

# Dragon Run Watershed Management Plan

September, 1996



This project was funded, in part, by the Virginia Coastal Resources Management Program of the Dept. of Environmental Quality through Grant #N037020091-01 of the National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resource Management, under the Coastal Zone Management Act of 1972, as amended. The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its subsidiaries or DEQ.



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# Dragon Run Watershed Management Plan

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## INTRODUCTION

The Dragon Run is a brackish water, tidal/nontidal stream which flows forty miles through the Virginia Middle Peninsula counties of Essex, King and Queen, Middlesex, and Gloucester. Fed by underground springs, surface runoff and numerous feeder swamps, the Dragon Run twists and turns, meandering through the four-county area, eventually emptying at the headwaters of the Piankatank River. The stream, along with the surrounding Dragon Run Swamp, forms an ecologically unique system. A system of excellent water quality and numerous and diverse species of flora and fauna. It is characterized by dense stands of hardwoods with occasional upland ridges extending to the stream's edge. It supports both recreational fishing and excellent game and nongame wildlife. There is very little evidence of man's presence, essentially maintaining a primitive character throughout the entire system.

In 1974 the Smithsonian Institution reviewed and subsequently ranked 232 ecologically significant areas throughout the Chesapeake Bay region. The Dragon Run System was ranked second. Prior to and since that time, concern has been voiced regarding the protection of this valuable natural resource. Early efforts to offer protection came in 1970, and most recently, again in 1985, to have the Dragon Run designated as a scenic river by the Virginia General Assembly. To date, these efforts have not achieved conservation of this valuable resource.

In 1984, concerned citizens and local government officials participated in a two-day Dragon Run Symposium conducted by the Middle Peninsula Planning District Commission and funded through a grant from the Virginia Environmental Endowment. The purpose of the symposium was to bring landowners, elected officials, and other interested parties together to discuss and heighten awareness of the legal, developmental, environmental and political issues which surround the Dragon Run System and, in addition, provide a process for rational decision making with regard to its future.

As a direct result of the symposium, the Dragon Run Steering Committee was formed and held its first meeting in February 1985. The membership included Dragon Run landowners and local government officials, all of whom were acutely aware of the need to provide protection to the Dragon Run System. Due to a lack of staff support and a lack of direction, the Committee had little success and, subsequently, became inactive.

In early 1987, the Committee experienced a resurgence and was reactivated. This new energy was in part due to a commitment of resources and staff support from the Middle Peninsula Planning District Commission and the Chesapeake Bay Foundation, and continued concern and interest on the part of landowners and local officials.

The reactivated Committee was charged with the task of developing among the property owners and local governments an awareness of:

- (1) The magnitude of the Dragon Run's value as an important resource to the region, the State, and the Chesapeake Bay;
- (2) The nature and impacts of potential future development;
- (3) Potential problems and dangers to this resource and the Bay if the Dragon continues without a coordinated development policy;
- (4) Cooperative options and alternatives (regulatory and non-regulatory mechanism) available to landowners in their efforts to influence the future protection and rational husbandry of the resources which exist in and along the Dragon.

Since that time, the Dragon Run Steering Committee has remained active and very committed. Originally scheduled to meet quarterly, the Committee soon decided monthly meetings were necessary in order to tackle the numerous issues. Early on, the Committee was able to identify five issues that needed to be addressed. They are as follow:

- (1) Development Management
- (2) Forestry Management
- (3) Agricultural Management
- (4) Recreational Access
- (5) Wildlife Management

The Committee evaluated each of the issues and prioritized them in the order in which they should be addressed. As a result, it was determined that Development Management would be the first issue to be addressed.

The Steering Committee went through a very extensive and thoughtful approach in examining the development issue. They discussed current land use controls, conservation areas, buffers, setbacks, forestry practices, soil types, flood zones, topography, and numerous other related topics. By September 1987, the Committee reached a point of consensus. That consensus was that the Dragon Run would best be conserved and protected from development through changes and/or incorporation of a conservation district within the zoning ordinances of each of the four counties. The conservation district would be known to the Committee as the Dragon Run Conservation District (DRCD). The district was essentially based on wet soil types. It also includes a minimum 100-foot buffer strip, which is found adjacent to the District's soils.

The Committee's proposed DRCD was only a first step in the protection of the Dragon Run. It was considered to be the absolute minimum necessary to provide protection to Dragon Run. The DRCD was only considered to be a "safety net" and should not be construed to be final or absolute.

There was much more to be done and many more issues to be addressed.

The significance of the DRSC is that it was not a mechanism that passed a directive from the top down, but instead a consensus was developed at the bottom and passed up. It is a grass roots effort...landowners, elected officials, citizens, private organizations, and State and Federal officials all working together for a common cause.

Since the enactment of the Dragon Run Conservation District by Essex, King and Queen, and Middlesex Counties, the Middle Peninsula Planning District Commission and the Dragon Run Steering committee have remained active in pursuing management issues of the Dragon Run watershed.

In 1994, the Steering Committee and MPPDC adopted the Dragon Run Access Plan. The Access Plan set out management policies with emphasis on conservation-friendly access rather than high activity recreation. The concepts of regional coordination of access points and managed access were explored to provide a system with low impact to the resource and to land owners.

Since 1994 the MPPDC, along with the DRSC, has been developing the Dragon Run Watershed Management Program. The Dragon Run Watershed Management Program is providing a comprehensive study of land use, water quality, pollutant loadings, and local government policies related to the Dragon Run. The program culminates in the development of this planning document, the Dragon Run Watershed Management Plan.

### **Significant Studies**

In 1971 Virginia's Commission of Outdoor Recreation published a report on the Dragon Run detailing the Commission's study under the Scenic Rivers Act of 1970. The Dragon Run was the first Virginia river to be studied under the Act and was recommended for designation. However, due to opposition from landowners fearing Scenic River status would encourage greater use of the stream, the designation was never adopted by the General Assembly.

The Smithsonian Institute's Center for Natural Areas published "Natural Areas of the Chesapeake Bay Region: Ecological Priorities" (1974), in which the Dragon Run was listed as the second most significant Chesapeake Bay habitat and water body. The highest priority water body was located in Maryland, making the Dragon Run Virginia's most significant tributary stream to the Bay.

## Description of Watershed

### Background

The Dragon Run is a forty-mile stream characterized by extensive non-tidal and tidal cypress swamp. The watershed consists of 140 square miles, of which 10% are wetlands. The watershed is largely undeveloped and is recognized by the Smithsonian Institute as Virginia's most pristine water body to the Chesapeake Bay. The Dragon Run Watershed is located in the Counties of Essex, Gloucester, King and Queen, and Middlesex.

### General Characteristics

**Total Area** 140.3 square miles  
**Area within Middle Peninsula** 140.3 square miles

<u>Locality</u>	<u>Watershed Area(sq.miles)</u>	<u>% Watershed</u>	<u>% Locality</u>
Essex	28.9	21	17
Gloucester	8.9	6	3
King and Queen	72.3	52	16
Middlesex	30.0	21	22

### Land Cover Classification

<u>Land Class</u>	<u>Square Miles</u>
High Intensity-Urban	0
Low Intensity-Urban	0.52
Herbaceous-Urban	0.33
Woody-Urban	0.12
Herbaceous (Field)	39.41
Woody (Forest)	99.25
Exposed (Bare)	0
Water	0.13
Emergent Wetlands	0.53
Total Land	140.17

**% Undeveloped Lands: 99.3**

# Dragon Run Watershed Management Plan

## Land Cover Classification



This map product was funded, in part, by the Department of Environmental Quality's Coastal Resource Management Program under the authority of 28VAC2-207.01 of the Uniform Code and Regulations Administration, Office of State and Coastal Resource Management, under the Coastal Zone Management Act of 1972, as amended.

The Dragon Run watershed is relatively undeveloped as compared to other Middle Peninsula watersheds. The percent undeveloped land (99.3%) is third among the region's 21 watersheds as delineated by the state Departments of Conservation and Recreation and Environmental Quality. Forest lands comprise of 71% of the watershed, and field and farm lands make up 28% of the area.

The primary activities impacting the watershed from forest lands is the harvesting of timber, which may contribute to sedimentation if BMPs are not employed. Timber harvest also alters wildlife habitat, however, disturbance may be temporary, as undergrowth and the development of a new stand of trees may simulate a natural forest succession process.

Farm lands in use without BMP measures may potentially contribute to water quality degradation through nutrient enrichment from fertilizer and animal wastes runoff. While the Dragon Run appears to develop significant oxygen depletion during the summer, this is likely due to the decay of swamp biomass than to algal blooms resulting from nutrient enrichment.

Urbanization and suburbanization of the rural areas are major concerns in the Middle Peninsula region. The Dragon Run watershed has seen some commercial growth along the Route 17 corridor near Saluda, primarily a fast food and grocery store, with more retail stores proposed. There also exists the potential for the conversion of farm lands to residential development as farming becomes less viable economically.

### **Future Land Uses**

**Essex:** The Essex County Comprehensive Plan (1991) Land Use Plan shows the entire County portion of the Dragon Run Watershed to be designated as "Countryside District" which is intended to limit development below a level requiring substantial county services. Subdivision would be limited to one acre per five acres owned.

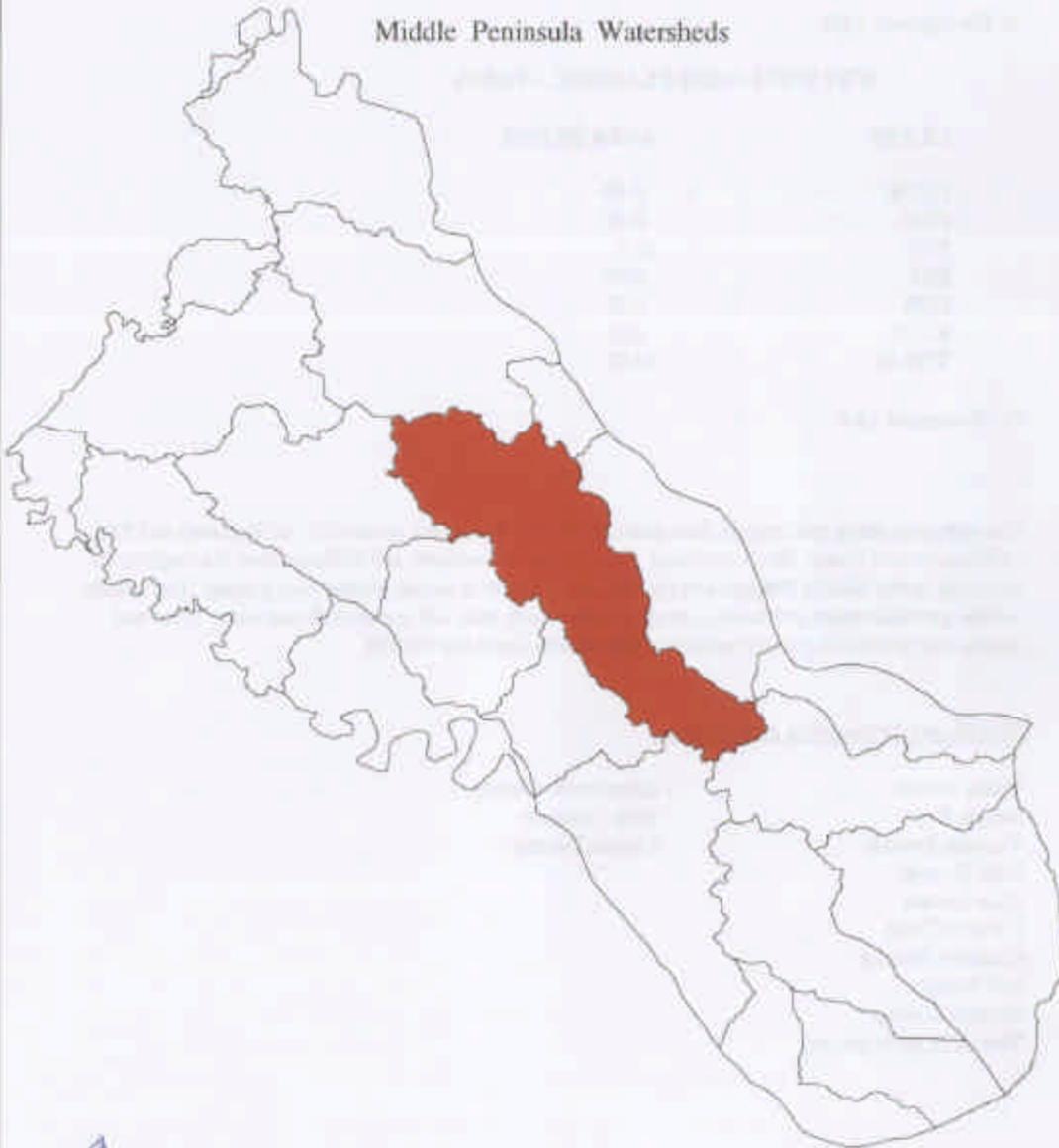
**Gloucester:** The 1991 Gloucester Land Use Plan shows the majority of Dragon Run Watershed here as a "Rural Countryside District" with a "Rural Service Center" located at Glenss. The Rural Countryside District is intended to primarily maintain farmlands and woodlands. The Rural Service Center District is designed to provide for limited commercial and industrial needs of rural areas with some residential development.

**King and Queen:** The 1994 Comprehensive Land Use Plan show the entire Dragon Run Watershed here as a "Rural Development Area" whose components are forests, agriculture, rural residential, small subdivisions, and rural village centers.

**Middlesex:** The Future Land Use Map of the 1994 Plan shows the majority of the Watershed as rural-open space. The area around Saluda and along Route 17 near Saluda are shown as areas for Commercial and Light Industrial growth, including the development of water and sewer utilities.

# Dragon Run Watershed Management Plan

## Middle Peninsula Watersheds



The map production was funded, in part, by the Department of Environment, Quality & Economic Development, Michigan through funds of the Department of the Natural Resources and Michigan Department of Environment, Quality & Economic Development under the Coastal Zone Management Act of 1972, as amended.

**Floodplain Area:** 21.17 square miles

**% Floodplain:** 15.0

**NWI WETLANDS CLASSIFICATIONS**

<b>CLASS</b>	<b>AREA (SQMI)</b>
L1UB	0.10
PEM	0.72
PFO	10.9
PSS	2.49
PUB	0.56
R1UB	0.06
TOTAL	14.83

**% Wetlands:** 10.6

The wetlands along the Dragon Run primarily PFO - Palustrine (nontidal) and Forested and PSS - Palustrine and Scrub-Shrub classified. These types of wetlands are different than the majority of wetlands in the Middle Peninsula in that the plant matter is woody rather than grasses. The woody habitat provides more extensive root structures, which hold soil and absorb nutrients. Trees and shrubs also provide a greater variety of habitat and foods for wildlife.

**Significant Tributaries and Swamps**

White Marsh	Courthouse Swamp
Meggs Bay	Briery Swamp
Yorkers Swamp	Church Swamp
Exol Swamp	
Zion Branch	
Carvers Creek	
Contrary Swamp	
Mill Stream	
Holmes Swamp	
Timber Branch Swamp	

# Dragon Run Watershed Management Plan

## Floodplain and Wetlands



■ 100 Year Floodplain  
■ Wetlands



This map product was created, in part, by the Department of Transportation (DOT) Coastal System Management Program through Grant # 6647022401 of the National Oceanic and Atmospheric Administration (NOAA) Office of Coastal Zone Management, under the Coastal Zone Management Act of 1972, as amended.

## Public Access Areas

<b>SITENAME</b>	<b>ROADNO</b>	<b>PARKING</b>
Wares Bridge	Rt. 602	9
New Dragon Bridge	Rt. 603	9

**Sites/100sq.mi.: 1.4**

## Natural Heritage Species

<u>Type</u>	<u>GlobalRank</u>	<u>StateRank</u>	<u>Federal</u>
Natural Community			
Vascular Plant	G3G4	S2	
Vascular Plant	G4	S2	
Vascular Plant	G3	S2S3	3C

**Species/10 sq.mi.: 0.3**

G3 - Globally rare to uncommon - 20 -100 occurrences or populations

G4 - Globally common Over 100 occurrences or populations

S2 - Very rare in the state 5 - 20 occurrences or populations

S3 - Rare to uncommon in state 20 -100 occurrences or populations

3C - Former Federal Threatened or Endangered candidate

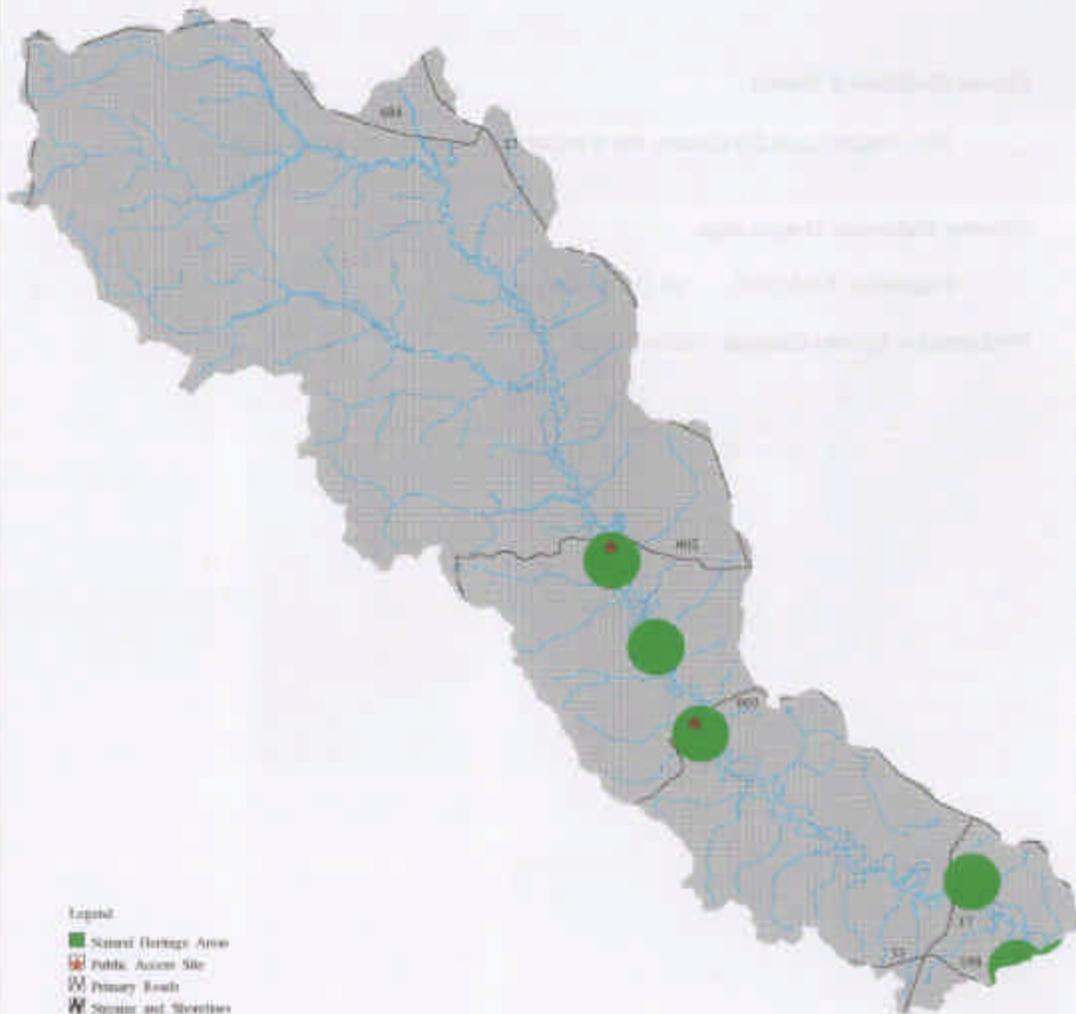
## Smithsonian Rank

The Smithsonian Institute ranked the Dragon Run as the second highest priority water body in the Chesapeake Bay region for ecological significance. This was the highest ranked Virginia water body.

**State Critical Areas:** 1st of 8 for the Middle Peninsula

# Dragon Run Watershed Management Plan

## Public Access and Natural Heritage Areas



This map production was funded, in part, by the Department of Environmental Quality's Coastal Resource Management Program through Grant # 5443020761 of the National Coastal and Atmospheric Assessment (NCAA) of Coastal and Ocean Resource Management under the Coastal Zone Management Act of 1972, as amended.

**VPDES Permits**

<b>VANUM</b>	<b>OWNER</b>	<b>OUTFALL</b>
VA0075302	Miller's Square Subdiv. WTP	001
VA0083011	Pitts Lumber Company Inc.	001
VA0028461	Rappahannock Community College	001

**Closed Shellfishing Waters**

The Dragon Run is Freshwater, but is technically closed to shellfish harvesting.

**Citation Fisheries:** Dragon Run

Freshwater 1984-1994      60 Total/6 Species

**Predominate Species Caught:** Yellow Perch

# Dragon Run Watershed Management Plan

## VPDES Permit Locations & Closed Shellfishing Waters



This map was prepared in cooperation with the Department of Environmental Quality's Coastal Resource Management Program through Grant # 10-12-02741 to the National Coastal and Estuarine Assessment (NECA) of Great and Coastal Resource Management under the Coastal Zone Management Act of 1972 as amended.

**Population Density: 65.0 People/sq.mi.**

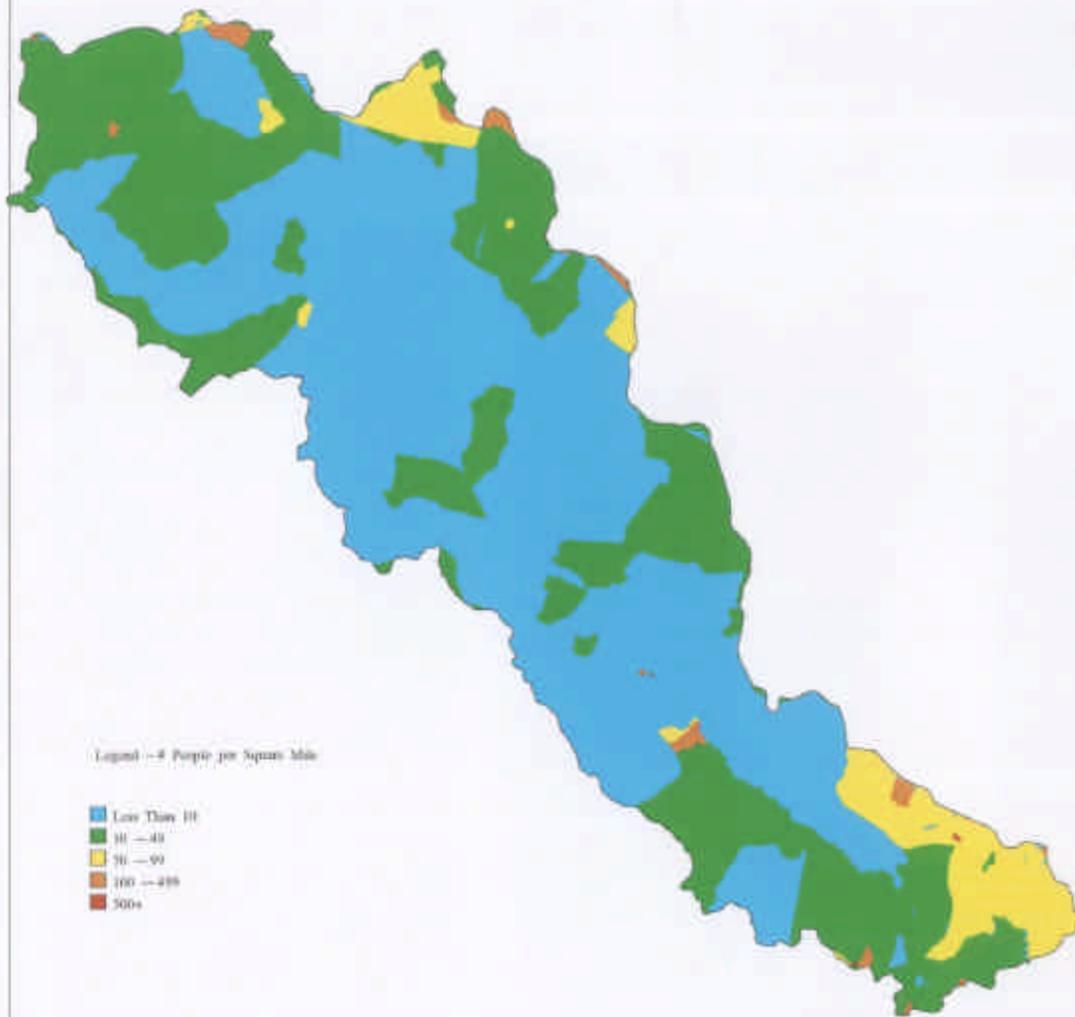
Much of the population is concentrated in the Village of Saluda.

**Significant Villages or Places**

Glenns  
Ino  
Mascot  
Jamaica  
Warner  
Stormont  
Saluda

# Dragon Run Watershed Management Plan

## Population Density



Legend -- # People per Square Mile

- Low Than 10
- 10 -- 49
- 50 -- 99
- 100 -- 499
- 500+



This map product was funded, in part, by the Department of Environmental Quality's Coastal Resource Management Program through Grant # 54430020101 of the National Coastal Act (ARSH2010; ARSH2010A; 1990; 1991) and Coastal Resource Management under the Coastal Zone Management Act of 1972, as amended.

**Comprehensive Plan - % Development Zones: 3.6 = 5 Sq. Miles**

# Dragon Run Watershed Management Plan

## Generalized Future Land Use

Based On Local Comprehensive Plans



- Legend
- Development Zones
  - Primary Road
  - Streams and Shorelines



This map production was funded, in part, by the Department of Environmental Quality's Coastal Resources Management Program through Order # 20030002701 of the Federal Clean Water Act, as amended.

## **Plan Methodology**

The development of the Dragon Run Watershed Management Plan involved the evaluation of numerous data, collection and testing of water samples, discussions with various specialists in the topics studied, and perhaps most importantly, the dedication and deliberation of the members of the Dragon Run Steering Committee.

The Dragon Run Steering Committee studied each issue addressed in the plan, bringing their local knowledge and perspective of the Dragon Run to bear in the development of the policies contained herein. The Committee meetings generally included speakers from the issue fields in the plan; land development, forestry, water uses, and wildlife habitat. After presentations by speakers, the DRSC would enter into discussion on the topic. The MPPDC staff noted the points of the speakers and the Steering Committee, and developed issue discussion papers, which formed a basis for further debate and evaluation by the Committee. After issues evaluation and discussion, the staff presented a menu of policy options to the Committee. These options span the range of "what's already being done" to "major overhauls" in the way localities and others manage the watershed. The DRSC evaluated each option and rated them as to suitability to the management issue and the practicality of implementation and acceptance by both local government and the landowners. Each policy was rated individually on its own merits with a score of five (5) stars as the most highly recommended policy option, to a score of one (1) star as the least recommended policy alternative.

## **Land Use/Water Quality Model**

The use of the Chesapeake Bay Program Land Use data provides the basis for the Water Quality Model described here for the Dragon Run Watershed. Three factors are pertinent to the prediction of non point source pollutant loadings. The first factor is the existing land cover classifications, and the existing farming and development practices. The second factor is the future land use as described in the counties' comprehensive plans as a means to determine the future development types and potential. Finally, the projected population growth and land value growth for each locality brings a more realistic picture of the development growth potential within the Watershed.

Based on the existing land cover, the following table shows Dragon Run Watershed land uses by locality.

**Present Land Use**

(In Acres)	<u>Essex</u>	<u>Gloucester</u>	<u>King&amp;Queen</u>	<u>Middlesex</u>
Low Intensity Urban	102	51	70	51
Herbaceous Urban	6	32	0	134
Woody Urban	0	26	0	32
Herbaceous - Conventional Till	2789	383	4683	1968
- Conservation Till	3521	225	5032	2049
Woody	8678	3770	28224	11405

**Present Annual Nitrogen Export**

(In Pounds/Year)	<u>Essex</u>	<u>Gloucester</u>	<u>King&amp;Queen</u>	<u>Middlesex</u>
Low Intensity Urban	469	235	322	235
Herbaceous Urban	18	90	0	375
Woody Urban	0	34	0	42
Herbaceous -Conventional till	51,875	7123	87,104	36,605
-Conservation till	53,871	3443	76,990	31,350
Woody	<u>11,281</u>	<u>4901</u>	<u>36,691</u>	<u>14,827</u>
Total Load	<b>117,514</b>	<b>15,826</b>	<b>201,107</b>	<b>83,434</b>

**Total For Watershed 417,881**

**Present Annual Phosphorus Export**

(In Pounds/Year)	<u>Essex</u>	<u>Gloucester</u>	<u>King&amp;Queen</u>	<u>Middlesex</u>
Low Intensity Urban	672	336	461	336
Herbaceous Urban	14	71	0	299
Woody Urban	0	6	0	7
Herbaceous -Conventional till	7635	736	11756	4862
-Conservation till	4796	462	7384	3054
Woody	<u>1041</u>	<u>452</u>	<u>3387</u>	<u>1369</u>
Total Load	<b>14,158</b>	<b>2,063</b>	<b>22,988</b>	<b>9,927</b>

**Total For Watershed 49,136**

**Population Growth-Land Use**

<b>(In Acres)</b>	<b><u>Essex</u></b>	<b><u>Gloucester</u></b>	<b><u>King&amp;Queen</u></b>	<b><u>Middlesex</u></b>
<b>Low Intensity Urban</b>	104	68	75	57
<b>Herbaceous Urban</b>	6	42	0	150
<b>Woody Urban</b>	0	35	0	36
<b>Herbaceous -Conventional Till</b>	2789	372	4682	1962
<b>-Conservation Till</b>	3520	218	5031	2042
<b>Woody</b>	8677	3352	28222	11392

**Predicted Annual Nitrogen Export**

<b>(In Pounds/Year)</b>	<b><u>Essex</u></b>	<b><u>Gloucester</u></b>	<b><u>King&amp;Queen</u></b>	<b><u>Middlesex</u></b>
<b>Low Intensity Urban</b>	478	313	345	262
<b>Herbaceous Urban</b>	18	118	0	420
<b>Woody Urban</b>	0	46	0	46
<b>Herbaceous -Conventional till</b>	51,875	6919	87,085	36,492
<b>-Conservation till</b>	53,856	3335	76,974	31,243
<b>Woody</b>	<u>11,280</u>	<u>4358</u>	<u>36,689</u>	<u>14,810</u>
<b>Total Load</b>	<b>117,507</b>	<b>15,089</b>	<b>201,093</b>	<b>83,273</b>

**Total For Watershed      416,962**

**Predicted Annual Phosphorus Export**

<b>(In Pounds/Year)</b>	<b><u>Essex</u></b>	<b><u>Gloucester</u></b>	<b><u>King&amp;Queen</u></b>	<b><u>Middlesex</u></b>
<b>Low Intensity Urban</b>	685	448	494	376
<b>Herbaceous Urban</b>	14	94	0	335
<b>Woody Urban</b>	0	8	0	8
<b>Herbaceous -Conventional till</b>	7634	714	11753	4845
<b>-Conservation till</b>	4795	448	7382	3043
<b>Woody</b>	<u>1041</u>	<u>402</u>	<u>3387</u>	<u>1367</u>
<b>Total Load</b>	<b>14,169</b>	<b>2,114</b>	<b>23,016</b>	<b>9,974</b>

**Total For Watershed      49,273**

**Comprehensive Plan Land Use**

<b>(In Acres)</b>	<b><u>Essex</u></b>	<b><u>Gloucester</u></b>	<b><u>King&amp;Queen</u></b>	<b><u>Middlesex</u></b>
<b>Low Intensity Urban</b>	102	51	70	1051
<b>Herbaceous Urban</b>	330	32	0	367
<b>Woody Urban</b>	330	26	0	265
<b>Herbaceous -Conventional Till</b>	2643	383	4683	1609
<b>-Conservation Till</b>	3337	225	5032	1675
<b>Woody</b>	8348	3770	28224	10672

**Predicted Annual Nitrogen Export**

<b>(In Pounds/Year)</b>	<b><u>Essex</u></b>	<b><u>Gloucester</u></b>	<b><u>King&amp;Queen</u></b>	<b><u>Middlesex</u></b>
<b>Low Intensity Urban</b>	469	235	322	4835
<b>Herbaceous Urban</b>	924	90	0	1028
<b>Woody Urban</b>	429	34	0	435
<b>Herbaceous -Conventional till</b>	49,160	7124	87,104	29,927
<b>-Conservation till</b>	51,056	3443	76,990	25,628
<b>Woody</b>	<u>10,852</u>	<u>4901</u>	<u>36,691</u>	<u>13,874</u>
<b>Total Load</b>	<b>112,890</b>	<b>15,827</b>	<b>210,107</b>	<b>75,727</b>
<b>Total For Watershed</b>	<b>414,551</b>			

**Predicted Annual Phosphorus Export**

<b>(In Pounds/Acre/Year)</b>	<b><u>Essex</u></b>	<b><u>Gloucester</u></b>	<b><u>King&amp;Queen</u></b>	<b><u>Middlesex</u></b>
<b>Low Intensity Urban</b>	672	336	461	6926
<b>Herbaceous Urban</b>	736	71	0	818
<b>Woody Urban</b>	73	6	0	58
<b>Herbaceous -Conventional till</b>	7236	736	11756	3974
<b>-Conservation till</b>	4545	462	7384	2496
<b>Woody</b>	<u>1002</u>	<u>452</u>	<u>3387</u>	<u>1281</u>
<b>Total Load</b>	<b>14,264</b>	<b>2,063</b>	<b>22,988</b>	<b>15,553</b>
<b>Total For Watershed</b>	<b>54,868</b>			

## Water Quality Monitoring Data

### Background

Weekly water quality monitoring began in April, 1994, along the Dragon Run. With assistance from the Richmond office of the Alliance for the Chesapeake Bay (ACB), suitable monitoring sites were selected and volunteer monitors trained. The water sampling protocols established by the ACB and the Virginia Department of Environmental Quality (DEQ) were utilized with slight modifications for the characteristics of the Dragon Run stream.

The basic data collected were:

Day	=	Day of observation
Time	=	Time of observation
WD	=	Water depth
DO	=	Dissolved oxygen
SC	=	Secchi depth
WT	=	Water temperature
AT	=	Air temperature
PH	=	pH
Color	=	Water Color

Salinity data (ACB protocol) were not collected since the Dragon Run is considered fresh water for its entire length. Also water flow observations were noted rather than tidal information since the greatest length of the Dragon Run is non-tidal.

The first year of collecting water quality data included six sites from the upper reaches to the mouth of the Dragon near the Piankatank River. Six primary volunteer monitors and three backup monitors were trained under the ACB protocol. After one year, three new primary monitors and one backup monitor were trained to replace monitors leaving the program. Two new sites were established to replace private property sites of those departing monitors. The new sites were distributed to provide coverage of the lost sites. As with the first year, the ACB assisted in training the volunteers through organized training and quality control sessions.

Of the eight total sites established over the two year monitoring program, five have and continue to provide consistent and timely monitoring data. These sites are:

DR1A	-	at Deer Chase on Piankatank
DR2	-	at Glens
DR3	-	at New Dragon Bridge
DR6	-	at Wares Bridge
DR7	-	at Byrds Bridge

## Site Data Analysis

For the remainder of this report, these five sites will be analyzed and discussed. Data from the other sites may be used to support observations at related sites.

### Site: DR1A-Deer Chase    Monitor: Jane Cooke

Site DR1A is located at the Deer Chase subdivision along the Piankatank River just below the confluence of the Dragon Run. This freshwater site does see tidal influence. The site has been monitored since April, 1995.

#### Summary for Site: DR1A

	<u>Time</u>	<u>WD</u>	<u>DO</u>	<u>SC</u>	<u>WT</u>	<u>AT</u>	<u>PH</u>
<b>Average</b>	1173	2.2	8.1	1.0	18.0	19.8	7.0
<b>Minimum</b>	800	.3	5.6	.1	2.0	1.0	4.0
<b>Maximum</b>	2000	10.5	14.1	7.2	29.5	32.0	8.0

**Number of observations: 65**

**Minimum date: 4/14/95**

**Maximum date: 09/04/96**

Data from this site serves to show many of the dissimilarities that the Dragon Run holds with other coastal waters including the Piankatank River. This Piankatank site shows a neutral pH, relatively high summer dissolved oxygen and wide variations in Secchi depth due to tidal fluctuations and wave action.

Site DR1A replaces Site DR1.

### Site DR2-Glenns    Monitor: Wayne Charnick

Site DR2 is located upstream of the Route 17 bridge in Gloucester, in the vicinity of the Rappahannock Community College at Glenns. The site is remote on private property and sampled from the bank. Surrounding lands are in forest and farm crop uses. The site has been monitored since April, 1995.

#### Summary for Site: DR2

	<u>Time</u>	<u>WD</u>	<u>DO</u>	<u>SC</u>	<u>WT</u>	<u>AT</u>	<u>PH</u>
<b>Average</b>	1785	.6	5.0	.6	21.6	23.4	6.9
<b>Minimum</b>	1227	.2	1.3	.2	9.5	15.5	6.0
<b>Maximum</b>	1915	1.0	8.0	1.0	27.5	31.0	9.0

**Number of observations:** 20

**Minimum date:** 4/05/95

**Maximum date:** 8/30.95

Data at this site shows some of the characteristic qualities of the Dragon Run. Examples are low warm weather dissolved oxygen and slightly acidic pH. The low Secchi depth and water depth are due to sampling close to the shoreline.

**Site:** DR3-New Dragon Bridge      **Monitors:** Jim Uzel, James Riley

Sampling of site DR3 is conducted from the New Dragon Bridge. This site has been sampled since November, 1994.

#### Summary for Site: DR3

	<u>Time</u>	<u>WD</u>	<u>DO</u>	<u>SC</u>	<u>WT</u>	<u>AT</u>	<u>PH</u>
<b>Average</b>	1528	1.6	6.3	1.3	16.3	18.9	6.5
<b>Minimum</b>	1045	.4	1.9	.4	.5	- 1.0	6.0
<b>Maximum</b>	1830	4.0	12.7	3.0	28.0	30.0	7.2

**Number of observations:** 50

**Minimum date:** 11/02/94

**Maximum date:** 07/15/96

The complete year of data for this site provides a good example of the seasonal characteristics of the swamp waters of the Dragon Run. Basic factors are low summer flow, combined with warm water temperatures result in very low dissolved oxygen readings. Conversely, the high winter flows and cold temperatures provide high dissolved oxygen.

**Site:** DR6-Wares Bridge      **Monitors:** Jim Uzel, Mark Northam

Sampling at Wares Bridge began in April of 1994. The Wares Bridge crossing is located centrally in the watershed and is generally the uppermost canoeable area of the stream.

#### Summary for Site: DR6

	<u>Time</u>	<u>WD</u>	<u>DO</u>	<u>SC</u>	<u>WT</u>	<u>AT</u>	<u>PH</u>
<b>Average</b>	1435	3.8	6.6	1.9	15.6	18.7	6.4
<b>Minimum</b>	900	0.4	2.0	0.5	0.0	- 1.0	6.0
<b>Maximum</b>	1810	4.1	13.6	3.9	30.0	35.0	6.8

**Number of observations:** 82

**Minimum date:** 4/15/94

**Maximum date:** 9/17/96

The acidic pH characteristic of the Dragon Run continues at this site. Tannic acid and acids resulting from the decomposition of carbon-based materials lower the pH in swamp waters. Water depth at this site was always greater than four meters (over 12 feet) at the bridge channel.

**Site: DR7-Byrds Bridge      Monitors: Dorothy Miller, Jim Uzel**

Site DR7 at Byrds Bridge is the uppermost sampling site for the Watershed program. Located at the Essex-King and Queen Counties line, the stream drains farm and forest lands. The Dragon Run at the bridge crossing is shallow and flows are generally low. Monitoring began in April, 1994.

#### **Summary for Site: DR7**

	<u>Time</u>	<u>WD</u>	<u>DO</u>	<u>SC</u>	<u>WT</u>	<u>AT</u>	<u>PH</u>
<b>Average</b>	1436	2.4	5.2	1.2	19.2	23.3	6.3
<b>Minimum</b>	900	1.7	0.4	0.2	0.0	3.0	6.0
<b>Maximum</b>	1940	4.0	14.7	3.2	33.5	38.0	7.0

**Number of observations:** 72

**Minimum date:** 4/24/94

**Maximum date:** 9/17/96

This water quality monitoring site showed the most visible and striking seasonal change in water quality characteristics. During the summers of 1994 and 1995, at times of extreme low flow and heat, the water color changed to a dark-chocolate milk color, Secchi depth was very low and dissolved oxygen was close to 1.0. The average DO for this site is also the lowest among the sites monitored.

#### **Summary**

With a total of over 290 water quality samples from eight different monitoring stations within the Dragon Run Watershed, the six monitoring parameters begin to show the characteristic or "base-line" information on the waters. To summarize, the following general characteristics can be interpreted:

- Dissolved Oxygen-     \$ Low of 1.1mg/ml-very close to anoxic conditions limits aquatic species in summer.  
                                \$ High of 12.7mg/ml-oxygen level supportive of aquatic life.  
                                \$ Seasonal pattern warm-low DO; cold-high DO.
- Secchi Depth-         \$ Low of 0.2\* meters (~8 inches)-highly turbid-algal bloom. \*0.1 meter at Piankatank site due to mud suspended by storm.  
                                \$ High of greater than 5 meters-very clear waters.  
                                \$ Again a seasonal pattern of summer stress.
- Water Temperature/Air Temperature
- \$ Parts of the Dragon Freeze over for periods of the winter.  
                                \$ Summer water temperatures as high as 33.5°C (93°F).  
                                \$ Water temperatures lag trends in air temperature.
- pH                         -     \$ Waters of the Dragon Run are acidic; coastal tidal waters are generally slightly basic in pH.  
                                \$ Swamp waters are normally acid due to acids released from biologic decomposition of carbon substances.

The collection of monitoring data for the Dragon Run is providing a starting point to evaluate and gauge the water body's health.

# Dragon Run Watershed

## Monitoring Sites



## **Land Development Issues**

### **Background**

Based on the Land Use data described earlier, the Dragon Run Watershed is projected to experience between 14% and 520% growth in land development. The low number being based on population projections, and the high number based on comprehensive plan designations. The population projection is likely the more probable scenario, however, the comprehensive plan land use changes reflect the types of land conversion planned for. There appears to be a near even split between future residential development (1096 acres) and future low intensity urban development (994 acres). Trends in rural residential development indicate that land conversion from farming and woodlands will occur most readily close to water amenities. In the case of the Dragon Run, this would be close to the main stem and also on the lower, deeper sections of the stream.

Low intensity urban development, on the other hand, will likely be centered along existing highway corridors where the ease of transportation plays a major role.

### **Issue -Farmland Conversion**

As rural residential development continues in the Middle Peninsula region, available open farmland may attract such development into the Dragon Run Watershed. Open farmland becomes a platform for new development as family farms become less viable and the new generation abandons farming as a livelihood. The large tracts of land can be bought relatively inexpensively when farms are sold. Generally, farmlands provide the developer with the lowest development costs since land is already cleared and tillable soils are well drained, thus best suited to onsite drain fields for sewage disposal.

The impacts of farm land conversion to residential land are manifold. The most obvious is the loss of a characteristic trait of the area, i.e. open farm fields to barren house lots. This aesthetic impact affects the visual character of the community. More tangible impacts are a permanent loss of productive farm land, higher human activity in wildlife areas and the increase in impermeable surfaces increasing stormwater runoff into streams. An increase in human activity in the watershed not only affects wildlife foraging patterns, but also begins to limit the hunting traditions of sportsmen, who must avoid populated areas.

Other characteristics of farms which could be lost to development include hedgerows which serve as windbreaks, soil stabilizer and small animal habitat; plant variety such as fruit trees, grains and legumes, the spillage of which provide food for wildlife; and active forest management of lands adjoining fields. The cumulative impacts of these losses could dramatically change the distribution of wildlife and alter the soil and plant community.

### **Problem Statement**

The conversion of farmland to residential development with the Dragon Run Watershed

may lead to decreased water quality, loss of wildlife habitat, loss of traditional sportsman activities, and a change in the visual quality of the landscape.

## **Policy Options**

- \*\*\*\*\* *Conservation Subdivision* -allows subdivision yield of current zoning but designed to preserve primary and secondary conservation areas. Delineates development areas and locates lot line based on open space access, views, and land form protection.
- \*\*\*\* *Dragon Run Conservation District* -100 ft. buffers of hydric soils and stream bank.--  
Comment: only protects areas immediate to stream bank and wetlands. Does not address land use conversion.
- \*\*\*\* *Chesapeake Bay Preservation Act Ordinances* -provides 100 foot buffers as Dragon Run Conservation District above. Also requires stormwater quality management for any land development within Resource Protection or Management Areas.--Comment: open spaces or prime farmland not protected.
- \*\*\* *Resource Husbandry Zoning District* -Middlesex currently employs a zoning district to protect farming and forestry uses. Allows 1 acre or larger subdivision per 50 acres of land. Such subdivision must be on unproductive land.--Comment: currently applies only to tracts of at least 100 acres in size.
- \* *Large Lot Subdivision* -permit only subdivision of farmland into large lots 10-50 acres each.--  
Comment: does not address the impacts of habitat loss or loss of productive farmlands.

## **Issue-New Waterfront**

Waterfront property in the Middle Peninsula commands a premium in price. The traditional waterfront has been those shorelines along the tidal-brackish waters of the region's rivers and bays, where boating access is available. As prime waterfront property becomes more expensive and less available, the real estate professionals have begun to market the waterfront qualities of the Dragon Run. The remote and pristine attributes of the Dragon Run have become selling points for the water body. Land ownership along the Dragon Run offers seclusion, wildlife, fishing, and hunting activities.

The extensive swampland surrounding much of the Dragon Stream limits access to the flowing channel. There becomes a potential for new landowners who were promised "waterfront" to forge the wetlands by constructing piers or filling low lying areas. At the few places where substantial stream banks do occur, landowners may be tempted to construct homes very close to the water body.

## **Problem Statement**

Lot subdivision and home construction along the Dragon Run presents disruption of the riparian corridor which impacts wetlands functions, water quality, and wildlife habitat.

## **Policy Options**

\*\*\*\*\* *Net Buildable Lot Subdivision* -all localities along the Dragon Run have minimum lot size restrictions for subdivisions based on their current zoning ordinance requirements. However, most do not have a net buildable area requirement. For example if a 5 acre minimum lot size is required for a particular zone and a 5 acre lot is subdivided along the Dragon run, 4 acres could be in wetlands with only one acre buildable. This results in higher densities on the buildable land than intended by the zoning ordinance. A Net Buildable Lot Subdivision would require the entire unbuildable or a large percentage thereof (80%) not be allowed to be counted toward lot size. Comment--this would prevent the use of wetlands area to make up a majority of a required building lot size.

\*\*\*\*\* *Chesapeake Bay Preservation Act Ordinances* -provides 100 foot buffer of stream and wetlands where building is prohibited. However, water dependant uses are allowed such as piers are allowed. Comment--extensive piers across wetlands should have some limitations.

\*\*\*\*\* *Dragon Run Conservation District* -same general provisions as CBPA ordinances above.

## **Issue -Commercial/Industrial Development**

U. S. Route 17 crosses and borders the Dragon Run Watershed for approximately 26 miles in length. This four lane divided highway provides a major north-south corridor for the Middle Peninsula and surrounding areas. In this role, U. S. 17 is the transportation link that attracts many types of commercial and industrial uses. Commercial uses within the watershed include fast food/convenience stores, grocery stores, shops, auto dealers, and repair shops, restaurants, and consumer services. Industrial uses include sawmills and a concrete plant.

## **Problem Statement**

The potential for commercial and industrial development along U. S. Route 17 is great. Since most of this corridor is on the fringe of the Dragon Run watershed, impacts to the main stem of the stream may not be very noticeable. However, if future development is scattered along the Route 17 corridor, there will be less opportunity for adequate control measures.

## **Policy Options**

\*\*\*\*\* *Commercial/Industrial Planned Units* -encourage local governments to provide for commercial and industrial zoning at specific locations planned in relation to road access, cross road traffic, site suitability, and planned infrastructure. Comment--commercial and industrial sites grouped together would benefit from shared stormwater management facilities and other shared infrastructure requirements.

## **Forestry Issues**

### **Background**

The Dragon Run Watershed is primarily covered in forest lands. Over 99 square miles of the 140 square mile area is forested (71%). Forest lands are an important component of the watershed's ecology and economy. Silvicultural activities compliment the agricultural uses of the land. These traditional forms of resource management continue to be the primary means of maintaining the environmental qualities of the Dragon Run.

Management and harvest of timber provides periodic cash flow to landowners. Many landowners also lease their forested lands to hunt clubs, which utilize the areas for hunting sports.

### **Forest Functions**

Forest cover along the streams and wetlands within the Dragon Run Watershed provide several important functions to the watershed system as a whole. Riparian forests, those along the stream banks, contribute to bank and soil stabilization; nutrient uptake; carbon deposition; thermal insulation and wind break; and habitat and food source for wildlife.

Riparian forests play an important role in the stabilization and function of streamside and swamp soils. Primarily through their massive root structures, certain trees can hold soil particles, absorb nutrients, and transfer oxygen in wet soils. In order to thrive in the wet conditions, several tree species have special adaptations in root and trunk structures, providing support for the tree in the soft, wet soil. Typically, these adaptations are in the form of extensive lateral roots, which are near or at the surface of the ground. A good example of this root support structure is found in cypress trees, which because of its roots and "knees" can grow in inundated swamp areas. The opposite is true of tap root species such as the pine tree, whose vertical main root requires drier soil conditions for support and oxygen.

Forested stream sides also provide the service of absorbing nutrients such as phosphorus and nitrogen, thereby preventing excess nutrients from reaching the stream waters. Again the root structure

plays an important role in absorbing nutrients with the lateral root mats providing the greatest nutrient absorption.

The leaf litter from trees plays a leading role in the characteristics of a forested swamp such as the Dragon Run. When the leaves fall from the trees they become a primary source of carbon for other life on the forest floor or in the water. This organic food source is fed upon by microscopic organisms, which in turn feed the higher ups on the food chain. The leaf litter carbon becomes a key element in the carbon cycle and oxygen cycle within the biologic community. In forested swamps, where leaf drop is high, the accumulation of carbon forms weak acids, which lowers the pH of the waters. The waters of the Dragon Run are slightly acidic (pH6.5) compared to neutral (7.0) and sea water (pH8.0). The acidic nature of the Dragon Run waters creates a unique habitat for the region.

One of the most important functions that riparian forests contribute to the stream ecology is that of thermal insulation. A tree canopy in full leaf provides shade to the waters in the warm months, while in the leaf off seasons sunlight can penetrate and warm the waters. Likewise the tree mass dissipates the cold season winds, thus moderating in stream temperatures. But, in the summer months the tree shade provides the greatest benefits to the stream ecology by cooling water temperatures. Cold water can absorb and hold more dissolved oxygen than warm water. In the summer, the combination of heat and low water flows combine to drive off oxygen in the water. Dissolved oxygen is necessary for aquatic life respiration.

In considering the importance of stream shading by riparian forests, it is necessary to realize that the shading must have continuity throughout the streamside area. A fragmented shading is much less effective than a continuous shading since water tends to retain heat much longer than air.

The combination of all the above mentioned functions results in the characteristics of valuable wildlife habitat and food supplies. Trees provide the necessary food source through seeds and sap. Nesting materials and shelter are found in the forest. Wildlife also depends of the riparian forest for foraging and territorial patterns, disruptions of which stress animal communities.

In addition to the ecological and economic functions, which are supplied by the forest within the Dragon Run watershed, there is a certain sense of admiration and awe, which one can realize when recognizing the beauty and longevity of the trees found in the swamp.

### **Issue - Timber Harvests**

The harvesting of timber from forest lands is an important part of the economy in the Middle Peninsula and the Dragon Run Watershed. Timber harvests are also the most outwardly obvious change in landscape character due to its visual impact. While visually striking, a timber cutting may not necessarily be detrimental to the ecology or environment within the Dragon Run watershed. The Virginia Department of Forestry, through its network of local and regional foresters, monitors timber

harvests, and works with the landowners and harvesters to ensure a quality cutting operation with little environmental impact. However rare, an improper timber cut can cause a long term detrimental impact to the Dragon Run ecological system. Some areas clear cut in the Dragon Run wetlands have never reforested. Recent harvests of timber without the utilization of Best Management Practices (BMPs) demonstrates the vulnerability of the watershed system. When a "bad cutting" operation does occur, there can be a significant time lag before Department of Forestry personnel or local government officials learn of the situation and can assess any possible violations of law.

The Department of Forestry (DOF) has published a booklet entitled "Forestry Best Management Practices For Water Quality In Virginia." The booklet provides for definition, purpose, condition of application, and specifications for Best Management Practices for Forestry activities. The first activity provided for in the booklet is pre-harvest planning whose purpose is for efficient harvest and the maintenance of water quality through the use of BMPs. The guidelines recommend a written pre-harvest plan, including a map of the site, location of BMPs and timing of harvest. The DOF offers assistance for pre-harvest planning. The DOF also has programs designed to educate landowners in effective forest stewardship, which is particularly important for landowners contemplating their first timber harvest. The DOF's [New Forest Landowners Guide](#) provides information on selling timber, state laws, wildlife enhancement, and forest stewardship.

The Streamside Management Zone (SMZ) is a primary BMP for the protection of stream banks and water quality. The guidelines specify an area of 50 feet or more on both sides of perennial streams or shorelines where harvesting is limited to a maximum of 50% loss of crown cover or 50 square feet of basal area per acre distributed evenly over the SMZ. This BMP also requires no disturbance of the organic litter layer of the forest and the limited use of logging equipment.

Other BMPs includes specifications and applications of haul roads, skid trails, decks and landings, drainage crossings, stream crossings, and water turn outs.

The DOF oversees and enforces two laws related to forestry and water quality. These are the Silvicultural Water Quality Law and the Debris in Stream Law. Under the Silvicultural Water Quality Law, the DOF can issue stop work orders and assess civil penalties if sediment is entering a stream from a forest harvest operation. The Debris in Stream Law provides criminal penalty for the blockage of navigable waters resulting from a timbering operation. Excepting these two laws, silvicultural activities are exempted from all other water quality and land disturbing laws and regulations including the Chesapeake Bay Preservation Act, Erosion and Sediment Regulations, and the Federal Section 404 Wetlands provisions. These exemptions are based on the implementation of BMPs by the owner and harvester. If BMPs are not instituted for a harvest then the exemptions are void and the operation is subject to all laws and regulations.

## Problem Statement

Forest harvesting operations are exempt from most local and Federal water quality laws provided the operation institutes Best Management Practices. BMPs are voluntary, therefore, local and state agencies do not strictly monitor the implementation of BMPs. There is no mechanism ensuring BMPs are planned or implemented until after environmental damage occurs. Often landowners are unaware of their responsibility to incorporate BMPs requirements into contracts with timber harvesters.

## Policy Options

- \*\*\*\*\* *PreHarvest Plan* - Localities could require a written PreHarvest Plan be submitted and approved prior to the beginning of timbering operations. This would provide notice to the locality and DOF that a harvest was planned and would allow for communication to the landowner that BMPs must be utilized to maintain exemptions from the stricter requirements of other laws and regulations.
- \*\*\*\*\* *Streamside Management Zone* - The provision of a Streamside Management Zone could be required in conjunction with local Chesapeake Bay Preservation Act ordinances. The SMZ could be broadened to match the delineation of Resource Protection Areas, i.e. wetlands and a 100 foot buffer.
- \*\*\*\*\* *Education* - Make a concerted effort to educate new forest landowners by compiling quarterly updates of property transfers within the watershed and providing information on forest stewardship and the relation to the Dragon Run.
- \*\*\*\*\* *Memorandum of Agreement* - A Memorandum of Agreement (MOA) could be negotiated between local governments and the DOF outlining notification procedures and enforcement protocols for timber harvests in violation of BMPs or local ordinances.
- \*\* *E&S Ordinance Provisions* - Some Virginia localities have placed forestry requirements into their Erosion and Sedimentation Ordinances. For example; the requirement of a forestry management plan for all forestry operations, or the requirement of an E&S Plan for stump removal or grubbing at a forestry site.(See York County Example).

## Issue - Riparian Forest Buffers

The multi state and federal Chesapeake Bay Program is presently studying the issue of protecting riparian forest areas. The Bay Program defines Riparian Forest Buffer as *A forested area situated between a land use and adjacent body of water which is designed and managed to 1) help maintain the hydrologic , hydraulic and ecologic integrity of the stream channels and*

*shorelines, 2) help prevent upland sources of pollution from reaching surface waters by trapping, filtering and converting sediments, nutrients and chemicals and 3) protect fish and other wildlife by supplying food, cover and thermal protection.* The forested area of the Dragon Run watershed fulfills all of these functions.

The large percentage of land in the Dragon Run watershed that is forested provides for a good opportunity to apply Riparian Forest Buffers (RFBs) along the stream sides. RFBs can be instituted through landowner stewardship, tax relief programs, grants, or conservation easements. With any of these implementation strategies, there will be a need to provide improved landowner understanding of the purpose of the riparian forest. The primary uses are described in the definition above, i.e. the protection of water quality and the maintenance of wildlife corridors. It should be emphasized that RFBs are not public corridors, and the landowner maintains control of land and its uses based upon the means of establishment. For example, landowner stewardship provides the complete landowner control while grants or easements may require some negotiated measures.

### **Problem Statement**

The concept and designation of Riparian Forest Buffers (RFBs) may be new to many landowners. It may also be confused with other buffer programs such as the Chesapeake Bay Preservation Act. There is a need for extensive education on the utility of RFBs so as to foster public support for their implementation.

### **Policy Options**

\*\*\*\*\* *Education* - The proposed goals of the Chesapeake Bay Executive Council provides for options for RFBs in the Dragon Run watershed.

- Improve public understanding of RFBs.
- Increase knowledge of landowners in forest buffer planting and management.
- Provide incentives to gain landowners acceptance of RFBs.
- Increase role of private and non-profit organizations.
- Increase scientific knowledge of riparian buffer effectiveness and monitor RFBs.

\*\* *Forest Easement* - Establish a program to purchase riparian trees in a conservation easement type approach by which the trees would remain in place in the buffer, the landowner would receive market value of the trees, and retain ownership of the land. The second party would own the trees.

## **Water Rights And Uses**

### **Background**

The use of water bodies by adjoining landowners is a long established right both in common law and civil law. Generally, the riparian landowner enjoys the beneficial use of bordering waters provided that use does not degrade the possible uses of others downstream.

In Virginia, the state retains ownership of all flowing or tidal water bodies= bottom, within its borders. This state ownership allows for the recreational and commercial use of the waterways, subject to the laws of the state and federal governments. Local governments, too, may have some regulatory powers over waterways when uses are related to adjoining land uses. In rare cases, claims of King's Grants to water body (and bottom) ownership by private citizens have been upheld in the state, however the burden of proof is placed on the citizen claiming such a grant.

Since the Dragon Run is relatively narrow in width throughout its length, there arises the potential for conflict between adjoining property owners or between landowners and recreational users of the stream. These conflicts may take the form of property disputes and trespass claims.

### **Issue - Landowner Rights**

Riparian landowners have several rights of use to water bodies bordering their lands. These uses include water withdrawal, aquaculture, and access, among others. These rights are subject to state and federal laws, which govern the protection of wetlands, navigation, commerce, water quality, and endangered species. In reference to the Dragon Run these laws apply whenever someone wishes to build or fill in the wetlands, build a pier or dock, or obstruct the stream in any way. The Virginia Marine Resources Commission (VMRC) has tidal wetlands jurisdiction, which includes wetlands on the Dragon Run to just below the Route 17 bridge. The VMRC reviews specific disturbance activities on a case by case basis to determine the impact to tidal wetlands. The U.S. Army Corps of Engineers and the state Department of Environmental Quality have jurisdiction over nontidal wetland activities. However, the VMRC maintains jurisdiction over any stream crossings or encroachments on subaqueous lands, which would include the entire Dragon Run stream bottom.

Under State Water Control Law, a landowner may withdraw up to 300,000 gallons of water per month from a surface source, e.g. Dragon Run, without being required to obtain a water withdrawal permit. This is provided there is no disturbance of the water body resulting in the discharge of dredge or fill materials. Above the 300,000 gallon per month threshold, a landowner must obtain a permit and is required to report on the monthly withdrawals.

Related to water withdrawal, is the topic of Scenic River Designation. A river designated as a state scenic river may not be dammed or otherwise impeded by structures without an approved act of

the General Assembly. All other riparian uses are preserved through a scenic river designation. When a river is designated as a scenic river by the General Assembly, an advisory board is appointed by the Governor. The board advises federal, state, or local plans on the management of the river body. The Dragon Run was studied in 1971 as a candidate for scenic river status, however the General Assembly never approved the inclusion of the Dragon Run in the scenic river system.

Law enforcement on the Dragon Run is shared by officers of the VMRC and the Virginia Department of Game and Inland Fisheries (DGIF). The fresh/saltwater line applicable to fishing licenses is located at the power line crossing near Anderson Point on the Piankatank River. The VMRC and DGIF both patrol above this line.

Another issue of landowner concern is that of damaging wakes from power boats on the lower Dragon Run. The use of high speed or reckless maneuvering within the narrow Dragon Run channel can cause wave energy destructive to shoreline stability. The DGIF is responsible for the approval and placement of No Wake Zones. Citizens may petition the DGIF and their local government for the establishment of No Wake Zones. Localities in turn petition the DGIF.

The issue of trespass is another concern for Dragon Run landowners. At times irresponsible users of the Dragon Run despoil the adjacent lands by unauthorized camping or trespass, often leaving behind trash or other debris. There are also times when unauthorized hunting occurs in the area. Landowners have the right to post their land and to call upon local sheriff's departments to enforce the trespass laws.

At times landowners along the Dragon Run claim ownership of the water and bottom of the stream to the centerline. The State, however, assumes ownership of all stream subaqueous land unless a landowner can demonstrate a valid King's Grant to the land and water. Kings Grants were given in colonial times from the King of England to prominent families in Virginia. After the American Revolution, property transfers came under the laws of the new government, Kings Grants were invalid unless inherited through an unbroken chain of ownership from the original grantee. A landowner claiming a King's Grant must demonstrate the claim to the State's Attorney General to be valid. While a King's Grant does provide stream bottom ownership, it does not provide water ownership nor allow navigation restriction. There have been no King's Grants shown to date along the Dragon Run.

## **Problem Statement**

At times there may arise conflicts between landowners along the Dragon Run and those people using the Dragon Run for recreation or sport. There needs to be an effort to educate the general public that most of the land along the Dragon Run is privately owned and any use of the land must be with the consent of the owner. Scenic River designation does not restrict a landowner's riparian rights, except in the building of dams across the waterbody.

## Policy Options

- \*\*\*\*\* *Educate Public* - All information developed or disseminated to the general public by local governments concerning the Dragon Run should state that the lands along the stream are privately owned and use of land should be by owner permission only.
- \*\*\*\*\* *Exceptional Waters Designation* - Support the designation of the Dragon Run as an Exceptional Water under state law. This designation would prevent any new or expanded point source discharges into the waterbody
- \*\*\*\* *No Wake Zones* - Local governments should petition the Virginia Department of Game and Inland Fisheries to establish No Wake Zones from Meggs Bay and upstream.
- \*\*\* *King's Grant* - Landowners cannot assume stream bottom ownership unless they demonstrate a valid King's Grant.
- \* *Scenic River Designation* - Request the state revisit the inclusion of the Dragon Run in the state Scenic River System.

## Habitat Protection Issues

### Background

Habitat features of the Dragon Run watershed comprise of extensive wetlands, pools, flowing streams, trees, brush, and grasses and other herbaceous plants. The vast forest and field land uses in the watershed combine to provide food, protection, and area for healthy populations of both plant and animal species. The ecological significance of the Dragon Run is due in large part to the unique habitat it provides to the region. While most of the near Bay related habitat consists of saline waters and tidal marshes, the Dragon Run provides a contrast of heavily forested wetlands and fresh, free flowing streams for most of its length. In evaluating the ecological importance of habitat, the most important factors are the diversity of habitat types at a macro level and the continuity of habitat types within a single species range.

The Virginia Department of Conservation and Recreation's Division of Natural Heritage conducts studies and inventories the occurrences of rare and endangered species and of important habitat communities. The Dragon Run watershed includes one Natural Community identified under the Natural Heritage program. A natural community is a significant habitat, which supports a variety of animal and plant species. The watershed also has been documented to contain two vascular plants with a statewide ranking of A very rare, meaning between 5 and 20 populations or

occurrences in the state. Another plant (Parker's Pipewort) has also been identified in the watershed with a state rank of **A**very rare to uncommon@with a federal **A**former candidate@for threatened or endangered status.

Habitat quality is not only of value to rare plant or animal species. The common species in the watershed also depend on the high ecological quality of the forest and open lands. Plentiful deer, ducks and fish, among others, are components of the healthy ecosystem. They also provide for recreational activities for people, whether for nature enthusiasts or for sportsmen. The natural areas owned and managed by nonprofit groups such as Friends of Dragon Run, provide for opportunities for viewing the plants and animals in the watershed. Numerous hunt clubs own or lease lands for the purpose of providing hunting opportunities for their members. These types of human interactions with the Dragon Run may help achieving a broad appreciation of the natural ecology found here.

### **Issue - Corridor Protection**

In order to maintain a healthy ecological base for the Dragon Run watershed, habitat for plants and animals must remain relatively undisturbed for significant areas within the basin. The fragmentation of forest or wetlands areas by human activity inhibits species mobility and range. Development insensitive to habitat destruction acts as a wall to populations of animals and plants, narrowing the options for food foraging, nesting, and reproduction. The issues and problems addressed throughout this document relate directly to the protection of habitat. Farmland conversion to subdivision development, streamside development, forestry practices, and landowner uses of property all have impacts on the type and quality of habitat available to species in the watershed.

While development will occur in the future, it is not necessary that wildlife habitat be disrupted leaving gaps in the connectivity of species within their range. Corridors can be maintained throughout the watershed, which will allow the freedom of movement of animal species and the maintenance of land conditions for plant species. Corridor protection may be accomplished through common sense approaches, which fall under good land stewardship. Protection of the corridors may also take a more proactive or public approach.

### **Problem Statement**

The fragmentation of habitat areas caused by land development and practices becomes detrimental to wildlife species. The maintenance of habitat corridors are essential to a healthy population of plants and animals within the Dragon Run watershed.

## Policy Options

- \*\*\*\*\* *Conservation Subdivision* -allows subdivision yield of current zoning but designed to preserve primary and secondary conservation areas. Delineates development areas and locates lot line based on open space access, views, and land form protection.
  
- \*\*\*\*\* *Net Buildable Lot Subdivision* -all localities along the Dragon Run have minimum lot size restrictions for subdivisions based on their current zoning ordinance requirements. However, most do not have a net buildable area requirement. For example if a 5 acre minimum lot size is required for a particular zone and a 5 acre lot is subdivided along the Dragon run, 4 acres could be in wetlands with only one acre buildable. This results in higher densities on the buildable land than intended by the zoning ordinance. A Net Buildable Lot Subdivision would require the entire unbuildable or a large percentage thereof (80%) not be allowed to be counted toward lot size. Comment--this would prevent the use of wetlands area to make up a majority of a required building lot size.
  
- \*\*\*\*\* *Dragon Run Conservation District* -100 ft. buffers of hydric soils and stream bank.--  
Comment: only protects areas immediate to stream bank and wetlands.
  
- \*\*\*\*\* *Chesapeake Bay Preservation Act Ordinances* -provides 100 foot buffers as Dragon Run Conservation District above. Also requires stormwater quality management for any land development within Resource Protection or Management Areas.
  
- \*\*\* *Resource Husbandry Zoning District* -Middlesex currently employs a zoning district to protect farming and forestry uses. Allows 1 acre or larger subdivision per 50 acres of land. Such subdivision must be on unproductive land.--Comment: currently applies only to tracts of at least 100 acres in size.

## **Plan Implementation Tools**

### **Conservation Subdivision Design**

The following handbook describes the process by which to design residential subdivisions with the goals of preserving the natural and aesthetic features of the site. These type of developments result in the same yield of house lots, but concentrates the lots so that conservation areas are preserved and homeowners benefit from open space views rather than facing other homes on all four sides. The process basically requires four steps: identify conservation and development areas; locating house sites; aligning streets; and drawing in lot lines.

The Natural Lands Trust, Inc. publishes the handbook as well as more detailed text and workbooks on the subject. Rural by Design and Designing Open Space Subdivisions are books available at the MPPDC for use in local adaptation of these concepts.

**Conservation Subdivision Design: A Four-Step Process**

Natural Lands Trust, February 1995

8 pages















## **Net Buildable Lot Provision**

The concept behind this provision is that wetlands and other nonbuildable areas should not be fully counted into the minimum lot sizes of a parcel subdivision. For example, if there is a minimum lot size requirement of five acre lots for a residential subdivision in an agricultural district, the makeup of each five areas divided should not be predominantly wetlands, i.e. four acres wetland to one acre buildable. The ratio of buildable to nonbuildable is up to local deliberation, however it is recommended that no more than 20% of the minimum lot size be achieved from nonbuildable lands. For example, a minimum of four acres must be buildable to meet a five acre minimum lot size. This provision can be incorporated into a locality's subdivision ordinance or the Dragon Run Conservation District zone.

**Example Text:** *Minimum Lot Size - For the purpose of delineating subdivision lots, the minimum lot size requirements for any zoning district shall be achieved by allowing no more than 20% of the minimum lot size required to be unbuildable lands.*

## **Forestry PreHarvest Plan**

Requiring a landowner to submit a written PreHarvest Plan for approval by the local forester at least ten working days prior to the beginning of cutting would provide the Department of Forestry an opportunity to review all Best Management Practices necessary for the site and make recommendations on harvest practices related to water quality protection. This provision may be incorporated into the locality's Erosion and Sedimentation Control, Chesapeake Bay Preservation, and/or Dragon Run Conservation District ordinances .A PreHarvest Plan provides evidence that a landowner intends to comply with the BMPs necessary to obtain exemption from the more stringent development provision of these ordinances. The locality will need to secure arrangements with the Department of Forestry to coordinate implementation of this provision.

**Example Text:** *Forestry Operations Exemption - Proof of BMP Intent. In order to achieve exemption of forestry operations under the provisions of this ordinance, a landowner must submit for approval, a PreHarvest Plan to the local office of the Virginia Department of Forestry no less than ten working days prior to the beginning of any cutting, grading or other land disturbance on the site. The landowner shall receive approval of the Plan prior to any cutting, grading, or other land disturbance activity on the site. The Plan shall contain both a site drawing and descriptive text. The Plan shall include all of the following features and proposed BMPs applicable to the site: property boundaries, streams and drainages, soil restrictions, slopes, wetlands, main haul road and skid trail locations, log landings, portable sawmill locations, stream and drainage crossings, and streamside management zones, and other pertinent information impacting water quality and soil retention. The timing of the harvest shall be noted.*

## **Streamside Management Zone**

Streamside Management Zones (SMZ) are a Best Management Practice for forestry operations. This BMP provides for an area on either side of perennial streams where partial harvesting is acceptable with certain requirements. The purpose of the SMZ is to maintain soil stability and water quality along waterways. The SMZ also maintains stream shading and provides a riparian corridor for wildlife habitat. The forestry BMP manual recommends the SMZ be a minimum of 50 to 200 feet from the stream bank. The Dragon Run Steering Committee has recommended that the SMZ for the Dragon Run correspond to the delineation of the Dragon Run Conservation District or the Resource Protection Area of the local Chesapeake Bay Preservation ordinance. The Streamside Management Zone provision may be included in the locality's Erosion and Sedimentation Control, Chesapeake Bay Preservation, and/or Dragon Run Conservation District ordinances.

**Example Text:** *The Streamside Management Zone (SMZ) shall be incorporated into all forestry harvesting operations where perennial streams or wetlands are present. Timber harvest within the SMZ is allowed provided that a minimum of 50% of the crown cover or 50 square feet of basal area per acre is evenly retained in the SMZ. Logging equipment use in the SMZ is limited to dispersed skidding, cable and winch, and chainsaws. The forest floor organic layer shall not be broken through to expose mineral soil. Sawmill sites and loading decks shall be located outside of the SMZ. Access roads in the SMZ shall be at a minimum necessary for harvest and shall be stabilized by seeding or planting within the first 15 days of the completion of harvest or the next growing season, whichever comes first.*

## **Erosion and Sedimentation Control**

Local Erosion and Sedimentation Control (E&S) ordinances can require standards by which forestry operations are defined and managed to qualify for the exemption from E&S ordinance soil disturbance standards. The E&S ordinance may include or reference the provisions stated above for PreHarvest Plans and Streamside Management Zones. The example below from York County, establishes a forestry operation through the submittal and approval of a Forestry Management Plan. A Forestry Management Plan is a written plan for the operation of a forest or woodland property utilizing accepted professional forestry principles which records data and prescribes measures designed to provide for the optimum use of all forest resources (York Co.).

**Example Text:** *Standards for Forestry Operations - A forestry management plan for all forestry operations shall be submitted to and approved by the Virginia Department of Forestry. All forestry operations shall be in accordance with the approved forestry management plan. Where stump removal, grubbing, and/or other soil disturbing activities are proposed in conjunction with tree harvesting, except those preparations for reforestation which are in accordance with the*

*approved forest management plan, an erosion and sedimentation control plan shall be submitted to and approved by the county prior to commencement of any soil disturbing activity. A minimum of five acres shall be required for forestry operations. (York Co.)*

### **Dragon Run Conservation District**

The Dragon Run Conservation District was submitted by the Dragon Run Steering Committee in 1987 to the Middle Peninsula Planning District Commission, which adopted the concept and recommended localities adopt the measure as a first protection of the Dragon Run. Three of the four counties bordering the Dragon Run adopted the Conservation District. The Conservation District is a valid tool for special recognition and consideration for the watershed and may be adopted where it is not in force or may be modified to include some of the specific Plan implementation tools mentioned herein.

## DRAGON RUN CONSERVATION DISTRICT

Purpose - The purpose of the Dragon Run Conservation District (DRCS) is to protect and conserve fragile resource areas which perform valuable functions in their natural state and which are unsuitable for development and intense use. Areas to be designated as the DRCD primarily include wetlands and swamps, but may include other areas deemed to important for flood plain management, aquifer recharge, water storage, critical wildlife habitat, or similar functions.

The boundary between the DRCD and other zoning districts shown on the Official Zoning Map shall consist, for the purpose of this ordinance, of those areas of Fluvaquents and Sulfaquents soils adjacent to the boundary line between \_\_\_\_\_(adopting county) and the county or counties of \_\_\_\_\_(adjacent county or counties), plus an additional 100 foot buffer strip measured horizontally from the inland most boundary of these soil types. However, when there is a rise in elevation of 10 feet or greater within 50 feet (horizontally measured) from the edge of Fluvaquents and Sulfaquent soils, then the 100 foot buffer strip shall be measured from the highest point of elevation within said 50 feet.

Permitted Uses - The following are permitted within the DRCD. Note that whenever these permitted uses are at variance with the requirements of any other lawfully adopted rules, regulations, ordinances, or resolutions, the most restrictive or one imposing the higher standards shall govern.

1. The construction and maintenance of non-commercial catwalks, piers, fences and duckblinds, provided that such structures are so constructed on pilings as to permit the reasonably unobstructed flow of the tide in tidal areas, or natural flow in non-tidal areas, and to preserve the natural contour of marshes, swamps and water courses.
2. The cultivation and harvesting of shellfish, and worms for bait.
3. Non-commercial outdoor recreational activities, including hiking, boating, trapping, hunting, fishing, shellfishing, horseback riding, swimming, and skeet and

trap shooting; provided that no structure shall be constructed except as permitted in subsection (1) of this section.

4. Conservation, repletion, education and research activities of the Virginia Marine Resources Commission, the Virginia Institute of Marine Science, the Commission of Game and Inland Fisheries, and other related conservation agencies.
5. The normal maintenance, repair, or addition to existing roads, highways, or the facilities of any person, firm, corporation, utility, or government abutting on or crossing wetlands or swamps, provided that no waterway is altered and no additional wetlands or swamps are covered or drained.
6. Governmental activity on wetlands or swamps owned or leased by the Commonwealth of Virginia or by \_\_\_\_\_(adopting county).
7. The normal maintenance of existing man-made drainage ditches, provided that no additional wetlands or swamps are covered or drained and provided further that this paragraph shall not be deemed to authorize construction of any drainage ditch.
8. Agricultural management activities must incorporate the application of Best Management Practices (BMPs) in a plan approved by the local Soil and Water Conservation District.
9. Forestry management activities must incorporate the application of Best Management Practices in a plan approved by the Virginia Department of Forestry.

## Chesapeake Bay Preservation Ordinances

The local ordinances implementing the Chesapeake Bay Preservation Act allow for the exemption of forestry and agricultural operations from the resource protection areas (RPA) requirements provided that the operations implement Best Management Practices (BMPs). If an operation does not implement BMPs, then it is not exempt from the regulations and must comply with the RPA buffer requirements. A statement to this effect could be added to the local ordinance to clarify the requirement.

**Example Text:** *In order to obtain and maintain exemption from the requirements of establishing and maintaining a Resource Protection Area, including a 100 foot buffer, the forestry or agricultural operation must demonstrate the implementation of Best Management Practices through the approval of a Farm Management Plan and /or Forestry Management Plan. Failure to obtain and follow such a plan voids the exemption from RPA criteria for such operations.*

## Resource Husbandry Zone

The concept behind the Resource Husbandry District zone used by Middlesex County is that large tracts of farm and forest land should be protected from piecemeal subdivision in order to protect the integrity of the agricultural and forestry uses. To this end the zone limits the number and size of subdivisions from a parent parcel.

**Example Text:** *Only minor subdivisions shall be permitted. Such subdivisions shall be limited to one tract per fifty acres or more, and it must be demonstrated that the subdivided land is unsuited for agricultural or forestry use due to location, size, shape, topography, or other factors. The creation of the subdivision shall not render the adjacent land unsuitable for agricultural or forestry uses. The minimum size of parcels included in this zone shall be 100 acres. (Partial text from Middlesex County Zoning Ordinance).*

## Exceptional Waters Program

The state Exceptional Waters program requires evidence of exceptional environmental setting, exceptional aquatic communities, and exceptional recreational opportunities.

The Dragon Run watershed is largely undeveloped, with 99.3 % of the land in forest and agriculture uses. The watershed also rates highly in floodplain and wetlands extent, Natural Heritage areas, fish citations, and recognition by state and Smithsonian studies as a unique nature habitat. Population density and future development areas are low. Recreation access is limited to low impact uses such as canoeing, fishing, and hunting.

A nomination for Exceptional Water status may be made by any person, party, or local government. The Dragon Run has been nominated by a group of citizens in the watershed. Local government support of the nomination is important to designation of the water body by the Virginia General Assembly. The Counties could express such support in their comprehensive plans or through a resolution.

**Example Text:** *The Dragon Run watershed received the second highest ranking of exceptional features in the Middle Peninsula Planning District Commission's October, 1995 Exceptional Waters Assessment Element to the Water Quality Management Plan. This watershed is a probable candidate for Exceptional Waters status and conforms to local comprehensive planning goals.*

### **No Wake Zone Resolution**

Local governments may petition the Virginia Department of Game and Inland Fisheries to establish and post a No Wake zone for the waterway at Meggs Bay and upstream.

**Example Text:** *RESOLUTION: WHEREAS; the Dragon Run stream is a water body with significant water quality, habitat value, and natural beauty, and WHEREAS; protection of the water and shoreline areas depends on compatible uses which do not harm or destroy the environment, and WHEREAS; the high speed of boating traffic in the Meggs Bay area and upstream in the Dragon Run creates wakes which can be unsafe for boaters in small craft using the waterway and cause shoreline erosion and water sedimentation. THEREFORE, NOW LET IT BE RESOLVED; that the Board of Supervisors requests the Virginia Department of Game and Inland Fisheries to establish and post a NO WAKE zone for the area of Meggs Bay and the Dragon Run upstream, and enforce the measure through regular patrols of the area.*

### **Educational Opportunities**

The protection of the Dragon Run will rely primarily on the willingness of the landowners and visitors to accept personal responsibility for all activities they undertake within the watershed. Key to the development and sustainment of good stewardship practices is the provision of effective educational materials to the targeted audience. There are many means by which the MPPDC, the Dragon Run Steering Committee (DRSC), local governments, and other organizations and individuals can inform the public of the issues of management concerning the Dragon Run.

### **Examples:**

*Forest Landowner Information Packet* - The Virginia Department of Forestry publishes information on forest owner stewardship. The local government, MPPDC, or DRSC could track the sale or parcels within the watershed and mail out the landowner information to new owners, providing

them with guidance in forest and land management.

*Riparian Forest Buffers* - The MPPDC and DRSC can act as a conduit for information from the Chesapeake Bay Program in the development of riparian forest buffer policies. Landowner education is key to any measures designed to protect the riparian forest.

*Notice of Private Lands* - All information developed or disseminated to the general public concerning the Dragon Run should state that lands along the stream are primarily privately owned, and the use of the lands should be by landowner permission only. *NOTICE - Lands along the Dragon Run are privately owned, any use of these lands should be by permission of the landowner.*

## GLOSSARY

**Best Management Practices (BMP)** - Procedures or physical structures which are designed to mitigate the impact of an activity on the surrounding environment. The selection of BMPs are usually related to the characteristics of the site.

**Buildable Lands** - That portion of a parcel that is suited to the construction of buildings, roadways, wells, septic systems, sidewalks, and other activities requiring soil disturbance or fill.

**Dissolved Oxygen (DO)** - Oxygen molecules that are dissolved in liquid water. The available oxygen content within the water is critical to the aquatic life present. At least 4 mg/l of DO is considered adequate for most aquatic life.

**Dragon Run Conservation District (DRCD)** - A zoning designation locally adopted which establishes uses within an area within the wetlands and buffer of the Dragon Run stream.

**Forage (foraging)** - To search for food. An animal's foraging range is the area normally covered by an individual in search of food for survival.

**Fragmentation of Habitat** - The interruption of acceptable ground cover, food sources, and nesting areas by habitats inhospitable to a species, thereby causing stress and diminishing the species' chance of survival.

**Habitat** - An area or environment in which an animal or plant may be found. Combinations of physical, chemical, and biological features, which may support a particular species.

**Hedgerow** - A row of bushes or trees that form a hedge. In agricultural areas, hedgerows can act as windbreaks and water absorption areas.

**Riparian** - Pertaining to the natural bank of a water body, i.e. adjacent to the water.

**Salinity ( saline)** - A description of the amount of salt dissolved in the water.

**Secchi Depth** - The vertical distance from the water surface to the point where a white and black quartered weighted disk (secchi disk) becomes invisible. A measure of clarity or visibility within the water.

**Silviculture** - the care and cultivation of forest trees.

**Species Range** - The area in which a species is likely to be found, which includes the suitable

environment for its life.

**Unbuildable Lands** - Those areas of a parcel that are not suited for construction, which disturbs the soil, layer. Examples include wetlands and steep slopes.

**Watershed** - The drainage area of a water body, to include all land and water features which flow or runoff into the water body.

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## Appendices

**Appendix A - Dragon Run Steering Committee members 1993 - 1996**

## **Appendix B - Dragon Run Access Plan**

Note: The Dragon Run Access Plan was adopted by the Dragon Run Steering Committee and the Middle Peninsula Planning District Commission in 1994. It is included herein as a reference to the overall Dragon Run Watershed Management Plan.

Note: The maps within this plan are showing present bridge crossings of the Dragon Run, where access occurs along the VDOT road rights-of-way. The maps are not intended to identify any particular parcel(s) for future access development.