# DRAGON RUN WATERSHED MANAGEMENT PLAN

## NOVEMBER 2003

Photo credit: Teta Kain

This project was funded by the Virginia Coastal Program of the Department of Environmental Quality through Grants #NA17OZ1142-01 and #NA17OZ2355 of the National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resource Management, under the Coastal Zone Management Act of 1972, as amended. The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its subagencies.

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U.S. DEPARTMENT OF COMMERCE

# DRAGON RUN WATERSHED MANAGEMENT PLAN

**NOVEMBER 2003**


**DRAGON RUN STEERING COMMITTEE,**
**MIDDLE PENINSULA PLANNING DISTRICT COMMISSION**

**MARGARET DAVIS, CHAIR**
**WILLIAM F. HERRIN, VICE-CHAIR**

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**MIDDLE PENINSULA PLANNING DISTRICT COMMISSION**



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# ACKNOWLEDGEMENTS

David Fuss, Director of the Dragon Run Special Area Management Plan, at the Middle Peninsula Planning District Commission, compiled this report for the Dragon Run Steering Committee. The Dragon Run Steering Committee members are:

| ***County*** | ***Elected Official*** | ***Landowner*** | ***Landowner*** |
|---|---|---|---|
| Essex | M. “Prue” Davis | Dorothy Miller | M. Scott Owen |
| Gloucester | Rick Allen | Elizabeth DeHardit | Jerry Horner |
| King and Queen | Keith Haden | William F. Herrin | Russell Williams |
| Middlesex | Jack Miller | Robert Major | Davis Wilson |

The Dragon Run Steering Committee wishes to thank its Advisory Group, who met monthly from March 2002 to October 2003 to develop this plan. The Steering Committee also wishes to thank Julie Bixby and the Virginia Coastal Program for providing funding and oversight for the project. Ancillary funding was provided by the Environmental Protection Agency’s Chesapeake Bay Program through the Virginia Department of Conservation and Recreation, via grant agreement number BAY-2002-20-SR. This report was printed with funds generated from the sale of Chesapeake Bay license plates through a Chesapeake Bay Restoration Fund Advisory Committee grant.

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**The Dragon Run Steering Committee**

The Steering Committee would also like to thank all of the citizens who participated in any of the meetings that led to the production of this watershed management plan. Participants are listed below:

**Lorna Anderberg**
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**David Birdsall**
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**Jimmie Pitts**
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**Will Smith**
**Hugh Soles**
**Pat Tyrrell**
**Hoyt Wheeland**
**Rachel Williams**
**Cathy Wilson**
**Rebecca Wilson**

# Executive Summary

As one of the Chesapeake Bay watershed's most pristine waterways, the spring-fed Dragon Run flows forty miles along and through nontidal and tidal cypress swamp situated in portions of Essex, King and Queen, Middlesex, and Gloucester Counties. The Dragon Run plays a central role in the Middle Peninsula's culture and identity. Natural resources - forestry and farming - have been the bedrock of the watershed's economy. These land uses, together with extensive swamps and unique natural resources, are the main reasons that the Dragon Run remains wild and secluded.

The Dragon Run's unique character evokes strong feelings to protect the pristine watershed in both long-time residents and first-time visitors alike. Yet, opinions differ about how to address the threats of encroaching development and habitat fragmentation. An innate difference in point of view between property rights advocates and conservationists centers on how to maintain a pristine watershed into the future. Yet, substantial common ground exists for proactively preserving the Dragon Run for future generations that safeguards both natural resources and traditional uses of the land and water, including the property rights of landowners.

The Dragon Run Watershed Special Area Management Plan (SAMP), a partnership between the Virginia Coastal Program and the Dragon Run Steering Committee of the Middle Peninsula Planning District Commission, is designed to address both the differences of opinion and the common ground that exist concerning the future of the watershed. The Steering Committee believes that the best approach is to bring stakeholders to the table for proactive discussions of the issues. The Steering Committee and its Advisory Group, representing a broad cross-section of the community, have proactively developed a mission, goals, objectives, and action plans to address the priority issues facing the Dragon Run.

This watershed management plan for the Dragon Run watershed represents a body of work by citizens, stakeholders, and decision-makers to achieve a common vision for the future – the preservation of the traditional uses and unique resources in the pristine Dragon Run. It is a symbol of regional cooperation and coordination that crosses jurisdictional boundaries. It is not a static document. Rather, it is a modifiable guidebook that harnesses the passion and energy for the Dragon Run of those who live, work, and play in its watershed.

### ***MISSION***

To support and promote community-based efforts to preserve the cultural, historic, and natural character of the Dragon Run, while preserving property rights and the traditional uses within the watershed.

***GOALS***

1. Establish a high level of cooperation and communication among the four counties within the Dragon Run Watershed to achieve consistency across county boundaries.
2. Foster educational partnerships and opportunities to establish the community's connection to and respect for the land and water of the Dragon Run.
3. Promote the concept of landowner stewardship that has served to preserve the Dragon Run Watershed as a regional treasure.

***ACTIONS***

| |
|---|
| ***Underway/Completed*** |
| 1. Memorandum of Agreement |
| 2. Establish Baseline Watershed Information |
| 3. SAMP Project Awareness Campaign |
| ***Recommended*** |
| 1. Land Use and Resource Preservation |
| A. Designate a Unified "Dragon Run Planning Area" |
| B. Implement Tools to Preserve Farm, Forest, and Natural Resources |
| C. Address Public and Landowner Access Issues |
| D. Control Invasive Species |
| 2. Education and Landowner Stewardship |
| 3. Encourage and Support Sustainable Economic Development |
| 4. Monitor Plan Implementation |

# PART I

# SECTION 1: Watershed Description

**Section 1 describes the Dragon Run watershed's setting, its role in local history and culture, and its unique natural resources. The potential source of conflict is change in land ownership that threatens to fragment productive farm and forest land and natural habitat. The community's vision for the watershed is to preserve the traditional land uses – forestry, farming, hunting – and the unique natural resources. This section highlights both the differences of opinion on how to address the threat to the watershed and the common ground that defines the community's vision.**

As one of the Chesapeake Bay watershed's most pristine waterways, the Dragon Run "encompasses some of the most extensive and unspoiled swamp forest and woodland communities in Virginia" (Belden, Jr. et al, 2001). Effectively bisecting Virginia's Middle Peninsula located between the York and Rappahannock Rivers, this fresh and brackish water stream (**Figure 1**) meanders forty miles along and through nontidal and tidal cypress swamp. The watershed is mainly undeveloped, almost entirely privately owned, and encompasses approximately 140 square miles (90,000 acres) of rural landscape – mostly forests, farms, and wetlands. The spring-fed Dragon Run flows through portions of Essex, King and Queen, Middlesex, and Gloucester Counties, emptying into the estuarine Piankatank River and ultimately the Chesapeake Bay.

**Figure 1**. The Dragon Run

The Dragon Run plays a central role in the Middle Peninsula's culture and identity. Its intriguing name is frequently borrowed by local enterprises and establishments and is often overheard in community conversations. Since European settlement in the early 1600's and Native American inhabitation up to 10,000 years before that, natural resources have been the bedrock of the watershed's economy. For older generations, forestry, farming, hunting, trapping and fishing were the primary ventures. Today, forestry and farming continue to generate wealth and drive the watershed's economy. Upholding an ancient tradition, hunters range over prime hunting grounds stalking prized game. These land uses, together with extensive swamps, are the main reasons that the Dragon Run remains wild and secluded.

The watershed's wilderness is both expansive and unique. The Dragon Run contains the northernmost example of the Baldcypress-Tupelo Swamp natural community in Virginia and the best example north of the James River (Belden, Jr. et al., 2001). Moreover, 14 rare species and 5 rare natural communities are found here (**Appendix A**). Based on his investigations of the watershed's aquatic communities, one researcher

observes that the Dragon Run is a “100 year old time capsule,” resembling coastal plain streams in the Chesapeake Bay region at the turn of the 20th century (Garman, 2003).

The Dragon Run’s unique character evokes strong feelings to protect the pristine watershed in both long-time residents and first-time visitors alike. Although development pressure in the watershed is currently low, the potential for significant land ownership changes (>25% in 10 years due to aging and absentee corporate landowners) threatens to disrupt the rural character and fragment productive farm and forest land. Likewise, habitat fragmentation jeopardizes the Dragon Run’s unique natural communities. Landowner opinions about how to address these threats vary widely, ranging from the belief that “the Dragon takes care of itself” by its wild nature and voluntary landowner stewardship to enacting and enforcing regulations with “teeth.”

The difference in point of view between property rights advocates and conservationists centers on how to maintain a pristine watershed into the future. Yet, as the Dragon Run Special Area Management Plan unfolds, the community is learning that substantial common ground exists for proactively preserving the Dragon Run for future generations that safeguards both natural resources and traditional uses of the land and water, including the property rights of landowners.

# SECTION 2: Planning Approach

**Section 2 describes the Dragon Run Steering Committee's planning approach. The Dragon Run Watershed Special Area Management Plan (SAMP), a partnership between the Virginia Coastal Program and the Dragon Run Steering Committee of the Middle Peninsula Planning District Commission, is designed to address both the differing viewpoints and the common ground that exist concerning the future of the watershed. The Steering Committee's approach to the SAMP is to stimulate and coordinate community involvement in the proactive development and implementation of goals, objectives, and action plans for a watershed management plan. The Steering Committee finds that the watershed approach is the most effective way to manage natural resources and traditional land uses. A Memorandum of Agreement describing the goals and objectives of the SAMP was signed by Essex, Gloucester, King and Queen, and Middlesex Counties and the Middle Peninsula Planning District Commission. The Steering Committee and its Advisory Group then developed watershed action plans designed to achieve those goals and objectives.**

The Dragon Run Watershed Special Area Management Plan (SAMP), a partnership between the Virginia Coastal Program and the Dragon Run Steering Committee of the Middle Peninsula Planning District Commission, is designed to address both the differing viewpoints and the common ground that exist concerning the future of the watershed. The project began in January 2002 with a grant from the Virginia Coastal Program under authority of the National Oceanic and Atmospheric Administration (NOAA). Enabled by the federal Coastal Zone Management Act of 1972 as amended, SAMPs aim to protect significant coastal resources through a collaborative, multi-level planning process to develop and implement new enforceable policies.

One of the fundamental elements of a SAMP is that a strong regional entity must exist that is willing to sponsor the planning program. In the Dragon Run watershed's case, that regional entity is the Middle Peninsula Planning District Commission through its Dragon Run Steering Committee. Formed in 1985, the Dragon Run Steering Committee consists of landowners and local elected officials and is the key vehicle for cooperation and coordination among the four counties concerning watershed issues. The Steering Committee's approach to the SAMP is to stimulate and coordinate community involvement in the proactive development and implementation of goals, objectives, and action plans for a watershed management plan.

Another major element of a SAMP is that conflict exists concerning the area's proposed uses. The Steering Committee believes that the best approach is to proactively head off conflict before it grows by enabling stakeholders to openly discuss the issues. Potential conflicts in the Dragon Run watershed are: 1) the differences between conservation and property rights advocates; and 2) the private use of land versus the public use of the water. The Steering Committee finds that the watershed approach is the most effective way to manage natural resources and traditional land uses.

In this spirit, the Dragon Run Watershed SAMP (**Figure 2**) began with public planning forums in December 2001 and January 2002. Newspaper announcements were published and representatives from many sectors of the community were specifically invited. These planning forums led to two primary outcomes: 1) the development and confirmation of common themes for watershed issues; and 2) the establishment of a SAMP Advisory Group representing a broad cross-section of the community.

Building upon the foundation established by the planning forums, the SAMP Advisory Group developed a mission statement (see **Section 3**). The Advisory Group developed a list of three goals, each with several objectives. With minor modifications, the Steering Committee approved the goals and objectives, which were incorporated into a Memorandum of Agreement (**Appendix B**). Each county – Essex, Gloucester, King and Queen, and Middlesex - and the Middle Peninsula Planning District Commission signed the Agreement during the late summer and fall of 2002 and will consider the actions (see **Section 4**) recommended by the Steering Committee. The actions address the goals and objectives in the Memorandum of Agreement.

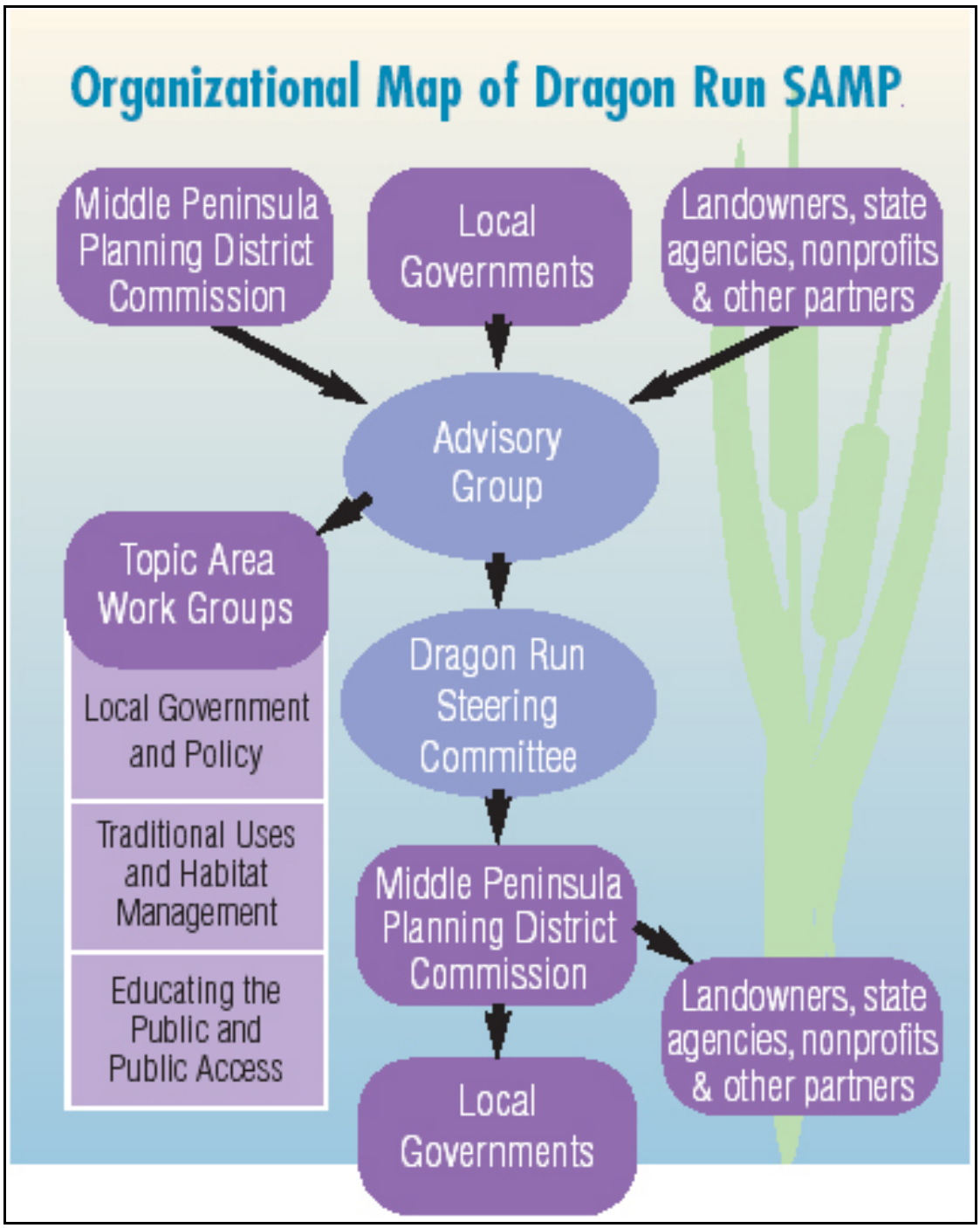


**Figure 2**. Organizational Map of the Dragon Run SAMP

# SECTION 3: Goals and Objectives

**Section 3 contains the mission, goals and objectives featured in the Memorandum of Agreement. This section serves as the basis for the proposed actions in Section 4.**

**MISSION**
To support and promote community-based efforts to preserve the cultural, historic, and natural character of the Dragon Run, while preserving property rights and the traditional uses within the watershed.

**GOAL I**
Establish a high level of cooperation and communication among the four counties within the Dragon Run Watershed to achieve consistency across county boundaries.

**OBJECTIVE A**
Develop a plan to address the inevitable future development pressure to change the traditional use of land in the Dragon Run Watershed.

**OBJECTIVE B**
Achieve consistency across county boundaries among land use plans and regulations in order to maintain farming and forestry and to preserve natural heritage areas by protecting plants, animals, natural communities, and aquatic systems.

**OBJECTIVE C**
Provide ongoing monitoring of existing plans and planning tools in order to assess traditional land uses and watershed health and take action necessary to preserve the watershed.

**OBJECTIVE D**
Comprehensively implement Best Management Practices (BMPs) for water quality, wildlife habitat, and soil conservation.

**GOAL II**
Foster educational partnerships and opportunities to establish the community's connection to and respect for the land and water of the Dragon Run.

**OBJECTIVE A**
Encourage experience-based education consistent with the Stewardship and Community Engagement goals of the Chesapeake 2000 Agreement.

**OBJECTIVE B**
Promote the community and economic benefits of the Dragon Run derived from its natural characteristics and traditional uses such as farming, forestry, hunting and fishing.

**GOAL III**
Promote the concept of landowner stewardship that has served to preserve the Dragon Run Watershed as a regional treasure.

**OBJECTIVE A**
Address the potential dilemma of preserving the watershed's sense of peace and serenity by protecting open space and reducing fragmentation of farms, forests, and wildlife habitat versus the landowners' rights in determining or influencing future land use.

**OBJECTIVE B**
Educate landowners about the regional importance of the Dragon Run.

# SECTION 4: Actions

**Section 4 explains and justifies the actions proposed to achieve the goals and objectives in Section 3. The proposed actions are:**

| |
|---|
| ***Underway/Completed*** |
| 1. Memorandum of Agreement |
| 2. Establish Baseline Watershed Information |
| 3. SAMP Project Awareness Campaign |
| ***Recommended*** |
| 1. Land Use and Resource Preservation |
| A. Designate a Unified “Dragon Run Planning Area” |
| B. Implement Tools to Preserve Farm, Forest, and Natural Resources |
| C. Address Public and Landowner Access Issues |
| D. Control Invasive Species |
| 2. Education and Landowner Stewardship |
| 3. Encourage and Support Sustainable Economic Development |
| 4. Monitor Plan Implementation |

The actions in this **Section** address the Goals and Objectives in **Section 3**. Notations after each action indicate links to goals and objectives and responsibilities.

## ACTIONS UNDERWAY OR COMPLETED

### 1. Memorandum of Agreement

The Middle Peninsula Planning District Commission entered into an agreement (**Appendix B**) with the Counties of Essex, Gloucester, King and Queen, and Middlesex to participate in the Dragon Run SAMP. The agreement established the signatories' acceptance of the goals and objectives of the SAMP (see **Section 3**) and willingness to consider the Steering Committee's recommendations for actions (**Section 4**).

*This action addresses Goal I(B), II*
*Responsibility: Middle Peninsula Planning District Commission, Local Governments*

### 2. Establish Baseline Watershed Information

The Dragon Run Steering Committee has identified the following studies that have been completed or are underway to help to establish baseline watershed information:

| Title (citation) | Description |
|---|---|
| *Natural Areas of the Chesapeake Bay Region: Ecological Priorities* (Jenkins, 1974) | Natural area survey throughout the Chesapeake Bay watershed; Dragon Run ranks 2nd of 232 in importance |
| *County comprehensive plans, land use policies and ordinances* | Maps and narratives addressing environmental and land use policies |
| *Dragon Run Access Plan* (MPPDC, 1994) | Describes access to the Dragon Run and factors influencing its availability |
| *Dragon Run Watershed Management Plan* (DeHardit et al., 1996) | Evaluates watershed and land use issues; offers recommendations; not implemented |
| *Dragon Run Land/Water Quality Preservation Project* (MPPDC, 2001) | Comprehensive evaluation of water quality using historical and recent data |
| *A Natural Heritage Inventory of the Dragon Run Watershed* (Belden, Jr. et al., 2001) | Survey of rare species and natural communities for the main stem and adjacent wetlands |
| *Dragon Run Management Framework* (MPPDC, 2002) | GIS CD-ROM and report with 18 data sets; evaluates economic contributions of traditional uses |
| *Dragon Run Watershed Land Use Policy Audit* (MPPDC, 2003) | Evaluates existing land use policies; recommends improvements to protect natural resources and traditional uses |
| *Living Resources Inventory of the Dragon Run* (Garman et al., 2003) | Survey and analysis of fish and benthic macroinvertebrate communities |
| *A Natural Heritage Inventory of 14 Headwater Sites in the Dragon Run Watershed* (Belden, Jr. et al., 2003) | Survey of rare species and natural communities for headwaters |

| Title | Description |
|---|---|
| *Virginia Dept. of Environmental Quality Water Quality Monitoring* (ongoing) | Ambient water quality monitoring at U.S. 17 and Rt. 603 |
| *U.S. Geological Survey Gaging Station* (ongoing) | Real-time gage height and discharge by volume at Mascot, Virginia |

*This action addresses Goal I(A,C)*
*Responsibility: Middle Peninsula Planning District Commission, universities, state and federal agencies*

**3. SAMP Project Awareness Campaign**
Middle Peninsula Planning District Commission staff delivered presentations, brochures, and fact sheets to Boards of Supervisors, Planning Commissions, and community groups that explained key components of the SAMP project and critical watershed issues.

*This action addresses Goal II(B), III(B)*
*Responsibility: Middle Peninsula Planning District Commission, Dragon Run Steering Committee*

## RECOMMENDED ACTIONS

**1. Land Use and Resource Preservation**
Currently, the watershed is 99% wetlands, forests, and farms (MPPDC, 2002) that support a variety of unique natural resources, including rare and threatened species (Belden, Jr. et al., 2001). To protect the unique natural resources and traditional land uses of the Dragon Run, it is crucial to work proactively to implement strong land use policies while development pressure and land use intensity are still low, rather than wait to react to intensifying development pressure (MPPDC, 2003). The Dragon Run Steering Committee **recommends** that counties proactively strengthen and better coordinate their land use policies within the watershed.

**A. Designate a Unified "Dragon Run Planning Area"**
All of the four counties share the goals of protecting traditional uses, rural character, and natural resources in the Dragon Run. Yet, none of the counties identifies the Dragon Run watershed as a distinct planning area. Based on the Dragon Run Land Use Policy Audit (MPPDC, 2003), the Dragon Run Steering Committee **recommends** a watershed approach to achieve better coordination of land use policies by designating the Dragon Run as a special planning area with a step-by-step implementation strategy.

| | |
|---|---|
| **Step 1** | Adopt Watershed Management Plan |
| **Step 2** | Amend Comprehensive Plan |
| **Step 3** | Amend Zoning Ordinance |

*Step 1*. Each county would adopt the Dragon Run Watershed Management Plan as an addendum to its comprehensive plan, requiring a simple amendment and a public hearing. This action would **not** require an amendment to the future land use maps. The purpose of Step 1 would be to formally acknowledge that the Dragon Run watershed deserves distinctive treatment.

By adopting the Watershed Management Plan, the counties would agree to the following policies:

- Recognize the overall value of maintaining the traditional rural character and forested and farmed landscape of the Dragon Run watershed
- Preserve the ecological integrity of the Dragon Run watershed
- Acknowledge the community and economic benefits of the Dragon Run watershed: for the production of agricultural and forest products; as a valued natural resource; for wildlife habitat; for maintaining water quality; and for scenic and aesthetic values
- Continue to fully enforce existing regulations and policies
- Protect forested and farmed land from fragmentation due to conversion to more intensive development
- Encourage a low-density, clustered pattern of development for new residential development in the watershed to protect open space and natural resources
- Seek techniques to protect open space in the watershed without infringing upon landowner rights to maintain an economic return from their property
- Identify land uses that are incompatible or competitive with traditional resource-based land uses (e.g. forestry, farming, hunting, fishing) and consider limiting them within the watershed
- Limit rezoning to more intense uses in order to protect the rural character and integrity of farming and forestry resources in the watershed
- Limit extension of public utilities and central water and sewer in the watershed
- Explore the feasibility of limiting major residential development in the watershed by aligning the Comprehensive Plan and Zoning Ordinance with provisions in the Subdivision Ordinance that limit major subdivisions
- Publish citizen stewardship materials that explain pertinent ordinances, policies, and regulations in easy-to-understand language

*Step 2*. Each county would create and map a specially designated “Dragon Run Planning Area” within its comprehensive plan. Placing detailed land use policies such as permitted uses, development density, and utility service into the plan text and the official Future Land Use map would stress that protection of the Dragon Run is an important priority in each county.

Specific goals, policies, and actions, based on a thorough review and analysis by the Dragon Run Steering Committee and its SAMP Advisory Group, would be summarized in a proposed “Model Comprehensive Plan Amendment for the Establishment of the Dragon Run Planning Area.” Considerable staff and public input (e.g. public hearings) would address inconsistencies in land use policies across jurisdictions.

*Step 3*. Each county would adopt a model "Dragon Run Protection Zone" within its zoning ordinance involving both zoning map and zoning text amendments. The Dragon Run Protection Zone would apply beyond the main channel to the entire watershed.

This step would require considerable staff and public input (e.g. public hearings) to devise a unified set of standards (e.g. permissible uses, acceptable densities, development standards) that integrates with the existing regulatory scheme and that meets the goals of the Special Area Management Plan (see **Section 3**).

*This action addresses Goal I(A,B,C), III(A)*
*Responsibility: Middle Peninsula Planning District Commission, Dragon Run Steering Committee, Local Governments*

### B. Implement Tools to Preserve Forest, Farm, and Natural Resources

A variety of tools exist with which to preserve forest and farmland (**Figure 3**) and unique natural resources within the Dragon Run watershed. These tools are highly flexible, rely mostly upon voluntary actions, and can provide ecological and cultural benefits. The Dragon Run Steering Committee **recommends** the implementation of an appropriate combination of the following tools (see **Appendix C** for description):

| **Tool** | **Responsibility** |
|---|---|
| Conservation Easements | Landowners, non-profits, state and local governments |
| Purchase of Development Rights (PDR) | Local governments |
| Purchase of Agricultural Conservation Easements | Non-profits and federal, state and local governments |
| Enforcement of Chesapeake Bay Preservation Act and Other Ordinances | Local governments |
| Agricultural and Forestal Districts | Local governments |
| Land Use Assessment | Local governments |
| Utilize Farm Programs and Forest Stewardship Plans | State and federal agencies; local governments; landowners |
| Sliding Scale Property Tax Rate | Local governments |
| Sliding Scale Zoning | Local governments |
| Local "Right-to-Farm" | Local governments |
| State Forest | Department of Forestry |
| Virginia Natural Area Preserves System | Landowners, Natural Heritage Program |
| Virginia Estuarine and Coastal Research Reserve System | Chesapeake Bay National Estuarine Research Reserve |

The Dragon Run Steering Committee also **recommends** the conservation of natural heritage resources and associated conservation sites as designated by the Virginia Natural Heritage Program (DCR, 2003a).

*This action addresses Goal I(A,B,C), III(A)*

**Figure 3.** Farming in the Dragon Run watershed.

### C. Address Public and Landowner Access Issues

Public access to the Dragon Run is limited because property adjacent to the navigable stream is almost entirely privately owned. In most cases, access must be arranged by landowner consent. While generally effective, this informal arrangement has sometimes frustrated landowners and recreation-seekers alike. Private landowners express frustration with trespassers and with users who do not practice “leave no trace” recreation. In contrast, those seeking recreation are hindered by sparse access to the pristine river.

Landowners have expended time and money to resolve trespassing and vandalism problems, ranging from posting signs to instituting a formal program requiring verbal or written permission prior to visitation. Liability is often cited as a landowner concern. Virginia’s landowner liability law (Code of Virginia §29.1-509), however, dismisses a landowner’s liability when recreational users access their property with permission, express or implied, if no fee is charged to the user. Furthermore, if a landowner grants an access easement to a government agency or authority, then the landowner is held harmless from all liability and the easement holder is responsible for providing and paying for the cost of all legal services required as a result of a claim or suit.

As demand for public access has increased, recreation-seekers have encountered access limitations. Land-based public access exists at three locations: 1) Rappahannock Community College in Glenns (hiking); 2) Virginia Coastal Reserve in Mascot (education); and 3) Friends of Dragon Run property in Mascot (hiking/birding) with parking on a Virginia Department of Transportation unpaved lot. Fishing spots are limited to traditional access points, such as bridges. Also, the boating distance between traditional access points equates to nearly an entire day, causing logistical problems for novice paddlers. Occasionally, the sheriff’s department must dispatch a rescue team to retrieve boaters who are lost in the dark. Organizations that offer guided paddling trips effectively manage access with trip planning and suitability, proper equipment and safety information, appropriate consideration for private property, and response to the unexpected (e.g. medical emergencies, cold water immersion).

The Dragon Run Steering Committee seeks to balance reasonable public access to publicly owned waters with private property rights, preservation of the watershed's sense of peace and seclusion, and the watershed's ecological integrity that are highly prized by landowners and visitors alike. The following is a list of **proposed** actions:

- Erect signage notifying boaters/recreationists of trespassing issues and the physical dangers of boating in a wilderness area
  *Responsibility: Dragon Run Steering Committee*
- Provide land-based access as an alternative to boat-based access
  *Responsibility: Middle Peninsula Chesapeake Bay Public Access Authority, Virginia Coastal Reserve (Virginia Institute of Marine Science), Virginia Dept. of Forestry, local governments, non-profit organizations*
- Supervise or manage public access sites
  *Responsibility: Middle Peninsula Chesapeake Bay Public Access Authority, Virginia Coastal Reserve (Virginia Institute of Marine Science), Virginia Dept. of Forestry, Virginia Dept. of Transportation, local governments, non-profit organizations*
- Assess recreational carrying capacity/access to determine appropriate recreational "load"
  *Responsibility: Dragon Run Steering Committee*

*This action addresses Goal I(A,C), II(A), III(A)*

### D. Control Invasive Species

Recent state legislation establishing the policy-setting Virginia Invasive Species Council signifies an era of formal concern about invasive or non-native species and their impacts on the integrity of Virginia's native ecosystems. Invasive species are purposely or accidentally introduced from other regions or countries and often physically displace or consume native species because they have few competitors or predators. The Dragon Run Steering Committee **recommends** that a Dragon Run Invasive Species Initiative be established in the watershed.

This initiative could include the following elements:

1. Form Dragon Run Invasive Species Initiative with scientific and policy experts
   *Responsibility: Dragon Run Steering Committee staff, state and federal agencies, universities, non-profit conservation organizations*
2. Assess status of existing invasive species or potential for new invasive species
   *Responsibility: Dragon Run Invasive Species Initiative*
3. Encourage the creation of state-level policies by seeking representation on the Virginia Invasive Species Council's Advisory Committee
   *Responsibility: Virginia Invasive Species Council, Dragon Run Invasive Species Initiative*

4. Establish education program to reduce the potential for species introduction
   *Responsibility: Dragon Run Invasive Species Initiative*
5. Establish monitoring and control program
   *Responsibility: Dragon Run Invasive Species Initiative*

Examples of common or potentially devastating invasive species that could affect the relatively intact natural communities in the Dragon Run are: blue catfish (*Ictalurus furcatus*); common reed (*Phragmites australis*); zebra mussel (*Dreissena polymorpha*); Asiatic dayflower (*Murdannia keisak*); and Japanese stiltgrass (*Microstegium vimineum*). Blue catfish, common reed, Asiatic dayflower and Japanese stiltgrass occur in the Dragon Run. These invasive species should be monitored and, to the extent practicable, controlled or excluded from the watershed.

*This action addresses Goal I(C), II, III(B)*

**2. Education and Landowner Stewardship**

In order to enhance and solidify the community's connection to and respect for the land and water of the Dragon Run, public education must be a central element of the Special Area Management Plan. Education should target citizens and stakeholders and focus on the unique ecological and recreational values in the watershed, the community and economic benefits of traditional land uses, and the need to preserve both through exemplary stewardship and proactive planning for the watershed's future. The Dragon Run Steering Committee **recommends** that a comprehensive education program be established to communicate the regional importance of the Dragon Run watershed to its citizens and to demonstrate the link between decisions about land management and the watershed's integrity and quality.

| Education Program Components | Responsibility |
|---|---|
| Hands-on Experiences | Dragon Run Steering Committee |
| Community Watershed Festival | Dragon Run Steering Committee |
| Watershed Stewardship Awards | Dragon Run Steering Committee |
| Watershed Boundary Signs | Dragon Run Steering Committee |
| Promote Use of Forest Stewardship Plans | Dragon Run Steering Committee; local governments; Dept. of Forestry |
| Promote Use of Farm Programs | Natural Resources Conservation Service; Virginia Cooperative Extension; Soil and Water Conservation Districts; Farm Service Agency; Virginia Farm Bureau |
| Promote Action-based Projects | Dragon Run Steering Committee; local governments; citizens |

*Hands-on Experiences*

The Dragon Run Steering Committee **recommends** the use of hands-on experiences to produce an understanding and appreciation of the Dragon Run, targeting:

- State and federal legislators, Boards of Supervisors, Planning Commissions, and county staff
- Landowners, hunt clubs, land management consultants, and farmers and foresters who rent or lease land
- Chamber of Commerce, service clubs, civic and church groups, and non-profit organizations
- State and federal agency representatives
- Schools, 4-H Club, Scouts, class projects
- General public

The recommended approach encompasses a variety of methods and materials. Education would focus on field experiences that incorporate activities designed to address critical watershed issues (e.g. wetland and habitat values, biodiversity, water quality and quantity, riparian buffers).

*This action addresses Goal II(A,B), III(B)*

*Community Watershed Festival*

A component of the education program should be a community watershed festival as a celebration of the watershed's natural, cultural, and historic heritage. The festival would **not** serve as a promotional tool to attract visitors. Displays and activities highlighting natural and cultural heritage would be featured. The Dragon Run Steering Committee **recommends** the festival as a way to increase citizen awareness of watershed issues and as an opportunity to acknowledge citizens for exemplary watershed stewardship.

*This action addresses Goal II(B), III(B)*

*Watershed Stewardship Awards*

The Dragon Run Steering Committee **recommends** the establishment of watershed stewardship awards that would honor landowners and land managers who have demonstrated commendable stewardship within the watershed. Awards would be bestowed annually at the watershed festival for a variety of categories that may include: forestry; farming; hunting; commercial enterprises; conservation; education; planning; and science. The awards program should serve as an incentive to implement exemplary land stewardship practices.

*This action addresses Goal II(B), III(B)*

*Watershed Boundary Signs*

The Dragon Run Steering Committee **recommends** placing watershed boundary signs along frequently traveled highway and secondary roads to increase community awareness of the location and importance of the Dragon Run watershed. By indicating

the watershed boundary, the signs would alert citizens that they are in the watershed. Teamed with other educational efforts, the signs should lead to citizen awareness that their land management practices influence the health of the watershed.

*This action addresses Goal II, III(B)*

*Promote Forest Stewardship Plans*

The watershed is more than 80% forested and has intact riparian buffers. Since forested riparian buffers provide effective water quality protection and wildlife habitat, forested lands exhibit low nutrient input to adjacent streams relative to other land uses in the watershed (MPPDC, 2001). Therefore, forest stewardship plans have the potential to significantly influence the health and profitability of the watershed's forests. To benefit landowners and the local economy and to preserve the rural landscape and the natural resources in the watershed, the Dragon Run Steering Committee **recommends** promotion and implementation of forest stewardship plans prior to timber harvesting.

Forest stewardship plans are ecosystem management plans that combine ecological function with landowner goals to attain a vision for a particular property. The Department of Forestry's Forest Stewardship Plans leverage professional resources across disciplines to provide an inventory, recommendations and reference information that address landowners' specific goals and objectives, which may include: wildlife enhancement; aesthetics; recreation; water quality protection; forest regeneration; financial investment and incentives; and fire, pest, and disease control. The Virginia Department of Forestry prepares Forest Stewardship Plans for up to 200 acres at no cost to landowners. Beyond 200 acres, the Department charges fees, so it may be cost-effective for a consulting forester to develop a Forest Stewardship Plan.

*This action addresses Goal I(A,B,D), II(B), III(A)*

*Promote Farm Programs*

Agricultural lands make up 18% of the watershed and have the potential to contribute sediments, nutrients, and bacteria to ground and surface water. Existing state and federal farm programs (see **Appendix D** for description) can positively influence the health and profitability of the watershed by providing incentives for employing Best Management Practices or for taking marginal land out of agricultural production. To benefit farming operations, water quality, wildlife habitat, and the rural landscape and character of the watershed, the Dragon Run Steering Committee **recommends** promotion and implementation of programs, such as:

| **Program** | **Responsibility** |
|---|---|
| Conservation Reserve Program (CRP) | Natural Resources Conservation Service |
| Conservation Reserve Enhancement Program (CREP) | Natural Resources Conservation Service, Soil and Water Conservation Districts, Farm Service Agency |
| Environmental Quality Incentives Program (EQIP) | Natural Resources Conservation Service |

| Program | Responsibility |
|---|---|
| Farm and Ranch Lands Protection Program | Natural Resources Conservation Service |
| FarmLink Program | Virginia Farm Bureau |
| Forest Land Enhancement Program (FLEP) | Natural Resources Conservation Service; Dept. of Forestry |
| Wetland Reserve Program | Natural Resources Conservation Service |
| Wildlife Habitat Incentives Program (WHIP) | Natural Resources Conservation Service |

It should be noted that the existence and availability of these programs changes depending on funding. Also, Virginia Cooperative Extension provides considerable technical assistance to farmers and actively promotes these programs.

*This action addresses Goal I(A,B,D), II(B), III(A)*

*Promote Action-based Projects*

Action-oriented projects can sustain enthusiasm for watershed activities by involving community members in active resource stewardship. For example, James City County's program entitled "Protecting Resources in Delicate Environments" strives "to improve water quality…by teaching residents about the importance of watershed protection while providing residents and neighborhoods with specific watershed restoration and protection tools (James City County, 2003)." The Dragon Run Steering Committee **recommends** encouraging action-based projects, such as:

- Trash pickup (e.g. Adopt-a-Highway, Adopt-a-Stream)
- Development of nature trails
- Construction of rain gardens to capture roof runoff
- Stream bank stabilization
- Stream restoration

*This action addresses Goal I(C,D), II(A), III(B)*

**3. Encourage and Support Sustainable Economic Development**

While natural resource-based industries have been and continue to be at the core of the watershed's economy, external economic forces threaten to fragment these traditional uses and alter the rural landscape. The Dragon Run Steering Committee **recommends** that sustainable natural resource-based development be pursued to strengthen the region's economy and boost the quality of life, while supporting the traditional land uses that preserve the Dragon Run watershed and its resources.

*Support Sustainable Forestry and Farming*

Agriculture is Virginia's top sales industry, makes up 11.2% of Virginia's Gross State Product, and creates about 10% of the state's jobs (DACS, 2003). Similarly, forestry supports "one of the largest manufacturing industries in the state ranking first in employment, first in wages and salaries, and accounts for $1 out of every $8 of value added through manufacturing (DOF, 2003)." Forestry (**Figure 4**) and farming are key industries in the Dragon Run watershed.

**Figure 4.** Forestry in the Dragon Run watershed.

As the tax base expands with rapid population growth (>14.4% in 3 of 4 watershed counties), the demands for public services also grow, often at a faster rate than tax revenues. Many rapidly growing counties have found their ability to provide adequate public services outstripped by the rapid demand for those services.

In contrast, agricultural and forestal land have been shown to demand a low cost of public services ($0.23 relative to $1.00 generated in taxes in Northampton County, VA [American Farmland Trust, 2002]). Yet, farm and forest land continue to disappear at a rapid rate, giving way to suburban-style development.

For the natural resource-based industries to continue to thrive, the watershed communities **should** develop a regional capacity to produce value-added forest and farm products to capture additional value locally. With funding from the Virginia Coastal Program, the Dragon Run Steering Committee is sponsoring a study of potential sustainable economic development opportunities within the watershed. The study will involve local and regional experts in natural resource-based industries and demonstrate how sustainable natural resource-based development can generate wealth within the community.

*This action addresses Goal I(A,B,C), II(B), III(A)*
*Responsibility: Dragon Run Steering Committee, local governments, business/industry*

*Encourage Sustainable Nature-based Tourism*
Nature-based tourism and agritourism can help to diversify and strengthen the economy of a region that is rich in natural resources, such as the Middle Peninsula. Nature-based tourism is the fastest growing sector of the U.S. tourism industry and Virginia is one of the top 10 destinations for travelers (DGIF, 2002b). The Dragon Run Steering Committee **recommends** encouraging and supporting appropriate nature-based tourism and agritourism to benefit from these trends.

The Dragon Run watershed contains several sites on the newly established Virginia Birding and Wildlife Trail that is designed for car travel (DGIF, 2002a). In addition, the Virginia Ecotourism Association has developed a certification course using standards that avoid negative impacts on the resources that attract tourism. Supporting these initiatives in nature-based tourism could benefit the economy and, in turn, the natural resources of the watershed. For example, surveys along the Great Texas Coastal Birding Trail indicate that travelers spend ~$1,000 per person per trip, two-thirds of which flows directly into the local economy. More importantly, rural communities that are not able to promote their destinations are gaining economic stimulation from their assocation with the Trail. Meanwhile, the Trail increased awareness of the importance of the region's natural resources and the need to conserve them (DGIF, 2002b).

*This action addresses Goal I(A,B,C), II(B), III(A)*
*Responsibility: Dragon Run Steering Committee, local governments, business/industry*

**4. Monitor the Implementation of the Watershed Management Plan**

An important element of any planning effort is monitoring plan effectiveness. The Dragon Run Steering Committee **recommends** that a monitoring program be developed that assesses the results of watershed management plan implementation to ensure that the plan is effectively implemented.

The monitoring program should assess factors and parameters that are easily compared to the baseline information in the watershed management plan. Examples include: designation of watershed planning area; acres enrolled in farm and forest programs; land use/land cover; water quality; number of educational trips; invasive species; amount and type of public access; and number of action-based projects. Furthermore, the Dragon Run Steering Committee should coordinate and provide oversight for the monitoring program. For instance, the Steering Committee could draft an agreement with localities whereby the Committee reviews development applications in the watershed and offers advisory comments to the localities. Stable funding for staff support will continue to be a key component of Steering Committee activities.

The results of the monitoring program should be used to refocus efforts on actions that have not been fully implemented. The monitoring program may also highlight successes and identify new or unforeseen needs (e.g. funding for new projects).

*This action addresses Goal I(C)*
*Responsibility: Dragon Run Steering Committee, local governments*

## HOW DO ACTIONS SUPPORT GOALS AND OBJECTIVES?

Actions in this **Section** support the goals and objectives stated in **Section 3** as shown in **Table 1**. For example, Recommended Action 1A: *Land Use: Designate a Unified "Dragon Run Planning Area"* (pp. 16-18) supports:

- Goal I (p. 12): Establish a high level of cooperation and communication between the four counties within the Dragon Run Watershed to achieve consistency across county boundaries.
  - Objective A: Develop a plan to address the inevitable future development pressure to change the traditional use of land in the Dragon Run Watershed.
  - Objective B: Achieve consistency across county boundaries among land use plans and regulations in order to maintain farming and forestry and to preserve natural heritage areas by protecting plants, animals, natural communities, and aquatic systems.
  - Objective C: Provide ongoing monitoring of existing plans and planning tools in order to assess traditional land uses and watershed health and take action necessary to preserve the watershed.
- Goal III (p. 13): Promote the concept of landowner stewardship that has served to preserve the Dragon Run Watershed as a regional treasure.
  - Objective A: Address the potential dilemma of preserving the watershed's sense of peace and serenity by protecting open space and reducing fragmentation of farms, forests, and wildlife habitat versus the landowners' rights in determining or influencing future land use.

| **Action** [Section 4] | **Goal (Objective)** [Section 3] |
|---|---|
| ***Completed/Underway*** | |
| 1 | I (B); II |
| 2 | I (A, C) |
| 3 | II (B); III (B) |
| ***Recommended*** | |
| 1A | I (A, B, C); III (A) |
| 1B | I (A, B, C); III (A) |
| 1C | I (A, C); II (A); III (A) |
| 1D | I (C); II; III (B) |
| 2 | I (A, B, C, D); II (A, B); III (A, B) |
| 3 | I (A, B, C); II (B); III (A) |
| 4 | I (C) |

**Table 1.** How actions support the Dragon Run SAMP's goals and objectives.

# PART II

# SECTION 5: Framework of Institutional and Regulatory Responsibility

**Section 5 describes the responsibilities of federal, state, and local government agencies for mandatory and voluntary programs, policies, and regulations.**

Neither the MPPDC nor its Dragon Run Steering Committee has regulatory authority. Rather, they serve to encourage and facilitate local-local and state-local government cooperation in addressing regional issues. Consisting of elected officials and citizens appointed by member local governments, the MPPDC and the Dragon Run Steering Committee offer recommendations and technical assistance to the localities. The MPPDC's purpose is "to promote the orderly and efficient development of the physical, social and economic elements of the Planning District by planning, and encouraging, and assisting governmental subdivisions to plan for the future" (MPPDC, 1972).

The Virginia Coastal Program is a system of state laws and policies administered by a network of core agencies and coastal localities that manage a variety of coastal resources. The Department of Environmental Quality (DEQ) serves as the lead agency for Virginia's networked Coastal Program and helps agencies and localities to develop and implement coordinated coastal policies.

Within the context of the SAMP, county governments are responsible for long-range planning of public facilities, utilities, transportation, and land use, and for developing, implementing, reviewing and updating the local Comprehensive Plan, Zoning Ordinance and other ordinances. Through Boards of Supervisors, Planning Commissions, and staff, counties process and review rezoning, conditional use permits, special exceptions, site plans, and subdivisions. Therefore, counties implement land use policies and regulations.

Counties also have responsibility for implementing the Chesapeake Bay Preservation Act (Bay Act). The Chesapeake Bay Local Assistance Department (CBLAD) is charged with oversight of local implementation of the Bay Act and the Chesapeake Bay Preservation Area Designation and Management Regulations. The Bay Act (§10.1-2100 et seq.) requires that localities protect water quality by establishing and protecting Chesapeake Bay Preservation Areas, including wetlands, shorelines, and a 100-foot buffer.

The Virginia Department of Conservation and Recreation (DCR) administers: 1) the Coastal Nonpoint Source Pollution Control Program under authority of Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990; 2) the Nonpoint Source Pollution Management Program under authority of Section 319 of the Clean Water Act of 1987; 3) the Virginia Stormwater Management Program; 4) the Erosion and Sediment Control Program; 5) the Nutrient Management Program; and 6) and the Chesapeake Bay and Tributary Strategies Programs. DCR's Natural Heritage Program reviews development proposals that might affect the state's natural heritage resources (e.g. rare species and natural communities). DCR's Shoreline Erosion Advisory Service offers assistance to landowners experiencing erosion problems.

The authority to issue National Pollutant Discharge Elimination System (NPDES) permits lies with the DEQ. Furthermore, the DEQ regulates air quality, waste management (e.g. landfills), ground water management, water withdrawal, and petroleum storage tanks. The DEQ is also responsible for setting state water quality

standards and preparing the 305(b) Water Quality Assessment Report and the 303(d) Report on Impaired Waters. Impaired waters do not meet water quality standards and usually require the development of a Total Maximum Daily Load (TMDL) report. The implementation of TMDLs may require regulations governing discharges and nonpoint source pollution to impaired waters.

The Virginia Department of Game and Inland Fisheries (DGIF) regulates hunting, freshwater fishing, and boating. Furthermore, the DGIF maintains public boating access sites. The DGIF also regulates threatened and endangered species.

The U.S. Army Corps of Engineers' Norfolk District Regulatory Branch (ACOE) regulates waters and wetlands under the authority of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.

The Virginia Marine Resources Commission's Habitat Management Division (MRC) regulates physical encroachment into bottomlands, tidal wetlands, and coastal primary sand dunes under Subtitle III of Title 28.2 of the Code of Virginia. The permit process is the joint responsibility of local wetlands boards, the MRC, the DEQ (Section 401 certification), and the ACOE. Additionally, the MRC regulates saltwater fishing.

The Virginia Department of Forestry (DOF) has authority to regulate forestry operations throughout the state. Silvicultural activities are exempt from most laws such as the Clean Water Act, the Chesapeake Bay Preservation Act, and Erosion and Sediment Control. In exchange for these exemptions, silvicultural activities must comply with Best Management Practices designated by DOF in *Virginia's Forestry Best Management Practices for Water Quality, 4$^{th}$ Edition* (2002). DOF has responsibility for inspecting forestry operations, reporting violations, and enforcing regulatory requirements.

The Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture administers: the Conservation Reserve Program; the Conservation Reserve Enhancement Program; the Environmental Quality Incentives Program; the Farm and Ranch Lands Protection Program; the Forest Land Enhancement Program; the Wetland Reserve Program; and the Wildlife Habitat Incentives Program. The NRCS helps private landowners conserve soil, water, and other natural resources through technical assistance, cost sharing, and financial incentives. The NRCS also provides assistance to local, state, and federal agencies.

# SECTION 6: Watershed Characterization

**Section 6 describes the watershed in detail to establish the Dragon Run's current status. Physical and environmental features are characterized. Land use policies and recreational and educational activities are assessed. This information is designed to serve as a baseline to which to compare the success or failure of the watershed management plan in achieving its goals and objectives. Finally, gaps in the baseline information are identified.**

## Physical and Environmental Factors

Located entirely within the coastal plain physiographic province, Virginia's Middle Peninsula is bracketed by the Rappahannock River to the north, the York River to the south, and the Chesapeake Bay to the east. The Dragon Run watershed is the Middle Peninsula's geographic centerpiece, expanding outward from its 40-mile fresh and brackish water stream that runs through Essex, Gloucester, King and Queen, and Middlesex Counties. The watershed encompasses 90,000 acres or 140 square miles and exhibits topography typical of coastal plain stream systems in Virginia (**Figure 5**). Watershed area by locality is shown in **Table 2**.

| County | Area within Locality (acre) | % of Total Watershed | % of Locality within Watershed |
|---|---|---|---|
| Essex | 18466.6 | 20.6 | 10.1 |
| Gloucester | 5671.7 | 6.3 | 3.1 |
| King and Queen | 46425.1 | 51.7 | 22.2 |
| Middlesex | 19207.7 | 21.4 | 16.3 |
| Total | 89771.1 | 100 | |

**Table 2.** Dragon Run watershed statistics by locality (from MPPDC, 2001).

The Dragon Run watershed, state hydrologic unit CO2, is a fourth-order stream system that is nontidal freshwater above the U.S. Route 17 bridge and tidal freshwater from the U.S. 17 bridge to its mouth at Meggs Bay (**Figure 6**). There it forms the Piankatank River, where it becomes estuarine, and eventually drains into the Chesapeake Bay (**Figure 7**). Underground springs, feeder swamps, and surface waters support streamflow in the Dragon Run. Significant tributaries include Dragon Swamp, Yonkers Swamp, Exol Swamp, Timber Branch Swamp, Briery Swamp, Holmes Swamp, White Marsh, Zion Branch, Carvers Creek, Mill Stream, and Meggs Bay (MPPDC, 2001).

Land cover data indicate that the watershed is 80.3-83.9% forested and wetlands, 15.1-18.4% agricultural, and 1.0-1.3 % commercial and residential (**Figure 8**) (MPPDC, 2002; DCR, 2003). The Dragon Run watershed lies within the transitional Oak-Pine vegetation region where dominant oaks share the forest with Virginia pine, shortleaf pine, and loblolly pine. Although loblolly pine originally appeared in the forest as scattered associates of oaks and other hardwoods, loblolly pine plantations are increasingly common.

Since the watershed is relatively intact, it contains many unique resources. For example, the Baldcypress-Tupelo Swamp community is extensive and is the northernmost example of this community type in Virginia and the best example north of the James River (Belden, Jr. et al., 2001). Natural heritage resources are abundant in the Dragon Run (**Figure 9**). Several rare natural communities occur in the Dragon Run, including Baldcypress-Tupelo Swamp, Tidal Baldcypress-Tupelo Swamp, Tidal

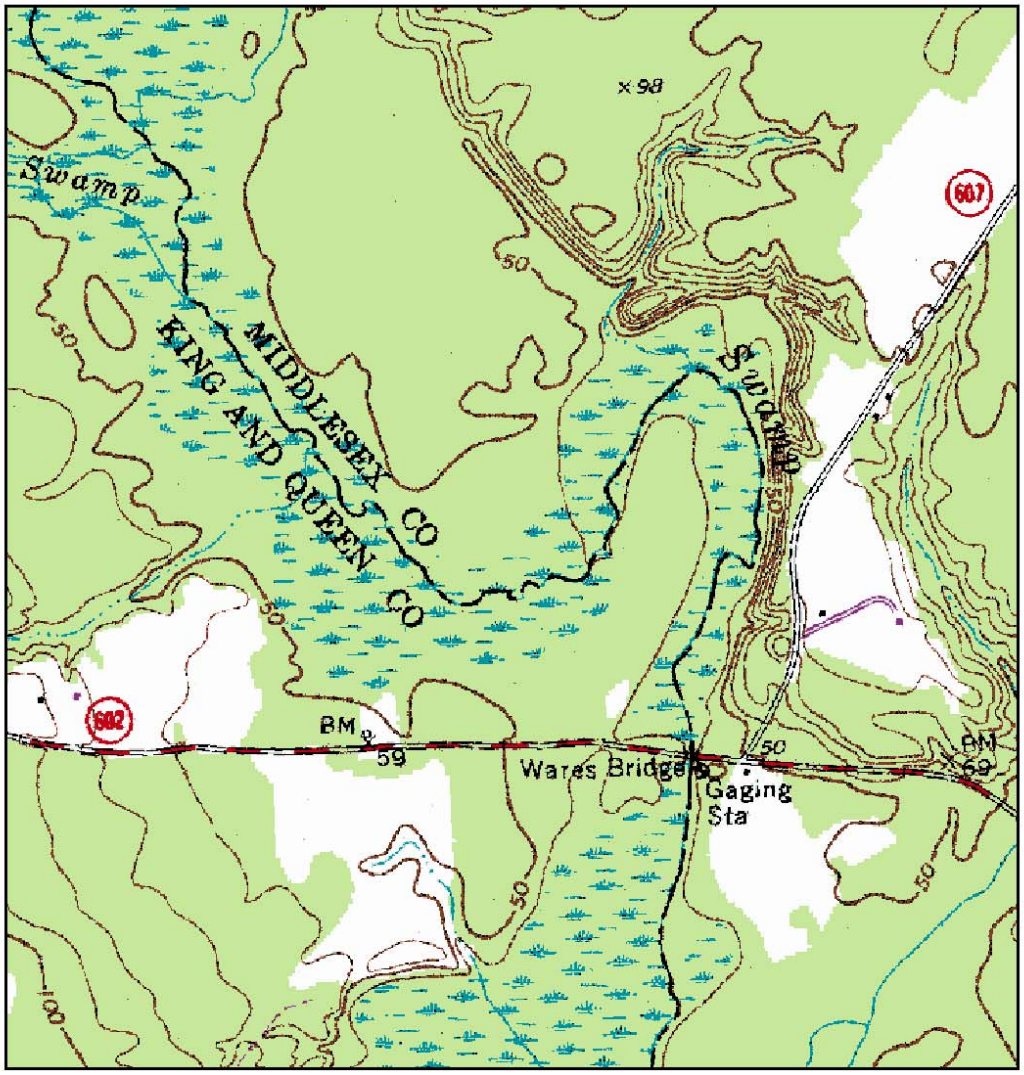


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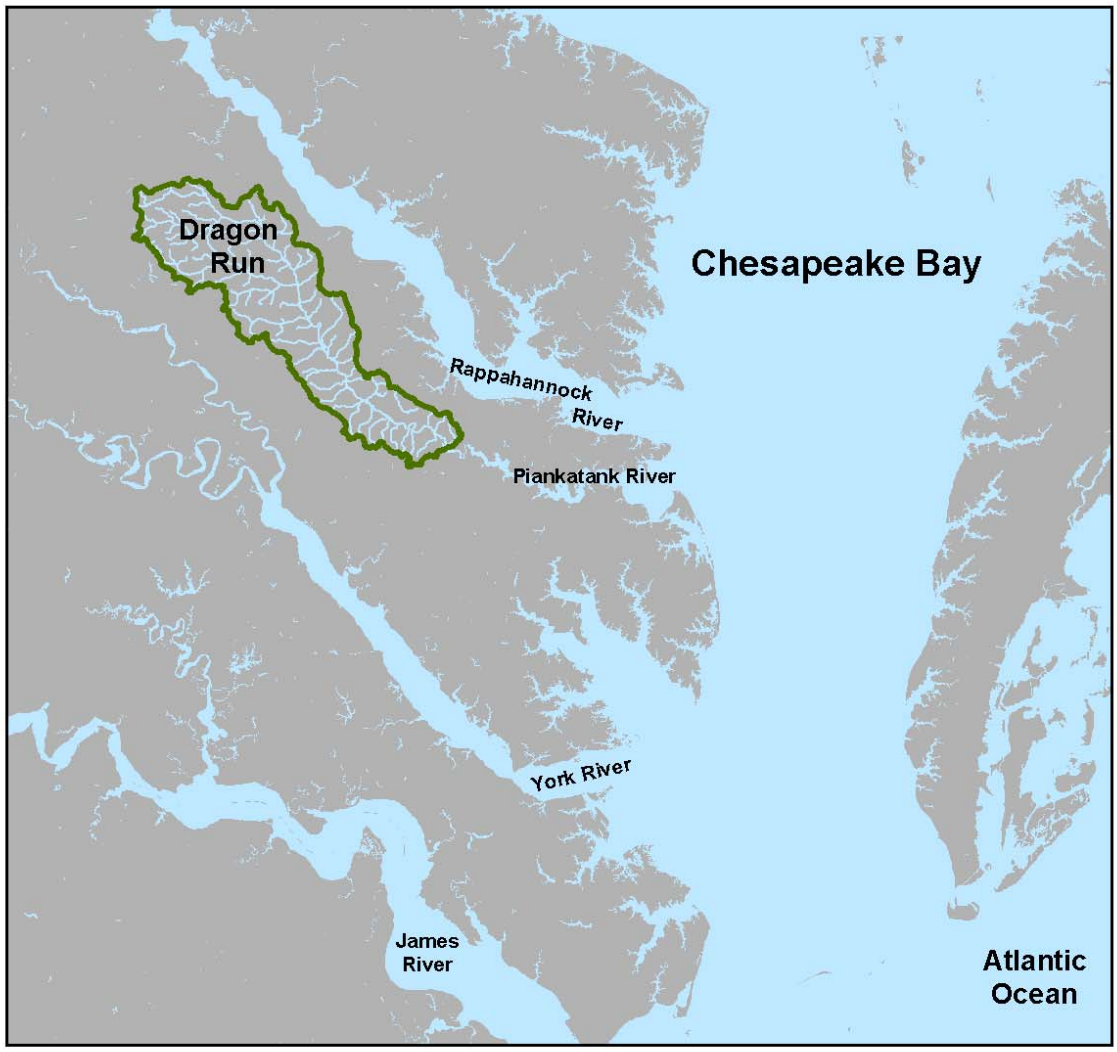
**Figure 5**. U.S. Geological Survey topographic map of the Dragon Run watershed in Middlesex and King and Queen Counties.


**Figure 6.** Map of the Dragon Run watershed boundary showing villages and towns.

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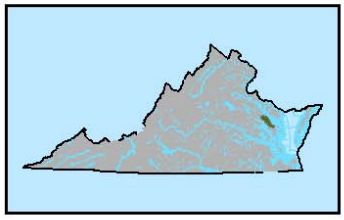

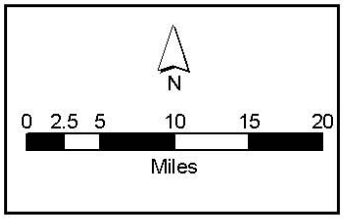


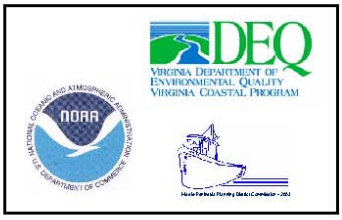


**Figure 7**. Map showing the Dragon Run watershed (in green) flowing into the Piankatank River and ultimately into the Chesapeake Bay.

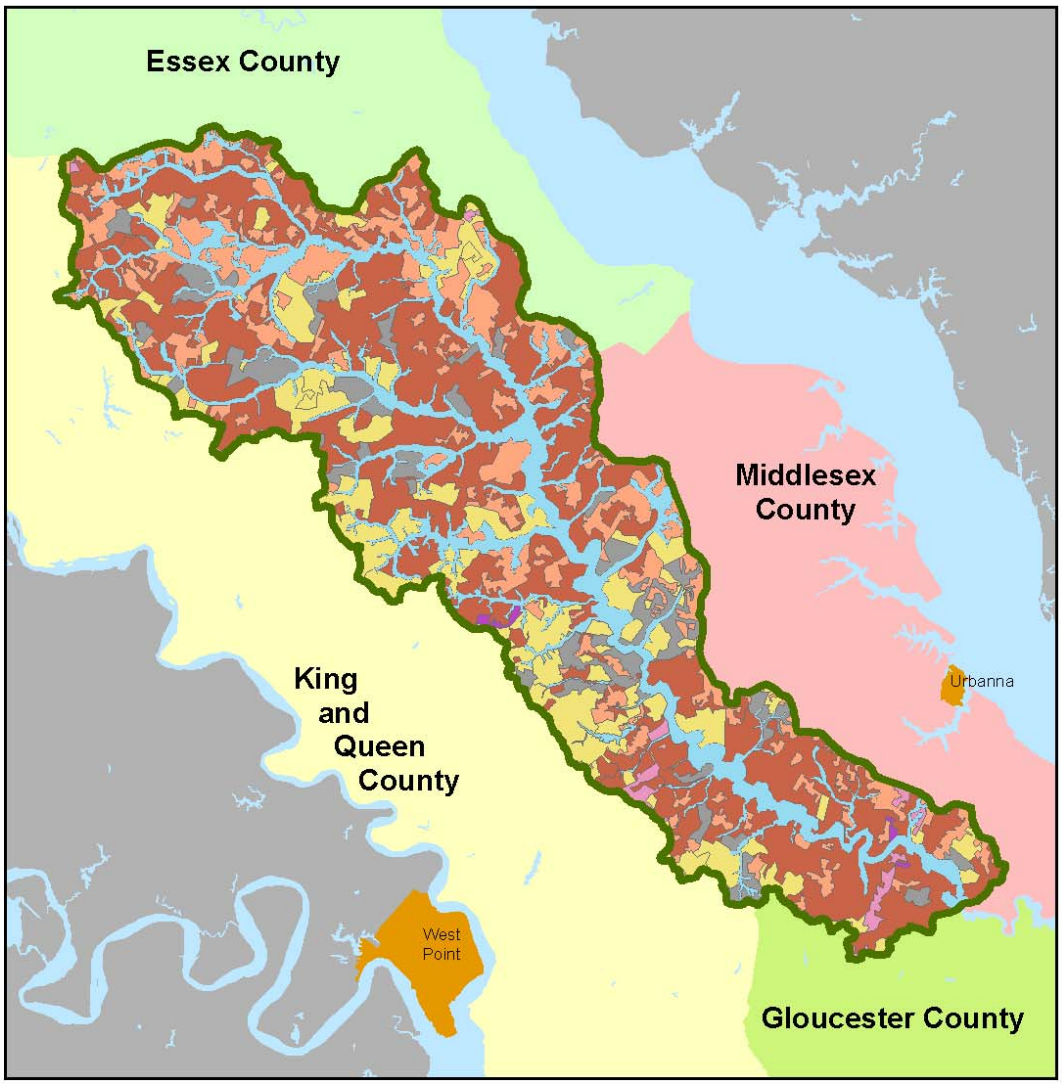


**Figure 8**. Land cover designations in the Dragon Run watershed.

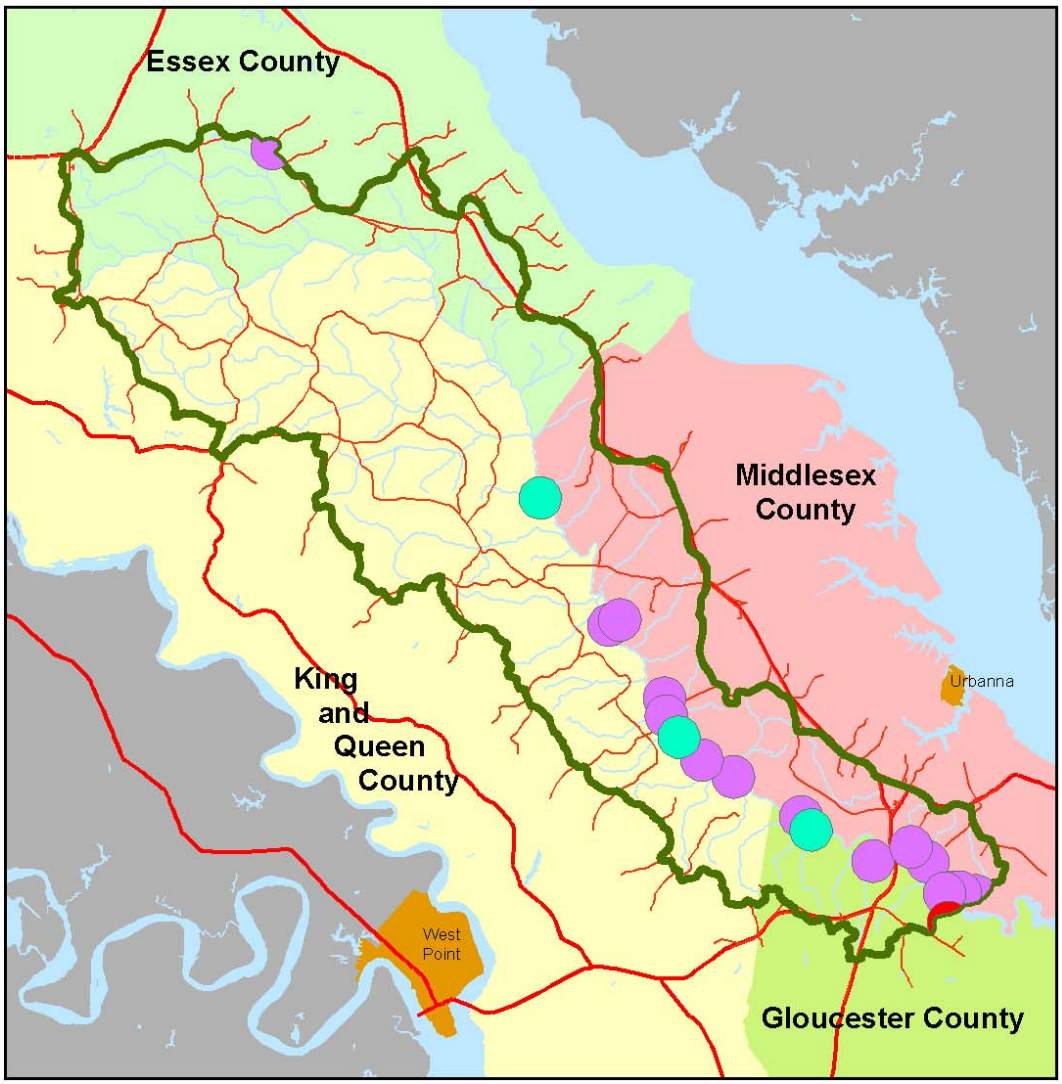


**Figure 9**. Occurrences of natural heritage resources in the Dragon Run watershed.

Baldcypress Woodland/Savanna, Fluvial Terrace Woodland, and Tidal Freshwater Marsh (see **Appendix A** for descriptions). The Baldcypress-Tupelo Swamp community (**Figure 10**) also harbors a number of rare plant and animal species. Rare animals include bald eagle, great purple hairstreak, blackwater bluet, robust baskettail, cypress sphinx, Selys' sunfly, fine-lined emerald and Southern pitcher-plant mosquito. Rare plants include cuckooflower, red turtlehead, Parker's pipewort, pineland tick-trefoil, river bulrush, Northern purple pitcher-plant, and cypress-knee sedge (Belden, Jr. et al., 2001; Belden, Jr. et al., 2003). The Dragon Run also harbors a number of rookeries for colonial water birds, such as egrets and herons. Other natural communities that occur in the Dragon Run include: Coastal Plain/Piedmont Bottomland Forest; Coastal Plain/Piedmont Acidic Seepage Swamp; and Coastal Plain Semipermanent Impoundment (Belden, Jr. et al., 2003).

**Figure 10**. Baldcypress-Tupelo Swamp community.

In addition to natural heritage resources, the Dragon Run supports a diversity of freshwater and estuarine fishes, aquatic macroinvertebrates, freshwater bivalves (primarily unionid mussels), and herptefauna (amphibians and reptiles) (McIninch et al., 2003). At least forty-five fish species from nineteen families have been collected in the Dragon Run, representing a mixed assemblage of mostly lowland freshwater forms that is highly dynamic spatially and temporally. At least sixty-five macroinvertebrate species from fourteen orders and forty-seven families have been recorded from the Dragon Run.

The watershed contains only limited examples of invasive, or non-native, species, again emphasizing a relatively intact natural system. Currently, blue catfish, common reed, Asiatic dayflower and Japanese stiltgrass occur in the Dragon Run in limited quantities (**Figure 11**).

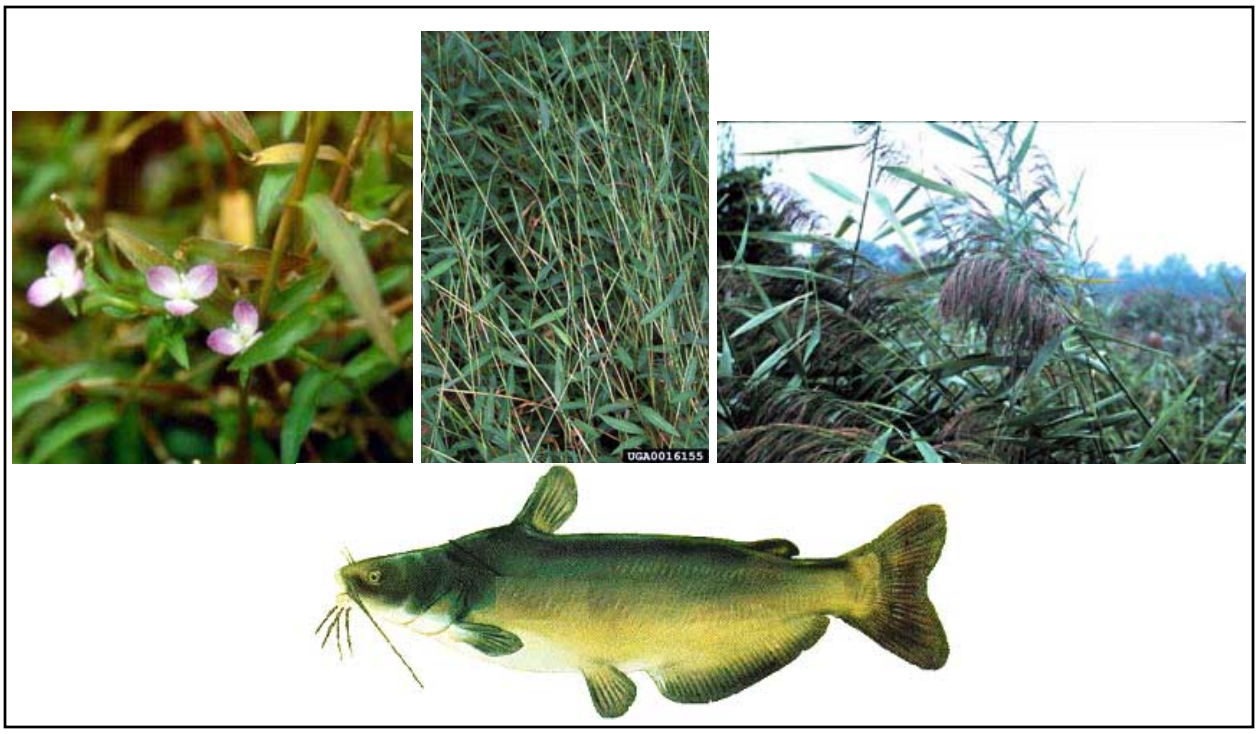


**Figure 11**. Invasive species of the Dragon Run - clockwise: Asiatic dayflower (Brent Steury, NPS); Japanese stiltgrass (Ted Bodner); Common reed (Joseph McCauley, USFWS); Blue catfish (www.landbigfish.com)

According to the National Wetland Inventory, wetlands along the Dragon Run (**Figure 12**) are Palustrine, mostly Forested Wetlands except for Emergent Wetlands in Meggs Bay. U.S. Route 17 is the approximate demarcation between tidal wetlands and non-tidal wetlands. The hydrologic regime of most Dragon Run wetlands is Seasonally Flooded, Seasonally Flooded-Saturated, or Temporarily Flooded (Belden, Jr. et al., 2001).

The U.S. Geological Survey (USGS) maintained a streamflow gaging station at Church View (Route 602) from 1943 to 1981 that received drainage from 60% of the watershed (84 square miles) and has maintained a streamflow gaging station at Mascot (Route 603) since 1981 that receives drainage from 75% of the watershed (105 square miles). Median daily streamflow at Mascot from 1981 to 1999 was 79 $ft^3$/sec and varied between 0.01-6050 $ft^3$/sec. Median daily streamflow at Church View from 1943 to 1981 was 57 $ft^3$/sec and varied from 0-3790 $ft^3$/sec. Compared to other coastal plain stream systems such as the Chickahominy River (New Kent County), the Mattaponi River (King William County), and Cat Point Creek (Richmond County), the Dragon Run exhibits lower median daily streamflow per square mile of drainage area. Base flow, fed primarily by groundwater discharge, accounts for two-thirds of the Dragon Run's total streamflow, with the remaining third attributable to surface water runoff. Of the annual precipitation, only one-third becomes streamflow, with two-thirds lost to evapotranspiration. Seasonally, streamflow is highest in the spring and lowest in the fall (MPPDC, 2001).


**Figure 12.** Wetlands in the Dragon Run watershed.

Geological features are described by the following excerpt from *A Natural Heritage Inventory of the Dragon Run Watershed* (Belden, Jr. et al., 2001):

*Surficial deposits of riverine terraces bordering Dragon Run from the vicinity of the Essex-Middlesex county line to Meggs Bay belong to the Shirley Formation and the Sedgefield Member of the Tabb formation. The middle Pleistocene Shirley Formation consists of light- to dark-gray, bluish-gray and brown sand, gravel, silt, clay, and peat; the Sedgefield Member is of upper Pleistocene age and consists of pebbly to bouldery, clayey sand and fine to medium, shelly sand grading upward to sandy and clayey silt. Somewhat higher topography away from the waterway is underlain by the Chesapeake Group. This consists of fine to coarse quartzose sand, silt, and clay (variably shelly and diatomaceous) deposited in shallow waters of the upper Pliocene and lower Miocene periods. At still higher elevations, the Windsor Formation is found, consisting of gray and yellowish to reddish-brown sand, gravel, silt, and clay of lower Pleistocene or upper Pliocene age. At higher elevations southwest of Dragon Run, two other formations are prevalent, both of upper Pliocene age. The Bacons Castle Formation is characterized by gray, yellowish-orange, and reddish-brown sand, gravel, silt, and clay and the Moorings Unit by white, light gray, and grayish-yellow quartzose sand and clay to grayish-brown clayey silt and silty clay.*

Watershed elevation ranges from 180 feet to near sea-level. Detailed soils information can be found in the *Soil Survey* for each county (Note: King and Queen County does not have a published *Soil Survey*). Many of these soils are considered prime farmland and are suitable for silviculture. Generally, soil associations are as follows:

Essex County

Emporia-Slagle-Atlee; Rumford-Suffolk-Emporia - somewhat excessively drained to moderately well drained loamy and sandy soils (Hoppe, 1989)

Middlesex County

Suffolk-Eunola-Remlik; Kempsville-Suffolk-Kinston; Emporia-Slagle-Nevarc - deep, well drained to poorly drained loamy or clayey soils (Newhouse et al., 1985); Pocaty-Kinston-Bibb - deep, very poorly to poorly drained organic and loamy soils that are flooded by fresh and brackish water (Newhouse et al., 1985)

Gloucester County

Suffolk-Eunola-Kenansville; Emporia-Hapludults-Wrightsboro - deep, well drained to moderately well drained loamy or clayey soils (Newhouse et al., 1980)

DCR's Shoreline Erosion Advisory Service identified five areas of streambank erosion in the lower Dragon Run (Vanlandingham, 2003). The lower Dragon Run undergoes an average of less than one foot per year of erosion that is mostly attributable to high water flow undercutting the stream bank during storms. These erosion "hot spots" are relatively few and small and are unlikely to cause impairment to the stream.

**Water Quality**

Water Quality Assessment

The primary water contaminant sources in the Dragon Run are point source discharges and nonpoint source pollution from precipitation (atmospheric deposition), residential land use, agricultural land use, and forested lands (MPPDC, 2002). According to the Virginia Department of Environmental Quality (DEQ), the Dragon Run generally exhibits

medium nutrient levels and is listed as “impaired” for pH, fecal coliform bacteria, mercury, and lead (DEQ, 2002). Based on agricultural, urban, and forested pollution loadings potential determined by DCR, however, the overall nonpoint source pollution potential rating is low for the Dragon Run (DCR, 2002).

Point source discharges, which are permitted and monitored by the Virginia Department of Environmental Quality, are relatively easy to quantify and, in turn, control or track. Point source discharges to the Dragon Run include: stormwater runoff from a wood treatment facility (arsenic, chromium, copper) at Pitts Lumber Company, Inc. to an intermittent stream adjacent to U.S. Route 17 in Middlesex County (Permit #VA0083011); discharge from a sewage treatment plant (biological oxygen demand, total suspended solids, ammonia nitrogen, total residual chlorine, pH, fecal coliform) at Rappahannock Community College to an intermittent stream near Glenns in Gloucester County (Permit #VA0028461); and discharge from a wellwater treatment plant (pH, total suspended solids) at the Miller’s Square Subdivision to an intermittent stream near Miller’s Tavern in Essex County (Permit #VA0075302). According to the Shoreline Sanitary Survey (Smither et al., 2003), there are 9 other indirect sources of pollution, including five animal pollution sources (Middlesex County near Saluda and Stormont and Gloucester County near Glenns); a solid waste dumpsite in Middlesex County near Stormont; and a potential pollution source in Middlesex County in Saluda. Furthermore, a network of water quality monitoring wells is maintained at the Browning-Ferris Industries landfill in King and Queen County.

Throughout the Chesapeake Bay, atmospheric deposition (e.g. precipitation) contributes a significant amount of the total nutrient loadings in coastal waters (MPPDC, 2001). Air quality is not currently monitored in the watershed.

More than 90% of residents in Gloucester, King and Queen, and Middlesex Counties use on-site wastewater treatment systems, commonly known as septic systems (MPPDC, 2001). When operated properly, conventional septic systems remove nutrients and fecal coliform. Conventional septic systems can pose potential environmental and health risks due to inappropriate design, poor maintenance, poor soils, or inefficient nitrogen removal. Driven by changes to Department of Health regulations for on-site wastewater treatment systems (12 VAC 5-610-10 et seq. effective July 2000), the popularity of “engineered” on-site wastewater treatment systems is increasing. These alternative systems, when properly maintained, can be effective at removing nutrients and fecal coliform in areas where conventional septic systems are ineffective. Regardless of the type, however, improperly maintained or failing septic systems pose significant environmental and health risks by contributing nutrients, pathogenic bacteria, and viruses to groundwater.

Forested lands, representing a significant land area, yield low nutrient input to streams relative to other land uses in the watershed. Best Management Practices (BMPs) are designed to minimize these inputs. For example, forested riparian buffers provide effective protection for water quality. The watershed currently exhibits intact riparian buffers.

By contrast, agricultural land use in rural and semirural areas in Virginia can be the source of significant sediments, fecal coliform bacteria, and nutrients such as nitrogen and phosphorus. Nitrogen is transported through the groundwater, whereas phosphorus is generally transported on soil particles in surface water. BMPs such as fencing cattle out of streams, conservation tillage, and expanded riparian buffers are designed to minimize these inputs.

Residential and commercial land uses typically contribute less nutrients and sediments than agriculture, but more than forestry. These residential and commercial contributions are mainly attributable to reduced or no riparian buffers, chemical application for landscaping, and stormwater runoff.

Water Quality Monitoring

Water quality data sets in the watershed are sparse in quantity, duration, and parameters measured. Existing data sets include: STORET, a database managed by the Virginia Department of Environmental Quality (DEQ); data collections during fish surveys by the Virginia Department of Game and Inland Fisheries (DGIF) and Virginia Commonwealth University (VCU); data collections by the Chesapeake Bay National Estuarine Research Reserve in Virginia at the Virginia Institute of Marine Science (VIMS); and a now-defunct volunteer water quality monitoring program in the watershed (MPPDC, 2001).

Two stations are currently sampled regularly by the DEQ. Station DRN003.40 is located at the U.S. Route 17 bridge and Station DRN010.48 is located at the Route 603 bridge near Mascot. Data are available from DRN003.40 for the period 1968-1974 and 1992-present and from DRN010.48 for the period 1992-present. Samples are evaluated bimonthly for nutrients, fecal coliform, suspended solids, dissolved oxygen, pH, salinity, and temperature and are occasionally evaluated for pesticides, toxic metals, and other harmful compounds (MPPDC, 2001). The data sets collected at these sampling stations were used by the DEQ to list the Dragon Run as “impaired” for pH and fecal coliform bacteria. Fish tissue samples were used by the DEQ to list the Dragon Run as “impaired” for mercury and lead. The Virginia Department of Health issued a health advisory for the Dragon Run for mercury contamination in largemouth bass (DOH, 2003). The DEQ attributes the pH impairment to natural causes, citing the acidic nature of water in swamps. The DEQ lists the cause of the fecal coliform and mercury and lead impairments as unknown. Potential sources of fecal coliform bacteria include: wildlife; failing septic systems; and livestock. Potential sources of metals include: atmospheric deposition; automobile and roadway deposits; and industrial operations.

Data collected by the DGIF in 1995-1996 and 1998 includes temperature, Secchi depth, pH, dissolved oxygen, conductivity, salinity, alkalinity, hardness, and total dissolved solids. Nutrient data are very limited and were frequently below detection limits. Dissolved oxygen at sampling stations with no or low flow frequently violated daily minimum standards to support aquatic life (MPPDC, 2001).

VIMS data from 2000-2001 measured temperature, salinity, total dissolved solids, pH, dissolved inorganic nitrogen, and fecal coliform bacteria. Of specific note, samples from Briery Swamp exhibited high nitrate and fecal coliform levels, indicating the presence of subsurface agricultural or wastewater drainage (MPPDC, 2001).

A weekly volunteer water quality monitoring program collected data throughout the watershed during the period 1994-1997, although monitoring was not continuous at all eight sites. Measurements included dissolved oxygen, Secchi depth, water and air temperature, pH, and water color. The findings indicated: low dissolved oxygen during warm temperatures and high dissolved oxygen during cold temperatures; low Secchi depth values during the summer associated with algal blooms and storm events; and acidic pH values in the upper Dragon Run with slightly more basic pH values in the tidal waters (MPPDC, 2001).

Impervious Cover

One key indicator of water quality status and stream health is the percentage of impervious surface in a watershed. The Dragon Run watershed exhibits a very low level of impervious cover and, in turn, is in good condition (e.g. natural heritage resources).

Impervious surfaces (e.g. paved streets and parking lots, rooftops) are hardened areas that do not allow infiltration of rainwater and promote runoff to streams. This runoff often occurs at a higher volume and velocity than normal stream flow and can lead to stream erosion and instability. Runoff also carries pollutants that are not absorbed by soil and plants and can lead to degraded water quality. The Center for Watershed Protection (2002) has developed a watershed vulnerability analysis that relies on an impervious cover model. The model indicates that watersheds are generally in good condition when impervious cover is less than 10%. From 10-25% impervious cover, watersheds are generally impacted, which means that they only partially support their intended uses (e.g. drinking, swimming, shellfish harvest). Above 25% impervious cover, watersheds generally do not support their intended uses at all.

Impervious cover can be estimated for the Dragon Run watershed. Based on the 1994 aerial photography, we learn that 1.3% of the watershed is commercial or residential development. Assuming 100% imperviousness, a highly conservative estimate, the watershed is approximately 1.3% impervious surface. The sparse road network is likely to add modestly to this estimate. Since the Dragon Run watershed exhibits less than 10% impervious cover, the Center for Watershed Protection's model (2002) predicts that it is in good condition, which is confirmed by the MPPDC's Dragon Run Watershed Land-Water Quality Preservation Project (MPPDC, 2001).

**Recreation and Access**

Significant recreational activities and opportunities exist in the Dragon Run watershed, including hunting, fishing, hiking, and boating. Educational opportunities and activities also exist. Meanwhile, access often requires landowner permission; public access is limited.

Hunting represents a significant recreational activity that generates at least $300,000 per year in the watershed. Seventeen hunt clubs lease approximately 42,000 acres, or 46%, of land in the watershed for hunting - mainly deer, turkey, and waterfowl (MPPDC, 2002). Hunt club leases provide income to landowners and offer hunting access to many acres of private lands.

Fishing is also a significant recreational activity in the Dragon Run. According to the DGIF, the Dragon Run's share of the state's fishing value is more than $1.6 million, including trip related expenses such as food and lodging and transportation (MPPDC, 2002). Fishing by boat is popular in the lower Dragon, while bank and fly fishing are more common in the upper Dragon. Fishermen regularly use the public, unpaved lot at Route 603 near Mascot, and a public boat ramp exists at Harcum in the Piankatank River (Gloucester County). Otherwise, landowner permission is generally required.

The Virginia Birding and Wildlife Trail for the Coastal Area, published in 2002 (DGIF, 2002a), describes two sites within the Dragon Run watershed. First, Rappahannock Community College (public), located in Glenns on State Route 33 in Gloucester County, offers wooded trails adjacent to a tributary to the Dragon Run. Second, the Friends of Dragon Run (private) offer a birding trail with views of the Dragon Run and the Baldcypress-Tupelo Swamp community. The site is located near Mascot on Route 603 with parking in a public, unpaved lot. It is important to note that the Friends' site and adjacent properties are privately owned.

Additionally, a 121-acre tract on Route 603 near Mascot is part of the Virginia Estuarine and Coastal Research Reserve System (public). The site can be accessed with permission and is used for research, long-term monitoring and education.

Besides the sites near Route 603, the Dragon Run Access Plan (MPPDC, 1994) indicates other traditional access sites in the watershed. Landowner permission is generally required at these sites, which include: Route 604 at the Essex/King and Queen county line (Byrd's Bridge); Route 602 at the Middlesex/King and Queen county line (Ware's Bridge); and U.S. Route 17 at the Middlesex/Gloucester county line (James Vincent Morgan Bridges).

Boating is also a significant recreational activity in the watershed. Motorized pleasure craft seasonally utilize the lower Dragon. Self-propelled boating is common from Route 602 to Meggs Bay. For example, waterfowl hunters often make short trips in canoes or jon boats, while guided and unguided paddling trips also occur. Several organizations offer guided paddling trips on the Dragon Run (**Figure 13**), including Gloucester County Parks and Recreation (2 trips/summer; ~30 people/summer); Chesapeake Bay Foundation (since 1995, 56 trips; 1080 people; for middle and high school students in Middlesex and Gloucester Counties); Rappahannock Community College (1 3-day trip/year; ~20 people); and Friends of Dragon Run (15-20 trips/year; ~200 people/year). Some outdoor outfitters offer guided trips by appointment.

**Figure 13**. Guided paddling trip on the Dragon Run.

## Watershed Education

Limited watershed education efforts include workshops, field trips, and publications. Soil and Water Conservation Districts, Virginia Cooperative Extension, and the Natural Resources Conservation Service offer a variety of workshops, seminars, and publications related to watersheds, nonpoint source pollution, agriculture, and forestry. These programs mainly target those involved in agriculture and forestry activities. Rappahannock Community College and the Chesapeake Bay Foundation both lead students on paddle trips. The Friends of Dragon Run offer paddle trips to citizens and decision-makers. Finally, local governments provide publications explaining land use regulations. For example, King and Queen and Middlesex Counties distribute fact sheets about pertinent ordinances to new and prospective property owners.

## Infrastructure and Planning

To effectively characterize the watershed's landscape and how it may change in the future, existing infrastructure and plans guiding future development must be assessed.

### Future Land Use

Local comprehensive plans are intended to serve as the county's guide to its vision for the future. One of the most important elements of a comprehensive plan is future land use designation. In general, future land use throughout the Dragon Run watershed is primarily designated as rural in the comprehensive plans of the four counties. There exists, however, a wide range of specific land use designations within the watershed, ranging from industrial to commercial to town-like development, rural residential and rural preservation (**Figure 14**).


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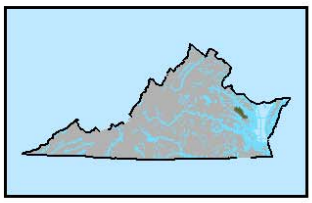

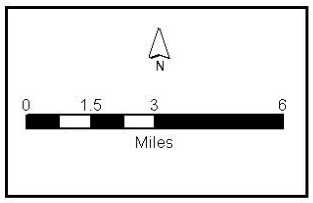


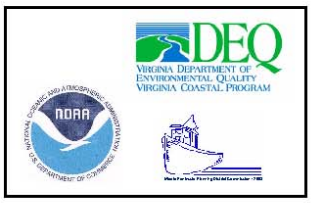


**Figure 14**. Future land use in the Dragon Run watershed.

Land use designations are tied to existing land uses, infrastructure, and anticipated growth patterns. It is clear through the comprehensive plans that localities expect that the majority of the watershed will remain rural, dominated by farming and forestry. Specific areas, like those along major roadways such as U.S. Route 17 and VA Route 33, are more suited to industrial and commercial development. Conversely, the swamps and streams of the Dragon Run do not lend themselves to development.

Zoning

Zoning is designed to regulate the use of land to ensure land use compatibility. Logically, then, zoning is the regulatory implementation of provisions in the comprehensive plan. Therefore, the Dragon Run watershed is zoned primarily in rural districts, with limited areas in conservation, industrial, commercial and residential districts (**Figure 15**).

The majority of the watershed is zoned for agricultural uses, with varying restrictions and allowances across county boundaries. Significant commercial and industrial zoning occurs along U.S. Route 17 throughout Gloucester and Middlesex Counties. Furthermore, the landfill in King and Queen County owned by Browning-Ferris Industries is zoned industrial. Both King and Queen and Middlesex Counties maintain the Dragon Run Conservation District along the main channel of the Dragon Run. King and Queen's Dragon Run Conservation District is not mapped.

Distinctions between major and minor subdivisions, density requirements, and permitted uses vary widely across zoning district types and among counties. As a result, on-the-ground conditions can and do vary considerably across county boundaries. For instance, the maximum number of lots permitted by right (e.g. minor subdivisions) in agricultural and conservation districts ranges from 2-6 lots.

Other Ordinances and Regulations

The counties also employ other ordinances and regulations. These include Chesapeake Bay Preservation Act provisions or ordinances, wetlands ordinances, erosion and sediment control provisions and ordinances, subdivision ordinances, and site plan review. Some of the major effects of these regulations include land use restrictions and development standards in Chesapeake Bay Preservation Areas and the prohibition of major subdivisions in agricultural zoning districts.

A major difference between the counties is how the Resource Management Areas (RMA) are defined. Gloucester County defines RMA as any area outside of the Resource Protection Area (RPA) countywide. Essex County effectively applies RMA restrictions countywide, while King and Queen and Middlesex Counties apply a buffer landward of the RPA.

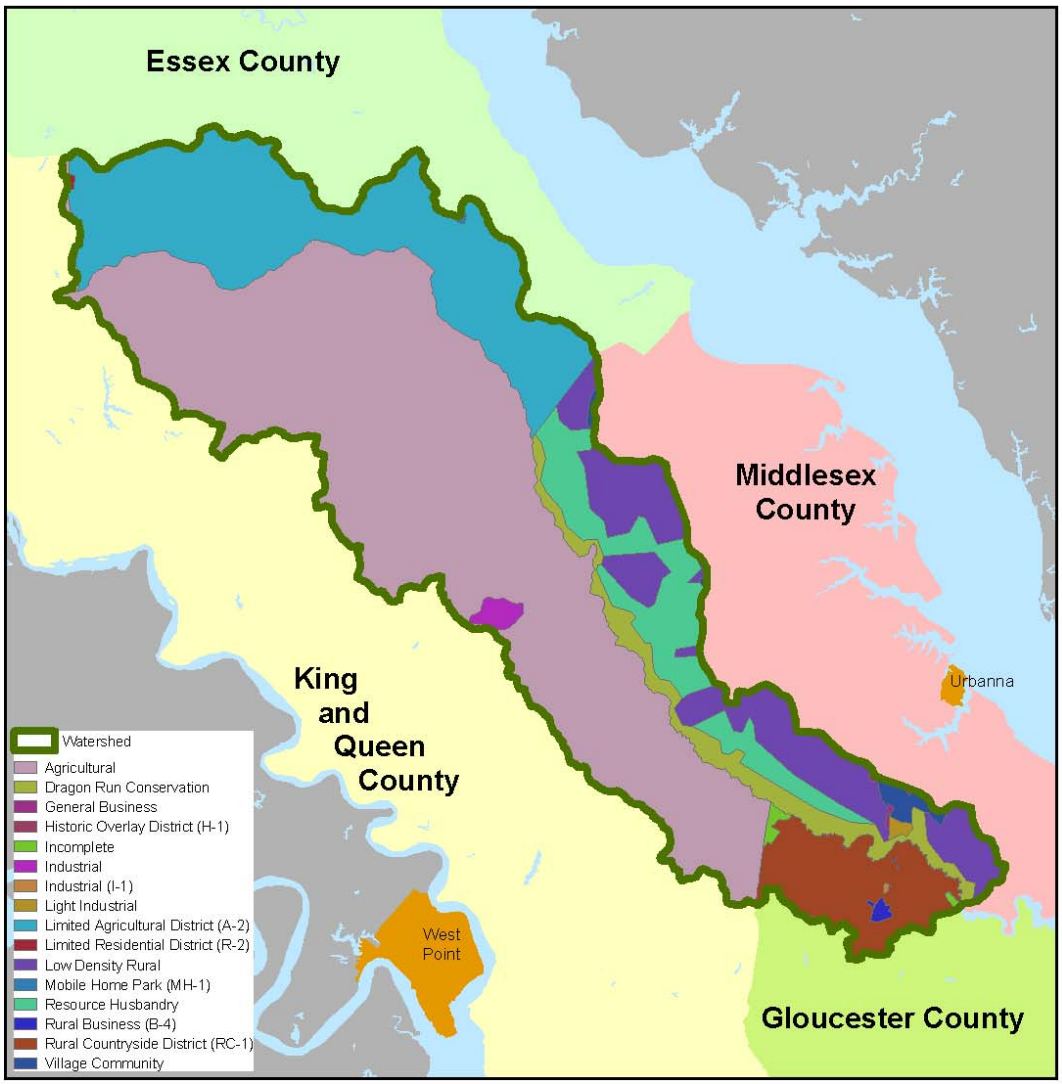


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**Figure 15**. Zoning classifications in the Dragon Run watershed.

Road Network

The road network within the watershed could be described as sparse (**Figure 16**), with few primary highways. The primary highways are U.S. Route 17, which runs north and south through Gloucester, Middlesex, and Essex Counties, and State Route 33, which runs east and west through King and Queen, Gloucester, and Middlesex Counties. Logically, these highways contain the most development within the watershed and are designated for that purpose in the comprehensive plans. These two highways intersect at Glenns in Gloucester County and Saluda in Middlesex County, which are both designated as rural business districts. A short length of State Route 198, a primary highway, runs east from Glenns in Gloucester County before leaving the watershed.

There is a sparse network of secondary roads, some of which serve as connectors along the road network. Route 603 and Route 602 both cross the middle Dragon Run and connect King and Queen and Middlesex Counties. Route 604 and Route 612 both cross the upper Dragon Run and connect Essex and King and Queen Counties. Route 684 serves as a connector between U.S. Route 17 and U.S. Route 360 in Essex County. Several other secondary roads serve as significant links within the road network. Examples of these are: Route 644 in Middlesex County; Routes 609, 610, 616, and 617 in King and Queen County; and Route 607 in Essex County. Finally, there is a network of unpaved logging, farm, and residential roads that access the more remote parts of the watershed.

Land Parcels

According to data collected in 2001, there are 3,073 parcels of land in the Dragon Run watershed (**Figure 17**) (MPPDC, 2002). The distribution of parcels is: Essex (25%); Gloucester (11%); King and Queen (38%); and Middlesex (26%). The land area within the watershed is distributed as follows: Essex (21%); Gloucester (6%); King and Queen (52%); and Middlesex (21%). Comparing the distribution of parcels to the distribution of land area within the watershed, we find that Essex, Gloucester, and Middlesex Counties have a higher percentage of parcels than of land area, meaning that they have smaller average parcel sizes than King and Queen County. King and Queen County has a much higher percentage of land area than of parcels, indicating a much larger average parcel size than the other three counties.

Land ownership is almost entirely private. A considerable amount of private land is owned by timber interests. For example, the single largest owner, John Hancock Life Insurance Company, owns approximately 26,000 acres (28.9% of the watershed). Much of this timber land is, in turn, leased to hunt clubs. Public ownership includes the College of William and Mary (121 acres) and the Virginia Department of Transportation (fee simple and prescriptive easements for roads and right-of-way).

Conservation

The Virginia Division of Natural Heritage has established conservation planning boundaries (**Figure 18**) around natural heritage resources - rare species and natural communities - based on their habitat needs to ensure their preservation. These conservation sites represent the ideal conservation scenario for these state and globally


**Figure 16**. Road network in the Dragon Run watershed.


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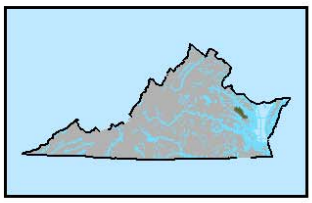

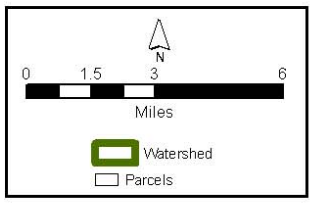


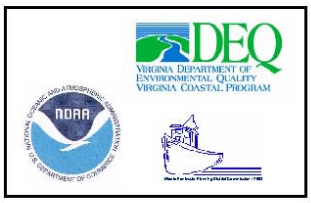


**Figure 17**. Parcels of land in the Dragon Run watershed.

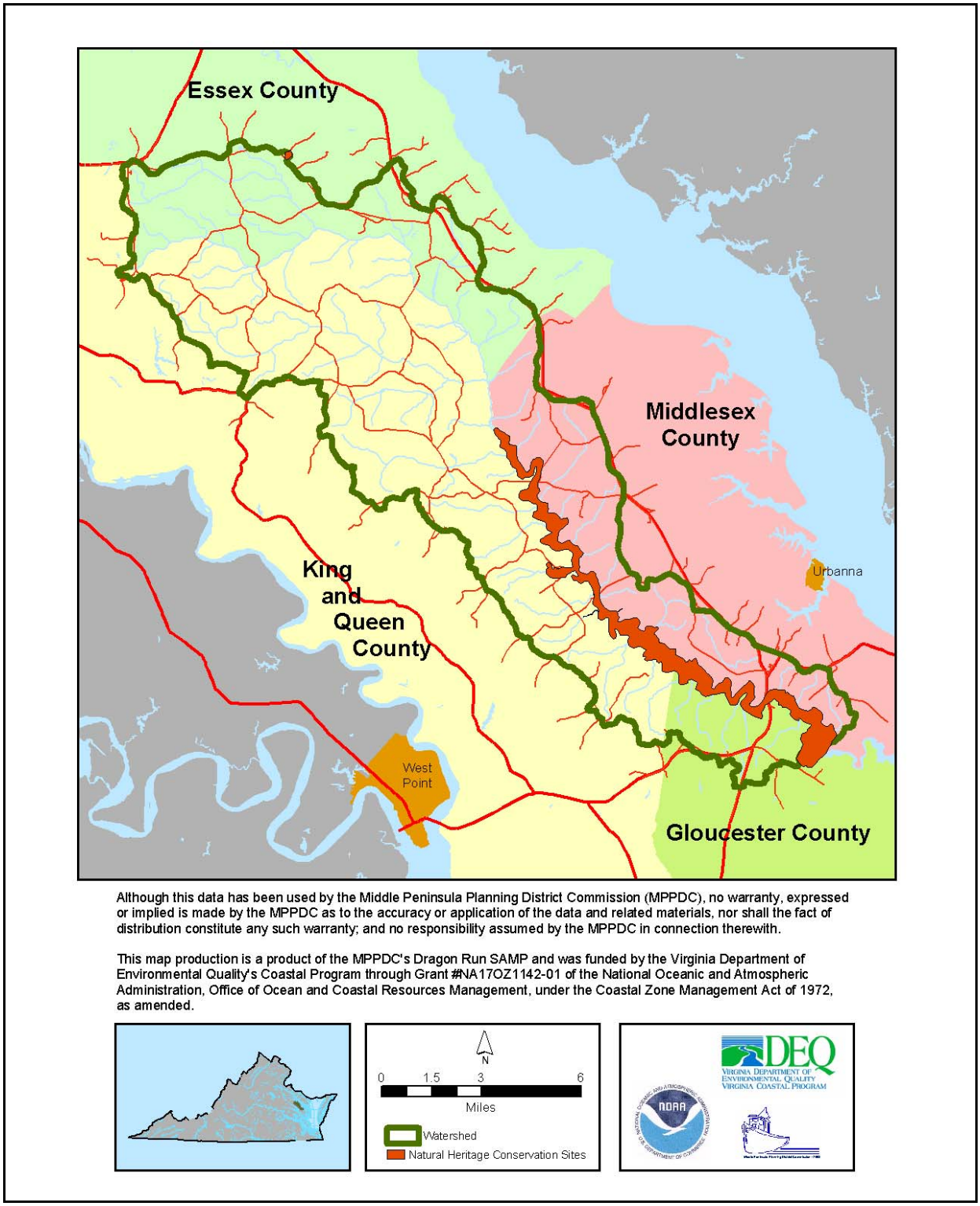


**Figure 18**. Natural heritage conservation sites for the Dragon Run watershed.

rare resources. Some of these resources have been conserved, either through fee simple purchase or purchase of conservation easements (**Figure 19).** Conservation easements are held on 235 acres by the Virginia Outdoors Foundation, 72 acres by Friends of Dragon Run, and 32 acres by the Chesapeake Bay Foundation.

Structures

Interpretation of digital orthophoto quadrangles from 1994 revealed that there were 1,311 structures or clusters of structures (e.g. barns and accessory buildings) in the Dragon Run watershed (**Figure 20**) (MPPDC, 2002). As expected, the majority of the structures are located along the primary highways and, to a lesser degree, along the secondary road network. It is likely that population growth and accompanying residential structures will continue to follow this pattern.

Sustainable Economic Development

Landowners find it increasingly difficult to sustain farm and forest operations. Virginia's River County, the Middle Peninsula's business development partnership, finds that sustainable economic development in the region is limited and the farming and forestry industries are suffering losses (VRC, 2002). Virginia's River Country indicates in its strategic plan that one of its priorities is to promote sustainable growth in resource-based industries (e.g. forestry, farming, nature-based tourism) to preserve natural resources from the pressures of development. In other words, the region has opportunities to develop the capacity to produce sustainable and value-added forest and agricultural products.

Buildout analysis

A buildout analysis offers an assessment of the potential number of lots allowed by land use regulations. Assessments may be based upon the number of lots allowed by right or upon the number of lots allowed by exception or by rezoning.

Based on a supplement to the *Dragon Run Land Use Policy Audit* (MPPDC, 2003), it is estimated that there is a potential for 3,916 parcels allowed by right (i.e. without the need for an exception or rezoning). This estimate is founded upon the number of lots and the minimum lot size permitted by right for minor subdivisions. The result represents a 27% increase in the potential number of parcels. An example of potential development under current land use policies in the watershed is featured in **Figure 21**.

As part of the *Dragon Run Management Framework* (MPPDC, 2002), a buildout analysis was completed based on both the potential number of lots allowed by right, by exception, or by rezoning. The analysis evaluated buildout based on both "build-compatible" values (i.e. wetlands) and "environmental" values (i.e. wetlands, topography [slope], floodplains, land cover, conservation easements, threatened and endangered species locations, and conservation species sites). An index was created based on these values and those that ranked low for development unsuitability were assessed for their development potential under current zoning designations. Based on zoning and subdivision rules, "theoretical lots" were then calculated within


**Figure 19**. Conservation easements in the Dragon Run watershed.

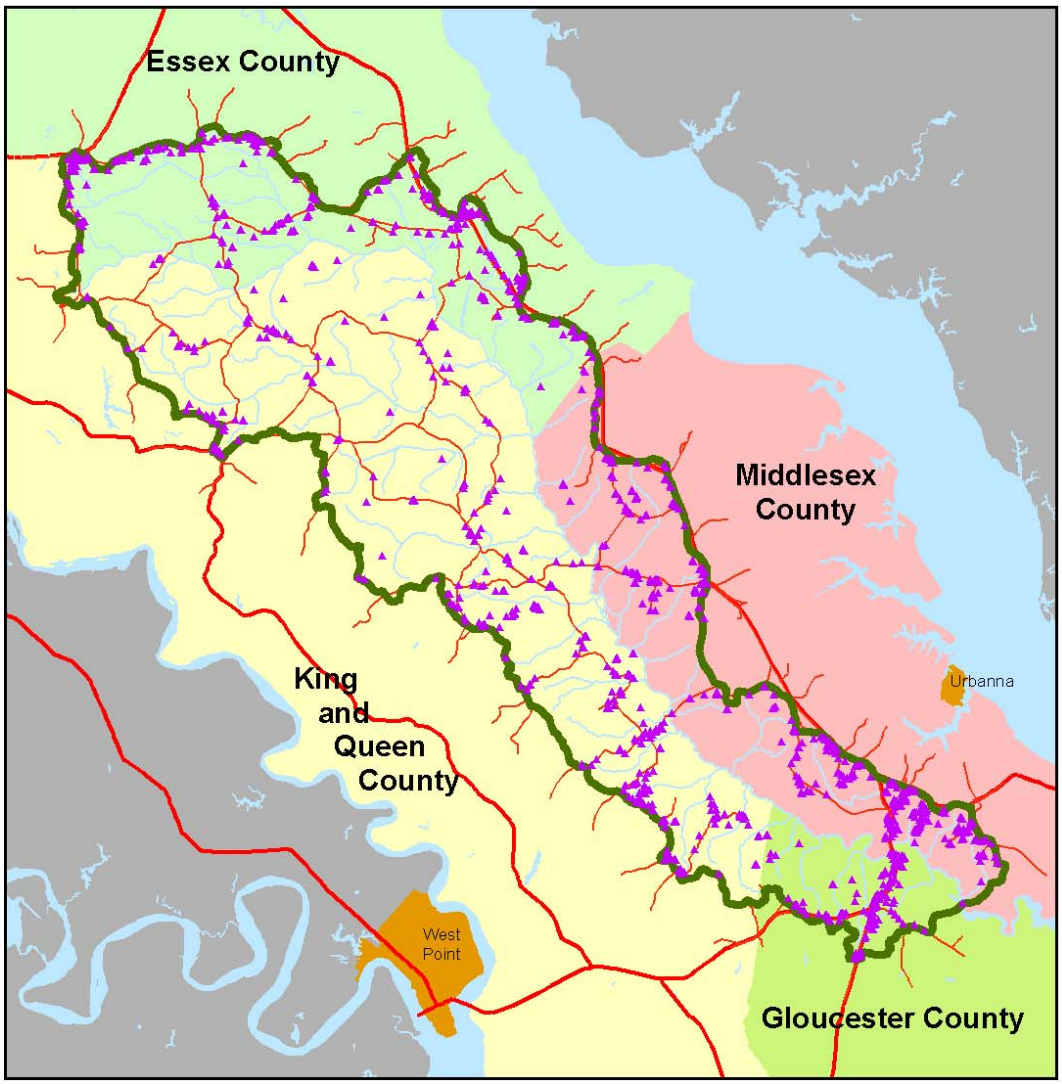


**Figure 20**. Structures in the Dragon Run watershed.

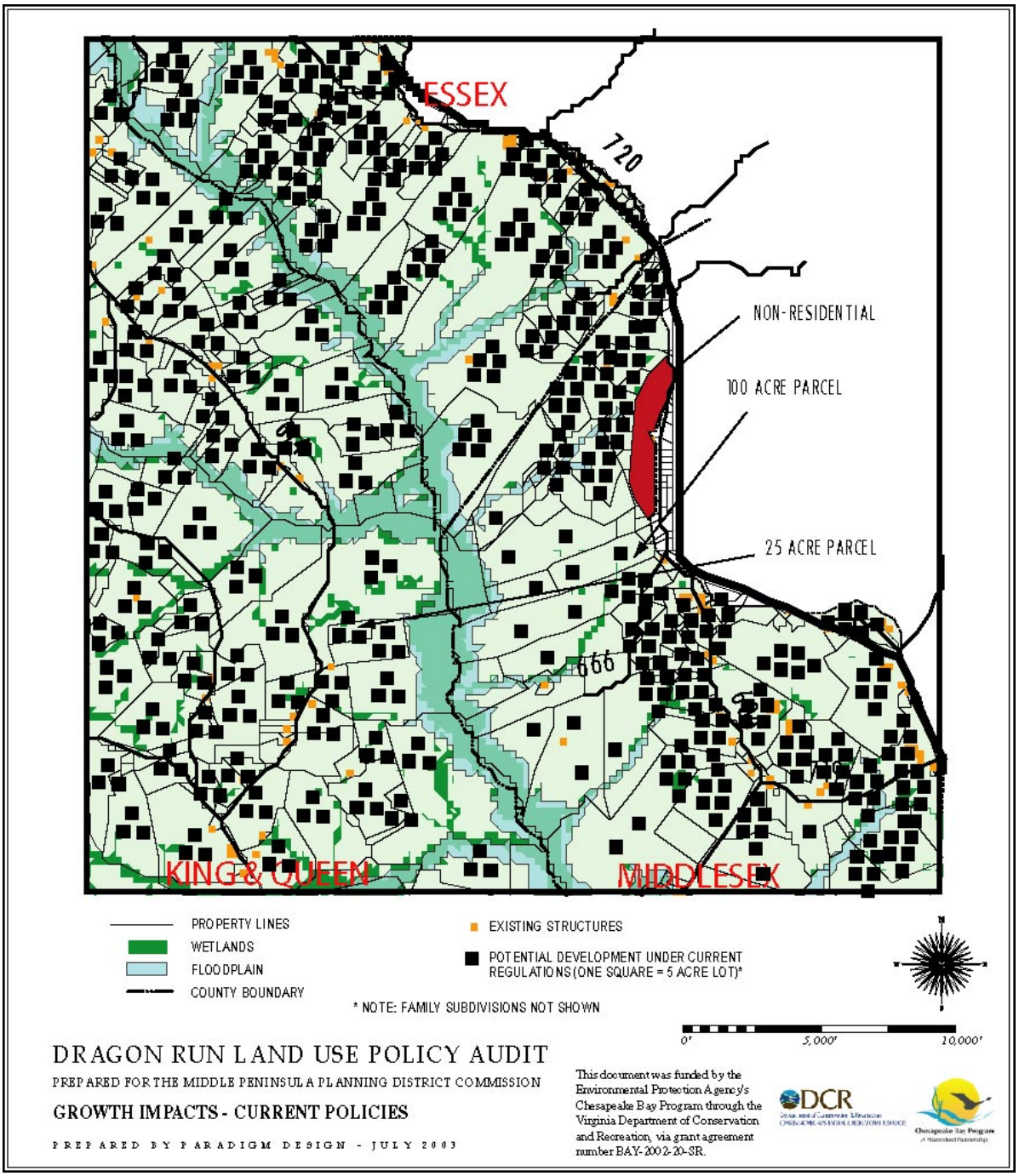


**Figure 21**. Potential development under current land use policies in the Dragon Run watershed (from MPPDC, 2003).

those areas that were ranked as suitable for development under both scenarios. The "build-compatible" analysis yielded a total of 40,851 theoretical lots that could be developed under current zoning, while the "environmental" analysis yielded 38,208 theoretical lots. The results of the analysis represent a 1,143% increase in the potential number of parcels based on "environmental" values and a 1,229% increase in the potential number of parcels based on "build-compatible" values.

**Identified Data Gaps**

Several gaps in the available data were identified. Two of these data gaps, fish communities and benthic macroinvertebrates including freshwater mussels, are being addressed by a research project being undertaken by Virginia Commonwealth University's Center for Environmental Studies (VCU). This project is anticipated to be completed during the fall of 2003. Its final report will also summarize previous data collection efforts by VCU and the Virginia Department of Game and Inland Fisheries.

Natural heritage information is available for the main channel of the Dragon Run and its adjacent swamps, but not for headwater streams and adjacent uplands. This data gap is being addressed by a natural heritage inventory of 14 sites in the upper reaches of the watershed being undertaken by the Department of Conservation and Recreation's Division of Natural Heritage. A technical report titled "A Natural Heritage Inventory of Fourteen Headwater Sites in the Dragon Run Watershed" will be completed by December 2003.

The status of invasive species in the Dragon Run is partially known. Efforts to gather more detailed information about invasive species, primarily common reed and blue catfish, are underway.

Other data gaps are not being addressed at this time. For example, there is scant information about migratory birds, other than highly specific research (e.g. bald eagle nesting assessment, colonial bird nesting assessment) and amateur observational records. The scope of a research project to comprehensively assess migratory bird activity in the watershed is tremendous and would require funding that is not available at this time.

Another data gap that is not currently being addressed is the source of water quality impairments (e.g. pH, fecal coliform, mercury, lead) for stream segments on the Virginia 303(d) list (DEQ, 2002). It is assumed that pH impairment is from natural sources (i.e. swamps are naturally acidic). Development of Total Maximum Daily Loads (TMDL) for impairments in Dragon Run stream segments are planned by the Virginia Department of Environmental Quality (DEQ) in 2010.

Finally, the effect of tax policies on the viability of farming and forestry operations is not fully understood in the watershed. The impact of tax incentive programs (e.g. land use taxation) and tax policies (e.g. taxation based on full development potential) on the sustainability of agriculture and silviculture has not been assessed.

# SECTION 7: Resource Needs

**Section 7 itemizes the resources needed to implement the actions in the watershed management plan. This section also identifies responsible parties and possible funding sources.**

**Table 3** lists Actions (**Section 4)** with responsibilities, estimates of funding needs, and possible funding sources.

| ACTION | RESPONSIBILITY | FUNDING | FUNDING SOURCE |
|---|---|---|---|
| *1. Land Use and Resource Preservation* | | | |
| A. Designate a Unified "Dragon Run Planning Area" | MPPDC; Dragon Run Steering Committee; local governments | Minimal to moderate | MPPDC (VA Coastal Program); local governments |
| B. Implement Tools to Preserve Forest, Farm, and Natural Resources | Local, state, federal government; non-profits; landowners | Varies from minimal (local "right-to-farm") to considerable (PDR program) | Local, state governments; non-profits; EPA; Forest Legacy Program |
| C. Address Public and Landowner Access Issues | Dragon Run Steering Committee; local, regional, state gov'ts | Varies from low (signs) to considerable (land acquisition, site development) | VA Coastal Program; Public Access Authority |
| D. Control Invasive Species | Dragon Run Steering Committee; Invasive Species Initiative | Moderate | VA Coastal Program; DGIF; VMRC; DCR; U.S. Fish and Wildlife Service |
| *2. Education and Landowner Stewardship* | Dragon Run Steering Committee; local, state, federal gov'ts; citizens | ~$20K/year; programmatic | VA Coastal Program; Dept. of Forestry; USDA/NRCS; DCR; EPA; US FWS |
| *3.Encourage and Support Sustainable Economic Development* | Dragon Run Steering Committee; local gov'ts; business | $18,000 in 2003-2004 | VA Coastal Program |
| *4. Monitor Plan Implementation* | Dragon Run Steering Committee; local gov'ts | Minimal to moderate | MPPDC (VA Coastal Program); local gov'ts |

**Table 3.** Resource needs for Dragon Run Watershed Management Plan.

# SECTION 8: Progress Benchmarks

**Section 8 serves as a monitoring framework for assessing the implementation of the watershed management plan.**

**Table 4** lists Actions from **Section 4** and their corresponding progress benchmarks, including responsible parties and anticipated completion time. This table serves as a monitoring plan framework.

| ACTION | RESPONSIBILITY | BENCHMARK | COMPLETION |
|---|---|---|---|
| *1. Land Use and Resource Preservation* | | | |
| A. Designate a Unified "Dragon Run Planning Area" | MPPDC; Dragon Run Steering Committee; local governments | Adoption of phases of strategy in all four counties | Level 1 - September 2004; Levels 2 & 3 – 2005-2006? |
| B. Implement Tools to Preserve Forest, Farm, and Natural Resources | Local, state, federal government; non-profits; landowners | Use 1 or more tools to preserve 50 acres/year | Ongoing |
| C. Address Public and Landowner Access Issues | Dragon Run Steering Committee; local, regional, state gov'ts | Acquisition of 1 land-based site; erect trespassing signs at access points | December 2004 |
| D. Control Invasive Species | Dragon Run Steering Committee; Invasive Species Initiative | Representation on Council; establish education materials | September 2004; ongoing |
| *2. Education and Landowner Stewardship* | Dragon Run Steering Committee; local, state, federal gov'ts; citizens | Establish festival and awards; perform 6 trips/year; post signs along major roadways; develop forest stewardship plans (5/year); enrollment in farm programs (100 acres/year); complete one action-based project/year | December 2004; ongoing |
| *3. Encourage and Support Sustainable Economic Development* | Dragon Run Steering Committee; local gov'ts; business | Complete sustainable economic development report; promote Coastal Birding Trail | September 2004; ongoing |
| *4. Monitor Plan Implementation* | Dragon Run Steering Committee; local gov'ts | Complete Table 4 | As designated |

**Table 4.** Benchmarks for monitoring the Dragon Run Watershed Management Plan.

# SECTION 9: Conclusions

**Section 9 reminds readers of the watershed management plan's purpose. This section recalls the plan's citizen-initiated beginnings and that it serves as a vision for the future of the Dragon Run watershed.**

This watershed management plan for the Dragon Run watershed represents a body of work by citizens, stakeholders, and decision-makers to achieve a common vision for the future – the preservation of the traditional uses and unique resources in the pristine Dragon Run. It is a symbol of regional cooperation and coordination that crosses jurisdictional boundaries. It is the next logical step on the path towards protecting the Dragon Run watershed and preserving its cultural, historic, and natural heritage for future generations.

The plan's goals and objectives (**Section 3**) speak to the major issues at play in the watershed. Its actions (**Section 4**) attempt to address those issues. Together, they are a road map for the watershed.

The plan also captures the current status and state of knowledge of the watershed (**Section 6**). It highlights what we know and what we do not know. It also offers a mechanism for monitoring plan implementation by comparing the baseline watershed information to future results. Progress benchmarks are the basis for this monitoring (**Section 8**). The plan designates responsibility for plan implementation (**Sections 7 & 8**) and estimates costs and funding sources (**Section 7**).

The watershed management plan is not a static document. It is not an end in and of itself. It is a citizen-initiated vision for the future of the watershed that may be modified as situations change or as new information becomes available. It is a vision that harnesses the passion and energy for the Dragon Run (**Figure 22**) of those who live, work and play in its watershed.

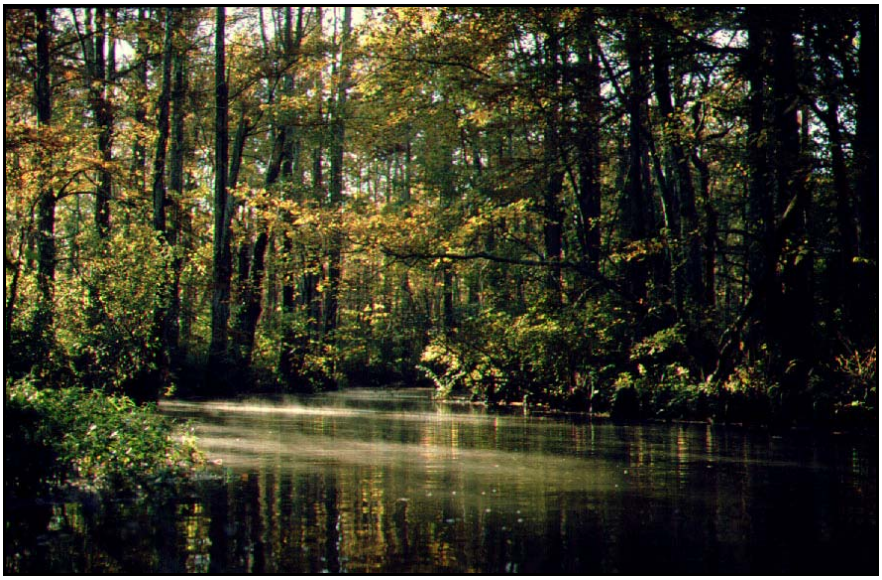

**Figure 22.** A misty morning on the Dragon Run (Credit: Teta Kain)

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# APPENDIX A: Rare Species and Natural Communities

**Table 4** indicates the rare species and natural communities that have been found in the Dragon Run watershed, according to the Virginia Division of Natural Heritage (Belden, Jr. et al., 2001; Belden, Jr. et al., 2003).

| SCIENTIFIC NAME | COMMON NAME | STATUS |
|---|---|---|
| | | |
| *Animals* | | |
| Atlides halesus | Great purple hairstreak | S2, S3 |
| Enallagma weewa | Blackwater bluet | S1 |
| Epitheca spinosa | Robust baskettail | S2 |
| Haliaeetus leucocephalus | Bald eagle | S2 |
| Helocordulia selysii | Selys' sunfly | S2 |
| Isoparce cupressi | Cypress sphinx | S1, S3 |
| Somatochlora filosa | Fine-lined emerald | S2 |
| Wyeomyia haynei | Southern pitcher-plant mosquito | S1 |
| | | |
| *Plants* | | |
| Bolboschoenus fluviatillis | River bulrush | S2 |
| Cardamine pratensis | Cuckooflower | S1 |
| Carex decomposita | Cypress-knee sedge | S2 |
| Chelone oblique | Red turtlehead | S1 |
| Desmodium strictum | Pineland tick-trefoil | S2 |
| Eriocaulon parkei | Parker's pipewort | S2 |
| Sarracenia purpurea var. purpurea | Northern purple pitcher-plant | S2 |
| | | |
| **Hottonia inflata | Featherfoil | S3 |
| **Ranunculus flabellaris | Yellow water crowfoot | S3 |
| | | |
| *Natural Communities* | | |
| Baldcypress-Tupelo Swamp | | |
| Fluvial Terrace Woodland | | |
| Tidal Baldcypress-Tupelo Swamp | | |
| Tidal Baldcypress Woodland/Savanna | | |
| Tidal Freshwater Marsh | | |

S1 = Extremely rare; usually 5 or fewer occurrences in the state; or may have a few remaining individuals; often especially vulnerable to extirpation.

S2 = Very rare; usually between 5 and 20 occurrences; or few occurrences with many individuals; often susceptible to becoming endangered.

S3 = Rare to uncommon; usually between 20 to 100 occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances

** = No longer tracked by the Division of Natural Heritage; placed on watchlist due to an increased number of documented occurrences within the state since 2001

**Table 4**. Rare species and natural communities in the Dragon Run watershed.

The following descriptions of natural communities are taken from *The Natural Communities of Virginia* (Fleming et al., 2001).

**Bald Cypress-Tupelo Swamps**
*Seasonally to semipermanently flooded forests of backswamps, sloughs, and low terraces of Coastal Plain rivers and large streams. These swamp forests are distributed throughout southeastern Virginia, north to Dragon Swamp (Gloucester, King and Queen, and Middlesex Counties). Habitats are deeply flooded (up to 1m) for part of the year; most retain at least some standing water throughout the growing season. Microtopography is often pronounced with small channels, swales, tree-base hummocks, and numerous bald cypress "knees." Tree canopies vary from mixed stands of bald cypress (Taxodium distichum), water tupelo (Nyssa aquatica), and swamp tupelo (N. biflora) to nearly pure stands of one species or another. The three dominants have complex competitive and successional relationships. As a rule, the two tupelos are less shade-tolerant than bald cypress and regenerate more readily by sprouting in cut-over stands. Thus, tupelos tend to become dominant when bald cypress stands are heavily logged. Green ash (Fraxinus pennsylvanica) and red maple (Acer rubrum) are occasional canopy associates and frequent understory trees. Carolina ash (F. caroliniana) is often dominant in the small tree and shrub layers, while vines of climbing hydrangea (Decumaria Barbara) are often abundant. Herb layers vary from sparse to rather lush. Most herbaceous plants of bald cypress-tupelo swamps are tolerant of muck soils and fluctuating water levels, or are capable of becoming established on tree hummocks, stumps, and logs. A few of the typical herbs are lizard's tail (Saururus cernuus), false nettle (Boehmeria cylindrical), Walter's St. John's-wort (Triadenum walteri), swamp beggar-ticks (Bidens discoidea), weak stellate sedge (Carex seorsa), giant sedge (Carex gigantean), taperleaf bugleweed (Lycopus rubellus), and pale mannagrass (Torreyochloa pallida). Although community types in this group are relatively common, high-quality specimens of the dominant trees are known to provide nesting habitats for the globally uncommon, state-rare eastern big-eared bat (Corynorhinus rafinesquii macrotis) and southern myotis (Myotis austroparius). Old-growth stands of bald cypress-tupelo swamp with trees up to 800 years old occur along the Blackwater River in Surry and Isle of Wight Counties. References: Fleming and Moorhead (1998), Parker and Wyatt (1975), Plunkett and Hall (1995).*

**Tidal Bald Cypress Forests and Woodlands**
*Coniferous or mixed swamp forests and woodlands occurring along the upper tidal reaches of rivers in southeastern Virginia. Examples are documented from the Dragon Swamp/Piankatank River (Gloucester, King and Queen, and Middlesex Counties), the Chickahominy River (Charles City, James City, and New Kent Counties), the James River (Isle of Wight and Surry Counties), and the wind-tidal Northwest River (City of Chesapeake). At some sites, these communities occur in ecotones between tidal marshes and non-tidal backswamps or uplands. Bald cypress (Taxodium distichum) dominates the open to very open canopy, with or without hardwood associates such as swamp tupelo (Nyssa biflora), water tupelo (Nyssa aquatica), and green ash (Fraxinus pennsylvanica). Stand structure and canopy cover range from closed forest to very open woodland. Shrub and herb layers are variable but generally contain a mixture of species characteristic of both marshes and swamps. Some well-developed tidal bald cypress forests appear floristically similar to palustrine bald cypress-tupelo swamps. Other stands have a nearly monospecific herb dominance by shoreline sedge (Carex hyalinolepis). In a unique, possibly fire-influenced, savanna-like stand on the Northwest River, the herbaceous dominants, in rough seasonal order, are silvery sedge (Carex canescens spp. Disjuncta), spikerushes (Eleocharis fallax and E. rostellata), marsh rattlesnake-master (Eryngium aquaticum var. aquaticum), and wild rice (Zizania aquatica var. aquatica). The environmental dynamics, compositional variation,*

*and state-wide distribution of this group are poorly known and need intensive study. Reference: Fleming and Moorhead (1998).*

**Fluvial Terrace Woodlands**

*A somewhat enigmatic group of communities occurring on flat, sandy terraces and islands along Coastal Plain rivers in eastern Virginia. These habitats are elevated well above the level of adjacent swamps and are characterized by xeric, sandy soils and open forest or woodland vegetation. Single occurrences have been documented along the Nottoway River (Sussex County), Chickahominy River (New Kent County), Dragon Swamp (Middlesex County), and Mattaponi River (Caroline County). At all four sites, hickories (Carya pallida and C. alba) are dominant trees, with drought-tolerant oaks (Quercus falcate, Q. nigra, Q. marilandica, Q. alba) present in smaller numbers. Shrubs occurring at all or most sites include sand post oak (Q. margarettiae), horse-sugar (Symplocos tinctoria), American holly (Ilex opaca var. opaca), and eastern red cedar (Juniperus virginiana var. virginiana). Typical herbs include sedges (Carex albicans var. australis, C. pensylvanica, and C. tonsa), Canada frostweed (Helianthemum canadense), butterfly-pea (Clitoria mariana), late goldenrod (Solidago tarda), and prickly-pear (Opuntia humifusa). The Dragon Run site is anomalous in the presence (despite low soil pH and base status) of several calciphiles such as eastern redbud (Cercis canadensis var. canadensis), wild columbine (Aquilegia canadensis), smooth rock-cress (Arabis laevigata var. laevigata), robin's-plantain (Erigeron pulchellus var. pulchellus), and elm-leaved goldenrod (Solidago ulmifolia var. ulmifolia). A full understanding of the status and compositional relationships of this group will require additional inventory and assessment.*

**Tidal Freshwater Marshes**

*A diverse group of herbaceous wetlands subject to regular diurnal flooding along upper tidal reaches of inner Coastal Plain river and tributaries. Freshwater marshes occur in the uppermost portion of the estuarine zone, where the inflow of saltwater from tidal influence is diluted by a much larger volume of freshwater from upstream. Strictly speaking, freshwater conditions have salt concerntrations <0.5 ppt, but pulses of higher salinity may occur during spring tides or periods of unusually low river discharge. The most common species are arrow-arum (Peltandra virginica), dotted smartweed (Polygonum punctatum), wild rice (Zizania aquatic var. aquatica), pickerelweed (Pontederia cordata), rice cutgrass (Leersia oryzoides), tearthumbs (Polygonum arifolium and P. sagittatum), and beggar-ticks (Bidens spp.). Locally, sweetflag (Acorus calamus) and southern wild rice (Zizaniopsis miliacea) may form large dominance patches. Species diversity and vegetation stature vary with salinity, duration of inundation, and disturbance; the most diverse marshes occupy more elevated surfaces in strictly freshwater regimes. Mud flats that are fully exposed only at low tide support nearly monospecific stands of spatterdock (Nuphar advena), although cryptic submerged aquatic species may also be present. Tidal freshwater marshes are best developed on sediments deposited by large meanders of the Pamunkey and Mattaponi Rivers, although outstanding examples also occur along the Potomac, Rappahannock, Chickahominy, and James Rivers. These communities provide the principal habitat for the globally rare plant sensitive joint-vetch (Aeschynomene virginica). Chronic sea-level rise is advancing the salinity gradient upstream in rivers on the Atlantic Coast, leading to shifts in vegetation composition and the conversion of some tidal freshwater marshes into oligohaline marshes. Tidal Freshwater Marshes are also threatened by the invasive exotic marsh dewflower (Murdannia keisak). Several communities in this group are chiefly restricted to the Chesapeake Bay drainage basin and are considered globally rare or uncommon. References: Parker and Wyatt (1975), Perry and Atkinson (1997), Perry and Hershner (1999), McCoy and Fleming (2000).*

# APPENDIX B: Memorandum of Agreement

# Memorandum of Agreement

Between

Middle Peninsula
Planning District Commission

County of Essex, Virginia

County of Gloucester, Virginia

County of King and Queen, Virginia

County of Middlesex, Virginia

To Participate in the

Dragon Run Watershed
Special Area Management Plan

**Memorandum of Agreement**
**Between**

**Middle Peninsula Planning District Commission**
**County of Essex, Virginia**
**County of Gloucester, Virginia**
**County of King and Queen, Virginia**
**County of Middlesex, Virginia**

**To Participate in the**
**Dragon Run Watershed Special Area Management Plan**

## 1. PARTIES TO THE AGREEMENT

This Memorandum of Agreement (MOA) is between the following entities:

- Middle Peninsula Planning District Commission
- County of Essex, Virginia
- County of Gloucester, Virginia
- County of King and Queen, Virginia
- County of Middlesex, Virginia

## 2. ENABLING AUTHORITY

### Counties of Essex, Gloucester, King and Queen, and Middlesex

Section 15.2-1300 of the Code of Virginia enables local governments to enter into cooperative agreements to exercise those powers that each may be enabled to exercise.

### Middle Peninsula Planning District Commission

Section 15.2-4205 of the Code of Virginia enables the Middle Peninsula Planning District Commission to enter into cooperative agreements with local governments to exercise those powers that each may be enabled to exercise.

## 3. CONTEXT

The Dragon Run is a brackish water stream that flows forty miles through the Virginia Middle Peninsula counties of Essex, King and Queen, Middlesex, and Gloucester and eventually empties into the Piankatank River. The Dragon Run Watershed has been defined for the purposes of this Agreement as the Commonwealth Hydrologic Unit ID ‘CO2’ described by the Virginia Department of Conservation and Recreation from the streams’ headwaters down to and including Meggs Bay (see Appendix).

The Dragon Run's pristine nature can, in large part, be attributed to exemplary landowner stewardship and difficult access and is a central part of the region's culture and identity. Ecologically unique, the Dragon Run was ranked second of 232 ecologically significant areas throughout the Chesapeake Bay region by the Smithsonian Institution and is characterized by extensive tidal and nontidal cypress swamp, which is otherwise rare this far north. Furthermore, the Virginia Division of Natural Heritage recognizes the importance of the Dragon Run due to occurrences of one endangered animal species, five rare animal species, eight rare plant species, and five rare natural communities. Moreover, the Dragon Run Watershed supports a high quality of life for its residents. For example, recreational activities, such as hunting, fishing, and paddling, are popular in the Dragon Run.

The Middle Peninsula Planning District Commission, advised by the Dragon Run Steering Committee, obtained a Virginia Coastal Resources Management Program grant for the development of the Dragon Run Watershed Special Area Management Plan (SAMP). Each county in the watershed makes three appointments – one elected official and two landowners along the Dragon Run – to the Dragon Run Steering Committee. The SAMP Advisory Group, which reports to the Steering Committee, represents a cross-section of the community, including: Steering Committee members; local government elected officials and planning staff; landowners; state agencies; farming; forestry; education; non-profit organizations; and ecotourism.

## 4. PURPOSE AND TERMS OF THE AGREEMENT

The project's mission, as recommended by the SAMP Advisory Group to the Dragon Run Steering Committee, is to support and promote community-based efforts to preserve the cultural, historic, and natural character of the Dragon Run, while preserving property rights and the traditional uses within the watershed.

Each of the signatory entities in this Memorandum of Agreement agrees to participate in the Special Area Management Plan to promote the distinctive treatment deserving of the Dragon Run Watershed through the support and efforts of local government, the fostering of educational partnerships and grassroots support and the involvement of landowners whose stewardship has served to preserve the wonder of the Dragon. The signatories will consider the recommendations of the Dragon Run Steering Committee's SAMP Advisory Group to achieve the following goals and objectives that it developed by consensus:

**GOAL I**
Establish a high level of cooperation and communication between the four counties within the Dragon Run Watershed to achieve consistency across county boundaries.

**OBJECTIVE A**
Develop a plan to address the inevitable future development pressure to change the traditional use of land in the Dragon Run Watershed.

**OBJECTIVE B**
Achieve consistency across county boundaries among land use plans and regulations in order to maintain farming and forestry and to preserve natural heritage areas by protecting plants, animals, natural communities, and aquatic systems.

**OBJECTIVE C**
Provide ongoing monitoring of existing plans and planning tools in order to assess traditional land uses and watershed health and take action necessary to preserve the watershed.

**OBJECTIVE D**
Comprehensively implement Best Management Practices (BMPs) for water quality, wildlife habitat, and soil conservation.

**GOAL II**
Foster educational partnerships and opportunities to establish the community's connection to and respect for the land and water of the Dragon Run.

**OBJECTIVE A**
Encourage experience-based education consistent with the Stewardship and Community Engagement goals of the Chesapeake 2000 Agreement.

**OBJECTIVE B**
Promote the community and economic benefits of the Dragon Run derived from its natural characteristics and traditional uses such as farming, forestry, hunting and fishing.

**GOAL III**
Promote the concept of landowner stewardship that has served to preserve the Dragon Run Watershed as a regional treasure.

**OBJECTIVE A**
Address the potential dilemma of preserving the watershed's sense of peace and serenity by protecting open space and reducing fragmentation of farms, forests, and wildlife habitat versus the landowners rights in determining or influencing future land use.

**OBJECTIVE B**
Educate landowners about the regional importance of the Dragon Run.

The Advisory Group's recommendations to achieve the goals and objectives will be delivered by the Dragon Run Steering Committee to the signatory entities for their consideration.

## 5. MODIFICATIONS

Modifications to this Memorandum of Agreement must be submitted in writing and approved by all parties to the Memorandum of Agreement.

## 6. EFFECTIVE DATE

The effective date of the Memorandum of Agreement shall be the date of the signing of the Memorandum of Agreement by the Counties of Essex, Gloucester, King and Queen, and Middlesex and the Middle Peninsula Planning District Commission.

## 7. DURATION AND TERMINATION OF THE AGREEMENT

The duration of this Memorandum of Agreement will be until such time as it is terminated upon agreement of all parties; however, any party to the Memorandum of Agreement may terminate its participation by written notice to all other parties.

## 8. MANNER OF FINANCING

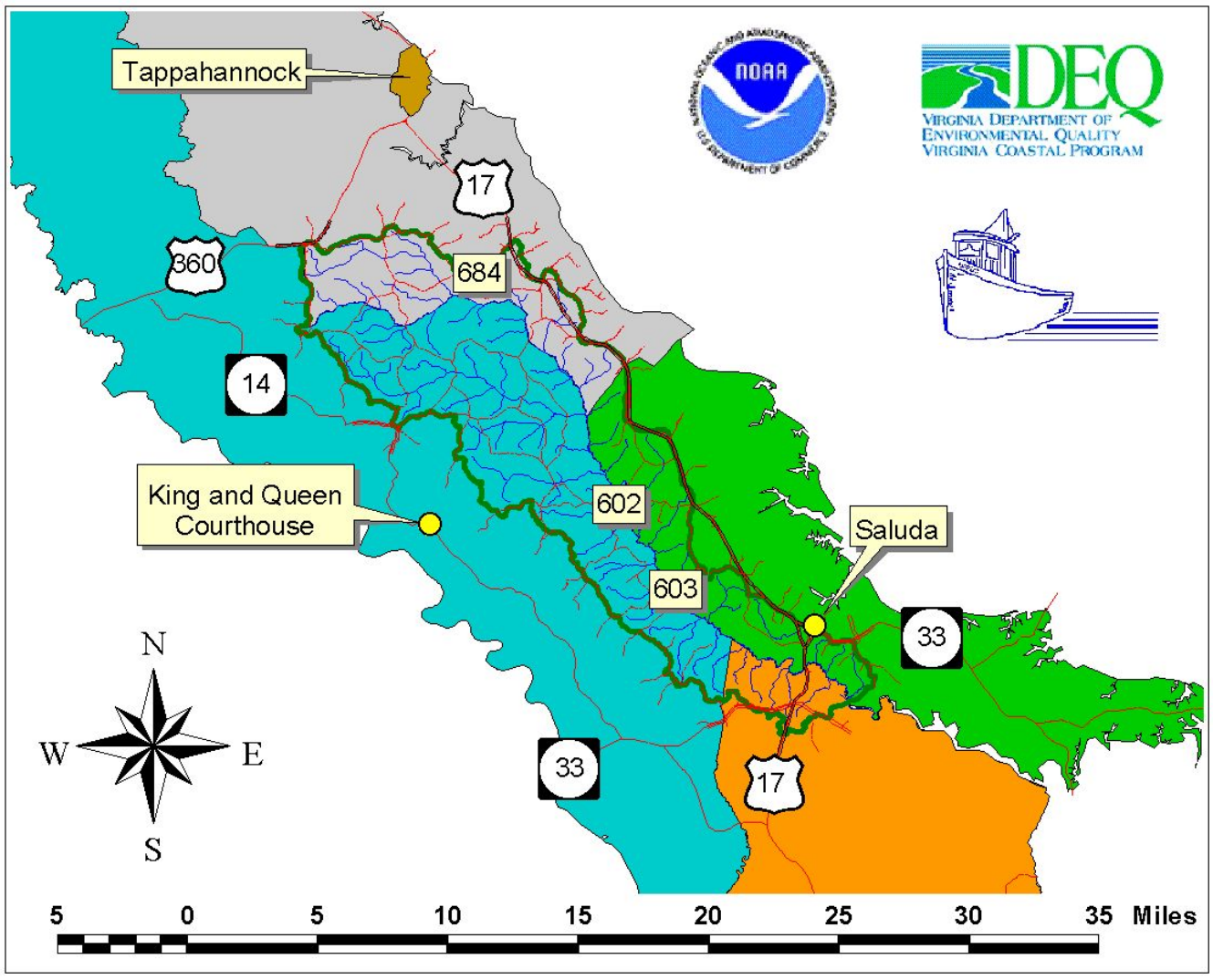
This Memorandum of Agreement will not require financing or budgeting from or by the signatory agencies; however, this clause will not preclude, under a separate document or agreement, grant funding or other financial assistance from one signatory to another for the purpose of carrying out the purposes of the Memorandum of Agreement.

## 9. OWNERSHIP OF PROPERTY

It is not the intent of the signatory parties that this Memorandum of Agreement will result in the purchase, ownership, holding or conveying of any real or personal property.

## 10. APPENDIX

Map of the Dragon Run Watershed - defined as Commonwealth Hydrologic Unit ID 'CO2' described by the Virginia Department of Conservation and Recreation from the streams' headwaters down to and including Meggs Bay.



**LIST OF SIGNATORIES**

**Middle Peninsula Planning District Commission**

**County of Essex, Virginia**

**County of Gloucester, Virginia**

**County of King and Queen, Virginia**

**County of Middlesex, Virginia**

**SIGNATURE PAGE FOR THE MIDDLE PENINSULA PLANNING DISTRICT COMMISSION**

IN WITNESS WHEREOF, the following individuals execute this agreement

Chairman, Middle Peninsula Planning District Commission

County Administrator, County of Essex, Virginia

County Administrator, County of Gloucester, Virginia

County Administrator, County of King and Queen, Virginia

County Administrator, County of Middlesex, Virginia

MIDDLE PENINULA PLANNING DISTRICT COMMISSION

By: Sadie E. Ingram

Date: 8-1-202

Attest: _____

Date: 8/1/02

**SIGNATURE PAGE FOR THE COUNTY OF ESSEX, VIRGINIA**

IN WITNESS WHEREOF, the following individuals execute this agreement

Chairman, Middle Peninsula Planning District Commission

County Administrator, County of Essex, Virginia

County Administrator, County of Gloucester, Virginia

County Administrator, County of King and Queen, Virginia

County Administrator, County of Middlesex, Virginia

COUNTY OF ESSEX, VIRGINIA

By: Margaret Davis

Date: AUGUST 20, 2002

Attest: Linda E. Dameron

Date: AUGUST 20, 2002

**SIGNATURE PAGE FOR THE COUNTY OF GLOUCESTER, VIRGINIA**

IN WITNESS WHEREOF, the following individuals execute this agreement

Chairman, Middle Peninsula Planning District Commission

County Administrator, County of Essex, Virginia

County Administrator, County of Gloucester, Virginia

County Administrator, County of King and Queen, Virginia

County Administrator, County of Middlesex, Virginia

COUNTY OF GLOUCESTER, VIRGINIA

By: _____

Date: 10-3-22

Attest: _____

Date: _____

**SIGNATURE PAGE FOR THE COUNTY OF KING AND QUEEN, VIRGINIA**

IN WITNESS WHEREOF, the following individuals execute this agreement

Chairman, Middle Peninsula Planning District Commission

County Administrator, County of Essex, Virginia

County Administrator, County of Gloucester, Virginia

County Administrator, County of King and Queen, Virginia

County Administrator, County of Middlesex, Virginia

COUNTY OF KING AND QUEEN, VIRGINIA

By: _____

Date: 9/9/02

Attest: K. Deane Gabe

Date: 9-9-02

**SIGNATURE PAGE FOR THE COUNTY OF MIDDLESEX, VIRGINIA**

IN WITNESS WHEREOF, the following individuals execute this agreement

Chairman, Middle Peninsula Planning District Commission

County Administrator, County of Essex, Virginia

County Administrator, County of Gloucester, Virginia

County Administrator, County of King and Queen, Virginia

County Administrator, County of Middlesex, Virginia

COUNTY OF MIDDLESEX, VIRGINIA

By: _____

Date: 10-2-02

Attest: _____

Date: 10-2-02

# APPENDIX C: Description of Natural Resource Preservation Tools

**Conservation Easements**: According to the Virginia Conservation Easement Act (§10.1-1009 et seq.), a conservation easement "means a nonpossessory interest of a holder in real property, whether easement appurtenant or in gross, acquired through gift, purchase, devise, or bequest imposing limitations or affirmative obligations, the purposes of which include retaining or protecting natural or open-space values of real property, assuring its availability for agricultural, forestal, recreational, or open-space use, protecting natural resources, maintaining or enhancing air or water quality, or preserving the historical, architectural or archaeological aspects of real property." There are significant tax benefits associated with the donation of conservation easements. The terms of the easement are highly flexible and dictate the permissible uses of the land. The easement is attached to the deed for the property.

**Purchase of Development Rights (PDR) or Purchase of Agricultural Conservation Easements (PACE)**: A voluntary land conservation program that pays landowners to protect the cultural and natural resource assets of their property. The purpose is to protect open-space, agricultural, historic, scenic, and natural resources. In particular cases, the purpose is to maintain the economic viability of farm and forest operations. The program allows landowners to enter into agreements to sell the development potential of qualifying property to the County while maintaining the right to continue to use, own, sell, mortgage, and bequeath the property. PDR programs accommodate a variety of conservation categories and generally protect land in perpetuity, while PACE programs are specifically geared to agricultural operations and sometimes offer a buyback option at the current fair market value after a specified period of time.

**Chesapeake Bay Preservation Act**: The Chesapeake Bay Preservation Act (§10.1-2100 et seq.) requires that "(i) the counties, cities, and towns of Tidewater Virginia incorporate general water quality protection measures into their comprehensive plans, zoning ordinances, and subdivision ordinances; (ii) the counties, cities, and towns of Tidewater Virginia establish programs, in accordance with criteria established by the Commonwealth, that define and protect certain lands, hereinafter called Chesapeake Bay Preservation Areas, which if improperly developed may result in substantial damage to the water quality of the Chesapeake Bay and its tributaries." Furthermore, the Act states that "Local governments have the initiative for planning and for implementing the provisions of this chapter, and the Commonwealth shall act primarily in a supportive role by providing oversight for local governmental programs, by establishing criteria as required by this chapter, and by providing those resources necessary to carry out and enforce the provisions of this chapter."

**Agricultural and Forestal Districts**: The Local Agricultural and Forestal Districts Act (§15.2-4400 et seq.) indicates that "It is state policy to encourage localities of the Commonwealth to conserve and protect and to encourage the development and improvement of their agricultural and forestal lands for the production of food and other agricultural and forestal products. It is also state policy to encourage localities of the Commonwealth 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, aesthetic quality and other environmental

purposes. It is the purpose of this chapter to provide a means by which localities may protect and enhance agricultural and forestal lands of local significance as a viable segment of the local economy and as an important economic and environmental resource." Agricultural/forestal districts qualify for reduction in property tax rate under land use assessment.

**Land Use Assessment**: Authorized by the Code of Virginia (§58.1-3229 et seq.), a land use assessment program provides for the deferral of real estate taxes on real estate that qualifies for agricultural, horticultural, forestry and/or open space uses. Assessed values under the program are generally less than those estimated at fair market value. The purpose of such a program is generally to encourage the preservation of land, the protection of natural resources, the supply of safe water, and the promotion of orderly land use planning and development.

**Sliding Scale Property Tax Rate**: Used in conjunction with a land use assessment program, local governments may reduce the tax rate on properties that agree to remain in their current use for up to 20 years. The sliding scale of tax rates is based upon the length of the agreement.

**Sliding Scale Zoning**: This zoning method targets land in agricultural zoning districts and is designed to preserve agricultural land and open space. Sliding scale zoning allows a range of density depending on the size of the original lot. As parcel size increases, the density of allowable dwelling units decreases, enabling the preservation of large contiguous tracts of land that can still be farmed or simply preserved as open space. Lots that have been created from a parent parcel cannot be subdivided.

**Local "Right-to-Farm"**: Virginia's Right-to-Farm laws (§3.1-22.28 et seq.) make any agricultural or silvicultural operation a "by right" use in agriculturally zoned areas. Special use permits cannot be required for operations in these areas and these operations cannot be found guilty of nuisance. The local variation of Right-to-Farm triggers notification to new or potential purchasers of land in agricultural zones of daily farming activities and possible "inconveniences" (e.g. dust, odors, noise).

**State Forest**: The Virginia Dept. of Forestry (DOF) manages state forests by balancing a self-supporting operation with multiple benefits, such as timber management, recreation, aesthetics, wildlife, water quality, and stability of the local economy. Operations are funded by the sale of forest products, with twenty-five percent of this revenue returned to the county in which the state forest is located. Special demonstration, research, and recreation areas are sometimes featured in state forests.

**Virginia Natural Area Preserves System**: Administered by the Department of Conservation and Recreation's Division of Natural Heritage, the Virginia Natural Area Preserves System protects examples of some of the rarest natural communities and rare species habitats in the Commonwealth. Natural Area Preserves are managed for their rare plants, animals and natural communities. Natural Area Preserve dedication places legally binding restrictions on future activities on a property. Preserve ownership

includes the Department of Conservation and Recreation, local governments, universities, private citizens, and non-profit conservation organizations. Access ranges from low-intensity public access to owner permission.

**Virginia Estuarine and Coastal Research Reserve System**: The Virginia Estuarine and Coastal Research Reserve System (VECRRS), created in the Code of Virginia (28.2-1103 et seq.), protects estuarine and coastal lands for research and long-term monitoring that supports the Commonwealth's coastal resource management efforts. The Virginia Institute of Marine Science administers the Reserve System, which is coordinated with the Chesapeake Bay National Estuarine Research Reserve in Virginia. A 121-acre research reserve site is located in the Dragon Run watershed.

# APPENDIX D: Description of Farm Programs

The **Conservation Reserve Program** (NRCS, 2003a) reduces soil erosion, protects the Nation's ability to produce food and fiber, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filterstrips, or riparian buffers. Farmers receive an annual rental payment for the term of the multi-year contract. Cost sharing is provided to establish the vegetative cover practices.

The **Conservation Reserve Enhancement Program (CREP)** (NRCS, 2003a) aims to improve Virginia's water quality and wildlife habitat by offering rental payments to farmers who voluntarily restore riparian buffers, filter strips and wetlands through the installation of approved conservation practices. CREP is an enhancement to the federal *Conservation Reserve Program*.

The Virginia CREP has two programs. The *Chesapeake Bay CREP* targets Virginia's entire bay watershed and calls for the planting of 22,000 acres of riparian buffer and filter strips as well as 3,000 acres of wetland restoration. The *Southern Rivers CREP* targets watersheds outside the bay drainage basin and will establish 8,500 acres of riparian buffer and filter strip plantings and 1,500 acres of wetland restoration.

The **Environmental Quality Incentives Program (EQIP)** (NRCS, 2003a) was reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill) to provide a voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible national goals. EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agricultural land.

EQIP offers contracts with a minimum term that ends one year after the implementation of the last scheduled practices and a maximum term of ten years. These contracts provide incentive payments and cost-shares to implement conservation practices. Those engaged in livestock or agricultural production on eligible land may participate. EQIP activities are carried out according to an environmental quality incentives program plan of operations developed in conjunction with the producer that identifies the appropriate conservation practice or practices to address the resource concerns. The practices are subject to NRCS technical standards adapted for local conditions. The local conservation district approves the plan.

EQIP may cost-share up to 75 percent of the costs of certain conservation practices. Incentive payments may be provided for up to three years to encourage producers to carry out management practices they may not otherwise use without the incentive. However, limited resource producers and beginning farmers and ranchers may be eligible for cost-shares up to 90 percent. Farmers and ranchers may elect to use a certified third-party provider for technical assistance. An individual or entity may not receive, directly or indirectly, cost-share or incentive payments that, in the aggregate, exceed $450,000 for all EQIP contracts entered during the term of the Farm Bill.

The program targets watersheds, regions, and areas of special environmental sensitivity or other areas facing significant soil, water or related natural resources concerns. By encouraging voluntary landowner participation in these areas, EQIP supports the development and implementation of conservation plans in critical areas. Developed in cooperation with professional resource managers, the plans encompass both scientific management principles, and landowner objectives.

The **Farm and Ranch Lands Protection Program** (NRCS, 2003a) provides matching funds to help purchase development rights to keep productive farm and ranchland in agricultural uses. Working through existing programs, the U.S. Department of Agriculture (USDA) partners with State, tribal, or local governments and non-governmental organizations to acquire conservation easements or other interests in land from landowners. USDA provides up to 50 percent of the fair market easement value.

To qualify, farmland must: be part of a pending offer from a State, tribe, or local farmland protection program; be privately owned; have a conservation plan for highly erodible land; be large enough to sustain agricultural production; be accessible to markets for what the land produces; have adequate infrastructure and agricultural support services; and have surrounding parcels of land that can support long-term agricultural production.

The **FarmLink Program** (Virginia Farm Bureau, 2003) connects farmers who are looking to sell, but wish to see their farms remain active, with people who would like to farm. Currently, the "highest and best use" of most farmland is considered to be in housing lots and shopping malls. As farmers retire or move on, they are often forced to divide up their farmland to pay off debt. In other cases, the land is worth so much more as a "development" site that the farmer finds it impossible to turn this option down. The goal of the FarmLink Program is to curb this trend and maintain the state's agricultural heritage for generations to come.

Prospective farmers and farmers searching for options for their farms each fill out an application form. This information is entered into a database so that farms may be sorted by location, size, type and other features that a potential buyer might be seeking. When it appears that a match is possible, the buyer and seller are both contacted by the FarmLink coordinator. If the farm owner agrees to meet the potential buyer, they are connected. Because many people who are looking to farm cannot afford to buy a farm outright, sellers are asked to consider long-term leases and work-in options in addition to immediate sale.

The **Forest Land Enhancement Program** (FLEP) (NRCS, 2003a) was part of Title VIII of the 2002 Farm Bill. FLEP embodies a commitment to sustainable forest management to enhance the productivity of timber, fish and wildlife habitat, soil and water quality, wetlands, recreational resources, and aesthetic values of forest land. It also establishes a coordinated and cooperative Federal, State, and local sustainable forestry program for

the establishment, management, maintenance, enhancement, and restoration of forests on nonindustrial private forest land.

FLEP is a voluntary program designed to provide technical, educational, and cost-share assistance to promote sustainability of non-industrial private forest. State forestry agencies develop State Priority Plans that provide details for how the FLEP funds will be utilized, including minimum acres, maximum acres, aggregate payment, use for technical, educational and cost-share assistance, and all other factors for the program. Landowners are required to have a forest management plan to be eligible for cost-share. The practices to be cost-shared and the cost-share rate are described in the State Priority Plan.

The cost-share practices are limited to the treatment of 1,000 acres per year on non-industrial private forest (NIPF) with an aggregate payment not to exceed $100,000 for the life of this Farm Bill. A waiver for the treatment of up to 5,000 acres is available if significant public benefit is shown. There is no limit to the amount of forest land owned by an individual as long as the person qualifies as an NIPF owner.

The **Wetlands Reserve Program** (NRCS, 2003a) is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. The USDA Natural Resources Conservation Service (NRCS) provides technical and financial support to help landowners with their wetland restoration efforts. The NRCS goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection.

The **Wildlife Habitat Incentives Program (WHIP)** (NRCS, 2003a) is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. NRCS provides both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat. WHIP agreements between NRCS and the participant generally last from 5 to 10 years from the date the agreement is signed.