish a deed's reversion clause that protects open space.

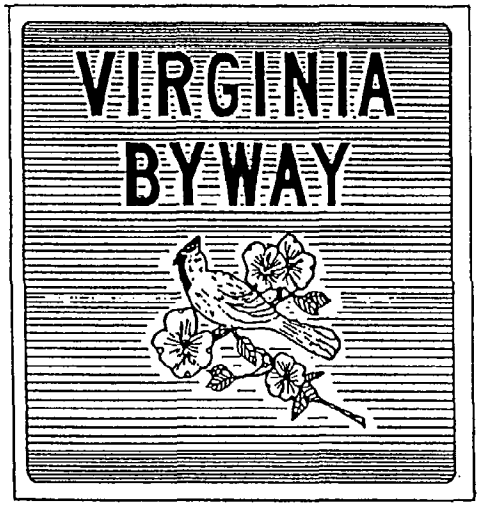
RECOGNITION AND NON-BINDING AGREEMENTS

Virginia has several programs that encourage local communities and citizens to steward their lands. Each landowner who preserves open space acts voluntarily to restrain certain activities on their land for a specific period. The restraints are agreed upon in an implementation action taken by a local governing body, state, or federal agency. Some examples show: only a local government can establish an agricultural and forestal district; the General Assembly acts, usually with the concurrence of local government, to establish a scenic river; and, depending upon the situation, a local government, a state agency, or a federal agency must accept a scenic easement granted in perpetuity by a private land owner (Marshall, 1990)[3]. The major limitation of these protection methods is that there are few requirements for designated properties and no assurance that the open space quality of the land will be maintained. Below are a few examples of Recognition and Non-binding Agreement programs that a land owner can voluntarily implement.

- **Adopt-A-Highway**
- **Agricultural and Forestal Districts**
- **Bicentennial Farm**
- **National Register of Historic Places**
- **Soil Conservation Service Earth Teams**
- **Virginia Landmark Register**
- **Virginia Natural Areas Registry**

BICENTENNIAL FARM

The Virginia Scenic Highways and Byways Program is a citizens initialed designation. In 1966 the Virginia General Assembly passed the Scenic Highway and Virginia Byway Act authorizing the Commonwealth Transportation Board to designate certain outstanding roads as Virginia Byways or Scenic Highways. Virginia Byways are defined as existing roads with relatively significant aesthetic and cultural values, leading to or lying within an area of historical, natural, or recreational significance. A Virginia Byway designation does not place any restrictions or regulations upon land within a Byway corridor. The State obtains no land-use controls, implied or otherwise, through the process of designating state roads as Virginia Byways. Maintenance and operating procedures of the Department of Transportation remain unchanged.



The **Virginia Scenic Rivers Program** was passed by the Scenic Rivers Act in 1970. This Act authorized the establishment of a scenic-river system to protect rivers that possess natural or pastoral beauty. The designation provides certain protection for these rivers and gives riparian (river front) landowners and other local citizens greater voice in any government actions that might adversely affect their river. The State has so far designated 17 river segments totalling 346 miles.

Management agreements can also be set up between government entries and major landowners. Such an agreement may be negotiated between a timber company and a local government to cooperate and manage lands for recreation access to certain of the property owner's lands. The Nature Conservancy, Potomac Appalachian Trail Club, the Department of Forestry, the Division of Natural Heritage, and the Commissions of Game and Inland Fisheries all use management agreements in Virginia to assist in the management of resources on special private properties.

Build coalitions by communicating and bring together individuals and groups who are dedicated to open space and the various aspects of open space. Form new groups where none exist. Remember to communicate with others who have similar interests. Regional

groups can help address open space issues that go beyond political boundaries. Rivers are a good example of an open space resource that may can involve the effort of more than a town, county or even a state. There is incredible strength in numbers. The Friends of the Staunton River, the National Committee of the New River, and the Friends of the Rivers of Virginia, are a few of the Virginia organizations making great strides to work to protect open space that encompasses many jurisdictions.

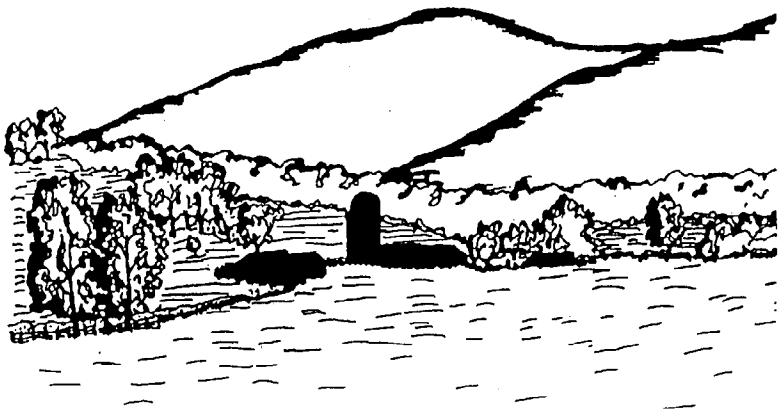
ASK:

* **How much government involvement is needed to establish open space?**
* **Will land be managed as open space permanently or temporarily?**
* **Do land owners wish to retain ownership or transfer all or part of their interests.**
* **Is compensation or tax deductions for gifts of land desired by landowners?**
* **Who will take responsibility for promoting and managing open lands?**
* **Is there a local private group or individual who can acquire land to protect open space?**
* **Will money be spent to acquire open space lands?**
* **Where will the money come from?**
* **How will the cost be paid?**
* **Does a long-range open space plan make sense or are there threats that require immediate attention?**
* **Are private landowners willing to volunteer open space easements?**

STEP 7

MAINTENANCE

The open space eligible for tax deductions are limited to lands that a community has indicated a willingness to care for. Open space maintenance and administration are important considerations for assuring that your community will have a healthy, safe, beautiful landscape. Designating open space is not enough; there needs to be a land management plan. Management means people-power and usually money to ensure open space that adds to the quality of an area. The list in Box 10 are government options and private options of organizations who can take responsibility. Consider who can most adequately protect open space resources before choosing a responsible organization.



BOX 10
OPEN-SPACE MANAGERS

GOVERNMENT OPTIONS

Local:
- **County**
- **City**
- **Town**

State:
- **Department of Game and Inland Fisheries**
- **Department of Forestry**
- **Department of Conservation and Recreation**

Federal:
- **National Park Service and National Forest Service**
- **U.S. Fish and Wildlife Service**
- **U.S. Army Corp of Engineers**
- **Tennessee Valley Authority**

PRIVATE OPTIONS

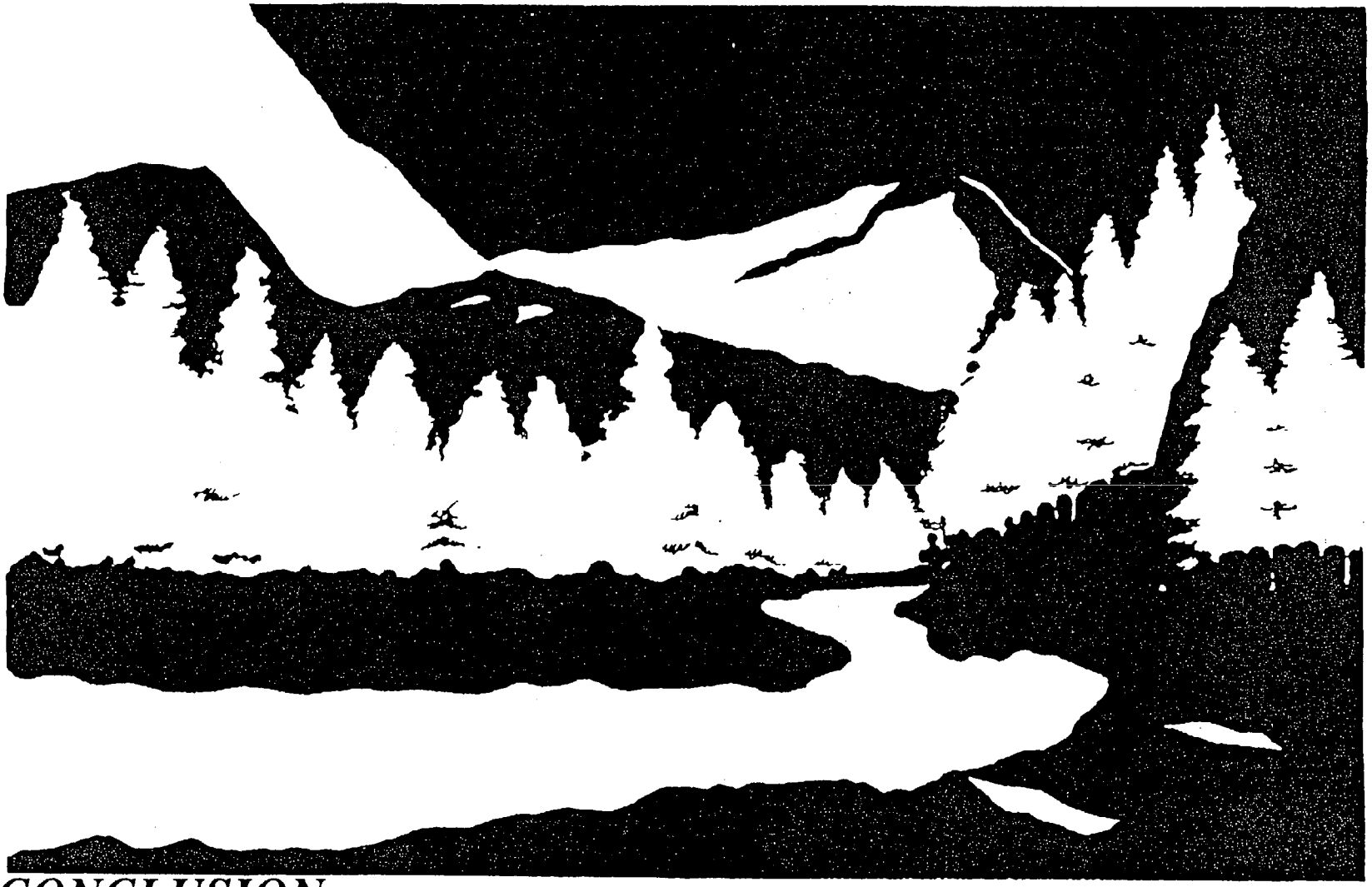
Private non-profit:
- **Appalachian Trail Conference**
- **Land trust**
- **Nature Conservancy**

Private citizens/organizations:
- **Garden club**
- **Ruritans**
- **Lions**
- **Little League Associations**
- **Homeowners associations**
- **Landowner stewardship**

Monitoring of environmental quality:
- **Septic tank monitoring**
- **Stream monitoring**
- **Wildlife biodiversity indices**

ASK:

* **What are the advantages and disadvantages to having different groups manage open space land?**
* **Where will the money and the labor come from to police, clean, and care for your open space network?**
* **Has your management plan outlined how to limit use to only appropriate activities. (i.e., limited building)?**
* **Will there be periodic evaluations of the effectiveness of your maintenance program?**



CONCLUSION

The Commonwealth of Virginia is a magnificent state with mountains, piedmont, miles of coastline, and attractive urban centers. Our open lands, if carefully managed, can continue to enhance our enchantingly diverse landscape. Open space provides recreational opportunities, protects resources, directs growth, and can encourage economic development. With your help, Virginia and her open space can grow and expand with dignity and grace.

The open space planning process, which can protect both sites of cultural significance and the great outdoors, is driven by the efforts of concerned citizens. Most of the initiative for protecting open space comes from the local level. It is important for communities to decide how they want to approach local and regional open space planning. Time and patience are necessary to follow the process through its various twists and turns to find the best avenue for each particular community.

Localities initiating this process should get people involved, and think about their local situation and their current open space issues. Consider what resources your community values? What are your community's goals and what growth are you experiencing? Where could open space be located and what activities will happen there? What management tools are citizens and local government officials likely to embrace? Consider a management plan and who will take responsibility for open space to ensure that the maintenance and administration is structured and orderly. Where will the money come from to pay for expenses? Documenting the open space planning process will give you ideas to fall back on. Draw a diagram of the process and plug in your local situation. Flow charts can be fun and will inform others about the status of the project. Remember to spend time enjoying your open space!

RESOURCE AGENCIES:

These organizations all contributed technical assistance to making this publication possible.

- **Council on the Environment**
  202 North Ninth Street, Suite 900
  Richmond, Virginia 23219
  804/786-4500

- **The Nature Conservancy**
  1815 North Lynn
  Arlington, Virginia 22209
  703/841-5300

- **Virginia Department of Conservation and Recreation**
  203 Governors Street
  Richmond, Virginia 23219
  804/786-1712

- **Virginia Outdoors Foundation**
  203 Governors Street, Suite 302
  Richmond, Va 23219
  804/786-5539

- **New River Valley Planning District Commission**
  P.O. Box 3726
  Radford, Virginia 24143
  703/639-9313

- **Virginia Tech Community Design Assistance Center**
  108 Dietrick Hall
  Blacksburg, Virginia 24061
  703/231/5644

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Open Space Plan for Henrico County, Virginia adapted from *The Parks, Recreation and Open Space Plan: Update 2000*, adopted by the Enrico County Board of Supervisors, September 14, 1988.

Development Responding to Cluster Verses Conventional Zoning adapted from *Dealing with Change in the Connecticut River Valley: A Design Manual for Conservation and Development*, page 42 and 43, prepared by the Massachusetts Department of Environmental Management and the Center for Rural Massachusetts, published by the Lincoln Institute of Land Policy and the Environmental Law Foundation, 1989.

Piedmont Vineyards adapted from *Virginia's Heritage* page 9. See the Bibliography for reference.

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2. Randolph, John, 1991. "Land Use and the Environment", Virginia Tech.

3. Marshall, Paxton, February 1990. Virginia Cooperative Extension Service Publication 72#, *Land; Issues and Problems*, "The Framework for Protecting Open Space".

APPENDIX

For further assistance in your region, contact your local Planning District Commission:

Accomack-Northampton
Post Office Box 417
Accomac, VA 23301
804-787-2936
Mr. Paul Berge, Executive Director

Central Shenandoah
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Staunton, VA 24401
703-885-5174
Mr. William Strider, Executive Director

Central Virginia
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Lynchburg, VA 24505
804-845-3491
Mr. Dennis E. Gragg, Executive Director

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Petersburg, VA 23803
804-861-1666
Mr. Dennis K. Morris, Executive Director

Cumberland Plateau
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Lebanon, VA 24266
703-889-1778
Mr. Andrew Chafin, Executive Director

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703-343-4417
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804-420-8300
Mr. Arthur L. Collins, Executive Director

Lenowisco
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703-431-2206
Mr. Ronald Flanary, Executive Director

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Ms. Nancy O'Brien, Executive Director

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One Starling Avenue
Martinsville, VA 24112
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Mr. Robert W. Dowd, Executive Director

University Outreach and International Programs

Public Service Programs

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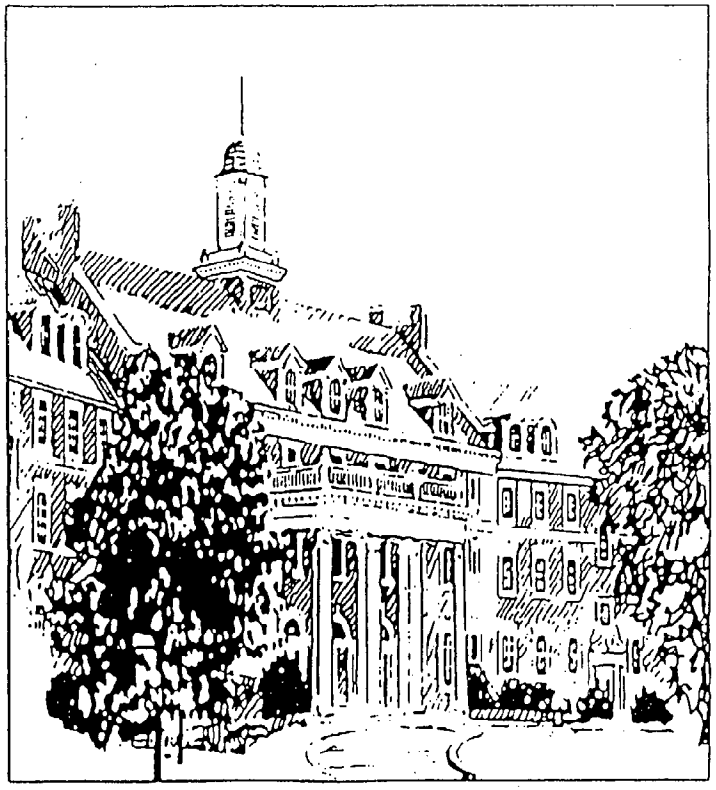


APPENDIX C

LANDOWNER CONTACT LETTER

February 3, 1994

Mr. Dennis Jones
P.O. Box 333
Virginia Beach, VA 23456

Dear Mr. Jones:

The Virginia Department of Conservation and Recreation is dedicated to identifying and conserving Virginia's natural heritage resources. As a representative of this division, I would like to talk with you regarding the significance of your property in the City of Virginia Beach.

According to courthouse records, you own land which represents one of the most significant natural areas in Virginia. This natural area contains some of the finest freshwater marshes in Virginia. Few pristine marshes of thsi type occur in Virginia and many people are unaware of the importance of these marshes. It is very likely that these ponds may support several plant and animal species associated with this type of habitat.

As a landowner, you play an important role in the future condition of these seasonal ponds and the unique species they may support. Your stewardship of the property has allowed these natural resources to exist here for years. Private lands stewardship by individuals, such as yourself, is crucial to the conservation of Virginia's natural heritage and for the enjoyment of future generations.

I would like to meet with you for a few minutes to discuss the importance of these marshes and the species they may support. I will contact you by telephone in the near future to set a meeting time and date to fit your schedule.

Thank you for your time. I look forward to meeting you. If you have any questions, do not hesitate to call me at (804) 786-9112.

Sincerely,

Melissa Donoff
Land Protection Assistant

APPENDIX D

NORTH LANDING RIVER PRIMER

NORTH LANDING RIVER WATERSHED

General Overview

The North Landing River Watershed embraces a variety of natural resource values. Local fishermen and seafood restaurants value the river for the fish, crabs, and eels it supports; farmers may use the wetlands as an irrigation source; sportsmen value the watershed as a place to hunt and fish; and ecologists rank this watershed as one of the most biologically diverse regions of Virginia. Many people appreciate this riverine system for these specific attributes. However, the watershed is also valued by many people in a general sense: it provides an area for recreational activities such as boating, waterskiing, and birdwatching. In addition, the river is a place for people to relax and enjoy nature.

Several agencies consider this river a priority for the conservation of natural resources. More than 7,000 acres within the North Landing River Watershed are owned by local, state, and federal agencies, primarily for the purpose of providing refuge for rare species, waterfowl, and natural environments. The Nature Conservancy and the Department of Conservation and Recreation own and manage the majority of these protected lands. Additionally, land is owned by the City of Virginia Beach and the U.S. Army Corp of Engineers.

The North Landing River Watershed provides important habitat for breeding and migrating waterfowl. The North American Waterfowl Management Plan through the Atlantic Coast Joint Venture (covering an area from Maine to South Carolina) has identified these wetlands as a top priority for protection. A local interest group initiated the legislative process for protecting and recognizing the river as a natural, scenic, historical, and recreational resource of statewide significance. This led to the designation of the North Landing River and its tributaries as part of Virginia's Scenic Rivers Systems in 1989. The area is also included in a local Scenic Waterways System by the Cities of Virginia Beach and Chesapeake.

Virginia's Southern Watersheds include the Northwest River, the North Landing River, and Back Bay in southern Virginia Beach and Chesapeake. These are the only three oligohaline to freshwater tidal systems in Virginia which are primarily influenced by the wind rather than tidal fluctuations. These wind tide systems allow for a great diversity of natural communities. Of the three wind-tide systems, the North Landing River has the greatest biological diversity.

The North Landing River Watershed includes the North Landing River, extensive forested and herbaceous wetlands which line the river, and several tributaries. Its two major tributaries are West Neck Creek and the Intracoastal Waterway. Other tributaries include the Pocaty River, Alton's Creek, Blackwater Creek, and Milldam Creek. This riverine system is located along the Atlantic Coastal Plain in the southeastern corner of Virginia. It lies west of the Atlantic Ocean, south of the Chesapeake Bay, and north of Currituck Sound, North Carolina.

The river covers 22 miles and drains approximately 72,000 acres of land. It flows through the Cities of Virginia Beach and Chesapeake in a southeasterly direction. It continues past the Virginia-North Carolina state line and drains into the Currituck Sound, which then empties into the Albemarle Sound. The North Landing River watershed is within the Albemarle-Pamlico Estuarine Region, the second largest estuarine system in the United States.

History

The North Landing River, along with the lands that surround it, are rich in historical culture. The river has played a central role in the lives of people who have settled in the area, from the Native Americans who first inhabited this land 11,000 years ago to the current residents of Virginia Beach and Chesapeake.

Up to 18th Century

A wide variety of Native American cultural groups lived in the North Landing area between 9,500 B.C. and 1600 A.D. With ample quantities of fish and game within the forests and marshy waterways, the area continually attracted groups of nomadic people. Native American groups settled along North Landing River and Back Bay rather than the ocean side. This was primarily due to two factors: the ocean side is more vulnerable to natural disasters, such as hurricanes; and the river and bay provided better access routes and farmland.

Native Americans began to practice agriculture in the area around 1,000 A.D. When the first Europeans arrived in the area in the late 16th and early 17th centuries, they found tribes living in villages raising corn, squash, and beans. The Native Americans inhabiting the land when the Jamestown colonists arrived were known to the English as Chesapeans. English inhabitants first settled at the mouth of Lynnhaven River. Settlement in the southern portion of Virginia Beach along North Landing River occurred gradually in the latter half of the 17th century.

The areas known today as Chesapeake and Virginia Beach were referred to as Lower Norfolk County in 1638. In 1691, Lower Norfolk was divided into Norfolk County (presently Chesapeake City) and Princess Anne County (known as Virginia Beach City since 1963). The colonists named the area Princess Anne to honor the daughter of King James II.

Tobacco was the first crop in Princess Anne and became the center of the colonial economy. In the 1680's, soil depletion, fluctuating prices, and rising labor costs forced farmers to produce other crops and to harvest timber. As a result, grains such as corn, oats, and wheat became popular crops. In addition, the regions extensive evergreen forests produced high-quality lumber and shingles of cypress, cedar, and pine.

Early settlers of Princess Anne County relied on very poor roads, particularly the southern section of the county. The roads were often impassible due to wet conditions. As a result, the North Landing River, along with other rivers in the area, remained the primary transportation network from the 1700's until the mid 1800's. In the 1700's, Kempsville became an important

shipping center whereby goods such as timber, grains, and tobacco were transported from there to Norfolk.

19th Century

Agriculture continued to be the predominant land use in the nineteenth century. Following the agricultural depression of the 1830's, farmers further diversified their resources. Hay production, poultry, and fisheries ranked high in production. Princess Anne County was well-known for its produce and supplied many other areas, including cities of the North.

Two man-made canals were constructed in this period, making shipment of produce easier. Both of the canals connect the North Landing River with the Chesapeake Bay. The Albemarle and Chesapeake Canal, connecting the Southern Branch of Elizabeth River with the North Landing River, was completed in 1859. This canal connection was used to ship produce to the Norfolk markets and lumber from Currituck Sound. The second canal, London Bridge Creek and Canal No. 2, was constructed by the U.S. Army Corps of Engineers. This canal connects the North Landing River from West Neck Creek to the Eastern Branch of the Lynnhaven River.

In the 1870's and 1880's, the Albemarle and Chesapeake Canal was largely responsible for boosting the Princess Anne economy following the Civil War. Large quantities of products such as cotton, fish, lumber, shingles, juniper logs, wheat, and fresh shad were shipped via this canal system. This era experienced an increase in water trade and an introduction of better farming methods and more diversified crops. In addition, timber harvesting became more mechanized thereby offering increased employment, as did commercial fishing and waterfowl hunting.

20th Century

The North Landing River Watershed remained primarily agricultural until the last half of the 20th century. In 1925, potatoes were the largest crop, ranking fifth in the state. Other products included apples, peaches, hay, corn, cotton, wheat, and peanuts. Dairy cows and hogs were also raised at this time.

Commercial fishing and hunting played a significant role in the economy of Princess Anne up through the mid-1920's. The region's marshlands, strategically situated along the Atlantic flyway, became known as a waterfowler's paradise. After 1920, sport shooting and fishing increased in popularity along the North Landing River as northern businessmen seeked an escape from the pressures and constraints of city life.

Today, the primary land use within the Southern Watersheds is agriculture with soybeans, field corn, and wheat being the predominant crops. Approximately 20% of land in the City of Virginia Beach is farmed.

Values of North Landing River Watershed

The North Landing River Watershed is a significant resource for its economical, recreational, and ecological values. These values are important to Virginia Beach and Chesapeake residents, as well as local, state, and federal agencies.

The river is economically significant in various ways. First, the river is important to the seafood industry. The North Landing River supports fish, crabs, eels, etc. which many local fisherman, restaurants, and stores depend upon to make a living. Common fish caught from this river include catfish, chain pickerel, crappie, largemouth bass, sunfish, and white perch. Secondly, it plays a role in interstate commerce and transportation. The river, particularly the Albemarle and Chesapeake Canal, played a vital to the economy in the late 1800's when water routes were the major method of transportation. Though, railways and highways reduced the commercial role of the canal, it is still used for some commercial shipping today.

Many people enjoy the recreational uses of North Landing River and its tributaries. As in the past, fishing and hunting are popular activities throughout the watershed. Other popular recreational activities in the area include waterskiing, jet skiing, and boating. Additionally, the river provides a place for people to enjoy the beauty and serenity of our natural world.

In addition to the economical and recreational values of the river, it is an area of high ecological significance. The North Landing River contains one of the most diverse and unspoiled wetland systems in Virginia. These riverine wetlands cover an area of more than 20,000 acres in the Cities of Virginia Beach and Chesapeake. The North Landing River Watershed contains extensive freshwater and oligohaline marshes, pocosins, and forested swamps.

Significant Natural Environments

The marshes along North Landing River are clearly of statewide or national significance. The marshes range from low-salinity to freshwater. Winds influence the water levels and salinity levels of these wetlands, resulting in a vast diversity of vegetation and natural community composition. Cordgrass, needlerush, and sawgrass dominate along the water's edge. Southern cattails, bulrushes, and creeping spikerush are more characteristic of the interior marshes. Over twenty rare species have been documented from these marshes, including the least bittern and Carolina lilaeopsis.

The least bittern is a small bird whose populations appear to be reduced throughout its range. They inhabit fresh and brackish water marshes, with tall, dense vegetation. When frightened, these birds position their narrow bodies in an upright position and sway back and forth to blend in with the wind-blown marsh. A plant known as Carolina lilaeopsis also occurs in these marshes. This perennial herb is rare throughout its range, which extends from southeastern Virginia to northern Florida. It bears a dainty white flower in late summer, and is found in shallow water, marshes, and swamps.

Another rare natural environment found in the North Landing River Watershed is the pocosin. Pocosins are fire-maintained environments dominated by dense shrub growth. Trees are scattered, and usually stunted and include Atlantic white cedar, pond pine, sweet bay, and red bay. These natural environments support many rare species, and are considered an endangered community type in Virginia. They are restricted primarily to the North Landing River and Great Dismal Swamp. The best remaining pocosins in Virginia occur along the North Landing River north of Pungo Ferry Road.

Pocosins are considered by the U.S. Fish and Wildlife Service among the least understood and fastest disappearing wetland communities in the Eastern United States. These wetlands occur along the Atlantic Coastal Plain from southern Virginia to northern Florida and west to Alabama. Pocosins covered more than three million acres of the southeastern Coastal Plain at one time. Today, less than 30% of this ecosystem remains in its natural state and much of that is threatened by ditching, draining, or mining.

Forested hardwood swamps represent another significant natural environment observed along this riverine system. Black gum, red maple, bald cypress, loblolly pine and pond pine are typical canopy dominants. Red Bay and sweet bay magnolia may occur in the subcanopy. One of Virginia's largest heronries is found in these swamp forests. Hundreds of Great Egrets and Great Blue Herons roost and nest in these remote swamps and feed along the extensive marshes of the river.

Epiphytic sedge, a globally declining plant known from only one site in Virginia, and the state endangered canebrake rattlesnake are found in the swamps of North Landing River. Epiphytic sedge, often called cypress-knee sedge, occurs on floating or partially-submerged rotting logs, stumps, and cypress knees along the edge of swamp forests. Seed dispersal is believed to be facilitated by waterbirds, carried on the feet and deposited when the birds come to rest on stumps and logs. The canebrake rattlesnake feeds on small mammals, primarily rabbits and gray squirrels. Despite the non-aggressive nature of this animal, deliberate molestation and killing by humans is a major cause of their decline.

Atlantic white cedar swamps are extremely rare in Virginia and highly threatened throughout its range. These swamps are restricted to a narrow band of the eastern coastal United States. In Virginia, the largest known Atlantic white cedar swamp occurs along the North Landing River. It is approximately 50 acres in size, the oldest cedars trees estimated to be 60-70 years old. These swamps are characteristically dominated by Atlantic white cedar, sometimes with scattered amounts of other wetland species such as pond pine, loblolly pine, red maple, and water tupelo.

Threats

The Nature Conservancy and the Department of Conservation and Recreation have jointly purchased a significant portion of the wetlands along North Landing River, forming a 7,500 acre preserve system. Acquisition of land, however, does not solely guarantee protection of these sensitive environments. Threats may continue to exist within the wetlands as well as in

critical buffer areas surrounding the wetlands. Such threats include changes in water chemistry and hydrology, invasion of exotic species, fire suppression, and land conversion.

The invasive species common reed grass has spread throughout the marshes of the watershed. This problem species quickly invades disturbed areas and is very tolerant of increased salinities, nutrients, and sediments. This aggressive grass can easily form dense clones and replace native vegetation, including many rare plant species. When stands of this grass displace a diverse mixture of native plant species, food and shelter for many species of waterfowl and wildlife are also eliminated. Resource managers throughout Back Bay, the North Landing River, and Northwest River have documented the rapid spread of this species throughout the watershed.

The nutria, or coypu, is another invasive alien species found in the marshes of the North Landing River. These large rodents were imported to the United States from South America around the turn of the century to bolster the fur trade. They have increased rapidly in the marshes of the southern United States. Within the North Landing River, native populations of muskrats are being displaced and marsh vegetation impacted with increasing nutria populations.

The key ecological forces influencing these wetlands are fire and water. Fire, a natural disturbance, has played a major role in the development and maintenance of pocosins, marshes, and swamps. These communities depend upon fire for reproduction and elimination of competing species. In addition, fire provides habitat and food sources for migrating geese and other wildlife species. Muskrat trappers and waterfowl hunters have historically burned these marshes on a regular basis.

Hydrology, like fire, is another major determinant of vegetation character. The existing diversity of plants indicate the dynamic interplay between habitats affected by wind tides and those habitats primarily influenced by groundwater seepage and rainwater.

The suppression of fire and changes in water chemistry and hydrology pose a serious threat to these environments. The effectiveness of fire suppression during recent decades, and modern obstacles to the spread of fire such as roads and man-made water courses, have contributed to the decline of these wetland communities. Alteration of hydrology, such as draining and ditching, is also considered a factor in this decline.

Management of Conservation Lands

Ecological management plans have been developed for the natural areas currently protected by The Nature Conservancy and the Department of Conservation and Recreation. Active management plans in progress include the control of the exotic species, common reed and a fire management program to determine the effects of controlled fire on the wetland communities.

The control of common reed project involves application of an herbicide which will kill the root system of the invasive plant. This environmentally safe herbicide biodegrades upon

contact with soil or water. A controlled fire is then implemented to clear away the dead common reed and open the habitat to desired species. These two steps are repeated the following year.

The fire management program has been developed in order to reintroduce fire as a natural process. These controlled fires are conducted by an experienced team of experts. The purpose of this program is maintenance of the fire-dependent natural environments and rare plants within the North Landing River Watershed.

Various research projects are underway in order to fully understand influences to these environments. Current research includes a study of the wild fire history in the area and its influence on vegetation dating back 500 years, and a study to better understand the impact hydrological alterations have on these sensitive environments. The hydrology studies will help us understand the role surface and ground water have on wetland ecology.

Landowner Conservation Options

Past and present residents of Virginia Beach and Chesapeake have enjoyed the numerous values of the North Landing River. Even though this watershed lies within two of the fastest developing cities in the Eastern United States, it supports some of the most extensive wetlands in our state!

Landowners within this area have played a crucial role in the excellent condition of these wetland communities. Continued stewardship of private property in the future is the key to conserving the North Landing River Watershed. To ensure that this resource will continue to exist for future generations, we must protect and manage not only the watershed, but also its critical buffer lands.

Agriculture has been the predominant land use in North Landing since the land was first discovered. In recent years, protection of the North Landing River Watershed as a historical, ecological, and recreational resource has become an important issue. Agricultural use of the land and conservation of the watershed are compatible with each other.

Resource experts from Soil Conservation Service (SCS) and Agricultural Stabilization & Conservation Service (ASCS) are available to help farmers develop conservation plans. Various cost-share programs are offered to assist the farmer in financial and management responsibilities. These programs encourage farmers to use best management procedures (BMPs) so as to ensure that their methods are environmentally friendly. One such program is the Wetlands Reserve Program.

The Wetlands Reserve Program is a voluntary program offering landowners a chance to receive payments for restoring and protecting wetlands on their property. This program is sponsored by the Department of Agriculture's Agricultural Stabilization & Conservation

Services. Qualifying lands include agricultural fields at least two acres in size that were previously wetlands, wetlands that are farmed under natural conditions, associated riparian upland and wetlands, and riparian areas that link wetlands. This is a cost share program in which ASCS will cover up to 75% of the restoration expenses. A permanent easement is attached to the deed and lump sums are based on certified appraisal of the agricultural value of the land. The wetland will be restored to its original hydrology and vegetation if possible. Soil and Water Conservation Districts in the area can provide farmers with information about additional programs.

There are also incentive programs designed to protect and conserve other natural resources, such as forested land. Some agencies offer programs designed to restore damaged natural areas, such as drained wetlands.

The Virginia Department of Forestry assists private landowners in the development of multi-resource management plans through the Forest Stewardship Program. Once this plan is developed, the Stewardship Incentive Program assists landowners in implementing the plans. The objective of these two programs is enhancement of the following: fish & wildlife habitat, water & air quality, wetlands management, forest health, soil productivity, recreation & aesthetics, and timber production & reforestation. The Stewardship Incentive Program pays up to 75% of management costs, while the landowner pays the remaining 25%. To be eligible of this financial assistance, the landowner must have a complete Forest Stewardship Plan and own between 12 and 1000 acres of woodland.

Partners for Wildlife program is a nationwide program administrated by the U.S. Fish & Wildlife Service to restore severely degraded or lost habitats on private lands. This program was funded by Congress specifically to do habitat restoration work with emphasis placed on those habitats that have been directly altered by human activities. Most of the direct project costs are covered by the Partners for Wildlife program, providing certain expenditure limitations and restrictions are met. Project maintenance is the responsibility of the landowner. This program assists in restoration, not improvements or management of existing habitat. In other words, this program offers assistance in the restoration of a damaged or destroyed areas by re-establishment of the native plant community and hydrology. Examples include plugging ditches in drained wetlands to reflood and removing dikes which block natural tidal flow.

The Nature Conservancy (TNC) is an international private conservation organization dedicated to safeguarding the finest examples of all elements of our natural world. Since 1951, the Conservancy has protected approximately 3 million acres of mountains, marshes, forests, prairies, and islands throughout the U.S., Canada, Latin America, and the Caribbean. In Virginia, the Conservancy's state chapter has protected more than 70 natural areas.

Virginia's Department of Conservation and Recreation (DCR) works towards the mission of conserving Virginia's natural and recreational resources. DCR coordinates a program that

protects natural area preserves totaling over 5,000 acres. These lands are managed to restore natural conditions and assure long-term health of the species and communities.

Both The Nature Conservancy and the Department of Conservation and Recreation have used acquisition as a conservation tool throughout the Commonwealth. In addition, both of these organizations are available to work with private landowners who wish to retain ownership of their land while conserving its natural resources. Protection tools available for landowners include the Registry of Natural Areas, a Natural Area Management Agreement, Conservation or open space easements, and Natural Area Dedication.

The Registry of Natural Areas is a program developed to encourage voluntary conservation of significant lands in private and public ownership. Participating landowners agree to protect the natural heritage resources on their land to the best of their knowledge and to inform DCR of any potential threats to the resources or other changes, such as intent to sell the property. In return, the landowners are rewarded with a plaque in recognition of the significance of their property and their effort in preserving it.

A Natural Area Management Agreement is a written contract between a landowner and a conservation organization designed to achieve specific conservation objectives. The agreement will clearly state the management plan for the land and the duration of the agreement. The contents of the agreement are determined according to specific ecological management needs of the natural area and the natural resources within the area.

Conservation or open space easements entails the restriction of certain property rights (such as subdivision for development), while retaining other rights (such as farming the land) in order to achieve specific conservation goals. This is a legal agreement and will be recorded with the property deed.

Natural Area Dedication is the strongest protection available for the preservation of our natural heritage resources. Natural Area Dedication is the placement of natural areas, both privately and publicly owned, into Virginia's Natural Area Preserve System. The landowner retains ownership and transfer rights of the land, while voluntarily restricting those land uses which are incompatible with the conservation needs of the natural area.

Fact sheets explaining these options in more detail are available from DCR's Division of Natural Heritage. Many organizations and conservation specialists are available to assist landowners in the North Landing River area with questions or concerns about conservation. Please refer to the contact list for further information.

Table 1. Natural Heritage Resources of the North Landing River.

NATURAL HERITAGE RESOURCES		HERITAGE RANKS		STATUS	
Scientific Name	Common Name	Global	State	Federal	State
PLANTS					
Asclepias lanceolata	Few-flowered milkweed	G5	S3-W		
Aster elliottii	Elliott's Aster	G3G4	S1		
Azolla caroliniana	Carolina Mosquito-fern	G5	S3-W		
Bacopa monnieri	Coastal Water-hyssop	G5?	S3-W		
Boltonia asteroides	Aster-like Boltonia	G5	S2		
Boltonia caroliniana	Carolina Boltonia	GQ	S2		
Carex cannescens	Hoary Sedge	G5	S3-W		
Carex decomposita	Epiphytic Sedge	G3G4	S1	3C	
Carex hylinolepis	Shore-line Sedge	G4G5	S3-W		
Carex straminea	Straw Sedge	G5	S2		
Chamaecyparis thyoides	Atlantic White Cedar	G4	S2		
Cladium jamaicense	Sawgrass	G5	S1		
Cladium mariscoides	Twig Rush	G5	S3-W		
Cleistes divaricata	Spreading Pogonia	G4	S1S2		
Clematis crispa	Blue Jasmine Leatherfl	G5	S3		
Cuscuta cephalanthii	a dodder	G5	S2		
Cyperus haspan	Galingale Sedge	G5	S3-W		
Eleocharis rostellata	Beaked Spikerush	G5	S1		
Juncus megacephalus	Big-headed Rush	G4G5	S2		
Kalmia angustifolia	Sheep-laurel	G5	S2		
Lilaeopsis carolinensis	Carolina Lilaeopsis	G3	S1		3C
Limnobium spongia	American Frog's-bit	G5	S2		
Lobelia elongata	Elongated Lobelia	G3G5	S1		

W - uncommon species under consideration for addition to the rare spp list

Table 1 (continued). Natural Heritage Resources of the North Landing River.

NATURAL HERITAGE RESOURCES		HERITAGE RANKS		STATUS	
Scientific Name	Common Name	Global	State	Federal	State
PLANTS (continued)					
Ludwigia alata	Winged Seedbox	G3G4	S1		
Lyonia lucida	Fetterbush	G5	S2S3		
Paspalum distichum	a grass	G5	S2		
Physostegia leptophylla	Slender Dragon-head	G4G5	S2		
Pinus serotina	Pond Pine	G4Q	S3-W		
Pogonia ophioglossoides	Rose Pogonia	G5	S3-W		
Scirpus acutus	Hard-stemmed Bulrush	G5	S2		
Spiranthes odorata	Sweet Lady's-tresses	G5	S1		
Styrax americana	American Snowbell	G5	S2		
Stewartia malacodendron	Silky Camellia	G4	S2		
Tillandsia usneoides	Spanish Moss	G5	S2		
Triglochin striata	Three-ribbed Arrowgrass	G5	S3-W		
Typha domingensis	Southern Cattail	G4G5	S3-W		
Vaccinium macrocarpon	Large Bog Cranberry	G4	S2		
ANIMALS					
Atlides halesus	Great Purple Hairstreak	G5	S3		
Ardea herodias	Great Blue Heron	G5	S3-W		
Casmerodius albus	Great Egret	G5	S2		
Crotalus horridus ssp. atricaudatus	Canebrake Rattlesnake	G5	S1		LE
Euphyes dukesi	Scarce Swamp Skipper	G3G4	S2		
Ixobrychus exilis	Least Bittern	G5	S2		
Rallus elegans	King Rail	G4Q	S2		
Rallus limicola	Virginia Rail	G5	S2		

W - uncommon species under consideration for addition to the rare spp list

Table 1 (continued). *Natural Heritage Resources of the North Landing River.*

NATURAL HERITAGE RESOURCES		HERITAGE RANKS		STATUS	
Scientific Name	Common Name	Global	State	Federal	State
ANIMALS (continued)					
Synaptomys cooperi helaletus	*Dismal Swamp Bog lemming*	G5T3	S3	3C	
Sorex longirostris fisheri	Dismal Swamp Shrew	G5T2	S2	LT	LT
NATURAL COMMUNITIES					
Atlantic White Cedar Swamp Community		G3G4	S1		
Low Salinity Lagoon Marsh Community		G4	S3		
High Pocosin Community		G3G4	S1		
Low Pocosin Community		G3	S1		

LIST OF CONTACTS

Don Schwab
Department of Game & Inland Fisheries
P.O. Box 847
Suffolk, VA 23439 446-4868

Julie Bright
VA Dare Soil and Water Conservation District
2449 Princess Anne Rd.
Agriculture Building(#14)/Municipal Center
Virginia Beach, VA 23456 427-4775

Caren Caljouw
Department of Conservation and Recreation
1500 E. Main Street
Richmond, VA 23219 786-7951

Bridgett Costanzo
U.S. Fish & Wildlife Service
P.O. Box 480
White Marsh, VA 23183 693-6694

Judy Dunscomb
The Nature Conservancy
1233A Cedars Court Rd.
Charlottesville, VA 23903 295-6106

Michael Focazio
U.S. Geologic Survey
3600 West Broad St.
Richmond, VA 23230 771-2427

Fred Hazelwood
Department of Conservation & Recreation
Seashore State Park
2500 Shore Dr.
Virginia Beach, VA 23451

Andrew Reid
U.S. Army Corps of Engineers
803 Front St.
Norfolk, VA 23510 441-7641

Carl Garrison
Virginia Department of Forestry
P.O. Box 3306
Portsmouth, VA 23701 465-6840

Valerie King
City of Virginia Beach
2150 Lynnhaven Parkway
Virginia Beach, VA 23456 471-5827

APPENDIX E

LANDOWNER CONTACT REPORT FORM

LANDOWNER TRACT FILE SYSTEM
NOTIFICATION PROCESS

OWNER NAME:
ADDRESS:

PHONE:

SITE NAME:
QUAD NAME:
QUAD CODE:

COUNTY/CITY:
PLAT MAP/PARCEL NUMBER:
TRACT NUMBER:
TOTAL ACREAGE:

Notification Step:	Completed(Y/N):	Date:
Mail introductory letter		
Schedule an appointment		
Compile site package		
Landowner/site visit		
Complete landowner report		
Mail thank you letter		
Distribute registry materials		
Sign up for registry		
Estimated date of next contact		

Landowner Contact Report

OWNER:
SITE:

Type of contact accomplished:
- mail
- telephone
- meeting with landowner
- site visit with landowner
- other

Date of next contact (if applicable):

Next plan of action:

Information needed:

Notification Progress:

Date introductory letter mailed:

Date of telephone contact:

If no telephone contact, explain:

Date of visit:

If did not schedule an appointment for visit, explain:

Person(s) visited:

Date thank you letter mailed:

Additional information mailed:

Site Information:

Site name:

Quadrangle name:

Quadrangle code:

County/City:

Estimated value of land/improvements:

Access to property:

Plat map/parcel number:

Size of tract in acreage:

Resources in natural area:

Which of these resources have been documented on this tract?

In the preserve design, does this tract fall within the primary conservation boundary, the secondary, or both?

Resources observed during visit (if site visit done):

Short-term threats to these resources:

Long-term threats to these resources:

Ownership Information:

Name:

Mailing address:

Phone number:

Age:

Occupation:

Children:
How many?____ Ages(range):_____

How long has the owner owned the tract?

Does the owner reside on the tract?

If no, what is the property address?

What is the present land use?

What are the plans for future land use?

What (if any) specific concerns were expressed by owner?

Conservation Progress:

What is the owners attitude towards conservation?

Was the owner aware of the resources prior to contact?

If yes, has the owner protected them deliberately?

What is DNH's conservation goal for this tract?

What conservation options were discussed?

What was the owners response and attitude toward these options?

What level of protection was achieved through this contact?

Does the owner appear to be receptive to stronger levels of protection in the future (if necessary):

Additional comments or observations during visit:

APPENDIX F

LANDOWNER CONTACT FOLLOW-UP LETTER

June 7, 1994

Ms. Mamie Johnson
Route 1, Box 130
Virginia Beach, VA 23456

Dear Ms. Johnson,

Thank you so much for taking time out of your schedule to meet with me a couple of months ago! I enjoyed talking with you and your uncle about your land along North Landing River River.

As you know, the cypress-tupelo vegetation along this section of the river represents the best example of this natural community in Virginia! Actually, it is one of the best in all of the United States. Natural areas as beautiful and serene as this one are becoming an increasing rare sight. The excellent stewardship of your family has allowed this natural area to exist for hundreds of years. We hope that it will continue to thrive for future Bailey generations!

Enclosed is the Natural Areas Registry brochure and my card. If you or your family have any questions regarding the preservation of this area or our registry program, please do not hesitate to contact me!

Thanks again for your time, Ms. Bailey. I look forward to talking with you again in the future!

Sincerely,

Melissa Donoff
Landowner Contact Specialist

APPENDIX G

NATURAL AREA REGISTRY BROCHURE

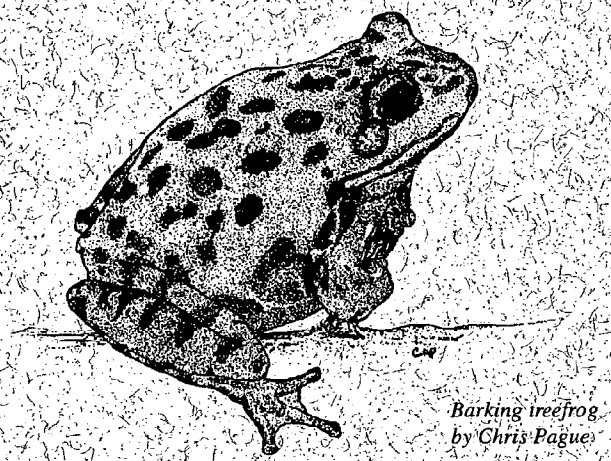
What commitment does the landowner make?

Landowners who participate in Virginia's Registry of Natural Areas commit to the following:

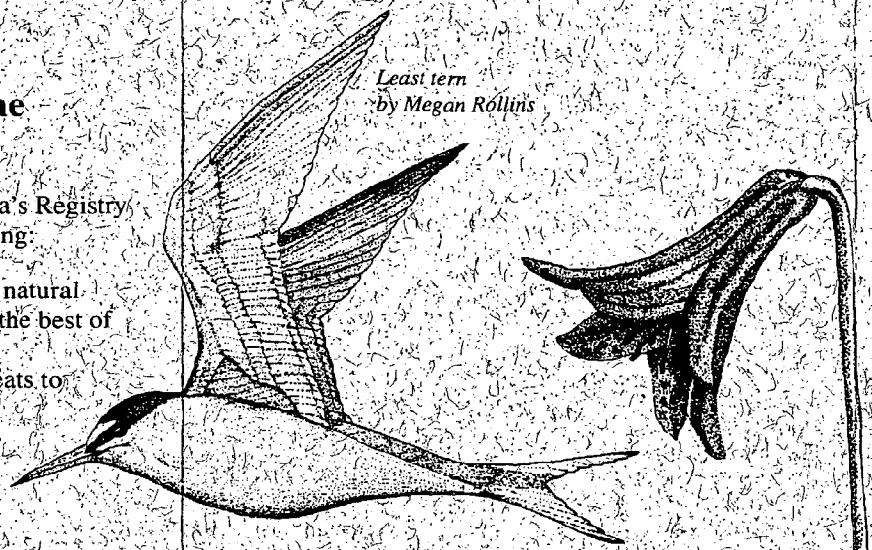
1) to voluntarily preserve and protect natural heritage resources on their land to the best of their ability;
2) to notify DCR of any potential threats to these resources, such as pollution, clearing of land, etc.;
3) to notify DCR of any intent to sell or transfer ownership of the property.

What recognition does the landowner receive for this commitment?

In honor of the voluntary commitment to protect the natural area, the landowner will receive a plaque recognizing the land for its significant features and the owner for their stewardship commitment.



Barking treefrog
by Chris Pague



Least tern
by Megan Rollins

Does the owner receive any financial incentives?

No. However, there are other protection methods available, such as conservation easements and natural area dedication which could offer tax incentives.

Is management assistance available to the owner of a registered area?

Yes. DCR will provide management assistance at the landowner's request.

For additional information, contact:

DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

Division of Natural Heritage
1500 E. Main Street, Suite 312
Richmond, VA 23219
(804) 786-7951

Gray's lilly
by Megan Rollins

Virginia

REGISTRY

OF

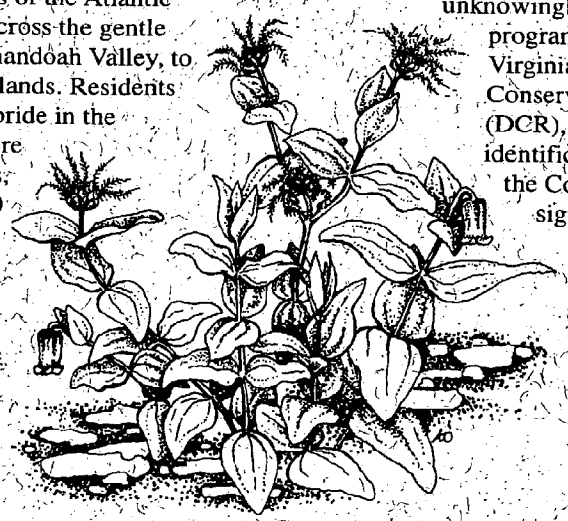
NATURAL

AREAS

Cypress swamp
by Ali Wieboldt

Virginia's Natural Heritage...

Virginia is a state of extraordinary natural diversity—from the sandy beaches of the Atlantic Ocean and the Chesapeake Bay, across the gentle hills of the Piedmont and the Shenandoah Valley, to the mountains of the western highlands. Residents of the Commonwealth take great pride in the beauty of our natural heritage. More than 2,400 native species of plants, 848 vertebrate animals and 30,000 invertebrate animals interact with Virginia's rocks, soils, and water to form unique natural communities and ecosystems. However, some species and ecosystems which flourished in Virginia's past are very threatened today. As the human population increases, so does the conversion of natural lands to other uses. As a result, the land certain plants and animals depend upon for survival may be permanently damaged or destroyed. Fortunately, we are learning to take precautions and property owners are acting voluntarily to safeguard the best that remains of our natural world.



Millboro leather flower
by Ali Wieboldt

What is the Registry of Natural Areas?

Virginia's Registry of Natural Areas is a program developed to encourage voluntary conservation of significant lands in private and public ownership. Our staff has identified more than 900 natural areas throughout the Commonwealth which serve as habitat for our natural heritage resources. Landowners of these sites play a crucial role in the conservation of such lands and in turn the future survival of the natural communities and rare species they support. Species are often lost simply because the landowner is unaware of its existence and needs. By informing and recognizing the landowners of these significant natural areas, the Registry of Natural Areas Program reduces the chance that these resources may be unknowingly destroyed. The program is operated by the Virginia Department of Conservation and Recreation (DCR), an agency devoted to the identification and protection of the Commonwealth's most significant natural areas.

What areas qualify for the registry?

To be eligible for placement on the registry, a property must support significant natural heritage resources for Virginia, such as:

1) habitat for rare, threatened, or endangered plants or animals.

2) rare or state significant natural communities.

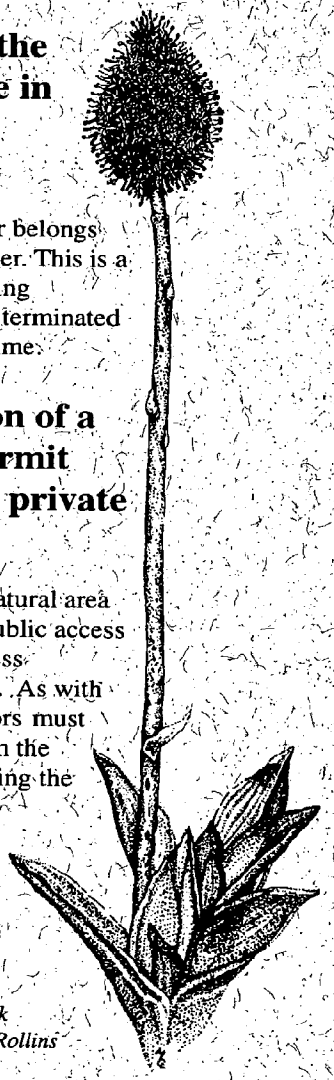
3) significant geologic landmarks.

What say does the landowner have in the registration process?

The decision to register belongs entirely to the landowner. This is a voluntary and nonbinding agreement that may be terminated by either party at any time.

Does registration of a natural area permit public access to private property?

No. Registration of a natural area provides no rights of public access to private property unless requested by the owner. As with any private land, visitors must receive permission from the landowner before entering the property. Locations of registered natural areas are not publicized unless the owner so desires.



Swamp pink
by Megan Rollins

APPENDIX H

NATURAL AREA REGISTRY AGREEMENT

VIRGINIA'S REGISTRY OF NATURAL AREAS
AGREEMENT FORM

I, _____, owner of the _____ Natural Area agree to include the area described and bounded on the enclosed map in Virginia's Registry of Natural Areas. I agree not to take any intentional action which could destroy or degrade the natural area so long as the property is registered.

I agree to allow qualified representatives of the Department of Conservation and Recreation to visit the property a minimum of once per year with prior notice to examine the condition of the natural area and the natural heritage resources within. Should I observe any significant change in the condition of the natural area or any of the resources within, I agree to notify the Department of Conservation and Recreation.

I agree to notify the Department of Conservation and Recreation at least 30 days before I transfer by any means the title to the registered property or decide for any reason to withdraw from this agreement.

It is understood that this agreement involves no change of title or loss of ownership rights. The agreement solely expresses the landowner's sincere intention to protect certain natural heritage resources and the Department of Conservation and Recreation's desire to recognize the importance of the property and the landowner's civic gesture by awarding a plaque. Neither party shall incur any liability for any injury to persons or property on the land.

By_____ _____
Property owner Date

By_____ _____
H. Kirby Burch, Director Date
Department of Conservation
and Recreation

APPENDIX I

VIRGINIA BEACH AGRICULTURAL RESERVE PROGRAM

by the
ad hoc Southern Watersheds Committee
and
The Nature Conservancy

VIRGINIA BEACH AGRICULTURAL RESERVE PROGRAM

ad hoc Southern Watersheds Committee
and
The Nature Conservancy

April 30, 1994

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VIRGINIA BEACH AGRICULTURAL RESERVE PROGRAM

A proposal for safeguarding Virginia Beach's prime agricultural lands in the Southern Watersheds

by the

ad hoc Southern Watersheds Committee
and
The Nature Conservancy

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EXECUTIVE SUMMARY

The ad hoc Southern Watersheds Committee, a coalition of farm and conservation interests, is proposing the Virginia Beach Agricultural Reserve Program to promote and enhance agriculture as an important local industry which is an integral part of a diverse and balanced local economy.

The local farmer faces a number of pressures in operating his business. The farmer's main resource - land - is also a commodity for speculation. As urban and suburban development have intruded into agricultural areas in the city the price of this commodity has increased, creating a situation where the farmer cannot compete with other interests for land.

The conversion of farmland raises other issues of concern. There is a fundamental incompatibility between farming and residential uses. As the suburban uses increase, the farmer is continually pushed to alter or stop his farming practices to the detriment of his business.

This continuing conversion of land challenges our ability to stabilize and balance the local tax base, to protect the sensitive eco-systems which intermingle with the agricultural areas of the city, and to preserve open space and the visual qualities of the southern rural areas.

The forests and farms complement and protect the natural areas; conversion of the farmland to residential uses may imperil the health of the wetlands and river systems, negatively impacting another growing and profitable local industry - nature and outdoor tourism.

The Agricultural Reserve Program (ARP) offers a market solution to these challenging issues. The program is based upon purchase of residential, commercial, and industrial development rights by the City of Virginia Beach. The advantages of the program are numerous:

- it is voluntary, the farmland owner decides whether or not to participate;
- the farmland owner is compensated for the sale of development rights;
- the farmland owner retains title and all other rights to his land;
- the proceeds can be used any way the farmer wishes - to retire debt, to improve the farm, as savings, for college, or for retirement;
- farmland is kept affordable for young farmers;
- the local economy, and the tax base, benefit by retaining agriculture; and
- the development rights are held in trust, assuring that areas with high potential and active farms will remain in agricultural uses.

The process is simple. A farmland owner submits an application to the Agricultural Reserve Board for consideration. The farmland will be ranked according to a set of assessment criteria including location, parcel size, adjacent conditions, capital investment, cultural significance, economic importance, and threat of conversion.

Appraisals will be completed for the farmland tracts ranking highest according to the selection criteria. Should an offer for purchase be refused, the Board will go to the next highest ranked tract and make an offer to that owner.

The development rights will be held in public trust in perpetuity. This will be a permanent commitment of a portion of the rights in the land. Local conditions can change, however, so after a minimum period of twenty-five years, a farmland owner could ask the Board to review the purchase. If the Board finds that because of changed circumstances the development rights should no longer be held in trust, it has the option to sell back the rights, at market value, to the farmland owner.

In Conclusion

The ARP program is aimed at the southern watersheds area of the city identified in the Comprehensive Plan and by local residents for future and continuing agriculture and rural uses. The ARP is designed to bridge the gap between the short-term economic pressures on the farmland owner and the long-term benefits of farmland preservation. It gives another choice to a farmland owner, one that does not exist today - the sale of development rights in return for working capital that can be reinvested in the farm.

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INTRODUCTION

Southeastern Virginia once nourished a forest which supported man and nature in quiet harmony. Indigenous peoples navigated and fished the waters of the North Landing and Northwest Rivers and Back Bay, hunted in the lush wetlands, and farmed the grassy uplands from 9,000 B.C. until the seventeenth century. Later, the region was colonized by England and the landscape was characterized by scattered farms with small crossroad settlements and river landings.

The region remained relatively isolated until the Albemarle and Chesapeake Canal was completed in 1859 transforming the North Landing River to the principal transportation artery connecting Currituck Sound with Hampton Roads. In the early twentieth century, the railroad replaced the steam boats for carrying passengers, produce, lumber and freight to and from lower Princess Anne County. In 1913, the federal government purchased the waterway as one of the first links in the Atlantic Intracoastal Waterway.

As time has passed, the harmony has become discord; spreading urbanization and fragmentation further threaten this wild and rural landscape. The forest has become farmland surrounding a necklace of wetlands along the North Landing and Northwest Rivers and Back Bay.

One large portion of this magnificent area has remained virtually intact over the centuries. An area of more than 15,000 acres of the most diverse and unspoiled wetland systems in Virginia that follows the North Landing River.

Natural area inventories of the watershed conducted by the Virginia Department of Conservation and Recreation's Division of Natural Heritage have identified these wetlands as exemplary ecosystems as well as significant and critical habitat for rare and endangered plant and animal species. The area is one of the most important regions of the state in terms of biodiversity and rare, threatened, or endangered species. At least 46 rare species have been documented in the watershed. The area also provides important habitat for breeding and migratory waterfowl as they travel along the Atlantic Flyway. The North American Waterfowl Management Plan, through the Atlantic Coast Joint Venture, has identified the wetlands of the North Landing and Northwest Rivers and the Back Bay as a top priority for protection.

In 1989, the North Landing River was designated a Virginia Scenic River pursuant to the Virginia Scenic Rivers Act of 1970. A local interest group initiated the process for protection and recognition of the river as a natural, scenic, historic, and recreational resource of statewide significance. The City of Virginia Beach has also designated the river as scenic and has dedicated it as part of its Scenic Waterway Plan.

However, these designations alone do not provide adequate protection from the activities which threaten the integrity of this valuable ecosystem. The threats to the North Landing River system are highly complex, often interconnected, and generally misunderstood. It is difficult to isolate and analyze any one threat, and man's influence must be kept in mind. Five categories of threat have been identified:

- non-point source pollution
- alteration of hydrology
- destructive land use practices
- fire suppression
- invasive exotic species

To address these threats, a comprehensive and holistic program needs to be employed. The North Landing River Conservation Project is a joint initiative of The Nature Conservancy and the Department of Conservation and Recreation to establish a core, 10,000 acre refuge within the North Landing River watershed for rare plants and animals, natural communities and waterfowl. The Back Bay National Wildlife Refuge has also embarked on an expansion program to purchase the lands necessary to keep their system intact. Other regional initiatives involve state, local and federal agencies addressing conservation and management issues for this southern watersheds area.

These marshes exist in a largely agricultural area. Despite the dramatic growth in Virginia Beach in the last decades, the area surrounding the North Landing and Back Bay has remained largely unspoiled with broad expanses of open farmland, forested wetlands, and marshes. Four of the five threats to these systems are directly related to increased development. While poor agricultural practices can pose a threat to the wetland system, the far more devastating threat is the nonpoint pollution, modified hydrology and chemistry resulting from residential and commercial development.

Although current local zoning and land use plans identify the rural area as agricultural, pressure from development interests is increasing. Virginia Beach was the fastest

growing city in the United States over the decades of the 1970s and 1980s, creating a congested northern section which looks south to the rural sector for relief. As land prices increase and fragmentation of farmland occurs, the aging farming community finds it less and less attractive to maintain their agrarian lifestyle.

In 1981, the first national agricultural lands conference was held in Chicago. Then Secretary of Agriculture, John Block, highlighted the issues facing the agricultural industry - the same issues which face us today. He warned that prompt action was needed to prevent "a lengthy and expensive chain of problems." Since then millions of acres of the very best farmland have been lost to development. America has watched the descent of this important national resource and has not moved to stop its decline.

One part of the comprehensive and holistic program addresses the challenge of safeguarding the nation's prime farmlands from development. This paper presents the Virginia Beach Agricultural Reserve Program proposed by The Nature Conservancy and the ad hoc Virginia Beach Southern Watersheds Committee to address the gap between the short-term economic pressures on the farmland owner and the long-term societal benefits of farmland preservation.

VIRGINIA BEACH AGRICULTURAL RESERVE PROGRAM

BACKGROUND

In November 1993, the City of Virginia Beach sponsored a workshop under a grant from the Virginia Coastal Resources Management Program called, *"Defining a Vision for the Southern Watersheds."* This day-long program presented background on the southern area's natural environment, cultural history, zoning and planning chronology, and an examination of the many issues related to sustainable development. At the end of the day, participants where invited to break into small groups to "brainstorm" about this "vision." An ad hoc group formed to continue this discussion at further meetings. In cooperation, these private interests have joined to promote a program for the continued existence of the agricultural industry in the rural southern watersheds area of Virginia Beach.

This ad hoc committee (the Committee) consists mainly of farm and conservation interests, but these individuals also bring their expertise and experience from the Virginia Beach City Council, Virginia Beach Planning Commission, Virginia Beach Department of Agriculture, Planning Department, Virginia Beach Farm Bureau, Back Bay National Wildlife Refuge, the Sierra Club, Virginia Beach Chapter of the National Audubon Society, Southeastern Association for Virginia's Environment, Council of Civic Organizations, and The Nature Conservancy.

Meeting evenings in December and January, the Committee examined the consequences of the continued unplanned and unchecked development of farmlands. The problems with creating incompatible uses, fragmentation of farmlands, and roadway congestion were considered.

While all of these issues are concerns, it is economic need that is the deciding factor in the conversion of individual farms to other uses. On a community level, this continued conversion of farmlands to residential sprawl portends a future economic crisis to the taxpayers of Virginia Beach. Repeatedly, community studies have shown that a balanced and diverse tax base is needed for community budgets to balance. Virginia Beach is struggling to reverse its growing imbalance of residential and commercial land use while more pressure is put on to convert open lands to residential uses. Farmland and open space subsidize, in their property tax payments, the deficit that residential sprawl creates. Only by preserving these open spaces and farmlands can the city prevent a future taxing crisis.

In the fall of 1993, a new comprehensive plan amendment was being prepared for hearings at the public level, proposing new standards for the Southern Watersheds. The ad hoc group agreed the current and proposed comprehensive and zoning plans do not address the continuation of agriculture as a land use or industry, and simply set standards for the conversion of those lands into residences.

The Committee is pursuing the establishment of an Agricultural Reserve Program for the City of Virginia Beach. An examination of similar programs from around the country has been performed; information has been compiled and reviewed from recent studies about the farm industry, land values, soils, transportation networks, and parcel sizes; other local development and economic initiatives were considered. The committee also solicited advice from Virginia Polytechnic Institute and State

University, American Farmland Trust, Chesapeake Bay Foundation, and local experts.

The Agricultural Reserve Program proposed in this document is the result of the studies and discussions of the Committee.

PROBLEM STATEMENT

The loss of farmland is an issue that has been examined regionally, nationally and globally in recent years. The "National Agricultural Lands Study" of 1981 observed that the conversion of farmlands to other uses were concentrated in areas undergoing rapid development and expansion. Approximately forty percent of the land area in Virginia Beach remains rural while the northern part of the city has developed. Virginia Beach has grown by 4.7 times (390%) in population in the last three decades.

Historic Perspective

Virginia Beach, founded as Princess Anne County, saw the settlement of English immigrants in the late 16th century who established themselves as farmers, attempting to recreate their England on the shores of the new continent. In the 1800's, the agricultural recession saw a decline in the local population from 9,000 to 7,000 people. While in the higher, northern part of the County farming flourished, the southern area was relegated to subsistence farming. The wealthiest farmers were "timber gatherers."

The 1880's saw the establishment of the resort development in Virginia Beach and the conversion of the northern areas began. Poor access, lack of transportation

routes and low elevations reserved the southern areas from early development pressure. From World War I on, the large military presence here began to consume land, as well, with the establishment in the north of Camp Pendleton, Fort Story, Little Creek Amphibious Base, and finally, Dam Neck.

The southern area changed from subsistence farming to cotton and tobacco, then added vegetables. Hogs and dairy cattle became a profitable enterprise and the Pungo Ridge came to notoriety for its sweet potatoes. The 1950's saw the farmers, with technical assistance from the Soil Conservation Service and some federal cost-sharing funds, ditching and draining more wet soils in the southern sections. Meanwhile the labor force began to move to the cities for higher wages.

The 1970's were very profitable for southern Virginia Beach farmers; export opportunities increased, grain and corn gained in volume, and 250,000 hogs were raised here. In the 1980's, specialty crops got a foothold; the Pungo Strawberry Festival became a regional event and horse enterprises moved in. High value crops like strawberries, blueberries, sweet corn, blackberries and small fruits became widespread. Farming was a family business and preserved the rural character lost in the northern city.

However, those days seem a distant memory. Between 1980 and 1991, the Commonwealth of Virginia saw a decrease in cropland dedicated to corn by fifty-three percent (53%); statewide, the number of hogs shrank from 850,000 to 390,000 in the same period, a decrease of forty-six percent (46%), while in North Carolina, hogs increased in numbers from 2.3 million to 4.5 million.

Between 1939 and 1993, the cropland in Virginia Beach shrank from 60,000 acres to 32,000 acres. Now cotton is no longer grown; only 35 acres remain in sweet potatoes; white potatoes, which were a staple crop for over half a century, went from over 4,000 acres to just 600 today.

The dramatic reduction in farmland in Virginia Beach has been caused by the rapid growth in the city. During the decades of the 70's and 80's, Virginia Beach was the fastest growing large city in the United States by fifty percent (50%). Between 1970 and 1980 the population increased from 171,000 people to 262,000; from 1980 to 1990, the increase in population was 50 percent higher than the 70's, from 262,000 to 393,000 people.

By contrast, in the rural Pungo Borough of the city, encompassing 35% of the city's land area, the population only rose from 3,270 people to 4,074 in the same time. The loss of farmland in the southern area over the last 20 years can be attributed to the rise in land values tied to the development in northern Virginia Beach; a nationwide decline in agriculture, especially in "family farms"; and an aging farming population with no new generation to carry on the farming business. The fact that a "wave of humanity" has not crowded out southern Virginia Beach farming *yet* is what gives us an opportunity to make this program work.

With the increase in population and houses, commercial and industrial development also boomed. A national company built a regional shopping center; the City of Virginia Beach built three large industrial parks; and private developers built offices and stores. Virginia Beach

grew so rapidly that much of the regulation and planning lagged behind the actual building.

It was not until the middle of these two decades that the city passed its first Comprehensive Plan and created the so-called *"Green Line"* to indicate the southern limit of "urban" infrastructure. This limit was established to avoid the problems created by "leap frogging" development and the pressure for unplanned and unfinanced infrastructure. The Southern Watersheds area lies south of the Green Line, but is currently facing increasing residential development pressure. In fact, this "line in the sand" became a poor substitute for the comprehensive planning of the future of the Southern Watersheds. This lack of planning is what jeopardizes rural Virginia Beach today.

Growing Challenges to Farmers

Long before the actual conversion of farmland to non-farm uses, the business of farming becomes increasingly difficult. As suburban development intrudes into agricultural areas, the price of land increases. When farmers want to buy or rent additional land, this increased value makes it difficult for them to compete with other users. Local planning and zoning processes have worked against the farmers by trying to impose value on agricultural land based upon these "other uses," compounding the farmers' dilemma. This dilemma is further intensified by the fact that many farmers work part-time off the farm to earn their household incomes. The part-time nature of the farming can limit their ability to invest capital and management time in a business "competing" with other interests for their main resource - land.

There is also a fundamental incompatibility between many types of agricultural activities and residential uses. Suburban residents often do not understand that agriculture is an industry which can create noise, unpleasant smells, air pollution, and other disturbances. While suburban dwellers would not seek a home near a shipyard or steel mill, they do not consider the consequences of being downwind from a dairy or cornfield when shopping for a home.

The irritation of noise from normal farming activities often results in complaints and legal actions against farmers. Pressure may be put on local government to limit various farm activities which are perceived as offending. Neighbors may report farmers to local or state agencies. As suburban uses encroach into farming areas, farmers find that defending themselves from their new neighbors can be expensive and time-consuming.

As suburban dwellers are attracted to the "open spaces," instances of trespass, theft and vandalism increase. More traffic makes it difficult to transport farm equipment and deliver products. Illegal disposal of trash and refuse on farms and in ditches increases and can cause hazards and damage to farm animals and equipment.

As conflicts and frustrations increase, farmers begin to prepare for the inevitable closing of their businesses and sale of their land to developers. Capital investment decreases or stops, and conservation practices are laid aside. Long before the sale and conversion, the land is no longer being farmed effectively, or perhaps not at all.

Economic Importance of Farming to Virginia Beach

Despite the challenges faced, Virginia Beach "agribusiness" had an economic impact of more than $76.69 million in 1992 based upon a product valued at $23.89 million. There are still 106 farm operations on 686 tracts in southern Virginia Beach with approximately 32,000 acres of land in cultivation.

To anyone who has lived in Virginia Beach very long, the change in rural character and the loss of farmlands has been obvious over the last decades. In addition to the shrinking amount of land in active cultivation, the city lost 12,500 acres of forested land to development and agriculture between 1975 and 1985. Roughly forty percent (40%) of the city's land area remains rural today, with increasing pressure upon it to convert to residential and other uses. The economic effects of this conversion causes concern. The American Farmland Trust has studied various areas in the United States and finds consistently,

> **"that although residential development increases the local tax base, it does not pay for itself. On the other hand, while privately owned farm and open lands do not raise nearly as much gross income as developed lands, their need for service is so modest, their net effect on the tax base is a surplus."**

In addition, Virginia Beach has determined that the mix in our tax base is already imbalanced with a surplus of residential base.

Undoubtedly, Virginia Beach must maintain a diverse economic base that ensures prosperity in a tumultuous world economy. Agriculture is an *essential* component in the conservation of Virginia Beach's natural and economic resources. A 1993 report published by Virginia's Rural Economic Analysis Program found that over 85% of Virginia Beach's croplands have a per acre yield potential for corn of greater than 130 bushels, exceeding the potential of the other 18 communities examined. Sources say the potential for soy beans is almost equal. There are concerns that the conversion of good farmland will increase the inputs of energy, fertilizers and chemicals to farm the poorer lands that will remain. The acknowledgment that good farmland is a natural resource which needs conservation is a tenet of this paper.

Until the oceanfront resort developed in the late 19th century, farming and timber were the only local industries. Some are concerned with the loss of the last links to our past and heritage. Some are concerned with the loss of the rural way of life and the values associated with that life. As a resort city, Virginia Beach competes with many localities with varied amenities and features to capture the imaginations of vacationing families. The forests and farms buffer a variety of natural resource areas that have regional and national significance and attraction. Conversion of these farmlands may imperil the health of these natural systems and, in turn, negatively impact the resort industry.

There are concerns about the loss of open space in the community brought about by the continued conversion of farmland. To attract new employers in an ever increasingly

competitive market, Virginia Beach must maintain those features related to "quality of life" and visual attractiveness.

MAJOR STATE AND LOCAL PROGRAMS

While some national incentives have been created to help the farm industry, the most effective programs appear to be implemented at the state and local levels.

The Commonwealth of Virginia does not have a history of strong initiatives to support its agricultural industry. Consequently, as population and development pressures have increased, more and more land has converted from farmland to other uses. In Virginia Beach, many of the opportunities and profits went south to North Carolina as that state made major efforts to protect and promote farming.

Nationwide, many states have passed right-to-farm laws, agricultural districting, and tax breaks designed to retain agriculture land for agriculture. Local governments have implemented zoning and agricultural plans designed to forestall the additional conversion of prime farmland. Virginia is a Dillon's Rule state which limits localities to the use of authority expressly granted to each by state law. An overview of our state and local programs follows:

Virginia Right-To-Farm Law

Right-To-Farm laws are enacted to protect agricultural activities from common law nuisance suits and from local ordinances that might restrict certain farm activities. These laws attempt to remedy situations where suburban uses have entered farming areas and the new neighbors are

unfamiliar with normal farm activities by protecting the farm use from frivolous attacks.

The Virginia legislation has never been challenged in court, and may be vulnerable to attack. Public notice of this protection is also weak; notice is only recorded on the plat of a farm parcel. This regulation also has a clause which refers to "substantial change" in the farming operation, which could deter protection should a farmer change crops or farming practices.

Measures are in committee in the current General Assembly session to strengthen this bill by prohibiting localities from requiring conditional use permits for any farming practice in any agriculture district or classification.

Use Value Assessment

This law allows localities to assess and tax farmland at its agricultural value rather than at some perceived development value. This benefits the farmer in bringing his tax bill closer to the amount he uses in services, or parity. Farm buildings and homes are assessed at regular rates, just as their residential neighbors are.

One weakness of this law is that the roll-back period is five years; when the zoning is changed on farmland enrolled in this program, the difference in taxation must be paid retroactively for five years. The profit margin in conversion of these lands is often great enough that this provision does not deter owners and developers from converting farmland.

Another serious weakness in this program is that some localities that are experiencing rapid growth and development pressure see farmland as a new source of revenue by eliminating this program. In Virginia, there is an annual challenge to this program; currently House Document #7 calls for study.

Agricultural Districting

Legally recognized geographic areas are established for one or more farms which are required to remain active farms for five years in exchange for use value taxation benefits and other limited protection.

Virginia Beach does not use this system as it requires a minimum of 1,000 acres of contiguous farmland and does not provide benefits beyond the Use Value Taxation program.

Land Evaluation and Site Assessment Systems (LESA)

The Land Use Evaluation and Site Assessment system is a land-use decision-making tool created by the Soil Conservation Service. It is used as a guide in deciding whether or not to allow proposed changes on specific parcels of farmland and to target protection efforts. Information is used, ranging from current development trends to the health of the local agricultural economy, to arrive at a numerical rating that indicates the parcel's agricultural importance and future viability.

The system was designed for implementation in the midwestern United States; application of the soils evaluation system is contradictory when applied locally.

First, it ranks soils by capability class and Virginia Beach, with its soils based upon deposition, lacks the rocky soils and others in the classifications. Second, soil potential is based upon a single crop profile across all soils and locations. Virginia Beach is not a single crop area, and while certain crops cannot grow in all local soils, others do very well in those same soils.

Conservation Enabling Legislation

Virginia has adopted laws to allow the use of easements in the reservation of certain land types for various purposes. In Virginia Beach, Oceana Naval Air Station has used this to prevent further development in the AICUZ program (Air Installation Compatible Use Zone) in the airport vicinity.

Unfortunately, the Navy did not acquire 100 percent of their air rights needs, and they are currently asking local government to "freeze" agricultural parcels in their current use, without compensation. This often puts Oceana and the City in opposing positions on requests for development of lands which Oceana would like to see undeveloped, but does not control the rights to.

While this enabling legislation has the capability to conserve large areas for open space, agriculture, and natural resource conservation, funds have not been available to date for such a program.

Comprehensive Plan

The City of Virginia Beach adopted its first Comprehensive Plan in 1979. It is "the City's official statement of physical

and planning policy...Once adopted, this Comprehensive Plan serves as a guide to public and private decision making on matters related to growth and community development." The plan is a general guide for growth, but does not provide smaller scale area plans.

Unfortunately, the current plan , while discussing "Rural Area Issues," really addresses the continued conversion of farmlands to residential use with "rural" planning standards. A policy to "ensure the preservation of agricultural and forestal activities" is limited to the "foreseeable future," a term which foretells its demise. Additionally the plan puts forth only three objectives for agriculture in Virginia Beach - supporting policies and initiatives that "recognize" rural uses as the dominant land uses; promotion of use value taxation; and encouragement of Best Management Practices.

The Comprehensive Plan must be reviewed every five years by state direction, and is subject to change from political pressure, so it does not necessarily extend protection to farmland.

THE PROPOSED VIRGINIA BEACH AGRICULTURAL RESERVE PROGRAM

Current local and state programs are important continuing elements of an effective program to protect farmland, but have not proved sufficient to provide lasting protection against the constant pressures of urban development.

During the recent comprehensive plan amendment preparation, the Virginia Beach Planning Commission developed and circulated a questionnaire to each property owner and resident south of Indian River Road. While many opinions were expressed, five common goals were identified for the plan amendments:

1. To provide the opportunity for continued agriculture,
2. To preserve rural character,
3. To protect environmental resources,
4. To provide reasonable development opportunities, and
5. To defer the need for major urban infrastructure improvements.

Based upon the continuing conversion of farmlands in Virginia Beach, with consideration of the regional and national information reviewed, and the strong desire of the people who live in the farmlands to maintain agriculture, the Committee believes that an agricultural protection program is necessary.

Program Goal

The Committee sees one goal for this program:

To promote and enhance agriculture as an important local industry which is part of a diverse local economy.

Agriculture can compliment Virginia Beach's other main industries, tourism and the military, enhancing the open spaces and environmental resources in the southern area and keeping a low density use in the southern flyway of Oceana Naval Air Base.

Program Elements

The Virginia Beach Agricultural Reserve Program (ARP) proposed by the Committee is composed of five program elements:

1. Public Outreach and Education.
2. Funding.
3. Program development.
4. Public Approval.
5. ARP Implementation.

Program Overview

The Virginia Beach Agricultural Reserve Program (ARP) is based upon purchase of residential, commercial, and industrial development rights by the City of Virginia Beach.

The advantages of this program are numerous:

- it is voluntary,
- the landowner decides whether or not to participate,
- the farmland owner is compensated for the sale of the development rights,
- the farmer retains title and all other rights to his land,
- farming activities continue and are encouraged, and
- the development rights are held in trust, assuring that areas with high potential and active farms will remain in agricultural uses.

A number of questions and answers follow, explaining how the Agricultural Reserve Program will work in Virginia Beach:

1. Why an Agricultural Reserve Program?

Over half of all the value of U.S. farm production comes from areas on the urban fringe. The unique microclimates along the coastline which naturally favor agriculture are also a magnet for development. For decades we have taken the best land out of production because it is the easiest to build on. It is time in Virginia Beach to conserve the productive farmland that remains.

One challenge of land conservation has been identified as the balancing of private property rights with the broader public good. **The ARP would *enhance* private property rights by providing landowners with an alternative that does not exist today: the sale of development rights in return for working capital that can be reinvested in the farm.**

The Comprehensive Plan and zoning are the most important tools a local government has to direct the growth and development of an area. Even supported by state tax programs and right-to-farm legislation,though, they are not able to prevent urban development of agricultural land.

In response, some jurisdictions have turned to acquiring less-than-fee interests in land to control its use. Ownership of land may be defined as a set of interests or rights; the right to keep others off the land, the right to sell or bequeath it, the right to use it for farming, forestry or outdoor recreation, the right to build structures on it, etc. Ownership of the entire set of rights is called fee-simple-ownership. Less-than-fee ownership is when ones owns some but not all of these rights. In the Agricultural Reserve Program, the City of Virginia Beach would purchase and retire the development rights on the land while the owner would retain all the other rights of their land.

2. What are development rights?

Development rights are "... an interest in and the right to use and subdivide land for any and all residential, commercial, and industrial purposes and activities which are not incidental to agricultural uses."

The purchase of development rights is simply a restriction on the use of land which the owner willingly allows in exchange for monetary compensation.

3. Where will the agricultural reserve most likely occur?

A map in Appendix "A" shows the location of current agricultural and forestal activities in Virginia Beach. While much of the northern area of Virginia Beach is already developed in residential or commercial uses, areas south of the "Green Line" remain undeveloped or farmed. This southern area is what the program seeks to reserve.

4. Which land owners would be eligible?

Those possessing land of at least ten acres in size would be eligible. Smaller parcels would be considered if they are contiguous to land already in the program or that are adjacent to natural areas or other protected areas.

5. Who would administer the Agricultural Reserve Program?

The Committee is proposing that the Virginia Beach Agricultural Reserve Program be administered by a five member board (hereafter referred to as the Board). The Board would include the Director of Agriculture of the City of Virginia Beach and one member of City Council. The three remaining seats would be appointed by City Council from two slates of nominees; two would be appointed from a list of farm operators or retired farmers presented by the farm community, and one would be appointed from a list of nominees presented by the conservation community.

6. How would this Program work?

The Board would purchase the development rights from farmers who voluntarily nominate their property for inclusion in the program. The program **would be strictly voluntary**; the Board could not require anyone to sell the development rights to their land. The Board could only consider a piece of property for inclusion into the program *after* the farmland owner submitted an application. The farmland owner would be free to completely withdraw from the ARP at any time up to the time he signs the final contract and accepts payment for his development rights.

The farmland owner who sold his development rights would still retain all the agricultural rights; the right to use the land for purposes and activities related to horticulture, silviculture, livestock, dairy and other agricultural uses. This program will not restrict a farmer from improving his farmland or maintaining ditches or drainage systems. The farmland owner would still pay taxes on the land and have the right to live on it, work it, improve it for farming or related purposes, sell it, lease it, or pass it on to heirs. The public could not come onto the property without the owner's permission. It would still be private property and subject to the laws of trespass.

The development rights acquired would be held in public trust by the city for the benefit of its citizens in perpetuity. Farmland owners who entered this voluntary program would be making a permanent commitment of a portion of the rights in their land. However, most programs recognize that conditions can change in a locality over a very, long period of time and make some provision for the farmland owner to buy back the development rights.

The intent of the program is to retain prime agricultural land for agricultural purposes permanently, so withdrawal from the program should not be easy. The Committee proposes that all development rights be held for a minimum of twenty-five years without review. Any time after twenty-five years had elapsed, upon the request of the farmland owner, the Board could review the purchase. If the Board found that because of changed circumstances that the development rights should no longer be held, it has the option of selling back the development rights to the farmland owner. The proceeds of such a disposition would be restricted for use to acquiring other farmlands under the ARP.

7. How would farmland be selected for inclusion in the program?

The interested farmland owner would complete and submit an ARP application form, together with the necessary plat(s), deed(s), etc. to the Board. After the application process has been satisfactorily completed, the applicant's farmland would be scored according to a set of site-assessment criteria. The Board will have appraisals done for those farmland tracts ranking highest according to the selection criteria. The individual scores determine the order by which offers for development rights will be made. Offers are non-negotiable; the Board will not pay more for the development rights than the appraised market value.

8. How long would the ARP process take?

The acquisition process will take about six months from the time a landowner submits his application to final action.

9. What are the site assessment criteria?

Agricultural conservation programs rely on a number of criteria by which candidate lands are assessed and ranked. Many programs examined throughout the United States rely greatly upon soils evaluations as a major component in their evaluations.

Virginia Beach has examined the LESA (Land Evaluation and Site Assessment System of the US Department of Agriculture) and has found that the Land Evaluation component is not a reliable measure for our area. The topography in the agricultural area of Virginia Beach is nearly level; the parent source for our soils is sand eliminating many of the problems of rocks in other regions, and; our soils do not perform in uniformity from crop to crop. For example, soils which are suitable for sweet potatoes or tomatoes have only moderate potential for raising corn.

The proposed criteria, with the associated point values, for assessment of farmland, cropland, and forestal lands under the Virginia Beach Agricultural Reserve Program are listed below. The higher the rating, the higher a farm will be on the list for offers. A total of 1,000 points is possible.

A. Farm Size - 100 points potential.

The farm parcel size varies in Virginia Beach from under 5 acres to just under 1,000 acres, but over 73 percent of the tracts are under 50 acres in size. Points are assigned according to size of farm, decreasing as the size of the farmland decreases.

50 acres or more -	100 pts.
40 to 49 acres -	80 pts.
30 to 39 acres -	60 pts.
20 to 29 acres -	40 pts.
10 to 19 acres -	20 pts.
0 to 9 acres -	0 pts.

B. Distance from Urban Improvements - 100 points potential.

Points assigned for distance from or lack of urban type development or infrastructure on adjacent tracts.

no existing or platted subdivision -	25 pts.
no municipal water -	25 pts.
no municipal sewer -	25 pts.
no public roadway adjacent to tract -	25 pts.

C. Pressure for Conversion - 100 points potential.

Points assigned according to the degree of probability of conditions to have conversion occur.

age of property owner -	25 pts.
forced sale pending -	25 pts.

estate settlement - 25 pts.
personal hardship - 25 pts.

D. Location/Adjacent Conditions - 200 points.

Points assigned if adjacent or contiguous properties have acquired easements or have been identified as natural or conservation areas. 200 points is assigned for any of the conditions.

acquired easements
conservation lands
natural area

E. Capital Investment - 100 points potential.

Points assigned in relation to the amount of capital and degree of improvements the landowner has invested for agricultural purposes. This is a measure of how high the viability of the farming operation is.

barns
ponds
irrigation
fencing
drainage
grain storage and handling facility
livestock facilities

F. Cultural Significance - 100 points potential.

Points assigned according to cultural significance of the site and its building improvements.

historic building - 25 pts.
ownership history - 25 pts.
archaeological site - 25 pts.
architectural significance - 25 pts.

G. Economic Importance - 100 points.

Points assigned if the loss of the farm operation would have a negative impact upon local economy. For example, loss of an active farmer, unique farm service facility, or specialty product.

H. Environmental Impact - 100 points potential.

Points assigned according to land's compatibility with surrounding existing land uses and potential negative impact upon adjacent areas with change in use.

Protected areas - 25 pts.
Floodways - 25 pts.
Wildlife habitat - 25 pts.
Wetlands - 25 pts.

I. Specialty Products - 100 points potential.

Points awarded if product produced is a specialty product like Christmas trees, aquaculture, strawberries, etc.

10. Would the landowner have only one chance to enter the program?

No. Applications would be accepted on a year-round basis and remain under consideration until a farmer chooses to withdraw.

11. Would the landowner have to offer all of his property?

No. They may offer to sell all or any part of the property.

12. What would happen if the landowner sold his development rights and then decided to change the type of farming or quit farming all together?

Nothing in this program requires the landowner to farm his property. Selling development rights simply restricts the landowner or anyone else from developing the property for nonfarm purposes. If the landowner wished to change his type of farming, he would be perfectly free to do so. If he didn't want to farm the property at all, he would be free to lease it to someone else to farm, sell it, or just let it lie idle. The only restriction on the landowner or any subsequent owner is that the property cannot be developed for nonfarm purposes. In other words, even if the landowner sold the property, the restriction against development would continue with the land.

13. What restrictions would be placed on land in the Agricultural Reserve Program?

Once the development rights had been purchased, no non-farm development could take place on the land. However, the owner can exclude certain lands for provision of future homesites to meet their needs at the time of sale.

The Board would have to decide in cases where agricultural sales, agricultural processing, or other agricultural related uses of the land are proposed whether

such uses are in keeping with the purpose and intent of the program.

The mineral rights would be retained by the landowner, but the program forbids excavation, dredging, or removal of loam, peat, gravel, soil or other mineral substance in such a manner as to adversely affect the land's overall future agricultural potential.

14. Would this program exclude development of bed and breakfasts, eco-tourism, agricultural tourism, and like pursuits?

No. Small business development which complements this program is encouraged as long as the future agricultural potential of the farmland is not adversely affected.

15. What if the landowner did not sell his development rights? Would the City stop him from developing the land?

If the landowner did not sell his development rights, he would retain all the rights to development subject to the same zoning, subdivision, and building code restrictions as other landowners.

16. Could the City build on the acquired property or sell the development rights to someone else to build on the acquired property?

No. Once the City paid for the development rights, the rights would be held in public trust and could not be used by anyone without the owner's consent. The taxpayers are

paying the landowner not to develop because they want the land to remain undeveloped.

17. Would this mean the public has a right to come on the landowners property?

No. Even though the landowner sells his development rights to his land, it does not become public property. It is still the landowner's private property and subject to the laws of trespass. The general public could not enter the property without the landowner's permission.

18. If a landowner sold the development rights, could the land still be taken by eminent domain for something like a high school site?

Protection from this could be part of the program. If a farmland owner agrees voluntarily not to develop his land for non-agricultural purposes, then the city should likewise give a package of protection to the agriculture landowner.

19. How would selling development rights affect the landowner's standing in the Use Value Taxation program?

If the property is already enrolled in the Use Value Taxation program, selling the development rights will not affect the landowner's standing in that program, nor would it change the tax assessment he pays under that program. If the landowner is in the program, he is already being taxed on what the state considers to be the "current use" or the agricultural value of the property. If he is not now in

the program, selling the development rights would not change his ability to enter the program.

20. If a landowner is buying his property on contract or has a mortgage, could he still enter the program?

Yes. The type of contract or mortgage that the landowner holds would determine the terms of his transaction with the City.

21. What has been the experience of farmers who try to obtain loans once the development rights have been sold?

In other programs, this has not been a problem. That goes back to the bank's loaning on the ability of the farm to pay off the loan based on its farm income. If the value is there, then banks will make the loan. In fact, most times after the development rights are sold, the money is used to improve the farming operation, which enhances its farm value and thus the ability to get more loans.

22. Could the landowner repurchase his development rights?

After a period of twenty-five years from the date the development rights were purchased, the landowner could request a review for repurchase by the Board. The repurchase would be at the current fair-market value. If the Board found that because of changed circumstances that the development rights should no longer be reserved, it could approve the repurchase.

23. What would be the incentives for landowners to enter into the program?

The program would provide a way for a landowner to cash in on the development value of his land while still being able to retain the land for farming. In cases where inheritance taxes might force the sale of a farm, sale of development rights might bring enough cash to allow the heirs to continue farming. Other incentives include:

- possible reduction of property taxes;
- possible extra capital which could be used for purchasing additional land, making improvements in present operations, or for any other purpose the landowner chooses;
- the assurance that other farms around them in the program would continue to be farmed for at least 25 years;
- stability in agriculture and the feeling that the state and city care about farmers and farming; and
- present farmers who are farming on rented land (or new farmers) would be better able financially to purchase land for farming. A seller naturally wants top dollar for his land and the appraisal for our program would reflect that top dollar value. The ARP would pay the seller for the development portion, the buyer (possibly a farmer who is now renting land) would pay the seller for the agriculture portion, so the seller would come out the same as if he sold the land to a developer.

24. Is there another program like this in Virginia?

No. While purchase of development rights programs are in place in other parts of the country, there are no programs in Virginia. North Carolina has two programs like this, one in Forsyth County and another, based upon it, was initiated in Wake County in 1989.

25. Is the City empowered to purchase development rights under state law?

Yes, the City is fully authorized to purchase fee simple interest or partial interest in land.

26. How will the Agricultural Reserve Program be funded?

Bonds are frequently used in other programs because they can be issued over a period of time as farmland owners apply for and are accepted into the program. Other possible sources of funding include applying particular sources of revenue to this program such as the roll-back tax, the land use tax, or applying proffers from conditional use permits. Funding tied to the real estate transfer tax has the appeal that as development activity increases and the pressure to convert farmland increases, funds to protect some of that farmland would also increase. The farmers may participate in a product assessment fee or check-off program.

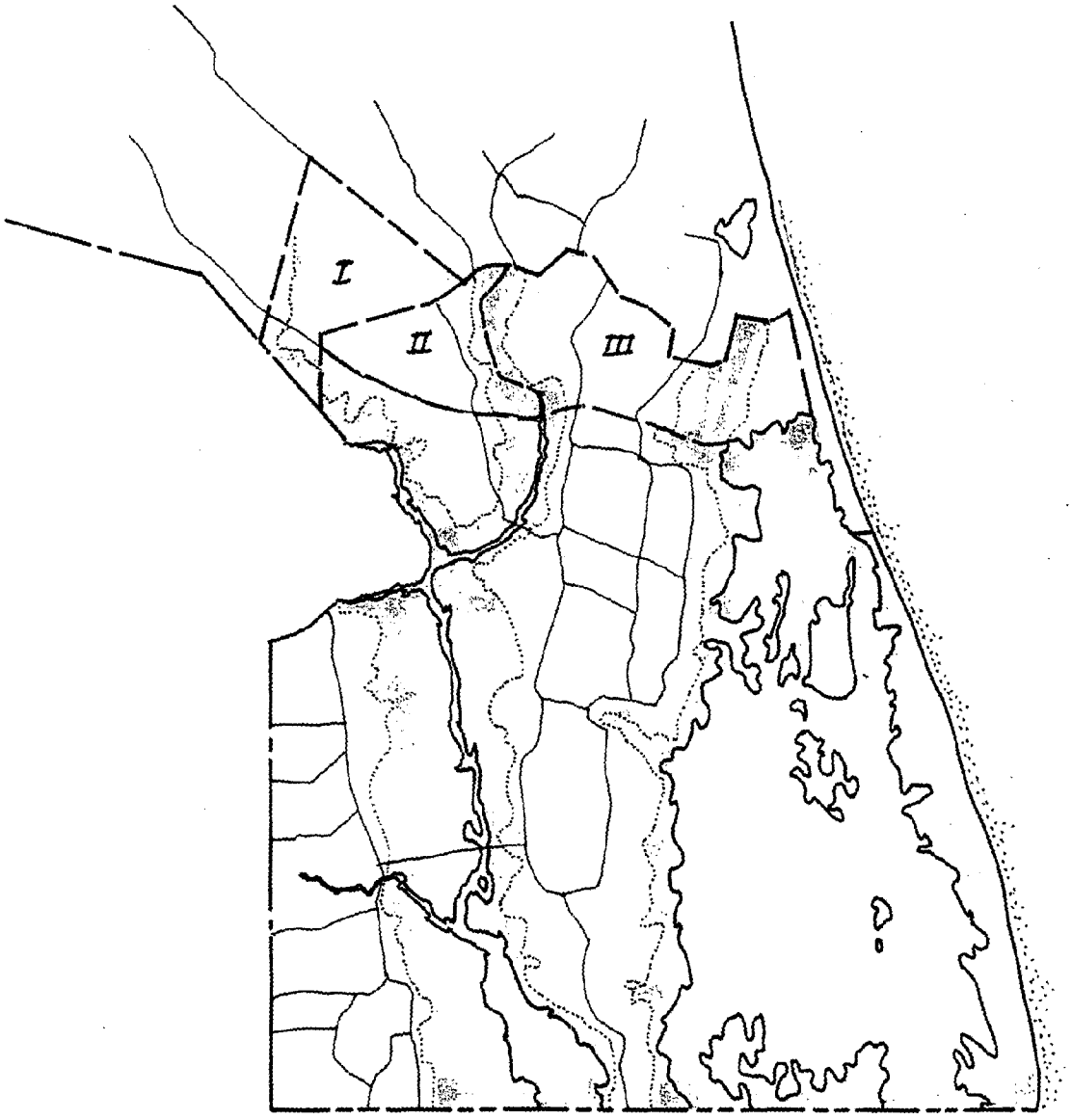
The Committee feels there is some urgency in getting this program established, and funding through a bond issue this fall. Supplemental or matching funds from other governmental agencies or private sources (gifts, grants)

may become available to pay a portion of the cost of acquiring development rights. The Commonwealth of Virginia is encouraged to support the City of Virginia Beach Agricultural Reserve Program as a pilot program for the rest of the state by appropriating matching funds.

27. Is the ARP the solution to preserving farmland?

The Agricultural Reserve Program, with the support and participation of the local farm community, is one element of a comprehensive program to address the challenges of the modern agricultural industry. In Virginia Beach, if the program is well administered and adequately funded, it can begin to reverse the steady conversion of farmland to non-farm uses that we have seen in recent decades. The ARP, though, must be supported by existing programs and policies, and by other economic and policy initiatives if Virginia Beach is to have an effective program for the preservation of farms and farmland.

APPENDIX A
SOUTHERN WATERSHEDS MAP

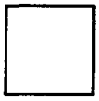


APPENDIX A
SOUTHERN WATERSHEDS MAP - LEGEND

Transition Areas I, II, and III

Surface Water and Conservation Lands

Roads



Farm lands eligible for Agricultural Reserve Program

APPENDIX B
OTHER FARMLAND PROTECTION PROGRAMS

State-sponsored Programs

State-sponsored programs for purchase of development right programs were started as early as 1977 in Maryland and Massachusetts. The New England states embraced this tool as a region, and there are programs in Connecticut, Maine, New Hampshire, Rhode Island and Vermont. Maine and Vermont are multi-purpose land acquisition programs. New Jersey initiated a state program in 1981, and Pennsylvania began theirs in 1989.

The state programs are funded in a variety of ways including bonding, general appropriations, transfer taxes and local matches. Some programs use more than one source of funds. By the end of 1991, in excess of $350 million dollars were expended on the purchase of development rights through the nine states programs.

Currently, eleven states have purchase of development rights programs in effect: California, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Rhode Island, and Vermont.

Local/County Programs

Suffolk County, New York started the first local program in the east in 1976, funding their program through bonds and local matching funds. King County, Washington started a program in 1979 funded through general

obligation bonds. In California, six counties fund local programs through Proposition 70, a statewide bond issue. Marin County, California funds their program through state bonds, a property tax, and the California Coastal Conservancy.

Local programs, operating independently from state programs are found in twelve states: California, Colorado, Connecticut, Maryland, Massachusetts, New Hampshire, New Jersey, New York North Carolina, Pennsylvania, Vermont, and Washington.

Other Tools

All fifty states have enacted both tax relief programs and Right-To-Farm laws. Fifteen states, including Virginia, have Agricultural Districting regulations. Only nine states have enacted Growth Management Plans or zoning. Forty-six states have legislation enabling conservation easements. Twenty-eight states use the Land Evaluation and Site Assessment Systems (LESA).

APPENDIX C
COMPLEMENTARY LOCAL PROGRAMS

Albemarle - Pamlico Estuarine Study

Funded jointly by US Environmental Protection Agency and the State of North Carolina. Local coordination by the Hampton Roads Planning District Commission

Back Bay - North Landing River - Northwest River Focal Area of the Atlantic Coast Joint Venture of the North American Waterfowl Management Plan

Coordinated by the Virginia Joint Venture Board

Conservation and Restoration Program for the North Landing River Wetland System

Coordinated by the Virginia Department of Conservation and Recreation, Division of Natural Heritage

Control of Common Reedgrass in the Southern Watersheds Demonstration Project

Coordinated by the Virginia Department of Conservation and Recreation, Division of Natural Heritage

Natural Areas Inventory of the City of Virginia Beach

Funded by the Virginia Council on the Environment's Coastal Resources Management Program through National Oceanographic and Atmospheric Administration and the City of Virginia Beach

Southern Watersheds Habitat Committee

Coordinated by the Hampton Roads Planning District Commission

Stormwater Monitoring Program on Back Bay National Wildlife Refuge

Coordinated by the U.S. Department of Interior, Fish and Wildlife Service

The North Landing and Northwest Rivers Conservation Project

A joint program by the Virginia Department of Conservation and Recreation and The Nature Conservancy

The North Landing River Natural Area Preserve

A joint program by the Virginia Department of Conservcation and Recreation and The Nature Conservancy

Virginia Beach Capital Improvements Plan

Funding for identified projects

Virginia Beach Comprehensive Plan

Official statement of the City of Virginia Beach regarding physical development and planning policy

Virginia Beach Outdoors Plan

Draft statement of Virginia Beach policy regarding the planning, protection, design, development, financing, construction, management, and maintenance of its natural and recreational resources

Virginia Beach Rural Preservation Plan of the Comprehensive Plan

Proposed change to the adopted Comprehensive Plan

Virginia Beach Scenic Waterway System

Includes the North Landing River and West Neck Creek. Funds available for site and access development

Virginia Beach Southern Watersheds Plan of the Comprehensive Plan

Governs standards for change of use in the agricultural districts of the Southern Watersheds area

APPENDIX J

DISCOVER VIRGINIA BEACH TREASURES BROCHURE

Discover a Natural Setting For Outdoor Recreation

☑ Your Checklist For Fun:

- ☐ Walking
- ☐ Canoeing
- ☐ Biking
- ☐ Fishing
- ☐ Boating
- ☐ Swimming
- ☐ Picnicking
- ☐ Camping
- ☐ Hiking
- ☐ Beachcombing
- ☐ Bird Watching
- ☐ Exploring
- ☐ Sun Bathing
- ☐ Nature Study
- ☐ Relaxing
- ☐ Wildlife Watching
- ☐ Environmental Education
- ☐ Nature Photography

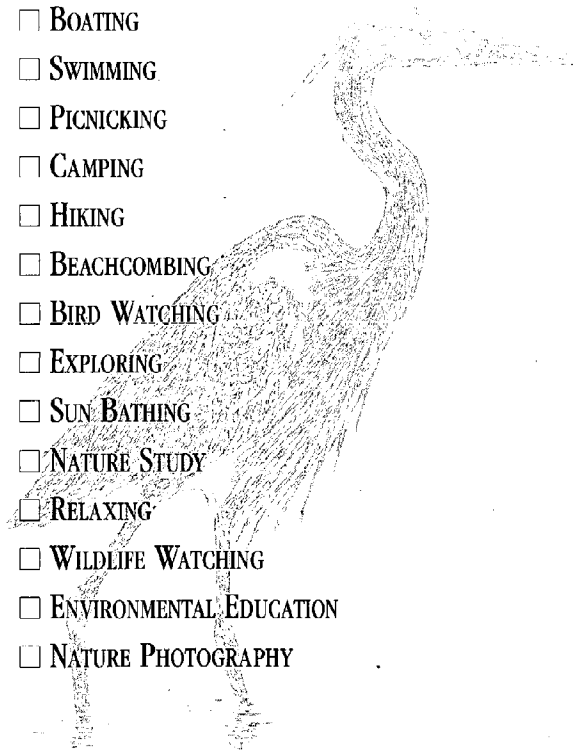


Illustration by Sandra Koury

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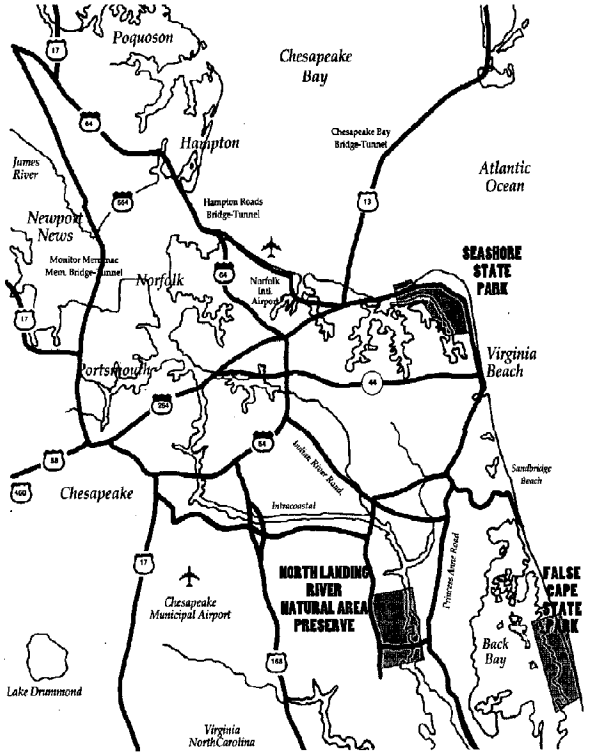

For More Information
Call:
1-800-VA-BEACH

DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

Public Information Office
City of Virginia Beach
Municipal Center
Virginia Beach, VA 23456-5080

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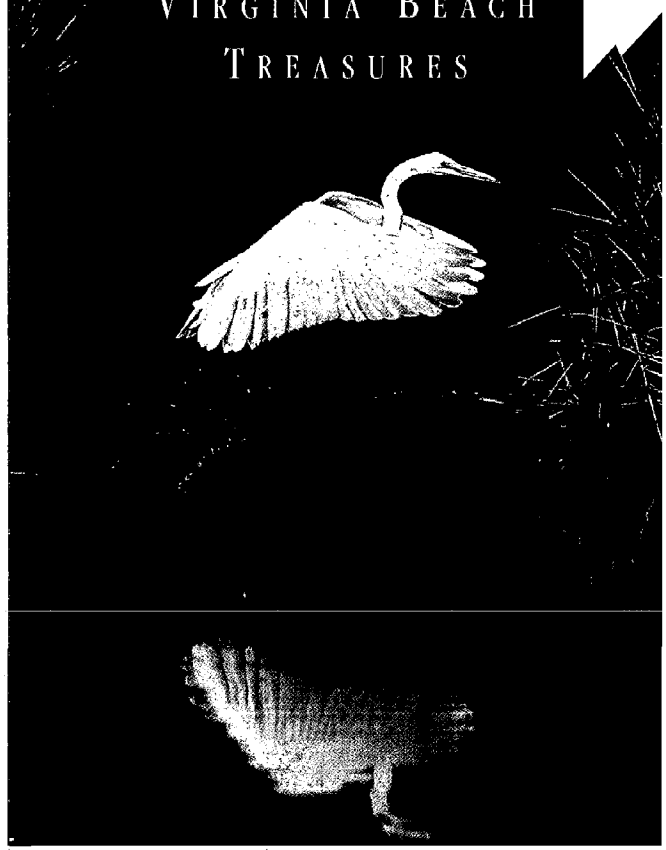
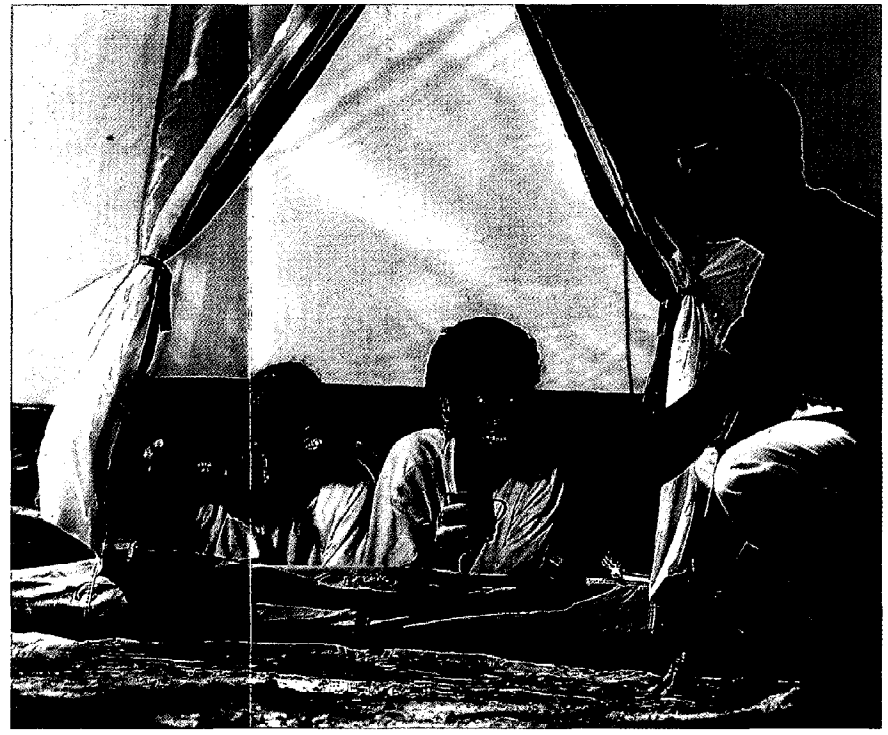
DISCOVER

Virginia Beach Treasures

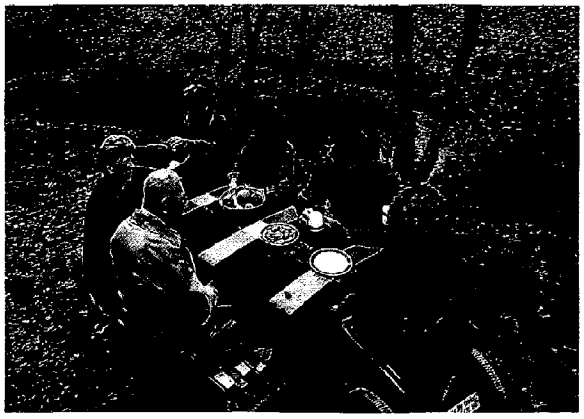


- Seashore State Park and Natural Area...
  a Registered National Natural Landmark
- False Cape State Park
- North Landing River Natural Area Preserve

Seashore State Park and Natural Area



This National Natural Landmark offers recreational activities along with an opportunity to explore unique habitats featuring lagoons, large cypress trees and rare plants. More than 19 miles of scenic hiking trails wind through the natural area, and visitor center exhibits explain much about this coastal environment. Housekeeping cabins, campsites, picnic areas, boat ramps and a bicycle trail are offered in the park.



False Cape State Park

One of the few remaining undeveloped areas along the Atlantic coast, False Cape offers a chance to experience nature in a one-of-a-kind setting. A huge migratory bird population and a variety of wildlife, plants and trees make the park an outdoor living museum. A pontoon boat and canoes are available for on-water educational activities. An environmental education resource center is available for day and overnight rental for group environmental education activities. Hiking, biking and primitive camping are favorite activities. The park is accessible by hiking, biking or boating.

North Landing River Natural Area Preserve

This designated state scenic river provides excellent canoeing with breathtaking scenery. One of the largest and most significant natural area preserves in Virginia, the North Landing River Natural Area Preserve protects some of the finest remnant pocosins on Virginia's Coastal Plain. This unique wetland community, forested swamps and freshwater tidal marshes support as many as 27 rare species. The area also provides important habitat for breeding and wintering waterfowl.

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